

Our ref: R1742B-L05
29th March 2018

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Dear Andy

Upper Heyford – Dorchester Phase 8 In-Situ Validation

SGP have been instructed to produce a validation report for Dorchester Phase 8 following the demolition of the former buildings and removal of hardstanding. A site location plan including the approximate location of validation entries is provide within Drawing D01.

The area was previously occupied by a number of buildings with associated hardstanding (car parking, roads and pavements) and verges. A summary of the buildings cross-referenced with their former use as reported within the Oxford Archaeology 'Written scheme of investigation for recording of buildings to be demolished' (June 2012) is made below:

Table 1. Summary of former Buildings within Phase 8 area

Building	Date	Use
87	Unknown	Unknown
56	1951	The Works Squadron
53	1940	Offices
66	1939	Offices
70	1972	Conference Room
68	1939	Offices
UH46	Unknown	Office
72	1940	Storage Sheds
62/69	1981	Workshops

No potential contaminative activities such as the storage of fuels (ASTs, USTs, boiler house etc.) was identified within previous reporting.

Preparatory works consisted of the demolition of the buildings following an asbestos survey and removal, and internal strip of materials for recovery and disposal. Demolition materials were side cast in a temporary stockpile pending processing. Following demolition, the underlying hardstanding which consisted of concrete slabs and areas of tarmac, pavements and verges were broken out, trimming the area to -200mm. Recovered hardstanding was reprocessed on site generating approximate 3,000m³ of aggregate for reuse by the developer.

In-Situ Formation Soil Validation

It is a requirement under the Remediation Strategy that a 600mm cover of clean soils over made ground is placed in garden areas, however due to the contractual requirement to trim development areas by -200mm below previous ground levels, made ground was absent due to the shallowness of natural strata following the preparatory works. This meant that a 400mm depth of subsoil will be left in-situ which could form part of the full 600mm of garden soil cover after replacement of garden topsoil providing that it is uncontaminated and suitable for such use.



SGP attended site on 13.03.18 during the final preparatory earthworks to carry out in-situ sampling of the formation level strata through the sampling of the top 400mm, at a test frequency of 1 sample per 500m³, the residual depth 400mm depth equating to 1 sample per 1,250m² plan area of development.

Fourteen in-situ samples were collected from the exposed formation level soils where accessible with depth validation photos showing the extent of the 0-400mm depth range appended to this report and sampling locations reproduced in Drawing D01. Assuming an approximate area of 12,870m², the volume of validated soils is effectively 5,150m³, exceeding the specified sampling rate of 1 sample per 500m³ (1 per 368m³ achieved). A photographic record detailing the depth of the soil profiles is provided below:

Sampled soils comprised a dark brown clayey topsoil and/or a gravel of angular cobbles (weathered limestone bedrock) within a light brown sandy clay matrix, typical of the natural soils encountered across the wider Heyford development. No inclusions of anthropogenic material such as ash or clinker were observed.

Samples were collected by SGP and were placed in appropriate laboratory-provided containers and stored in cooled boxes. Samples submitted for chemical analysis were delivered to Exova-Jones Environmental Ltd (EJEL) within 24 hours of collection and samples for asbestos screen were sent to Chemtest within 48 hours of collection. SGP retains chain of custody documentation.

Chemical laboratory certificate (18-3756) and asbestos laboratory certificate (18-07142) are attached. Results are summarised in the table below and are compared to assessment criteria for garden cover soils in accordance with Table B1 of the Waterman's Strategy.

