Gedney, Oliver

From: Grant, David
Sent: 10 December 2020 20:47
To: _planningadvice
Subject: FW: Horseshoe Road H16-0935-20
Attachments: We sent you safe versions of your files; 0492 Land Off Horseshoe Road Spalding Lincs - Phase 2 Report - April 2018-signed.pdf

Please add this Remediation Method Statement to the file under 6SUP – Remediation Method Statement.

Many thanks,

David Grant | Senior Planning Officer | **South Holland District Council**
Direct Dial: 01775 764472
www.sholland.gov.uk
Please note that any informal officer opinion expressed by this email is without prejudice and is not binding on the Council during the consideration of any formal application.

From: G R MERCHANT LTD <grmerchant.arch.cons@gmail.com>
Sent: 10 December 2020 11:39
To: Grant, David <dgrant@sholland.gov.uk>
Subject: Re: Horseshoe Road H16-0935-20

Mimecast Attachment Protection has deemed this file to be safe, but always exercise caution when opening files.

This message originated from outside your organization

Dear David,

Please see attached report as requested.

Regards
Sarah

G R Merchant Ltd
01406 490800
www.grmerchantltd.com

We wish you all a Merry Christmas & A Happy New Year
This office will be closed from Tuesday 22nd December PM and re-opens Monday 4th January
All emails will be monitored during this time

On Mon, 7 Dec 2020 at 11:40, Grant, David <dgrant@sholland.gov.uk> wrote:

> Dear Sarah,
>
> The Environmental Protection Officer, Sue Armour, has requested a copy of the remediation method statement that was agreed for this site.

Kind regards,

David Grant | Senior Planning Officer | **South Holland District Council**
Direct Dial: 01775 764472
www.sholland.gov.uk

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ENVIRONMENTAL LTD

PROPOSED RESIDENTIAL DEVELOPMENT
LAND OFF HORSESHOE ROAD
SPALDING
LINCS.

PROPOSED RESIDENTIAL DEVELOPMENT
LAND OFF HORSESHOE ROAD
SPALDING
LINCS.

GEOENVIRONMENTAL GROUND INVESTIGATION REPORT – PHASE 2

Report Ref.: 0492/2

Prepared by :

D Sargeant
D Sargeant

Date:

April 2018

Goldfinch Environmental Limited
19 Palmer Street, Walsham-le-Willows, Bury St Edmunds, Suffolk, IP31 3BZ
Tel: 01359 258681

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APPENDICES

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Appendix 2	-	Exploratory Location Records
Appendix 3	-	Chemical Laboratory Test Report

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PROPOSED RESIDENTIAL DEVELOPMENT

LAND OFF HORSESHOE ROAD

SPALDING

LINCS.

1. INTRODUCTION.

1.1. General.

This report describes the findings of a geoenvironmental site investigation undertaken by Goldfinch Environmental Limited, on the instruction of Mr B Maddison, South Lincs Plant Hire & Sales Ltd (the Client), via the offices of G R Merchant, at a site located off Horseshoe Road, Spalding, Lincolnshire. A site location plan has been included as Figure 1 towards the back of this report to assist the reader.

A site location plan has been provided as Figure 1 towards the back of this report. The proposed layout for the site can be seen in Figure 2b, also towards the back of this report.

Prior to commencement of the fieldwork described in this report, the scope for the Phase 2 investigation was discussed and subsequently agreed in writing with South Holland District Council.

The purpose of the investigation was to characterise the shallower soils at the site in the context of the potential contamination sources identified in the Desk Study and assess the potential risk to human health from the soils present in the proposed garden areas in the new development, as required by the Regulator.

This report describes the outcome of the completed fieldwork and reviews and interprets the factual results of the chemical laboratory testing in the context of risk to human health and the wider environment and provides outline comments regarding the need for, and strategy for, the management of any *proven* land contamination. Variation to the approved strategy, based upon the findings of the fieldwork as it progressed, has been documented within this report accordingly.

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2. LIMITATIONS.

This report is for the sole reliance and use of the referred Client. Any Third Party coming into possession of this report relies on it at their own risk unless written permission is expressly sought from Goldfinch Environmental Limited. The author owes them no duty of care and skill. Goldfinch Environmental Ltd accepts no responsibility or liability for the consequences of this document being used for purposes other than that for which it was commissioned and the assessments provided herein should not be relied on as a legal opinion.

The findings and opinions expressed are relevant to the time of the site visit and information review and should not be relied upon to represent conditions at substantially later dates. The assessments and opinions given in this report are based upon information available at the time of the report. Where additional information comes available which may affect or identify a need to review our conclusions or assessments we request the opportunity (and reserve the right), to review the information and where warranted, modify our assessment / opinion in part or wholly, accordingly.

This intrusive (Phase 2) investigation report does not include any geotechnical considerations pertaining to the site as these were outside the agreed brief. Goldfinch Environmental Ltd cannot and does accept any responsibility or liabilities for geotechnical inferences, assumptions or conclusions drawn by any other Parties as a result of information included in this report.

The risk assessment was based on the source-pathway-receptor framework, with respect to the geoenvironmental condition of the site in the context of various sensitive receptors. Goldfinch Environmental Ltd have based this desk study upon the sources given in this report, and believes them to be reliable but cannot and does not guarantee the authenticity or reliability of the data it has relied upon

The recommendations given in this report are based on guidance and best practice in place at the time of issue of the report, the information available at the time of the investigation, the nature of the indicated proposed development and associated end user behaviour patterns. Should any of the foregoing change at any time this report should be reviewed (by a suitably qualified person), in the context of proposed changes.

This investigation report and the Conceptual Model and Risk Assessment included in Section 7 of this report have been based upon the construction details, layout drawings and pattern of occupancy/usage provided by the Client and/or their Agent. Where these details are subject to change either by the commissioning Party (Client), (or a subsequent owner where a site is ‘sold-on’), then this report will need to be reviewed and amended accordingly in the light of any such proposed design changes. It is reasonably anticipated this review would be required by the Local Planning Authority/Regulator.

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3. LEGISLATIVE & REGULATORY SETTING.

The Environmental Protection Act of 1990 created the framework for the identification and remediation of contaminated land. The Act defines "contaminated land" as any land, which appears by the Local Authority to be "in such a condition, by reason of substances, in, on, or under the land that significant harm is being caused or there is significant possibility of such harm being caused, or, pollution of Controlled Waters is being, or is likely to be, caused".

Land potentially affected by 'contamination' is a material consideration for planning purposes together with its relationship with 'regulatory intervention' (Part IIa), and 'voluntary' investigation (which includes redevelopment of sites which may be affected by contamination). The Model Procedures (CLR-11, Environment Agency 2004), provide a generic framework indicating key technical activities applicable in each of these contexts.

The management of land contamination broadly comprises three components, which are identified as 'Risk assessment', 'Options appraisal' and 'Implementation'. These, in turn, determine if any *un*acceptable risks exist, ascertain the most appropriate remediation strategy for the site and, finally, demonstrate that the strategy will be effective.

In accordance with this and other current guidance, where a 'land quality' risk assessment is required each 'Relevant Pollutant Linkage' (RPL, formerly referred to as "source-pathway-receptor" framework), is separately identified and a level of risk attached. This is documented in the form of a 'Conceptual Model'.

The outcome of the assessment of established, plausible relevant pollutant linkages is used to determine qualitatively the need for further investigation, or remediation with ensuing mitigation of the determined unacceptable risk. (In accordance with the Model Procedures and Regulatory preference, detailed remedial measures should be provided in a separate phase).

The risk assessment takes account of the local environment, end user behaviour patterns, and the nature of the development in relation to proven 'unacceptable' risk. This is the approach advocated by current guidance and therefore has been adopted in the assessment of this site.

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4. SITE LOCATION AND DESCRIPTION.

At the time the fieldwork was carried out as part of this investigation the site comprised an open plot of land with two main buildings and was mainly down to hard cover (apart from peripheral soft cover) and was unchanged from the time of the site walkover survey carried out as part of the Phase 1 Desk Study report.

