



Your Environment

PHASE 4: VERIFICATION REPORT – SOUTHMERE FARM, THE MALLARDS, HAVANT, PO9 1SS

For Knightsgate UK

Your Environment

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For and on behalf of YourEnvironment				

Issue	Date	Description	Prepared	Reviewed	Approved
00	31.05.19	Full Report	MG	RG	CH
01	03.07.19	Revision 1: Addition of logs confirming that validation samples were collected from Made Ground.	MG	RG	CH

1.0 Introduction

YourEnvironment (YE) was instructed by Knightsgate UK (Quote No: Q7106, Dated: April 23rd 2019) for the provision of a Phase 4: Verification Report for a site located at Southmere Farm, The Mallards, Havant, PO9 1SS.

The purpose of this report is to satisfy a particular planning condition, which has been attached to the redevelopment of the site by Havant Borough Council, application reference number APP/18/00380, specifically condition 5.4.

We understand current plans for the redevelopment of the site include:

- Construction of three (3no.) two storey detached dwellings following the demolition of existing buildings.

The site was subject to a Phase 1: Desk Study issued by YE (Report Reference: YE6179, Issued: January 2019), to which this report should be read in conjunction with. This provided information on the site's current and historical setting as well as an initial Conceptual Site Model (CSM) for the site.

YE was subsequently instructed to complete a Phase 2: Site Investigation (Report Reference: YE6611, issued: February 2019) which established ground conditions and provided quantified data relating to contamination on site, such that any environmental issues pertaining to the redevelopment proposals can be addressed and/or mitigated appropriately. In addition YE undertook a Phase 3: Remedial Strategy (YE7106).

Salient details from these earlier reports have been reproduced where deemed necessary. The purpose of this document is to outline the various remedial works that have taken place that have been required to mitigate plausible pollutant linkages on site.

All previous reports available for the site should be reviewed in their entirety in conjunction with this document.

The information contained in this report is intended for the use of the named client (or their approved contractors). Should any part of this report be relied on by a third party, that party does so wholly at its own risk and YE disclaim any liability to such parties. Should the purposes for which the report is used, or the proposed use of the site change, this report may no longer be valid and further use of reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. YE should in all such altered circumstances be commissioned to review and update this report accordingly.

2.0 Proposed Development

We understand current plans for the redevelopment of the site include:

- Construction of three (3no.) two storey detached dwellings following the demolition of existing buildings.

The proposed redevelopment plans for the site can be reviewed within **Appendix A.**

3.0 Previous Contamination Results

With the exception of the limited depth of Made Ground identified, no visual and/or olfactory evidence of potential contamination was noted within any soils encountered during the SI works undertaken, which focussed in the proposed private garden areas.

With the exception of general anthropogenic material identified, no visual evidence of potential contamination was noted within any soils encountered during the site investigation. An organic odour was noted within WS04 at a depth of 0.50mbgl. Overall, one individual soil exceedance was noted from one of the selected soil samples from the SI which were submitted for the range of inorganic and organic analyses, which was for lead (GAC 200mg/kg) in the Made Ground of TP04 (317mg/kg).

The remaining samples returned a value below the available SGVs and LQM guidance values for each determinand which were adopted as Generic Assessment Criteria (GAC) within YE's risk assessment for the site.

A review of the trial pit logs indicate that natural soils are present across the majority site from approximately 0.45–0.70mbgl, it would therefore be reasonable to conclude that these forms of contamination would cease at these depths. In TP04, natural soil was not encountered with refusal at 0.80mbgl.

We believe the contamination to be localised to the southwest of the site given the presence of a lead exceedance within TP04 only. We also consider the contamination to be localised to the Made Ground judging by the lack of exceedances identified in the laboratory results of the soil samples tested from the natural ground.

The full site investigation laboratory certificates can be viewed in **Appendix B**.

Further details of the site investigation are presented in the Site Investigation Report (YE6611).

4.0 Remediation Strategy

4.1 Mitigation of Risks to Future Occupiers & Site Visitors

Elevated concentrations of inorganic contamination were identified from within the shallow Made Ground identified during the previous site investigation works in the form of the lead.

