



VALIDATION REPORT

Block A

5 to 9 Berkeley Avenue, Reading, Berkshire, RG1 6EL

Project Reference:

CON01-READ-052

Site Address:

Block A
5 to 9 Berkeley Avenue
Reading
Berkshire
RG1 6EL

Report Date:

25 April 2019

Version Number:

Version 1

Customer:

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EXECUTIVE SUMMARY

Stansted Environmental Services Limited (SES) has been commissioned by Weston Homes plc to prepare a Validation Report for a multi-storey development at the former 'Lok 'n' Store' site at 5 to 9 Berkeley Avenue, Reading, RG1 6EL, comprising 112 residential units, with an undercroft car park and areas of communal soft landscaping. This report refers to Block A, forming the northernmost building of the three-block development.

The previous Construction Phase Remediation Plan for the site, completed by SES, specified that a validated clean 200mm break layer and 450mm topsoil cover be provided in areas of proposed soft landscaping at the development stage in order to break the contaminant pathways of direct contact, ingestion and dust inhalation to future site users. The report specified that validation samples should be collected from the topsoil at a rate of one per 50m³ and analysis for a broad range of organic and inorganic contaminants of concern (discussed in the section below). A 2000-gauge gas proof membrane was specified in the floor construction of structures where undercroft parking was not proposed, as per the recommendations of BS8485:2015: *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*, and sites corresponding to CIRIA Characteristic Situation 2 (CS2).

Based upon the observations made at the study site by SES, the results of the attached chemical analysis and a review of information supplied by the Client the following has been established:

- Site reconnaissance by SES indicates that topsoil and subsoil have been provided to soft landscaped areas surrounding Block A to a depth of at least 450mm;
- Laboratory analysis of topsoil and subsoil imported to the site did not record significantly elevated concentrations of any of the potential contaminants tested;
- Although asbestos fibres were recorded within a sample of topsoil collected from trial pit VS05, located to the east of Block A, quantification testing indicated that this comprised less than 0.001% of the sample, by weight. It was therefore not considered to represent a significant risk to future site users. Furthermore, the detected fibres were recorded at a depth beneath the 450mm clean cover specified by the Remediation Method Statement. No asbestos fibres were recorded within topsoil, placed above the underlying subsoil layer; and
- Ground gas protection measures have been installed in accordance with the recommendations within the previous Remediation Method Statement. A Certificate of Conformity, confirming that appropriate gas protection measures have been installed correctly beneath Block A has been provided by Geo Shield Ltd and is appended to this document.

This Validation Report may be used to part discharge Condition 5(iv) of Planning Application 10/01567/EXT, for Block A, relating to the verification of remedial works.

1. INTRODUCTION

Stansted Environmental Services Limited (SES) has been commissioned by Weston Homes plc to prepare a Validation Report for a multi-storey development at the former 'Lok 'n' Store' site at 5 to 9 Berkeley Avenue, Reading, RG1 6EL, comprising 112 residential units, with an undercroft car park and areas of communal soft landscaping.

This report refers to Block A, forming the northernmost building of the three-block development.

1.1 Planning Status

The evidence compiled will be used to support Planning Application 10/01567/EXT (granted under appeal dated 4th October 2011) with conditions. Details of the specific planning conditions relating to contamination are shown below:

5. i) *No development shall take place until the method and extent of work for a detailed contaminated land phase II report (site investigation) has been agreed by the local planning authority in writing and carried out in accordance with the approved details by a competent person.*
- ii) *Following completion of the phase II report and before any construction above ground level, a remediation scheme to deal with any contaminants identified shall be submitted to and approved in writing by the local planning authority and carried out in accordance with the approved details. The scheme shall include an implementation timetable, monitoring proposals and a remediation verification methodology.*
- iii) *Should any unforeseen contamination be encountered during the development, the local planning authority shall be informed immediately. Any further investigation and remedial/protective works shall be carried out in accordance with timescales approved in writing by the local planning authority.*
- iv) *Construction of buildings shall not commence until an appropriately qualified person has provided a site completion report. This shall include details of the conclusions, actions taken and verification methodology at each stage of the works and shall include a sampling and analysis programme to confirm the adequacy of decontamination in accordance with the remediation scheme. Post remediation sampling and monitoring and future monitoring proposals and reporting shall also be detailed.*
- v) *If no contamination is encountered during the development, a letter confirming this fact shall be submitted to the local planning authority upon completion of the development.*

This Validation Report has been prepared as a response to part iv) of Condition 5 of the Planning Application.

1.2 National and Local Policy and Guidance

This Validation Report has been prepared in line with UK and Local guidance as evidence to discharge part iv) of Condition 5 of Planning Application 10/01567/EXT. The guidance includes;

- Model Procedures for the Management of Contaminated Land – Contaminated Land Report 11 (CLR11).

All validation work has been carried out in accordance with the Guidance document listed above and BS10175:2011 + A1:2013 (Code of Practice for the Investigation of Potentially Contaminated Sites) and BS5930:2015 (Code of Practice for Site Investigations).

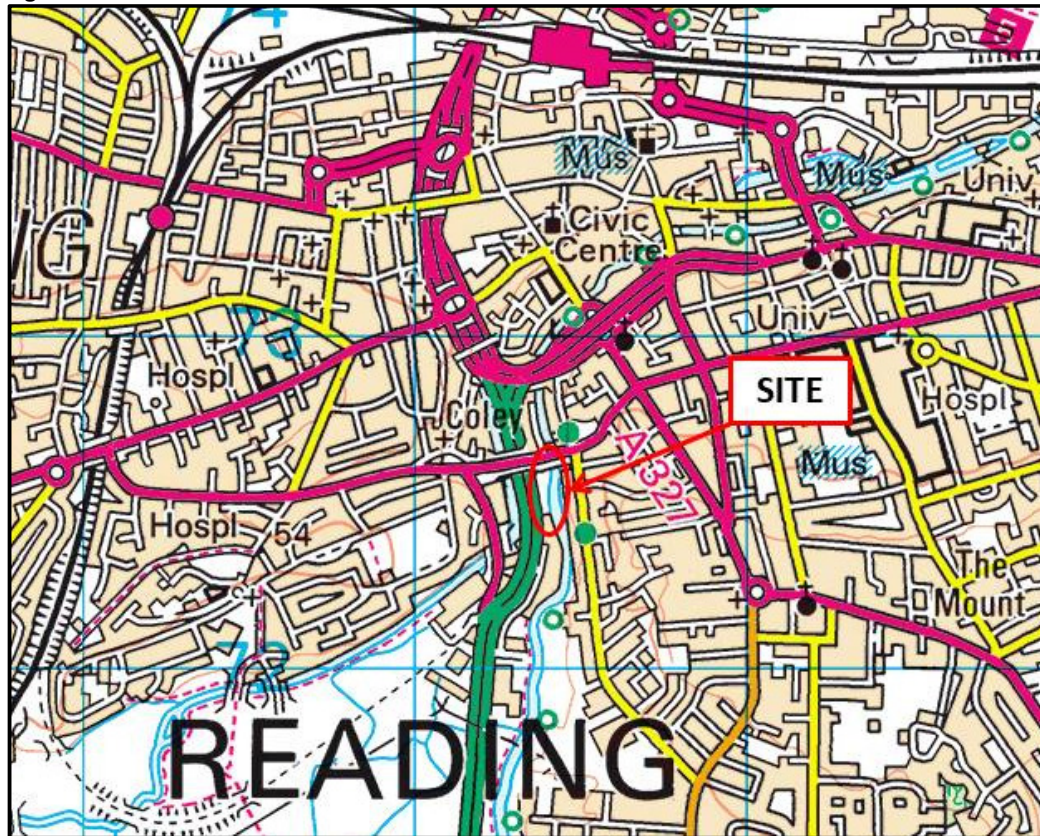
2. SITE SETTING

2.1 Site Location

2.2 Site Location

The site is located at the former 'Lok 'n' Store' site at 5 to 9 Berkeley Avenue, Reading, RG1 6EL, approximately 1km to the south of Reading Railway Station. The site is situated to the south of Berkeley Avenue, with the River Kennet forming its eastern boundary and the A33 trunk road forming the western boundary. To the south are industrial/commercial units associated with Rose Kiln Trading Estate. The site location is shown in Figure 1.

