

Our ref: 8353bprs

Build Phase Remediation Strategy
for Land Adjacent to
Bealey Industrial Estate,
Radcliffe

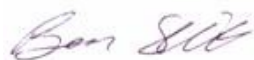
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Date of Report: 2 April 2026

Document Verification

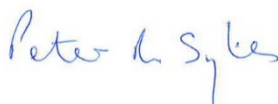
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Prepared by

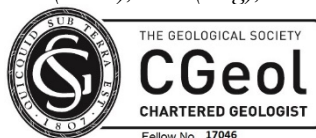


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Document Register

Report Reference	Rev (*)	Date	Description	Prepared	Checked and Approved
8353bprs	-	2 April 2026	Build Phase Remediation Strategy	B W Hill	P R Sykes

* - Refer to end of Section 1 for details of revision notes

This report has been prepared for and on behalf of our client, in accordance with the terms and conditions of the appointment agreement with Coopers. Other than where specifically allowed for in the said appointment agreement, any other party using this report for any purpose whatsoever does so at their own risk and any duty of care to that party is specifically excluded.

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1) Summary of Build Phase Remediation Works

The site requires specific works for the protection of human health relating to contaminants within the soils. The proposals within this document detail the site procedures for placement/construction of works to mitigate these risks, along with the methodology for verification. This report should be submitted to Bury Council for approval.

Over a large proportion of the site, shallow madeground deposits were encountered, some of which contained elevated concentrations of inorganic and PAH compounds, as well as asbestos fibres/debris. Due to the nature of these contaminants, the site will require an inert cover system to break the primary exposure pathway between the residents and the contaminated material. The inert cover system will consist of between 450mm (frontages/open space) to 600mm (rear gardens) of inert topsoil and subsoil overlying a geotextile membrane where madeground deposits are still present at the base. Where natural strata is present at the base of the inert cover system, the requirement for the geotextile membrane is removed.

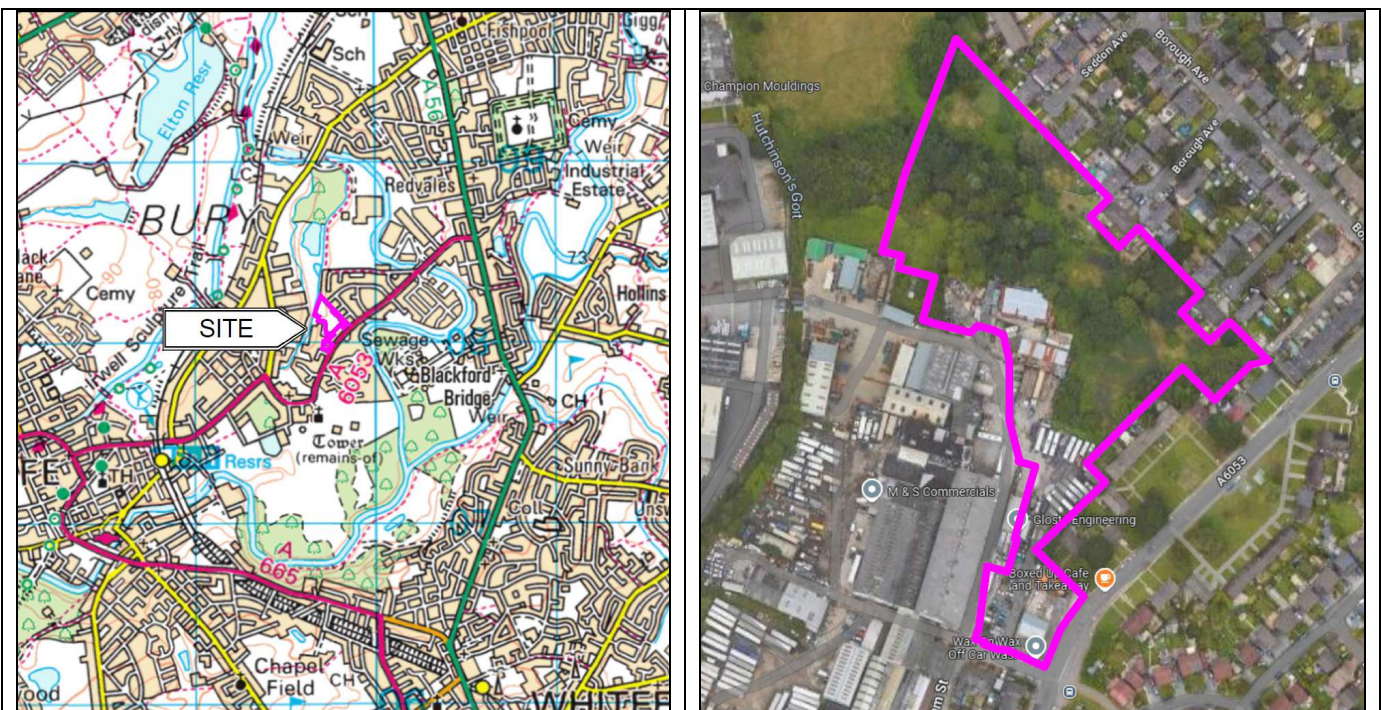
Soils which are to be used in the inert cover systems are anticipated to be imported to site. Any soils intended for use in gardens will require chemical testing to confirm suitability for reuse in the inert cover systems on site.

Revision Notes:

- *First issue.*

2) Site Location, Description and Proposed Development

The site is located approximately 1.58km to the north-east of Radcliffe Town Centre at National Grid Reference SJ 797 081. Access to the proposed site was located off Wild Street and the adjacent Bealey Industrial Estate located to the north west of Dumers Lane (A6053). The location of the site is shown on Drawing No. 8353/L1 & 8353/AP in the enclosed drawings (extracts in Figures 1 and 2).



Figures 1 and 2: Extract of Site Location Plan and Aerial Photograph.