Table 2. Analysis Summary for Formation Level Soils

Contaminant	Samples	Range of Concentrations (mg/kg unless stated)	Residential Use	
			Screening criteria (mg/kg unless stated)	Exceedances
SOM	14	0.2-3.6	-	None
pH	14	8.17-9.21	WRAS <5>8	All
asbestos fibre*	14	NAD	<0.001%	None
antimony	14	<1-3	550	None
arsenic	14	9.4-26.1	32	None
barium	14	15-100	1300	None
beryllium	14	<0.5-1.7	51	None
cadmium	14	<0.1-0.2	10	None
chromium	14	12.9-55.9	3000	None
chromium IV	14	<0.3	4.3	None
cobalt	14	3.1-14.30	240	None
copper	14	5-16	300	None
lead	14	<5-38	450	None
mercury	14	<0.1	1	None
molybdenum	14	0.8-2.7	670	None
nickel	14	7.9-31	130	None
selenium	14	<1-1	350	None
vanadium	14	29-89	75	(2): Ph8-S1 & Ph8-S3

Contaminant	Samples	Range of Concentrations (mg/kg unless stated)	Residential Use	
			Screening criteria (mg/kg unless stated)	Exceedances
water soluble boron	14	0.5-3.3	291	None
zinc	14	15-75	300	None
naphthalene	14	<0.04	1.5	None
acenaphthylene	14	<0.03-0.04	210	None
acenaphthene	14	<0.05	170	None
fluorene	14	<0.04	160	None
phenanthrene	14	<0.03-0.35	92	None
anthracene	14	<0.04-0.08	2300	None
fluoranthene	14	<0.03-0.61	260	None
pyrene	14	<0.03-0.48	560	None
benzo(a)anthracene	14	<0.06-0.32	3.1	None
chrysene	14	<0.02-0.35	6	None
benzo(bk)fluoranthene	14	<0.07-0.56	-	-
benzo(a)pyrene	14	<0.04-0.28	0.83	None
indeno(123cd)pyrene	14	<0.01-0.2	3.2	None
dibenzo(ah)anthracene	14	<0.04	0.76	None
benzo(ghi)perylene	14	<0.04-0.19	44	None
aliphatic C5-C6	14	<0.1	30	None
aliphatic C6-C8	14	<0.1	73	None
aliphatic C8-C10	14	<0.1	19	None
aliphatic C10-C12	14	<0.2	93	None
aliphatic C12-C16	14	<4	740	None
aliphatic C16-C21	14	<7	1000	None
aliphatic C21-C35	14	<7	1000	None
aromatic C5-C7	14	<0.1	30	None
aromatic C7-C8	14	<0.1	120	None
aromatic C8-C10	14	<0.1	27	None
aromatic C10-C12	14	<0.2	69	None
aromatic C12-C16	14	<4	140	None
aromatic C16-C21	14	<7-34	250	None
aromatic C21-C35	14	<7-120	890	None
benzene	14	<0.005	0.08	None
toluene	14	<0.005	120	None
ethylbenzene	14	<0.005	65	None
o-xylene	14	<0.005	45	None
m-xylene	14	<0.005	44	None
p-xylene	14	<0.005	42	None
methyl tert butyl ether	14	<0.005	49	None



Elevated pH in excess of the former WRAS trigger pH value of >8 was reported within all fourteen samples with concentrations ranging between 8.17 and 9.21. Alkaline soil pH is likely to be attributed to the ubiquitous presence of carbonate limestone identified across the New Settlement Area (NSA) and is consistent with concentrations reported across the wider development area.

Exceedances of other determinants was limited to two minor exceedances for vanadium in samples Ph8-S1 and Ph8-S3 with concentrations of 77 and 89 mg/kg respectively compared to the criteria of 75 mg/kg. Concentrations are typical of those recorded within the natural ground across the wider Heyford Development area and attributed to the underlying ironstone domain bedrock which is reported to have a normal background concentration (NBC) of >128 mg/kg vanadium.

The reported exceedances are above the site screening criteria as detailed within the approved Strategy which is based on the former LQM/CIEH Generic Assessment Criteria (GACs) 2nd edition human health criteria for a residential land use with plant uptake. This criterion has been revised since the production of the Strategy, with the publication of the LQM/CIEH Suitable for Use Levels (S4ULs)¹ which takes into account updated toxicological information.

The S4UL criteria for vanadium increases to 410 mg/kg based on residential garden soils with plant uptake resulting in no exceedances. It is therefore considered that there is no risk to human health from vanadium in the site soils.