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5. ENVIRONMENTAL SITE INVESTIGATION.

5.1. Fieldwork.

Ground conditions were determined by advancing nine number exploratory locations by percussive methods to depths between approximately 1.0m and 2.40m in agreement with the (LPA-) approved strategy.

The exploratory locations, (referenced WS1-9 inclusive), are shown (dimensioned) on a plan of the site (not to scale), in Figure 2b towards the back of this report. The accompanying Exploratory Location Records (Logs) describing the soils encountered during the fieldwork have been included in Appendix 2 towards the back of this report.

Exploratory locations had been positioned having taken account of specific potential contamination sources (e.g. WS7 and WS8 in the area of fuel tanks), access, obstructions and possible service locations together with appropriate acknowledgement of the proposed layout for the development together with proposed garden and soft landscaping areas, as agreed with the Regulator.

Site operations were carried out generally in accordance with BS 5930, “Code of Practice for Site Investigation”, and BS 10175:2011 as required by the Regulator.

Soil samples for inorganic analyses were placed in 1-litre plastic tubs which sealed upon closure, or where necessary, for organics analysis, in 250ml amber glass jars with PTFE-lined screw-on tops.

Where appropriate, samples were placed in cool-boxes, pre-cooled to $4^{o}C \pm 2^{o}C$, for delivery to the chemical test laboratory.

5.2. Laboratory Analyses.

Upon completion of the fieldwork, in accordance with the LPA-Approved strategy letter eight soil samples were despatched, under chain of custody, to a UKAS and MCERTS accredited analytical laboratory for analysis.

The analytical schedule (variously) comprised a metals suite, pH, SOM and Speciated PAHs as agreed with the Regulator. Asbestos I.D. was alllowed for in the initial strategy. However, there was no evidence of its presence in arising soils therefore it was reasonably omitted from the analytical schedule.

The Chemical Laboratory Test Report(s) containing the factual test results are included in Appendix 3 towards the back of this report.

5.3 Groundwater Observations During Fieldwork.

Groundwater was not encountered in any of the exploratory locations during the fieldwork.

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5.4. Proven Ground Conditions.

5.4.1. Overview.

The soil profile at the exploratory locations generally comprised a 'surface layer' of Made Ground and/or 'Topsoil' underlain by cohesive soils as described in Sections 5.4.2 and 5.4.3 of this report accordingly.

5.4.2. Made Ground (& Possible Made Ground).

This horizon was encountered from ground (surface) level in all of the exploratory locations (except WS1), and generally comprised either lean mix concrete (WS1, WS2 and WS9) or 'loose' soils of (variously) sandy, gravelly clay with variable fractions of comminuted concrete brick and flint. This horizon appeared to be present to depths between approximately 0.10 and 0.55m at these locations.

These materials are generally considered to be 'inert' in nature and therefore not a 'plausible' source of contamination.

5.4.3. Clay.

This horizon was encountered in all the exploratory locations at approximate depths of between 0.02 and 0.55m. It was generally described as firm to stiff, or soft to firm, dark brown (occasioanlly mottled orange brown) silty clay with a variable subordinate fraction of angular to subangular fine to coarse gravel sized fragments of flint.

This horizon was not fully penetrated.

5.5. Evidence of Potential Contamination.

There were no indicators, olfactory or visual, of potential contamination in the arising soils at any of the exploratory locations except inert Made Ground (not considered a plausible source) and a small pocket of dark grey ash in borehole WS4 at very shallow depth.

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6. DISCUSSION OF CHEMICAL LABORATORY TEST RESULTS.

6.1. Overview.

This section of the report provides commentary on the interpretation of the results of the chemical laboratory testing of the seven soil samples obtained from the site. The outcome of the review was to be carried forward into the [updated] Conceptual Model and Risk Assessment for the site which is included in Section 7 of this report.

The site has been proposed for residential development with private gardens as described in Section 1 of this report. For the purpose of the assessment of the chemical laboratory test results the LQM/CIEH 'S4UL' values for 'residential with home-grown produce' were employed as required by the Regulator with an organic matter content of **2.5**% (based upon the results of the chemical laboratory testing) taking the precautionary approach as required by the Regulator.

6.2. Land Contamination.

6.2.1. Inorganic Determinants.

Nine soil samples were tested for a suite of metals which included Arsenic, Lead, Copper, Nickel, Chromium, Zinc, Cadmium, Selenium and Mercury.

When compared to current guidance values for human health assessment one soil sample exceeded the guidance criteria of 180mg kg^{-1} for nickel, and 3700mg kg^{-1} for zinc and two soil samples exceeded the guidance criteria of 200mg kg^{-1} for lead. The referred samples are WS3, D1 @ 0.30-0.40m and WS8, D1 @ 0.30-0.40m. For the purposes of clarity this has been tabulated below:~

Sample I.D.	WS3	WS8	**Guidance Value (mg kg^{-1})**
Nickel	1100	-	180
Zinc	4200	-	3700
Lead	330	360	200

To assist the reader these results have been shown on a proposed layout of the site provided as Figure 3 towards the back of this report.

6.2.2. Organic Determinants.

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Nine soil samples were analysed for speciated polycyclic aromatic hydrocarbons (PAHs), a suite of sixteen species sometimes referred to as 'congeners'. The sixteen 'congeners of concern' are discussed individually in Sections 6.2.2.i-xvi inclusive of this report.

6.2.2.i. Napthalene.

Nine soil samples were analysed for this determinant. None of the samples exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 5.6mg kg^{-1}.

6.2.2.ii. Acenapthylene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 420mg kg^{-1}.

6.2.2.iii. Acenapthene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 510mg kg^{-1}.

6.2.2.iv. Fluorene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 400mg kg^{-1}.

6.2.2.v. Phenanthrene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 220mg kg^{-1}.

6.2.2.vi. Anthracene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 5400mg kg^{-1}.

6.2.2.vii. Fluoranthene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 560mg kg^{-1}.

6.2.2.viii. Pyrene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 1200mg kg^{-1}.

6.2.2.ix. Benzo[a]anthracene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 11mg kg^{-1}.

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6.2.2.x. Chrysene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 22mg kg^{-1}.

6.2.2.xi. Benzo[b]fluoranthene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 3.3mg kg^{-1}.

6.2.2.xii. Benzo[k]fluoranthene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 93mg kg^{-1}.

6.2.2.xiii. Benzo[a]pyrene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 2.7mg kg^{-1}

6.2.2.xiv. Indeno(1,2,3-c,d)Pyrene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 36mg kg^{-1}.

6.2.2.xv. Dibenz(a,h)Anthracene.

Nine soil samples were analysed for this determinant. *Two* of these exceeded the 'S4UL' guidance value for this determinant of 0.28mg kg^{-1}. The referred samples are WS1, D1 @ 0.30-0.40m, and, WS6, D1 @ 0.15-0.25m which had recorded concentrations of 0.72mg kg^{-1} and 1.1mg kg^{-1} respectively.

To assist the reader these results have been shown on a proposed layout of the site provided as Figure 3 towards the back of this report.

6.2.2.xvi. Benzo[g,h,i]perylene.

Nine soil samples were analysed for this determinant. None of these exceeded the LQM-CIEH S4UL 'residential with home-grown produce' value of 340mg kg^{-1}.

6.3. Total Petroleum Hydrocarbons & BTEX

These determinants were below their respective guidance values.

6.4 Concluding Remarks to Section 6.

6.3.1. Soils.

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6.3.1.1. Inorganic Determinants.

Two soil samples exceeded the guidance criteria for the metals lead, nickel and zinc as tabulated below.

Sample I.D.	WS3	WS8	**Guidance Value (mg kg^{-1})**
Nickel	1100	-	180
Zinc	4200	-	3700
Lead	330	360	200

6.3.1.2. Organic Determinants.

Two of the soil samples tested for Speciated PAHs marginally exceeded the 'residential with home-grown produce' S4UL guidance value for variously two of the sixteen congeners in this analytical suite as described in Section 6.2.2i-xv of this report.