The site consisted of rough open ground with dense vegetation and commercial units from Bealey Industrial Estate. Extensive areas of Japanese Knotweed and Himalayan Balsam have been noted. Locations of fly tipping identified, including suspected Asbestos Containing Materials (ACMs). The adjacent land consisted of open land to the north west, housing to the north east and south east, and Bealey Industrial Estate to the south west. A telecoms mast was present close to the site boundary.

The site is proposed for development by Westchurch, comprising of a residential development of 77 No. dwellings together with vehicular / pedestrian access, open space, landscaping and other related infrastructure. The dwellings comprise traditional 2 story buildings, consisting of a combination of detached, semi-detached and mews properties, with the mews buildings including self-contained apartments over separate floors. The detached and semi-detached properties have private gardens, whilst the mews buildings contain communal landscaped areas. An extract of the overall layout is shown on Figure 3 with details shown on Coopers Drawing No. 8353/BPRP, appended to this report.



Figure 3: Extract of Build Phase Remediation Plan showing Development Layout.

3) Summary of Site History

The desk study data records the site to have consisted of agricultural land from 1850. From 1891 the north western parts of the site consisted of a reservoir and settling tanks to the adjacent Broad Durers Paper Works, located to the south west of the site. A raised tramway was recorded within the site. In the 1980's the reservoir and settling tanks were infilled and the paper works repurposed by the existing Bealey Industrial Estate.

The land to the south of the site (beyond Durers Lane) was the former Bealey's Bleach and Chemical Works, now occupied by housing. A diverted channel of water, named Bealey's Goit, ran from the River Irwell to the north west of the site and fed the onsite reservoir and channelled water to the former bleach & chemical works. An offshoot from Bealey's Goit is considered likely to be culverted in the southern part of the site.

4) Ground Investigations and Consultations

The build phase remediation proposals are based upon the findings/data from reports by Coopers, listed below:

- Coopers Report No. 8353si, "*Site Investigation Report for Land Adjacent to Bealey Industrial Estate, Radcliffe*".

At the time of this report additional investigation and assessments are being undertaken within the former reservoir and settling tanks following consultation with Bury Council, covering parts of Plots 52 to 77. The area will be proposed to include additional works to facilitate the development as part of the pre-development remediation and enabling works. Proposals for this area are therefore pending further works and phased approach to assessments and approvals are considered to be warranted to reflect the varying nature of the ground conditions identified.

The investigations identified the following ground conditions:

- **Hardstanding and Remnant Substructures** – Surface tarmac and concrete hardstanding within industrial unit areas. Anticipated that remnant substructures to former buildings and reservoir will be present within the site, to be cleared prior to development.
- **Topsoil** – Encountered in open parts of the site, sandy/gravelly silt with inclusions of fragmented brick, concrete, glass, plastic and ash.
- **Made ground** – Generally shallow (<1.1m) to absent to the south of the former tramway, and relatively deeper to the north (up to 2.7m). Former reservoir is up to 5.9m deep and filled with materials including areas of visible fragmented ACMs (cement bound).
- **Natural Drift Strata** – alluvium highly varied, primarily soft/firm clay, very loose/loose sand, and loose to medium dense gravel. Localised areas of soft silt and peat identified. Deeper stiff glacial clay identified.
- **Bedrock** – Not encountered (anticipated to be circa 20m depth).
- **Groundwater** – frequent shallow perched groundwater. Commonly 2m to 3m depth, but variable and in places <1m.

5) Summary of Ground Gas Risk

The Coopers' initial conceptual model identified potential sources of ground gas ingress with the potential to affect receptors on the site. The primary risks were identified associated with gas generation potential from the infilled reservoirs/holding tanks, designated as a landfill. Outside of the landfill area the madeground deposits were determined to be of low gas generation potential. Targeted gas monitoring has determined that outside of the reservoir/tank area the gas generation and flow rates were low and no mitigation measures are required. The assessments for gas/vapour mitigation measures within the reservoir/tank area are pending ongoing works in a phased approach and proposals for this area are therefore excluded from this report.

6) Summary of Contamination and Pre-Development Remediation

Summary of Contaminated Land Assessments

The investigations identified the general madeground and topsoil to have elevated concentrations of metals and PAH compounds relative to the human health thresholds for residential gardens, summarised in Table 1 below. Asbestos fibres and ACM debris was identified in several samples of topsoil/madeground, asbestos fibres were quantified as containing between 0.002% to 0.004% of the soil, whilst microscopic cement debris was measured to be 0.0309g, with asbestos 0.035% of the soil sample.

Table 1: Elevated concentrations of inorganic and PAH compound contaminants above human health thresholds

Determinant	Concentration in mg/kg (above Tier 1)	Tier 1 Threshold in mg/kg	Elevated samples
Arsenic	49-150	37	8 of 25 No.
Beryllium	2.8	1.7	2 of 25 No.
Copper	200-440	100-200 (*)	3 of 25 No.
Lead	210-300	200	7 of 25 No.
Nickel	80	60-110	1 of 25 No.
Zinc	310	200-300 (*)	1 of 25 No.
Benzo(a)pyrene	3.1-3.2	2.2	2 of 25 No.
Dibenzo(a,h)anthracene	0.44	0.24	1 of 25 No.

Pre-Development Works

Prior to development there will be phases of site clearance, removal of substructures, and earthworks to facilitate the development. During these works localised areas of unforeseen contaminants may be found where further testing and assessments are required. The pre-development works are subject to ongoing works with testing and assessments of the former reservoir/holding tank area. If suitable materials are generated from the predevelopment works, including any crushed aggregates these will need to be tested and planned for the intended reuse.

7) Cover Systems in Gardens (Development Phase)

The contaminants identified were considered to pose a potential significant risk to human health where chronic exposure to soils occur within garden and landscaping growing mediums. The contamination encountered was present in the shallow madeground across the site, and the contaminants are therefore likely to be site-wide based on the nature of the current/former land use and the ground conditions encountered during the phases of site investigation.