Figure 1: Site Location



2.2 Site Description

The site is roughly rectangular in shape, tapering towards its southern end and covers an area of approximately 0.50 hectares.

Prior to the development, the ground surface was lightly vegetated with some areas covered with building demolition rubble. Patches of weathered asphalt surfacing (possibly a former foot path or narrow road) followed the eastern boundary of the site. The site is lower than the adjacent A4 (Berkeley Avenue) road, at a similar elevation with the River Kennet located some 8m to 10m from the eastern boundary of the site. At the time of the verification works, several storeys of Block A had been constructed and landscaping completed on its northern, eastern and southern sides.

2.3 Geological Setting

Details of the geology underlying the site have been obtained from the British Geological Survey website (www.bgs.ac.uk).

British Geological Survey mapping indicates the site to be underlain by superficial deposits comprising Alluvium (clays, silts sands and gravels with deposits of peat) and River Gravel (sand and gravels), overlying Bedrock, comprising the Seaford and Newhaven Chalk Formation (undifferentiated).

The Environment Agency has classified the Alluvium and River Gravels as Secondary A Aquifers and the underlying Seaford and Newhaven Chalk Formation as a Principal Aquifer. The site is not indicated to be within a Groundwater Source Protection Zone.

The nearest surface water feature is the River Kennet which is about 10m to the east of the site.

3. SUMMARY OF PHASED INVESTIGATION

A number of reports have been prepared for the site as detailed below:

- SOILS Limited: Report on Desk Study at Land between the A33 and Elgar Road, Reading, Berkshire for Lok 'n' Store (Ref. J8948, dated 21st July 2005);
- SOILS Limited: Report on Ground Investigation at 5-9 Berkeley Avenue, Reading, Berkshire, RG1 6EL for Lok 'n' Store (Ref. J10683, dated June 2008);
- SOILS Limited: Report on Remediation Strategy at 5-9 Berkeley Avenue, Reading, Berkshire, RG1 6EL for Lok 'n' Store (Ref. J10799/RS, dated August 2008);
- ST Consult: Additional Site Investigation Report for 5-9 Berkeley Avenue, Reading for Taylor Wimpey West London (Ref. J12451, dated December 2015);
- SES: Phase II Ground Investigation & Generic Risk Assessment Report for 5-9 Berkeley Avenue, Reading, Berkshire, RG1 6EL (Ref. CON01-READ-052, dated December 2017); and
- SES: Remediation Method Statement for 5-9 Berkeley Avenue, Reading, Berkshire, RG1 6EL (Ref. CON01-READ-052, dated May 2018).

Information from the reports listed above, relevant to the current assessment, are summarised below:

The Phase 1 assessment indicated that the site comprised open land between 1879 and 1914 with an embankment in the northern and eastern part of the site from 1912 until 1999. Between 1931 and 1932, the site was used as a Saw Mill and, subsequently, as a depot between 1958 and 1963. The site was in use as a case & pallet works between 1969 and 1972. Sometime in 1986, the site was occupied by a works of unspecified use until 1995 with no further indication of its use after this time. An unidentified tank was present in the northeastern corner of the site between 1972 and 1995.

The subsequent Phase 2 Site Investigation by SOILS Limited comprised four cable percussion boreholes to a maximum depth of 20m below ground level (bgl) and nine windowless sampler holes to a maximum depth of 3.60m bgl. Ground conditions encountered comprised Made Ground to depths ranging between 1.50m bgl and 3.60m bgl underlain by Alluvium to a maximum depth of 4.00m bgl which in turn is underlain by River Terrace Deposits to a maximum depth of 9.90m bgl. The River Terrace Deposits were underlain by the Seaford Chalk Formation.

Soil and groundwater samples were collected and scheduled for laboratory analysis for contaminants of concern including metals, polycyclic aromatic hydrocarbons (PAH), volatile organic compounds (VOC), petroleum hydrocarbons (TPH) and asbestos.

The investigation identified elevated concentrations of TPH and PAH in samples collected from soil and groundwater beneath the site. The report suggested that there was a potential risk to human health and controlled waters from these contaminants.

A ground gas risk assessment was also undertaken which recommended that protection measures appropriate for CIRIA Characteristic Situation 2 (CS2) would be required for new dwellings on site.

Further investigation was undertaken by Card Geotechnics Limited (CGL) in 2011 following correspondence with the Environment Agency (EA), which confirmed that the discharge of Condition 4 of Planning Consent 07/00412/FUL was not recommended. The reasons given related to the remediation strategy proposed by SOILS Ltd assessing the site using the incorrect groundwater flow direction in the River Terrace Deposits and a suggestion by the EA that a plume of hydrocarbon contamination identified between boreholes WS9 and WS6 may be representative of two separate sources of contamination at approximately 3.00m bgl in the area to the south of WS6 and WS9. It was also recommended that groundwater quality data be provided for the central part of the site, in the area of BH3, before any demolition takes place. The location of tanks, stores and workshops were

also to be identified and included in a revised remediation strategy. Following the remediation of the site, further groundwater monitoring in the area of BH4 and BHA was requested to ensure that the source removal has been successful in protecting controlled waters.

In response, CGL reviewed the site history and environmental setting and drilled five additional window sampler boreholes with groundwater/gas monitoring installations, with associated chemical analysis of soil and groundwater samples. The borehole locations were agreed in advance with the EA.

The CGL investigation confirmed a groundwater flow direction towards the northeast. Elevated concentrations of lead, xylene, TPH and PAH were identified within the Made Ground and shallow alluvial deposits across the site. The most recent testing indicated that groundwater on the site was not impacted by hydrocarbon contamination, including the central area around BH3. No sources of gross contamination were found to be present in or to the south of WS6 and WS9.

Historic groundwater contamination was considered likely to be from either an off-site source, located up hydraulic gradient (e.g. the oil depot to the south) or due to fluctuations of the groundwater table causing leaching of contaminants from localised hydrocarbon impacted soils.

On this basis, no groundwater clean-up on the site was considered necessary.

Remediation of hotspots of leachable contaminants, known to exist in soils located around boreholes BH2, WS6 and, and likely to exist around boreholes BH3, BH4, WS3, CG02 and CG03 was recommended to mitigate against risks to groundwater, subject to a quantitative risk assessment to confirm remedial target levels.

Elevated concentrations of contaminants, including lead, xylenes, TPH and PAHs, in the soil were not considered to be a significant risk to long term human health as the proposed hardstanding across the site would break the contaminant pathway. Although limited soil gases were present, no specific remediation was considered to be required due to the ventilated car park to be constructed across the whole of the development footprint.

The investigation undertaken by ST Consult in 2015 generally agreed with the findings given in the earlier SOILS Ltd report.

- Elevated concentrations of lead in the Made Ground
- Elevated concentrations of mercury in the Made Ground
- Elevated concentrations of naphthalene in the Made Ground
- Elevated concentrations of TPH in the Made Ground
- Loose asbestos fibres within the Made Ground
- Dissolved phase TPH in the groundwater.

