

# Supplementary guidance for the selection of water pipes in land potentially affected by contamination



## Introduction

In January 2011, UK Water Industry Research (UKWIR) published "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WM/03/21; the 'UKWIR Guidance'). Its aim is to ensure that the correct materials are selected for water pipes and components to be used below ground in brownfield sites to protect the quality of drinking water whilst taking into account the service life of the water distribution system. It supersedes the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note 9-04-03 "Laying Pipes in Contaminated Land" which has been withdrawn.

The UKWIR Guidance is for use by developers, self-lay organisations, water companies and consultants when planning, designing and constructing water mains and/or services in brownfield sites. It defines brownfield sites as "land or premises that have previously been used or developed. They may also be vacant or derelict. However, they are not necessarily contaminated." The UKWIR Guidance states that it does not apply to greenfield sites; however, we consider this supplementary guidance and the relevant sections of the UKWIR guidance as being equally suitable for application to those greenfield sites considered to be potentially affected by contamination. Where greenfield sites are not affected by contamination a preliminary risk assessment (see below) will suffice.

The UKWIR Guidance also states that there should be no departure from its provisions "*except where formally approved by the Water Company, such departure being technically justifiable or representing advances in knowledge or product development*".

We have adopted the UKWIR Guidance in principle and produced this company specific supplementary guidance (the 'UUW Guidance') which includes the Risk Assessment for Water Pipes (the 'RA').

This guidance does not cover operative safety, health exposure modelling or accidental pipe damage.

## Risk Assessment for Water Pipes in Land Potentially Affected by Contamination

Any application for new water supplies to a development (construction of new properties, or renovation or conversion of existing buildings) in land potentially affected by contamination shall include a completed RA.

As a minimum a desk study (preliminary risk assessment) shall be provided with the RA in accordance with the framework in Environment Agency publication "Model Procedures for the Management of Land Contamination" (ref: CLR11) that sets out whether the land through which the pipes are to be laid may be affected by contamination. The application of the source, pathway, receptor concept will be an integral part of any pipeline risk assessment. For each potential source (the contamination) and each potential receptor (the water pipe), consideration shall be given to whether a potential pathway between source and receptor exists, or may exist in the future, linking the two. There are normally only three pathways by which contamination may come into contact with water pipes. These are direct contact with the soil or backfill, an excessive vapour phase or a contaminated groundwater regime. If none of these conditions exist on site (adopting the source, pathway, receptor concept) then it is likely that extended and/or targeted soil testing will not be required and a simple risk assessment will suffice. For those sites where land may be affected by contamination appropriate testing shall be undertaken on the materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials. The testing requirements are as described in the following section.

The signatories of the Water Supply Application Form and the RA must ensure that all assessments of land condition have been carried out in accordance with applicable current standards and guidelines by or under the direction of a suitably qualified competent person.

We require the competent person to be a) a chartered member of an appropriate professional body (such as the Institution of Civil Engineers, the Geological Society of London or the Royal Institution of Chartered Surveyors) with relevant experience of investigating contaminated sites or b) a Specialist in Land Condition (SiLC) with appropriate geo-environmental experience.

## Testing Requirements

The soil, rock and if appropriate groundwater tests that are required on all sites where the potential for organic contamination has been identified in the desk study and where water pipes are proposed to be laid must be accredited by United Kingdom Accreditation Service (UKAS) as a minimum and where commercially available the Environment Agency's Monitoring Certification Service (MCERTS). These accredited tests should be undertaken for:

Banded hydrocarbons EC5-EC10, EC10-EC16, EC16-EC40 (Total aliphatic and aromatic hydrocarbons for each banding may be summed). Aliphatic/aromatic fractionation and subsequent banding may be required should a more detailed site specific risk assessment be undertaken. The bandings have been amended to take into account readily available laboratory tests. The equivalent carbon number (EC) is used to assess petroleum hydrocarbon mixtures rather than the actual number of carbon atoms in the molecule in line with guidance issued by the Environment Agency (2005).

Volatile organic compounds (VOCs) (method by head space or purge & trap GCMS) with tentative identification of compounds greater than 20µg/kg. The method used should be capable of detecting a wide range of compounds listed in US EPA Method 8260C or similar. The method should include analysis of naphthalene.

BTEX (Benzene, toluene, ethyl benzene and xylenes) plus MTBE (Methyl-tertiary butyl ether) (by head space GCMS)

Semi-Volatile Organic Compounds (SVOCs) (method by GCMS) with tentative identification of compounds greater than 20µg/kg. The method used should be capable of detecting the compounds listed in US EPA Method 8270D or similar. The total concentration of SVOCs excludes polycyclic aromatic hydrocarbons, ethers, nitrobenzene, ketones, aldehydes, phenols, cresols and chlorinated phenols. Phenols, cresols and chlorinated phenols which are detected by the SVOC analysis are given their own assessment criteria.

We do not consider Table G1 and Table 3.1 of the UKWIR Guidance to be a definitive guide for assessing total concentrations. Table 1 in the RA below replaces Table 3.1 of the UKWIR Guidance.

Where previous site uses include the use, storage, treatment, disposal or manufacture of any of the following, appropriate testing for these substances will be required:

*Ethers, nitrobenzene, ketones, aldehydes and amines.* Note that the presence of amines on any site at the proposed pipe depth +/- 1.0m precludes the use of polyethylene. The methods of analysis and method of calculation of total concentrations of these compounds will need to be agreed with UUW.

To comply with the testing requirements, the suites of tests that are required on all brownfield sites where wrapped steel, wrapped ductile iron or copper pipes are to be laid as minimum must include:

*pH, Conductivity and redox potential*

## Sufficiency of Testing

Water pipes are normally laid at between 0.75 and 1.35m from finished ground level to crown of pipe. Samples taken and tested must represent both a) the soil in which the water pipes are to be laid and b) the soil down to at least 500mm below the underside of the proposed pipe. Where the proposed depth of the pipes is unknown at the time of application, soil samples representative of the ground condition between surface level and 1.5m below finished ground level shall be taken as a minimum. Where appropriate (see UKWIR Guidance) groundwater sampling and groundwater monitoring will also be

necessary. Photo-ionisation detection (PID) monitoring along the proposed route of the pipeline may be employed, though this does not provide a definitive guide to the suitability of water pipe materials.

Where required a sufficient number of test results should be obtained from the material in which the pipes are to be laid. CLAIRE/CIEH 2008 "Guidance on comparing soil contamination data with a critical concentration" may be used, where appropriate, to justify the number of soil samples tested; however, this statistical model should not be used on heterogeneous materials or used to average test results from different types of materials.

Further guidance on representative sampling is contained within BS10175:2011 Code of Practice for the Investigation of Potentially Contaminated Sites, the Department of the Environment's Contaminated Land Research Report "Sampling strategies for contaminated land" prepared by The Centre for Research into the Built Environment, Nottingham Trent University (Ref: CLR 4; 1994) and the Environment Agency's "Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination" (ref: R&D Technical Report P5-066/TR; 2000).

Where remediation has been carried out on the site, the test results obtained from validation samples will be used in the assessment. Where a horizontal capping system has been or will be employed using materials spread across a site, sufficient samples will need to be taken to characterise the capping material used and the results presented to UUW. However, the sufficiency of sampling on the horizontal capping system, in which the pipeline will be placed, may be assessed on the basis of the source, quantity and type of materials used.

### **Detection Limits**

Only positive concentrations, ie those above the limit of detection should be used in summation of VOC and SVOC (or other test groups of compounds ie phenols, cresols and chlorinated phenols). Laboratory methods shall provide a minimum limit of detection of 10µg/kg for each individual VOC or SVOC (or other test groups of compounds) quantitatively detected in accordance with the methods described above. For tentatively identified compounds (TICs), only those compounds with a concentration of 20µg/kg or greater shall be used in the summation of VOC and SVOC (or other test groups of compounds).

### **Protective Measures**

Where polyethylene, ductile iron, steel or copper pipes are to be laid on a brownfield site or other land potentially affected by contamination (whether or not it has been remediated) and where the concentrations exceed the generic guideline values set out in Table 1 of the RA, the developer shall provide either:

- a) a robust risk assessment to show how any contaminants will not significantly impact on proposed water supplies or buried assets over the lifetime of the assets; or
- b) more suitable pipe materials; or
- c) an engineering solution to protect the pipe work backed up by an adequate assessment of the risk.

Liquid free phase product (e.g. oil or free solvent layers) shall not remain in the ground or groundwater in the vicinity of water pipes, whether barrier pipe or any other pipe materials are used.

When designing pipe routes on land potentially affected by contamination, new preferential contamination pathways along the route of new water pipes shall not be created. Particular measures may be required to prevent the possible migration of contamination through pipe bedding and into controlled waters.

## References

BS10175:2011 "Investigation of Potentially Contaminated Sites Code of Practice"

CLAIRE/CIEH "Guidance on comparing soil contamination data with a critical concentration" 2008

Department of the Environment Contaminated Land Research Report "Sampling strategies for contaminated land" prepared by The Centre for Research into the Built Environment, Nottingham Trent University (Ref: CLR 4) 1994

Environment Agency "Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination" (ref: R&D Technical Report P5-066/TR) 2000

Environment Agency "Model Procedures for the Management of Land Contamination" (ref: CLR11), 2004

Environment Agency P5-080/TR3 "The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils", 2005

UK Water Industry Research (UKWIR) "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WM/03/21)" January 2011

Water Regulations Advisory Scheme (WRAS) Information and Guidance Note 9-04-03 "Laying Pipes in Contaminated Land" 2002



### About us

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# Risk Assessment for Water Pipes (RA)



The risk assessment for water pipes will help you choose appropriate materials for your development. We are happy to deal with a risk assessment for water pipes in advance of any formal application for a new water supply.

**If you need any help completing the form please call us on 0845 026 4296.**

*When completing this form electronically, the larger text boxes will expand in height if required.*

Section 1: Development Details	
Development Name <i>(if it has one)</i>	Land located at Stubbins House, Stubbins Lane, Claughton-On-Brock Preston PR3 0PI
Development Address	Land located at Stubbins House, Stubbins Lane, Claughton-On-Brock Preston PR3 0PI
OS Grid Reference <i>(mid point)</i>	350668E, 442683N
Developers Name	Mr & Mrs Thompson
UW reference number <i>(for UU use only)</i>	
Please provide details below of the current and historical use of the site and adjacent sites.	
<i>If your supporting information has details of the current and historical site use, please reference below the relevant sections of your report.</i>	
The site is an approximately rectangular shaped plot, about 29 by 24 metres, located to the southeast of Stubbins Lane in Claughton-On-Brock.	
The site is part of a farm and comprises agricultural buildings, currently being used mainly for livestock. The site was generally level with a grass surface to the west of the building, and concrete surface to the north and east. In the south the surrounding area was unsurfaced. Surrounding the site was mainly farmland and farm buildings.	
The buildings on site comprise a stone built two storey barn with a corrugated steel roof (north-east) with an attached single storey block work lean-to with a corrugated steel roof, a Timber/metal/asbestos dilapidated shed (north of the site and a corrugated steel and timber shed, with diesel tank inside (south-east).	
Further buildings off-site include a large high barn of corrugated steel, with diesel tank inside (south), open front barn/stable timber and steel (south-east) and Large modern barns (east). A barn immediately south of the site had a diesel/oil tank inside. One barn stored hay and another had different oils/lubricants and tools. The area slopes down gently to the northwest.	

Section 2: Preliminary Risk Assessment	
Has your desk study and site walkover identified any land potentially affected by contamination?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If the site is potentially affected by contamination but you have not completed any intrusive site investigation please provide details below of the rationale behind the intended pipe selection.	
<i>If your supporting information has details of the rationale behind the intended pipe selection, please reference below the relevant sections of your report.</i>	

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**Section 3: Intrusive Site Investigation**

Have you completed any intrusive site investigation?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
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Date(s) when the site investigation(s) undertaken	19th February 2021
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At what level has groundwater been encountered?	metres below ground level or <input checked="" type="checkbox"/> Not encountered
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Table 1 (Pipeline Selection Risk Assessment Summary (PSRAS)) below classifies testing required where the preliminary risk assessment has identified land potentially affected by contamination. Please provide details below of any test groups which have not been tested and the rationale for not testing.

*If your supporting information has details of the rationale behind not testing any particular test groups, please reference below the relevant sections of your report.*

Following a thorough assessment of history of the site and the surrounding land use as well as existing land use, the potential contaminants of concern were determined. The assessment of site history and surrounding land use is detailed in Wormseye Preliminary Risk Assessment (Desk Study) report – Stubbins House, Stubbins Lane, Cloughton-On-Brock, Preston, PR3 0PL [Stubbins Lane/PR3 0PL, dated 1 December 2017].

The information presented in the Report includes a Preliminary Risk Assessment (qualitative assessment) to identify the potential contaminants of concern present based on historic and current site activities and this has informed the extent and scope of the site investigation works undertaken. The site investigation tested for the following contaminants of concern as recommended by the Wormseye report and following a review of ground conditions at the site: As, Cd, Cr, Cr (VI) Cu, Pb, Ni, Se, Hg, Zn, Cu, Cyanide, sulphate, pH, phenols, polycyclic aromatic hydrocarbons (PAHs), Speciated Total Petroleum Hydrocarbons, VOC compounds, SVOC compounds, soil organic matter and asbestos.

If the intrusive site investigation has identified concentrations above the PE threshold (see PSRAS) and your intended pipe selection is PE please provide details below of the rationale behind the intended pipe selection.

*If your supporting information has details of the rationale behind the intended pipe selection, please reference below the relevant sections of your report.*

The concentrations above the PE threshold presented in the PSRAS table were present within the made ground topsoil overlying the site which extended to a maximum depth of 0.4 m. Therefore, the pipes will not be laid in this material. Moreover, these soils will be removed from the landscaped areas on site as part of the re-development works. Therefore, risks associated with the made ground topsoil are not considered.

**Section 4: Site Remediation**

Please provide details below of any site remediation (which may include a change in site levels) already completed.

*If your supporting information has details of the site remediation already completed, please reference below the relevant sections of your report.*

None

Has the PSRAS (Table 1) been completed using appropriate data after remediation?  Yes  No  N/A

Please provide details below of any proposed site remediation and an analysis of whether this will affect your intended pipe selection.

*If your supporting information has details of any proposed site remediation and whether this will affect your intended pipe selection, please reference below the relevant sections of your report.*

Removal of made ground topsoil from landscaped areas. Removal of made ground topsoil will render the landscaped areas generally uncontaminated with respect to the threshold values for the contaminants outlined within the PSRAS table which are deleterious to water pipes. Moreover, the pipes are to be laid within natural materials which are not anticipated to contain elevated concentrations of contaminants above PSRAS thresholds

### Section 5: Final Use of Site

Please provide details below of any chemicals (including fuel) to be stored on site and any other future contamination risks which may affect your intended pipe selection.

*If your supporting information has details of potential contamination risks which may affect your intended pipe selection, please reference below the relevant sections of your report.*

N/A - residential development

What water pipe materials are intended to be used on site?  PE  PE Barrier Pipe Type A  PE Barrier Pipe Type B  
Other (please specify):

### Section 6: Additional Information

Please use the section below to provide any additional details to support your intended pipe selection.

*If your supporting information has additional information to support your intended pipe selection, please reference below the relevant sections of your report.*

### Section 7: Risk Assessor

Name and relevant qualifications of person directing the risk assessment for water pipes	Michael Buckley MSc(Hons) MSc MEnvSci CEnv
Name and address of risk assessor's company	BEK Enviro Limited - Suite 1 - No 3 Mitton Road Business Park - Mitton Road - Whalley - Lancashire - BB7 9YE
Date risk assessment performed	17 <sup>th</sup> March 2021

### Section 8: Declaration

I confirm I have completed this form and provided supporting information in accordance with 'UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' and U UW's Supplementary Guidance. I also confirm that if any further site investigation is needed and carried out, I will be required to submit an additional Risk Assessment for Water Pipes with the relevant supporting information. I understand that failure to supply any of the required information may delay my application being processed.

Name	Michael Buckley	Company	BEK Enviro Limited
Phone Number	07906753583	Date	17 <sup>th</sup> MArch 2021

Please e-mail the completed form and supporting information to [water.connections@uuplc.co.uk](mailto:water.connections@uuplc.co.uk). Alternatively you can fax a paper version to 01925 678926 or post to us at United Utilities Water, Metering and Connections, Ullswater House, Lingley Mere, Warrington, WA5 3LP.



#### About us

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**Table 1 - Pipe Selection Risk Assessment Summary (PSRAS)**

- 1) Testing must be undertaken on the materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials. Please use the appropriate testing data to complete Table 1 below.
- 2) If more than one pipe selection is being made, for example, for pipes in different areas of a large site, a completed PSRAS is required for each selection.

What materials have been tested to populate Table 1 below?

Existing ground materials  Remediated materials  Imported capping materials

All concentrations in mg/kg

Test Group	Testing Required?	PE threshold	Metal Pipes/ Barrier Pipe	Laboratory Detection Limit	Testing UKAS accredited Y/N	Maximum concentration at proposed pipeline depth See Note [2]	Maximum site concentration See Note [3]	Locations and depths where concentrations exceed proposed pipeline threshold
Total VOCs	Where Preliminary Risk Assessment (PRA) has identified land potentially affected by contamination	0.5	Pass	<0.01	Y	---	<0.01	---
Total BTEX & MTBE		0.1	Pass	<0.01	Y	---	<0.01	---
Total SVOCs (excluding PAHs and those substances marked with an *)		2	Pass	<0.05	Y	---	0.72	---
EC5-EC10 aliphatic and aromatic hydrocarbons		2	Pass	<1	Y	---	38	WS1 (0.2 m), WS4 (0.1 m), WS5 (0.2 m), WS3 (0.2 m)
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass	<1	Y	---	88	WS1 (0.2 m), WS4 (0.1 m), WS5 (0.2 m), WS3 (0.2 m)
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass	<1	Y	---	660	WS1 (0.2 m), WS3 (0.2 m)
Phenols* (from SVOC analysis)		2	Pass	<0.1	Y	---	<0.1	---
Cresols and chlorinated phenols* (from SVOC analysis)		2	Pass	<0.1	Y	---	<0.1	---
Ethers*	Only where identified	0.5	Pass					
Nitrobenzene*		0.5	Pass					
Ketones*		0.5	Pass					
Aldehydes*		0.5	Pass					
Amines		Fail	Pass					
Corrosive	Conductivity, Redox and pH	Pass	See Note [1]					

Note [1] Threshold: For wrapped steel, corrosive if pH<7 and conductivity > 400µS/cm. For wrapped ductile iron corrosive if pH<5, Eh not neutral and conductivity > 400µS/cm. For copper, corrosive if pH<5 or >8 and Eh positive.

Note [2] Water pipes are normally laid at 0.75-1.35m below finished ground level.

Note [3] Also state if liquid free product is present in soil or groundwater.