The depths of garden activities and use of the garden area has to be reasonable. It is not feasible to carry out risk assessments regarding extreme land use; therefore, it has been assumed that the majority of domestic gardening occurs within the upper 0.6m of soil. The predominant depth of regular excavation will be up to 0.2m due to the planting of annual and biannual bedding plants with shallow weeding. It is anticipated that the deeper planting will be associated with the planting of deep potted shrubs, and is generally restricted to few occasions over several years.

It is anticipated that the majority of the gardens will comprise lawn and ornamental bedding. Residents may utilise their rear garden as allotments and grow vegetables. It is anticipated that the deepest cropping vegetable will be the potato and generally crops to depths of up to 0.5m (it should be noted that potatoes are generally over dug where by during the growth of the crop soil is piled onto the plant). It is therefore considered that the initial 0.6m depth of garden will be the threshold zone for risk to the resident for non-mobile contaminants. This assessment concurs with the findings of BRE Report 465, Cover Systems for Land Regeneration. It is highly unlikely that the resident will excavate to depths in excess of 0.6m. If this does occur, it will be on the basis of once or possibly twice a year for a very small period of time.

It is highly unlikely that the residents will be planting vegetables for consumption within the front gardens/borders of the houses, and the development layout shows the frontages are primarily parking bays and borders. It should be noted that it is unlikely that clauses will be present within the deeds to restrict this practice; however, we have to assume reasonable practices within these areas of the site. It is traditional to plant lawn and bedding plants, or pave the entire area of the front garden depending upon the resident's proficiency regarding gardening. It is generally assumed that the aesthetic value of having a vegetable patch in the front garden is significantly low, and produce may be lost by theft from passers-by. The potential for human health risk regarding the consumption of vegetables grown in these areas is hence negligible and should not be considered. The assumed typical planting within the plot frontages are therefore designated as 0.45m.

The transporting of soils into the property also poses a risk to the residents. The soils caked on shoes and adhered to clothing due to contact with soils will dry, desiccate and form dust in the houses.

Any excavations associated with the constructing of extensions to the property should only be completed after consulting the Planning Department of Bury Council.

Children may come into contact with soils during unsupervised playtime through direct ingestion and during supervised playtime through inadvertent consumption of soils from toys, which have come into contact with soils. When very young children excavate in soils, it is anticipated the maximum depth will be in the order of 0.2m to 0.3m. It is anticipated that parents will not leave young children unsupervised in garden areas for any significant period of time.

Based upon the conceptual model the proposed reasonable use of the garden growing medium is restricted to 0.6m, and frontages as 0.45m, with consideration of contaminants within this zone requiring remedial actions, discussed in the following sections.

To protect the future residents from exposure to contaminants the made ground can be excavated from the 0.6m growing medium in rear gardens and 0.45m in frontages for replacement with inert subsoil and topsoil. Subject to the proposals for cutting and filling as part of regrading site levels the made ground depth within parts of the site the natural strata may be less than 0.6m deep, where the inert cover would in places remove the entirety of the made ground. Where the made ground is removed prior to the 0.6m inert cover depth the proposed gardens would be as demonstrated in Figure 4. Where made ground is still present at the base of the 0.6m cover layer a high tensile strength geotextile will be placed at the base to prevent inadvertent exposure to the underlying contaminants or cross-mixing. The cover system for the proposed gardens would be as demonstrated in Figure 5.

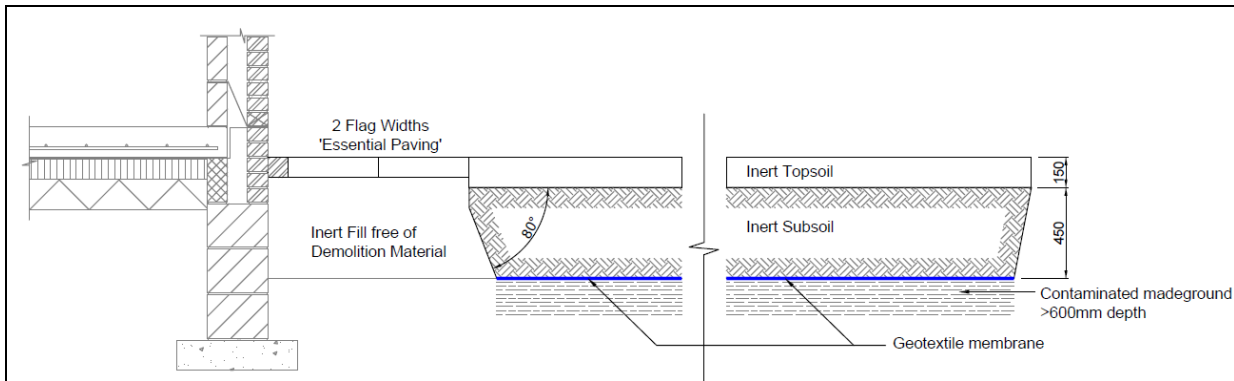


Figure 4: Inert Cover within Proposed Gardens where Contaminants are >600mm in Depth