Both reports recommended that remedial works be undertaken.

The investigation undertaken by SES in 2017 generally confirmed the findings of the earlier reports. However, the data from all the reports was reassessed in light of the recently produced S4ULs for 'Public Open Space adjacent to residential areas'. This assumes that there are predominantly grassed/landscaped areas adjacent to high density residential developments. This use allows for informal grassed areas or more formal landscaped areas with a mixture of open space and covered soil with planting.

The results of the chemical analyses from all the investigations were processed in accordance with recommendations set out in the CIEH and CL:AIRE document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration'. Where the concentrations determined on site are

at or below the respective Generic Assessment Criteria (GAC), they are considered not to pose a risk and are removed from further consideration, unless otherwise stated.

Those determinands which exceeded the relevant S4UL/C4SL are summarised in the table below:

Table 1: Summary of Contaminants of Concern

Contaminant	Key statistics				S4UL* (POS res)	
	Number of detects	Min. Value (mg/kg)	Max. Value (mg/kg)	Mean Value (mg/kg)	S4UL (mg/kg)	No. Samples exceeding assessment criteria
Lead [#]	43	12	4300	566	630	13
Mercury	35	0.30	660	31	16	6
Benzo(a)anthracene	39	0.20	200	12	29	5
Chrysene	39	0.20	130	10	57	2
Benzo(b)fluoranthene	38	0.30	180	10	7.2	8
Benzo(a)pyrene	38	0.28	140	10	5.7	9
Indeno(123-cd)pyrene	36	0.23	120	7.2	82	1
Dibenzo(ah)anthracene	21	0.10	36	2.8	0.57	9
TPH aromatic C ₂₁ -C ₃₅	27	3.0	4400	705	3800	1
<i>Notes to Table</i> * Most appropriate screening values are Sustainable 4 Use Level (S4UL) for a public open space (adjacent to residential properties) end use, a sandy loam soil type, pH of 7 and a soil organic matter (SOM) of 2.5%. # Category 4 Screening Level (2014) used in absence of suitable S4UL.						

Further statistical analysis was undertaken which demonstrated that exceedances for both indeno(123-cd)pyrene and the aromatic TPH C₂₁ to C₃₅ fraction were part of the same population and, therefore, did not represent a risk to human health.

Chrysene and lead contamination was determined to be widespread across the site, while the remaining determinands were hotspots.

Therefore, it was shown that there were pollutant linkages due to elevated lead, mercury and individual speciated PAHs within the Made Ground.

In addition, chrysotile asbestos fibres were present locally within the Made Ground.

Groundwater samples were also collected and analysed as part of the various phases of site work. The results were initially screened against Water Quality Standards (WQS) comprising the Water Supply (Water Quality) Regulations 2000, and, where no guidance is given in the Water Supply Regulations, the *freshwater* Environmental Quality Standards (EQS), or World Health Organisation (WHO) guidelines, have been used.

It should be noted that there is no TPH guideline parameter within the Water Supply Regulations 2000. As such, the level of 10µg/l within the Water Supply Regulations 1989, has been adopted as a conservative approach.

A number of determinands were found to be marginally in excess of the WQS during the various monitoring rounds. However, the nearest potable abstraction is approximately 1km to the northeast for groundwater and 1km to the north for surface water. Given, the distance of the abstraction

points and that the site does not overlay a Groundwater Source Protection Zone, it is considered that the risk to water supplies is very low. In addition, the site is underlain by at least 5m of putty chalk which would inhibit the downward and lateral migration of contamination. In addition, removal of the near surface soils (and therefore contaminated soils), for basement construction, would also limit the potential for contamination to migrate.

Gas monitoring was undertaken on six occasions during 2017 with the results detailed below:

Table 2: Summary of Gas Monitoring (maximum values)

Sample Point	CH ₄ % v/v		CO ₂ % v/v		O ₂ % v/v		Flow l/hr
	Min	Max	Min	Max	Min	Max	
BH01	0.04	0.08	0.7	4.6	15.9	19.7	0.2
BH02	<0.01	0.10	0.1	4.9	15.1	20.7	0.6
BH03	0.09	0.15	0.4	6.6	5.6	16.3	0.6

In accordance with the methodology published in CIRIA Document C665 the maximum recorded values were taken to calculate a Gas Screening Value for the site. The GSV calculated for methane is 0.0009l/hr. The GSV calculated for carbon dioxide is 0.0396l/hr. Although these values indicate the site to be CIRIA CS1, levels of carbon dioxide exceeded 5% and it was considered that protection measures consistent with CIRIA Characteristic Situation 2 should be adopted.

The Conceptual Model was produced to show the active pollution linkages and is presented in the table overleaf.

Table 3: Post Intrusive Investigation Conceptual Site Model

Potential Source	Potential Contaminant	Potential Migration Pathway	Potential Receptor	Probability	Consequence	Overall Risk Classification	Discussion
Onsite Made Ground	Lead Mercury PAHs TPH	Contact with or ingestion of contaminated soils Inhalation of dust and vapours Leaching and subsequent migration Uptake of contaminants through soils, flora and fauna	Future Site Users Construction Workers Controlled Waters Structures	Low	Mild	Low	No private gardens are envisaged. Remedial works for landscaped areas will ameliorate any such risk
Onsite Made Ground	Asbestos	Contact with or ingestion of contaminated soils Inhalation of dust	Future Site Users Construction Workers Structures	Likely	Severe	High	No private gardens are envisaged. Remedial works for landscaped areas will ameliorate any such risk
Onsite Landfill Gas	Ground Gases (CO ₂)	Inhalation Migration into enclosed spaces leading to asphyxiation/explosion	Future Site Users Construction Workers Structures	High	Severe	Very High	It is likely that ground gases are being produced from naturally occurring organic material onsite. Gas membranes will be required where residential units and public access areas are present at ground level.
Onsite and Offsite Groundwater	TPH	Volatilisation	Future Site Users Construction Workers Structures	Low	Minor	Very Low	The site is not within a Groundwater Source Protection Zone and the nearest abstraction points are 1km to the north & northeast

4. PROPOSED REMEDIATION STRATEGY

A Remediation Method Statement was produced by SES in May 2018 and is summarised below:

4.1 Placement of Clean Capping

- In areas of communal soft landscaping, a 200mm thickness break layer (comprising recycled crushed aggregate, or similar), should be placed, followed by a coloured geotextile marker. A 450mm thickness of validated clean topsoil (or 300mm subsoil and a minimum of 150mm topsoil) should be placed above this;
- Whilst a certificate confirming contaminant concentrations for all imported soil should be obtained from the supplier prior to importation, independent chemical analysis of the material will also need to be undertaken once it is in place to confirm its quality and suitability for use in garden areas. All contaminant concentrations must be below published screening criteria for a residential end use with homegrown produce and the thickness of the imported layer will also need to be measured for validation purposes;
- Should any previously unidentified contamination or deleterious materials be encountered during ground works, further assessment will need to be undertaken;
- All waste material must be disposed of to an appropriately licensed site. The chemical testing and assessments previously carried out may be used to aid classification of any soil that is to be disposed of. However, further testing might be required by the tip prior to disposal. Copies of the waste consignment documentation should be kept for validation purposes; and
- A Validation Statement will need to be produced following completion of the remedial works, detailing the measures undertaken, including all relevant documentation, and confirming that the site is suitable for its proposed use.

