Geo-Environmental

VERIFICATION REPORT

PLOTS 7-12, 15-16, 24-27, 38-45, & 48-53

BARTONS RISE, HAVANT

HAMPSHIRE, PO9 5FF

on behalf of

VISTRY SOUTHERN



Report:	**VERIFICATION REPORT**
Site:	**PLOTS 7-12, 15-16, 24-27, 38-45, & 48-53, BARTONS RISE, HAVANT, HAMPSHIRE, PO9 5FF**
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AMENDMENT RECORD

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1.0 INTRODUCTION

1.1 General

In line with the remedial strategy for the site, Geo-Environmental Services Limited ('Geo-Environmental') was instructed by Vistry Southern ('the Client') to prepare a Verification Report to compile the relevant information in relation to the residential development for Plots 7-12, 15-16, 24-27, 38-45, & 48-53, Bartons Rise, Havant, Hampshire, PO9 5FF, herein referred to as 'the site' (see Figure 1).

The site has previously been subject to a Phase I and Phase II intrusive investigation undertaken and reported by Geo-Environmental, ref GE15054/GIR/NOV15 dated November 2015. Following the completion of this investigation, the Remediation Strategy was developed for the site by Geo-Environmental, ref. GE15735/RMS/JUL16, dated July 2016.

This report details and compiles information provided by Vistry Southern, and independent verification works undertaken by Geo-Environmental in relation to the Topsoil and subsoil installed within the rear gardens of Plots 7-12, 15-16, 24-27, 38-45, & 48-53. It should be noted that at the time of the 2019, 2022, 2023 and 2024 inspections all inspected plots were completed and occupied by residents.

This report relates specifically to Plots 7-12, 15-16, 24-27, 38-45 & 48-53 and sets out the works undertaken to provide independent verification of the risk mitigation measures incorporated into the development to protect the development and end users thereof. This report provides final validation for works undertaken in relation to the installation and independent inspection and validation of remedial measures within Plots 7-12, 15-16, 24-27, 38-45, & 48-53 in relation to soft landscaping validation only. At the time of reporting, private gardens and areas of soft landscaping on further plots required further independent verification inspection works and will be validated within a separate verification (or an updated) report in due course, although some element of inspection works to date in relation to these Plots may be present here for information only at this stage.

Previous phases of validation on site have already been undertaken and reported for the site under the following report:

GE21572/VR/SEP24, which presented the validation of Plots 1-6, 13-14, 17-23, 28-29 & 54-55 only.

Although this report refers to the constructed dwellings by plot number, each plot has a postal address. The postal address for each plot covered by this verification report is shown below in Table 1.1.

Plot Number	Postal Address
7	6 Lynch Close
8	5 Lynch Close
9	4 Lynch Close
10	3 Lynch Close
11	2 Lynch Close
12	1 Lynch Close
15	5 Harrison Way
16	7 Harrison Way
24	16 Harrison Way
25	18 Harrison Way
26	20 Harrison Way
27	22 Harrison Way
38	11 Harrison Way
39	15 Harrison Way

Plot Number	Postal Address
40	17 Harrison Way
41	19 Harrison Way
42	21 Harrison Way
43	23 Harrison Way
44	9 Harrison Way
45	2 Garrett Close
48	8 Garrett Close
49	10 Garrett Close
50	12 Garrett Close
51	14 Garrett Close
52	16 Garrett Close
53	18 Garrett Close

Table 1.1 Plot numbers with associated Postal Address

1.2 Objectives

A desk study and investigation undertaken by Geo-Environmental identified the presence of potential hazards and, through a risk assessment process, a series of contamination linkages were identified which required action to mitigate or otherwise reduce the risk. The Remediation Method Statement (RMS) for site set out the proposed remedial works to be undertaken to support its development for a residential end use.

This Verification Report (VR) presents the details and findings of inspection visits undertaken throughout the construction period by Geo-Environmental and/or to compile data provided by the Client with respect to Plots 7-12, 15-16, 24-27, 38-45, & 48-53 in relation to soils in order to demonstrate that the soil risk mitigation measures were implemented within these specific plots.

1.3 Planning Permission

It is understood that a planning application has been approved for the site by Havant Borough Council under Planning Reference APP/14/00863. The following planning conditions have been attached to the application which relate to the remediation and validation of land contamination on the site.

25. If, during development, contamination not previously identified on site is found to be present, no further development (unless otherwise agreed in writing by the Local Planning Authority) shall be undertaken until a report has been submitted to and approved by the Local Planning Authority that details how that contamination is to be dealt with. Unless otherwise agreed in writing with the Local Planning Authority, all works outlined in the submitted report shall be adhered to.

    Reason: Having due regard to policies and proposals E1 of the Hampshire County Structure plan 1996-2011 (Review), and DM10 of the Havant Borough Adopted Core Strategy (2011); Contamination may be present at the site as a result of both previous & current land uses (&/or activities) at the site that could pose a risk to future site occupiers.

26. No occupation of any part of the permitted development shall take place until a verification report has been submitted to and approved in writing by the Local Planning Authority.

    The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan and must demonstrate that site remediation criteria have been met. It shall also include any plan identified as being necessary for longer-term monitoring of pollutant linkages (a "long-term

monitoring and maintenance plan″), including provision for maintenance and contingency action. The long-term monitoring and maintenance plan shall be implemented as approved.″

Reason: Having due regard to policies and proposals E1 of the Hampshire County Structure plan 1996-2011 (Review), and DM10 of the Havant Borough Adopted Core Strategy (2011); Contamination may be present at the site as a result of both previous & current land uses (&/or activities) at the site that could pose a risk to future site occupiers.

2.0 BACKGROUND

This Verification Report has been produced in order to demonstrate that the works required and presented within the Remediation Method Statement (RMS) for the site have been carried out in relation to Plots 7-12, 15-16, 24-27, 38-45, & 48-53. The RMS for the site was developed following the investigation of the site undertaken by Geo-Environmental comprising a Phase I and Phase II report presented within the Ground Investigation Report by Geo-Environmental (ref. GE15054/GIR/NOV15, November 2015). Whilst a summary of these reports is presented below, reference should be made to the complete reports for further details.

2.1 Proposed Site Use

The development comprises a residential estate including detached and semi-detached residential dwellings with private gardens, access roads, parking, communal soft landscaping and associated infrastructure.

2.2 Investigation and Assessment

At the time of the intrusive investigation works, the site comprised an approximately rectangular parcel of land which had been the subject of several and consecutive uses including a lawn mower repair shop, houses, dog grooming/hydrotherapy pool, dog kennels and fields/paddocks.

The ground conditions beneath the site comprised a mantle of Made Ground and/or Topsoil overlying a succession of gravelly clay soils (Head Deposits) and predominantly clay soils of the London Clay Formation.

Investigation and testing of soils on site identified contaminant concentrations of concern within the Made Ground at WS2 that were indicated to be unsuitable for re-use within residential gardens and associated soft landscaping. The assessment presented in GE15054/GIR/NOV15, included a statistical assessment of the full dataset of analytical results which led to the identification of WS2 as a localised area requiring further action. The recent review and revision of the soil contamination assessment is summarised in Section 5 of this report.

The intrusive investigation also identified the presence of asbestos within Made Ground sampled from WS5.

The investigations undertaken also considered and assessed ground gas and controlled waters contamination. In neither case was a requirement for remedial action identified to protect human health, the development, controlled waters or other receptors.

2.3 Conceptual Site Model

The conceptual site model (CSM) developed as part of the various phases of intrusive investigation and risk assessment undertaken for the site identified particular hazards, or potential hazards which were considered to require intervention (remediation) to mitigate the risk of harm.

2.4 Approach for Remediation, Monitoring and Validation

Remediation works were proposed to break the pathways of identified sources of contamination to receptors. The aim of the remediation was not necessarily to remove all contamination from the site but to provide betterment and to reduce the identified risk to an acceptable level with respect to relevant receptors, e.g. human health, the built environment and controlled waters.

3.0 SOILS

3.1 End Users (Shallow Soils)

With reference to the Ground Investigation Report (GE15054-GIR-NOV15) and the Remediation Method Statement (GE15735-RMS-JUL16) undertaken by Geo-Environmental. The Tier 1 contamination assessment identified several locations where reported concentrations were either elevated or exceeded the Tier 1 screening criteria within the Made Ground encountered across the site. No concentrations of concern were identified within the Topsoil or naturally occurring subsoil and thus no specific remedial measures were considered to be warranted in relation to these soil types.

Where Made Ground soils were to remain in-situ beneath a soil cover, the formation should be covered by a geotextile separator to prevent mixing of soil types and overlain by a high visibility geogrid mesh to inhibit excavation.

An example of the recommended cover system for the garden areas underlain by Made Ground soils is shown below:

[redacted]

Schematic 1 Topsoil and subsoil cover system where Made Ground is present beneath gardens

It should be noted that the eastern boundary of the development included no-dig zones associated with tree protection orders and these portions of gardens were to be separated from the main garden areas by a retaining wall. In these no-dig zones, there was no scope to undertake a reduced dig to remove any Made Ground soils, if present, and as such it was proposed to install a geogrid mesh and separate geotextile separator fabric on the existing ground surface and place a cover of Topsoil over the mesh. A target cover thickness of 300mm of Topsoil would generally be required but this was subject to such a cover thickness being achievable within the fixed development level limits and not adversely affecting the protected vegetation. The 'no-dig' restriction would continue to apply for the occupation phase of the development and thus the provision of a clean cover, geogrid mesh barrier and geotextile separator are considered to prevent end users coming into contact with soils beneath this cover.

An example of the recommended cover system for use in no-dig areas is provided below:

[redacted]

Schematic 2 Soil cover system in tree protection 'No-dig' zone

Table 3.1 summarises the recommended remedial solution as stated in the Remediation Method Statement on a Plot by Plot basis.

Plot	Level change (m)	Remediation strategy
1-6	-0.1 to -0.3	Amenity soft landscaping only. Install separator and geogrid mesh over formation and Topsoil cover.
7	-0.7 to -0.4	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
8	-0.4 to 0	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
9	-0.5	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
10	+0.6 to +0.8	Install soil cover system as per Schematic 1 if Made Ground is present.
11	+0.7	Install soil cover system as per Schematic 1 if Made Ground is present.
12	+0.6 to +0.4	Install soil cover system as per Schematic 1 if Made Ground is present.
13	+0.5 to +1.0	Install soil cover system as per Schematic 1 if Made Ground is present.
14	+0.5	Install soil cover system as per Schematic 1 if Made Ground is present.
15	+0.9 to +1.0	Install soil cover system as per Schematic 1 if Made Ground is present.
16	+0.7	Install soil cover system as per Schematic 1 if Made Ground is present.
17	-0.5 to -0.7	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
18	-0.5 to -0.9	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
19	-0.2	Reduced dig and install soil cover system as per Schematic 1 if Made Ground is present at/beneath the exposed formation.
20	-0.2 to -0.4	Reduced dig and install soil cover system as per Schematic 1 if Made Ground is present at/beneath the exposed formation.
21	-0.5 to -0.1	Reduced dig and install soil cover system as per Schematic 1 if Made Ground is present at/beneath the exposed formation.
22	-0.2 to -0.3	Reduced dig and install soil cover system as per Schematic 1 if Made Ground is present at/beneath the exposed formation.

Plot	Level change (m)	Remediation strategy
23	-0.1 to -0.4	Reduced dig and install soil cover system as per Schematic 1 if Made Ground is present at/beneath the exposed formation.
24	-0.4	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
25	-0.4 to -0.5	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
26	-1.0	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
27	-0.7 to -1.0	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
28	-0.1 to -0.8	Reduced dig to remove Made Ground. Place subsoil (if required) and Topsoil to achieve development level.
29	+0.3 to +0.5	Install soil cover system as per Schematic 1 if Made Ground is present.
30-37	Variable	Reduced dig to remove Made Ground from main garden areas. Place subsoil (if required) and Topsoil to achieve development level. Apply Schematic 2 soil cover in any 'no-dig' zone.
38-55	Variable	In previously undeveloped area where Made Ground is not anticipated. Watching brief and discovery strategy to remain in place.

Table 3.1 Summary of ground level variations by plot (from existing to finished development level)

In areas where no remedial action was required, or where Topsoil was to be placed directly on to subsoil, a minimum thickness of 150mm of suitable Topsoil was recommended.

It is understood from the Client that Topsoil and subsoil were imported to site for use within the completed rear garden areas across the site. Further reference to the importation of materials to site is provided in Section 4.

4.0 IMPORTATION OF MATERIALS

The chain of custody (COC) delivery certificates for Topsoil and subsoil materials imported into site for use across the site were provided to Geo-Environmental by the Client in the form of a tabulated spreadsheet provided by the ground works contractor (Raymond Brown) a copy of this table is presented within Appendix A.

Pre-import analysis of some of this imported material has also been provided by Vistry Southern. Copies of these pre-import test results are included within Appendix B.

Independent sampling and analysis of the imported materials was undertaken by Geo-Environmental in November 2022, November 2023 and April 2024 within a selection of plots. It should be noted that this independent sampling was undertaken following the occupation of the entire development site. Therefore, a sampling strategy was agreed with the Local Authority Environmental Health Officer, prior to sampling works being undertaken to provide general coverage of the site, where access was achievable, and/or where initial sampling identified potentially elevated results.

Although material tracking information has not been provided for this imported material, Geo-Environmental was provided with Building Control sign off dates for plots by Vistry Southern. It has been assumed that materials would have been imported in batches and installed within rear garden areas with the same sign off dates. Figure 8 shows the Building Control sign off dates for plots and how plots have been grouped together with the same sign off date.

All the results of the independent validation analysis testing undertaken by Geo-Environmental, are presented in Appendix J (Plots 7-12), Appendix K (Plots 15-16 and 24-27) and Appendix L (Plots 38-45 and 48-53) and detailed and discussed within Section 5 of this report.

5.0 INSPECTION/VALIDATION (SOILS)

An engineer from Geo-Environmental visited the site during construction works, and on several occasions upon completion of the works once the site had been occupied, details of which are reported herein. It should be noted that these validation inspections comprised the inspection of plots additional to those subject to verification within this report. However, for clarity the sections below only provide specific detail within regards to Plots 7-12, 15-16, 24-27, 38-45, & 48-53.

5.1 Validation Inspection of Reduced Dig (May 2017)

The inspection/validation works to inspect the reduced dig works undertaken to enable the installation of the cover systems installed within the rear garden areas and soft landscaping area associated with Plots 15-16 & 24-27 was undertaken by a Geo-Environmental Engineer on 10th May 2017. The site photographs are presented in Appendix C.

At the time of the visit a reduced dig had been undertaken within the rear garden areas of Plots 15-16 and 24-27. The reduced dig area was noted to extend across the entire proposed rear garden of these plots. The depth of the reduced dig was noted to be a consistent level.

5.2 Topsoil and subsoil placement

Confirmation of the placement and depth of Topsoil and subsoil was established across a number of different visits undertaken by Geo-Environmental. The depth of the encountered material has been summarised in relation to each visit in the following sections with the inspection records presented within Appendix C to Appendix I, and the locations of the hand excavated pits presented in Figures 3-7.

5.2.1 Topsoil and subsoil placement (May 2017)

The inspection/validation works of the cover systems installed within the rear garden areas was undertaken by a Geo-Environmental Engineer on 10th May 2017.

Inspection comprised four shallow hand pits (Plots 7-10), which were excavated by the Engineer from Geo-Environmental. The location of the inspection pits excavated is presented on Figure 3 and photographs taken during this inspection visit are presented in Appendix C, which confirm the depth of the installed Topsoil and subsoil within the cover system installed. It should be noted that the turf and any soil associated with the turf placement had not been laid within any of the areas of soft landscaping at the time of the inspection.

The inspection confirmed that within the inspection pits within Plots 7-10, a deter-to-dig geotextile type high visibility membrane was present along with a geo-grid beneath the subsoil. Subsoil was found to be c.300mm in thickness and Topsoil was found to be c.300mm in thickness with the total soil cover found to be 600mm in thickness within all the inspected areas in Plots 7-10. Table 5.1 below summarises the encountered soil cover per plot.

Plot	Soil cover system installed	Comments
7	0.3m Topsoil and 0.3m subsoil placed.	Deter to dig and geogrid placed over formation prior to soil cover placement.
8	0.3m Topsoil and >0.3m subsoil placed.	
9	0.3m Topsoil and 0.3m subsoil placed.	
10	0.3m Topsoil and 0.3m subsoil placed.	

Table 5.1 Summary of encountered soil cover during validation visit on 10th May 2017

5.2.2 Topsoil and subsoil placement (March 2019)

The inspection/validation of the cover system thickness installed within the rear garden areas of Plots 1-6, 13-14, 17-18, 25-29, 31, 33 & 36-37, was undertaken by Geo-Environmental Engineers on 7th and 8th March 2019. It should be noted that the validation of soil placement undertaking in March 2019 has previously been report but is included for clarity.

Inspection comprised seventeen shallow hand pits which were excavated by Engineers from Geo-Environmental. The location of the inspection pits excavated is presented on Figure 4, photographs are presented in Appendix D, which confirm the depth of the installed Topsoil and subsoil within the cover system installed, and exploratory logs are presented in Appendix F. It should be noted that all inspected plots were occupied at the time of the inspection, as such inspection pits were undertaken where access was available.

The inspection confirmed the following within each of the hand pits undertaken:

Plot	Cover Depth (mm)	Geo-Grid	Membrane	Natural Strata	RMS Recommendation
1-6 (HP01)	Topsoil – 200	Yes	Yes	-	150mm Topsoil over subsoil
1-6 (HP02)	Topsoil – 150	Yes	Yes	-	150mm Topsoil over subsoil
1-6 (HP03)	Topsoil - 200	No	No	Yes	150mm Topsoil over subsoil
13 (HP06)	Topsoil – 300 Subsoil – 250	Yes	Yes	-	300mm Topsoil over 300mm subsoil
14 (HP07)	Topsoil – 300 Subsoil - 300	Yes	Yes	-	300mm Topsoil over 300mm subsoil
17 (HP05)	Topsoil – 150	No	No	Yes	150mm Topsoil over subsoil
18 (HP04)	Topsoil – 150	No	No	Yes	150mm Topsoil over subsoil
25 (HP11)	Topsoil – 400	No	No	Subsoil	150mm Topsoil over subsoil
26 (HP17)	Topsoil – 400	No	No	Yes	150mm Topsoil over subsoil
27 (HP16)	Topsoil – 300	No	No	Yes	150mm Topsoil over subsoil
28 (HP08)	Topsoil – 250	No	No	Yes	150mm Topsoil over subsoil
29 (HP18)	Topsoil – 300	No	No	Yes	150mm Topsoil over subsoil
31 (HP15)	Topsoil – 250	No	Yes	-	300mm Topsoil with Geo-grid (root zones) or 150mm Topsoil over subsoil
33 (HP10)	Topsoil – 300	No	Yes	-	300mm Topsoil with Geo-grid (root zones) or 150mm Topsoil over subsoil
36 (HP14)	Topsoil – 300	No	No	Yes	150mm Topsoil over subsoil
37 (HP12)	Topsoil – 200	No	No	Yes	150mm Topsoil over subsoil
37 (HP13)	Topsoil – 200	No	No	Yes	150mm Topsoil over subsoil

Table 5.2 Summary of encountered soil cover during validation visits on 7th and 8th March 2019

5.2.3 Topsoil and subsoil placement (November 2022)

Further inspection/validation of the cover systems installed within the rear garden areas of Plots 8, 39, 43, 44, 52, was undertaken by Geo-Environmental Engineers on 9th, 10th and 16th November 2022. The exploratory hole logs with photographs are presented in Appendix G.

Inspection comprised five shallow hand pits, which were excavated by Engineers from Geo-Environmental. The location of the inspection pits excavated is presented on Figure 5 and the sampling strategy for the works was

agreed with Havant Borough Council Environmental Health Officer ahead of attending site. Exploratory hole logs with photographs are presented in Appendix G, which confirm the depth of the installed Topsoil and subsoil within the cover system installed within inspection pit locations, along with soil logs of the material encountered. It should be noted that all inspected plots were occupied at the time of the inspection, as such inspection pits were undertaken where access was available. The inspection confirmed the following within each of the hand pits undertaken:

Plot	Cover Depth (mm)	Sampled?	RMS Recommendation
8 (TS02)	Topsoil – 120 over subsoil	Yes	150mm Topsoil over subsoil
39 (TS13)	Topsoil – 200 over subsoil	Yes	150mm Topsoil over subsoil
43 (TS14)	Topsoil – 140 over subsoil	Yes	150mm Topsoil over subsoil
44 (TS10)	Topsoil – 100 over subsoil	Yes	150mm Topsoil over subsoil
52 (TS-FG)	Topsoil – 150	Yes	150mm Topsoil

Table 5.3 Summary of encountered soil cover during validation visits on 9th, 10th and 16th November 2022

It is noted that some of the thicknesses measured on specific plots varied between the two visits and it is anticipated that this reflects factors such as increased footfall, plot specific activities and the like following occupation rather than a thickness deficiency at the time of soil placement.

5.2.4 Topsoil and subsoil placement (November 2023)

Further inspection/validation of the cover systems installed within the rear garden areas of Plots 8, 11, 25, 30, 32, 37, 41 and 47 was undertaken by Geo-Environmental Engineers on 27th and 29th November 2023. The exploratory hole logs with photographs are presented in Appendix H.

Inspection comprised twenty six shallow hand pits, which were excavated by Engineers from Geo-Environmental. The location of the inspection pits excavated is presented on Figure 6 and the sampling strategy for the works was agreed with Havant Borough Council Environmental Health Officer ahead of attending site. Exploratory hole logs with photographs are presented in Appendix H, which confirm the depth of the installed Topsoil and subsoil within the cover system installed within inspection pit locations, along with soil logs of the material encountered. It should be noted that all inspected plots were occupied at the time of the inspection, as such inspection pits were undertaken where access was available.

The inspection confirmed the following within each of the hand pits undertaken:

Plot	Cover Depth (mm)	Sampled?	RMS Recommendation
8 (HP05A-E)	Topsoil – 200-280 over subsoil	Yes	150mm Topsoil over subsoil
11 (HP02A-B)	Topsoil – 300-360 over natural	Yes	150mm Topsoil over subsoil
25 (HP18A-C)	Topsoil – 250-300 over subsoil	Yes	150mm Topsoil over subsoil
28 (HP24A-C)	Topsoil – 200-260 over subsoil	Yes	150mm Topsoil over subsoil
30 (HP28A-D)	Topsoil – 150-230 over subsoil and Geo-textile	Yes	150mm Topsoil over subsoil
37 (HP38A-E)	Topsoil – 150-220 over subsoil	Yes	150mm Topsoil over subsoil
41 (HP19A)	Topsoil – 150 over subsoil	Yes	150mm Topsoil over subsoil
47 (HP06A-C)	Topsoil – 200-300 over subsoil	Yes	150mm Topsoil over subsoil

Table 5.4 Summary of encountered soil cover during validation visits on 27th and 29th November 2023

It is noted that some of the thicknesses measured on specific plots varied between the visits and it is anticipated that this reflects factors such as increased footfall, plot specific activities and the like following occupation rather than a thickness deficiency at the time of soil placement.

During this visit the following plots were noted to have rear garden areas that comprised either hardstanding or astro-turf, such that it was not possible to excavate inspection hand pits within these garden areas:

Plot 7 – 6 Lynch Close – Hardstanding
Plot 9 – 4 Lynch Close – Astro-turf
Plot 10 – 3 Lynch Close – Astro-turf
Plot 12 – 1 Lynch Close – Astro-turf
Plot 15 – 5 Harrison Way – Astro-turf
Plot 16 – 7 Harrison Way – Astro-turf
Plot 24 – 16 Harrison Way – Astro-turf
Plot 26 – 20 Harrison Way – Hardstanding
Plot 31 – 26 Harrison Way – Astro-turf
Plot 34 – 32 Harrison Way – Astro-turf
Plot 35 – 34 Harrison Way – Astro-turf
Plot 40 – 17 Harrison Way – Astro-turf
Plot 48 – 8 Garret Close - Hardstanding
Plot 49 – 10 Garret Close – Hardstanding & Astro-turf
Plot 50 – 12 Garret Close – Hardstanding
Plot 51 – 14 Garret Close – Astro-turf
Plot 52 – 16 Garret Close – Astro-turf
Plot 53 – 18 Garret Close - Astro-turf

Photographs of some of the rear gardens of the above listed plots are presented within Appendix E which show these covered garden areas.

5.2.5 Topsoil and subsoil placement (April 2024)

Further inspection/validation of the cover systems installed within the rear garden areas of Plots 39, 42, 43, 45 and 46 was undertaken by a Geo-Environmental Engineer on 25th April 2024. The validation inspection record with photographs is presented in Appendix I.

Inspection comprised eighteen shallow hand pits, which were excavated by the Engineer from Geo-Environmental. The location of the inspection pits excavated is presented on Figure 7 and the sampling strategy for the works was agreed with Havant Borough Council Environmental Health Officer ahead of attending site. The validation inspection record including exploratory hole logs and photographs are presented in Appendix I, which confirm the depth of the installed Topsoil and subsoil within the cover system installed within inspection pit locations, along with soil logs of the material encountered. It should be noted that all inspected plots were occupied at the time of the inspection, as such inspection pits were undertaken where access was available.