Based on the location of the investigative positions whereby lead was encountered, and that of the proposed layout of the site, these were to be located within the proposed soft landscaping areas. Therefore, given the continued presence this would pose a risk in respect of ingestion, dermal contact and inhalation pathways.

YE recommended that soils in the area of TP04 be delineated to a depth of approximately 1.00mbgl (to ensure natural soils are definitively encountered) and laterally by a proposed diameter of 1.0m, followed by the importation of clean material with import material testing to be carried out at a rate of 1 sample per 100m³. An appropriate number of soil samples should be taken from the sides and submitted to an UKAS and MCERTS accredited laboratory for the purposes of validating that none of the contamination remains insitu.

4.2 Gas Protective Measures

Current guidance indicates that Made Ground is generally classified as low risk in terms of potential for gas generation. The Made Ground identified on site is not considered to pose a significant potential risk due to limited historical development and while there are records of infilled land on site, these appear to be a result of a reduced water level in a river, rather than infilling. The returned laboratory results show that there were no exceedances of any organic contaminants within the samples taken, so the risk of any volatilisation is low.

5.0 Verification Reporting

YE came to site on 2nd May 2019 to observe the excavation works. No visual and/or olfactory evidence was noted within any soils encountered as part of the works.

YE confirmed that Made Ground had been removed to a depth of 1.00mbgl across the site in the area of TP04 in accordance with the agreed remediation strategy.

A total of five (5no.) soil samples were obtained for chemical testing from the excavation; soil samples were retrieved from each side of the excavation at a depth of 0.80mbgl and one from the base of the excavation at 1.00mbgl. Chemical testing was undertaken by Chemtech Environmental Ltd in their UKAS and MCERTS accredited laboratory in accordance with laboratory protocol.

All metals, PAHs, and TPH CWG analytes are presented in the following tables. Other potential contaminants of concern are only shown where there is at least one result exceeding the limit of detection. All of the soil contamination laboratory analytical results are presented within **Appendix C**.

Metalloids

Determinant	Min	Max	GAC	Number of exceedances
Arsenic	4.7	6.4	37*	0
Cadmium	<0.2	0.39	11*	0
Chromium (III)	91	146	910*	0
Chromium (VI)	<1	<1	6*	0
Copper	11	38	2400*	0
Lead	21	79	200*	1
Mercury	<0.5	<0.5	40* ^a	0
Nickel	16	17	180* ^b	0
Selenium	0.8	1.2	250*	0
Zinc	34	84	3700*	0
Total Phenols	<0.5	<0.5	420*	0

Total Cyanide	<1	<1	140*	0
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Table 1: Metalloids Soil Exceedances

*LQM/CIEH GAC for Residential with homegrown produce land use scenario based on a sandy loam soil and 1% SOM.

- Based on the inorganic mercury GAC as the conceptual site model does not suggest that other forms of mercury are likely to be present on site.
- LQM issued an update to the nickel S4ULs in August 2015 and this has been taken into account.

➤ There were no exceedances for the metals or metalloids screened for.

Organics

Determinant	Min	Max	GAC	Number of exceedances
Naphthalene	<0.02	<0.02	2.3*	0
Acenaphthylene	<0.02	<0.02	170*	0
Acenaphthene	<0.02	<0.02	210*	0
Fluorene	<0.02	<0.02	170*	0
Phenanthrene	<0.02	0.08	95*	0
Anthracene	<0.02	<0.02	2400*	0
Fluoranthene	<0.02	0.20	280*	0
Pyrene	<0.02	0.16	620*	0
Benzo(a)anthracene	<0.02	0.09	7.2*	0
Chrysene	<0.03	0.12	15*	0
Benzo(b)fluoranthene	<0.02	0.13	2.6*	0
Benzo(k)fluoranthene	<0.03	0.08	77*	0
Benzo(a)pyrene	<0.02	0.10	2.2*	0
Indeno(1,2,3-cd)pyrene	<0.02	0.08	27*	0
Dibenz(a,h)anthracene	<0.02	<0.02	0.24*	0
Benzo(ghi)perylene	<0.02	0.08	320*	0

Table 2: PAH Soil Exceedances

➤ There are no exceedances noted from the screening undertaken on PAH congeners.