4.2 Ground Gas Protection Measures

A minimum 2000-gauge gas-resistant membrane should be incorporated into ground-bearing or suspended floor slabs for the proposed development. Given the presence of undercroft car parking at ground level across much of the building footprint (which are open sided and offered a significant degree of ventilation), membranes would only be required beneath remaining enclosed ground floor areas (i.e. commercial units, stairwells, and maintenance areas).

5. VALIDATION

5.1 Soil Sampling

The break layer placed beneath the site was formed predominantly of recycled crushed aggregate obtained from the demolition of previous structures on the site (approximately 200mm thickness).

SES attended site on 29th October 2018 and 2nd April 2019 in order to validate the depth of topsoil and subsoil cover by excavating hand dug pits within the landscaped areas. A trial pit plan is presented within Appendix A and scaled photographs as Appendix B. The samples were forwarded to an UKAS/MCerts accredited laboratory on the day of collection in cool boxes and were scheduled for the following general suite of contaminants:

- A suite of metals comprising As, Cu, Cd, Cr, Cr VI, Hg, Pb, Ni, Se and Zn;
- Speciated Poly Aromatic Hydrocarbons (PAHs);
- Banded petroleum hydrocarbons (TPH CWG);
- Asbestos identification;
- Total monohydric phenols;
- Total cyanide;
- pH; and
- Total Organic Carbon (TOC).

The topsoil validation results are included as Appendix C of this report.

5.1.1 Generic Human Health Risk Assessment

Attention is drawn to the fact that whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there are potential risks of variations in ground conditions and contamination between and beyond the specific locations investigated. No liability can be accepted for any such variations. Furthermore, any recommendations are specific to the client requirements and no liability will be accepted should these be used by third parties without prior consultation with SES.

In order to assess risks to future site users, concentrations of contaminants of concern have been compared to Suitable 4 Use Levels (S4UL) generic Assessment Criteria (AC) published by Land Quality Management: Chartered Institute of Environmental Health (LQM:CIEH) in 2015.

The assessment has been based upon a residential land use (public open space) based on the proposed redevelopment of the site as a residential and commercial complex.

Soil Organic Matter (SOM) content for samples collected from the topsoil and subsoil ranged from 3.60% to 12.00%, with an average of 4.32%. Concentrations of contaminants of concern have therefore been compared to the S4UL (3.00% SOM) values.

A notable exclusion from the S4ULs is lead. In the absence of a S4UL for lead, the Category 4 Screening Level (C4SL) has been selected, published by DEFRA in 2014. It is noted that the C4SL are based on the acceptance of a low level of toxicological concern, rather than the more conservative standard adopted in the derivation of S4ULs, which are based on a tolerable or minimal level of risk.

The potential risk posed to controlled waters from contaminants of concern within soils beneath the site is not addressed by these screening criteria.

A comparison of the results recorded by the analysis with the corresponding generic screening criteria is presented in the following table for those samples which recorded positive results:

Table 4: Comparison of Analytical Data for Topsoil/Subsoil

Contaminant	Key statistics			S4UL* (POS _{resi})	
	Number of detections	Min. Value (mg/kg)	Max. Value (mg/kg)	S4UL (mg/kg)	No. Samples exceeding assessment criteria
Arsenic	14	11	14	79	0
Boron	7	1.0	3.0	21000	0
Cadmium	14	0.3	0.4	120	0
Chromium III	14	15	22	1500	0
Copper	14	27	130	12000	0
Lead [#]	14	96	200	630	0
Mercury	1		2.6	120	0
Nickel	14	12	19	230	0
Zinc	14	110	240	81000	0
Acenaphthylene	7	0.1	0.3	15000	0
Acenaphthene	1		0.4	15000	0
Fluorene	3	0.1	0.4	9900	0
Phenanthrene	14	0.4	3.8	3100	0
Anthracene	13	0.1	0.8	74000	0
Fluoranthene	14	1.1	7.4	3100	0
Pyrene	14	1.0	6.5	7400	0
Benzo(a)anthracene	14	0.6	3.2	29	0
Chrysene	14	0.6	3.4	57	0
Benzo(b)fluoranthene	14	0.6	3.6	7.2	0
Benzo(k)fluoranthene	14	0.6	3.6	190	0
Benzo(a)pyrene	14	0.6	3.9	5.7	0
Indeno(123-cd)pyrene	14	0.4	2.0	82	0
Dibenzo(ah)anthracene	12	0.2	0.7	0.57	2
Benzo(ghi)perylene	14	0.5	2.2	640	0
TPH (aliphatic C ₁₀ – C ₁₂)	3	19	24	13000	0
TPH (aromatic C ₁₀ – C ₁₂)	1		2.0	5000	0
TPH (aliphatic C ₁₂ – C ₁₆)	2	1.0	12	13000	0
TPH (aromatic C ₁₂ – C ₁₆)	11	2.0	10	5100	0
TPH (aliphatic C ₁₆ – C ₂₁)	10	2.0	39	250000	0
TPH (aromatic C ₁₆ – C ₂₁)	14	16	65	3800	0
TPH (aliphatic C ₂₁ – C ₃₅)	14	10	260	250000	0
TPH (aromatic C ₂₁ – C ₃₅)	14	55	500	3800	0
Notes to Table * Most appropriate screening values are Sustainable 4 Use Level (S4UL) for a public open space adjacent to residential dwellings end use, a sandy loam soil type, pH of 7 and a soil organic matter (SOM) of 1%. # Category 4 Screening Level (2014) use in absence of suitable S4UL.					

Loose asbestos fibres were recorded within a sample of subsoil collected from hand pit VS02, located on the eastern side of Block A, at a depth of approximately 0.60m bgl. However, topsoil in this section was replaced following the first sampling visit in October 2018. Asbestos fibres were not recorded in a sample collected from hand pit VS04, positioned in approximately the same location as trial pit VS02.

Loose asbestos fibres were also recorded within a sample of subsoil collected from trial pit VS05, located to the southeast of Block A at a depth of approximately 0.60m bgl. Quantification of this material indicated that asbestos made up less than 0.001% of the sample, by weight and was therefore not considered to represent a significant risk to future site users. Furthermore, the detected fibres were recorded at a depth beneath the 450mm clean cover specified by the Remediation Method Statement. No asbestos fibres were recorded within topsoil, placed above the underlying subsoil layer.

Dibenzo(ah)anthracene was recorded at a concentration marginally in excess of adopted GAC in one subsoil sample collected from hand pit VS04, located on the eastern side of Block A, at a depth of approximately 0.60m bgl (0.70mg/kg). Dibenzo(ah)anthracene was also recorded at a concentration marginally in excess of adopted GAC in one topsoil sample collected from hand pit VS07, located on the southern side of Block A, at a depth of approximately 0.30m bgl (0.60mg/kg). The adopted GAC for Dibenzo(ah)anthracene is 0.57mg/kg.

These exceedances are considered to be isolated and marginal and unlikely to pose a significant risk to site occupiers. Contaminants of concern were not recorded within any of the other samples at concentrations in excess of the adopted assessment criteria.

It was observed that topsoil had been placed on the steeply sloping strip of land to the north of Block A. However, this area of landscaping was not safely accessible at the time of the visits and could not be sampled. Given the inaccessibility of this area of the site, it is considered unlikely that future site users would come into contact with potential contaminants of concern beneath this area (if present). On this basis, the potential risk to future site users posed by potential contaminants of concern beneath this area of the site is not considered to be significant.

5.2 Ground Gas Protection Measures

A 2000-gauge gas proof membrane was installed beneath ground floor slabs in enclosed areas, not occupied by well ventilated undercroft car parking. A Certificate of Conformity, confirming that appropriate gas protection measures have been installed correctly beneath Block A has been provided by Geo Shield Ltd and is included as Appendix D of this report.