The inspection confirmed the following within each of the hand pits undertaken:

Plot	Cover Depth (mm)	Sampled?	RMS Recommendation
39 (HP15a-d)	Topsoil – 120-200 over subsoil	Yes	150mm Topsoil over subsoil
42 (HP21a-c)	Topsoil – 150-200 over natural	Yes	150mm Topsoil over subsoil
43 (HP23a-e)	Topsoil – 120-230 over subsoil	Yes	150mm Topsoil over subsoil
45 (HP2a-c)	Topsoil – 140-200 over subsoil	Yes	150mm Topsoil over subsoil

Plot	Cover Depth (mm)	Sampled?	RMS Recommendation
46 (HP4a-c)	Topsoil – 160-250 over subsoil	Yes	150mm Topsoil over subsoil

Table 5.5 Summary of encountered soil cover during validation visits on 25th April 2024

It is noted that some of the thicknesses measured on specific plots varied between the visits and it is anticipated that this reflects factors such as increased footfall, plot specific activities and the like following occupation rather than a thickness deficiency at the time of soil placement.

5.3 Topsoil and subsoil analysis of laboratory test results

Independent sampling and laboratory testing of the installed imported soils on site was initially undertaken by engineers from Geo-Environmental on 9th, 10th and 16th November 2022, within occupied plots where access had been permitted. These initial sampling and testing works identified some potentially elevated results, such that a meeting was arranged between the Client, Geo-Environmental and Havant Borough Council. Following this meeting on 9th May 2023, it was agreed that additional sampling and testing would be required to provide further laboratory testing data to enable a suitable assessment to demonstrate that the installed imported materials are considered suitable for use.

As such, an additional visit was undertaken by engineers from Geo-Environmental on 27th and 29th November 2023, within occupied plots where access was permitted and inline with the approach discussed and agreed at the meeting on 9th May 2023 with Havant Borough Council.

Following these additional sampling and testing works a further meeting was arranged with the client, Geo-Environmental and Havant Borough Council on 25th March 2024. It was agreed that additional sampling and testing works would be required in order to provide a robust assessment of the sampling and testing data, to provide the council with confidence that the imported soils are considered suitable for use.

The results of the sampling and laboratory testing are presented within the sections below in relation to plot groups. The plot grouping has been established with reference to the building control sign off dates as well as based on plot location, and in line with the approach agreed with Havant Borough Council.

5.3.1 Human Health Assessment Criteria

CL:AIRE have published a limited number of Category Four Screening Levels (C4SLs)[1] which represent a precautionary level to chronic risk to human health. Although the C4SLs were released for Part 2A use, the associated policy companion document for the C4SLs indicated that they may also be used for planning. Although the C4SLs represent a marginally higher risk level than site specific assessment criteria (low risk rather than minimal risk) it is considered that the risk levels remain very low. Therefore, the final C4SLs are considered to be suitable to assess soils under the planning regime.

LQM and the CIEH have produced a more comprehensive set of screening values for a wider range of determinands, Suitable for Use Levels (S4ULs)[2]. The S4UL's are based on health criteria values representing minimal or negligible levels of risk under planning. For each substance, S4ULs have been derived for each of the six current generic land uses and a range of soil organic matter contents. All toxicological and physical-chemical inputs used in the derivation of the S4ULs are clearly identified and justified (LQM/CIEH, 2015). The S4ULs have been derived in accordance with UK legislation, national as well as Environment Agency policy and using the Environment Agency's tools and available guidance provided to the contaminated land practitioner community

1 CL:AIRE Final Project Report. SP1010 – Development of Category 4 Screening Levels for Assessment of land affected by contamination. CL:AIRE, December 2013

2 LQM/CIEH S4ULs for Human Health Risk Assessment, Nathaniel P et al, 2015. Copyright Land Quality Management Limited reproduced with permission, Publication Number S4UL3453. All rights Reserved

for the purpose of deriving Generic Assessment Criteria (GAC). S4ULs are widely used and accepted as Tier 1 screening criteria under the planning regime and are considered to be broadly equivalent to the withdrawn Environment Agency's Soil Guideline Values (SGVs), albeit with updated toxicological and exposure data.

There are always ongoing scientific advances in knowledge of both toxicological and exposure issues, therefore reference should be made to the most current and up to date screening criteria and values. Table 5.6 below presents the Tier 1 screening criteria used for Heavy Metals and a selection of PAH compounds for the human health risk assessment based on the site end use.

Determinand	C4SL	S4UL	RMS	Screening Value Utilised
Arsenic	37	37	<32	C4SL
Cadmium	14	11	10⁺	C4SL
Chromium (Total)	-	910	<130	S4UL
Chromium (VI)	6.1	6	-	C4SL
Copper	-	2400	<2330	S4UL
Lead	200	-	<200	C4SL
Mercury (inorganic)	200	40	<8	C4SL
Nickel	-	130	<130	S4UL
Selenium	-	250	<350	S4UL
Vanadium	-	410	-	S4UL
Zinc	-	3700	<3750	S4UL
Benzo(a)pyrene*	4.95	2.2	0.83	C4SL
Benzo(b)fluoranthene*	-	2.6	5.6	S4UL
Dibenz(a,h)anthracene*	-	0.24	0.76	S4UL
Naphthalene*	15	2.3	1.5	C4SL

*1% SOM, ⁺6% SOM

Table 5.6 Summary of GAC utilised in the human health risk assessment

Statistical analysis of the samples within the dataset was undertaken in accordance with guidance contained in the CIEH/CL:AIRE report 'Comparing Soil Contamination Data with a Critical Concentration' (May 2008). If the contamination status of the soils is considered in a planning context, the null hypothesis tested by the analysis is whether the true mean concentration is equal to or greater than the critical concentration for a given determinand, with the critical concentration being the relevant GAC (the soil screening value) for that determinand in the context of the intended end use of the site. If the analysis shows that the true mean concentration is less than the critical concentration the null hypothesis can be rejected. The guidance recommends that for the null hypothesis to be rejected the analysis should show that there is a 95% (or higher) likelihood that the true mean concentration is below the critical concentration. Where this is the case the site is considered to be acceptable for the planned end use without any necessary remedial measures.

5.3.2 Topsoil and subsoil analysis of laboratory test results (Plots 7-12)

Two soil samples were recovered from the hand pit excavated in the rear garden areas of both the Topsoil and subsoil in Plots 8 during the November 2022 inspection works. Fourteen soil samples were recovered from the hand pits excavated in the rear garden areas of both Topsoil and subsoil in Plots 8 and 11 during the November 2023 inspection works. All of these samples were submitted for testing for a suite of commonly occurring brownfield contaminants and asbestos screening. It should be noted that during the November 2023 inspection works it was noted that the rear garden areas of Plots 7, 9-10 and 12 were all covered with either hardstanding or Astro-turf and therefore were not accessible for hand pitting. Photographs of these garden areas are presented within Appendix E.

The laboratory test results are presented within Appendix J.

The results of the analyses were compared to the Category 4 Screening Levels and Suitable for Use (S4UL) Levels for 'private gardens with home-grown produce' (representative of the proposed development end use). The following exceedances above these respective screening criteria were initially identified, as summarised in Table 5.7 below:

Determinand	Screening Criteria mg/kg	Depth m bgl	Concentration mg/kg	Inspection Date
Benzo(b)fluoranthene	S4UL - 2.6	TS02 at 0.30 (Plot 8)	5.3	Nov 22
Dibenz(a,h)anthracene	S4UL – 0.24	TS02 at 0.60 (Plot 8) HP5E at 0.10 (Plot 8)	0.60 0.38	Nov 22 Nov 23
Lead	C4SL – 200	HP02A at 0.15 (Plot 11) HP02A at 0.30 (Plot 11) HP02B at 0.10 (Plot 11)	212 226 204	Nov 23

Table 5.7 Summary of chemical analyses

Statistical assessment was undertaken on all results of geochemical testing undertaken for PAH compounds and heavy metals from across Plots 7-12. As the inspection works, and sampling targeted imported soils installed within rear garden areas thought to have had soils imported and installed at similar times based on building control sign off date, it was considered that both Topsoil and subsoil were representative of these imported materials.

The statistical analysis showed that whilst potential statistical outliers were recorded within the datasets the null hypothesis could be rejected for Benzo(b)fluoranthene and Lead. The reported mean concentrations and statistical upper confidence limits were both found to be below the relevant C4SL/S4UL, for each compound. It is therefore considered that further action is not required in relation to the concentrations of Benzo(b)fluoranthene, and Lead identified within the imported soils identified in Plots 8 and 11. Table 5.8 details the sample means and statistical upper confidence limits.

For Dibenz(a,h)anthracene, the statistical analysis showed that if the original SSAC (calculated as part of the SI works) and RMS values were utilised, whilst potential statistical outliers were recorded within the datasets, the null hypothesis could be rejected. However, if the S4UL value for 1% Soil Organic Matter of 0.24mg/kg was utilised then the statistical analysis showed that there was a less than 95% likelihood that the true mean concentration is below the critical concentration. The statistical analysis indicated that it would be a 91% likelihood that the true mean concentration is below the critical concentration.

The S4UL value presented is for soils with a 1% Soil Organic Matter (SOM) content and does not take into account the pH value of the soils. PAHs are structurally similar to the humic components of soil so become closely associated with this organic component. Therefore, it is important to take into account the SOM content of the analysed soils when undertaking a risk assessment. The average SOM for the soils imported to plots 7-12 has been calculated using the independent laboratory test results undertaken by Geo-Environmental and is 2.3% with an average pH of 9.4. Using these values, that relate specifically to the imported soils, at new Site Specific Assessment value of 0.39mg/kg has been calculated for Dibenz(a,h)anthracene. Utilising this SSAC value (0.39mg/kg) for Dibenz(a,h)anthracene within the statistical assessment indicated that the null hypothesis can be rejected as a 98% likelihood that the true mean concentration is below the critical concentration has been calculated.

It is considered that the SSAC of 0.39mg/kg for Dibenz(a,h)anthracene is an appropriate value as it relates specifically to the composition of the imported soils. It is also worth noting that the majority of PAHs found in soils are present due to atmospheric deposition (LQM/CIEH, 2015). Dibenz(a,h)anthracene is generated whenever organic matter or fuel is completely burnt or combusted, for example, car exhaust, bonfires, tobacco smoke, and barbecued foods. As such, it is possible that recent activities and local atmospheric deposition have contributed to the identified concentrations of Dibenz(a,h)anthracene.

Based on the above, it is considered that further action is not required in relation to the concentrations of Dibenz(a,h)anthracene identified within the imported soils identified in Plots 8. Table 5.8 details the sample means and statistical upper confidence limits.

Determinand	Screening Criteria mg/kg	Sample Mean	Upper confidence limit
Benzo(b)fluoranthene	S4UL – 2.6	1.03	2.43
Dibenz(a,h)anthracene	SSAC – 0.39	0.1088	0.28
Lead	C4SL – 200	155.77	181.64

Table 5.8 Summary of sample means and upper confidence limits

The results of the statistical assessment indicated that the null hypothesis could be rejected for Benzo(b)fluoranthene, Dibenz(a,h)anthracene and Lead utilising the relevant Tier 1 screening criteria for each determinand. The reported mean concentrations and statistical upper confidence limits were both found to be below the relevant Tier 1 screening criteria. Therefore, further action is not deemed necessary, and the imported soils can remain within the rear garden areas of plots 7-12.

In addition, a selection of samples were also submitted for asbestos screening and returned with no asbestos fibres identified.

5.3.3 Topsoil and subsoil analysis of laboratory test results (Plots 15-16 and 24-27)

Six soil samples were recovered from the hand pits excavated in the rear garden areas of both Topsoil and subsoil in Plots 15-16 and 24-27 during the November 2023 inspection works. All of these samples were submitted for testing for a suite of commonly occurring brownfield contaminants and asbestos screening. It should be noted that during the November 2023 inspection works it was noted that the rear garden areas of Plots 15-16, 24 and 26 were all covered with either hardstanding or Astro-turf and therefore were not accessible for hand pitting. Photographs of these garden areas are presented within Appendix E.

The laboratory test results are presented within Appendix K.

The results of the analyses were compared to the Category 4 Screening Levels and Suitable for Use (S4UL) Levels for 'private gardens with home-grown produce' (representative of the proposed development end use). The following exceedance above the screening criteria was initially identified, as summarised in Table 5.9 below:

Determinand	Screening Criteria mg/kg	Depth m bgl	Concentration mg/kg	Inspection Date
Lead	C4SL - 200	HP18A at 0.20 (Plot 25)	219	Nov 23

Table 5.9 Summary of chemical analyses

Statistical assessment was undertaken on all results of geochemical testing undertaken for heavy metals from across Plots 15-16 and 24-27. As the inspection works, and sampling targeted imported soils installed within rear garden areas thought to have had soils imported and installed at similar times based on building control sign off date, it was considered that both Topsoil and subsoil were representative of these imported materials.

The statistical analysis showed that potential statistical outliers were recorded within the datasets for Lead. Running the statistical analysis with the inclusion of the outlier, the null hypothesis cannot be rejected. Removal of the outlier within the dataset for Lead indicated that the null hypothesis could be rejected. The identified statistical outlier for Lead was one result, 219mg/kg, this result is only marginally in exceedance of the 200mg/kg C4SL for Lead. Assessment of the dataset with the inclusion of all results indicates a sample mean of 188.3mg/kg, below the C4SL value for Lead. However, the upper confidence limit is 205.88 which marginally exceeds the screening value for Lead. Table 5.10 below details the sample means and statistical upper confidence limits.

A C4SL value of 200mg/kg is widely accepted and used as the screening value for Lead for a residential end use with plant uptake. However, the SP1010 Development of Category 4 screening levels document provides a range Lead for this end use of 82mg/kg to 210mg/kg. If the upper value of this range, 210mg/kg is utilised within the statistical assessment, the assessment indicates that the null hypothesis can be rejected within both the sample mean and upper confidence limit below the critical value, 210mg/kg.

Determinand	Screening Criteria mg/kg	Sample Mean	Upper confidence limit
Lead	C4SL – 200	188.3	205.88
Lead	C4SL - 210	188.3	205.88

Table 5.10 Summary of sample means and upper confidence limits

The C4SL for Lead was developed with reference to toxicological data, exposure pathway data and published background levels in soils. As such, it is considered appropriate to utilise the upper value for Lead, 210mg/kg within the risk assessment.

It is therefore considered that further action is not required in relation to the concentrations of Lead identified within the imported soils identified in Plot 25.

The results of the statistical and further assessment indicated further action is not deemed necessary and soils can remain within the rear garden areas of plots 15-16 and 24-27.

5.3.4 Topsoil and subsoil analysis of laboratory test results (Plots 38-45 & 48-53)

Six soil samples were recovered from the hand pits excavated in the rear garden areas of both Topsoil and subsoil in Plots 39, 43 and 44 during the November 2022 inspection works. One soil sample was recovered from the hand pit excavated in the rear garden area of Topsoil in Plot 19 during the November 2023 inspection works. Thirty soil samples were recovered from the hand pits excavated in the rear garden areas of both Topsoil and subsoil in Plots 39, 42, 43 and 45 during the April 2024 inspection works. All of these samples were submitted for testing for a suite of commonly occurring brownfield contaminants and asbestos screening. It should be noted that during the inspection works it was noted that the rear garden areas of Plots 40 and 48-50 were all covered with either hardstanding or Astro-turf and therefore were not accessible for hand pitting/soil sampling. Photographs of these garden areas are presented within Appendix E.

The laboratory test results are presented within Appendix L.

The results of the analyses were compared to the Category 4 Screening Levels and Suitable for Use (S4UL) Levels for 'private gardens with home-grown produce' (representative of the proposed development end use), and are summarised in Table 5.11 below:

Determinand	Soil Screening Value (mg/kg)	Sample Max. Conc. (mg/kg)	Below Screening Value?
Arsenic	37	14.5	Yes
Cadmium	11	0.9	Yes
Chromium (III)	910	169	Yes
Copper	2400	82.2	Yes
Hexavalent Chromium	6	<0.8	Yes
Lead	200	177	Yes
Mercury (inorganic)	40	1.3	Yes
Nickel	130	37.2	Yes
Selenium	250	<1.0	Yes

Determinand	Soil Screening Value (mg/kg)	Sample Max. Conc. (mg/kg)	Below Screening Value?
Vanadium	410	45.9	Yes
Zinc	3700	267	Yes
Benzo(a)pyrene	4.95	2.20	Yes
Naphthalene	2.3	0.30	Yes
Benzo(b)fluoranthene	2.6	2.08	Yes
Dibenz(a,h)anthracene	0.24	0.20	Yes

Table 5.11 Summary of chemical analyses (Plots 38-45 & 48-53)

In addition, a selection of samples were submitted for asbestos screening and returned with no asbestos fibres identified.

The results indicated that all of the determinand concentrations were below the relevant Tier 1 screening criteria, therefore no further action is considered necessary.

5.4 Topsoil nutritional analysis

A further eight validation samples were submitted for a physical and nutrient testing suite. The results of the soils tested were compared to the Table 1 from BS3882:2015 entitled 'Specification for Topsoil'. The results are summarised in Table 5.12 below:

Parameters	Limits for Multipurpose Topsoil	Sample Range	Within acceptable Limits?
Maximum Coarse Fragment Content (%) Stones >2mm Stones > 20mm Stones >50mm	 30 10 0	 12 - 44 <1 <1	Exceedance of the >2mm stones threshold
Mass loss on ignition % Clay 5% to 20%	3 to 20	2.94 – 5.82	No, one results is marginally below the lowest threshold
Soil pH	5.5 to 8.5	8.1 – 10.0	Exceedance of the upper pH threshold, average is 8.7
Plant nutrient content Total nitrogen % Extractable phosphate mg/l Extractable potassium mg/l Extractable magnesium mg/l	 >0.15 16 to 140 121 to 1500 51 to 600	 0.11 – 0.22 49 - 117 114 - 333 50 - 161	Slight deficit in Nitrogen, Potassium and Magnesium
Carbon:nitrogen ratio	<20:1	15:0 – 21:5	Yes
Electrical conductivity µS·cm	<3300	1630 - 2400	Yes
Potentially Phytotoxic Elements Zn mg/kg Cu mg/kg Ni mg/kg	 <200 <135 <110	 56.8 - 181 15.8 – 60.3 7.5 – 22.6	Yes
Visible contaminants % m/m …of which plastics	 <0.5 <0.25	 <0.01 <0.01	Yes

Table 5.12 Summary of BS8332 Topsoil Analysis

The results demonstrate that the soils analysed are generally in accordance with BS3882:2015 Multipurpose Topsoil, with the exception of an exceedance of the 2mm stones threshold, slight exceedance of the upper pH limit, although the average pH is compliant with Low Fertility Topsoil, and a slight shortfall of Nitrogen, Potassium and Magnesium, with the average for each compliant with Multipurpose Topsoil. It should be noted that the soils were sampled and tested whilst all of the properties were occupied, with the works completed and the properties having been occupied for some time. However, the tested soils are considered suitable for landscaping purposes.

6.0 DISCOVERY STRATEGY

A discovery strategy remained in place throughout the development works on this site. Geo-Environmental has not been made aware of any discoveries having been made to date in relation to the site or these plots unless detailed within this report and thus the strategy, as set out in the RMS did not require enacting.

7.0 VERIFICATION

In accordance with the Client's instruction, Geo-Environmental undertook independent validation inspections. The risk mitigation measures in relation to remedial measures for Plots 7-12, 15-16, 24-27, 38-45, and 48-53, clean cover system as detailed herein, have been inspected and were considered to broadly comply with the requirements of the Remediation Method Statement at the point of inspection or defects otherwise noted and subsequently rectified and plots re-inspected (where required). Further validation work in relation to other plots on the site will be reported via an updated report or under separate cover in due course.

The inspection of the installed soil cover system was undertaken by Geo-Environmental via the excavation of a number of hand pits. There was no visual evidence on any of these plots to indicate that the areas remote from the pits undertaken were likely to differ significantly from the areas where the pits had been excavated for inspection. However, the confirmation of the presence of a geotextile membrane, the confirmation of depth and composition of subsoil and Topsoil has only been independently verified by Geo-Environmental within these hand pit locations and in relation to the samples analysed. It has been assumed that these hand pits are representative of the imported soils within the soft landscaping areas of Plots 7-12, 15-16, 24-27, 38-45, and 48-53.

Geo-Environmental can only verify the installation of a cover system at the locations and depths inspected at the time of inspections. Geo-Environmental accepts no liability for areas that have not been directly inspected or works that have subsequently been undertaken on the site following our inspection visit(s) that may in any way alter or affect the validation works inspected and reported herein.

As agreed with the Environmental Health Officer at Havant Borough Council during the meeting on 25th March 2024, this report has been drafted and relates solely to Plots 7-12, 15-16, 24-27, 38-45, and 48-53, allowing for the discharge of conditions in relation to these plots only at this stage. Validation and or remediation works with respect to the soil cover system installed within other plots (Plots 30-37 and 46-47) will be presented under separate cover in due course in line with further discussions and liaison with the Havant Borough Council EHO in line with the approach discussed and agreed within the meetings on both 9th May 2023 and 25th March 2024.

This report remains the property of Geo-Environmental and the Client has no rights to, or reliance upon this document or supporting documents until such time as payment has been received in full for all invoices for works undertaken in connection with this report.