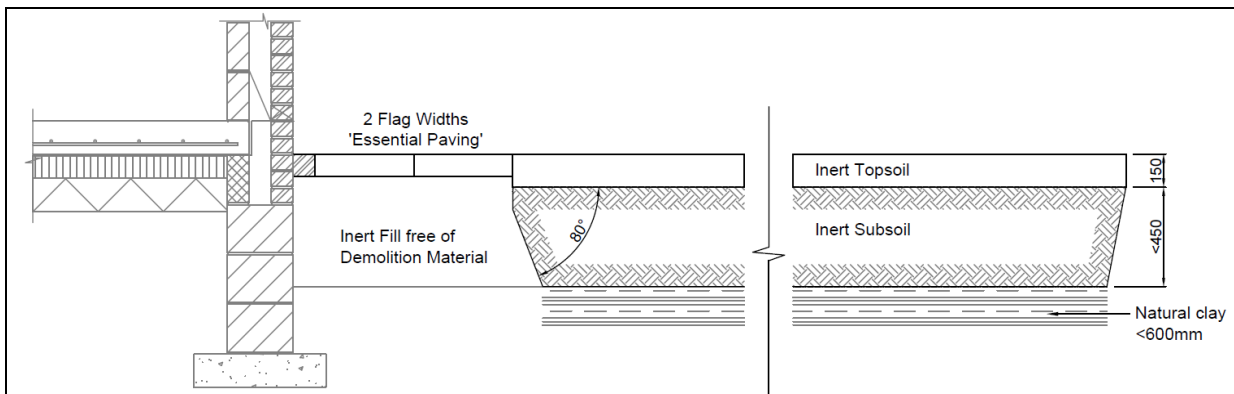


Figure 5: Inert Cover within Proposed Gardens where Contaminants are <600mm in Depth

It is likely that the inert subsoil and topsoil to be placed within the gardens will be inert natural soils imported to site. Verification testing of any soils intended for gardens are required to be considered appropriate to ensure it has not been cross-mixed during generation. Further discussions of soil testing are provided in Section 8.

Following placement of the inert subsoil and topsoil the depth of the inert cover will be confirmed via excavation of validation holes, to the full cover depth or natural strata. The validation holes should prove the presence of the geotextile or natural strata at the base of the validation holes. The validation strategy for verification of inert cover systems within gardens is provided in Section 8.

8) Soil Testing.

The subsoils and topsoil intended for reuse within the proposed gardens should be stockpiled for testing prior to placement. It is anticipated that the majority or all of the soils for placement within the gardens will be inert natural strata and topsoil from the site. The soils testing during the site investigation and conceptual model indicate no significant risk of contaminants within these strata, unless accidentally cross-mixed during placement.

Should imported soils be required for use within the proposed gardens these will require testing prior to use, with suites and quotas subject to provenance. The source of any imported soils and indicative testing should be provided to Coopers in advance, to determine if appropriate for delivery to site for testing.

Once soils are delivered to site or generated from site and stockpiled the materials should be segregated by source and end use for testing by Coopers. Sample frequencies are provided within Table 2 (below), based upon Bury Council guidance, although all imported soils (including for general filling) will require testing.

Table 2: Sample testing quota and suites by source for reuse in garden growing medium

<u>Strata Type</u>	<u>Origin</u>	<u>Sample quote</u>	<u>Testing Suite</u>
Subsoil	Brownfield / Manufactured / Site Won	1:100m ³ (min. 3 samples)	Standard Metals, PAH-16, TPH-CWG, pH, TOC, and asbestos (other analysis may be required if unverified or specific risks, e.g. PCB, VOC, SVOC suites)
	Greenfield	1:250m ³ (min. 3 samples)	Standard Metals, PAH-16, pH, TOC, and asbestos
Topsoil	Brownfield / Manufactured / Site Won	1:50m ³ (min. 6 samples)	Standard Metals, PAH-16, TPH-CWG, pH, TOC, and asbestos (other analysis may be required if unverified or specific risks, e.g. PCB, VOC, SVOC suites)
	Greenfield	1:250m ³ (min. 3 samples)	Standard Metals, PAH-16, pH, TOC, and asbestos
Imported Crushed Brick/Concrete (if present within inert cover depths)	N/A	1:1000m ³ (min. 3 samples)	Standard Metals, PAH-16, pH, TOC, and asbestos

The criteria for acceptance of soils for use are defined in Coopers Tier 1 thresholds, enclosed to this document.

9) Garden Validations

The remediation for the removal/capping of the made ground from the proposed gardens and landscaping in all parts of the site will be subject to validation. Where the individual gardens are proposed for placement of an inert cover/removal of contaminated soil to natural, the inert cover depth and geotextile/natural strata at the base should be verified via validation holes. The validation of the placement of inert cover growing mediums will consist of:

Upon completion of the gardens to finished level, Coopers are to attend site to excavate validation holes to prove cover thickness of the growing medium. This will be undertaken on a spacing as follows (following guidance by Bury Council):

- 1 No. validation hole per completed 1 No. rear gardens.
- 1 No. validation hole per completed 1 No. front gardens/front landscaped borders.
- Validation holes within public open space on 25m grid.

The procedures for the validation works are as follows:

- Upon completion of gardens/landscaping/POS to finished level, Coopers are to attend site to excavate validation holes to prove cover thickness of the growing medium.
- The validation holes must not be pre-dug and be in locations of Coopers choosing. Placement of pipes and removal to validate depths are not considered as independent validation.

- Photographic evidence to demonstrate the location of the validation hole, the nature of the inert material and the depth of cover (refer to Photographs 1 to 4).
- Appropriate chemical testing certificates will be required to verify suitability for use.
- Upon completion of the validation Coopers will produce a validation completion report to include all photographic records and verification documents required for statutory approvals.



Photographs 1 and 2: Examples of validation photographs demonstrating validation hole location and soils forming inert cover.



Photographs 3 and 4: Examples of validation photographs demonstrating inert cover depth and geotextile.

Upon completion of the development a validation completion report will be produced confirming the remediation requirements have been achieved including testing of all soils.

10) Potable Water Supply Pipelines

The enclosed documents include a UU pipeline risk assessment which defines the requirement for source removal to permit Polyethylene pipes within the proposed pipelines based upon ground investigation results. Subject to regrading levels and predevelopment works further testing may redefine the risks.

