

in the case of the analysis, are available in the form of a detailed description in Figure 4 (continued).

The Committee also notes that the Government has not yet established a system of monitoring and evaluation of its policies and programmes. The Committee is concerned that the Government has not yet established a system of monitoring and evaluation of its policies and programmes.

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The results of the large-scale longitudinal study are consistent with previous research suggesting that the effects of the intervention are most pronounced in the early years of life.

...the ...

8.0 CONTAMINATION

8.1 AVERAGING AREAS

In order to assess the laboratory test results reliably and in context, the data have been grouped into an averaging area. An averaging area (or area of interest) is that area of soil to which a receptor is exposed or which otherwise contributes to the creation of hazardous conditions. This may be an area of historical industrial usage, a soil type, or a specific proposed end use.

In the case of this analysis, the averaging area has been determined according to the proposed residential end use.

8.2 SOIL CONTAMINATION

The Suitable 4 Use Levels (S4ULs) published by LQM have been adopted as critical concentrations against which soil contaminant concentrations can be compared. In the absence of additional published S4ULs, the Category 4 Screening Levels (C4SLs) derived by DEFRA and Soil Screening Values (SSVs) derived by Atkins ATRISK^{soil} for a residential with home grown produce end use have been adopted, where considered appropriate.

The results of the testing indicate total organic carbon content (TOC) in the range of 3.2% to 5.5%. As a first tier risk assessment, the results have been compared to the respective guidelines, where applicable, for 1% soil organic matter content.

The soil test results for topsoil and made ground have been summarised and are shown in Appendix H.

8.2.1 Topsoil

The results of the laboratory testing indicate that most of the analysed chemical elements or compounds are present at concentrations below the appropriate thresholds with the exception of a single arsenic exceedance.

Within the sample collected from TP02 at 0.2mbgl, an arsenic concentration of 53mg/kg exceeds the S4UL of 37mg/kg. All other arsenic concentrations were below the S4UL.

No other elevated levels of contaminants were detected within the samples of topsoil and no asbestos was detected in any of the samples.

8.2 SOIL CONTAMINATION (CONTINUED)

8.2.2 Made Ground

The results of the laboratory testing on a single sample of made ground indicate that all of the analysed chemical elements or compounds are present at concentrations below the appropriate thresholds and that no asbestos was detected.

8.2.3 In-situ Natural Ground

No visual or olfactory evidence of contamination of the in-situ natural ground was identified during the excavation of the trial pits. At the time of writing this report no samples of natural ground had been tested. It is considered likely that concentrations of determinands within the natural ground are likely to be naturally occurring and as such, the natural ground poses no significant threat to human health or the environment.

9.0 REVISED CONCEPTUAL EXPOSURE MODEL

The preliminary conceptual exposure model has been reviewed and revised to reflect the findings of the site investigation and the results of the laboratory testing of soils. Pathways identified as a relevant pollutant linkage require appropriate risk assessment or mitigation measures (see Section 10).

Table 8: Revised Conceptual Exposure Model

Source		Receptor	Pathway	Preliminary Active Pathway? (see Sect. 5.8)	Relevant Pollutant Linkage	Justification/ Mitigation
Origin	Contaminant					
Topsoil/ Made Ground of unknown origin and historical reprofiling of the site and demolition of buildings.	Metals, semi-metals, non-metals, PAH, Asbestos/ACM	Resident – human health	Dermal Contact with made ground/dust	✓	✓	Single elevated concentration of arsenic in topsoil. <i>Risk Assess</i>
			Ingestion of soil and/or soil attached to home-grown produce	✓	✓	
			Ingestion of home-grown produce	✓	✓	
			Inhalation of dust	✓	✓	
			Inhalation of vapours – indoor/outdoor	✓	x	
	Metals, semi-metals, inorganics, PAH	Groundwater quality	Leaching from made ground	✓	x	No elevated contaminant concentrations detected in soil samples.
	Metals, semi-metals, inorganics, PAH	Surface water quality	Transportation within groundwater	✓	x	
Building materials/fabric	Asbestos/ACM	Resident – human health	Inhalation of fibres	✓	✓/x	Not determined as part of soil testing. Resultant risk to be assessed following demolition.