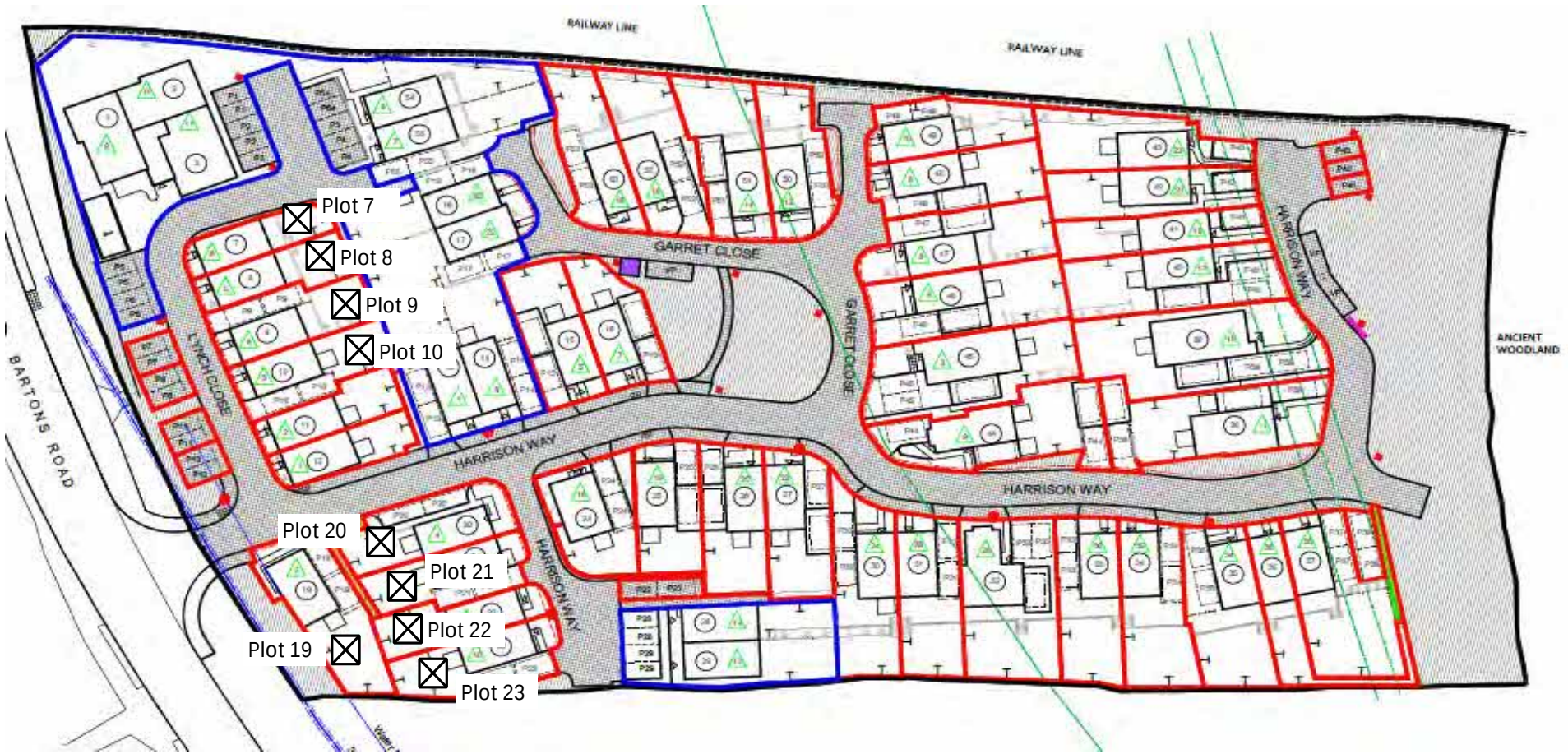
FIGURES



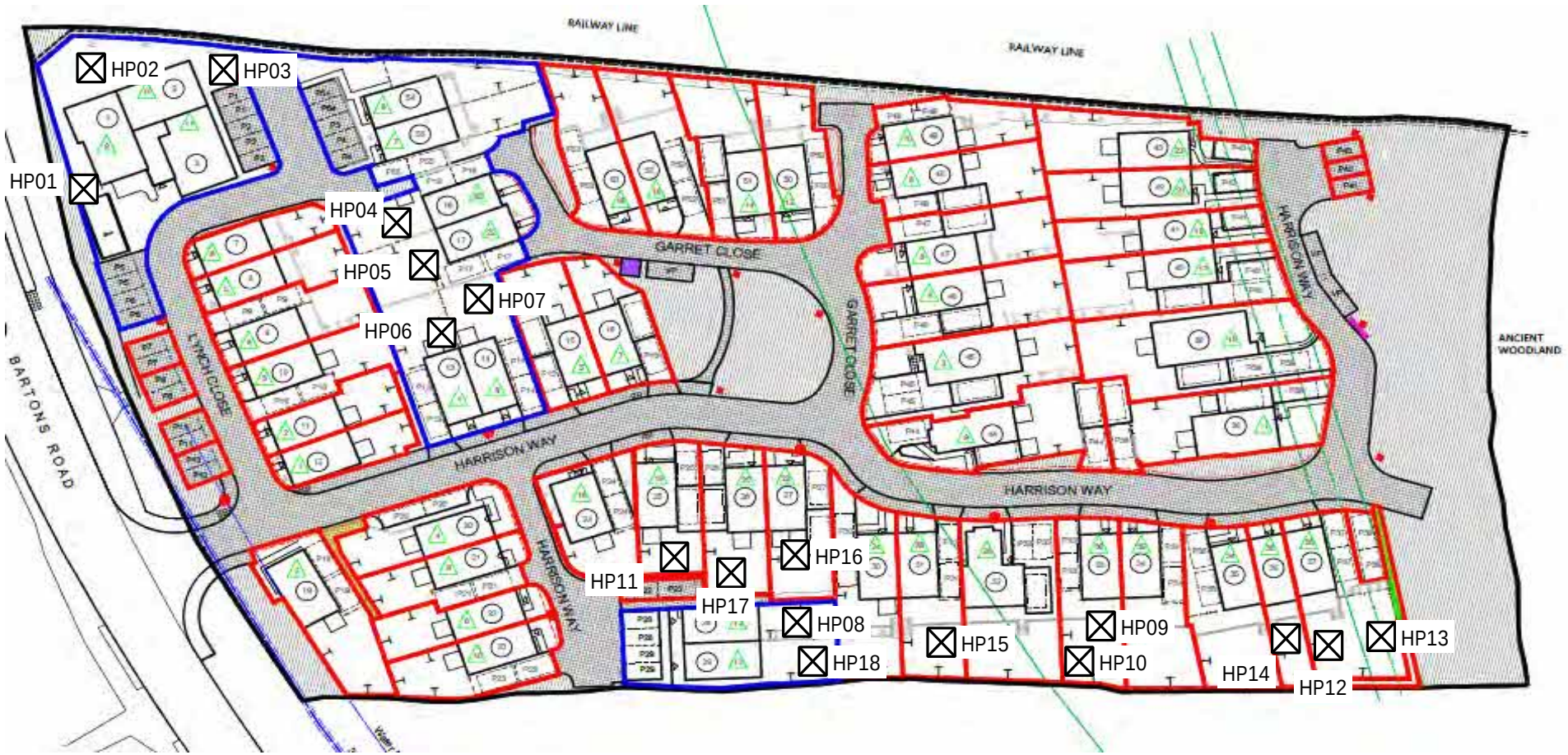
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Client:	Vistry Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21752	Revision:	0		
Drawn:	FG	Date:	23/11/2023		
Figure:	1	Scale:	NTS		



Project:	Bartons Rise, Havant			Title	Development Layout
Client:	Vistry Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21752	Revision:	0		
Drawn:	FG	Date:	17/09/2024		
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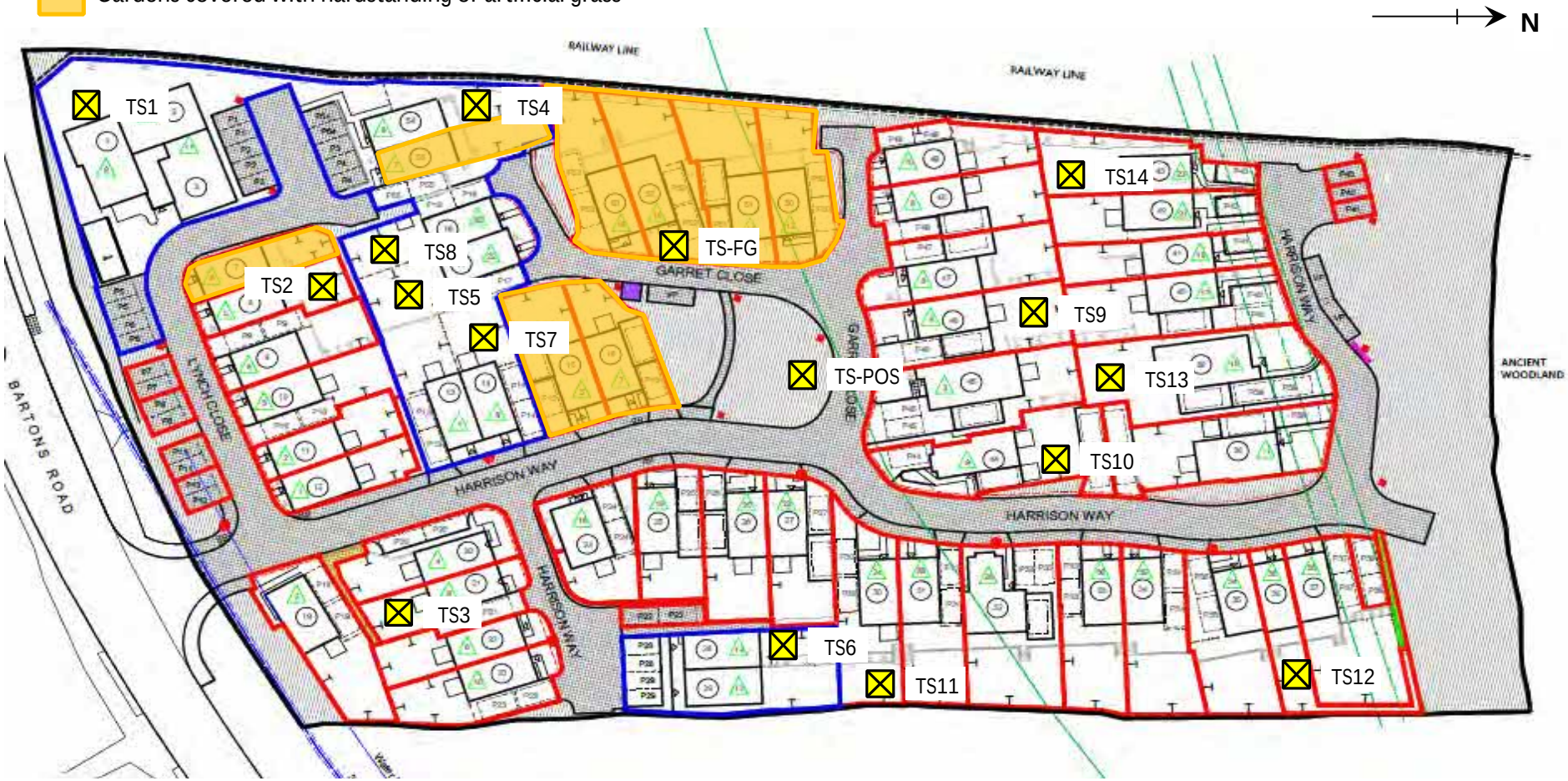


Project:	Bartons Rise, Havant			Title	Validation Sample Location Plan (May 2017)
Client:	Vistry Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21752	Revision:	0		
Drawn:	FG	Date:	13/05/2017		
Figure:	3	Scale:	Not To Scale		



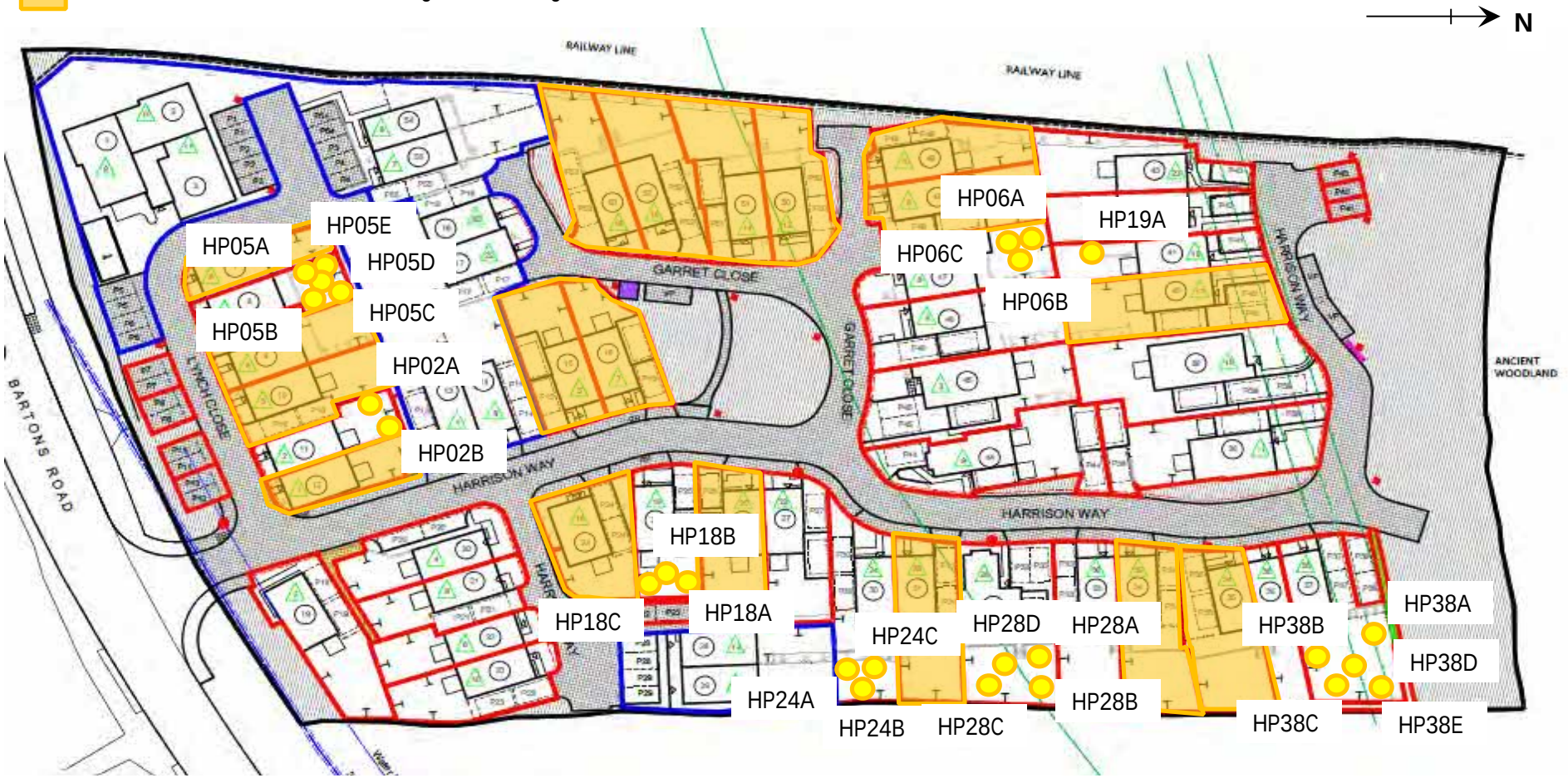
Project:	Bartons Rise, Havant	Title	Validation Sample Location Plan (March 2019)
Client:	Vistry Southern	Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21752	Revision:	0
Drawn:	FG	Date:	08/03/2019
Figure:	4	Scale:	Not To Scale

Gardens covered with hardstanding or artificial grass



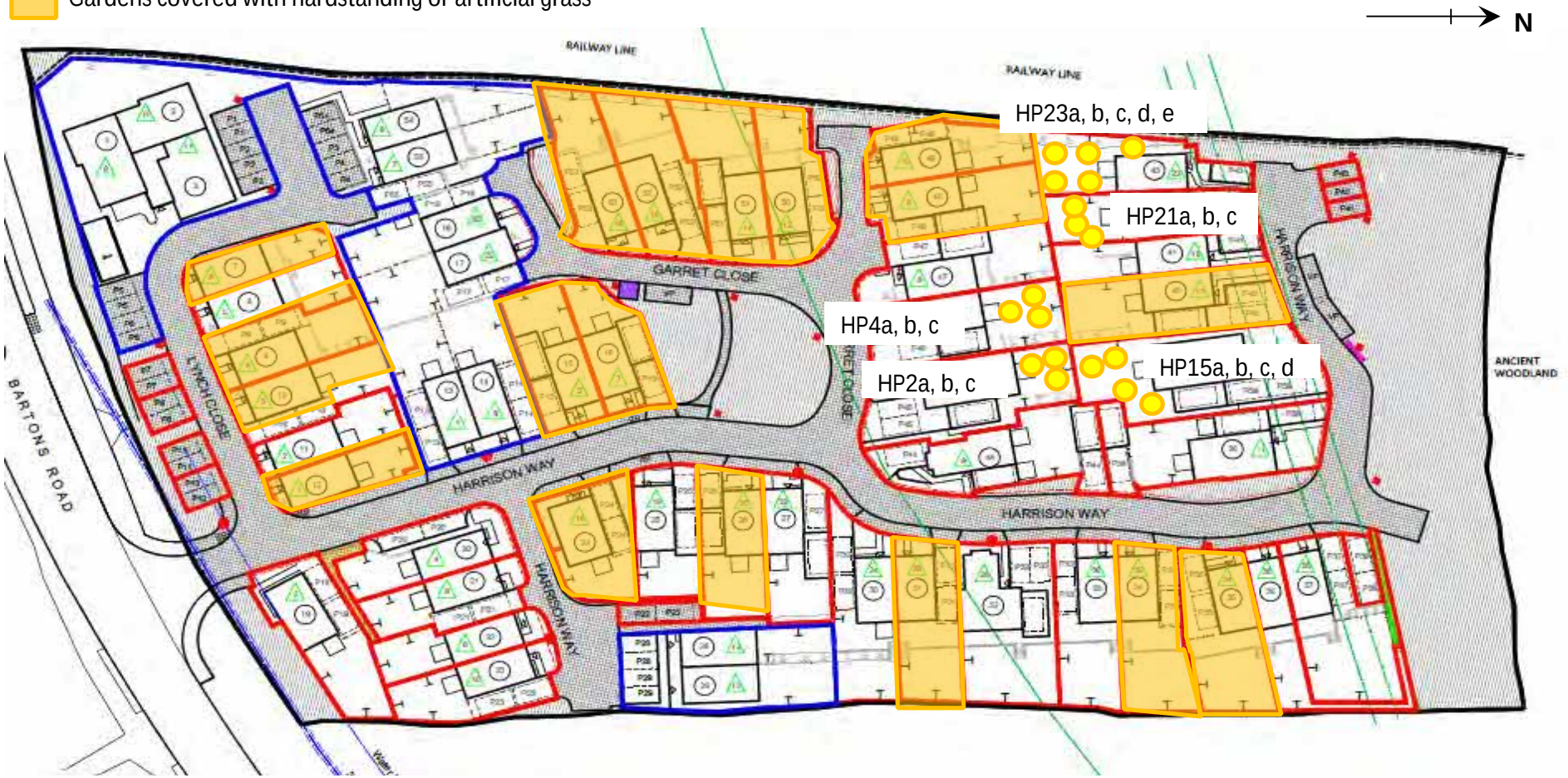
Project:	Bartons Road, Havant			Title	Validation Sample Location Plan (TS01-TS14)
Client:	Linden Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21752	Revision:	v3		
Drawn:	WP/FG	Date:	11/11/2022		
Figure:	5	Scale:	Not To Scale		

Gardens covered with hardstanding or artificial grass

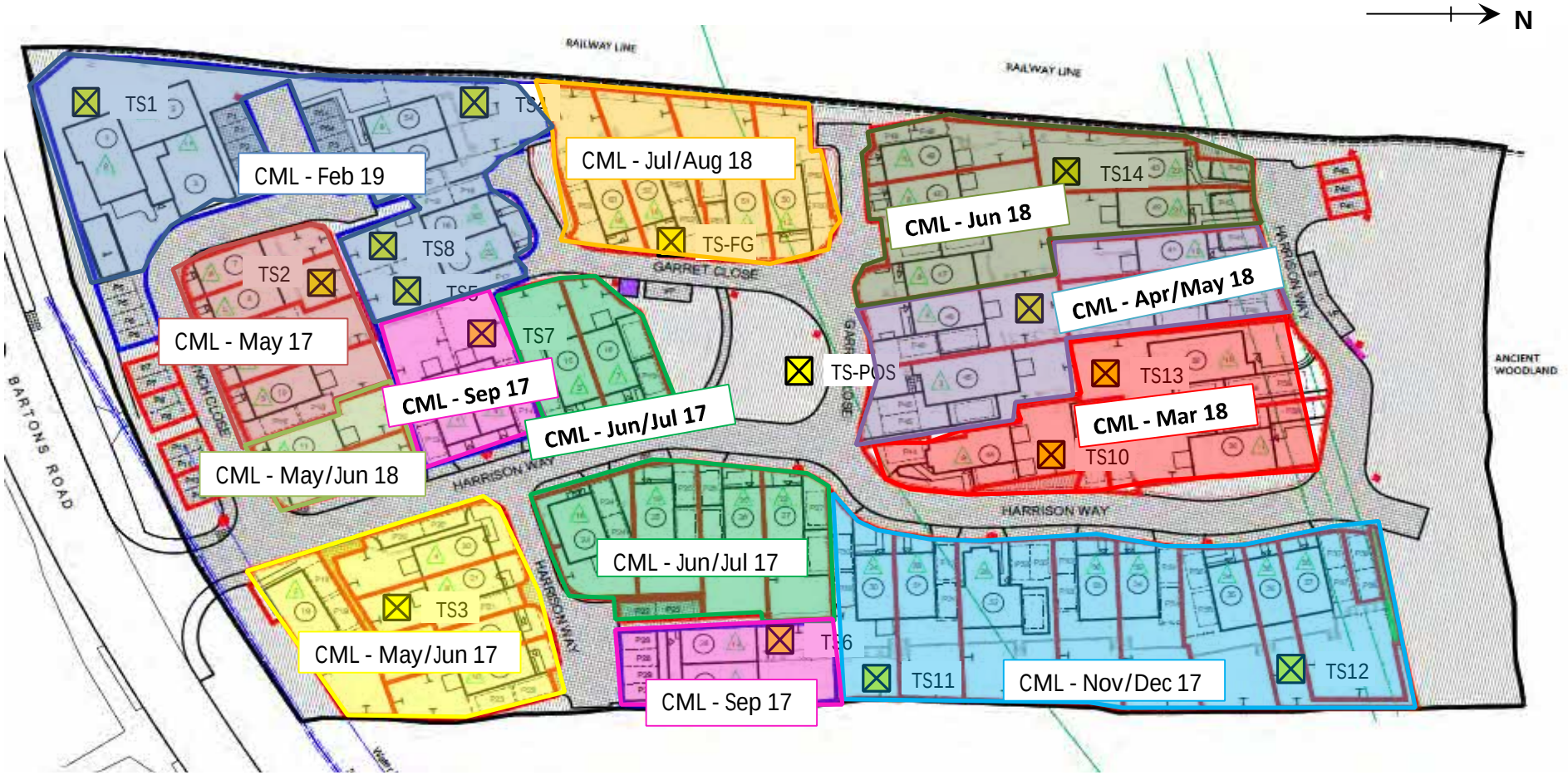


Project:	Bartons Road, Havant			Title	Validation Sample Location Plan (HP02-HP38)
Client:	Vistry Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21752	Revision:	1		
Drawn:	FG	Date:	11/12/2023		
Figure:	6	Scale:	Not To Scale		

Gardens covered with hardstanding or artificial grass



Project:	Bartons Road, Havant			Title	Validation Sample Location Plan (HP2-HP23)
Client:	Vistry Southern			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21752	Revision:	1		
Drawn:	FG	Date:	31/05/2024		
Figure:	7	Scale:	Not To Scale		



Project:	Bartons Road, Havant			Title	Bilding Control Sign Off Dates
Client:	Linden Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	Geo-Environmental
Ref No:	GE21022	Revision:	1		
Drawn:	FG	Date:	04/04/2023		
Figure:	8	Scale:	Not To Scale		

APPENDIX A

Topsoil/Subsoil Delivery Records Spreadsheet



Ticket	Ext ref	Quarry	Company	Customer	Customer order	Reg	Haulier	Material	Date and Time	Weight
Material: BS3882 20mm Screened Soil										
924458	350226	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/KN/0289	WR64VRW		BS3882 20mm Screened Soil	6/21/17 7:20:00	18,860.00
924459	350227	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/KN/0289	WR64VRW		BS3882 20mm Screened Soil	6/21/17 11:12:00	18,980.00
924461	350228	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/KN/0289	WR64VRW		BS3882 20mm Screened Soil	6/21/17 15:49:00	18,800.00
925247	350244	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203 / KN / 0291	WR64VRW		BS3882 20mm Screened Soil	6/28/17 7:20:00	19,100.00
926490	348209	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203 / KN / 0298	WR64VRW		BS3882 20mm Screened Soil	7/7/17 7:20:00	19,000.00
962506	357156	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	.	WR64VRW		BS3882 20mm Screened Soil	2/7/18 11:34:00	19,040.00
979032	359532	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	.	WR64VRW		BS3882 20mm Screened Soil	5/9/18 7:20:00	18,900.00
981949	02904	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	.	WOODMACE 1	WOODMACE PLANT LIMITED	BS3882 20mm Screened Soil	5/15/18 7:20:00	18,500.00
1010872	383031	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/ER/1028	WU65NRK		BS3882 20mm Screened Soil	11/2/18 8:44:00	18,700.00
1015288	383435	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203 / ER / 0140	WR64VRW		BS3882 20mm Screened Soil	11/22/18 12:43:00	19,240.00
1018067	401355	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203 / ER / 0148	WR64VRW		BS3882 20mm Screened Soil	12/4/18 15:36:00	19,120.00
1020888	401386	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/ER/0155	WR64VRW		BS3882 20mm Screened Soil	12/14/18 7:20:00	18,740.00
1024565	397646	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/ER/0160	WR64VRT		BS3882 20mm Screened Soil	1/10/19 7:20:00	19,100.00
1024566	397647	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/ER/0160	WR64VRT		BS3882 20mm Screened Soil	1/10/19 11:12:00	18,900.00
1026659	400797	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/ER/0167	WR64VRU		BS3882 20mm Screened Soil	1/21/19 7:20:00	18,980.00
1026660	400799	Eco Hurn	DIS	P. J. Brown (Construction) Ltd	G203/ER/0167	WR64VRU		BS3882 20mm Screened Soil	1/21/19 12:08:00	18,820.00
				Total for BS3882 20mm Screened Soil						302,780.00
Material: BS3882 Screened Soil										
925251	350247	Rookery	WS	P. J. Brown (Construction) Ltd	G203 / KN / 0291	WR64VRW		BS3882 Screened Soil	6/28/17 14:49:00	19,180.00
940917	352599	Rookery	WS	P. J. Brown (Construction) Ltd	g203-rm0452	WX17 WXF		BS3882 Screened Soil	10/10/17 7:44:00	18,200.00
942811	336882	Rookery	WS	P. J. Brown (Construction) Ltd	G203 / ER / 0458	WX17 WXC		BS3882 Screened Soil	10/18/17 7:19:00	18,540.00
942854	336883	Rookery	WS	P. J. Brown (Construction) Ltd	G203 / ER / 0458	WX17 WXC		BS3882 Screened Soil	10/18/17 9:15:00	18,920.00
944582	54827	Rookery	WS	P. J. Brown (Construction) Ltd	G203 / ER / 0458	SIBLEY	Sibley Material Movements Ltd	BS3882 Screened Soil	10/23/17 7:20:00	19,840.00
943963	351952	Rookery	WS	P. J. Brown (Construction) Ltd	G203 / ER / 0458	WX17 WXC		BS3882 Screened Soil	10/24/17 7:49:00	18,700.00
945300	351927	Rookery	WS	P. J. Brown (Construction) Ltd	BARTON ROAD	WX17 WXF		BS3882 Screened Soil	10/31/17 8:58:00	18,760.00
945417	351929	Rookery	WS	P. J. Brown (Construction) Ltd	BARTON ROAD	WX17 WXF		BS3882 Screened Soil	10/31/17 11:32:00	19,700.00
952570	368743	Rookery	WS	P. J. Brown (Construction) Ltd	G203	WU65NRK		BS3882 Screened Soil	12/1/17 9:46:00	19,020.00
952571	368744	Rookery	WS	P. J. Brown (Construction) Ltd	G203	WU65NRK		BS3882 Screened Soil	12/1/17 11:28:00	19,020.00
983567	359340	Rookery	WS	P. J. Brown (Construction) Ltd	Barton Road	WX17 WXC		BS3882 Screened Soil	6/6/18 10:16:00	19,140.00
984795	232650	Rookery	WS	P. J. Brown (Construction) Ltd	Barton Road	WALTET 2	Waltet Materials Limited	BS3882 Screened Soil	6/7/18 9:02:00	19,320.00
985170	362988	Rookery	WS	P. J. Brown (Construction) Ltd	.	WU65NRE		BS3882 Screened Soil	6/13/18 10:56:00	19,200.00
985171	362989	Rookery	WS	P. J. Brown (Construction) Ltd	.	WU65NRE		BS3882 Screened Soil	6/13/18 13:23:00	19,200.00
985172	362990	Rookery	WS	P. J. Brown (Construction) Ltd	.	WU65NRE		BS3882 Screened Soil	6/13/18 15:05:00	19,200.00
1006188	2837	Rookery	WS	P. J. Brown (Construction) Ltd	g203/er/0110	MX10BCF	Minerals & Materials (UK) Ltd	BS3882 Screened Soil	9/27/18 9:16:00	17,680.00
1005120	379706	Rookery	WS	P. J. Brown (Construction) Ltd	G203/ER/0116	WU65NRL		BS3882 Screened Soil	10/3/18 8:42:00	17,960.00
				Total for BS3882 Screened Soil						321,580.00

APPENDIX B

Topsoil/Subsoil Pre-import Analysis



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Justin Dampney
Eco Sustainable Solutions Ltd
Chapel Lane
Parley
Christchurch
Dorset BH6 5AD

18th May 2017
Our Ref: TOHA/17/7144/2/SS
Your Ref: 86PPW

Dear Sirs

Topsoil Analysis Report: Parley –15-20mm Enriched Soil

We have completed the analysis of the soil sample recently submitted, referenced *15-20mm Enriched Soil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification or validation for testing or waste designation purposes, especially after the topsoil has left the Eco Sustainable Solutions site.