11) Material Management Plans, Reuse and Disposal

Any soils excavated which are unsuitable in the given location are defined as a waste. Where possible, waste materials should be reused, rather than disposed, as part of sustainable development policy. Where materials are suitable for reuse on site for a construction purpose these will be required to follow a Material Management Plan (MMP) compliant with registration and approvals. The developer should establish the MMP showing the location of the materials to be stockpiled and progressive use. The proposals should be agreed between the developer and their contractor.

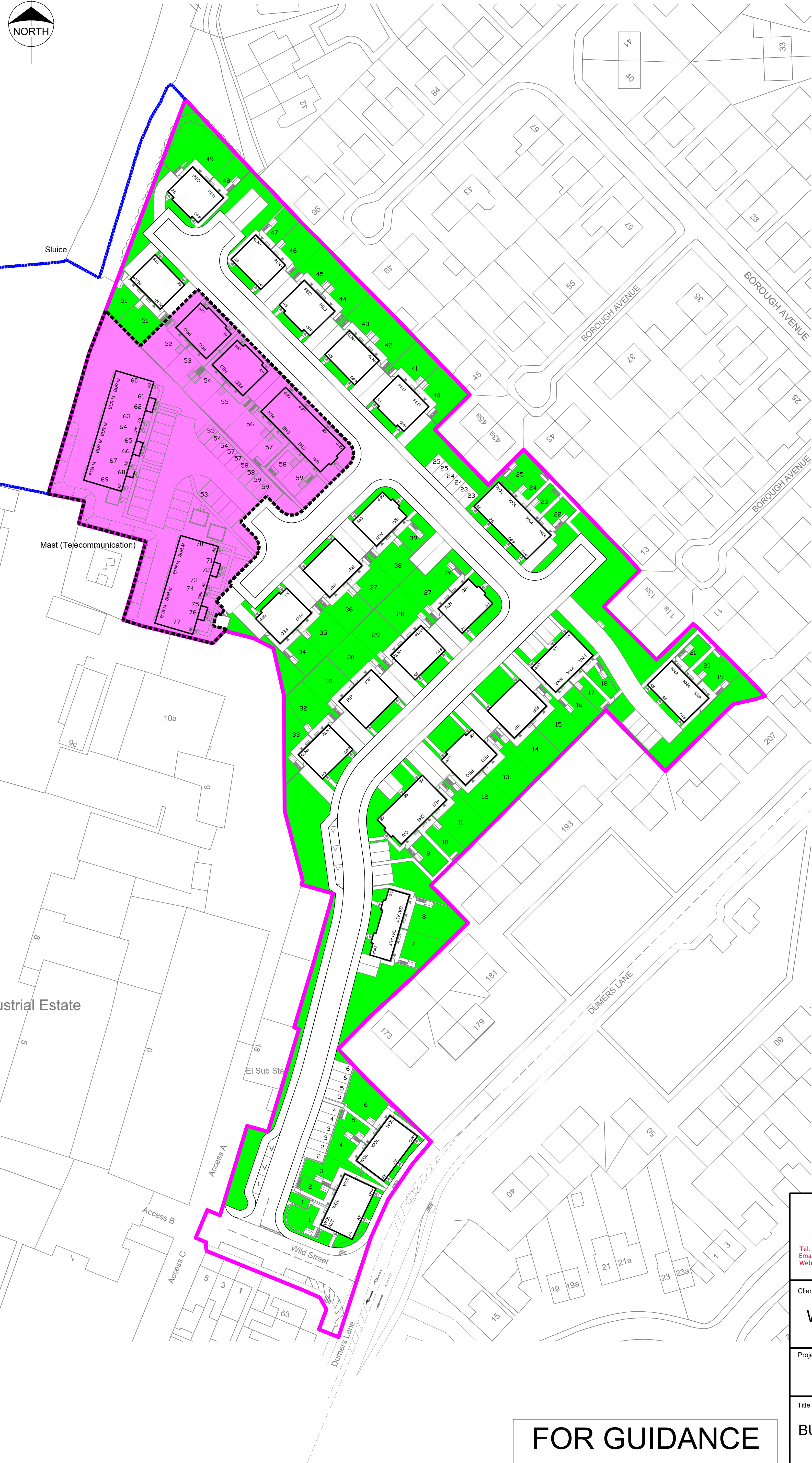
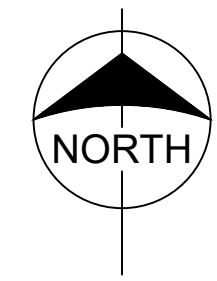
The QP will require regulatory approval of the remediation proposals, consultation with the Local Authority and Environmental Agency, prior to registering the declaration, which must be in place prior to the intended reuse of the made ground.

Any soils intended for disposal should be specifically assessed following Environment Agency procedures defined within WM3 guidance. It should be noted that further testing may be required by specific landfills prior to acceptance, and consultation with the intended disposal site is recommended to confirm requirements for testing prior to disposal.

As part of the site verification the export volumes and waste transfer documentation must be provided for all soils removed from site. We would advocate that all transfer tickets are copied and supplied as part of this process rather than a tabulated summary table in isolation.

Documents appended:

1. Coopers Drawing No. 8353/BPRP – *Build Phase Remediation Plan*.
2. Coopers Tier 1 Thresholds.
3. United Utilities Water Supply Pipeline Risk Assessment.



KEY
(All positions are approximate unless otherwise stated)

 Areas of gardens / landscaping with inert cover:
Rear gardens = 600mm
Fronts / borders / open space = 450mm

 Areas of former reservoir / holding tanks
- Determination of remediation works pending

 Site boundary (taken from ref. a)

THIS DRAWING SHOULD ONLY
BE PRINTED IN COLOUR

This drawing is to be read in conjunction with the following:-
a) Westchurch Homes, Bealey Industrial Estate, Radcliffe, Site
Location Plan, ref. BIE-LOC-001, dated February 2024.