Sample I.D.	WS1	WS6	**Guidance Value (mg kg^{-1})**
Dibenz(a,h)Anthracene)	0.72	1.1	0.28
Benz(a)pyrene	3.3	-	2.7

To assist the reader, where guidance values have been exceeded for organic and inorganic determinants these have been shown on a proposed layout of the site provided as Figure 3 towards the back of this report.

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7. CONCEPTUAL MODEL & RISK ASSESSMENT.

7.1. Overview.

In accordance with guidance current at the time of this report, there are three principal factors that are assessed whilst undertaking a qualitative risk assessment. These are described above in Section 3 in the context of 'Relevant Pollution Linkages' (RPL). At the time of this report, the site had been proposed for redevelopment to a continued residential end use therefore 'residential with home-grown produce' assessment criteria were used for the assessment of the laboratory testing results and the following risk assessment.

7.1.1. Conceptual Model.

Sources (Proven)	Pathway	Target	Risk
Soil: The intrusive investigation has proved two instances of measured concentrations of metals (nickel, zinc and lead) which exceeded the respective assessment criteria (Boreholes **WS3** and **WS8**). See Section 6.2.1 of this report. There were two instances of measured concentrations of PAH Congeners which exceeded assessment criteria (Boreholes **WS1** and **WS6**). See Section 6.2.2i-xv of this report.	❖ Dermal contact, ingestion and inhalation ❖ Wind erosion and atmospheric dispersion ❖ Leaching	• Present users • End users • Construction workers • General public	• Low-Med • Low-Med • Low-Med • Neg-Low
		• Adjacent properties • General public • Shallow groundwater • Services/construction materials • Plant life • Surface water	• Neg-Low • Neg-Low • Low • Low • Low • Low
Shallow groundwater: Groundwater was not encountered in any of the exploratory locations and site was underlain by cohesive soils. The measured concentrations of all determinants were not considered to pose an 'unacceptable' risk to this medium.	❖ Groundwater migration	• Adjacent properties • Deep groundwater • Services/construction materials • Plant life • Surface Water	• Low • Low • Low • Low • Neg-Low
	❖ Dermal contact, ingestion and inhalation	• Present users • End users • Construction workers • General public	• Low • Low • Low • Neg
Gas: Measurable (background) concentrations of ground gas would not (reasonably) be anticipated to be present as a result of historical site use or the underlying natural geology.	❖ Direct inhalation ❖ Soil migration ❖ Services migration	• End users • Construction workers • Buildings	• Neg-Low • Neg-Low • Neg-Low

Negligible Risk	Defined as the site should be considered suitable for present or future use and environmental setting. Contaminants unlikely to be present, which might have unacceptable impact on key targets.
Low Risk	Defined as the site should be considered suitable for present or future use and environmental setting. Contaminants may be present but unlikely to have unacceptable impact on key targets.
Medium Risk	Defined as the site may not be suitable for present or future use and environmental setting. Contaminants are probably present and might have unacceptable impact on key targets.
High Risk	Defined as the site is probably or certainly not suitable for present or future use and environmental setting. Contaminants probably or certainly present and likely to have an unacceptable impact on key targets.

The risk assessment follows below:~

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7.2. Risk Assessment.

7.2.1. Targets.

Potential targets/receptors, in the context of the risk assessment, where a plausible pathway can be proven, are discussed under separate subheadings as follows:-

7.2.2. Human Health (Site Users[1] & Construction Workers).

Measured concentrations of inorganic determinants *(*nickel, zinc, and lead*)* exceeded their guidance values as shown below.

Sample I.D.	WS3	WS8	**Guidance Value (mg kg^{-1})**
Nickel	1100	-	180
Zinc	4200	-	3700
Lead	330	360	200

Measured concentrations of organic determinants (Dibenz(a,h)Anthracene and Benz(a)pyrene exceeded their guidance values as shown below.

Sample I.D.	WS1	WS6	**Guidance Value (mg kg^{-1})**
Dibenz(a,h)Anthracene	0.72	1.1	0.28
Benz(a)pyrene	3.3	-	2.7

In the context of the proposed end use for the site and the localised distribution, depth, measured concentration values and contaminant type:-

A *Low-Medium* risk has been identified.

[1] Current & End User
[2] UK Water Industry Research. GUIDANCE FOR THE SELECTION OF WATER SUPPLY PIPES TO BE USED IN BROWNFIELD SITES. *Report Ref. No. 10/WM/03/21*. 2010.

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7.2.3. Construction Workers.

During the opening up and disturbance of ground at the referred locations, as part of demolition and construction works, construction staff, particularly groundworkers, may likely be exposed to (locally Lead, Nickel, Zinc and Speciated PAH impacted soils and soil dusts (e.g., when manually handling soil and working in excavations):-

Based on the localised distribution, depth, measured concentration and contaminant type:-

A *Low-Medium* risk has been identified.

7.2.4. Services and Construction Materials.

7.2.4.1. Concrete.

Concentrations of determinants are not considered to present an 'unacceptable' risk to this medium.

A *Low* risk has been identified.

7.2.4.2. Potable Water Supplies.

UK Water Industry Research (UKWIR), provides guidance[2] on material selection to prevent water supply lines failing prematurely. The chosen parameters are based on the potential for:

(a) taste or odour impairment of potable waters by permeation of organic contaminants through polymer-based pipework;

(b) the structural or physical deterioration of pipework materials;

(c) the contamination of the interior surfaces pipework when undertaking maintenance;

(d) health and safety of workers when undertaking repairs.

Some of these parameters follow other existing guidance, which have either been withdrawn or updated including the WRAS guidance of October 2002 (e.g., ICRCL and BRE Special Digest 1).

The UKWIR report only cites organic determinants as contaminants of concern. The investigation has shown very localised instances of marginally elevated PAHs in soils. Therefore:~

A *Low* risk has been identified.

[2] UK Water Industry Research. GUIDANCE FOR THE SELECTION OF WATER SUPPLY PIPES TO BE USED IN BROWNFIELD SITES. *Report Ref. No. 10/WM/03/21*. 2010.

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7.3. Landscaping & Planting.

No signs of stress or unusual staining in plant life was noted.

A *Low* risk to plantlife has been identified.

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8. REMEDIATION RECOMMENDATIONS.

8.1. Land Contamination - Soils.

Based upon the results of the chemical laboratory testing, which showed marginally raised concentrations of the inorganic determinants shown in Table 1 below.

Table 1: Table to Show Raised Concentrations of Inorganic Determinants.

Sample I.D.	WS3	WS8	**Guidance Value (mg kg^{-1})**
Nickel	1100	-	180
Zinc	4200	-	3700
Lead	330	360	200

The organic determinants in Table 2 below.

Table 2: Table to Show Raised Concentrations of Organic Determinants.

Sample I.D.	WS1	WS6	**Guidance Value (mg kg^{-1})**
Dibenz(a,h)Anthracene	0.72	1.1	0.28
Benz(a)pyrene	3.3	-	2.7

It is anticipated that 'management' (remediation) of soils in the affected localities or plots is warranted where these are coincident with soft landscaping and private gardens in the proposed development in order to bring the site into a condition where the Regulator may consider it 'suitable for use'.

8.2. Contamination Management

The referred instances of contamination have been shown on the proposed site layout in Figure 3 towards the back of this report.

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Four soil samples (WS1, WS3, WS6 and WS8) showed raised determinant concentrations where compared with current guidance.

Discussion with the Client revealed that these are all within areas of permanent hard cover in the proposed development, changed from the issue of the Phase 1 Desk Study.

The samples from boreholes WS1 and WS3 are within a building footprint (Plot 1 and Plot 2 respectively), and the samples from WS6 and WS8 are within the footprint of a garage (Plot 3) and under a driveway (Plot 4) respectively, which can be considered to be a 'management strategy' as the End User will not be exposed to these soils once the dwelling is occupied. Therefore no soil replacement is warranted in this area.