6. SUMMARY & CONCLUSIONS

Based upon the observations made at the study site by SES, the results of the attached chemical analysis and a review of information supplied by the Client the following has been established:

- Site reconnaissance by SES indicates that topsoil and subsoil have been provided to soft landscaped areas surrounding Block A to a depth of at least 450mm;
- Laboratory analysis of topsoil and subsoil imported to the site did not record significantly elevated concentrations of any of the potential contaminants tested;
- Although asbestos fibres were recorded within a sample of topsoil collected from trial pit VS05, located to the east of Block A, quantification testing indicated that this comprised less than 0.001% of the sample, by weight. It was therefore not considered to represent a significant risk to future site users. Furthermore, the detected fibres were recorded at a depth beneath the 450mm clean cover specified by the Remediation Method Statement. No asbestos fibres were recorded within topsoil, placed above the underlying subsoil layer; and
- Ground gas protection measures have been installed in accordance with the recommendations within the previous Remediation Method Statement. A Certificate of Conformity, confirming that appropriate gas protection measures have been installed correctly beneath Block A has been provided by Geo Shield Ltd and is appended to this document.

This Validation Report may be used to part discharge Condition 5(iv) of Planning Application 10/01567/EXT, for Block A, relating to the verification of remedial works.

APPENDICES

A – PLANS & FIGURES

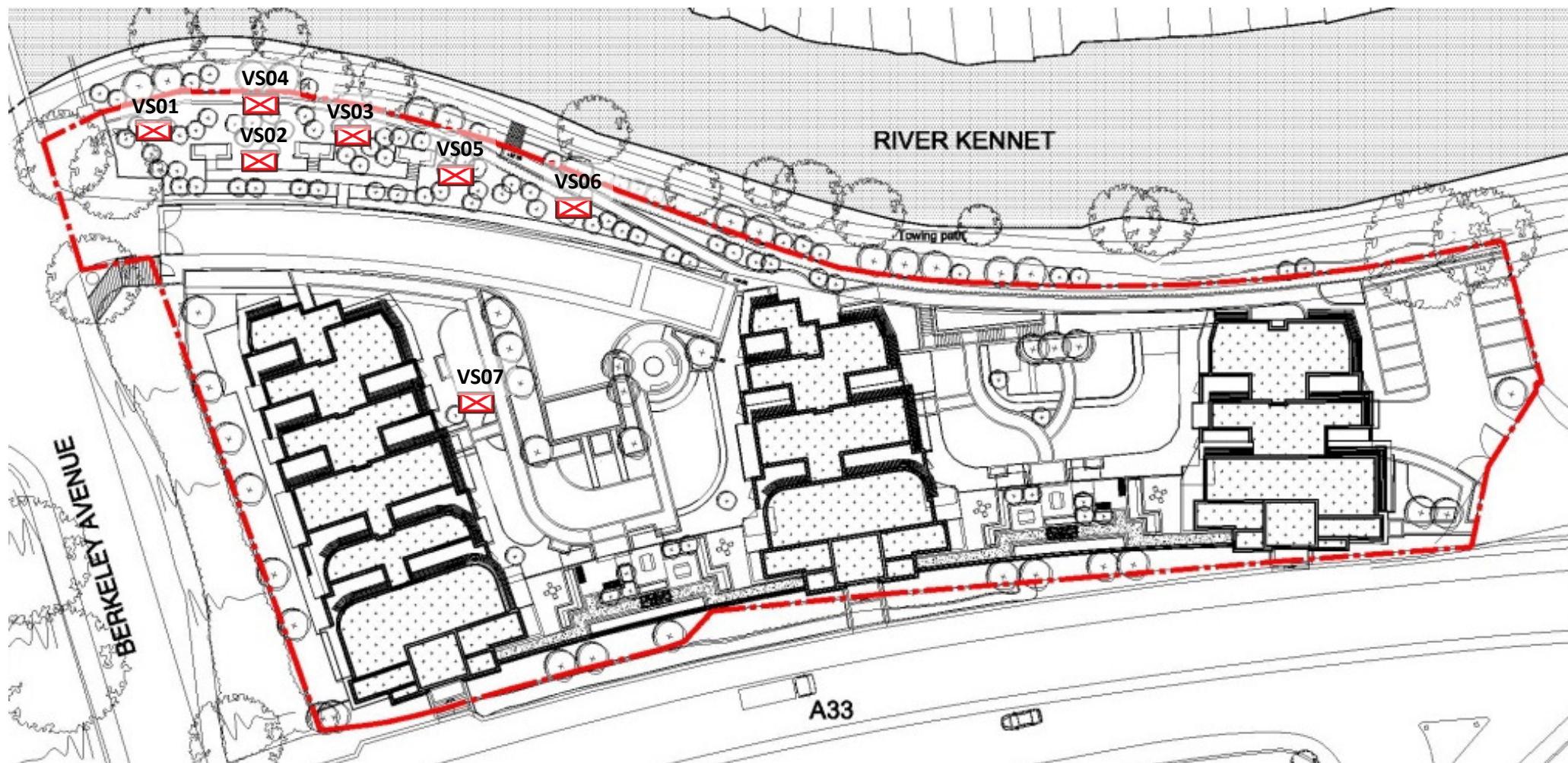
B– PHOTOGRAPHS

C – RESULTS OF LABORATORY ANALYSIS

D – GROUND GAS MEMBRANE CERTIFICATE OF CONFORMITY

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A. PLANS & FIGURES



LEGEND

 Location of Topsoil/Subsoil Validation Sample

Originator WGG

Checked & Approved SP

BERKELEY AVENUE, READING
CON01-READ-052

PROPOSED VALIDATION SAMPLE LOCATIONS

B. PHOTOGRAPHS



VS01



VS02

Originator	GB	BERKELEY AVENUE, READING CON01-READ-052 SITE PHOTOGRAPHS	
Checked & Approved	WGG		



VS03



VS04

Originator	GB	BERKELEY AVENUE, READING CON01-READ-052 SITE PHOTOGRAPHS	
Checked & Approved	WGG		



VS05



General – Communal Area

Originator	GB	BERKELEY AVENUE, READING CON01-READ-052 SITE PHOTOGRAPHS	
Checked & Approved	WGG		

13/07/2017



VS07

Originator	GB	BERKELEY AVENUE, READING	
Checked & Approved	WGG	CON01-READ-052	
		SITE PHOTOGRAPHS	

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C. RESULTS OF LABORATORY ANALYSIS

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 778352-1

Date of Report: 05-Nov-2018

Customer: Stansted Environmental Services Ltd
The Stansted Centre
Parsonage Road
Takeley
Essex
CM22 6PU

Customer Contact: Mr Gavin Greenwood

Customer Job Reference: CON01-READ-052

Customer Site Reference: WH186 - Reading

Date Job Received at Concept: 29-Oct-2018

Date Analysis Started: 30-Oct-2018

Date Analysis Completed: 05-Nov-2018

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Aislinn Arthey
Customer Service Advisor

Issued by :
Aislinn Arthey
Customer Service Advisor



Concept Reference: 778352 Project Site: WH186 - Reading Customer Reference: CON01-READ-052	
Soil SES Suite 1	Analysed as Soil

Concept Reference: 778352 Project Site: WH186 - Reading Customer Reference: CON01-READ-052	
Soil SES Suite 1	Analysed as Soil