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Client		
WESTCHURCH HOMES LTD		
Project		
Land Adjacent to Bealey Industrial Estate, Radcliffe.		
Title		
BUILD PHASE REMEDIATION PLAN		
DRAWING NUMBER		SCALE at A1 1:500
8353 / BPRP		DATE 30.03.26
		DRAWN AH
		CHECKED BH
		REVISION -

FOR GUIDANCE
PURPOSES ONLY

Soil Tier 1 Threshold Values (mg/kg) Residential and POS

		Elements and compounds	S4UL	Small Terrace	Med/Large Terrace	Semi-detached	Detached	Residential (without Veg)	POS (Resi)	POS (Park)
				White, yellow & green values are NOAEL with orange values C4SL						
Silty clay	Metals/Semi-metals	Arsenic	37	37 (32.4 CLEA)				40 (40)	79 (79)	168 (170)
		Beryllium	1.7 (inh.)	51 (to be used with caution and superseded)				(1.7)	(2.2)	(63)
		Boron	290	291				(11,000)	(21,000)	(46,000)
		Cadmium	11	22 (11 CLEA)				150 (85)	220 (120)	880 (532)
		Chromium (III)	910	3000				(910)	(1,500)	(33,000)
		Chromium (VI)	6	21 (4.3)				21 (6)	51 (7.7)	250 (220)
		Copper	2,400	2,330 (Phytotoxic pH <6 = 100, pH6-7 = 135, pH >7 = 200)				(7,100)	(12,000)	(44,000)
		Lead	-	200				310	630	1,300
		Mercury (methyl)	11	7.4 (SGV withdrawn)				(15)	(40)	(68)
		Mercury (inorganic)	40	169 (SGV withdrawn)				(56)	(120)	(240)
		Mercury (Hg)	1.2	1.2 (SGV withdrawn)				(1.2)	(16)	(30vap (25.8))
		Nickel	130	(130 S4UL) (Phytotoxic pH <6 = 60, pH6-7 = 75, pH >7 = 110)				(180)	(230)	(800)
		Selenium	250	351				(430)	(1,100)	(1,800)
		Vanadium	410	79				(1,200)	(2,000)	(5,000)
		Zinc	3,700	3,750 (Phytotoxic pH <6 = 200, pH6-7 = 200, pH >7 = 300)				(40,000)	(81,000)	(170,000)
	PAH	Acenaphthene	210	205				(3,000 – 57 s)	(15,000)	(29,000)
		Acenaphthylene	170	168				(2,900 – 86.1 s)	(15,000)	(29,000)
		Anthracene	2,400	2,260				(31,000 – 1.17 v)	(74,000)	(150,000)
		Benzo(a)anthracene	7.2	3.1				(11)	(29)	(49)
		Benzo(a)pyrene	2.2	5 (6% SOM) (0.83 CLEA)				5.3 (3.2)	10 (5.7)	21 (11)
		Benzo(b)fluoranthene	2.6	5.56				(3.9)	(7.1)	(13)
		Benzo(ghi)perylene	320	10.7				(360)	(640)	(1,400)
		Benzo(k)fluoranthene	7.7	8.5				(110)	(190)	(370)
		Chrysene	15	6.0				(30)	(57)	(93)
		Dibenz(ah)anthracene	0.24	0.76				(0.31)	(0.57)	(1.1)
		Fluoranthene	280	257				(1,500)	(3,100)	(6,300)
		Fluorene	170	163				(2,800 – 30.9 s)	(9,900)	(20,000)
		Indeno(123-cd)pyrene	27	3.18				(45)	(82)	(150)
Sandy loam	BTX	Phenanthrene	95	91.8				(1,300 – 36 s)	(3,100)	(6,200)
		Pyrene	620	563				(3,700)	(7,400)	(15,000)
		Naphthalene	2.3	1.54	1.71	1.7	1.97	(2.3)	(4,900)	(1,200 – 76.4 s)
		Benzene	0.087	0.2 (1%) (0.079 CLEA)	0.082	0.082	0.085	0.89 (0.38)	140 (72)	190 (90)
		Toluene	130	119	122	122	125	(869)	(56,000)	(87,000 v)
	Aliphatic	Ethylbenzene	47	62.5	68	67.9	71.6	(83)	(24,000)	(17,000 v)
		Xylene (based on p)	56	41.7	45.5	45.3	50.9	(70)	(41,000)	(17,000 v)
		Phenol	280	184	207	206	224	(750)	(760)	(760)
		5-6	42	30				(42)	(570,000 – 304 s)	(95,000 – 304 s)
		6-8	100	73				(100)	(600,000)	(150,000 – 144 s)
		8-10	27	19				(27)	(13,000)	(14,000 – 78 s)
		10-12	130 (48)	93 (48) ^{vap}				(130 – 48 v)	(13,000)	(21,000 – 48 s)
		12-16	1,100 (24)	740 (24) ^{sol}				(1,100 - 24 v)	(13,000)	(25,000 – 24 s)
		16-35	65,000 (8.48)	45,000 (8.48) ^{sol}				(65,000)	(250,000)	(450,000)
		35-44	65,000 (8.48)	45,000 (8.48) ^{sol}				(65,000)	(250,000)	(450,000)
Aromatic	8-10	34	27				(47)	(5,000)	(7,200 – 613 v)	
	10-12	74	69				(250)	(5,000)	(9,200 – 364 s)	
	12-16	140	140				(1,800)	(5,100)	(10,000)	
	16-21	260 (	250				(1,900)	(3,800)	(7,600)	
	21-35	1,100	890				(1,900)	(3,800)	(7,600)	

Notes:

The soil organic matter has been assumed to be 1% as this is the most conservative value for organic compounds. Inorganic compounds unaffected by this parameter.

Silty clay strata appears to prove more conservative threshold values for metals, semi-metals and several PAH compounds. Sandy loam strata appears to prove more conservative threshold values for TPH compounds, phenol and naphthalene.