Under the requirements of the planning regime specific remedial details will need to be included within a Remediation method Statement (RMS) which will need to be approved by the Regulator (LPA) prior to implementation of the work. On completion validation will also be required to demonstrate that the remedial works have been carried out in accordance with the (LPA-approved) RMS.

8.3 Concluding (and Additional) Remarks To Section 8.

Discussions with the Client (Applicant) revealed that the Planning Authority required that site levels be raised to at least 300mm above the nearby road level. It was understood this was to be achieved by importation of soils to the site. This means that site levels will be raised by at least 500mm compared to existing as at the time of this Report thus distancing the End User even further from the localised instances of contamination. This will further reduce the existing risk to *'Negligible - Low'*.

On that basis and on completion of the above worksd it is consideerd that the 'contamination' at the site will have been adequately managed.

Goldfinch Environmental Limited
19 Palmer Street, Walsham-le-Willows, Bury St Edmunds, Suffolk, IP31 3BZ
Tel: 01359 258681

9. CONCLUSIONS.

Mr B Maddison, South Lincs Plant Hire & Sales Ltd (the Client), proposes to establish a new residential development at a site located off Horseshoe Road, Spalding, Lincolnshire.

A geoenvironmental site investigation has been carried out by Goldfinch Environmental Ltd as required by the Regulator to further assess the presence of land contamination following consultation with South Holland District Council.

The intrusive investigation has confirmed the presence of predominantly clay soils, with a thin superficial cover of Made Ground which locally to WS1, WS3, WS6 and WS8 were shown to (variously) contain slightly raised concentrations of organic and inorganic contamination described in Sections 6, 7, 8 of this report. Recommendations for the management of these instances has been provided in Section 7 of this report. No unusual staining was noted in the arising soils encountered in this investigation.

Based on the foregoing results, and the qualifying comments notwithstanding, an overall *Low-Medium* risk is identified with the site, subject to the agreement of the Regulator who are the final arbiters in this matter.

Management of these soils for the protection of the End User has been discussed in Section 8 of this report. On completionof the referred 'management' of these soils the existing *Low-Medium* risk can be downgraded to *Negligible-Low* at which point the site may be considered 'suitable for use' by the Regulator

This report has been based on the results of the fieldwork, an examination of the recovered samples and the completed chemical laboratory testing. The possibility that different conditions may exist at other exploratory locations within the site, or at greater depth cannot be ruled out.

Should unanticipated contamination be suspected, or revealed during any groundworks, then the area should be temporarily isolated and further advice sought by a suitably independent qualified person and a management strategy for these occurrences would be required by the Local Authority.

Goldfinch Environmental Limited
19 Palmer Street, Walsham-le-Willows, Bury St Edmunds, Suffolk, IP31 3BZ
Tel: 01359 258681

