

Information for Developers about contaminated land and ground condition assessment guidance and advice given by

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anglianwater



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Contaminated Land

Introduction to the new approach

Prior to 2010 individual water companies set their own standards based on available data. In response to concerns by water companies in 2010 UKWIR have compiled a guide for water companies '[Guidance for the selection of water supply pipes to be used in Brownfield sites](#)'.

The guide provides:

- A clear concise guidance to developers, designers and water companies.
- National standards – national guidance.
- Key focus on pipe and fittings integrity in contaminated land.

Permeation of water pipes

Plastic supply pipes are permeable to hydrocarbons such as petrol, diesel, heating fuel and white spirits. To ensure that the water supply remains satisfactory we use a material which is not permeable to hydrocarbons, such as ductile iron, copper, plastic coated copper or aluminium lined polyethylene pipe (ALPE).

From a water company point of view there are a number of key concerns:

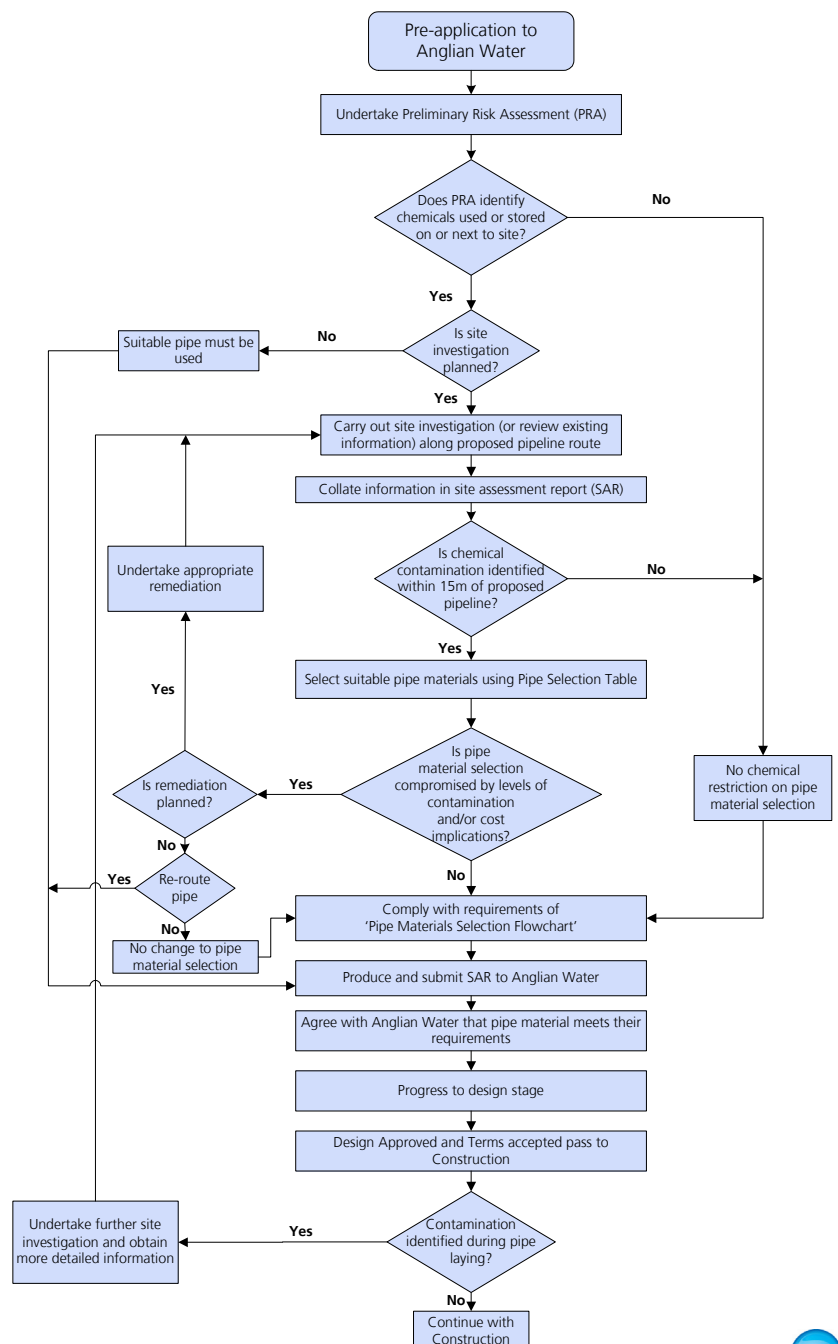
- Permeation of hydrocarbon based substances through pipework (ingestion).
- Pipe failure (environmental stress crackling, swelling of plastic pipes, corrosion of metal pipes).
- Effect of compounds on the health and safety of employees working in the ground (skin irritation).

How are sites assessed using UKWIR method?

Stage 1 – Undertake a Preliminary Risk Assessment (PRA)

For each site the developer will need to provide the following for assessment:

- Desktop study.
- Site walk over.
- Complete the PRA.
- Review findings.
- If chemicals have been stored/used on site eg oil tank, further work is required (See the flowchart below).
- If no chemicals have been stored/used on site then no further assessment is required. (See the flowchart¹ below).