The assessment of hydrocarbon fractions should be completed additively to determine the total risk of the whole range of compounds present as well as by single TPH fractional units, however this should be undertaken on a sample by sample basis where significant hydrocarbon concentrations have been encountered to derive a compound TPH concentration.

Although benzene has a C4SL value, this has been calculated for small terraced housing and not other housing stock, therefore other housing stock should either adopt the more conservative CLEA thresholds or that of a small terraced property. All thresholds not coloured orange (C4SL) for different housing stock have utilised LQM/CIEH Generic Assessment Criteria for Human Health Risk assessment, 2nd edition, 2009. CLEA values in brackets where C4SL values are available.

Vap denotes where the threshold is exceeded beyond the vapour saturation limit. Sol denotes where the threshold is exceeded beyond the solubility saturation limit.

It should be noted that these threshold values only relate to human health risk assessment and an assessment for potential groundwater risk should be undertaken as a separate risk assessment.

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.

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.

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

How to contact us about the information in this leaflet



DeveloperServicesWater@uuplc.co.uk



0345 072 6067

Opening hours:
8am-5pm Mon to Thurs
8am-4.30pm Fri

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

Frequently asked questions

Why has UUW published supplementary guidance to the 'UKWIR Guidance for the Selection of Water Pipes to be used in Brownfield Sites'?

UUW agrees with the UKWIR Guidance in principle; we have published supplementary guidance to clarify some of the areas in which it will operate.

Does the UKWIR Guidance only apply to 'brownfield sites'?

Yes, the UKWIR Guidance does apply to brownfield sites; in addition United Utilities Water will apply this guidance and the UUW supplementary guidance to any greenfield sites which are potentially affected by contamination.

Who is responsible for completing/ signing the Risk Assessment for Water Pipes (RA)?

This may be the Developer, the Developers representative, or the competent person directing the land assessment. The signatory of the Risk Assessment for Water Pipes (RA) must ensure that all land assessments have been carried out in accordance with current standards and guidelines by or under the direction of a suitably qualified competent person. For water supply applications on land potentially affected by contamination, UUW requires the competent person to be either 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 a Specialist in Land Condition (SiLC). This level of competency is intended to promote good practice and high professional standards and is no greater than that required for planning purposes by Local Authorities.

Do we need to agree the number and location of soil samples with the Water Company as indicated by the UKWIR guidance following the Preliminary Risk Assessment (PRA)?

Where a preliminary risk assessment (PRA) highlights the need for a site investigation UUW considers it is a responsibility of the qualified competent person directing the land assessment to determine the location and frequency of sampling. UUW's role would be to confirm that the appropriate

choice of pipe material has been made on the basis of the information provided.

What do we do if the pipe route is not known when the Site Investigation report is commissioned?

Where the route of the pipe is not known at the site investigation stage, then any resultant pipe selection needs to take account of any contamination found on the site. Consideration should be given to identifying the route and depth of the pipeline at the site investigation stage to avoid unnecessary testing.

Is it acceptable not to undertake a site investigation and specify the use of barrier pipe which seems to be suitable for all conditions?

Not all brownfield land is contaminated, and because of that a default to barrier pipe is not an acceptable approach to UUW, due to the possibility of higher installation and future maintenance costs. The approach as to whether a site investigation is needed should be risk based. For those sites where land may be affected by contamination appropriate testing shall be undertaken on the ground materials within which the pipes are to be laid, whether that be existing ground materials, remediated materials or imported capping materials.

Examples where defaulting to barrier pipe would not be acceptable:

- Where a capping layer (non-contaminated) is introduced within which the pipes will be installed.
- Sites with a potential low risk for contamination.
- Where liquid free phase product (e.g. oil or free solvent layers) is in the ground or groundwater in the vicinity of water pipes.
- Where the route of the pipe could be diverted to another suitable location free from contamination.

Are UUW employees who will assess the Design Proposals for contaminated sites suitably qualified?

It is the role of the Developer's suitably qualified competent person to deal with or direct the assessment of land. UUW's role is to assess the Risk Assessment for Water

Pipes and supporting Site Assessment Report (SAR) which is provided with any new water supply application (ie. it has been provided in the correct format, proposals for pipe selection are included, the methodology is in line with the UKWIR Guidance and UUW Supplementary Guidance, it has been directed by a suitably qualified competent person etc.). If UUW do need to provide assistance or information in deciding pipe materials then the assessment would be carried out under the direction of a suitably qualified competent person.

What happens to existing PE that is in the ground under the "old" guidelines?

The latest UKWIR guidance and UUW's supplementary guidance are intended to be used to decide what pipe materials will be used for new water mains and services. It will have no effect for developers with regard to any parts of UUW's existing network.

Will the Developer be required to submit a fully completed Risk Assessment for Water Pipes (RA) and supporting Site Assessment Report (SAR), including pipe material recommendation, for both the option of a mains requisition application and the option of a self-lay application?

Yes, UUW expect the 'Developer', as defined in UUW Supplementary Guidance, to submit a Risk Assessment for Water Pipes (RA) and supporting Site Assessment Report (SAR), including pipe material recommendation, in respect of any water pipes being installed on the development irrespective of who is to install them.

Does Table 1 in UUW's Risk Assessment for Water Pipes (RA) replace any of the tables to be completed in the Site Assessment Report (SAR) as required in the UKWIR Guidance?

UUW does not consider Table G1 and Table 3.1 of the UKWIR Guidance to be a definitive guide for assessing total concentrations. Table 1 in UUW's RA replaces Table 3.1 of the UKWIR Guidance.

Have any other Water Companies adopted the UKWIR Guidance yet?

You will need to contact the water company concerned if you are intending to install water pipes outside UUW's licensed area.

About us

United Utilities is the North West's water company. We keep the taps flowing and toilets flushing for seven million customers every day. From Crewe to Carlisle, we work hard behind the scenes to help your life flow smoothly.

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 **0345 072 6067**.