FIGURES

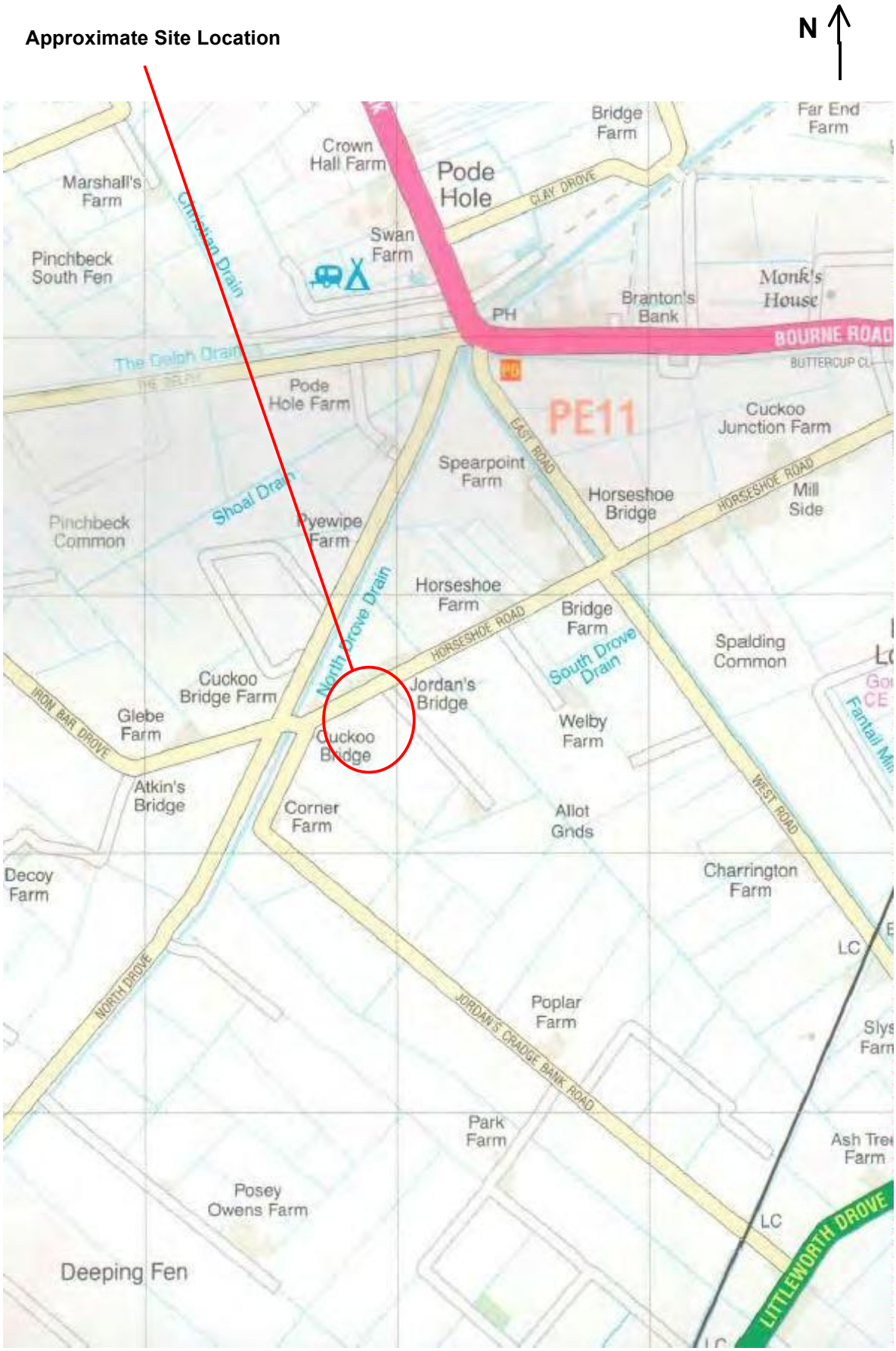


Figure 1	Site Location Plan	**Goldfinch** Environmental Ltd
Ref: 0331/1		

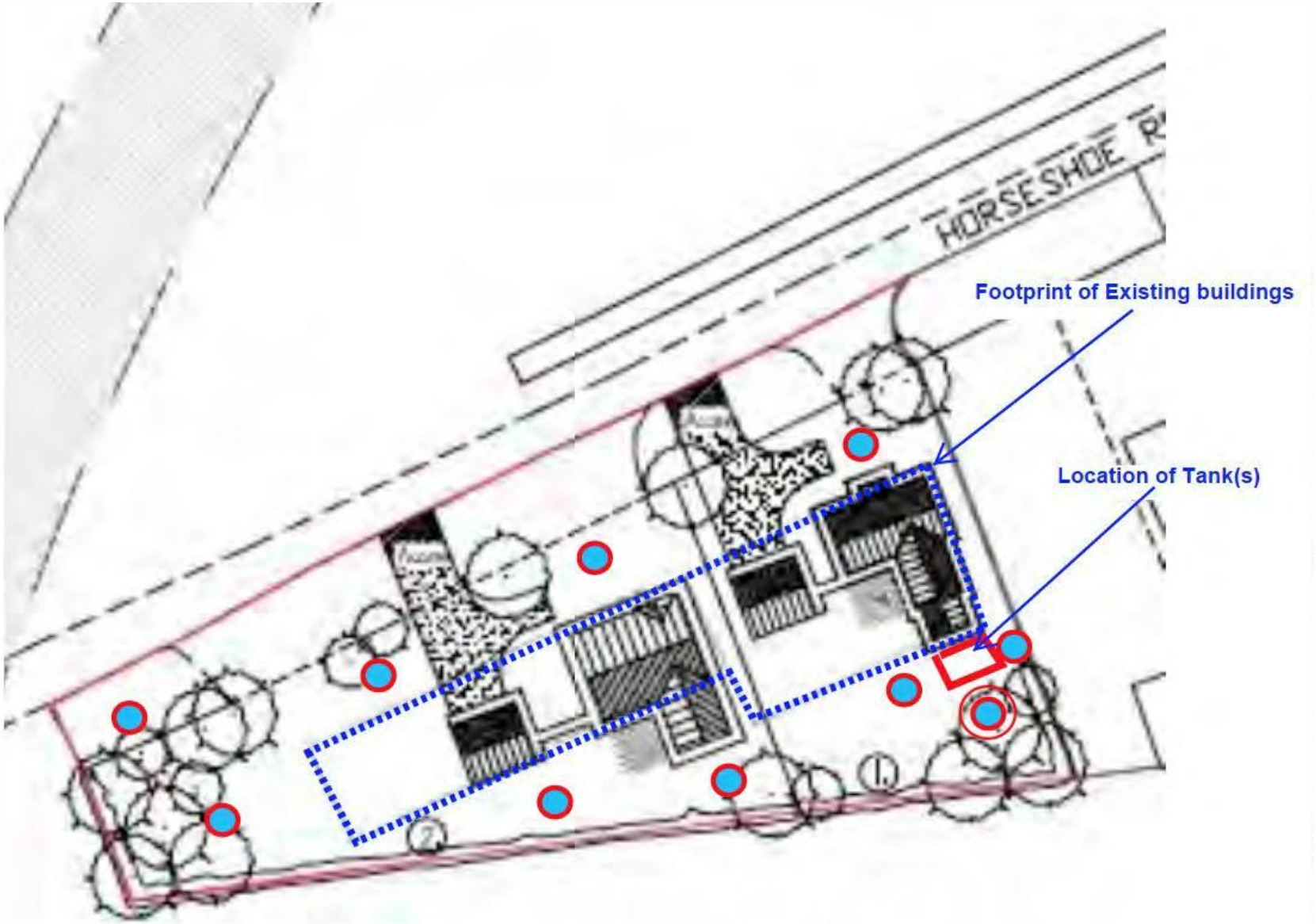


Figure 2a	Proposed Borehole Location Plan	**Goldfinch** Environmental Limited
Ref: 0492/2		

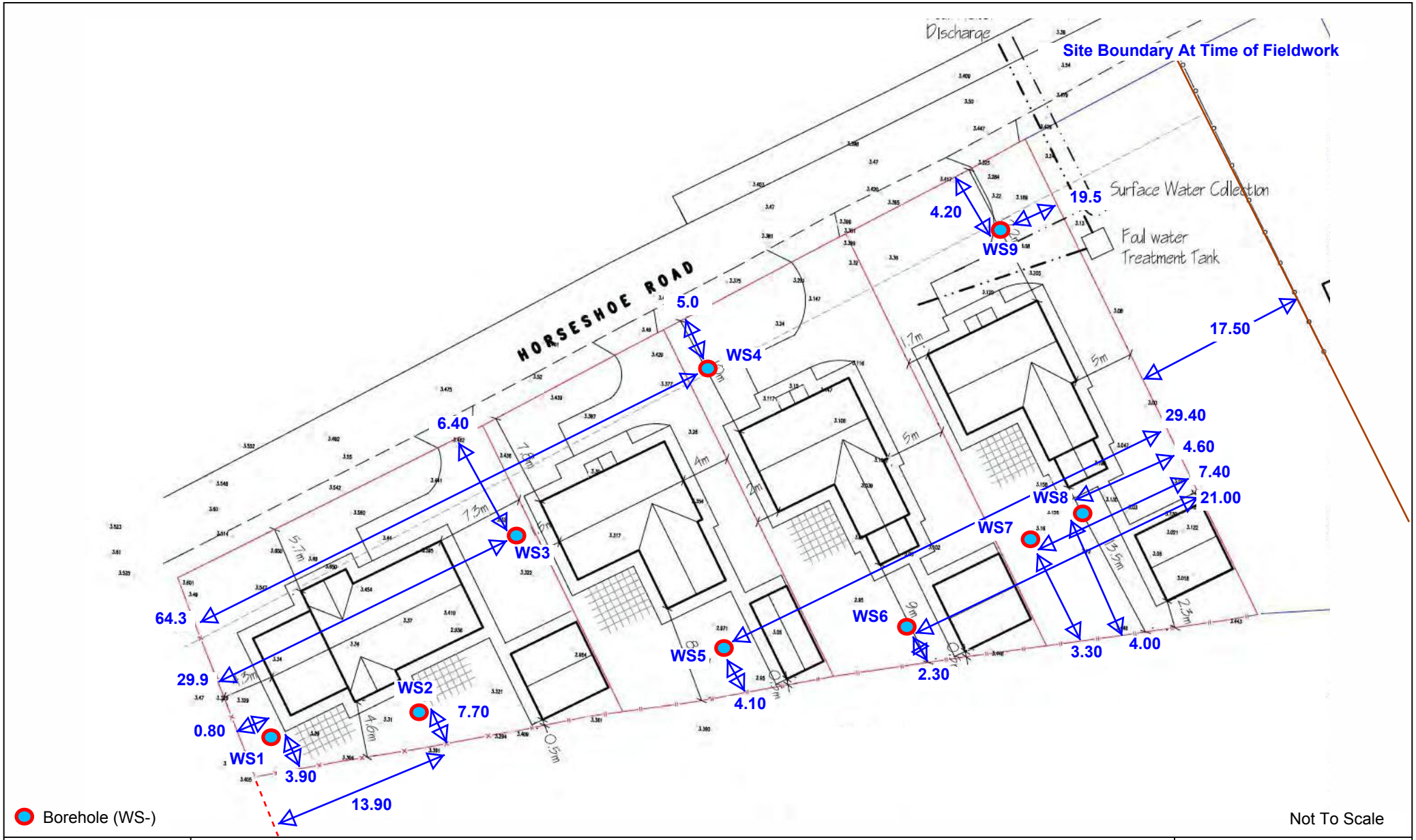
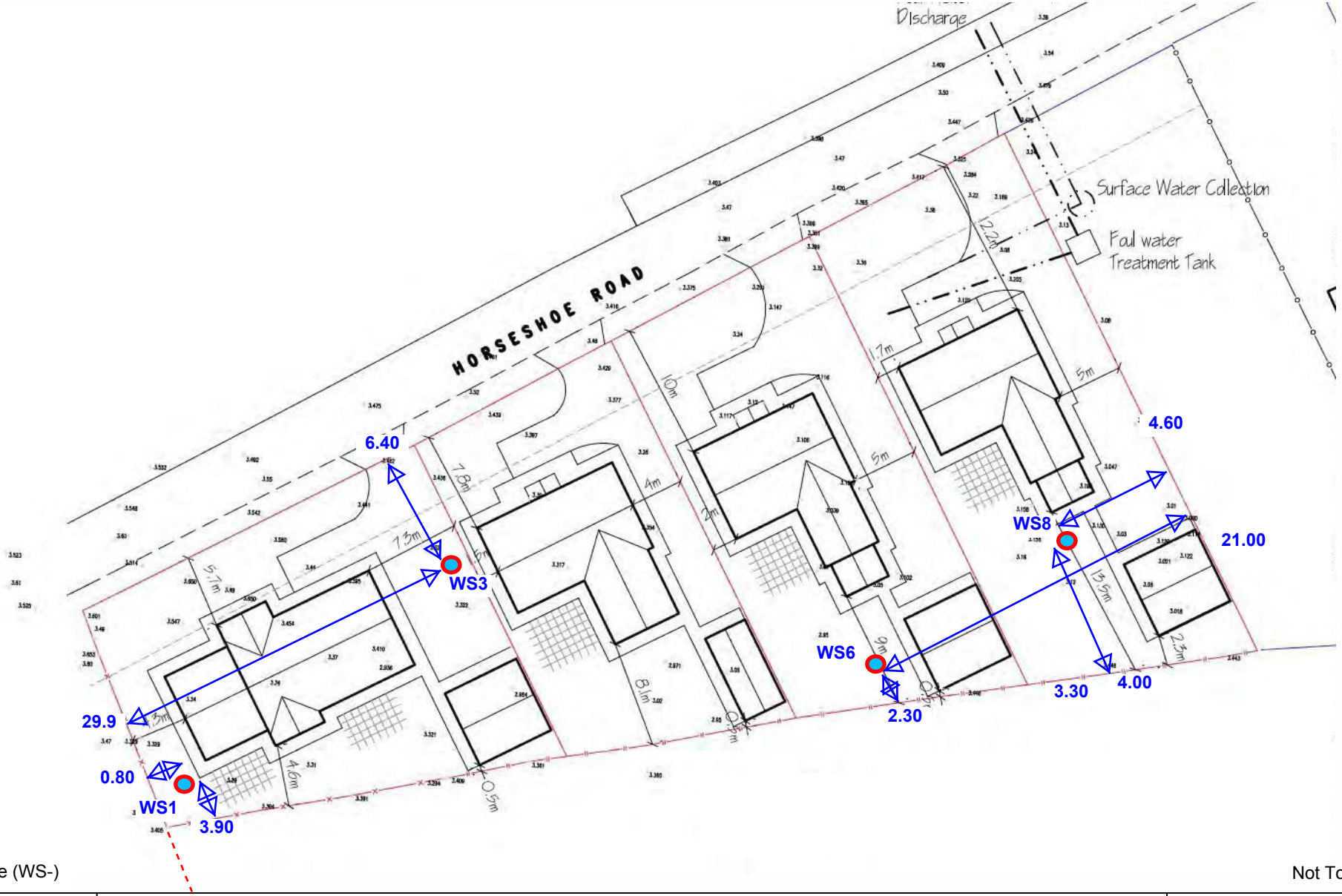