Validation of Site Generated Crushed Aggregate

Sampling and analysis was carried out to determine the suitability of crushed recovered aggregate for potential reuse during the development phase. Approximately 3,000m³ of aggregate was generated from the demolition of the former buildings, concrete slabs and foundations. It is proposed that the stockpile will be handed over to the developer for use during construction.

Sampling of the site generated aggregate was completed concurrently with the in-situ sampling with 3 samples collected for chemical testing and 6 samples submitted for an asbestos screen. This satisfies the prescribed screening frequency of 1 per 500m³ for asbestos and 1 per 1,000m³ for chemical analysis.

Results are compared to garden capping layer criteria and are summarised in the table below:

Table 3. Analysis Summary for Site Generated Crushed Aggregate

Contaminant	Samples	Range of Concentrations (mg/kg unless stated)	Screening criteria* (mg/kg unless stated)	Exceedances
SOM	3	1.1-1.6	-	None
pH	3	10.42-11.57	WRAS <5>8	(3): All
asbestos fibre*	6	NAD	<0.001%	None
antimony	3	<1-3	550	None
arsenic	3	14.4-21.7	32	None
barium	3	111-207	1300	None
beryllium	3	0.8-1.2	51	None
cadmium	3	0.1-0.2	10	None
chromium	3	30.8-46.7	3000	None

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Contaminant	Samples	Range of Concentrations (mg/kg unless stated)	Screening criteria* (mg/kg unless stated)	Exceedances
chromium IV	3	<0.3	4.3	None
cobalt	3	5.3-8	240	None
copper	3	11-14	300	None
lead	3	29-45	450	None
mercury	3	<0.1	1	None
molybdenum	3	2.1-2.6	670	None
nickel	3	15.1-20.9	130	None
selenium	3	<1	350	None
vanadium	3	33-45	75	None
water soluble boron	3	1.3-1.6	291	None
zinc	3	71-84	300	None
naphthalene	3	0.21-1.1	1.5	None
acenaphthylene	3	0.15-0.17	210	None
acenaphthene	3	0.29-1.71	170	None
fluorene	3	0.27-1.38	160	None
phenanthrene	3	1.94-7.81	92	None
anthracene	3	0.71-2.72	2300	None
fluoranthene	3	3.45-8.35	260	None
pyrene	3	3.09-6.46	560	None
benzo(a)anthracene	3	1.44-2.74	3.1	None
chrysene	3	1.38-2.6	6	None
benzo(bk)fluoranthene	3	2.93-4.87	-	None
benzo(a)pyrene	3	1.68-2.76	0.83	(3): All
indeno(123cd)pyrene	3	1.05-1.75	3.2	None
dibenzo(ah)anthracene	3	0.15-0.17	0.76	None
benzo(ghi)perylene	3	0.99-1.60	44	None
aliphatic C5-C6	3	<0.1	30	None
aliphatic C6-C8	3	<0.1-0.1	73	None
aliphatic C8-C10	3	<0.1	19	None
aliphatic C10-C12	3	<0.2-5.7	93	None
aliphatic C12-C16	3	9-29	740	None
aliphatic C16-C21	3	18-38	1000	None
aliphatic C21-C35	3	50-182	1000	None
aromatic C6-C7	3	<0.1	30	None
aromatic C7-C8	3	<0.1	12	None
aromatic C8-C10	3	<0.1	27	None

Contaminant	Samples	Range of Concentrations (mg/kg unless stated)	Screening criteria* (mg/kg unless stated)	Exceedances
aromatic C10-C12	3	<0.2-5.2	69	None
aromatic C12-C16	3	5-36	140	None
aromatic C16-C21	3	27-154	250	None
aromatic C21-C35	3	132-1377	890	(1): Ph8-Crush-3
benzene	3	<0.005	0.08	None
toluene	3	<0.005	120	None
ethylbenzene	3	<0.005	65	None
o-xylene	3	<0.005	45	None
m-xylene	3	<0.005	44	None
p-xylene	3	<0.005	42	None
methyl tert butyl ether	3	<0.005	49	None

No asbestos fibres were identified within the submitted samples. Chemical exceedances above the assessment criteria for material within the capping / garden cover system was limited to the PAH benzo(a)pyrene (BaP) in all 3 samples and a single exceedance of the high molecular weight aromatic C21-C35 hydrocarbon. It is anticipated that the elevated B(a)P and heavy end aromatic hydrocarbon concentrations are attributed to the minor presence of "tarmac" fragments which have been processed with the concrete hardstanding during processing.

Conclusions

SGP conclude that site preparatory works have been completed within the Dorchester Phase 8 area. No significant contamination or potential contaminative sources have been identified through historical and current uses within this part of the site.

In-situ validation of formation soils has been completed at the specified sampling frequency with exceedances of pH and minor exceedances vanadium, however when current assessment criteria (S4UL) are utilised then no exceedances of vanadium are reported. SGP considers that the risk associated to future site occupants to concentrations within the capping layer to be negligible. The concentrations do exceed the approved Remedial Strategy criteria and therefore represents a departure from the Strategy which should be agreed with Cherwell District Council (CDC).

Approximately 3,000m³ of recovered aggregate was generated on site and was sampled at the prescribed frequencies of 1 per 500m³ for asbestos and 1 per 1,000m³ for chemical analysis. No fibres were detected within the samples, however exceedances of PAHs, benzo(a)pyrene were reported within all samples and there was a single exceedance for the aromatic C21-C35 hydrocarbon fractions. Both exceedances are attributed to the processing of tarmac fragments; the processed aggregate should not form part of the garden layer cover system due to these exceedances.

Recommendations

To secure completion of remediation within Phase 8 in accordance with the Remediation Strategy, the developer is required to complete the agreed garden/landscaping cover system. This will entail a minimum 200mm clean, validated soil in all garden and landscaped areas.

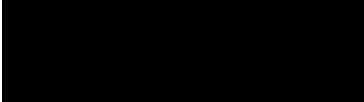
With the adoption of the above normal practice for Brownfield development, and on the information available to it, SGP concludes that the preparatory remedial works have been completed in accordance with the agreed strategy. In the event that any previously undisclosed contamination or

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suspect materials are identified then this should be assessed by an appropriately qualified and experienced person

Yours sincerely
for: Smith Grant LLP



D Wayland BSc MSc MCIWEM

Attached:
Drawing D01
Lab Certificate: 18-3756, 18-07142 & PSL1184



 In-situ Sample Location



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email: consult@smithgrant.co.uk

Project:
Heyford Park (Dorchester)

Drawing:
Phase 8 in-situ Validation

Drawn:
DW

Date:
08.03.18

Job No:
R1742b

Checked:
BJT

Scale:
1:1,250 @ A4

Drg No:
D01

1.



Ph8-S1

2.



Ph8-S1

3.



Ph8-S2

4.



Ph8-S2

5.



Ph8-S3

6.



Ph8-S3

7.



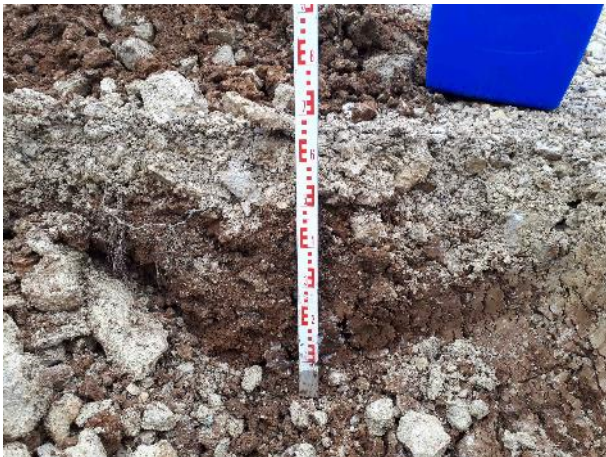
Ph8-S4

8.



Ph8-S4

9.



Ph8-S5

10.



Ph8-S5

11.



Ph8-S6

12.



Ph8-S6