Section 1: Development details	
Development name <i>(if it has one)</i>	N/A
Development address	Land adjacent to Bealey Industrial Estate, Radcliffe
OS Grid reference <i>(mid point)</i>	SD 797 082
Developer's name	Westchurch Homes
UUW 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> Onsite: Current: - open ground, dense vegetation, outside units and storage of trading estate. Historical: - part of former Broad Dumers Paper Works, including reservoirs, holding/storage tanks, and filter beds and Bealey's Goit. reservoir/tanks recorded as inert landfill following filling in the 1980's. Offsite: Current: Trading estate to the south west and west, open land to the north, residential to the east and south. Historical: Eaton Hill Cotton Mill (later a dyeing works, then dyeing and finishing), a gasometer, Dumers Paper Works, Radcliffe Bleach and Chemical Works (later bleaching works), a chemical works, engineering works, infilled reservoirs, areas of waste disposal activity and a sewage works.	
Section 2: Preliminary risk assessment	
Has your desk study and site walkover identified any land potentially affected by contamination?	☒ Yes ☐ 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> N/A - investigations undertaken	

Section 3: Intrusive site investigation																																	
Have you completed any intrusive site investigation?					☒ Yes ☐ No																												
Have you completed any none intrusive site investigation?					☐ Yes ☒ No																												
Date(s) when the site investigation(s) undertaken					<table border="1"> <tr> <td>2</td><td>1</td><td>0</td><td>3</td><td>2</td><td>0</td><td>2</td><td>4</td> </tr> <tr> <td>2</td><td>6</td><td>0</td><td>9</td><td>2</td><td>0</td><td>2</td><td>4</td> </tr> <tr> <td>D</td><td>D</td><td>M</td><td>M</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td> </tr> </table>					2	1	0	3	2	0	2	4	2	6	0	9	2	0	2	4	D	D	M	M	Y	Y	Y	Y
2	1	0	3	2	0	2	4																										
2	6	0	9	2	0	2	4																										
D	D	M	M	Y	Y	Y	Y																										
At what level has groundwater been encountered?					0.6-3.0 metres below ground level or ☐ Not encountered																												
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. <i>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.</i>																																	
Refer to Coopers Letter Report 8353si for rationale of selected suites of testing, based upon conceptual site model. Additional investigation required in areas of the site which were inaccessible.																																	
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. <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>																																	
Area of petroleum range hydrocarbon contamination proposed for removal.																																	
Section 4: Site remediation																																	
Please provide details below of any site remediation (which may include a change in site levels) already completed. <i>If your supporting information has details of the site remediation already completed, please reference below the relevant sections of your report.</i>																																	
No remediation undertaken at time of assessment (see below for proposals).																																	
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. <i>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.</i>																																	
Subject to additional investigation upon vacant possession of the site, concurrent with demolition works. Areas of petroleum range hydrocarbons from former reservoir to be removed. Cover systems intended for proposed gardens.																																	

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.

None - Proposed residential end use.

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.

Refer to Coopers Report 8353si.

The investigation has identified an areas of elevated petroleum range hydrocarbons intended for removal.

The proposed pipeline materials are for initial proposals only based upon the information of the areas accessible for investigation and this assessment should be revised upon completion of the additional investigation.

Section 7: Risk assessor

Name and relevant qualifications of person directing the risk assessment for water pipes

B W Hill BSc(Hons), CSci, MEnvSc, FGS (Chartered Scientist)

Name and address of risk assessor's company

Coopers (Chester) Ltd,
Park House, Sandpiper Court, Chester Business Park
Chester
CH4 9QU

Date risk assessment performed

0 8 1 1 2 0 2 4

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 UUW'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	Ben Hill	Company	Coopers (Chester) Ltd
Telephone	01244 684920	Date	0 8 1 1 2 0 2 4

Please email the completed form and supporting information to DeveloperServicesWater@uuplc.co.uk or post to us at United Utilities Water, Developer Services, Second floor Grasmere House, Lingley Mere, Warrington WA5 3LP.



About us

United Utilities is the North West's water company. We keep the taps flowing and toilets flushing for seven million customers every day. From Crewe to Carlisle, we work hard behind the scenes to help your life flow smoothly.

United Utilities Water Limited, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Warrington WA5 3LP.
Registered in England and Wales. Registered Number 2366678.

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

Coopers Note - further investigation needed, including targeting of former tanks and areas of high risk of elevated TPH.

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	<LOD	<LOD	None
Total BTEX & MTBE		0.1	Pass	0.1	Y	<LOD	<LOD	None
Total SVOCs (excluding PAHs and those substances marked with an *)		2	Pass	0.1	Y	0.1	0.1	None
EC5-EC10 aliphatic and aromatic hydrocarbons		2	Pass	0.01	Y	<LOD	<LOD	None
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass	1.5	Y	483.52	483.52	WS101 (3-4m bgl)
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass	3.4	Y	3121.9	3121.9	WS101 (3-4m bgl)
Phenols* (from SVOC analysis)		2	Pass	0.1	Y	<LOD	<LOD	None
Cresols and chlorinated phenols* (from SVOC analysis)		2	Pass	0.1	Y	<LOD	<LOD	None
Ethers*	Only where identified	0.5	Pass	N/A	N/A	N/A	N/A	N/A
Nitrobenzene*		0.5	Pass	N/A	N/A	N/A	N/A	N/A
Ketones*		0.5	Pass	N/A	N/A	N/A	N/A	N/A
Aldehydes*		0.5	Pass	N/A	N/A	N/A	N/A	N/A
Amines		Fail	Pass	N/A	N/A	N/A	N/A	N/A
Corrosive	Conductivity, Redox and pH	Pass	See Note [1]	N/A	N/A	N/A	N/A	N/A

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.

NA = not tested based upon conceptual site model - refer to Coopers Report No. 8353si for justification of testing.