SAMPLE EXAMINATION

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous LOAMY SAND with a weakly developed, fine to medium granular structure*. The sample was slightly stony with stones up to 24mm in size and contained occasional organic fines and woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

ECO SUSTAINABLE SOLUTIONS LTD

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- particle size analysis (sand, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for general landscape purposes.

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.8). This pH value would be considered suitable for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

The sample was adequately supplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 - Table 1*: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with home grown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

ECO SUSTAINABLE SOLUTIONS LTD

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as an alkaline, non-saline loamy sand with a weakly-developed structure and low stone content. The sample was adequately supplied with organic matter and all major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil would be considered suitable for general landscape purposes (trees, shrubs and amenity grass), provided the physical condition of the soil is satisfactory and plant species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, seeding and turfing.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

RECOMMENDATIONS

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of *BS3882:2015.*

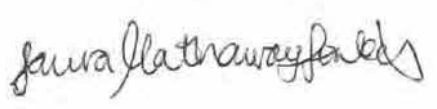
Further guidance on the management, preparation and handling of soils is provided in the DEFRA publication *Construction code of practice for the sustainable use of soils on construction sites.*

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Ruth Flower
BSc
Graduate Soil Scientist



Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Eco Sustainable Solutions Ltd**
Project:	**Parley**
Job:	**Topsoil Analysis - BS3882:2015**
Date:	**18/05/2017**
Job Ref No:	**TOHA/17/7144/2/SS**

Sample Reference			**15-20mm Enriched Soil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	8
Silt (0.002-0.063mm)	%	UKAS	11
Sand (0.063-2.0mm)	%	UKAS	81
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	12
Stones (20-50mm)	% DW	GLP	1
Stones (>50mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	7.8
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	1104
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2807
Exchangeable Sodium Percentage	%	UKAS	5.7
Organic Matter (LOI)	%	UKAS	6.0
Total Nitrogen (Dumas)	%	UKAS	0.24
C : N Ratio	ratio	UKAS	15
Extractable Phosphorus	mg/l	UKAS	37
Extractable Potassium	mg/l	UKAS	618
Extractable Magnesium	mg/l	UKAS	103
Total Arsenic (As)	mg/kg	MCERTS	5
Total Cadmium (Cd)	mg/kg	MCERTS	0.2
Total Chromium (Cr)	mg/kg	MCERTS	9.7
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	28
Total Lead (Pb)	mg/kg	MCERTS	40
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	6
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	80
Water Soluble Boron (B)	mg/kg	MCERTS	1
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	0.26
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	0.57
Pyrene	mg/kg	MCERTS	0.46
Benz(a)anthracene	mg/kg	MCERTS	0.30
Chrysene	mg/kg	MCERTS	0.32
Benzo(b)fluoranthene	mg/kg	MCERTS	0.39
Benzo(k)fluoranthene	mg/kg	MCERTS	0.2
Benzo(a)pyrene	mg/kg	MCERTS	0.28
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	0.2
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	0.28
Total PAHs (sum USEPA16)	mg/kg	MCERTS	3.3
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	50
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	57
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	35
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	43
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous LOAMY SAND with a weakly developed, fine to medium granular structure. The sample was slightly stony with stones up to 24mm in size and contained occasional organic fines and woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Ruth Flower

Ruth Flower
BSc
Graduate Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

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TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Justin Dampney
Eco Sustainable SolutionsLtd
Chapel Lane
Parley
Christchurch
DorsetBH6 5AD

13th July 2017
Our Ref: TOHA/17/7225/2/SS
Your Ref: 212PPW

Dear Sirs

Topsoil Analysis Report: Parley – 15-20mm Enriched Soil

We have completed the analysis of the soil sample recently submitted,referenced *15-20mm Enriched Soil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the samplefor general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

This report presents the results of analysis for the sample submitted to our office,and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by thirdparties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left theEco Sustainable Solutions site.

SAMPLE EXAMINATION

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous LOAMY SAND with a weakly developed, fine to medium granular structure*. The sample was slightly stony and contained frequent woody fragments and organic fines. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Eco Sustainable Solutions

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentrationof selected potential contaminants. The following parameters were determined:

- particle size analysis (sand, silt,clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The stone contentof the sample was low and as such, stones should not restrict the use of the soilfor general landscape purposes.

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.8). This pH value would be considered suitable for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts shouldnot be present at levels that would be harmful to plants.

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

The sample was adequatelysupplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 -Table 1*: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with home grown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULsfor Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Eco Sustainable Solutions

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as a mildly alkaline, non-saline, slightly calcareous loamy sand with a weakly-developed structure and low stone content. The sample was adequately supplied with organic matter and all major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of *BS3882:2015.*

Further guidance on the management, preparation and handling of soils is provided in the DEFRA publication *Construction code of practice for the sustainable use of soils on construction sites*, 2009.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully





Ruth Flower
BSc
Graduate Soil Scientist

Ceri Spears
BSc MScMISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Eco Sustainable Solutions

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Eco Sustainable Solutions Ltd**
Project:	**Parley**
Job:	**Topsoil Analysis - BS3882:2015**
Date:	**13/07/2017**
Job Ref No:	**TOHA/17/7225/2/SS**

Sample Reference			**15-20mm Enriched Soil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	6
Silt (0.002-0.063mm)	%	UKAS	8
Sand (0.063-2.0mm)	%	UKAS	86
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	9
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	7.8
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	1081
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2676
Exchangeable Sodium Percentage	%	UKAS	6.3
Organic Matter (LOI)	%	UKAS	5.3
Total Nitrogen (Dumas)	%	UKAS	0.16
C : N Ratio	ratio	UKAS	19
Extractable Phosphorus	mg/l	UKAS	31
Extractable Potassium	mg/l	UKAS	451
Extractable Magnesium	mg/l	UKAS	77
Total Arsenic (As)	mg/kg	MCERTS	6
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	9.6
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	27
Total Lead (Pb)	mg/kg	MCERTS	48
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	7.1
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	63
Water Soluble Boron (B)	mg/kg	MCERTS	0.7
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	0.34
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	0.52
Pyrene	mg/kg	MCERTS	0.43
Benz(a)anthracene	mg/kg	MCERTS	0.27
Chrysene	mg/kg	MCERTS	0.22
Benzo(b)fluoranthene	mg/kg	MCERTS	0.29
Benzo(k)fluoranthene	mg/kg	MCERTS	0.18
Benzo(a)pyrene	mg/kg	MCERTS	0.27
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	0.18
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	0.23
Total PAHs (sum USEPA16)	mg/kg	MCERTS	2.9
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	39
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	44
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	23
Aromatic TPH >C5 - C35	mg/kg	MCERTS	30
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous LOAMY SAND with a weakly developed, fine to medium granular structure. The sample was slightly stony and contained frequent woody fragments and organic fines. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Ruth Flower

Ruth Flower
BSc
Graduate Soil Scientist

Results of analysis should be read in conjunction with the report they were issued w

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Eco Sustainable Solutions

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

MrPatryk Wylecial
Eco Sustainable SolutionsLtd
Chapel Lane
Parley
Christchurch
DorsetBH6 5AD

20th February 2018
Our Ref: TOHA/18/7483/2/SS
Your Ref: 909PPW

Dear Sirs

Topsoil Analysis Report: Parley – 15-20mm Enriched Soil

We have completed the analysis of the soil sample recently submitted,referenced *15-20mm Enriched Soil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the samplefor general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

This report presents the results of analysis for the sample submitted to our office,and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by thirdparties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left theEco Sustainable Solutions site.

SAMPLE EXAMINATION

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous, LOAMY SANDwitha weaklydeveloped, fine to medium sub-angularstructure*. The sample was moderately stony and contained occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Eco Sustainable Solutions Ltd

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentrationof selected potential contaminants. The following parameters were determined:

- particle size analysis (sand, silt,clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

ParticleSize Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The stone contentof the sample was moderate and, as such, stones are unlikely to constitute a limitation for general landscape purposes.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.1). This pH value would be considered suitable for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

The sample was adequatelysupplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 -Table 1*: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with home grown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Eco Sustainable Solutions Ltd

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, slightly calcareous loamy sand with a weaklydeveloped structure and moderatestone content. The sample contained sufficient reserves of organic matter and all major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried outwhen soil is reasonably dry and non-plastic (friable) in consistency.

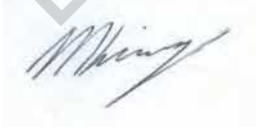
It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

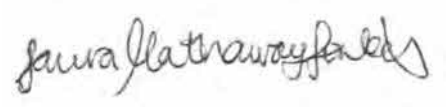
Further details on soil handling are provided in Annex A of *BS3882:2015.*

Further guidance on the management, preparation and handling of soils is provided in the DEFRA publication *Construction code of practice for the sustainable use of soils on construction sites*, 2009.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully





Matthew Heins
BSc (Hons)
Soil Scientist

Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Eco Sustainable Solutions Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Eco Sustainable Solutions Ltd**
Project:	**Parley**
Job:	**Topsoil Analysis - BS3882:2015**
Date:	**20/02/2018**
Job Ref No:	**TOHA/18/7483/2/SS**

Sample Reference			**15-20mm Enriched Soil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	8
Silt (0.002-0.063mm)	%	UKAS	8
Sand (0.063-2.0mm)	%	UKAS	84
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	14
Stones (20-50mm)	% DW	GLP	2
Stones (>50mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	8.1
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	1188
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2684
Exchangeable Sodium Percentage	%	UKAS	5.0
Organic Matter (LOI)	%	UKAS	7.7
Total Nitrogen (Dumas)	%	UKAS	0.27
C : N Ratio	ratio	UKAS	17
Extractable Phosphorus	mg/l	UKAS	45
Extractable Potassium	mg/l	UKAS	563
Extractable Magnesium	mg/l	UKAS	94
Total Arsenic (As)	mg/kg	MCERTS	7
Total Cadmium (Cd)	mg/kg	MCERTS	0.2
Total Chromium (Cr)	mg/kg	MCERTS	28
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	28
Total Lead (Pb)	mg/kg	MCERTS	87
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	13
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	100
Water Soluble Boron (B)	mg/kg	MCERTS	2.7
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1
Naphthalene	mg/kg	MCERTS	< 0.0
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	0.34
Anthracene	mg/kg	MCERTS	0.13
Fluoranthene	mg/kg	MCERTS	1.10
Pyrene	mg/kg	MCERTS	1.00
Benz(a)anthracene	mg/kg	MCERTS	0.65
Chrysene	mg/kg	MCERTS	0.64
Benzo(b)fluoranthene	mg/kg	MCERTS	1.10
Benzo(k)fluoranthene	mg/kg	MCERTS	0.47
Benzo(a)pyrene	mg/kg	MCERTS	0.87
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	0.49
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	0.46
Total PAHs (sum USEPA16)	mg/kg	MCERTS	7.2
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	41
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	45
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	2.3
Aromatic TPH >C12 - C16	mg/kg	MCERTS	5.6
Aromatic TPH >C16 - C21	mg/kg	MCERTS	22
Aromatic TPH >C21 - C35	mg/kg	MCERTS	92
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	120
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous, LOAMY SAND with a weakly developed, fine to medium sub-angular structure. The sample was moderately stony and contained occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Matthew Heins
BSc (Hons)
Soil Scientist

Results of analysis should be read in conjunction with the report they were issued wi

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Eco Sustainable Solutions Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

MrJustin Dampney
Eco Sustainable SolutionsLtd
Chapel Lane
Parley
Christchurch
DorsetBH6 5AD

11th May 2018
Our Ref: TOHA/18/7580/2/SS
Your Ref: 1178PPW

Dear Sirs

Topsoil Analysis Report: Parley – 15-20mm Enriched Soil

We have completed the analysis of the soil sample recently submitted,referenced *15-20mm Enriched Soil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the samplefor general landscape purposes (trees, shrubs, amenity grass). In addition, the sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

This report presents the results of analysis for the sample submitted to our office,and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by thirdparties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left theEco Sustainable Solutions site.

SAMPLE EXAMINATION

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous, SANDY LOAM with a weakly developed, medium to coarse granular structure*. The sample was slightly stony and contained organic fines and woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbedsample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Eco Sustainable Solutions Ltd

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentrationof selected potential contaminants. The following parameters were determined:

- particle size analysis (sand, silt,clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *sandy loam* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The stone contentof the sample was moderate and, as such, stones are unlikely to constitute a limitation for general landscape purposes. However, it may be prudent to reducea proportion of the larger stonesby raking,picking, buryingorscreening, should the soil be used for amenity grass areas orsports pitches.

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.9). This pH value would be considered suitable for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

The sample was adequatelysupplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 -Table 1*: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with home grown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – PolicyCompanion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Eco Sustainable Solutions Ltd

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was foundat levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as a slightly alkaline,non-saline,slightlycalcareous sandy loamwith a weaklydeveloped structure and moderatestone content. The sample contained sufficient reserves of organic matter and all major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkalinesoils are selectedand the physical condition of the soil is satisfactory.

The topsoil was fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

RECOMMENDATIONS

Stone Removal

To reduce the stone content for *informal* and *formal recreational* end uses (Annex A.4 of *BS3882:2015*), it may be prudent to remove a portion of the larger stones (>20mm) by intensive picking, raking, burying or screening prior to seeding or turfing.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of *BS3882:2015.*

Further guidance on the management, preparation and handling of soils is provided in the DEFRA publication *Construction code of practice for the sustainable use of soils on construction sites*, 2009.

Eco Sustainable Solutions Ltd

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Matthew Heins
BSc (Hons)
Soil Scientist



Laura Hathaway-Jenkins
BSc MScEngD MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Eco Sustainable Solutions Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Eco Sustainable Solutions Ltd**
Project:	**Parley**
Job:	**Topsoil Analysis - BS3882:2015**
Date:	**11/05/2018**
Job Ref No:	**TOHA/18/7580/2/SS**

Sample Reference			**15-20mm Enriched Soil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	10
Silt (0.002-0.063mm)	%	UKAS	12
Sand (0.063-2.0mm)	%	UKAS	78
Texture Class (UK Classification)	--	UKAS	SL
Stones (2-20mm)	% DW	GLP	16
Stones (20-50mm)	% DW	GLP	6
Stones (>50mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	7.9
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	1126
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2838
Exchangeable Sodium Percentage	%	UKAS	5.9
Organic Matter (LOI)	%	UKAS	8.3
Total Nitrogen (Dumas)	%	UKAS	0.29
C : N Ratio	ratio	UKAS	17
Extractable Phosphorus	mg/l	UKAS	73
Extractable Potassium	mg/l	UKAS	1007
Extractable Magnesium	mg/l	UKAS	125
Total Arsenic (As)	mg/kg	MCERTS	5
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	21
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	24
Total Lead (Pb)	mg/kg	MCERTS	58
Total Mercury (Hg)	mg/kg	MCERTS	0.3
Total Nickel (Ni)	mg/kg	MCERTS	8
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	94
Water Soluble Boron (B)	mg/kg	MCERTS	2.4
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1
Naphthalene	mg/kg	MCERTS	< 0.0
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	0.24
Anthracene	mg/kg	MCERTS	0.22
Fluoranthene	mg/kg	MCERTS	0.68
Pyrene	mg/kg	MCERTS	0.65
Benz(a)anthracene	mg/kg	MCERTS	0.31
Chrysene	mg/kg	MCERTS	0.32
Benzo(b)fluoranthene	mg/kg	MCERTS	0.53
Benzo(k)fluoranthene	mg/kg	MCERTS	0.12
Benzo(a)pyrene	mg/kg	MCERTS	0.35
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	0.19
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	0.25
Total PAHs (sum USEPA16)	mg/kg	MCERTS	3.9
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	2.2
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	8.5
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	60
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	71
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	9.1
Aromatic TPH >C16 - C21	mg/kg	MCERTS	27
Aromatic TPH >C21 - C35	mg/kg	MCERTS	120
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	150
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos	ND/D	ISO 17025	Not-detected

SL = SANDY LOAM

Visual Examination

The sample was described as a very dark grey (Munsell colour 10YR 3/1), moist, friable, slightly calcareous, SANDY LOAM with a weakly developed, medium to coarse granular structure. The sample was slightly stony and contained organic fines and woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Matthew Heins
BSc (Hons)
Soil Scientist

Results of analysis should be read in conjunction with the report they were issued wi

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Eco Sustainable Solutions Ltd

MARCHWOOD SCIENTIFIC SERVICES
Unit 1A.2(a) North Road
Marchwood Ind. Park
Marchwood
Southampton
SO40 4BL

TEST REPORT

Raymond Brown Minerals & Recycling
Lee Lane
Nursling
SO16 0AD

Certificate No.	117/3301
Date received	15/05/17
Ref.	RB/117/3301

1st June 2017

Re. Analysis of a Soil Sample Ref. R100-1133

.

Customer Reference		**R100-1133**	**Multipurpose Topsoil**		**Specific purpose/ Acidic**		**Specific purpose/ Low Fertility**		**Specific purpose/ Calcareous**	
MSS Reference		**117-3301**	**Limits**	**Complies**	**Limits**	**Complies**	**Limits**	**Complies**	**Limits**	**Complies**
Moisture	%	15	-	-	-	-	-	-	-	-
CN Ratio	C/N	14.8/1	<20:1	Y	<20:1	Y	<20:1	Y	<20:1	Y
Clay Content	%	13	5-35	Y	5-35	Y	5-35	Y	5-35	Y
Visible Contaminants >2 mm	%	0	<0.5	Y	<0.5	Y	<0.5	Y	<0.5	Y
Electrical Conductivity (Topsoil)	µS/cm	2300	-	-	-	-	-	-	-	-
Silt Content	%	19	0-65	Y	0-65	Y	0-65	Y	0-65	Y
Visible Contaminants Plastics	%	0	<0.5	Y	<0.5	Y	<0.5	Y	<0.5	Y
Sand Content	%	68	30-85	Y	30-85	Y	30-85	Y	30-85	Y
Visible Contaminants Man-Made Sharps	%	0	0	Y	0	Y	0	Y	0	Y
Soil Texture Class		Sandy Loam								
pH		7.5	5.5-8.5	Y	3.5-5.5	N	3.5-9.0	Y	7.5-9	Y
Stones >2mm	%	30	0-30	Y	0-30	Y	0-30	Y	0-30	Y
Stones >20mm	%	< 0.020	0-10	Y	0-10	Y	0-10	Y	0-10	Y
Stones >50mm	%	< 0.020	0	Y	0	Y	0	Y	0	Y
Nitrogen (Total)	%	0.31	≥0.15	Y	≥0.15	Y	<0.1	N	≥0.15	Y
Carbonate	%	<0.10	-		-		-		<1	Y
Extractable Potassium	mg/l	320	121-900	Y	121-900	Y	<120	N	121-900	Y
Extractable Magnesium	mg/l	95	51-600	Y	51-600	Y	<600	Y	51-600	Y
Available Calcium	mg/l	3000								
Available Sodium	mg/l	65	<15%	Y	<15%	Y	<15%	Y	<15%	Y
Extractable Phosphorus	mg/l	72	16-100	Y	16-100	Y	<15	N	16-100	Y
Copper (Nitric Acid)	mg/kg	20	<200	Y	<200	Y	<200	Y	<200	Y
Nickel (Nitric Acid)	mg/kg	6.2	<110	Y	<110	Y	<110	Y	<110	Y
Zinc (Nitric Acid)	mg/kg	50	<300	Y	<300	Y	<300	Y	<300	Y
Loss on Ignition	%	7.8	3-20	Y	3-30	Y	1-10	Y	3-30	Y

Reported by: J Fursman
Position: Director
For/on behalf of Marchwood Scientific Services Ltd.