¹ Flowchart adapted from UKWIR publication '[Guidance for the selection of water supply pipes to be used in Brownfield sites](#)'

Stage 2 – Site Investigations (SI) •

If identified as necessary at Stage 1, the developer should undertake a Site Investigation (SI).

The SI should contain the items detailed under 'What should the developer provide ?'(below) and with the methodologies in Part 2.1 of the UKWIR '[Guidance for the selection of water supply pipes to be used in Brownfield sites](#)'.

What should the developer provide?

When making a submission to Anglian Water the following needs to be included:

Information developer provides for the PRA

- Desk study
 - Desk based.
 - Historic and current use.
 - Chemicals that may have been stored on site.
 - Immediate area considered.
 - Land registry, maps. LA Records.
- Site plan
 - Site location, scale, site boundary, arrow identifying North, proposed route of pipes.
- Site walkover
 - Visual and factory evidence.
 - Previous/current site activities eg oil tanks.
 - Ground conditions eg fly-tipping.
 - Photographs.

Information developer provides for the IS Investigation

- Photo-ionisation detection (PID) – measure organic contamination on the site. Above ground and at depth.
- 15 metre corridor either side of the pipeline route.
- No evidence of organic vapours. At least two samples must be collected for analysis.
- If the pipeline route is unknown they must be across the site.
- All data collated into SAR and submitted to Anglian Water.

- Minimum depth 500 mm.
- Numbers and locations to be taken should be agreed with Anglian Water.
- Ground water/perched water within one metre of the base of trench a water sample should be collected (increase to two metres in the summer).
- Analysis.
- Mandatory analytical suite:
 - Group 1: Total VOCs minus total concentration of
 - Group 1a: BTEX and MTBE
 - Group 2: Total SVOCs – minus total concentration of Groups 2e and 2f
 - Group 2e: Phenols
 - Group 2f: Cresols and chlorinated phenols.
 - Group 2: (Only required if site use indicates they may be present).
 - Group 2a: Ethers.
 - Group 2b: Nitrobenzene.
 - Group 2c: Ketones.
 - Group 2d: Aldehydes.
 - Group 3: Mineral Oils C11 to C20.
 - Group 4: Mineral Oils C21 to C40.
 - Group 5: Corrosive (Conductivity, Redox and pH).
 - Group 6: Amines (only required if site use indicates they may be present).

Formats

Document formats should be as shown in Appendices A, B & C of 1 of the UKWIR '[Guidance for the selection of water supply pipes to be used in Brownfield sites](#)'.

Pipe materials selection

Upon receipt of PRA and SI, Anglian Water will assess the data to confirm material type considering the defined trigger levels in the Pipe Selection Table on page 5.

Pipe Selection Table²

		Pipe material						
		All threshold concentrations are in mg/kg						
Parameter group	PE	PVC	Barrier pipe (PE-Al-PE)	Wrapped Steel	Wrapped Ductile Iron	Copper		
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC	0.5	0.125	Pass	Pass	Pass	Pass	
1a	+ BTEX + MTBE	0.1	0.03	Pass	Pass	Pass	Pass	
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C5-C10)	2	1.4	Pass	Pass	Pass	Pass	
2e	+ Phenols	2	0.4	Pass	Pass	Pass	Pass	
2f	+ Cresols and chlorinated phenols	2	0.04	Pass	Pass	Pass	Pass	
3	Mineral oil C11-C20	10	Pass	Pass	Pass	Pass	Pass	
4	Mineral oil C21-C40	500	Pass	Pass	Pass	Pass	Pass	
5	Corrosive (Conductivity, Redox and pH)	Pass	Pass	Pass	Corrosive if pH <5, Eh not neutral and conductivity >400µS/cm	Corrosive if pH <7 and conductivity >400µS/cm	Corrosive if PH <5 or >8 and Eh positive	
Specific suite identified as relevant following site investigation								
2a	Ethers	0.5	1	Pass	Pass	Pass	Pass	
2b	Nitrobenzene	0.5	0.4	Pass	Pass	Pass	Pass	
2c	Ketones	0.5	0.02	Pass	Pass	Pass	Pass	
2d	Aldehydes	0.5	0.02	Pass	Pass	Pass	Pass	
6	Amines	Fail	Pass	Pass	Pass	Pass	Pass	

² Taken from the UKWIR publication 'Guidance for the selection of water supply pipes to be used in Brownfield sites'

Health and Safety assessment and the CLEA

The UKWIR guidance does not cover health and safety considerations.

In order to maintain the safety of our staff, contractors and customers, Anglian Water also assess the site based on EA CLEA (Contaminated Land Exposure Assessment) guidelines.

With each site application please include the following information to comply with Anglian Water health and safety requirements.

The samples are to be taken across the site and focused on the mains services route.

Table of trigger values for health and safety considerations when laying mains or services in contaminated land

	Contaminant	Soil guideline value (mg/kg DW)
Inorganic	Arsenic	32
	Nickel	130
	Mercury	170
	Selenium	35
	Cadmium	10
Organic	Benzene	0.33
	Toluene	610
	Ethylbenzene	350
	Xylene	230
	Phenol	420

Remediation

On site remediation of contaminated soil may have been requested as part of the planning process. Where this has been completed the following will be required in addition to the original soil survey:

- Sampling and analysis validation.
- Site plan showing areas and depths or remediation.
- Certificates of remediation.

Water infrastructure is laid with a minimum of 900mm cover to finished surface level. In order for a post remediation assessment to be

considered it is suggested that the minimum level of soil cleansed is 1.2 metres in depth. Remediation of only the garden areas will not be sufficient to mitigate against the impacts of contaminates on water mains and services.

Any imported backfill must be clean, inert and supported by a contamination validation certificate from the supplier with test results.

Remediation plan

Where on site remediation is necessary and has not been completed, there is an opportunity to submit a remediation plan to Anglian Water for consideration

Benefits include:

- Agreement to move contaminated soil into areas outside those where residential properties are being built, or where water mains and services are being laid.
- The classification of the development as non-contaminated and suitable for the installation of plastic water infrastructure.

The remediation plan should contain a detailed methodology accompanied by a full Health and Safety risk assessment detailing the impact of work on:

- The land in respect to the Environment Agency guidelines.
- Personnel working on site.
- Future residents on the site.

The excavated areas should be filled with clean material from other areas of the site or clean imported material.

Dual status sites

Land parcel status assessment for contaminants within a larger development site

On large developments it has been traditional to classify the status of the land parcels in accordance with the status of the large site as a whole in respect to contamination. In essence, if the site as a whole, under the initial spine mains scheme, was declared contaminated or non-contaminated, then that status was applicable to all the land parcels contained therein.

Anglian Water can undertake to assess not only the site for its spine mains, but also for each land parcel being developed. Therefore it is

requested that each land parcel developer carry out soil analysis for their land parcel and submit it with the application.

This means Anglian Water can better assess each parcel of land on its merits and thus the possibility of 'ring-fencing' areas of contamination within a buffer zone and/or declaring land parcels contamination free. In this process of evaluation of land parcels, the elevation of the land parcel and water table in correlation with the test results and any possible contamination hot spots will be taken into account.

Part contaminated, part non-contaminated sites

In assessing the status of a site where there are hotspots of contaminant, Anglian Water will evaluate the extent of the contamination within the site using the trial holes, test results and elevation data, which the Developer has provided as a guideline.

Should the results indicate that the contamination is in an isolated area far from the residential plots and water services, for example in a public open space, then the mains can be laid in unprotected material. However, Anglian Water must be satisfied that the risk is mitigated, for example no risk of leaching due to topography.

This will be done under the provision that, should the site layout change, this decision may be changed if necessary. However, should the contamination be in a contained area which is bordered on the residential development areas, then there is the possibility of that hot spot being ring-fenced within an Anglian Water defined buffer area. The area within the buffer zone will be classified as contaminated with the rest of the site classified as clear.

Contaminated land information sources

Prior site use (site history and description) is of vital importance and all surveys must contain a detailed consideration of the site history. Possible sources to be consulted in the desk top study are detailed below along with the type of information they may provide.

Contaminated land information sources	
Department of Environment	www.environment-agency.gov.uk/clea
Ordnance survey maps	Historical site layout, buildings roads and geographical features.
Street, town and county directories	Streets, businesses, trade and land use.
Hydro geological information	Surface and groundwater incidence, groundwater depth movement and flow.
Soil survey of England & Wales	Local soil type and texture.
British Geological Survey	Geology, mines and quarries.
Industrial records	Site owners, processes, transport and storage of goods, raw materials, waste and disposal.
Site plans and photographs	Current and historic site layout, access, structures and water courses.
Local Authority records	Waste disposal sites and landfills, planning registers and applications, land reclamation IPC registration, storage of hazardous substances.
Land Condition Register (from November 2000)	This is the register of 'contaminated' land held by Local Authorities.
Environment Agency records	Groundwater vulnerability, waste disposal, radioactive substances, prescribed processes, enforcement notices, prohibition orders, convictions.
Local knowledge (insufficient alone)	Anecdotal information from former employees, local residents etc.
Water Company records	Trade effluent discharges, sludge disposal.
Site inspection reports	Groundwater vulnerability, waste disposal, radioactive substances, prescribed processes, enforcement notices, prohibition orders, convictions.

Further guidance

Appendices E, F and G of the UKWIR '[Guidance for the selection of water supply pipes to be used in Brownfield sites](#)'.

BS10175 (2001) Investigation of Potentially Contaminated Sites a code of practice.

CIRIA (1993) A guide to stage working practices for contaminated sites, W S Atkins, Funders report/cp/9.

Environment Agency - Contaminated Land Exposure Assessment www.environment-agency.gov.uk/clea



Want to know more about Anglian Water?
Visit www.anglianwater.co.uk to see the full range of services.

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