Figure 2b	Exploratory Location Plan	**Goldfinch** Environmental Limited
Ref: 0492/2		



Borehole (WS-)

Not To Scale

Figure 3	Plan To Show Locations of Raised Determinant Concentrations	**Goldfinch** Environmental Limited
Ref: 0492/2		

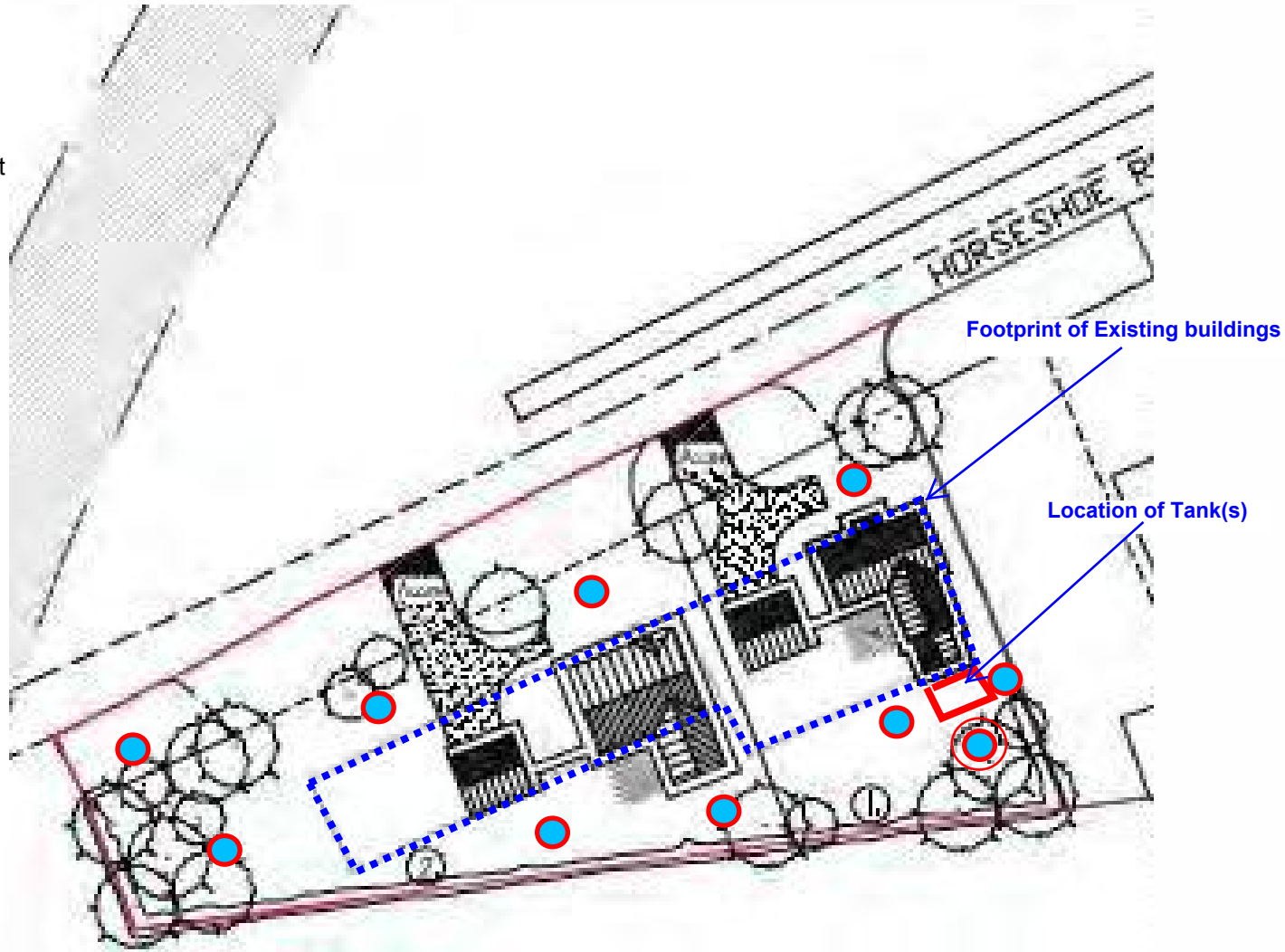
APPENDIX 1

LPA-Approved Phase 2 Investigation Strategy

Site Address: Land Off Horseshoe Road, Spalding Lincs.
Planning Ref: H16-0482-14.
Proposed Phase 2 Investigation Strategy.

1. 8-10 no. boreholes to 1-2m depth (Extended to 3m where 'contamination suspected/proven) as indicated on this plan. (The reader should note that definitive positions to take account of access, services, site operations and, proposed layout including specific potential sources e.g. tanks).
2. 2-3 of these to target tank location.
3. Chemical Lab Testing to comprise (variously):~ Metals Suite* (x7-9); Speciated PAHs (x7-9); Asbestos I.D (x4); pH (x6); OMC (x6).
4. Interpretative report update risk assessment from Phase 1 & Risk-based outline remedial recommendations as appropriate.
5. Agreed With Env Health that ground gas not warranted and therefore excluded from scope of work.
6. The reader should note that the above is subject to review/change based on inspection of arising soils at the time of the fieldwork (in accordance with LPA requirements and current guidance.).

Response/Queries regarding the above should be addressed to :~
Goldfinch Environmental Ltd
fao Derek Sargeant
by email/tel 01359 258681/07871 747221.



Potential Additional Borehole Based on Findings of other two Locations

Proposed Borehole Location

* comprising: As, Cd,Cr(iii & vi), Cu, Hg, Ni, Se & Zn.