Concept Reference					778352 006
Customer Sample Reference					VS03 @ 0.60m
Date Sampled					29-OCT-2018
Determinand	Method	Test Sample	LOD	Units	
Arsenic	T257	A40	2.0	mg/kg	12
Boron (water-soluble)	T82	A40	1	mg/kg	<1
Cadmium	T257	A40	0.1	mg/kg	0.3
Chromium	T245	A40	0.5	mg/kg	17
Copper	T245	A40	1.0	mg/kg	33
Lead	T257	A40	0.5	mg/kg	96
Mercury	T245	A40	1.0	mg/kg	<1.0
Nickel	T257	A40	0.5	mg/kg	13
Selenium	T257	A40	3	mg/kg	<3
Zinc	T257	A40	0.5	mg/kg	110
Asbestos ID	T27	A40			Asbestos not detected
Chromium VI	T6	A40	1	mg/kg	<1
Soil Organic Matter	T287	A40	0.1	%	3.6
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	1.3
pH	T7	A40			7.8
Cyanide(Total)	T546	AR	1	mg/kg	<1
Phenols(Mono)	T546	AR	1	mg/kg	<1

Concept Reference: 778352 Project Site: WH186 - Reading Customer Reference: CON01-READ-052 Soil Analysed as Soil Total and Speciated USEPA16 PAH (SE)									
Concept Reference					778352 001	778352 002	778352 003	778352 004	778352 005
Customer Sample Reference					VS01 @ 0.30m	VS01 @ 0.60m	VS02 @ 0.30m	VS02 @ 0.60m	VS03 @ 0.30m
Date Sampled					29-OCT-2018	29-OCT-2018	29-OCT-2018	29-OCT-2018	29-OCT-2018
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	0.6	0.5	1.0	1.2	1.2
Anthracene	T16	AR	0.1	mg/kg	0.2	0.1	0.4	0.4	0.3
Fluoranthene	T16	AR	0.1	mg/kg	1.6	1.4	3.8	3.4	3.4
Pyrene	T16	AR	0.1	mg/kg	1.3	1.2	3.4	2.9	3.0
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	0.8	0.6	1.5	1.6	1.7
Chrysene	T16	AR	0.1	mg/kg	0.9	0.8	1.7	1.9	2.0
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	0.8	0.6	1.4	1.4	1.5
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	0.8	0.6	1.4	1.5	1.6
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	0.8	0.7	1.6	1.6	1.7
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	0.5	0.4	0.9	0.9	0.9
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	0.2	0.2	0.3	0.4	0.4
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	0.6	0.5	1.1	1.1	1.1
PAH(total)	T16	AR	0.1	mg/kg	9.1	7.5	19	18	19

Concept Reference: 778352 Project Site: WH186 - Reading Customer Reference: CON01-READ-052 Soil Analysed as Soil Total and Speciated USEPA16 PAH (SE)					
Concept Reference					778352 006
Customer Sample Reference					VS03 @ 0.60m
Date Sampled					29-OCT-2018
Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T16	AR	0.1	mg/kg	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	1.0
Anthracene	T16	AR	0.1	mg/kg	0.3
Fluoranthene	T16	AR	0.1	mg/kg	2.1
Pyrene	T16	AR	0.1	mg/kg	1.7
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	0.9
Chrysene	T16	AR	0.1	mg/kg	1.1
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	0.8
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	0.8
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	0.9
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	0.5
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	0.2
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	0.6
PAH(total)	T16	AR	0.1	mg/kg	11

Value	Description
AR	As Received
A40	Assisted dried < 40C
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos subcontracted to REC Limited

Method Index

Value	Description
T16	GC/MS
T27	PLM
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T7	Probe
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T245	ICP/OES (Aqua Regia Extraction)
T219	GC/FID (SE)
T546	Colorimetry (CF)
T54	GC/MS (Headspace)
T287	Calc TOC/0.58
T6	ICP/OES
T82	ICP/OES (Sim)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2.0	mg/kg	U	001-006
Boron (water-soluble)	T82	A40	1	mg/kg	N	001-006
Cadmium	T257	A40	0.1	mg/kg	U	001-006
Chromium	T245	A40	0.5	mg/kg	U	001-006
Copper	T245	A40	1.0	mg/kg	U	001-006
Lead	T257	A40	0.5	mg/kg	U	001-006
Mercury	T245	A40	1.0	mg/kg	U	001-006
Nickel	T257	A40	0.5	mg/kg	U	001-006
Selenium	T257	A40	3	mg/kg	U	001-006
Zinc	T257	A40	0.5	mg/kg	U	001-006
Asbestos ID	T27	A40			SU	001-006
Chromium VI	T6	A40	1	mg/kg	N	001-006
Soil Organic Matter	T287	A40	0.1	%	N	001-006
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	U	001-006
pH	T7	A40			N	001-006
Cyanide(Total)	T546	AR	1	mg/kg	U	001-006
Phenols(Mono)	T546	AR	1	mg/kg	U	001-006
Benzene	T54	AR	1	µg/kg	U	001-006
Toluene	T54	AR	1	µg/kg	U	001-006
EthylBenzene	T54	AR	1	µg/kg	U	001-006
M/P Xylene	T54	AR	1	µg/kg	U	001-006
O Xylene	T54	AR	1	µg/kg	U	001-006
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001-006
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001-006
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	001-006
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001-006
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001-006
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001-006
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001-006
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	001-006
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	001-006
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	001-006
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	001-006
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	001-006
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	001-006
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	001-006
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	N	001-006
Naphthalene	T16	AR	0.1	mg/kg	U	001-006

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-006
Acenaphthene	T16	AR	0.1	mg/kg	U	001-006
Fluorene	T16	AR	0.1	mg/kg	U	001-006
Phenanthrene	T16	AR	0.1	mg/kg	U	001-006
Anthracene	T16	AR	0.1	mg/kg	U	001-006
Fluoranthene	T16	AR	0.1	mg/kg	N	001-006
Pyrene	T16	AR	0.1	mg/kg	N	001-006
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	U	001-006
Chrysene	T16	AR	0.1	mg/kg	U	001-006
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001-006
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	001-006
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	U	001-006
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	U	001-006
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	U	001-006
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	U	001-006
PAH(total)	T16	AR	0.1	mg/kg	U	001-006



Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 813657-1

Date of Report: 09-Apr-2019

Customer: Stansted Environmental Services Ltd
The Stansted Centre
Parsonage Road
Takeley
Essex
CM22 6PU

Customer Contact: Mr Gavin Greenwood

Customer Job Reference:

Customer Purchase Order: CON01-READ-052

Customer Site Reference: Berkeley Avenue, Reading

Date Job Received at Concept: 03-Apr-2019

Date Analysis Started: 04-Apr-2019

Date Analysis Completed: 09-Apr-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Mr Simon Wicks
Technical Lead

Issued by :
Aislinn Arthey
Customer Service Advisor

Customer Reference:

Analysed as Soil

Concept Reference					813657 001	813657 002	813657 003	813657 004	813657 005
Customer Sample Reference					VS4 @ 0.30m	VS4 @ 0.60m	VS5 @ 0.30m	VS5 @ 0.60m	VS6 @ 0.30m
Date Sampled					02-APR-2019	02-APR-2019	02-APR-2019	02-APR-2019	02-APR-2019
Matrix Class					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T257	A40	2	mg/kg	14	11	12	12	12
Boron (water-soluble)	T82	A40	1	mg/kg	1	<1	1	1	2
Cadmium	T257	A40	0.1	mg/kg	0.3	0.3	0.4	0.3	0.3
Chromium	T257	A40	0.5	mg/kg	19	17	21	16	18
Copper	T257	A40	2	mg/kg	36	41	57	36	59
Lead	T257	A40	2	mg/kg	200	110	150	120	130
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	15	15	15	13	14
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T257	A40	2	mg/kg	130	130	190	130	150
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Amosite Detected	Asbestos not detected
								Chrysotile Detected	
								Asbestos Insulation Board	
Soil Organic Matter	T287	A40	0.1	%	4.5	5.2	6.2	4.5	5.0
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	1.7	1.6	1.6	1.7	1.7
pH	T7	A40			7.8	7.6	7.6	7.9	7.8
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T921	M105	1	mg/kg	1	<1	3	2	2
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1	<1	<1	<1
Moisture @105C	T162	AR	0.1	%	22	19	24	21	19
Retained on 2mm	T2	A40	0.1	%	4.0	8.2	3.6	6.8	8.0

Concept Reference: 813657							
Project Site: Berkeley Avenue, Reading							
Customer Reference:							
Soil		Analysed as Soil					
Total and Speciated USEPA16 PAH (SE) (MCERTS)							
Concept Reference				813657 006	813657 007	813657 008	
Customer Sample Reference				VS6 @ 0.60m	VS7 @ 0.30m	VS7 @ 0.60m	
Date Sampled				02-APR-2019	02-APR-2019	02-APR-2019	
Matrix Class				Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units			
Acenaphthene	T1086	M105	0.1	mg/kg	<0.1	0.4	<0.1
Acenaphthylene	T1086	M105	0.1	mg/kg	0.1	<0.3 ⁽²⁾	0.1
Anthracene	T1086	M105	0.1	mg/kg	0.2	0.8	0.1
Benzo(a)Anthracene	T1086	M105	0.1	mg/kg	1.0	3.2	0.6
Benzo(a)Pyrene	T1086	M105	0.1	mg/kg	1.2	3.9	0.6
Benzo(b)fluoranthene	T1086	M105	0.1	mg/kg	1.2	3.6	0.6
Benzo(ghi)Perylene	T1086	M105	0.1	mg/kg	0.9	2.2	0.5
Benzo(k)fluoranthene	T1086	M105	0.1	mg/kg	1.1	3.6	0.6
Chrysene	T1086	M105	0.1	mg/kg	1.1	3.4	0.6
Dibenzo(ah)Anthracene	T1086	M105	0.1	mg/kg	0.3	0.6	0.2
Fluoranthene	T1086	M105	0.1	mg/kg	2.0	7.4	1.1
Fluorene	T1086	M105	0.1	mg/kg	<0.1	0.4	<0.1
Indeno(123-cd)Pyrene	T1086	M105	0.1	mg/kg	0.8	2.0	0.5
Naphthalene	T1086	M105	0.1	mg/kg	<0.1	<0.3 ⁽²⁾	0.1
Phenanthrene	T1086	M105	0.1	mg/kg	0.8	3.8	0.4
Pyrene	T1086	M105	0.1	mg/kg	1.8	6.5	1.0
PAH(total)	T1086	M105	0.1	mg/kg	13	42	7.1

Concept Reference: 813657									
Project Site: Berkeley Avenue, Reading									
Customer Reference:									
Soil					Analysed as Soil				
TPH (CWG) with MTBE & BTEX									
Concept Reference					813657 001	813657 002	813657 003	813657 004	813657 005
Customer Sample Reference					VS4 @ 0.30m	VS4 @ 0.60m	VS5 @ 0.30m	VS5 @ 0.60m	VS6 @ 0.30m
Date Sampled					02-APR-2019	02-APR-2019	02-APR-2019	02-APR-2019	02-APR-2019
Matrix Class					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Benzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C6-C7 aromatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C6-C8 aliphatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.20 ^(2,110)	<0.20 ^(110,2)	<0.20 ^(2,110)
TPH (C8-C10 aromatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.20 ^(110,2)	<0.20 ^(110,2)	<0.20 ^(2,110)
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1 ⁽¹³⁾	<1 ⁽¹³⁾	<1 ⁽¹³⁾	24	23
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2 ⁽¹³⁾	<2 ⁽¹³⁾	2 ⁽¹³⁾	<10 ⁽⁹⁾	<10 ⁽⁹⁾
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	12 ⁽¹³⁾	<1 ⁽¹³⁾	1 ⁽¹³⁾	<10 ⁽⁹⁾	<10 ⁽⁹⁾
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	8 ⁽¹³⁾	5 ⁽¹³⁾	10 ⁽¹³⁾	<10 ⁽⁹⁾	<10 ⁽⁹⁾
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	39 ⁽¹³⁾	3 ⁽¹³⁾	5 ⁽¹³⁾	<10 ⁽⁹⁾	<10 ⁽⁹⁾
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	44 ⁽¹³⁾	35 ⁽¹³⁾	41 ⁽¹³⁾	40	24
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	29 ⁽¹³⁾	26 ⁽¹³⁾	150 ⁽¹³⁾	180	170
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	71 ⁽¹³⁾	130 ⁽¹³⁾	100 ⁽¹³⁾	500	210

Concept Reference: 813657 Project Site: Berkeley Avenue, Reading Customer Reference:	
Soil TPH (CWG) with MTBE & BTEX	Analysed as Soil

Soil	Analysed as Soil
TPH (CWG) with MTBE & BTEX	

Concept Reference	813657 006	813657 007	813657 008
Customer Sample Reference	VS6 @ 0.60m	VS7 @ 0.30m	VS7 @ 0.60m
Date Sampled	02-APR-2019	02-APR-2019	02-APR-2019
Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil

Determinand	Method	Test Sample	LOD	Units			
Benzene	T209	M105	10	µg/kg	<10	<10	<10
Toluene	T209	M105	10	µg/kg	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10
TPH (C5-C6 aliphatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C6-C7 aromatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C6-C8 aliphatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T54	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T54	M105	0.10	mg/kg	<0.20 ^(110,2)	<0.20 ^(110,2)	<0.20 ^(2,110)
TPH (C8-C10 aromatic)	T54	M105	0.10	mg/kg	<0.20 ^(110,2)	<0.20 ^(110,2)	<0.20 ^(2,110)
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1 ⁽¹³⁾	19	<1 ⁽¹³⁾
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2 ⁽¹³⁾	<10 ⁽⁹⁾	<2 ⁽¹³⁾
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	<1 ⁽¹³⁾	<10 ⁽⁹⁾	<1 ⁽¹³⁾
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	6 ⁽¹³⁾	<10 ⁽⁹⁾	9 ⁽¹³⁾
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	3 ⁽¹³⁾	<10 ⁽⁹⁾	4 ⁽¹³⁾
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	33 ⁽¹³⁾	65	31 ⁽¹³⁾
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	32 ⁽¹³⁾	260	48 ⁽¹³⁾
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	82 ⁽¹³⁾	440	91 ⁽¹³⁾

Index to symbols used in 813657-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
13	Results have been blank corrected.
9	LOD raised due to dilution of sample
110	LOD raised due to low internal standard recovery.
2	LOD Raised Due to Matrix Interference
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos subcontracted to REC Limited
Retained on 2mm is removed before analysis

Method Index

Value	Description
T54	GC/MS (Headspace)
T82	ICP/OES (Sim)
T209	GC/MS (Head Space)(MCERTS)
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T162	Grav (1 Dec) (105 C)
T6	ICP/OES
T7	Probe
T909	GCxGC
T242	2:1 Extraction/ICP/OES (TRL 447 T1)

