

Information for Developers about contaminated land and ground condition assessment

As part of your application, Hartlepool Water requires environmental information on soil conditions for you site.

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1. Ground Condition Assessment

Why we need a ground conditions assessment (soil analysis)

As part of your application, Hartlepool Water required environmental information on soil conditions for your site.

An assessment is required to ascertain the chemical composition of the soil and the physical characteristics of the site. Certain compounds such as solvents and petrol can permeate the polyethylene (PE) water pipe that we would normally use, this can compromise water quality rendering it unfit for human consumption. Therefore, on contaminated sites alternative materials are required. It is recommended that an experienced geotechnical or environmental consultant is used to conduct the soil survey.

The following table outlines when alternative pipe materials may be needed.

Typical ground conditions	Mains material
Natural soil with no contaminants	Polyethylene (PE)
Inorganic contaminants only	Polyethylene (PE)
Organic contaminants only	Ductile Iron or barrier pipe
Organic and inorganic contaminants (light chemical, e.g. refuse site, farmyard etc.)	Ductile Iron or barrier pipe
Organic and inorganic contaminants (made ground containing clinker, bricks, flints or other materials likely to cause mechanical damage)	Ductile Iron or barrier pipe
Organic and inorganic contaminants (heavy chemical, e.g. disused gas plants, industrial sites, mines, chemical plants etc)	Ductile Iron or barrier pipe

Pipe materials and protection systems:

Pipeline	Service pipe	Meter box material
Polyethylene	Polyethylene	Wall mounted box or standard boundary box
Protected: ductile iron or barrier pipe*	Copper with polyethylene coating or multilayer plastic pipe	Wall mounted box or boundary box for contaminated land.

***Note:** manufacturers instructions on the suitability of their pipe system for certain ground conditions must always be followed.

Fittings: all metallic fittings must be adequately protected against corrosion by factory-applied coating (compliance with WIS-4-52-01 December 92 amended August 94 Polymeric anti-corrosion (barrier) coatings

Barrier pipe: is a composite material of polyethylene pipe with an integral metal barrier to prevent through wall permeation of hydrocarbon and related chemicals.

2. Information Required

Specific information should be provided by the applicant in a report format, to include the following elements. At a minimum the submitted report should comprise of the following sections:

- Contents
- Summary
- Introduction
- Methodology
- Desk top study of site history
- Site description
- Proposed development plans
- Statement of potential contamination
- Site investigation – criteria for sampling and analysis
- Conclusions

The report should be supported by a site plan showing the following:

- North sign
- Scale
- Areas/potential areas of contamination
- Sampling locations
- Landmark features
- Proposed road layouts
- Any landmark features

High risk	Medium risk	Low risk
<ul style="list-style-type: none"> • Asbestos works • Chemical works • Gasworks • Hazardous waste treatment • Industries using or making wood preservatives • Landfill sites • Metal mines, smelters, foundries, steel works • Munitions production and testing sites • Oil and fuel production, storage and distribution depots • Paper and printing works • Pesticide manufacture and formulation • Scrap yards • Sewage works and sewage farms • Tanneries 	<ul style="list-style-type: none"> • Dry cleaners • Electric/electrical equipment manufacture • Fertiliser storage • Garages/filling stations • Mechanical engineering works • Metal finishing installations • Paint and ink manufacture • Printing works • Railway land, particularly large sidings and work areas • Textile products manufacture • Research laboratories • Road haulage yards 	<ul style="list-style-type: none"> • Agriculture • Beverage distilleries • Food preparation and processing

Desk top study of site history

This should include details of surrounding land usage and information on historic land use, with particular emphasis on potentially contaminating processes. A list of possible sources of information available to assist with this exercise is presented in the table above, however it should be noted that this is not an exhaustive list.

Any known pollution events or fuel spillage affecting the site should be documented.

In addition, any known or suspected areas of contamination should be clearly marked on the plan submitted with the soil analysis.

Site description

This should include

- Site reconnaissance
- Current land use
- Soil type
- Geology and topography
- Presence and occurrence of surface water, groundwater and its depth



- Movement, flow and resistivity of the soil

Proposed development plans

The plan should show the location of all proposed roads and buildings and both the current and planned site drainage. It should include a clear indication of the proposed pipe trench and proposed entry positions for new services. Particular attention should be paid to the location of fuel stores, plant and equipment stores for the site during the construction work.

Statement of potential contamination

Specific information on the potential for migration of contaminants through soils and substrates, and risk of transfer of contaminants to and along the pipe trench should be identified. If the location of the trench is unknown, information concerning the mobility and pathways that would lead to migration of contaminants (for example by changes in water table and flowing etc.), together with any remedial recommendations should be included.

Site investigation

This should include:

- An account of all site works
- Sampling activities
- Methods
- Site observations
- Logs of material encountered
- Plan detailing the positions from which samples of water or soil were taken for analysis

Criteria for sampling and analysis

A detailed sampling methodology based on the statement of potential contamination must be provided prior to any network development in contaminated land.

This should include

1. Sampling design and rationale

Sampling design and rationale, including a plan of the location of soil and water sampling, should be determined based on the statement of potential contamination. The sampling should include soil and groundwater samples from between surface and pipe of the final design laying depths. This will allow an assessment to be made of the risk to both the pipeline and staff employed in the installation.

Typical numbers of sampling points are:

Area of site (hectares)	Minimum number of sampling points
0.5	15
1.0	25
5.0	85

Laboratories used for soil analysis must be accredited to UKAS and MCERT approved. All samples should be obtained, stored and transported under appropriate conditions as outlined in BS10175:2001. Original laboratory reports should be included.