APPENDIX C

Photographic Records (May 2017)





Plate 1 Plot 7 geo-grid and membrane beneath subsoil



Plate 2 Plot 7 confirmation of soil cover depth



Plate 3 Plot 8 confirmation of soil cover depth

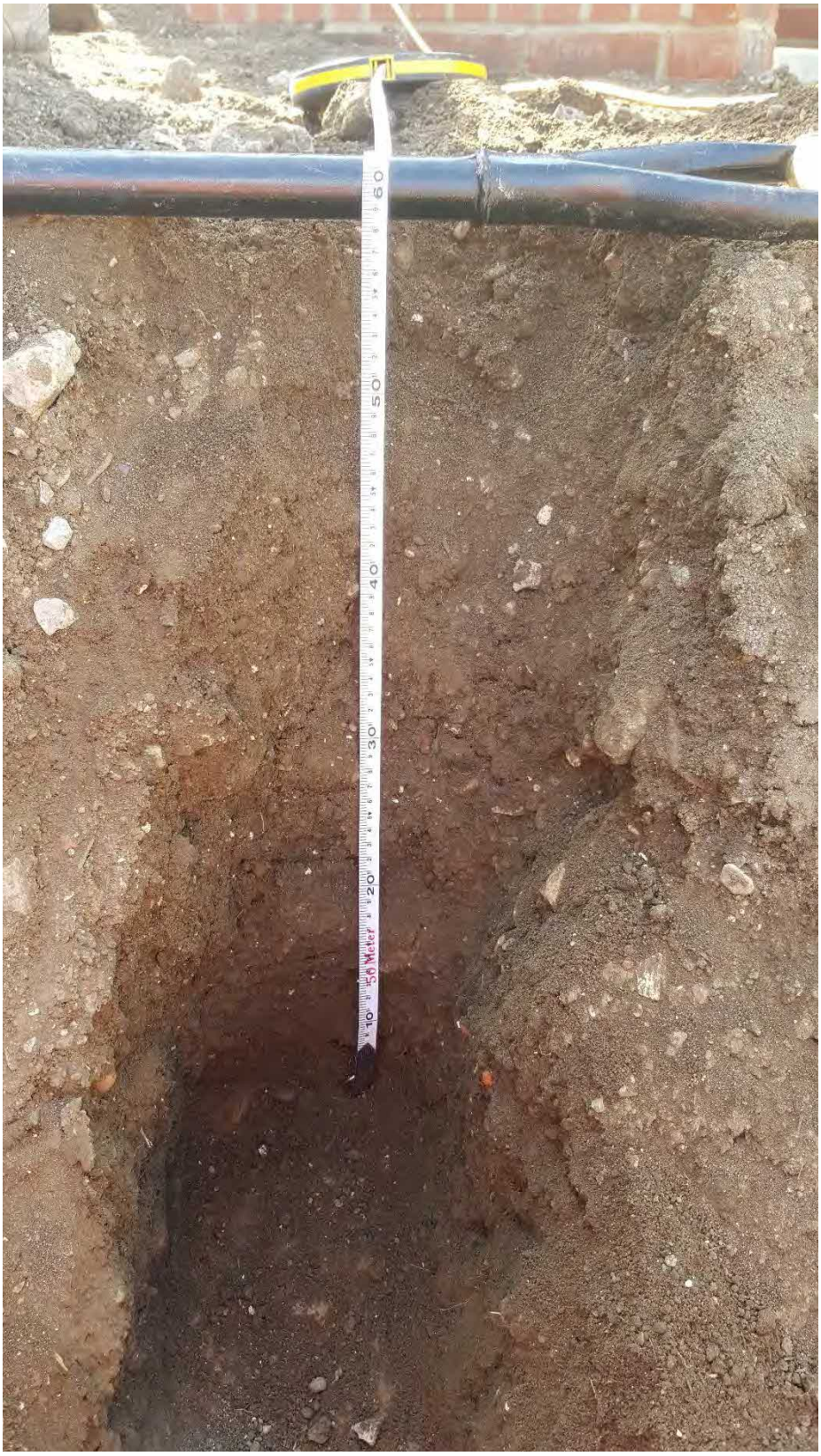


Plate 4 Plot 9 confirmation of soil cover depth



Plate 5 Plot 10 geo-grid and membrane beneath subsoil



Plate 6 Plot 10 confirmation of soil cover depth



Plate 7 View of rear garden area of Plot 19



Plate 8 Plot 19 confirmation of soil cover depth



Plate 9 View of rear garden area of Plot 20



Plate 10 Plot 20 confirmation of soil cover depth



Plate 11 View of the rear garden area of Plot 21



Plate 12 Plot 21 confirmation of soil cover depth

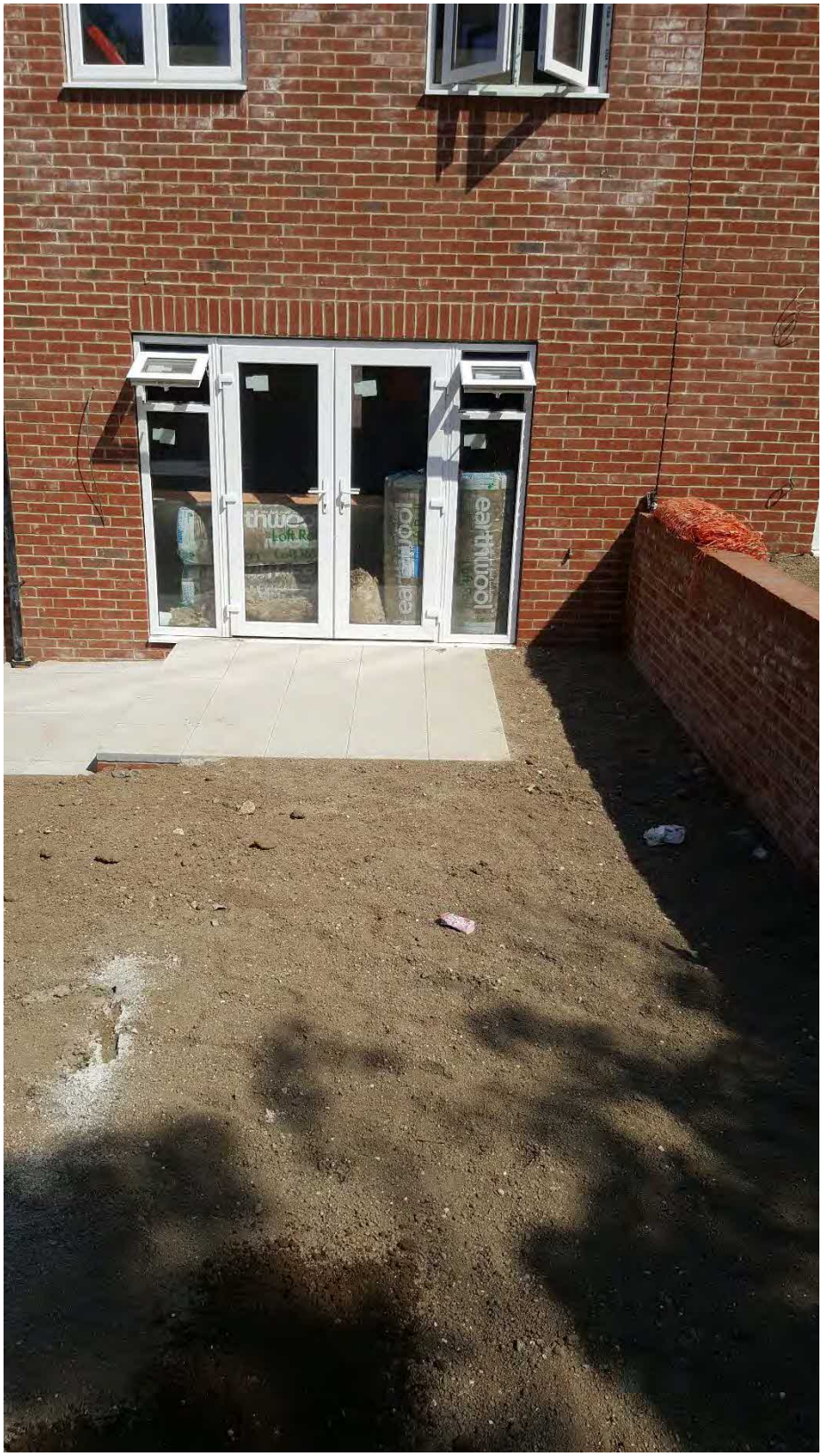


Plate 13 View of the rear garden of Plot 22



Plate 14 Plot 22 confirmation of soil cover depth

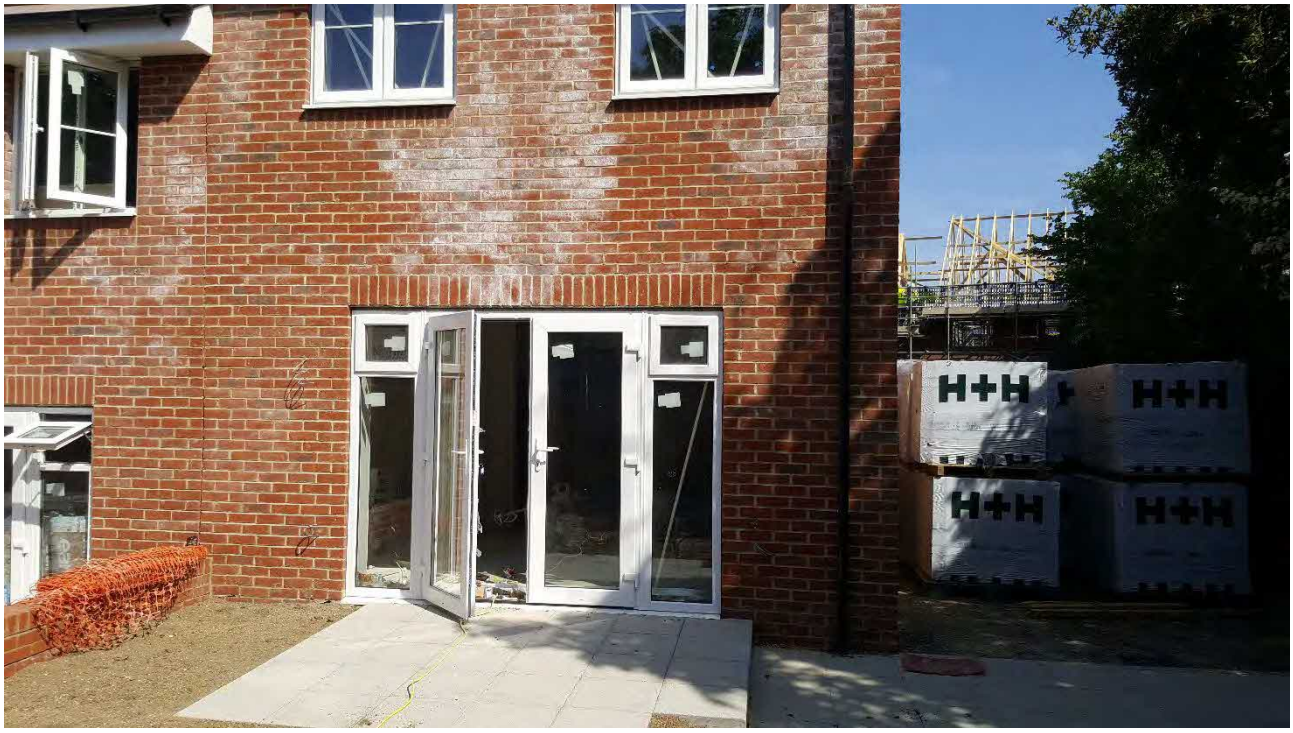


Plate 15 View of rear garden of Plot 23



Plate 16 Plot 23 confirmation of soil cover depth



Plate 17 Plot 24 reduce dig and installation of Topsoil



Plate 18 Reduced dig undertaken across Plots 13-16



Plate 19 Completed rear garden areas of Plots 20-23



Plate 20 Reduced dig undertaken across Plots 24-27



Plate 21 Reduced dig undertaken across Plots 24-27



Plate 22 Reduced dig undertaken across Plots 24-27

APPENDIX D

Photographic Records (March 2019)





Plate 1 Plot 1-6 Pit between flats and Bartons Road



Plate 2 Plot 1-6 Pit between flats and railway cutting boundary



Plate 3 Plot 1-6 Pit beside parking to rear of flats



Plate 4 Plot 13



Plate 5 Plot 14



Plate 6 Plot 17



Plate 7 Plot 18 Geogrid beneath Subsoil and Topsoil



Plate 8 Plot 18 Topsoil



Plate 9 Plot 25



Plate 10 Plot 26



Plate 11 Plot 27



Plate 12 Plot 28



Plate 13 Plot 29



Plate 14 Plot 31



Plate 15 Plot 33



Plate 16 Plot 36



Plate 17 Plot 37



Plate 18 Plot 37

APPENDIX E

Photographic Records (Covered Plots)





Plate 1 View of rear garden area of Plot 7 (6 Lynch Close)



Plate 2 View of the astroturf in rear garden of Plot 9 (4 Lynch Close)

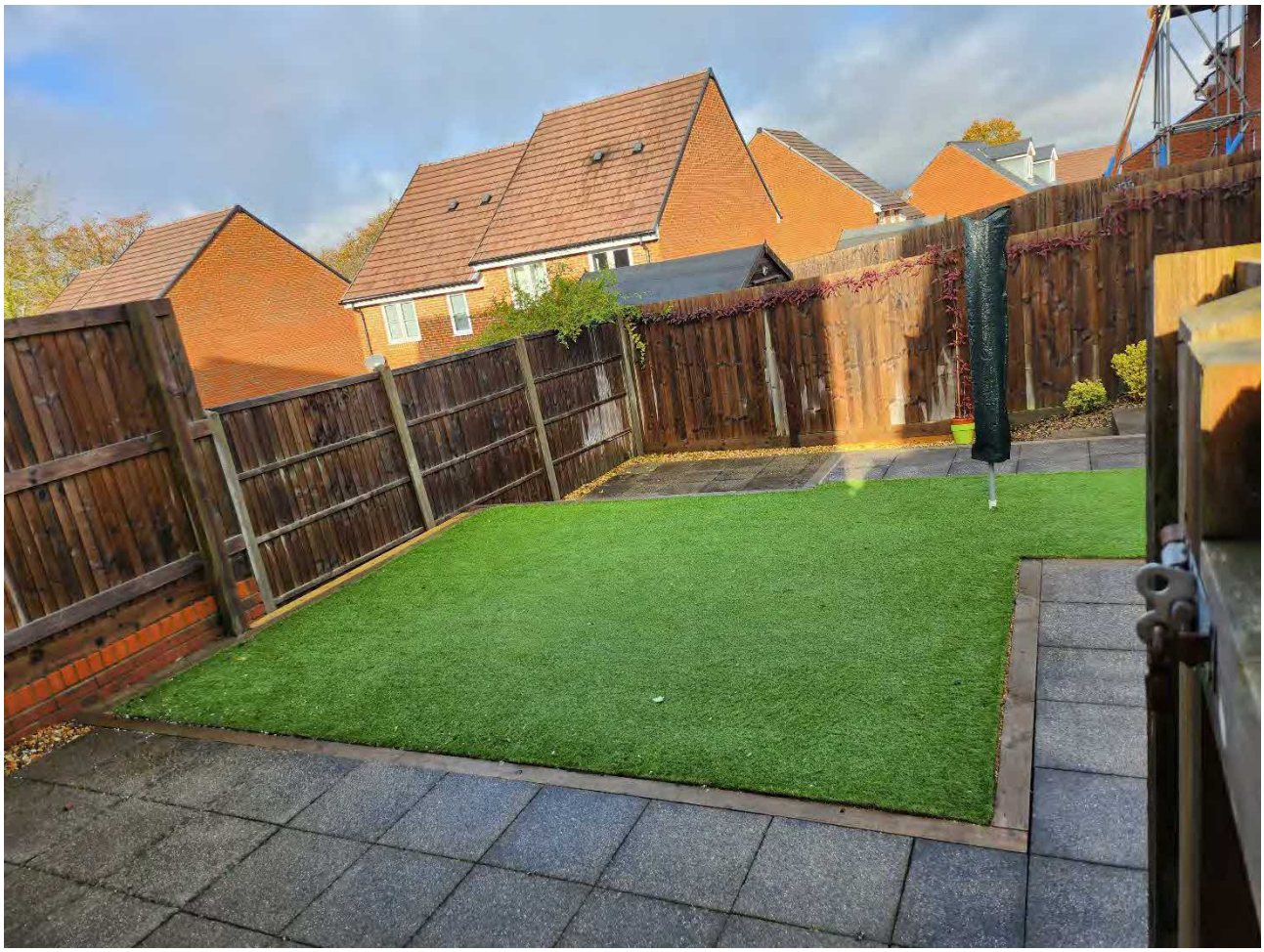


Plate 3 View of astroturf in rear garden of Plot 10 (3 Lynch Close)



Plate 4 View of astroturf in rear garden of Plot 12 (1 Lynch Close)



Plate 5 View of rear garden of Plot 28 (20 Harrison Way)

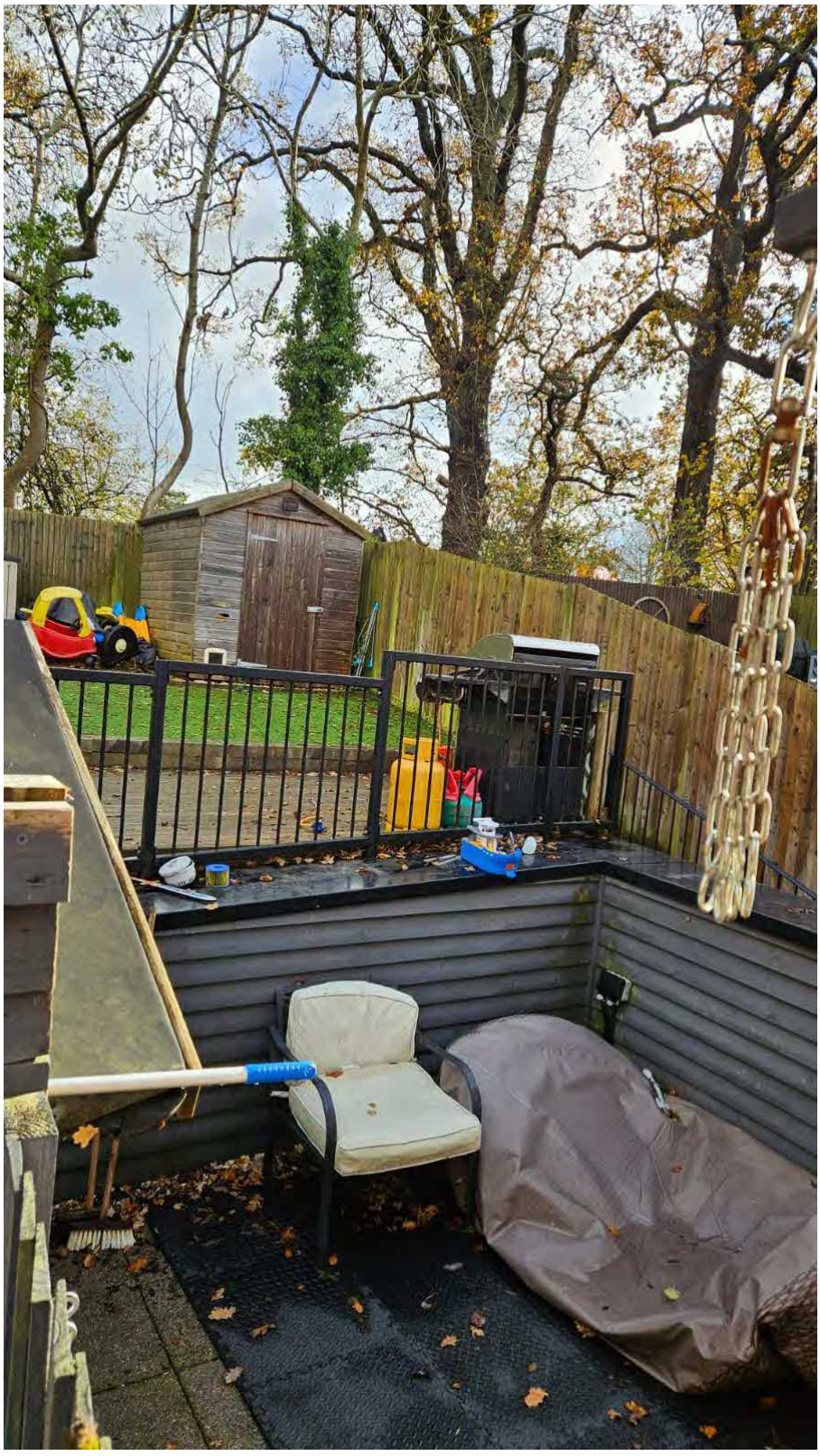


Plate 6 View of astroturf in rear garden of Plot 34 (32 Harrison Way)



Plate 7 View of astroturf in rear garden of Plot 35 (34 Harrison Way)

APPENDIX F

Exploratory Hole Logs (March 2019)



Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.15	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.10	
				0.35	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.15	
				0.35	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.30)	
				0.30	
				0.55	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.30)	
				0.30	
				(0.30)	
				0.60	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.25 0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.30)	
				0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.40)	
				0.40	
				0.50	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.20	
				0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.20	
				0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.30)	
				0.30 0.35	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				0.25	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.30)	
				0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.40)	
				0.40	
				0.45	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
				(0.30)	
				0.30 0.35	

APPENDIX G

Exploratory Hole Logs with Photos (TS01-TS14)



Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			0.15	
0.30	ES2			0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			0.12 0.14	
0.30	ES2			0.30 0.32	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			(0.30)	
				0.30	
0.50	ES2			0.50	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			0.15	
0.30	ES2			0.40	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.20	ES1			0.15	
0.45	ES2			0.40 0.50	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			0.10	
				0.20	
0.30	ES2			0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.20	ES1			0.25	
0.45	ES2			0.45	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.05	ES1			0.10	
0.30	ES2			0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.20	ES1			0.20	
0.40	ES2			0.35 0.45	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.05	ES1			0.10	
0.20	ES2			0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.20	ES1			(0.30) 0.30	
0.45	ES2			0.45	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			(0.30)	
				0.30	
0.40	ES2			0.40	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.20	ES1			0.20	
0.35	ES2			0.35	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			0.14	
0.40	ES2			0.40	

Geo-Environmental

APPENDIX H

Exploratory Hole Logs (HP02 - HP38)



Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.15	ES1			(0.30)	
0.30	ES2			0.30	

Geo-Environmental

Contract Name: Bartons Rise - Additional Garden Sampling			Client: Vistry Southern		Trial Pit ID: HP02B
Contract Number: GE21752	Date Started: 29/11/2023	Logged By: FG	Checked By:	Status: FINAL	Sheet 1 of 1
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used:	Date Printed: 17/09/2024	Scale: 1:25
Weather: Cloudy, dry	Hole Termination:		Stability: Sides stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
0.10	ES1							
0.35	ES2							

0.5
1.0
1.5
2.0
2.5
3.0
3.5

Dimensions:	
Final Depth:	0.36m
Final Width:	
Final Length:	

Remarks

Clay in base of pit

Water Strikes (mbgl)		
Depth Strike	Rose to	Time Elapsed (mins)

Photo:



PhotoofPit



PhotoofSpoil

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.15 0.20	ES1 ES2			0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.28	ES2			0.28	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.22	ES2			0.22	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.15 0.20	ES1 ES2			0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.25	ES2			0.25	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.15	ES1				
0.25	ES2			0.25	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.20	ES2			0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			(0.30)	
0.30	ES2			0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.25	ES2			0.25	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.15	ES1				
0.28	ES2			0.28	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			(0.30)	
0.30	ES2			0.30	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			0.15	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.15	ES1				
0.25	ES2			0.26	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.25	ES2			0.25	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.20	ES2			0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.20	ES2			0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.23	ES2			0.23	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.15	ES1			0.15	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1			0.18	
0.20	ES2			0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.18	ES2			0.18	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.20	ES2			0.20	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10 0.17	ES1 ES2			0.15 0.18	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.20	ES2			0.22	

Samples & In Situ Testing			Strata Details		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend
0.10	ES1				
0.20	ES2			0.20	

APPENDIX I

Validation Inspection Record (HP2-HP23)



Geo-Environmental

ID	GE21752
Project Name	Bartons Rise
Client	Vistry

Engineers

Fiona Goode fiona.goode@gesl.net

Project Manager

Fiona Goode fiona.goode@gesl.net

Location	Havant
Date	25/04/2024

Details of Hole

18 records

Hole ID	HP23a
Plot No./Position	23 Harrison Way
Date of Hole	25/04/2024, 09:50
Hole Type	HP
Final Depth	0.23

Ground Conditions

1 record

Top Depth	*Base Depth*	*General description of stratum*
0	0.23	Grass over dark brown slightly sandy gravelly CLAY with frequent roots and rootlets and rare brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP23b
Plot No./Position	23 Harrison Way
Date of Hole	25/04/2024, 10:05
Hole Type	HP
Final Depth	0.25

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.15	Grass over dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets
0.15	0.25	Brown very gravelly CLAY with rare brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.25		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP23c
Plot No./Position	23 Harrison Way
Date of Hole	25/04/2024, 10:14
Hole Type	HP
Final Depth	0.22

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.12	Grass over dark brown slightly sandy gravelly CLAY with rare rootlets
0.12	0.22	Brown gravelly CLAY with rare brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP23d
Plot No./Position	23 Harrison Way
Date of Hole	25/04/2024, 10:25
Hole Type	HP
Final Depth	0.2

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.19	Grass over dark and very gravelly CLAY with rare rootlets
0.19	0.2	Brown gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.15		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP23e
Plot No./Position	23 Harrison Way
Date of Hole	25/04/2024, 10:34
Hole Type	HP
Final Depth	0.2

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.17	Grass over dark slightly sandy gravelly CLAY with rare rootlets
0.17	0.2	Brown gravelly CLAY with rare

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP21a
Plot No./Position	21 Harrison Way
Date of Hole	25/04/2024, 10:48
Hole Type	HP
Final Depth	0.25

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.2	Dark brown slightly sandy slightly gravelly CLAY with occasional rootlets
0.2	0.25	Brown slightly gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.15		ES	1
0.25		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP21b
Plot No./Position	21 Harrison Way
Date of Hole	25/04/2024, 10:56
Hole Type	HP
Final Depth	0.2

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.15	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets
0.15	0.2	Brown gravelly CLAY with rare brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP21c
Plot No./Position	21 Harrison Way
Date of Hole	25/04/2024, 11:04
Hole Type	HP
Final Depth	0.24

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.15	Grass over dark brown slightly sandy gravelly CLAY with occasional roots and rootlets
0.15	0.24	Brown gravelly CLAY with rare brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.24		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP15a
Plot No./Position	15 Harrison Way
Date of Hole	25/04/2024, 11:19
Hole Type	HP
Final Depth	0.22

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.12	Grass over dark brown slightly sandy gravelly CLAY with frequent rootlets
0.12	0.22	Brown very gravelly CLAY with occasional brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP15b
Plot No./Position	15 Harrison Way
Date of Hole	25/04/2024, 11:28
Hole Type	HP
Final Depth	0.27

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.2	Grass over dark brown slightly sandy slightly gravelly CLAY with occasional rootlets
0.2	0.27	Brown gravelly CLAY with occasional brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.15		ES	1
0.27		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil

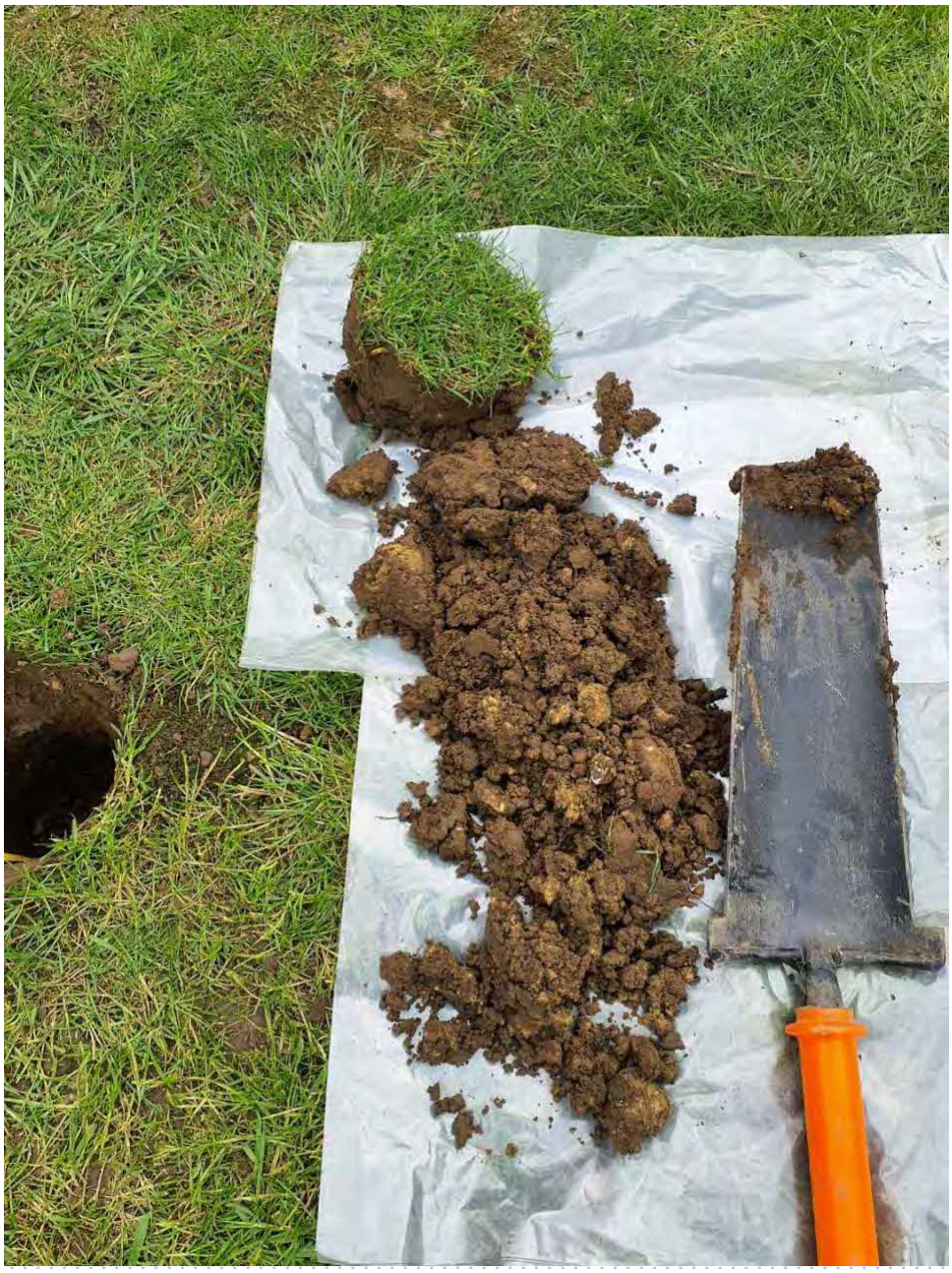


Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP15c
Plot No./Position	15 Harrison Way
Date of Hole	25/04/2024, 11:37
Hole Type	HP
Final Depth	0.24

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.17	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets
0.17	0.24	Brown gravelly CLAY with occasional brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.15		ES	1
0.24		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP15d
Plot No./Position	15 Harrison Way
Date of Hole	25/04/2024, 11:47
Hole Type	HP
Final Depth	0.20

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.18	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets.
0.18	0.2	Brown very gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP2a
Plot No./Position	2 Garrett Close
Date of Hole	25/04/2024, 12:07
Hole Type	HP
Final Depth	0.25

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.2	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets
0.2	0.25	Brown gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.25		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP2b
Plot No./Position	2 Garrett Close
Date of Hole	25/04/2024, 12:15
Hole Type	HP
Final Depth	0.24

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.19	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets
0.19	0.24	Brown gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.24		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP2c
Plot No./Position	2 Garrett Close
Date of Hole	25/04/2024, 12:23
Hole Type	HP
Final Depth	0.14

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.09	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets
0.09	0.14	Brown gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.09		ES	1
0.14		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP4a
Plot No./Position	4 Garrett Close
Date of Hole	25/04/2024, 12:37
Hole Type	HP

Final Depth 0.2

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.16	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets
0.16	0.2	Brown very gravelly CLAY with rare brick

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP4b
Plot No./Position	4 Garrett Close
Date of Hole	25/04/2024, 12:48
Hole Type	HP

Final Depth 0.3

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.25	Grass over dark brown sandy gravelly CLAY with frequent rootlets
0.25	0.3	Brown gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.15		ES	1
0.3		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Hole ID	HP4c
Plot No./Position	4 Garrett Close
Date of Hole	25/04/2024, 13:00
Hole Type	HP
Final Depth	0.20

Ground Conditions

2 records

Top Depth	*Base Depth*	*General description of stratum*
0	0.17	Grass over dark brown slightly sandy gravelly CLAY with occasional rootlets
0.17	0.2	Brown gravelly CLAY

Samples

2 records

Top Depth	*Base Depth*	*Sample type*	*Sample reference*
0.1		ES	1
0.2		ES	2

Pass/Fail

(X) Pass
( ) Fail

Remarks

Photo of Spoil



Photo of hole with tape in place



Photographs

1 record

Photograph



Description	Garden

Approved By

No users

Geo-Environmental

APPENDIX J

Independent Geochemical Laboratory Results and Statistical Assessments

(Plots 7-12)



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	22-44818
Issue:	1
Date of Issue:	01/12/2022
Contact:	Will Purslow
Customer Details:	GESL Unit 7 Danworth Farm Hurstpierpoint West SussexBN6 9GL
Quotation No:	Q22-02720
Order No:	PO-5928
Customer Reference:	GE21022
Date Received:	21/11/2022
Date Approved:	01/12/2022
Details:	Bartons Rise, Havant
Approved by:	

Tim Reeve, Quality Officer

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

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Sample Summary

Report No.: 22-44818, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
302391	TS02 0.10	16/11/2022	21/11/2022	Silty loam	
302392	TS02 0.30	16/11/2022	21/11/2022	Silty loam	

Sample Summary

Report No.: 23-51338, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
346804	HP02A 0.15	29/11/2023	30/11/2023	Silty loam	c
346805	HP02A 0.30	29/11/2023	30/11/2023	Silty loam	c
346806	HP02B 0.10	29/11/2023	30/11/2023	Silty loam	c
346807	HP02B 0.35	29/11/2023	30/11/2023	Silty loam	c

Sample Summary

Report No.: 23-51341, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
346825	HP5A 0.15	27/11/2023	30/11/2023	Silty loam	c
346826	HP5A 0.20	27/11/2023	30/11/2023		
346827	HP5B 0.10	27/11/2023	30/11/2023		
346828	HP5B 0.28	27/11/2023	30/11/2023	Silty loam	c
346829	HP5C 0.10	27/11/2023	30/11/2023	Silty loam	c
346830	HP5C 0.22	27/11/2023	30/11/2023		
346831	HP5D 0.15	27/11/2023	30/11/2023		
346832	HP5D 0.20	27/11/2023	30/11/2023		
346833	HP5E 0.10	27/11/2023	30/11/2023		
346834	HP5E 0.25	27/11/2023	30/11/2023	Silty loam	c

Results Summary

Report No.: 22-44818, issue number 1

ELAB Reference	302391	302392
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	TS02	TS02
Sample Depth (m)	0.10	0.30
Sampling Date	16/11/2022	16/11/2022

Determinand	Codes	Units	LOD		
Soil sample preparation parameters					
Moisture Content	N	%	0.1	16.7	18.0
Material removed	N	%	0.1	7.5	10.4
Description of Inert material removed	N		0	Stones	Stones/Clinker
Metals					
Arsenic	M	mg/kg	1	9.0	10.4
Beryllium	U	mg/kg	1	< 1.0	< 1.0
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	19.6	23.9
Copper	M	mg/kg	5	28.7	36.2
Lead	M	mg/kg	5	92.7	138
Mercury	M	mg/kg	0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	14.1	15.9
Selenium	M	mg/kg	1	< 1.0	< 1.0
Vanadium	M	mg/kg	5	25.4	31.1
Zinc	M	mg/kg	5	111	128
Anions					
Water Soluble Chloride	M	mg/kg	40	< 40	< 40
Water Soluble Sulphate	M	g/l	0.02	0.03	0.04
Inorganics					
Carbonate	N	%	0.1	4.5	5.3
Elemental Sulphur	M	mg/kg	20	< 20	< 20
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8
Total Sulphide	N	mg/kg	2	< 2	< 2
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0
Acid Soluble Sulphate (SO4)	U	%	0.02	0.05	0.07
Water Soluble Boron	N	mg/kg	0.5	0.7	1.1
Miscellaneous					
Electrical Conductivity (CaSO4 extract)	N	uS/cm	50	2060	2070
Carbon Nitrogen Ratio	N	ratio	0.1	21.5420	n/t
Loss on Ignition	M	%	0.01	4.16	4.75
pH	M	pH units	0.1	10.0	9.4
Density	N	g/ml	0	1.24	1.19
Soil Organic Matter	U	%	0.1	n/t	2.9
Total Carbon	N	%	0.01	2.4	n/t
Total Organic Carbon	N	%	0.01	1.2	1.5
Total Nitrogen	N	%	0.01	0.11	n/t
Extractable Potassium	N	mg/l	20	237	254
Extractable Magnesium	N	mg/l	20	78	95
Extractable Phosphate	N	mg/l	1	46	n/t
Extractable Calcium	N	mg/l	20	n/t	4890
Extractable Sodium	N	mg/l	20	n/t	21
Sand content	NS	%	1	46	42
Silt content	NS	%	1	33	37
Clay content	NS	%	1	21	22
Stones > 2mm	NS	%	1	19	18
Stones > 20mm	NS	%	1	< 1	< 1
Stones > 50mm	NS	%	1	< 1	n/t
Stones > 75mm	NS	%	1	n/t	< 1
Total Visible Contaminants	N	%	0.01	< 0.01	< 0.01
Plastics	N	%	0.01	< 0.01	< 0.01
Sharps	N	n/kg	0	0	0
Phenols					

Results Summary

Report No.: 22-44818, issue number 1

ELAB Reference	302391	302392
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	TS02	TS02
Sample Depth (m)	0.10	0.30
Sampling Date	16/11/2022	16/11/2022

Determinand	Codes	Units	LOD		
Total Phenols	N	mg/kg	6	< 6	< 6
Polyaromatic hydrocarbons					
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	0.4	1.3
Anthracene	M	mg/kg	0.1	< 0.1	0.6
Fluoranthene	M	mg/kg	0.1	1.2	5.4
Pyrene	M	mg/kg	0.1	1.1	4.1
Benzo(a)anthracene	M	mg/kg	0.1	0.5	3.3
Chrysene	M	mg/kg	0.1	0.5	3.6
Benzo(b)fluoranthene	M	mg/kg	0.1	1.0	5.3
Benzo(k)fluoranthene	M	mg/kg	0.1	0.8	3.5
Benzo(a)pyrene	M	mg/kg	0.1	0.8	4.4
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	0.5	2.9
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	0.6
Benzo[g,h,i]perylene	M	mg/kg	0.1	0.5	2.7
Total PAH(16)	M	mg/kg	0.4	7.6	38.0
BTEX					
Benzene	M	ug/kg	10	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0
MTBE	U	ug/kg	10	< 10.0	< 10.0
TPH CWG					
>C5-C6 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01
>C8-C10 Aliphatic (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	< 1.0	< 1.0
>C10-C12 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0
>C16-C21 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0
>C21-C35 Aliphatic (EH_2D_AL)	M	mg/kg	1	2.2	1.8
>C35-C40 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0
Total aliphatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	3.1	2.6
>C5-C7 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01
>C8-C10 Aromatic (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	< 1.0	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0
>C12-C16 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0
>C16-C21 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0
>C21-C35 Aromatic (EH_2D_AR)	M	mg/kg	1	9.9	12.2
>C35-C40 Aromatic (EH_2D_AR)	M	mg/kg	1	4.5	8.1
Total aromatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	15.9	21.8
Total petroleum hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_Total)	N	mg/kg	1	19.0	24.4

2683

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Results Summary

Report No.: 22-44818, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
302391	0.10	TS02	Brown Sandy Soil, Stones	No asbestos detected	n/t	n/t	n/t	n/t
302392	0.30	TS02	Brown Sandy Soil, Stones	No asbestos detected	n/t	n/t	n/t	n/t

Results Summary

Report No.: 23-51338, issue number 1

ELAB Reference				346804	346805	346806	346807
Customer Reference							
Sample ID							
Sample Type				SOIL	SOIL	SOIL	SOIL
Sample Location				HP02A	HP02A	HP02B	HP02B
Sample Depth (m)				0.15	0.30	0.10	0.35
Sampling Date				29/11/2023	29/11/2023	29/11/2023	29/11/2023
Determinand	**Codes**	**Units**	**LOD**				
Soil sample preparation parameters							
Moisture Content	N	%	0.1	18.9	19.1	19.2	19.3
Material removed	N	%	0.1	12.5	13.8	14.1	< 0.1
Description of Inert material removed	N		0	Stones	stones	Stones	None
Metals							
Arsenic	M	mg/kg	1	13.8	14.2	16.4	12.2
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	24.2	27.7	26.5	27.0
Copper	M	mg/kg	5	54.6	66.7	60.0	53.8
Iron	N	mg/kg	35	21500	22300	22300	21200
Lead	M	mg/kg	5	212	226	204	166
Mercury	M	mg/kg	0.5	< 0.5	0.5	0.5	< 0.5
Nickel	M	mg/kg	5	18.9	18.9	19.7	22.0
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	33.3	36.9	35.8	36.4
Zinc	M	mg/kg	5	176	201	205	179

Results Summary

Report No.: 23-51338, issue number 1

	ELAB Reference	346804	346805	346806	346807
	Customer Reference				
	Sample ID				
	Sample Type	SOIL	SOIL	SOIL	SOIL
	Sample Location	HP02A	HP02A	HP02B	HP02B
	Sample Depth (m)	0.15	0.30	0.10	0.35
	Sampling Date	29/11/2023	29/11/2023	29/11/2023	29/11/2023
Determinand	**Codes** / **Units** / **LOD**				
Inorganics					
Hexavalent Chromium	N / mg/kg / 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N / mg/kg / 0.5	c 0.8	c 0.8	c 1.0	c 0.8
Polyaromatic hydrocarbons					
Naphthalene	MS / mg/kg / 0.02	0.04	0.02	0.03	0.02
Acenaphthylene	MS / mg/kg / 0.02	0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	MS / mg/kg / 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	US / mg/kg / 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	MS / mg/kg / 0.02	0.19	0.20	0.25	0.13
Anthracene	US / mg/kg / 0.02	0.06	0.04	0.05	0.02
Fluoranthene	MS / mg/kg / 0.02	0.60	0.52	0.54	0.49
Pyrene	MS / mg/kg / 0.02	0.58	0.48	0.47	0.48
Benzo(a)anthracene	US / mg/kg / 0.02	0.31	0.26	0.25	0.27
Chrysene	MS / mg/kg / 0.02	0.28	0.24	0.22	0.24
Benzo(b)fluoranthene	MS / mg/kg / 0.02	0.46	0.37	0.32	0.38
Benzo(k)fluoranthene	MS / mg/kg / 0.03	0.17	0.14	0.13	0.14
Benzo(a)pyrene	US / mg/kg / 0.02	0.41	0.33	0.28	0.35
Indeno(1,2,3-cd)pyrene	MS / mg/kg / 0.02	0.31	0.25	0.21	0.23
Dibenzo(a,h)anthracene	MS / mg/kg / 0.02	0.04	0.02	< 0.02	0.02
Benzo[g,h,i]perylene	MS / mg/kg / 0.02	0.31	0.24	0.20	0.25
Total PAH(16)	NS / mg/kg / 0.34	3.77	3.12	2.96	3.02

Results Summary

2683

Report No.: 23-51341, issue number 1

				ELAB Reference	346825	346826	346827	346828	346829	346830	346831	346832	346833	346834
				Customer Reference										
				Sample ID										
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	HP5A	HP5A	HP5B	HP5B	HP5C	HP5C	HP5D	HP5D	HP5E	HP5E
				Sample Depth (m)	0.15	0.20	0.10	0.28	0.10	0.22	0.15	0.20	0.10	0.25
				Sampling Date	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
Determinand	**Codes**	**Units**	**LOD**											
Soil sample preparation parameters														
Moisture Content	N	%	0.1		20.9	n/t	n/t	20.5	21.6	n/t	n/t	n/t	n/t	19.1
Material removed	N	%	0.1		< 0.1	n/t	n/t	< 0.1	< 0.1	n/t	n/t	n/t	n/t	24.0
Description of Inert material removed	N		0		None	n/t	n/t	None	None	n/t	n/t	n/t	n/t	Stones
Metals														
Arsenic	M	mg/kg	1		11.6	n/t	n/t	11.8	11.7	n/t	n/t	n/t	n/t	11.7
Cadmium	M	mg/kg	0.5		< 0.5	n/t	n/t	< 0.5	< 0.5	n/t	n/t	n/t	n/t	< 0.5
Chromium	M	mg/kg	5		28.5	n/t	n/t	31.4	30.1	n/t	n/t	n/t	n/t	30.6
Copper	M	mg/kg	5		30.9	n/t	n/t	33.4	33.0	n/t	n/t	n/t	n/t	32.3
Iron	N	mg/kg	35		18500	n/t	n/t	19000	20800	n/t	n/t	n/t	n/t	19000
Lead	M	mg/kg	5		122	n/t	n/t	147	125	n/t	n/t	n/t	n/t	125
Mercury	M	mg/kg	0.5		< 0.5	n/t	n/t	< 0.5	< 0.5	n/t	n/t	n/t	n/t	< 0.5
Nickel	M	mg/kg	5		16.7	n/t	n/t	18.0	18.5	n/t	n/t	n/t	n/t	17.5
Selenium	M	mg/kg	1		< 1.0	n/t	n/t	< 1.0	< 1.0	n/t	n/t	n/t	n/t	< 1.0
Vanadium	M	mg/kg	5		29.1	n/t	n/t	31.0	34.4	n/t	n/t	n/t	n/t	29.5
Zinc	M	mg/kg	5		136	n/t	n/t	149	137	n/t	n/t	n/t	n/t	135
Inorganics														
Hexavalent Chromium	N	mg/kg	0.8		< 0.8	n/t	n/t	< 0.8	< 0.8	n/t	n/t	n/t	n/t	< 0.8
Water Soluble Boron	N	mg/kg	0.5		c 1.3	n/t	n/t	c 1.5	c 1.3	n/t	n/t	n/t	n/t	c 1.0

Results Summary

Report No.: 23-51341, issue number 1

	ELAB Reference	346825	346826	346827	346828	346829	346830	346831	346832	346833	346834
	Customer Reference										
	Sample ID										
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sample Location	HP5A	HP5A	HP5B	HP5B	HP5C	HP5C	HP5D	HP5D	HP5E	HP5E
	Sample Depth (m)	0.15	0.20	0.10	0.28	0.10	0.22	0.15	0.20	0.10	0.25
	Sampling Date	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
Determinand	**Codes**	**Units**	**LOD**								
Polyaromatic hydrocarbons											
Naphthalene	MS	mg/kg	0.02	< 0.02	^ 0.02	^ 0.04	0.02	< 0.02	^ < 0.02	^ 0.03	^ 0.06	^ 0.09	< 0.02
Acenaphthylene	MS	mg/kg	0.02	< 0.02	^ 0.02	^ 0.02	< 0.02	< 0.02	^ < 0.02	^ 0.06	^ < 0.02	^ 0.07	0.03
Acenaphthene	MS	mg/kg	0.02	< 0.02	^ < 0.02	^ < 0.02	< 0.02	< 0.02	^ < 0.02	^ 0.04	^ < 0.02	^ 0.03	< 0.02
Fluorene	US	mg/kg	0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	0.04	< 0.02	0.02	< 0.02
Phenanthrene	MS	mg/kg	0.02	0.17	^ 0.24	^ 0.63	0.23	0.24	^ 0.18	^ 0.75	^ 0.25	^ 3.58	0.25
Anthracene	US	mg/kg	0.02	0.05	0.05	0.16	0.05	0.06	0.07	0.22	0.08	1.09	0.09
Fluoranthene	MS	mg/kg	0.02	0.47	^ 0.75	^ 1.83	0.82	0.75	^ 0.62	^ 1.66	^ 0.81	^ 7.55	1.34
Pyrene	MS	mg/kg	0.02	0.42	^ 0.68	^ 1.73	0.73	0.68	^ 0.58	^ 1.38	^ 0.75	^ 5.88	1.31
Benzo(a)anthracene	US	mg/kg	0.02	0.22	0.36	1.04	0.39	0.35	0.32	0.78	0.39	3.32	0.87
Chrysene	MS	mg/kg	0.02	0.20	^ 0.32	^ 0.92	0.33	0.30	^ 0.40	^ 0.77	^ 0.48	^ 2.73	0.96
Benzo(b)fluoranthene	MS	mg/kg	0.02	0.27	^ 0.49	^ 1.36	0.48	0.44	^ 0.43	^ 0.96	^ 0.47	^ 2.70	0.98
Benzo(k)fluoranthene	MS	mg/kg	0.03	0.10	^ 0.18	^ 0.55	0.18	0.17	^ 0.19	^ 0.37	^ 0.21	^ 1.19	0.38
Benzo(a)pyrene	US	mg/kg	0.02	0.25	0.42	1.41	0.44	0.39	0.41	0.90	0.53	2.93	1.08
Indeno(1,2,3-cd)pyrene	MS	mg/kg	0.02	0.17	^ 0.35	^ 0.84	0.28	0.26	^ 0.31	^ 0.67	^ 0.38	^ 1.73	0.67
Dibenzo(a,h)anthracene	MS	mg/kg	0.02	< 0.02	^ 0.02	^ 0.14	0.03	0.03	^ 0.06	^ 0.13	^ 0.07	^ 0.38	0.13
Benzo[g,h,i]perylene	MS	mg/kg	0.02	0.17	^ 0.35	^ 0.87	0.30	0.27	^ 0.28	^ 0.57	^ 0.36	^ 1.52	0.58
Total PAH(16)	NS	mg/kg	0.34	2.48	4.27	11.6	4.29	3.94	3.84	9.34	4.84	34.8	8.68

Method Summary

Report No.: 22-44818, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Acid neutralisation capacity	N	Air dried sample	22/11/2022		
Extractable cations - BS3882	N	Air dried sample	22/11/2022		ICPMS
Visible Contaminants	N		22/11/2022		
Sulphide	N	As submitted sample	28/11/2022	109	Colorimetry
Hexavalent chromium	N	As submitted sample	22/11/2022	110	Colorimetry
pH	M	Air dried sample	22/11/2022	113	Electromeric
Electrical conductivity of soil	N	Air dried sample.	22/11/2022	114	Electromeric
Acid Soluble Sulphate	U	Air dried sample	24/11/2022	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	23/11/2022	300	ICPMS
Phenols in solids	N	As submitted sample	22/11/2022	121	HPLC
Elemental Sulphur	M	Air dried sample	22/11/2022	122	HPLC
Loss on ignition at 450 deg C	M	Air dried sample	23/11/2022	129	Gravimetry
PAH (GC-FID)	M	As submitted sample	23/11/2022	133	GC-FID
Extr. Phos	N	Air dried sample	22/11/2022	140	ICPMS
Water soluble anions	M	Air dried sample	22/11/2022	172	Ion Chromatography
Low range Aliphatic hydrocarbons soil	N	As submitted sample	23/11/2022	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	23/11/2022	181	GC-MS
BTEX in solids	M	As submitted sample	23/11/2022	181A	GC-MS
Water soluble boron	N	Air dried sample	22/11/2022	202	Colorimetry
Total cyanide	M	As submitted sample	24/11/2022	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	23/11/2022	210	IR
TPH CWG soil by gc-gc	M	As submitted sample	21/11/2022	271	
Asbestos identification	U	Air dried sample	28/11/2022	280	Microscopy
Soil organic matter	U	Air dried sample	22/11/2022	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited

Method Summary

Report No.: 23-51338, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	05/12/2023	110	Colorimetry
Aqua regia extractable metals	M	Air dried sample	01/12/2023	300	ICPMS
Water soluble boron	N	Air dried sample	01/12/2023	202	Colorimetry

Tests marked N are not UKAS accredited

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Report Information

Report No.: 22-44818, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
	Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
	ELAB are unable to provide an interpretation or opinion on the content of this report.
	The results relate only to the sample received.
	PCB congener results may include any coeluting PCBs
	Uncertainty of measurement for the determinands tested are available upon request
	Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

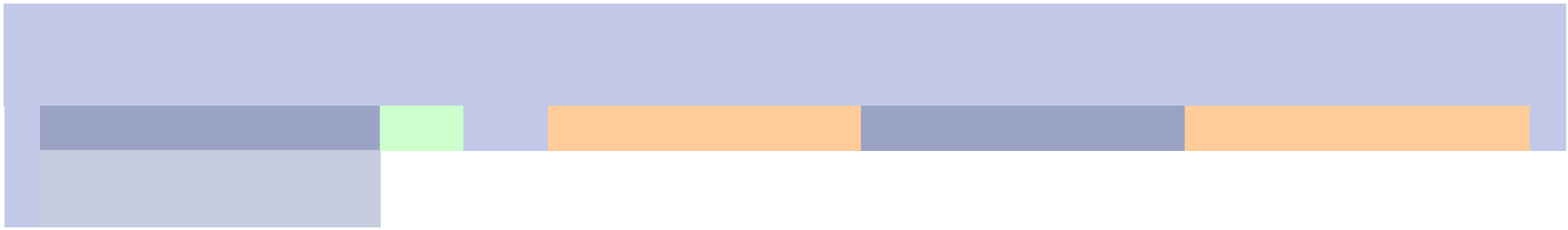
Where a sample has a deviation code, the applicable test result may be invalid.