9.0 REVISED CONCEPTUAL EXPOSURE MODEL (CONTINUED)

Table 8: Revised Conceptual Exposure Model

Source		Receptor	Pathway	Preliminary Active Pathway? (see Sect. 5.8)	Relevant Pollutant Linkage	Justification/ Mitigation
Origin	Contaminant					
Made Ground of unknown origin and natural ground	Metals, semi-metals, non-metals, PAH	Building Materials Durability	Direct contact	✓	×	Made ground and natural ground will be in contact with building materials. <i>Risk Assess</i>
Ground Gas – organic, gas producing materials	Methane, carbon dioxide	Human health	Accumulation of gases in confined spaces, and/or migration off site, leading to asphyxiation, or risk of explosion	✓	×	Significant thickness of gas producing materials not encountered. No off-site sources identified. Basic radon protection required.

10.0 RISK ASSESSMENT

10.1 METHODOLOGY

The risk of pollution, health effects or environmental harm occurring as a result of ground contamination is dependent upon three principal factors:

- The scale of the contamination sources;
- The presence of sensitive "receptors", eg Humans: health of the general public, site occupiers, redevelopment workers. Environment: flora, fauna, etc;
- The existence of migration pathways by which contaminants can reach the sensitive receptors.

This section assesses each of these factors in order to evaluate the overall level of risk and potential harm to receptors. The receptor may be human, a water resource, an eco-system or construction materials. Pathways connecting a perceived hazard to a receptor are referred to as exposure pathways.

The sources of contamination and the links connecting the hazards to the sensitive receptors will represent the basis for the risk assessment.

10.2 SOURCE-PATHWAY-RECEPTOR MODEL

The preliminary conceptual site model was based on the findings of the desk study. This was later reviewed and refined according to the findings of the site investigation, allowing for the ground conditions encountered and the results of laboratory testing of soil and groundwater. Any pathways considered to be inactive were removed from the model and all remaining potentially active pathways require risk assessment.

The pathways shown as potentially active in the Revised Conceptual Site Model in Section 9.0 above have been assessed below.

10.3 HUMAN HEALTH RISK ASSESSMENT

10.3.1 Site in its Present Condition

The site does not pose any risks to casual visitors or the existing residents.

10.3 HUMAN HEALTH RISK ASSESSMENT (CONTINUED)

10.3.2 Future Site Users

The contamination test results and investigation observations indicate that the contaminant levels within the made ground and topsoil beneath the site are generally within acceptable levels and it is considered that the natural ground does not present a potential risk to site end users.

A single concentration of arsenic within a sample of topsoil exceeded the guidance threshold (S4UL), however, reference to the DEFRA technical guidance on normal levels of contaminants in Welsh soil indicates that the normal background concentration (NBC) of the area is 250mg/kg (Urban 1 area).

Accordingly, the recorded concentration in a single topsoil sample beneath the site is not considered to be of significant concern given the general ambient concentrations of the area, associated with either historical land uses, natural mineralisation or naturally peaty organic rich soils.

As such, no specific mitigation measures are required, however the Local Authority may require bioaccessibility testing in order to further assess the risk to human health.

In the event that an unexpected hotspot or suspected contamination is encountered during the construction phase, this will require appropriate inspection and risk assessment to identify if any remedial measures will be required in order to protect end users.

It is recommended that the ground beneath the existing floor slab is inspected following the demolition of the existing building to note any signs of contamination including asbestos and/or asbestos containing materials (ACM). The risk to site end users arising from any asbestos containing materials within the building fabric has not yet been determined and will require investigation following demolition.

10.3.2 Future Site Users

Normal good hygiene practices are considered adequate to protect the health and safety of redevelopment workers, and should include:

- Minimum handling of materials;
- Washing of hands prior to all meal breaks, which should be taken in a designated clean area;
- The use of standard protective clothing such as boots and overalls and gloves, where considered relevant.

10.3 HUMAN HEALTH RISK ASSESSMENT (CONTINUED)

In dry weather, inhalation of dust should be avoided preferably by the use of dust suppression techniques to minimise fugitive emissions and minimisation of exposed materials at any particular time.

During excavation, in order to prevent cross contamination of materials and for good practice, any encountered made ground arisings should be segregated from any underlying natural soils.

Additionally, a system should be established by which any 'unusual' materials that may be encountered are reported rapidly to the site management, so that the appropriate action may be taken, following specialist advice if necessary. An unusual material may be identified on site by colour, odour or physical nature.

Reference should be made to the Health and Safety Executive document "Protection of Workers and the General Public during the development of contaminated land" for detailed guidance on these matters.

10.4 RISKS TO VEGETATION

Contaminant concentrations within the made ground do not indicate the potential for adverse effects to vegetation.