T2	Grav
T921	Colorimetry (CF) (MCERT)
T287	Calc TOC/0.58
T245	ICP/OES (Aqua Regia Extraction)
T27	PLM
T1086	GC/MS (GSOP12A)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	M	001-008
Boron (water-soluble)	T82	A40	1	mg/kg	N	001-008
Cadmium	T257	A40	0.1	mg/kg	M	001-008
Chromium	T257	A40	0.5	mg/kg	M	001-008
Copper	T257	A40	2	mg/kg	M	001-008
Lead	T257	A40	2	mg/kg	M	001-008
Mercury	T245	A40	1.0	mg/kg	U	001-008
Nickel	T257	A40	0.5	mg/kg	M	001-008
Selenium	T257	A40	3	mg/kg	U	001-008
Zinc	T257	A40	2	mg/kg	M	001-008
Asbestos ID	T27	A40			SU	001-008
Soil Organic Matter	T287	A40	0.1	%	N	001-008
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	001-008
pH	T7	A40			M	001-008
Chromium VI	T6	A40	1	mg/kg	N	001-008
Cyanide(Total)	T921	M105	1	mg/kg	M	001-008
Phenols(Mono)	T921	M105	1	mg/kg	M	001-008
Moisture @105C	T162	AR	0.1	%	N	001-008
Retained on 2mm	T2	A40	0.1	%	N	001-008
Acenaphthene	T1086	M105	0.1	mg/kg	M	001-008
Acenaphthylene	T1086	M105	0.1	mg/kg	M	001-008
Anthracene	T1086	M105	0.1	mg/kg	M	001-008
Benzo(a)Anthracene	T1086	M105	0.1	mg/kg	M	001-008
Benzo(a)Pyrene	T1086	M105	0.1	mg/kg	M	001-008
Benzo(b)fluoranthene	T1086	M105	0.1	mg/kg	M	001-008
Benzo(ghi)Perylene	T1086	M105	0.1	mg/kg	M	001-008
Benzo(k)fluoranthene	T1086	M105	0.1	mg/kg	N	001-008
Chrysene	T1086	M105	0.1	mg/kg	M	001-008
Dibenzo(ah)Anthracene	T1086	M105	0.1	mg/kg	M	001-008
Fluoranthene	T1086	M105	0.1	mg/kg	M	001-008
Fluorene	T1086	M105	0.1	mg/kg	M	001-008
Indeno(123-cd)Pyrene	T1086	M105	0.1	mg/kg	M	001-008
Naphthalene	T1086	M105	0.1	mg/kg	M	001-008
Phenanthrene	T1086	M105	0.1	mg/kg	M	001-008
Pyrene	T1086	M105	0.1	mg/kg	M	001-008
PAH(total)	T1086	M105	0.1	mg/kg	N	001-008
Benzene	T209	M105	10	µg/kg	M	001-008
Toluene	T209	M105	10	µg/kg	M	001-008
EthylBenzene	T209	M105	10	µg/kg	M	001-008
M/P Xylene	T209	M105	10	µg/kg	M	001-008
O Xylene	T209	M105	10	µg/kg	M	001-008
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-008
TPH (C5-C6 aliphatic)	T54	M105	0.10	mg/kg	N	001-008
TPH (C6-C7 aromatic)	T54	M105	0.10	mg/kg	N	001-008
TPH (C6-C8 aliphatic)	T54	M105	0.10	mg/kg	N	001-008
TPH (C7-C8 aromatic)	T54	M105	0.10	mg/kg	N	001-008
TPH (C8-C10 aliphatic)	T54	M105	0.10	mg/kg	N	001-008
TPH (C8-C10 aromatic)	T54	M105	0.10	mg/kg	N	001-008
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	N	001-008
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	N	001-008
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	N	001-008
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	N	001-008
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	N	001-008
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	N	001-008
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	N	001-008
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	N	001-008

Concept Life Sciences

Certificate of Analysis

Report Number: 814935-1

Date of Report: 16-Apr-2019

Customer: Stansted Environmental Services Ltd
The Stansted Centre
Parsonage Road
Takeley
Essex
CM22 6PU

Customer Contact: Mr Gavin Greenwood

Customer Job Reference: CON01-READ-052

Customer Site Reference: Berkeley Avenue, Reading

Date Job Received at Concept: 03-Apr-2019

Date Analysis Started: 09-Apr-2019

Date Analysis Completed: 16-Apr-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual

Report checked
and authorised by :
Aislinn Arthey
Customer Service Advisor

Issued by :
Aislinn Arthey
Customer Service Advisor



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D. GROUND GAS MEMBRANE CERTIFICATE OF CONFORMITY



PRE-SIGN OFF



CERTIFICATE OF CONFORMITY

PROJECT: READING RIVERSIDE DATE: 23/06/2018

PROJECT CONTACT: ANDREW ALFRED REPORT Nr 02

INSPECTION & VALIDATION DETAILS:

RE - INSPECTION OF ALL CAPS.
INSPECT BASE LAYER PRIOR TO CAGES

AREA/GRID LINE/PLOT NUMBER SIGNED OFF

- | | | | |
|---|-----------------------|---|--|
| 1 | <u>AA-RA X A1-A3</u> | 4 | |
| 2 | <u>MC-BC X M12-M5</u> | 5 | |
| 3 | <u>BB-BF X B1-B3</u> | 6 | |

OUTSTANDING REMEDIATIONS

- | | |
|---|-------------|
| 1 | <u>WONG</u> |
| 2 | |

Signed on behalf of GeoShield: J. Turnbull J TURNBULL

Signed on behalf of Client: SAM ALFRED

WHEN REPORT INVOICE HAS BEEN PAYED THE FULL REPORT WILL BE ISSUED.
ON SETTLEMENT OF FINAL ACCOUNT VERIFICATION CERTIFICATE WILL BE ISSUED



PRE-SIGN OFF



CERTIFICATE OF CONFORMITY

PROJECT: RIVERSIDE READING DATE: 25/06/18

PROJECT CONTACT: ANDREW ALFRED REPORT Nr 03

INSPECTION & VALIDATION DETAILS:

SAT AM.

INSPECT WRAP ROUND BEFORE BACKFILL

AREA/GRID LINE/PLOT NUMBER SIGNED OFF

1	<u>AA-RA X A1-A3</u>	4	
2		5	
3		6	

OUTSTANDING REMEDIATIONS

1	<u>NONE</u>
2	

Signed on behalf of GeoShield: Andrew Alfred

Signed on behalf of Client: Simon C.

WHEN REPORT INVOICE HAS BEEN PAYED THE FULL REPORT WILL BE ISSUED.
ON SETTLEMENT OF FINAL ACCOUNT VERIFICATION CERTIFICATE WILL BE ISSUED



GEOSHIELD LTD

VERIFICATION PROGRAMS FOR
GROUND GAS PROTECTION SYSTEMS

PRE-SIGN OFF

CERTIFICATE OF CONFORMITY

PROJECT: RIVERSIDE APARTMENTS

DATE:

29/06/18

PROJECT CONTACT: ANDREW

REPORT Nr:

04

INSPECTION & VALIDATION DETAILS:

Inspection of wrap round to Block B.
Backfilled before inspection, unable
to complete verification
No further backfilling before
inspection.

AREA/GRID LINE/PLOT NUMBER SIGNED

1 ME - BC X M23 - M5

4

2

5

3

6

OUTSTANDING REMEDIATIONS

1

2

Signed on behalf of Geoshield:

Amunball J. THREMBALL

Signed on behalf of Client:

SAM CHAFFORD

WHEN REPORT INVOICE HAS BEEN PAYED THE FULL REPORT WILL BE ISSUED.

ON SETTLEMENT OF FINAL ACCOUNT VERIFICATION CERIFICATE WILL BE ISSUED.