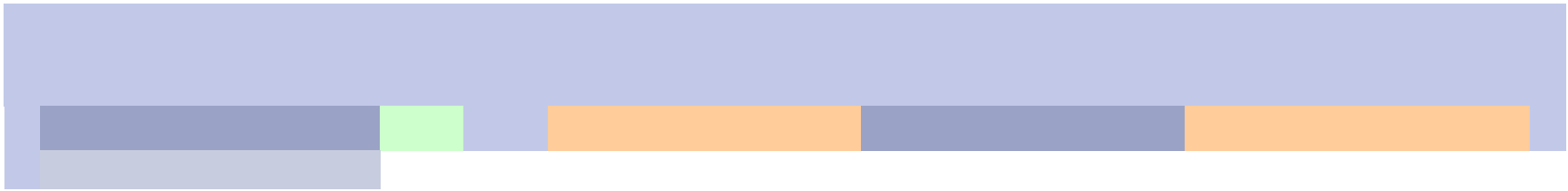
Sample Retention and Disposal

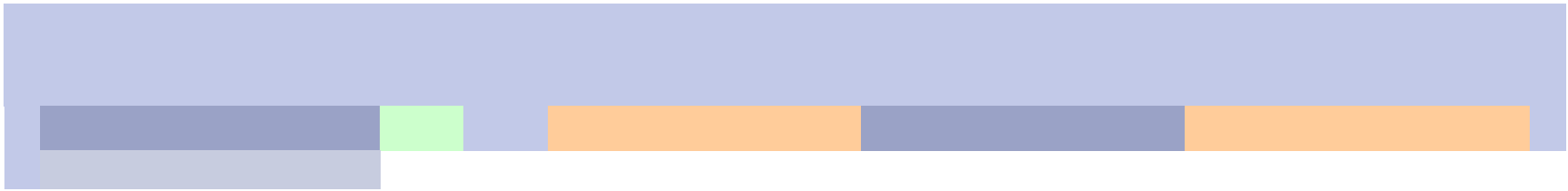
All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry







CLEA Software Version 1.071

Report generated	17/09/2024
Report title	Plots 7-12 Bartons Rise
Created by	FG at Geo-Environmental

BASIC SETTINGS

Land Use	Residential with produce (C4SL)						
Building	Small terraced house						
Receptor	Female (res C4SL)	Start age class	1	End age class	6	Exposure Duration	6 years
Soil	Sandy loam						

Exposure Pathways

Direct soil and dust ingestion	✓	Dermal contact with indoor dust	✓	Inhalation of indoor dust	✓
Consumption of homegrown produce	✓	Dermal contact with soil	✓	Inhalation of soil dust	✓
Soil attached to homegrown produce	✓			Inhalation of indoor vapour	✓
				Inhalation of outdoor vapour	✓

CLEA Software Version 1.071 Report generated 17-Sep-24

Land Use Residential with produce (C4SL) **Receptor** Female (res C4SL)

Age Class	Exposure Frequencies (days yr^{-1})						Occupation Periods (hr day^{-1})		Soil to skin adherence factors (mg cm^{-2})		Direct soil ingestion rate (g day^{-1})	Body weight (kg)	Body height (m)	Inhalation rate (m^3 day^{-1})	Max exposed skin factor		Total skin area (m^2)
	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with indoor dust	Dermal contact with soil	Inhalation of dust and vapour, indoor	Inhalation of dust and vapour, outdoor	Indoors	Outdoors	Indoor	Outdoor					Indoor (m^2 m^{-2})	Outdoor (m^2 m^{-2})	
1	180	180	180	170	365	365	23.0	1.0	0.06	0.10	0.10	5.60	0.7	5.4	0.32	0.26	3.43E-01
2	365	365	365	170	365	365	23.0	1.0	0.06	0.10	0.10	9.80	0.8	8.0	0.33	0.26	4.84E-01
3	365	365	365	170	365	365	23.0	1.0	0.06	0.10	0.10	12.70	0.9	8.9	0.32	0.25	5.82E-01
4	365	365	365	170	365	365	23.0	1.0	0.06	0.10	0.10	15.10	0.9	10.1	0.35	0.28	6.36E-01
5	365	365	365	170	365	365	19.0	1.0	0.06	0.10	0.10	16.90	1.0	10.1	0.35	0.28	7.04E-01
6	365	365	365	170	365	365	19.0	1.0	0.06	0.10	0.10	19.70	1.1	10.1	0.33	0.26	7.94E-01
7	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	22.10	1.2	12.0	0.22	0.15	8.73E-01
8	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	25.30	1.2	12.0	0.22	0.15	9.36E-01
9	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	27.50	1.3	12.0	0.22	0.15	1.01E+00
10	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	31.40	1.3	12.0	0.22	0.15	1.08E+00
11	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	35.70	1.4	12.0	0.22	0.14	1.19E+00
12	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	41.30	1.4	15.2	0.22	0.14	1.29E+00
13	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	47.20	1.5	15.2	0.22	0.14	1.42E+00
14	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	51.20	1.6	15.2	0.22	0.14	1.52E+00
15	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	56.70	1.6	15.2	0.21	0.14	1.60E+00
16	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	59.00	1.6	15.2	0.21	0.14	1.63E+00
17	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	70.00	1.6	15.7	0.33	0.27	1.78E+00
18	0	0	0	0	0	0	0.0	0.0	0.00	0.00	0.00	70.90	1.6	13.6	0.33	0.27	1.80E+00

Consumption Rates

Environment Agency

Consumption rates (g FW kg^{-1} bodyweight day^{-1}) by Produce Group

	MEAN RATES						90TH PERCENTILE RATES					
Age Class	Green veg	Root veg	Tuber veg	Herb. Fruit	Shrub fruit	Tree fruit	Green veg	Root veg	Tuber veg	Herb. Fruit	Shrub fruit	Tree fruit
1	3.47E+00	5.22E+00	9.22E+00	8.90E-01	1.07E+00	1.87E+00	7.12E+00	1.07E+01	1.60E+01	1.83E+00	2.23E+00	3.82E+00
2	3.34E+00	1.61E+00	3.14E+00	1.93E+00	2.60E-01	5.84E+00	5.87E+00	2.83E+00	6.60E+00	3.39E+00	4.60E-01	1.03E+01
3	3.34E+00	1.61E+00	3.14E+00	1.93E+00	2.60E-01	5.84E+00	5.87E+00	2.83E+00	6.60E+00	3.39E+00	4.60E-01	1.03E+01
4	3.34E+00	1.61E+00	3.14E+00	1.93E+00	2.60E-01	5.84E+00	5.87E+00	2.83E+00	6.60E+00	3.39E+00	4.60E-01	1.03E+01
5	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
6	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
7	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
8	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
9	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
10	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
11	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
12	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
13	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
14	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
15	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
16	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
17	1.26E+00	6.00E-01	1.18E+00	6.90E-01	9.00E-02	1.27E+00	2.36E+00	1.12E+00	2.35E+00	1.29E+00	1.80E-01	2.38E+00
18	1.35E+00	6.40E-01	1.25E+00	7.40E-01	1.00E-01	1.36E+00	2.34E+00	1.12E+00	2.36E+00	1.28E+00	1.80E-01	2.37E+00

Top 2 applied? Yes

Where top 2 method is applied, two produce categories use 90th percentile rates, while the remainder use the mean. Produce categories vary on a chemical-by-chemical basis. Where top 2 method is not used, all produce categories for all chemicals assume 90th percentile rates.

Building Small terraced house

Soil Sandy loam

Building footprint (m^2)	2.80E+01
Living space air exchange rate (hr^{-1})	5.00E-01
Living space height (above ground, m)	4.80E+00
Living space height (below ground, m)	0.00E+00
Pressure difference (soil to enclosed space, Pa)	3.10E+00
Foundation thickness (m)	1.50E-01
Floor crack area (cm^2)	4.23E+02
Dust loading factor ($\mu g\ m^{-3}$)	5.00E+01

Porosity, Total ($cm^3\ cm^{-3}$)	5.30E-01
Porosity, Air-Filled ($cm^3\ cm^{-3}$)	2.00E-01
Porosity, Water-Filled ($cm^3\ cm^{-3}$)	3.30E-01
Residual soil water content ($cm^3\ cm^{-3}$)	1.20E-01
Saturated hydraulic conductivity ($cm\ s^{-1}$)	3.56E-03
van Genuchten shape parameter *m* (dimensionless)	3.20E-01
Bulk density ($g\ cm^{-3}$)	1.21E+00
Threshold value of wind speed at 10m ($m\ s^{-1}$)	7.20E+00
Empirical function (F_x) for dust model (dimensionless)	1.22E+00
Ambient soil temperature (K)	2.83E+02
Soil pH	9.40E+00
Soil Organic Matter content (%)	2.32E+00
Fraction of organic carbon ($g\ g^{-1}$)	1.35E-02
Effective total fluid saturation (unitless)	5.12E-01
Intrinsic soil permeability (cm^2)	4.75E-08
Relative soil air permeability (unitless)	6.42E-01
Effective air permeability (cm^2)	3.05E-08

Soil - Vapour Model

Depth to top of source (no building) (cm)	0
Depth to top of source (beneath building) (cm)	65
Default soil gas ingress rate?	Yes
Soil gas ingress rate ($cm^3\ s^{-1}$)	2.50E+01
Building ventilation rate ($cm^3\ s^{-1}$)	1.87E+04
Averaging time surface emissions (yr)	6
Finite vapour source model?	No
Thickness of contaminated layer (cm)	200

Air Dispersion Model

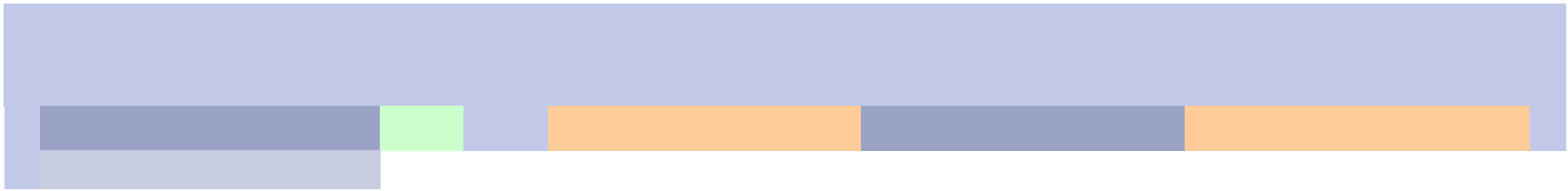
Mean annual windspeed at 10m ($m\ s^{-1}$)		5.00
Air dispersion factor at height of 0.8m *		2400.00
Air dispersion factor at height of 1.6m *		0.00
Fraction of site cover ($m^2\ m^{-2}$)		0.75

* Air dispersion factor in $g\ m^{-2}\ s^{-1}$ per $kg\ m^{-3}$

Soil - Plant Model

	Dry weight conversion factor	Homegrown fraction		Soil loading factor	Preparation correction factor
		Average	High		
	$g\ DW\ g^{-1}\ FW$	dimensionless		$g\ g^{-1}\ DW$	dimensionless
Green vegetables	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	0.103	0.06	0.40	1.00E-03	1.00E+00
Tuber vegetables	0.210	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	0.058	0.06	0.40	1.00E-03	6.00E-01
Shrub fruit	0.166	0.09	0.60	1.00E-03	6.00E-01
Tree fruit	0.157	0.04	0.27	1.00E-03	6.00E-01

Gardener type Average



Geo-Environmental

APPENDIX K

Independent Geochemical Laboratory Results and Statistical Assessment

(Plots 15-16 & 24-27)



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East Sussex
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UKAS TESTING 2683

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	23-51341
Issue:	1
Date of Issue:	08/12/2023
Contact:	Fiona Goode
Customer Details:	GESL Unit 7 Danworth Farm Hurstpierpoint West SussexBN6 9GL
Quotation No:	Q22-03510
Order No:	PO-7050
Customer Reference:	GE21752
Date Received:	30/11/2023
Date Approved:	08/12/2023
Details:	Bartons Rise
Approved by:	

Ben Rees, Customer Services Assistant

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

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Sample Summary

Report No.: 23-51341, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
346841	HP18A 0.10	27/11/2023	30/11/2023	Silty loam	
346842	HP18A 0.25	27/11/2023	30/11/2023	Silty loam	
346843	HP18B 0.15	27/11/2023	30/11/2023	Silty loam	
346844	HP18B 0.28	27/11/2023	30/11/2023	Silty loam	
346845	HP18C 0.10	27/11/2023	30/11/2023	Silty loam	
346846	HP18C 0.30	27/11/2023	30/11/2023	Silty loam	

Results Summary

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Report No.: 23-51341, issue number 1

ELAB Reference				346841	346842	346843	346844	346845	346846
Customer Reference									
Sample ID									
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				HP18A	HP18A	HP18B	HP18B	HP18C	HP18C
Sample Depth (m)				0.10	0.25	0.15	0.28	0.10	0.30
Sampling Date				27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	12.3	13.8	14.3	17.8	15.5	15.9
Material removed	N	%	0.1	22.3	26.2	27.7	22.7	12.7	22.5
Description of Inert material removed	N		0	Stones	Stones	Stones	Stones	Stones	Stones
Metals									
Arsenic	M	mg/kg	1	11.8	13.6	11.1	11.1	11.3	11.8
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5
Chromium	M	mg/kg	5	560	141	90.3	52.2	69.1	58.6
Copper	M	mg/kg	5	82.8	54.3	43.8	38.8	40.9	47.2
Iron	N	mg/kg	35	22300	21700	19600	18800	19300	19700
Lead	M	mg/kg	5	199	219	162	169	182	199
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	43.7	23.7	19.6	18.2	19.8	18.4
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	31.3	34.4	31.5	29.6	31.9	31.8
Zinc	M	mg/kg	5	179	212	158	154	162	172
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	0.9	0.7	0.8	0.6	0.8	< 0.5

Results Summary

Report No.: 23-51341, issue number 1

			ELAB Reference	346841	346842	346843	346844	346845	346846
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	HP18A	HP18A	HP18B	HP18B	HP18C	HP18C
			Sample Depth (m)	0.10	0.25	0.15	0.28	0.10	0.30
			Sampling Date	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023	27/11/2023
Determinand	**Codes**	**Units**	**LOD**						
Polyaromatic hydrocarbons									
Naphthalene	MS	mg/kg	0.02	1.25	< 0.02	< 0.02	0.04	0.02	0.02
Acenaphthylene	MS	mg/kg	0.02	< 0.02	< 0.02	< 0.02	0.03	0.02	0.03
Acenaphthene	MS	mg/kg	0.02	< 0.02	0.03	< 0.02	0.05	< 0.02	0.02
Fluorene	US	mg/kg	0.02	< 0.02	< 0.02	< 0.02	0.03	< 0.02	0.04
Phenanthrene	MS	mg/kg	0.02	0.40	0.29	0.09	0.84	0.18	0.67
Anthracene	US	mg/kg	0.02	0.08	0.08	0.03	0.26	0.08	0.13
Fluoranthene	MS	mg/kg	0.02	0.44	0.59	0.31	2.28	0.99	1.00
Pyrene	MS	mg/kg	0.02	0.41	0.53	0.28	2.04	0.96	0.84
Benzo(a)anthracene	US	mg/kg	0.02	0.24	0.29	0.18	1.14	0.68	0.40
Chrysene	MS	mg/kg	0.02	0.22	0.26	0.18	0.93	0.58	0.39
Benzo(b)fluoranthene	MS	mg/kg	0.02	0.30	0.37	0.26	1.22	0.72	0.53
Benzo(k)fluoranthene	MS	mg/kg	0.03	0.12	0.16	0.12	0.56	0.35	0.20
Benzo(a)pyrene	US	mg/kg	0.02	0.29	0.38	0.23	1.22	0.84	0.52
Indeno(1,2,3-cd)pyrene	MS	mg/kg	0.02	0.21	0.28	0.18	0.88	0.50	0.39
Dibenzo(a,h)anthracene	MS	mg/kg	0.02	0.05	0.05	0.04	0.18	0.11	0.07
Benzo[g,h,i]perylene	MS	mg/kg	0.02	0.21	0.29	0.18	0.84	0.47	0.37
Total PAH(16)	NS	mg/kg	0.34	4.21	3.60	2.09	12.6	6.51	5.62

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Method Summary

Report No.: 23-51341, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	05/12/2023	110	Colorimetry
Aqua regia extractable metals	M	Air dried sample	01/12/2023	300	ICPMS
Water soluble boron	N	Air dried sample	01/12/2023	202	Colorimetry

Tests marked N are not UKAS accredited

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Report Information

Report No.: 23-51341, issue number 1

Key	
U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
	Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
	ELAB are unable to provide an interpretation or opinion on the content of this report.
	The results relate only to the sample received.
	PCB congener results may include any coeluting PCBs
	Uncertainty of measurement for the determinands tested are available upon request
	Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

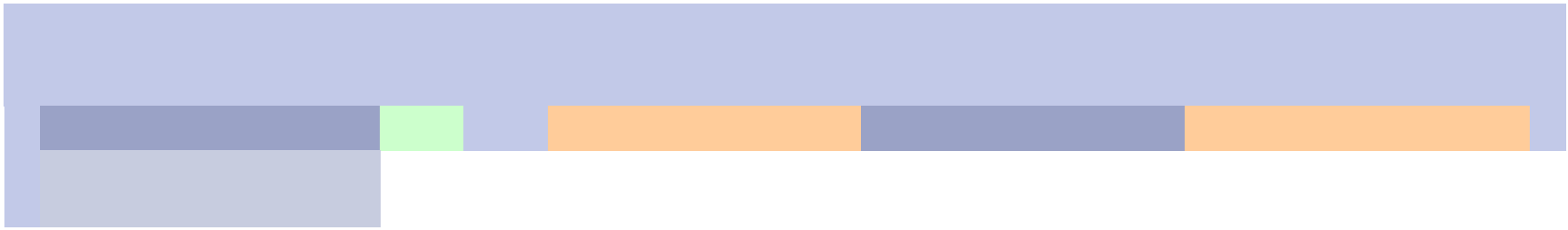
Where a sample has a deviation code, the applicable test result may be invalid.

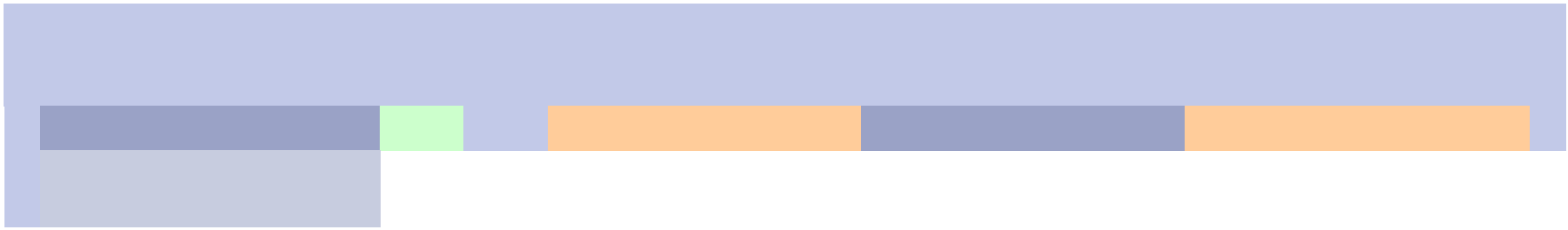
Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry





Geo-Environmental

APPENDIX L

Independent Geochemical Laboratory Results

(Plots 38-45 and 48-53)



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2683

Certificate of Analysis

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	24-53527
Issue:	1
Date of Issue:	08/05/2024
Contact:	Fiona Goode
Customer Details:	GESL Unit 7 Danworth Farm Hurstpierpoint West SussexBN6 9GL
Quotation No:	Q24-04259
Order No:	PO-7412
Customer Reference:	GE21752
Date Received:	29/04/2024
Date Approved:	08/05/2024
Details:	Bartons Rise
Approved by:	

Ben Rees, Customer Services Assistant

Sample Summary

Report No.: 22-44702, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
301832	TS10 0.05	09/11/2022	15/11/2022	Sandy silty loam	
301833	TS10 0.20	09/11/2022	15/11/2022	Silty loam	
301838	TS13 0.20	09/11/2022	15/11/2022	Sandy silty loam	
301839	TS13 0.35	09/11/2022	15/11/2022	Sandy silty loam	
301840	TS14 0.10	09/11/2022	15/11/2022	Silty loam	
301841	TS14 0.40	09/11/2022	15/11/2022	Silty loam	

Sample Summary

Report No.: 23-51341, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
346847	HP19A 0.10	27/11/2023	30/11/2023	Sandy silty loam	

Sample Summary

Report No.: 24-53527, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
359627	HP2a 0.10	25/04/2024	29/04/2024	Silty loam	c
359628	HP2a 0.25	25/04/2024	29/04/2024	Silty loam	c
359629	HP2b 0.10	25/04/2024	29/04/2024	Silty loam	c
359630	HP2b 0.24	25/04/2024	29/04/2024	Silty clayey loam	c
359631	HP2c 0.09	25/04/2024	29/04/2024	Silty loam	c
359632	HP2c 0.14	25/04/2024	29/04/2024	Silty loam	c
359639	HP15a 0.10	25/04/2024	29/04/2024	Silty loam	c
359640	HP15a 0.20	25/04/2024	29/04/2024	Silty loam	c
359641	HP15b 0.15	25/04/2024	29/04/2024	Silty loam	c
359642	HP15b 0.27	25/04/2024	29/04/2024	Silty loam	c
359643	HP15c 0.15	25/04/2024	29/04/2024	Silty loam	c
359644	HP15c 0.24	25/04/2024	29/04/2024	Silty loam	c
359645	HP15d 0.10	25/04/2024	29/04/2024	Silty loam	c
359646	HP15d 0.20	25/04/2024	29/04/2024	Silty clayey loam	c
359647	HP21a 0.15	25/04/2024	29/04/2024	Silty loam	c
359648	HP21a 0.25	25/04/2024	29/04/2024	Silty clayey loam	c
359649	HP21b 0.10	25/04/2024	29/04/2024	Silty loam	c
359650	HP21b 0.20	25/04/2024	29/04/2024	Silty clayey loam	c
359651	HP21c 0.10	25/04/2024	29/04/2024	Silty loam	c
359652	HP21c 0.24	25/04/2024	29/04/2024	Silty clayey loam	c
359653	HP23a 0.10	25/04/2024	29/04/2024	Silty loam	c
359654	HP23a 0.20	25/04/2024	29/04/2024	Silty loam	c
359655	HP23b 0.10	25/04/2024	29/04/2024	Silty loam	c
359656	HP23b 0.25	25/04/2024	29/04/2024	Silty clayey loam	c
359657	HP23c 0.10	25/04/2024	29/04/2024	Silty loam	c
359658	HP23c 0.20	25/04/2024	29/04/2024	Silty loam	c
359659	HP23d 0.15	25/04/2024	29/04/2024	Silty loam	c
359660	HP23d 0.20	25/04/2024	29/04/2024	Silty loam	c
359661	HP23e 0.10	25/04/2024	29/04/2024	Silty loam	c
359662	HP23e 0.20	25/04/2024	29/04/2024	Silty loam	c

Results Summary

Report No.: 22-44702, issue number 1

ELAB Reference	301832	301833	301838	301839	301840	301841
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TS10	TS10	TS13	TS13	TS14	TS14
Sample Depth (m)	0.05	0.20	0.20	0.35	0.10	0.40
Sampling Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Determinand						
Soil sample preparation parameters						
Moisture Content	15.7	14.8	24.8	16.5	18.1	15.2
Material removed	12.6	37.2	23.8	36.9	41.1	44.7
Description of Inert material removed	Stones	Stones	Stones	Stones	Stones	Stones
Metals						
Arsenic	6.2	10.2	6.3	8.1	6.8	6.8
Beryllium	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5	0.7	0.6
Chromium	52.9	62.8	175	177	56.5	37.6
Copper	20.8	60.3	41.3	49.8	32.4	15.8
Lead	43.9	92.1	69.4	55.9	79.0	31.0
Mercury	1.3	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	7.5	20.4	17.9	22.6	17.7	17.1
Selenium	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	23.4	38.5	28.6	35.5	26.5	26.9
Zinc	56.8	135	98.5	97.1	181	74.3
Anions						
Water Soluble Chloride	< 40	< 40	< 40	< 40	< 40	< 40
Water Soluble Sulphate	< 0.02	0.08	0.03	0.05	< 0.02	< 0.02
Inorganics						
Carbonate	0.5	7.1	1.3	5.8	4.0	8.9
Elemental Sulphur	< 20	< 20	< 20	< 20	< 20	< 20
Hexavalent Chromium	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Sulphide	< 2	< 2	< 2	3	< 2	< 2
Total Cyanide	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Acid Soluble Sulphate (SO4)	0.03	0.09	0.07	0.10	0.05	0.04
Water Soluble Boron	0.8	1.1	0.8	1.1	0.7	0.6

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 22-44702, issue number 1

ELAB Reference	301832	301833	301838	301839	301840	301841
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TS10	TS10	TS13	TS13	TS14	TS14
Sample Depth (m)	0.05	0.20	0.20	0.35	0.10	0.40
Sampling Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Determinand						
Miscellaneous						
Electrical Conductivity (CaSO4 extract)	1750	1800	1740	2400	2360	1630
Carbon Nitrogen Ratio	17.3706	n/t	17.3118	n/t	15.0795	n/t
Loss on Ignition	3.56	3.17	3.55	3.17	5.82	2.94
pH	8.1	8.4	8.3	8.5	8.3	8.4
Density	1.20	1.16	1.19	1.19	1.20	1.15
Soil Organic Matter	n/t	2.3	n/t	2.2	n/t	1.8
Total Carbon	2.1	n/t	2.1	n/t	3.4	n/t
Total Organic Carbon	1.2	1.0	1.2	1.0	2.3	0.89
Total Nitrogen	0.12	n/t	0.12	n/t	0.22	n/t
Extractable Potassium	170	225	158	184	333	114
Extractable Magnesium	77	125	126	161	98	50
Extractable Phosphate	117	n/t	49	n/t	116	n/t
Extractable Calcium	n/t	5510	n/t	5350	n/t	4880
Extractable Sodium	n/t	36	n/t	41	n/t	23
Sand content	63	48	59	38	15	10
Silt content	25	35	27	39	55	59
Clay content	13	17	14	23	31	31
Stones > 2mm	12	41	5	20	28	44
Stones > 20mm	< 1	< 1	< 1	< 1	< 1	< 1
Stones > 50mm	< 1	n/t	< 1	n/t	< 1	n/t
Stones > 75mm	n/t	< 1	n/t	< 1	n/t	< 1
Total Visible Contaminants	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Plastics	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sharps	0	0	0	0	0	0

Results Summary

Report No.: 22-44702, issue number 1

ELAB Reference	301832	301833	301838	301839	301840	301841
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TS10	TS10	TS13	TS13	TS14	TS14
Sample Depth (m)	0.05	0.20	0.20	0.35	0.10	0.40
Sampling Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Determinand						
Phenols						
Total Phenols	< 6	< 6	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons						
Naphthalene	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1
Acenaphthylene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	< 0.1	< 0.1	< 0.1	0.2	0.1	< 0.1
Fluorene	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1
Phenanthrene	< 0.1	< 0.1	< 0.1	0.7	1.6	0.2
Anthracene	< 0.1	< 0.1	< 0.1	0.2	0.2	< 0.1
Fluoranthene	0.2	0.2	< 0.1	1.0	3.9	0.6
Pyrene	0.2	0.2	< 0.1	0.8	3.4	0.5
Benzo(a)anthracene	0.1	0.1	< 0.1	0.4	1.5	0.2
Chrysene	0.1	0.2	< 0.1	0.4	1.8	0.2
Benzo(b)fluoranthene	0.1	0.2	< 0.1	0.4	1.9	0.2
Benzo(k)fluoranthene	0.1	0.2	< 0.1	0.4	2.0	0.3
Benzo(a)pyrene	0.1	0.2	< 0.1	0.5	2.2	0.3
Indeno(1,2,3-cd)pyrene	< 0.1	0.1	< 0.1	0.3	1.3	0.2
Dibenzo(a,h)anthracene	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1
Benzo[g,h,i]perylene	< 0.1	0.1	< 0.1	0.2	1.2	0.2
Total PAH(16)	1.2	1.6	< 0.4	6.0	21.5	3.0

Results Summary

Report No.: 22-44702, issue number 1

ELAB Reference	301832	301833	301838	301839	301840	301841
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TS10	TS10	TS13	TS13	TS14	TS14
Sample Depth (m)	0.05	0.20	0.20	0.35	0.10	0.40
Sampling Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022
Determinand						
BTEX						
Benzene	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
MTBE	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
TPH CWG						
>C5-C6 Aliphatic (HS_1D_MS)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic (HS_1D_MS+EH_2D_AL)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic (EH_2D_AL)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic (EH_2D_AL)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic (EH_2D_AL)	< 1.0	1.8	< 1.0	5.4	< 1.0	< 1.0
>C35-C40 Aliphatic (EH_2D_AL)	< 1.0	< 1.0	< 1.0	1.4	< 1.0	< 1.0
Total aliphatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AL)	< 1.0	2.7	< 1.0	7.3	< 1.0	< 1.0
>C5-C7 Aromatic (HS_1D_MS)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic (HS_1D_MS+EH_2D_AR)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic (EH_2D_AR)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic (EH_2D_AR)	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic (EH_2D_AR)	2.9	8.7	< 1.0	28.9	4.8	1.6
>C35-C40 Aromatic (EH_2D_AR)	1.0	1.8	< 1.0	16.6	< 1.0	< 1.0
Total aromatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AR)	4.3	12.5	< 1.0	47.3	6.9	2.2
Total petroleum hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_Total)	5.2	15.2	< 1.0	54.5	7.6	2.3

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 23-51341, issue number 1

ELAB Reference	346847
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	HP19A
Sample Depth (m)	0.10
Sampling Date	27/11/2023

Determinand	Codes	Units	LOD	
Soil sample preparation parameters				
Moisture Content	N	%	0.1	11.8
Material removed	N	%	0.1	9.6
Description of Inert material removed	N		0	Stones
Metals				
Arsenic	M	mg/kg	1	8.0
Cadmium	M	mg/kg	0.5	< 0.5
Chromium	M	mg/kg	5	126
Copper	M	mg/kg	5	52.7
Iron	N	mg/kg	35	15100
Lead	M	mg/kg	5	117
Mercury	M	mg/kg	0.5	< 0.5
Nickel	M	mg/kg	5	22.3
Selenium	M	mg/kg	1	< 1.0
Vanadium	M	mg/kg	5	21.4
Zinc	M	mg/kg	5	130
Inorganics				
Hexavalent Chromium	N	mg/kg	0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	1.9

Results Summary

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Report No.: 23-51341, issue number 1

ELAB Reference	346847
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	HP19A
Sample Depth (m)	0.10
Sampling Date	27/11/2023

Determinand	Codes	Units	LOD	
Polyaromatic hydrocarbons				
Naphthalene	MS	mg/kg	0.02	< 0.02
Acenaphthylene	MS	mg/kg	0.02	< 0.02
Acenaphthene	MS	mg/kg	0.02	< 0.02
Fluorene	US	mg/kg	0.02	< 0.02
Phenanthrene	MS	mg/kg	0.02	0.05
Anthracene	US	mg/kg	0.02	< 0.02
Fluoranthene	MS	mg/kg	0.02	0.14
Pyrene	MS	mg/kg	0.02	0.13
Benzo(a)anthracene	US	mg/kg	0.02	0.07
Chrysene	MS	mg/kg	0.02	0.08
Benzo(b)fluoranthene	MS	mg/kg	0.02	0.12
Benzo(k)fluoranthene	MS	mg/kg	0.03	0.05
Benzo(a)pyrene	US	mg/kg	0.02	0.11
Indeno(1,2,3-cd)pyrene	MS	mg/kg	0.02	0.10
Dibenzo(a,h)anthracene	MS	mg/kg	0.02	< 0.02
Benzo[g,h,i]perylene	MS	mg/kg	0.02	0.09
Total PAH(16)	NS	mg/kg	0.34	0.95

Results Summary

Report No.: 24-53527, issue number 1

			ELAB Reference	359627	359628	359629	359630	359631	359632
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	HP2a	HP2a	HP2b	HP2b	HP2c	HP2c
			Sample Depth (m)	0.10	0.25	0.10	0.24	0.09	0.14
			Sampling Date	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	26.6	23.0	23.4	23.2	21.3	25.0
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1	18.3	< 0.1
Description of Inert material removed	N		0	None	None	None	None	Stones	None
Metals									
Arsenic	M	mg/kg	1	1.4	< 1.0	3.0	5.2	< 1.0	3.6
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	10.9	8.9	12.4	107	45.2	38.8
Copper	M	mg/kg	5	57.5	38.2	18.0	41.7	26.2	38.0
Iron	N	mg/kg	35	7650	7750	8040	21200	10600	21300
Lead	M	mg/kg	5	51.2	46.3	47.4	78.0	57.9	68.2
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	5.4	5.0	< 5.0	21.6	11.2	18.9
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	12.9	10.6	17.5	36.8	15.3	35.2
Zinc	M	mg/kg	5	99.5	76.8	57.2	121	78.1	112
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	c 0.7	c 0.7	c 0.6	c 0.7	c < 0.5	c 0.5
Polyaromatic hydrocarbons									
Naphthalene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	SM	mg/kg	0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	S	mg/kg	0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02
Phenanthrene	SM	mg/kg	0.02	0.04	0.13	0.03	0.14	0.05	0.07
Anthracene	S	mg/kg	0.02	< 0.02	0.04	< 0.02	0.06	< 0.02	< 0.02
Fluoranthene	SM	mg/kg	0.02	0.11	0.50	0.15	0.35	0.18	0.15
Pyrene	SM	mg/kg	0.02	0.10	0.45	0.14	0.32	0.17	0.13
Benzo(a)anthracene	S	mg/kg	0.02	0.07	0.32	0.10	0.22	0.14	0.09
Chrysene	SM	mg/kg	0.02	0.08	0.36	0.11	0.26	0.18	0.10
Benzo(b)fluoranthene	SM	mg/kg	0.02	0.09	0.44	0.15	0.32	0.22	0.12
Benzo(k)fluoranthene	SM	mg/kg	0.03	0.04	0.16	0.05	0.15	0.13	0.04
Benzo(a)pyrene	S	mg/kg	0.02	0.09	0.40	0.13	0.30	0.17	0.11
Indeno(1,2,3-cd)pyrene	SM	mg/kg	0.02	0.07	0.29	0.11	0.27	0.20	0.09
Dibenzo(a,h)anthracene	SM	mg/kg	0.02	0.02	0.06	0.02	0.10	0.10	0.02
Benzo[g,h,i]perylene	SM	mg/kg	0.02	0.07	0.27	0.10	0.24	0.18	0.09
Total PAH(16)	NS	mg/kg	0.34	0.79	3.43	1.10	2.75	1.70	1.02

Results Summary

Report No.: 24-53527, issue number 1

			ELAB Reference	359639	359640	359641	359642	359643	359644
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	HP15a	HP15a	HP15b	HP15b	HP15c	HP15c
			Sample Depth (m)	0.10	0.20	0.15	0.27	0.15	0.24
			Sampling Date	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	24.7	22.6	24.9	22.1	27.6	29.5
Material removed	N	%	0.1	< 0.1	28.5	21.6	33.4	22.2	< 0.1
Description of Inert material removed	N		0	None	Stones	Stones	Stones	Stones	None
Metals									
Arsenic	M	mg/kg	1	< 1.0	< 1.0	< 1.0	2.6	< 1.0	3.7
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	106	169	18.9	41.3	15.1	36.3
Copper	M	mg/kg	5	28.5	34.3	22.4	32.0	18.3	54.5
Iron	N	mg/kg	35	9370	11000	8340	18300	9510	19200
Lead	M	mg/kg	5	40.2	60.4	27.6	48.7	29.7	54.1
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	11.0	17.4	6.8	18.0	7.1	23.2
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	19.7	18.4	14.0	32.7	19.4	37.5
Zinc	M	mg/kg	5	89.7	126	85.4	114	76.1	148
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	c 0.5	c 0.6	c 0.6	c 0.7	c 0.6	c 0.7
Polyaromatic hydrocarbons									
Naphthalene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	S	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	SM	mg/kg	0.02	0.05	0.07	< 0.02	0.03	0.03	< 0.02
Anthracene	S	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	SM	mg/kg	0.02	0.20	0.20	0.04	0.08	0.08	< 0.02
Pyrene	SM	mg/kg	0.02	0.18	0.19	0.04	0.08	0.07	< 0.02
Benzo(a)anthracene	S	mg/kg	0.02	0.19	0.13	0.04	0.06	0.06	< 0.02
Chrysene	SM	mg/kg	0.02	0.23	0.14	0.03	0.07	0.07	< 0.03
Benzo(b)fluoranthene	SM	mg/kg	0.02	0.34	0.17	0.05	0.09	0.08	< 0.02
Benzo(k)fluoranthene	SM	mg/kg	0.03	0.19	0.07	< 0.03	0.04	< 0.03	< 0.03
Benzo(a)pyrene	S	mg/kg	0.02	0.25	0.16	0.04	0.08	0.06	< 0.02
Indeno(1,2,3-cd)pyrene	SM	mg/kg	0.02	0.36	0.12	0.03	0.07	0.05	< 0.02
Dibenzo(a,h)anthracene	SM	mg/kg	0.02	0.18	0.03	< 0.02	< 0.02	< 0.02	< 0.02
Benzo[g,h,i]perylene	SM	mg/kg	0.02	0.29	0.13	0.03	0.07	0.04	< 0.02
Total PAH(16)	NS	mg/kg	0.34	2.45	1.42	< 0.34	0.67	0.54	< 0.34

Results Summary

Report No.: 24-53527, issue number 1

ELAB Reference				359645	359646	359647	359648	359649	359650
Customer Reference									
Sample ID									
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				HP15d	HP15d	HP21a	HP21a	HP21b	HP21b
Sample Depth (m)				0.10	0.20	0.15	0.25	0.10	0.20
Sampling Date				25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	29.1	24.3	25.1	30.1	31.1	24.0
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None	None	None	None
Metals									
Arsenic	M	mg/kg	1	< 1.0	3.9	10.5	9.2	10.7	7.3
Cadmium	M	mg/kg	0.5	< 0.5	0.6	0.6	0.6	0.5	0.5
Chromium	M	mg/kg	5	8.6	20.7	57.0	47.3	56.4	43.1
Copper	M	mg/kg	5	15.2	33.9	65.3	82.2	52.1	46.6
Iron	N	mg/kg	35	7720	17600	16400	26500	17500	23600
Lead	M	mg/kg	5	25.2	60.1	144	67.6	91.5	60.3
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	5.7	15.7	24.3	33.3	24.9	24.8
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	18.2	28.8	27.5	44.8	31.2	39.4
Zinc	M	mg/kg	5	59.8	112	172	122	133	107
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	c 0.6	c 0.6	c 1.1	c 0.7	c 0.9	c 0.8
Polyaromatic hydrocarbons									
Naphthalene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	S	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	SM	mg/kg	0.02	0.02	< 0.02	0.03	0.03	0.03	< 0.02
Anthracene	S	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	SM	mg/kg	0.02	0.07	0.05	0.11	0.13	0.08	0.04
Pyrene	SM	mg/kg	0.02	0.07	0.05	0.09	0.13	0.07	0.04
Benzo(a)anthracene	S	mg/kg	0.02	0.05	0.04	0.07	0.09	0.06	0.03
Chrysene	SM	mg/kg	0.02	0.06	0.04	0.08	0.10	0.06	0.03
Benzo(b)fluoranthene	SM	mg/kg	0.02	0.07	0.05	0.11	0.15	0.08	0.04
Benzo(k)fluoranthene	SM	mg/kg	0.03	< 0.03	< 0.03	0.04	0.05	< 0.03	< 0.03
Benzo(a)pyrene	S	mg/kg	0.02	0.05	0.03	0.08	0.10	0.06	0.03
Indeno(1,2,3-cd)pyrene	SM	mg/kg	0.02	0.04	0.03	0.08	0.10	0.05	0.03
Dibenzo(a,h)anthracene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	0.02	< 0.02	< 0.02
Benzo[g,h,i]perylene	SM	mg/kg	0.02	0.04	0.07	0.07	0.09	0.04	0.03
Total PAH(16)	NS	mg/kg	0.34	0.46	< 0.34	0.75	0.99	0.54	< 0.34

Results Summary

Report No.: 24-53527, issue number 1

			ELAB Reference	359651	359652	359653	359654	359655	359656
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	HP21c	HP21c	HP23a	HP23a	HP23b	HP23b
			Sample Depth (m)	0.10	0.24	0.10	0.20	0.10	0.25
			Sampling Date	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	25.7	22.6	24.7	25.6	20.6	20.5
Material removed	N	%	0.1	15.5	8.0	13.7	8.2	14.3	8.6
Description of Inert material removed	N		0	Stones	Stones	Stones	Stones	Stones	Stones
Metals									
Arsenic	M	mg/kg	1	10.3	7.5	9.9	10.4	14.5	5.6
Cadmium	M	mg/kg	0.5	0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5
Chromium	M	mg/kg	5	94.8	35.6	60.4	94.0	86.0	28.2
Copper	M	mg/kg	5	68.1	70.8	49.3	47.5	60.3	27.4
Iron	N	mg/kg	35	20300	23600	24400	25000	22600	19900
Lead	M	mg/kg	5	114	58.8	121	98.8	127	51.2
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	37.2	24.6	29.3	29.7	33.7	17.1
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	25.8	39.3	43.0	45.9	29.5	31.1
Zinc	M	mg/kg	5	143	158	167	146	151	73.5
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	c 0.8	c 0.7	c 1.1	c 1.2	c 1.2	c 1.3
Polyaromatic hydrocarbons									
Naphthalene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	SM	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	SM	mg/kg	0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	S	mg/kg	0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	SM	mg/kg	0.02	0.08	0.17	0.04	0.08	0.04	0.06
Anthracene	S	mg/kg	0.02	< 0.02	0.05	< 0.02	0.02	< 0.02	< 0.02
Fluoranthene	SM	mg/kg	0.02	0.19	0.29	0.13	0.17	0.14	0.15
Pyrene	SM	mg/kg	0.02	0.17	0.25	0.13	0.16	0.13	0.12
Benzo(a)anthracene	S	mg/kg	0.02	0.12	0.15	0.09	0.11	0.10	0.10
Chrysene	SM	mg/kg	0.02	0.14	0.17	0.11	0.11	0.12	0.13
Benzo(b)fluoranthene	SM	mg/kg	0.02	0.19	0.22	0.15	0.14	0.17	0.19
Benzo(k)fluoranthene	SM	mg/kg	0.03	0.06	0.07	0.05	0.04	0.05	0.06
Benzo(a)pyrene	S	mg/kg	0.02	0.13	0.17	0.11	0.10	0.12	0.12
Indeno(1,2,3-cd)pyrene	SM	mg/kg	0.02	0.12	0.13	0.10	0.08	0.11	0.11
Dibenzo(a,h)anthracene	SM	mg/kg	0.02	0.02	0.03	0.02	< 0.02	0.02	0.02
Benzo[g,h,i]perylene	SM	mg/kg	0.02	0.11	0.11	0.09	0.07	0.10	0.10
Total PAH(16)	NS	mg/kg	0.34	1.33	1.84	1.01	1.09	1.10	1.16

Results Summary

Report No.: 24-53527, issue number 1

			ELAB Reference	359657	359658	359659	359660	359661	359662
			Customer Reference						
			Sample ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	HP23c	HP23c	HP23d	HP23d	HP23e	HP23e
			Sample Depth (m)	0.10	0.20	0.15	0.20	0.10	0.20
			Sampling Date	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	23.8	25.1	28.1	21.7	22.7	23.4
Material removed	N	%	0.1	15.7	11.6	7.5	13.4	10.6	8.9
Description of Inert material removed	N		0	Stones	Stones	Stones	Stones	Stones	Stones
Metals									
Arsenic	M	mg/kg	1	12.4	6.6	7.3	5.3	6.6	5.8
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	0.8	0.9	0.8	0.9
Chromium	M	mg/kg	5	46.5	49.3	23.3	17.6	19.2	14.3
Copper	M	mg/kg	5	39.4	47.1	41.7	62.7	33.5	20.1
Iron	N	mg/kg	35	24700	20600	15200	14800	14900	15000
Lead	M	mg/kg	5	90.9	69.6	104	116	83.1	52.2
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	23.3	24.4	17.3	17.3	16.5	16.1
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5	34.5	33.8	24.4	18.4	20.9	17.8
Zinc	M	mg/kg	5	117	177	267	242	190	114
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	c 1.2	c 1.0	c 0.8	c 0.7	c 0.7	c < 0.5
Polyaromatic hydrocarbons									
Naphthalene	SM	mg/kg	0.02	< 0.02	< 0.02	0.05	0.03	0.03	< 0.02
Acenaphthylene	SM	mg/kg	0.02	< 0.02	< 0.02	0.04	0.03	0.03	< 0.02
Acenaphthene	SM	mg/kg	0.02	< 0.02	< 0.02	0.12	0.11	0.12	< 0.02
Fluorene	S	mg/kg	0.02	< 0.02	0.03	0.09	0.08	0.10	< 0.02
Phenanthrene	SM	mg/kg	0.02	0.02	0.58	1.67	1.59	1.62	0.19
Anthracene	S	mg/kg	0.02	< 0.02	0.14	0.29	0.28	0.28	0.04
Fluoranthene	SM	mg/kg	0.02	0.06	0.78	3.44	3.26	2.94	0.45
Pyrene	SM	mg/kg	0.02	0.06	0.57	3.02	2.87	2.61	0.41
Benzo(a)anthracene	S	mg/kg	0.02	0.05	0.42	1.50	1.37	1.28	0.24
Chrysene	SM	mg/kg	0.02	0.05	0.41	1.73	1.46	1.45	0.27
Benzo(b)fluoranthene	SM	mg/kg	0.02	0.06	0.40	2.08	1.66	1.59	0.31
Benzo(k)fluoranthene	SM	mg/kg	0.03	< 0.03	0.15	0.87	0.59	0.58	0.14
Benzo(a)pyrene	S	mg/kg	0.02	0.04	0.28	1.61	1.42	1.23	0.25
Indeno(1,2,3-cd)pyrene	SM	mg/kg	0.02	0.04	0.19	1.25	0.96	0.86	0.18
Dibenzo(a,h)anthracene	SM	mg/kg	0.02	< 0.02	0.05	0.23	0.16	0.16	0.04
Benzo[g,h,i]perylene	SM	mg/kg	0.02	0.04	0.16	1.15	0.86	0.82	0.17
Total PAH(16)	NS	mg/kg	0.34	0.43	4.16	19.1	16.7	15.7	2.69

Method Summary

Report No.: 22-44702, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Acid neutralisation capacity	N	Air dried sample	18/11/2022		
Extractable cations - BS3882	N	Air dried sample	18/11/2022		ICPMS
Visible Contaminants	N		17/11/2022		
Sulphide	N	As submitted sample	22/11/2022	109	Colorimetry
Hexavalent chromium	N	As submitted sample	17/11/2022	110	Colorimetry
pH	M	Air dried sample	19/11/2022	113	Electromeric
Electrical conductivity of soil	N	Air dried sample.	21/11/2022	114	Electromeric
Acid Soluble Sulphate	U	Air dried sample	18/11/2022	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	18/11/2022	118	ICPMS
Phenols in solids	N	As submitted sample	17/11/2022	121	HPLC
Elemental Sulphur	M	Air dried sample	17/11/2022	122	HPLC
Loss on ignition at 450 deg C	M	Air dried sample	21/11/2022	129	Gravimetry
PAH (GC-FID)	M	As submitted sample	17/11/2022	133	GC-FID
Extr. Phos	N	Air dried sample	18/11/2022	140	ICPMS
Water soluble anions	M	Air dried sample	17/11/2022	172	Ion Chromatography
Low range Aliphatic hydrocarbons soil	N	As submitted sample	21/11/2022	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	21/11/2022	181	GC-MS
BTEX in solids	M	As submitted sample	21/11/2022	181A	GC-MS
Water soluble boron	N	Air dried sample	17/11/2022	202	Colorimetry
Total cyanide	M	As submitted sample	17/11/2022	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	18/11/2022	210	IR
TPH CWG soil by gc-gc	M	As submitted sample	16/11/2022	271	
Asbestos identification	U	Air dried sample	21/11/2022	280	Microscopy
Soil organic matter	U	Air dried sample	22/11/2022	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited

Method Summary

Report No.: 23-51341, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	05/12/2023	110	Colorimetry
Aqua regia extractable metals	M	Air dried sample	01/12/2023	300	ICPMS
Water soluble boron	N	Air dried sample	01/12/2023	202	Colorimetry

Tests marked N are not UKAS accredited

Method Summary

Report No.: 24-53527, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	30/04/2024	110	Colorimetry
Aqua regia extractable metals	M	Air dried sample	30/04/2024	300	ICPMS
Water soluble boron	N	Air dried sample	30/04/2024	202	Colorimetry

Tests marked N are not UKAS accredited

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Report Information

Report No.: 24-53527, issue number 1

Key	
U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
	Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
	ELAB are unable to provide an interpretation or opinion on the content of this report.
	The results relate only to the sample received.
	PCB congener results may include any coeluting PCBs
	Uncertainty of measurement for the determinands tested are available upon request
	Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

End of Report