Figure A	Phase 2 Strategy - Proposed Borehole Plan - Over combined Existing (Blue) & Proposed Layouts	**Goldfinch** Environmental Limited
Ref: 0331/1		

APPENDIX 2

Exploratory Location Records

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS1 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Long Grass	-	-
0.02	Dark brown firm to stiff slightly gravelly silty clay. Gravel is angular to subangular flint.	-	-
0.30	Loose dark brown fine to coarse slightly sandy gravel. Gravel is angular to subangular flint.	D1 = 0.30-0.40	-
0.42	Firm to stiff dark brown silty clay.	-	-
0.53	Loose Gravel of angular to subangular flint.	-	-
0.95	Soft to firm orange brown silty clay.	-	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination.
3. Location terminated at 2.0m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS2 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Grey lean mix concrete (Made Ground)	-	-
0.01	Loose firm to stiff dark brown gravelly slightly sandy slightly silty clay. Gravel is angular to subangular crushed concrete and subbase. (Made Ground)	-	-
0.22	Loose light orange brown fine to coarse slightly gravelly silty sand. Gravel is angular to subangular flint.	-	-
0.40	Firm to stiff dark brown silty clay.	D1 = 0.40-0.50	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination.
3. Location terminated at 1.0m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS3 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Loose dark brown gravelly silty clay Gravel is angular concrete and brick ('hardcore') (Made Ground)	-	-
0.10	Loose yellow brown fine to coarse sand and fine to coarse gravel. Gravel is angular to subangular crushed concrete and subbase. (Made Ground)	-	-
0.30	Loose multicoloured fine to coarse sand and fine to coarse gravel. Gravel is angular to subangular flint. (Possible fine gravel sized ash fragments) (Made Ground)	D1 = 0.30-0.40	-
0.48	Loose brown silty fine to coarse sand.	-	-
0.65	Firm to stiff dark brown slightly sandy clay.	-	-

WS3 cont.

1.10	Very soft to soft orange brown silty clay.	-	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination. (except possible ash fragments at 0.32m)
3. Location terminated at 2.40m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS4 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Grass over firm to stiff dark brown silty clay. (PossibleMade Ground)	-	-
0.04	Loose brown fine to medium subangular flint gravel. (Made Ground)	-	-
0.10	Loose darkgrey/black fine to coarse sand and fine to medium gravel sized fragments of ash. (Made Ground)	-	-
0.30	Firm to stiff dark brown occasionally mottled orange brown silty clay.	D1 = 0.30-0.40	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination. (Ash fragments at 0.10m)
3. Location terminated at 1.00m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS5 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Loose brown Sand and Gravel (Possible Made Ground)	-	-
0.01	Loose light brown slightly sandy gravel. Gravel fine to medium subangular flint gravel and comminuted brick. (Made Ground)	-	-
0.32	Firm to stiff dark grey brown occasionally fine mottled black silty clay.	D1 = 0.35-0.45	-
0.56	Firm to stiff orange brown and grey brown silty slightly clayey sand.	-	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination. (Ash fragments at 0.10m)
3. Location terminated at 2.00m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS6 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Grass over dark brown silty clay. (Possible Made Ground)	-	-
0.02	Loose light brown fine to coarse clayey slightly sandy gravel. Gravel fine to medium subangular flint gravel and comminuted brick. (Made Ground)	D1 = 0.15 – 0.25	-
0.55	Soft to firm orange brown and grey brown silty clay.	-	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination.
3. Location terminated at 1.00m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS7 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Grass over dark brown silty clay. (Possible Made Ground)	-	-
0.02	Friable (Loose) dark brown fine to coarse slightly gravelly slightly sandy clay. Gravel fine to medium angular comminuted concrete, brick and flint. (Made Ground)	D1 = 0.15 – 0.25	-
0.30	Friable dark brown slightly gravelly silty clay. Gravel fine to medium angular comminuted concrete, brick and flint. (Made Ground)	-	-
0.45	Firm to stiff dark brown and dark grey silty clay. (Weak alluvial 'organic' odour) (Tidal Flat Deposits / Alluvium)	J1 = 0.45 – 0.50	-

WS7 cont.

0.68	Friable (loose) dark grey brown and orange brown slightly sandy silty clay.	-	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination. (Weak organic odours noted from 0.45-0.68).
3. Location terminated at 2.00m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS8 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Grass over dark brown silty clay. (Possible Made Ground)	-	-
0.02	Friable (Loose) dark brown fine to coarse slightly gravelly slightly sandy clay. Gravel fine to medium angular comminuted concrete, brick and flint. (Made Ground)	-	-
0.30	Friable dark brown slightly gravelly silty clay. Gravel fine to medium angular comminuted concrete, brick and flint. (Made Ground)	D1 = 0.30 – 0.40	-
0.45	Firm to stiff dark brown and dark grey silty clay. (Weak alluvial 'organic' odour) (Tidal Flat Deposits / Alluvium)	J1 = 0.55 – 0.65	-

0.68	Friable (loose) dark grey brown and orange brown slightly sandy silty clay.	-	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination. (Weak organic odours noted from 0.45-0.68).
3. Location terminated at 2.00m.

Goldfinch ENVIRONMENTAL LTD

EXPLORATORY LOCATION LOG

Site: 0492 - Horseshoe Road

Location Ref: WS9 **Date**: 20/3/2018

Depth	Description	Sampling depth (m)	Remarks
0.00	Concrete (Made Ground)	-	-
0.10	Friable (Loose) dark brown fine to coarse slightly gravelly slightly sandy clay. Gravel fine to medium angular comminuted concrete, brick and flint. (Made Ground)	-	-
0.20	Friable dark brown slightly gravelly silty clay. Gravel fine to medium angular comminuted concrete, brick and flint. (Made Ground)	D1 = 0.20 – 0.30	-
0.45	Firm to stiff orange brown slightly sandy silty clay.	-	Horizon not fully penetrated.

Notes:
1. Groundwater not encountered.
2. No apparent indicators of contamination. (Weak organic odours noted from 0.45-0.68).
3. Location terminated at 2.00m.

APPENDIX 3

Chemical Laboratory Test Report

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Amended Report

Report No.:	18-07758-2		
Initial Date of Issue:	09-Apr-2018	**Date of Re-Issue:**	09-Apr-2018
Client	Goldfinch Environmental Ltd		
Client Address:	19 Palmer Street Walsham-le-Willows Bury St. Edmunds Suffolk IP31 3BZ		
Contact(s):	Group Email Address		
Project	0492 Spalding		
Quotation No.:		**Date Received:**	21-Mar-2018
Order No.:		**Date Instructed:**	03-Apr-2018
No. of Samples:	11		
Turnaround (Wkdays):	5	**Results Due:**	09-Apr-2018
Date Approved:	09-Apr-2018		

Approved By:

Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 0492 Spalding

Client: Goldfinch Environmental Ltd				**Chemtest Job No.:**	18-07758	18-07758	18-07758	18-07758	18-07758	18-07758	18-07758	18-07758
Quotation No.:				**Chemtest Sample ID.:**	595035	595036	595037	595038	595039	595040	595041	595042
Order No.:				Client Sample Ref.:	D1	D1	D1	D1	D1	D1	D1	D1
				Client Sample ID.:	WS1	WS2	WS3	WS4	WS5	WS6	WS7	WS7
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.30	0.40	0.30	0.30	0.35	0.15	0.25	0.45
				Bottom Depth (m):	0.40	0.50	0.40	0.40	0.45	0.25	0.35	0.55
				Date Sampled:	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Moisture	N	2030	%	0.020	6.2	13	6.2	19	13	5.3	11	12
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones, Clinker	NONE	Stones	NONE	NONE	Stones	Stones, Brick	NONE
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Clay	Sand	Sand	Sand	Sand
pH	M	2010		N/A	10.1	8.7	8.7	8.7	8.0	8.4	9.7	
Arsenic	M	2450	mg/kg	1.0	28	12	24	17	9.7	32		14
Cadmium	M	2450	mg/kg	0.10	0.32	0.28	1.2	< 0.10	< 0.10	0.50		0.10
Copper	M	2450	mg/kg	0.50	20	38	870	33	10	92		31
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10	0.11		0.17
Nickel	M	2450	mg/kg	0.50	19	18	1100	62	14	20		19
Lead	M	2450	mg/kg	0.50	62	44	330	34	20	110		73
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20		< 0.20
Zinc	M	2450	mg/kg	0.50	91	67	4200	230	49	500		230
Chromium (Trivalent)	N	2490	mg/kg	1.0	18	18	34	44	14	20		21
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50
Organic Matter	M	2625	%	0.40	6.0	2.1	4.7	2.4	1.2	2.2		2.4
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0							[C] < 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0							[C] < 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0							[C] < 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0							[C] < 10	< 10
Naphthalene	M	2700	mg/kg	0.10	1.6	< 0.10	< 0.10	< 0.10	< 0.10	0.70	< 0.10	
Acenaphthylene	M	2700	mg/kg	0.10	0.25	< 0.10	< 0.10	< 0.10	< 0.10	0.51	< 0.10	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 0492 Spalding