The sample analysis must include rationale for samples taken, methods of test employed and sample results. Soil samples taken at pipe laying depths should be taken along the route of the proposed pipeline and should be analysed for all the compounds listed in the tables below, as a minimum requirement. Prior site use may dictate that analysis for other compounds should be carried out.

2. Trigger concentrations for inorganic contaminants

The list is concerned mainly with the effect of the presence of these substances on the health of personnel installing the pipework. These concentrations are used in our site risk assessment for our contractors information and do not impact on the selection of the pipe material.

Contaminants	Trigger concentration (mg/kg dry soil)
Arsenic	10 ‡
Cadium	3 ‡
Chromium (hexavalent)	25 ‡
Chromium (total)	250 †
Copper	100 †
Lead	150 †
Mercury	1 ‡
Nickel	70 ‡
Selenium	3 ‡
Zinc	300 ‡
Boron	3 ‡
Cyanide (free)	10 †
Cyanide (complex)	50 †
Thiocyanate	50 †
Sulphate	2000 ‡
Sulphide	250 ‡
Chloride	1500 (300 if wet)
Sulphur	5000 ‡
Acidity	pH<5 ‡

† Data taken from WRc Report PRD 1452 – M/1-Crathome et al May 1987

‡ Data taken from ICRC Guidance note 59/83 2nd Edition July 1987

3. Trigger concentrations for organic contaminants

Results for these compounds will be required, otherwise the report will be rejected or the scheme will default to protected materials being used.

Family	Contaminants	Trigger conc. In soil (mg/kg)
Chlorinated/halogenated/aliphatic hydrocarbons	Dichloromethane	1 ‡
	1,2-dichloromethane	1.2 ‡
	1,1,1-trichloromethane	8 ‡
	1,2-dichloropropane	0.1 ‡
	Tetrachloromethane	0.15 ‡
	Trichloromethane	1.5 ‡
	Tetrachloromethane	0.5 ‡
	Vinyl chloride	0.1 ‡
	Methyl bromide	10 ‡
	Total	7 *
	Benzene	0.5 ‡
	Ethylbenzene	0.5 ‡
	Trimethyl benzene	0.1 ‡
	Propylbenzene	2 ‡
	Toluene	0.25 ‡
	Xylenes	0.5 ‡
	Nitrobenzene	NA

Family	Contaminants	Trigger conc. In soil (mg/kg)

Phenols	Phenol	1 §			greater than 75 per cent of the trigger concentration) to TPH value than the recommendation for unprotected materials can be made until an upper threshold of 1000 above which protected materials must be used.
	Cresol	1 *			
	Total aromatics	7 §			
Chlorinated Phenols	Chlorophenols	0.5 §			
	Dichlorophenols	0.5 §			
	Trichlorophenols	0.5 §			
	2,4,6-trichlorophenols	0.5 §			
	Pentachlorophenol	0.5 §			
Total	1 §				
Chlorinated aromatic hydrocarbons	Chlorobenzene	0.4 ‡			
	Dichlorobenzene	0.01 ‡			
	Trichlorobenzene	0.5 ‡			
	Pentachlorobenzene	1 *			
	Total	2 *			
Polycyclic aromatic hydrocarbons (PAH)	Naphthalene	5 §			
	Anthracene	10 §			
	Phenanthrene	10 §			
	Fluranthene	10 §			
	Pyrene	10 §			
	Benzoprene	1 §			
	Total	20 §			
			Tetrahydrofuran (THF)	4 §	
			Styrene	5 §	
			Pyridene	2 §	

Analytical results should be presented simply, grouping contaminants into the 'families' shown in the attached table. Chemical names should be used rather than reporting data as for example DRO (diesel range organics). Determination of TPH is a useful analytical tool for assessing contaminated soils, however it does not provide adequate information on the nature of the contamination unless the compounds are speciated down to the level of chemical names. All of the compounds measured within the TPH method will not necessarily cause a problem but will indicate the presence of contamination that could potentially permeate plastic pipes and cause a water quality issue.

Missing information from soil report

Hartlepool Water encourages all Developers to submit soil reports that comply with the guidelines as published on the website. However, in the rare case where a soil report is submitted with incomplete information Hartlepool Water will do all it can to work with the Developer to assess what information is required to complete the report. If this is provided the report will undergo the normal assessment process.

3. 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 of 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 gardens areas will not be sufficient to mitigate against the impacts of contaminants 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

On site remediation is necessary and has not been completed, there is an opportunity to submit a remediation plan to Hartlepool 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.

A post remediation sample analysis will be required to confirm the non-contaminated status of the excavated areas.

4. 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 large sites 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.

Hartlepool 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 Hartlepool 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 contaminate, Hartlepool Water will evaluate the extent of the contamination within the site using trial holes, 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 un-protected material. However, Hartlepool 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 change 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 a Hartlepool Water defined buffer zone. The area within the buffer zone will be classified as contaminated with the rest of the site classified as clear.

5. Contaminated land information sources

Contaminated land information sources	
Site history and description	Prior use is of vital importance and all surveys must contain a detailed consideration of the site history. Possible sources to be consulted in the desk to study are detailed below along with the type of information they provide
Department of Environment	www.contaminatedland.co.uk
Ordnance Survey maps	Historical site layout, buildings, roads and geographical features.
Street, town and country directories	Streets, businesses, trade and land use
Hydrogeological information	Surface and groundwater incidence groundwater depth movement and flow
Soil survey of England and 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 Conditions 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

6. Further guidance

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

Water Regulations Advisory Scheme (WRAS), Information and guidance note (October 2002) No 9-01-03 – The selection of materials for water supply pipes to be laid in contaminated ground