The nature of the made ground in some areas may not provide a suitable growth medium for plants and vegetation, therefore where new trees or vegetation is to be planted it would be prudent to allow for a minimum 150mm thick layer of clean, inert topsoil materials to be placed in all proposed landscaped areas.

10.5 GROUNDWATER RISK ASSESSMENT

The intrusive site investigation has not identified any elevated contaminant concentrations or potentially contaminated materials considered to pose a risk to controlled waters in the near surface soils beneath the site. Alongside the site history, and identified ground conditions, the risk to controlled waters is therefore considered to be low.

10.6 GROUND GAS RISK ASSESSMENT

The intrusive investigation did not identify significant thicknesses of made ground beneath the site and no putrescible or potentially gas generating materials were noted. The site history and identified ground conditions indicate that the risk of on-site ground gas generation is considered to be low.

Off-site, the desk study has not identified any landfills or potential sources of ground gas within 250m of the site boundary, therefore the risk of off-site ground gas migration is also considered to be low.

A BGS radon report was obtained as part of the desk study. The report states that basic radon protective measures would be necessary in the construction of new buildings within the site.

10.7 RISKS TO BUILDINGS AND MATERIALS DURABILITY

10.7.1 Concrete Classification

The laboratory test results for the chemicals water soluble sulphate and pH, which may adversely affect the durability of building materials is presented in Appendix G. In addition, chemical testing on a single sample of made ground including analysis for sulphur, water soluble sulphate, total sulphate and pH and results are included in Appendix F.

Evidence to date does not indicate any specifically aggressive conditions, but it would be reasonable to expect a degree of sulphate and acidic aggressiveness from the made ground.

In accordance with BRE Digest SD1:2005 and adopting the assessment procedure specified therein for brownfield sites, the laboratory chemical test results indicate a characteristic value (taking the highest of the test results) for water soluble sulphate within both the made ground and natural ground of 120mg/l.

Using Table C2 of BRE Digest SD1:2005, this characteristic value corresponds to Design Sulphate Class DS-1.

The groundwater regime of the site has been assessed as 'mobile' and a characteristic pH value of 6.0 has been determined (adopting the lowest of the test results). The Design Sulphate Class has been modified to give a site ACEC class of AC-2z for concrete structures constructed within the made ground and natural ground beneath the site.

10.7 RISKS TO BUILDINGS AND MATERIALS DURABILITY (CONTINUED)

10.7.2 Water Services

Water supply pipes will need to be protected from any contamination present within the ground. In particular, the presence of organic contaminants (such as PAH) should be addressed when selecting pipe materials. Measures to protect the pipes will include clean backfill to trenches and possibly alternative material selection. Reference should be made to UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, document No. 10/WM/03/21. The final design and selection of the pipe and associated backfill should be agreed with the appropriate Regulator prior to installation.

Current test results indicate that PE or PVC pipe materials are likely to be acceptable based on negligible concentrations of PAH (with the exception of samples of topsoil). In order to comply with the UKWIR guidance, specific sampling and testing along the actual line of the proposed water supply route may need to be carried out once this has been established.

10.8 WASTE DISPOSAL

Excavated materials generated by the development may be considered as waste and subject to waste controls. Any re-use of excavated materials on-site should be undertaken in accordance with current waste and environmental legislation and which may require the production of an approved Materials Management Plan (MMP) prepared in accordance with the CL:AIRE Code of Practice.

It is recommended that a sustainable development strategy is adopted which reduces to a practicable minimum the generation of waste materials and the need for disposal to a licensed tip. Emphasis should be on recovery and re-use rather than disposal.

However, any waste or surplus materials that are generated will need to be classified in accordance with current EC regulations and Environment Agency guidance prior to disposal. It is the responsibility of the waste producer to classify the waste.

Based on the data obtained from the site investigation works, any waste materials comprising the existing made ground are likely to be classified as non-hazardous waste. The existing natural ground is likely to be classified as non-hazardous waste.

Any asbestos containing materials (ACMs) will be classified as hazardous waste.

10.8 WASTE DISPOSAL (CONTINUED)

This classification is provisional and indicative of the likely waste classification based on the data obtained to date (including chemical composition, moisture content, etc.). It also assumes that the materials tested will be representative of future generated waste.

In order to minimise disposal, the materials generated should be segregated and examined, with appropriate testing as necessary, to enable the materials to be sorted or treated into lower classifications, with the resultant benefit of potentially generating re-use rather than disposal.