Client: Goldfinch Environmental Ltd				**Chemtest Job No.:**	18-07758	18-07758	18-07758	18-07758	18-07758	18-07758	18-07758	18-07758
Quotation No.:				**Chemtest Sample ID.:**	595035	595036	595037	595038	595039	595040	595041	595042
Order No.:				Client Sample Ref.:	D1	D1	D1	D1	D1	D1	D1	D1
				Client Sample ID.:	WS1	WS2	WS3	WS4	WS5	WS6	WS7	WS7
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.30	0.40	0.30	0.30	0.35	0.15	0.25	0.45
				Bottom Depth (m):	0.40	0.50	0.40	0.40	0.45	0.25	0.35	0.55
				Date Sampled:	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018	20-Mar-2018
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Acenaphthene	M	2700	mg/kg	0.10	0.48	< 0.10	< 0.10	< 0.10	< 0.10	0.82	< 0.10	
Fluorene	M	2700	mg/kg	0.10	0.60	< 0.10	< 0.10	< 0.10	< 0.10	0.88	< 0.10	
Phenanthrene	M	2700	mg/kg	0.10	0.66	< 0.10	< 0.10	< 0.10	< 0.10	3.7	< 0.10	
Anthracene	M	2700	mg/kg	0.10	1.0	< 0.10	< 0.10	< 0.10	< 0.10	0.99	< 0.10	
Fluoranthene	M	2700	mg/kg	0.10	10	0.36	0.71	< 0.10	< 0.10	7.7	0.40	
Pyrene	M	2700	mg/kg	0.10	12	0.41	0.82	< 0.10	< 0.10	9.7	0.40	
Benzo[a]anthracene	M	2700	mg/kg	0.10	3.9	0.53	0.72	< 0.10	< 0.10	4.1	0.20	
Chrysene	M	2700	mg/kg	0.10	5.4	0.54	0.57	< 0.10	< 0.10	5.5	0.10	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	3.1	< 0.10	0.72	< 0.10	< 0.10	3.1	< 0.10	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	2.2	< 0.10	0.19	< 0.10	< 0.10	2.0	< 0.10	
Benzo[a]pyrene	M	2700	mg/kg	0.10	2.3	< 0.10	0.38	< 0.10	< 0.10	3.3	< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	1.2	< 0.10	< 0.10	< 0.10	< 0.10	2.0	< 0.10	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.72	< 0.10	< 0.10	< 0.10	< 0.10	1.1	< 0.10	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	1.1	< 0.10	< 0.10	< 0.10	< 0.10	1.7	< 0.10	
Total Of 16 PAH's	M	2700	mg/kg	2.0	47	< 2.0	4.1	< 2.0	< 2.0	48	< 2.0	
Benzene	M	2760	µg/kg	1.0							[C] < 1.0	< 1.0
Toluene	M	2760	µg/kg	1.0							[C] < 1.0	< 1.0
Ethylbenzene	M	2760	µg/kg	1.0							[C] < 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0							[C] < 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0							[C] < 1.0	< 1.0

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 0492 Spalding

Client: Goldfinch Environmental Ltd				**Chemtest Job No.:**	18-07758	18-07758	18-07758
Quotation No.:				**Chemtest Sample ID.:**	595043	595044	595045
Order No.:				Client Sample Ref.:	D1	D1	D1
				Client Sample ID.:	WS8	WS8	WS9
				Sample Type:	SOIL	SOIL	SOIL
				Top Depth (m):	0.30	0.55	0.20
				Bottom Depth (m):	0.40	0.65	0.30
				Date Sampled:	20-Mar-2018	20-Mar-2018	20-Mar-2018
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Moisture	N	2030	%	0.020	8.3	9.5	13
Soil Colour	N	2040		N/A	Brown	Brown	Brown
Other Material	N	2040		N/A	Brick	NONE	NONE
Soil Texture	N	2040		N/A	Sand	Sand	Sand
pH	M	2010		N/A			
Arsenic	M	2450	mg/kg	1.0	17		12
Cadmium	M	2450	mg/kg	0.10	1.3		< 0.10
Copper	M	2450	mg/kg	0.50	250		18
Mercury	M	2450	mg/kg	0.10	0.41		< 0.10
Nickel	M	2450	mg/kg	0.50	32		13
Lead	M	2450	mg/kg	0.50	360		30
Selenium	M	2450	mg/kg	0.20	< 0.20		< 0.20
Zinc	M	2450	mg/kg	0.50	1400		65
Chromium (Trivalent)	N	2490	mg/kg	1.0	29		16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50
Organic Matter	M	2625	%	0.40		2.9	1.1
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		< 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		< 1.0	
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0		< 1.0	
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0		20	
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0		110	
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0		130	
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0		1100	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		31	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		1400	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		< 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		< 1.0	
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0		< 1.0	
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0		< 1.0	
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0		24	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0		79	
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0		220	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		50	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		370	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		1800	
Naphthalene	M	2700	mg/kg	0.10		< 0.10	
Acenaphthylene	M	2700	mg/kg	0.10		< 0.10	

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Results - Soil

Project: 0492 Spalding

Client: Goldfinch Environmental Ltd			**Chemtest Job No.:**		18-07758	18-07758	18-07758
Quotation No.:			**Chemtest Sample ID.:**		595043	595044	595045
Order No.:			Client Sample Ref.:		D1	D1	D1
			Client Sample ID.:		WS8	WS8	WS9
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.30	0.55	0.20
			Bottom Depth (m):		0.40	0.65	0.30
			Date Sampled:		20-Mar-2018	20-Mar-2018	20-Mar-2018
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Acenaphthene	M	2700	mg/kg	0.10		< 0.10	
Fluorene	M	2700	mg/kg	0.10		< 0.10	
Phenanthrene	M	2700	mg/kg	0.10		< 0.10	
Anthracene	M	2700	mg/kg	0.10		< 0.10	
Fluoranthene	M	2700	mg/kg	0.10		1.3	
Pyrene	M	2700	mg/kg	0.10		2.4	
Benzo[a]anthracene	M	2700	mg/kg	0.10		< 0.10	
Chrysene	M	2700	mg/kg	0.10		< 0.10	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		< 0.10	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		< 0.10	
Benzo[a]pyrene	M	2700	mg/kg	0.10		< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10	
Total Of 16 PAH's	M	2700	mg/kg	2.0		3.7	
Benzene	M	2760	µg/kg	1.0		< 1.0	
Toluene	M	2760	µg/kg	1.0		< 1.0	
Ethylbenzene	M	2760	µg/kg	1.0		< 1.0	
m & p-Xylene	M	2760	µg/kg	1.0		< 1.0	
o-Xylene	M	2760	µg/kg	1.0		< 1.0	

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Deviation Code(s):	Containers Received:
595041	D1	WS7	20-Mar-2018	C	Plastic Tub 500g

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Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

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Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk