

Land Contamination Statement: Former Pub Site to Residential

Summary document dated 19-10-21

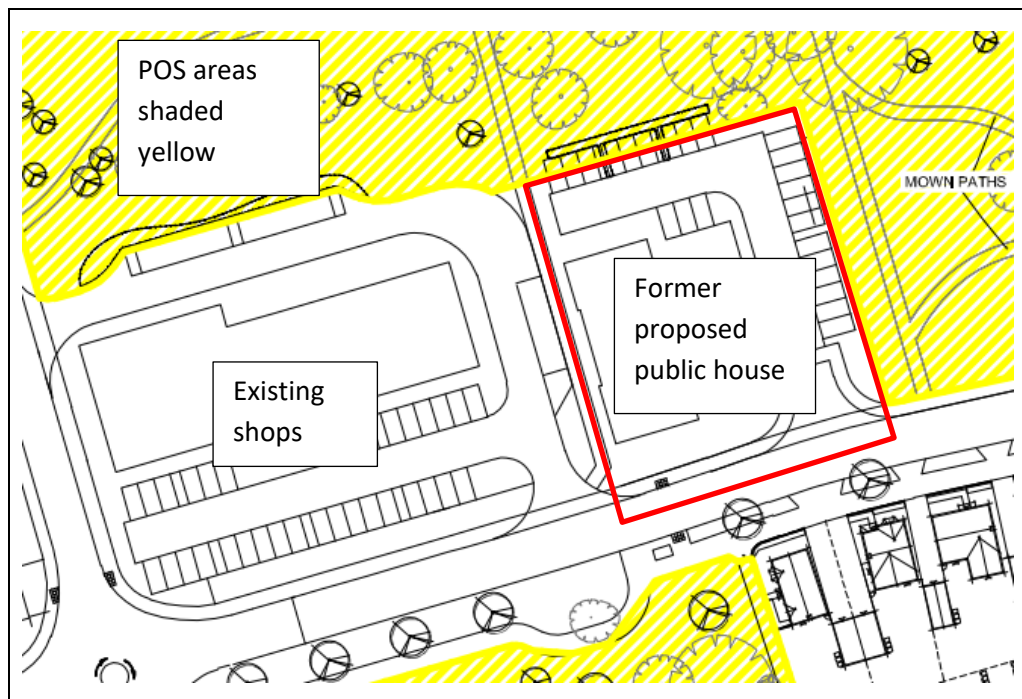
BACKGROUND

This statement has been prepared in support of a reserved matters application for a change of land use from a formerly proposed public house to residential end use on a sub-parcel of land at the former RAF Rissington airbase. The purpose of this document is to present a summary of the land quality specific to the development parcel.

Parts of the larger site were historically impacted by asbestos, hydrocarbon and radiological contamination. The whole site lies within a radon affected area. Appropriate remedial measures have been implemented across all previous phases of development.

Drawings showing the site location and historical site investigation locations within the proposed scheme are presented below which were reported under the following cover:

WSP Geo-Environmental Assessment, Draft Factual Report for ReLand (Rissington) Ltd, August 2011



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The following investigation locations are within the proposed development: TP224, TP225, TP228, TP230 and TP242.

The ground conditions within the area are summarised below:

STRATA	DEPTH TO TOP RANGE (m bgl)	THICKNESS RANGE (m)
Made Ground	0 - 2.0	0.5 - \geq 2.0
Solid	0.5 - \geq 2.0	not proven

Variable thicknesses of made ground were encountered, which was generally described as a soft brown clay with brick fragments. Metal, glass, wood, tarmac, ash and cinders were also locally recorded. Concrete slabs were recorded in TP224 and TP230. The slab in TP230 (recorded at 1.7 m bgl) was considered to be a remnant concrete bunker.

The natural strata initially comprised the weathered Salperton Limestone formation (limestone cobbles in a sandy, clayey matrix) before yielding to more competent limestone of the same unit.

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A summary of the soils chemistry from samples taken in the made ground strata is presented below. An initial screening exercise has been undertaken whereby contaminant concentrations recorded in soils have been assessed against contemporary *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH¹. These precautionary screening levels are designed to be representative of minimal risk to human health in a number of land use scenarios. S4ULs have been selected for a residential land use where the possibility of consumption of homegrown produce exists and assuming a soil organic matter of 1 %. For lead the DEFRA Category 4 Screening Level² has been used as this is based on updated toxicological data and a low risk to human health.

An additional set of phytotoxin screening levels have been adopted from 'The Code of Agricultural Practice for the Protection of Soil' Ministry of Agriculture, Fisheries and Food (MAFF), 1993, which are protective of healthy plant growth.

CONTAMINANT	No of Tests	MAX (mg.kg ⁻¹)	MEAN (mg.kg ⁻¹)	SCREENING LEVEL (SL) (mg.kg ⁻¹)	No > SL*
HUMAN HEALTH RISK ASSESSMENT					
Asbestos in soil	1	nd	nd	Detected	0
pH	5	8.9	8.4	5 – 9	0
Arsenic	2	12.9	12.6	37	0
Cadmium	2	0.4	0.3	11	0
Chromium (total)	2	14.9	13.3	910	0
Lead	2	37.8	24.6	200	0
Mercury	2	0.1	0.1	40	0
Nickel	2	9.2	8.2	130	0
Selenium	2	1.0	1.0	250	0
TPH Aliphatic >EC ₆ - EC ₈	5	10.000	10.000	100	0
TPH Aliphatic >EC ₈ - EC ₁₀	5	10.000	10.000	27	0
TPH Aliphatic >EC ₁₀ - EC ₁₂	5	10.00	10.00	130	0
TPH Aliphatic >EC ₁₂ - EC ₁₆	5	27.70	13.54	1100	0
TPH Aliphatic >EC ₁₆ - EC ₂₁	5	263.00	62.86	65000	0
TPH Aliphatic >EC ₂₁ - EC ₃₅	5	1610.00	353.92	65000	0
TPH Aromatic >EC ₇ - EC ₈	5	10.000	10.000	130	0
TPH Aromatic >EC ₈ - EC ₁₀	5	10.000	10.000	34	0
TPH Aromatic >EC ₁₀ - EC ₁₂	5	10.00	10.00	74	0
TPH Aromatic >EC ₁₂ - EC ₁₆	5	27.70	13.54	140	0
TPH Aromatic >EC ₁₆ - EC ₂₁	5	263.00	62.86	260	1
TPH Aromatic >EC ₂₁ - EC ₃₅	5	1610.00	353.92	1100	1
Benzene	1	0.009	0.009	0.087	0
Toluene	1	0.005	0.005	130	0

¹ Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Land Quality Press, Nottingham. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3100. All rights reserved. Including August 2015 nickel update.

² SP1010 *Development of Category 4 Screening Levels Main Report* (Dec 2013) and *SP1010 Policy Companion Document* (Mar 2014).

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CONTAMINANT	No of Tests	MAX (mg.kg ⁻¹)	MEAN (mg.kg ⁻¹)	SCREENING LEVEL (SL) (mg.kg ⁻¹)	No > SL*
Ethylbenzene	1	0.004	0.004	47	0
Xylene	1	0.014	0.014	56	0
Naphthalene	5	0.34	0.08	2.3	0
Acenaphthylene	5	0.72	0.15	170	0
Acenaphthene	5	1.09	0.23	210	0
Fluorene	5	0.75	0.16	170	0
Phenanthrene	5	9.18	1.91	95	0
Anthracene	5	3.96	0.81	2400	0
Fluoranthene	5	38.00	7.81	280	0
Pyrene	5	36.10	7.38	620	0
Benzo(a)anthracene	5	23.70	4.84	7.2	1
Chrysene	5	16.90	3.48	15	1
Benzo(b)fluoranthene	5	33.70	6.90	2.6	1
Benzo(k)fluoranthene	5	11.60	2.38	77	0
Benzo(a)pyrene	5	28.90	5.88	2.2	1
Indeno(1,2,3-c,d)pyrene	5	226.00	48.12	27	1
Dibenzo(a,h)anthracene	5	3.57	0.74	0.24	1
Benzo(g,h,i)perylene	5	17.50	3.59	320	0
Phenol	0	0.0	-	120	0
PHYTOTOXICITY RISK ASSESSMENT					
Copper	2	22.6	13.8	200	0
Nickel	2	9.2	8.2	110	0
Zinc	2	46.8	37.2	300	0

A sample of tarmacadam was taken in trial hole TP230 at 1.5 m bgl (which was associated with the presumed buried shelter) and the corresponding analysis indicated elevated hydrocarbon concentrations with recorded exceedances to the adopted screening levels for TPH fractions and PAH congeners. In the soils, no contaminants were detected above their adopted screening levels. Based on this information, following removal of the buried obstruction (if still present) and associated bituminous layer, no remedial measures would be required.

As the area was used for temporary stockpiling during redevelopment of the site, the formation soils on the formerly proposed public house site were subsequently validated by IDOM Merebrook to ensure that they did not present a risk to human health given that the area was accessible to the public. Plate 1 below shows the formation soils sampled.

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Plate 1: Formation soils in former proposed pub area

Six validation samples were taken from the formation in September 2018. The sample locations are indicated below.



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The results were assessed against *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH³. S4ULs were selected for a public open space park (POSpark) land use and assuming a soil organic matter of 1 %. No exceedances were recorded to the adopted screening levels. The results have now been reassessed for residential land use where the possibility of consumption of homegrown produce exists and assuming a soil organic matter of 1 %. A summary of the results is presented below:

CONTAMINANT	UNITS	MAX	MEAN	No of Tests	SCREENING LEVEL (SL)	No > SL*
HUMAN HEALTH RISK ASSESSMENT						
Asbestos in soil	-	nd	nd	6	Detected	0
Arsenic	mg.kg ⁻¹	18	12.93	6	37	0
Cadmium	mg.kg ⁻¹	0.2	0.17	6	11	0
Chromium (total)	mg.kg ⁻¹	170	40.17	6	910	0
Hexavalent Chromium	mg.kg ⁻¹	1	1.00	6	6	0
Lead	mg.kg ⁻¹	30	18.02	6	200	0
Mercury	mg.kg ⁻¹	0.05	0.05	6	40	0
Nickel	mg.kg ⁻¹	11	8.95	6	130	0
Selenium	mg.kg ⁻¹	0.7	0.53	6	250	0
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ⁻¹	0.01	0.01	6	42	0
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ⁻¹	0.01	0.01	6	100	0
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	0.01	0.01	6	27	0
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	1.5	1.50	6	130	0
TPH Aliphatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	1.2	1.20	6	1100	0
TPH Aliphatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	1.5	1.50	6	65000	0
TPH Aliphatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	17	6.55	6	65000	0
TPH Aromatic >EC ₅ - EC ₇	mg.kg ⁻¹	0.01	0.01	6	70	0
TPH Aromatic >EC ₇ - EC ₈	mg.kg ⁻¹	0.01	0.01	6	130	0
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	0.01	0.01	6	34	0
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	0.9	0.90	6	74	0
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	0.5	0.50	6	140	0
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	19	8.30	6	260	0
TPH Aromatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	67	30.87	6	1100	0
Benzene	mg.kg ⁻¹	0.01	0.01	6	0.087	0
Toluene	mg.kg ⁻¹	0.01	0.01	6	47	0
Ethylbenzene	mg.kg ⁻¹	0.01	0.01	6	130	0
Xylene	mg.kg ⁻¹	0.01	0.01	6	56	0
Acenaphthene	mg.kg ⁻¹	0.11	0.05	6	210	0
Acenaphthylene	mg.kg ⁻¹	0.06	0.04	6	170	0
Anthracene	mg.kg ⁻¹	0.29	0.15	6	2400	0
Benz(a)anthracene	mg.kg ⁻¹	1.4	0.82	6	7.2	0
Benzo(a)pyrene	mg.kg ⁻¹	1.8	1.00	6	2.2	0
Benzo(b)fluoranthene	mg.kg ⁻¹	2.5	1.45	6	2.6	0
Benzo(ghi)perylene	mg.kg ⁻¹	1.3	0.81	6	320	0

³ Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Land Quality Press, Nottingham. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3100. All rights reserved. Including August 2015 nickel update.

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CONTAMINANT	UNITS	MAX	MEAN	No of Tests	SCREENING LEVEL (SL)	No > SL*
HUMAN HEALTH RISK ASSESSMENT						
Benzo(k)fluoranthene	mg.kg ⁻¹	0.87	0.49	6	77	0
Chrysene	mg.kg ⁻¹	1.5	0.93	6	15	0
Dibenz(ah)anthracene	mg.kg ⁻¹	0.34	0.20	6	0.24	3
Fluoranthene	mg.kg ⁻¹	2.5	1.46	6	280	0
Fluorene	mg.kg ⁻¹	0.09	0.05	6	170	0
Indeno(123-cd)pyrene	mg.kg ⁻¹	1.1	0.65	6	27	0
Naphthalene	mg.kg ⁻¹	0.03	0.03	6	2.3	0
Phenanthrene	mg.kg ⁻¹	0.77	0.40	6	95	0
Pyrene	mg.kg ⁻¹	2.2	1.31	6	620	0
Phenol	mg.kg ⁻¹	0.6	0.35	6	120	0
PHYTOTOXICITY RISK ASSESSMENT						
Copper	mg.kg ⁻¹	25	12.78	6	200	0
Nickel	mg.kg ⁻¹	11	8.95	6	110	0
Zinc	mg.kg ⁻¹	62	49.67	6	300	0

Notes: * Number of samples exceeding screening level

nd = not detected

The results showed three slight exceedances for dibenz(ah)anthracene when compared to the more conservative residential screening level and further assessment may be necessary dependent on any development proposal.

The site will require a suitable topsoil to be sourced from elsewhere for any proposed soft landscaping areas. Material imported for the formation of domestic gardens and landscaped areas should be obtained from a validated source. The validation should incorporate an assessment of the provenance of the material and chemical analysis.

The proposed development lies within a Radon Affected Area as defined by the former Health Protection Agency, now Public Health England (10 to 30% of houses are above the action level). Guidance issued by the Buildings Research Establishment (BRE-211) indicates that full radon protection measures will be required within the development.