Once final waste sources and volumes are known, the waste stockpile to be disposed off-site will need to be classified in accordance with Environment Agency/Natural Resources Wales Waste Classification – Guidance on the Classification and Assessment of Waste Technical Guidance WM3 (2015). This is likely to require additional sampling and testing of the generated waste materials to provide an up to date current basis for classification.

Depending on the waste classification, waste acceptance criteria (WAC) testing may be required, in order to determine which class of landfill site the waste can be sent to.

It is recommended that the results of the waste classification and any WAC test results are sent to the intended licensed waste operator prior to disposal in order to confirm their classification and acceptance.

10.9 UNCERTAINTIES

It is important to recognise that there may be areas of contamination within the site that have not been found or that contaminants may be present at concentrations above those that have been found. It is also important to recognise that contamination may be localised and that no investigation, however comprehensive, is capable of finding such occurrences, other than by chance.

The ground beneath existing buildings has not been examined, though the site history does not indicate the potential for former site uses to have caused contaminant spills and no sign of basements was noted. Some degree of made ground material should be expected beneath the existing floor slabs. It would be prudent that inspection of the exposed formation(s) is undertaken following breaking out and removal of the floor slabs to note any signs of potential contamination.

Assessment of the embankment to the north of the existing dwelling has not been undertaken as part of this investigation.

10.9 UNCERTAINTIES (CONTINUED)

In addition, any the existing retaining walls have not been assessed as part of this investigation and any that are to remain should be inspected by a suitably qualified structural engineer.

APPENDIX F**LABORATORY CHEMICAL TEST RESULTS (SOILS)**

APPENDIX F

LABORATORY CHEMICAL TEST RESULTS (SOILS)



4041



M CERTS



Environmental Science

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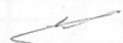
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Analytical Report Number : 21-55927

Project / Site name:	Wenallt Road, Tonna	Samples received on:	10/02/2021
Your job number:	12800	Samples instructed on/ Analysis started on:	10/02/2021
Your order number:	12800	Analysis completed by:	18/02/2021
Report Issue Number:	1	Report issued on:	18/02/2021
Samples Analysed:	4 soil samples		

Signed: 

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-55927
Project / Site name: Wenallt Road, Tonna
Your Order No: 12800

Lab Sample Number	1765236	1765237	1765238	1765239
Sample Reference	TP01	TP02	TP03	TP04
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.10	0.20	0.50	0.10
Date Sampled	08/02/2021	08/02/2021	08/02/2021	08/02/2021
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	21
Total mass of sample received	kg	0.001	NONE	0.5

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6	7.2	8.1	8.4
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	720	960	440	450
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.011	0.01	0.012	0.015
Sulphide	mg/kg	1	MCERTS	3.1	< 1.0	< 1.0	46
Total Sulphur	mg/kg	50	MCERTS	600	630	310	460
Total Organic Carbon (TOC)	%	0.1	MCERTS	5	5.5	3.2	4.7
Loss on Ignition @ 450oC	%	0.2	MCERTS	9.8	14.5	8.5	8.3

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.26
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.21
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.48	< 0.05	2.8
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.24
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.84	< 0.05	3.2
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.66	< 0.05	2.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.54	< 0.05	1.1
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.81	< 0.05	1.6
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.79	< 0.05	1.7
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.31	< 0.05	0.51
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.49	< 0.05	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.28	< 0.05	0.73
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.22
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.36	< 0.05	0.74

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	5.56	< 0.80	16.8
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	28	53	31	32
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.55	0.7	0.81	0.73
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.6	0.7	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	2.7	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25	19	17	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	42	130	60	67
Lead (aqua regia extractable)	mg/kg	1	MCERTS	66	98	52	130
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	24	33	24
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	1	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	30	31	27	31



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Environmental Science

Analytical Report Number: 21-55927

Project / Site name: Wenallt Road, Tonna

Your Order No: 12800

Lab Sample Number				1765236	1765237	1765238	1765239
Sample Reference				TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.20	0.50	0.10
Date Sampled				08/02/2021	08/02/2021	08/02/2021	08/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
	mg/kg	1	MCERTS				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	580	170	200

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 21-55927
Project / Site name: Wenallt Road, Tonna

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of soil should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1765236	TP01	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
1765237	TP02	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
1765238	TP03	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
1765239	TP04	None Supplied	0.1	Brown loam and clay with gravel and vegetation.



Analytical Report Number : 21-55927
Project / Site name: Wenallt Road, Tonna

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 300C.