Determinant	Min	Max	GAC	Number of exceedances
Aliphatic >C5 - C6	< 0.1	< 0.1	42*	0
Aliphatic >C6 - C8	< 0.1	< 0.1	100*	0
Aliphatic >C8 - C10	< 0.1	< 0.1	27*	0
Aliphatic >C10 - C12	< 4	< 4	130*	0
Aliphatic >C12 - C16	< 4	< 4	1100*	0
Aliphatic >C16 - C35	< 4	11	65000*	0
Aliphatic >C35 - C44	< 10	< 10	65000*	0
Aromatic >C5 - C7	< 0.01	< 0.01	70*	0
Aromatic >C7 - C8	< 0.05	< 0.05	130*	0

Aromatic >C8 - C10	< 0.01	< 0.01	34*	0
Aromatic >C10 - C12	< 1	< 1	74*	0
Aromatic >C12 - C16	< 1	< 1	140*	0
Aromatic >C16 - C21	< 1	< 1	260*	0
Aromatic >C21 - C35	< 1	< 1	1100*	0
Aromatic >C35 - C44	< 1	< 1	1100*	0

Table 3: TPH CWG Aliphatic/Aromatic Soil Exceedances

* LQM/CIEH GAC Residential with Homegrown Produce land use scenario based on a sandy loam soil and 1.0% SOM. It is noted that the LQM/CIEH S4UL guidance recommends an additive approach for the TPH fraction, so that a hazard index approach is used. Based on a preliminary conservative comparison of maximum concentrations to S4ULs, no forward modelling is necessary to prove that this would still result in no exceedances at the site.

- There are no exceedances noted from the screening undertaken on the respective TPH CWG bands.

Determinant	Min	Max	GAC	Number of exceedances
Benzene	<0.01	<0.01	380*	0
Toluene	<0.01	<0.01	880000*	0
Ethylbenzene	<0.01	<0.01	83000*	0
p & m-xylene	<0.02	<0.02	79000*	0
o-xylene	<0.01	<0.01	79000*	0
MTBE	<0.02	<0.02	49000*	0

Table 4: BTEX and MTBE Soil Exceedances

There were no exceedances for BTEX/MTBE congeners, all of which were below the limit of detection (LoD).

The laboratory certificates relating to these contamination parameters can be reviewed within **Appendix C** with the logs available within **Appendix E**.

6.0 Discussion and Recommendations

After the remediation works, no elevated concentrations of the broad suite of contaminants tested for are present in soils on the site that could pose a risk to site users based on the proposed generic end land use criteria of 'residential with homegrown produce' showing that the suitability of the site for its end purpose has been fulfilled.

The area of TP04 was located within the proposed garden area of the property where it is possible that future residents may grow edible plants. This area was excavated to a depth of 1.00mbgl and the excavated material was sent to landfill. The waste consignment notes are available for review within **Appendix D**.

Further information regarding the asbestos remediation is available within **Appendix F**.

Based on the returned laboratory results and the observations from the walkover, the site has fulfilled all the objectives and recommendations that were set within the earlier Phase 3: Remedial Strategy (YE7106).

It is recommended that this report is forwarded to Havant Borough Council in order to obtain their comments and approval.

All remediation works have now been completed on the site to the satisfaction of *YourEnvironment*.

7.0 Limitations and Uncertainties

This report has been prepared by YE with all reasonable skill, care and diligence. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources, together with a site walkover inspection of the site.

The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned.

Information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data with respect to site conditions. Should additional information become available which may influence the opinion expressed in this report, YE reserves the right to review such information and, if warranted, to alter the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

The 'vicinity' of the site for the purposes of the report, is defined as locations situated within an approximate 250m radius of the site, although certain source of contamination and/or sensitive targets further than 250m of site have also been included.

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time and as such are not a guarantee that the sites are free of hazardous, or potentially hazardous materials, or conditions.

This report has been prepared solely for the use of the named client, and may not be relied upon by other parties without written consent from YE. YE disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.