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Bury Road, Radcliffe

Remedial Strategy Report

For: Highall Developments Ltd

HIGHALL 
Developments

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1.0 INTRODUCTION

This Remedial Strategy Report has been prepared at the request of Highall Developments Ltd. Instructions to proceed with this report were received in February 2024.

This report primarily follows the findings and recommendations of the Westlakes Environmental *Phase 2 Ground Investigation Report* (Ref. 2300-001-001, January 2024). Additionally, this report uses findings and recommendations from the following documents:

- **The Land Consultancy Limited** *Phase 1 Geo-Environmental Desk Study* (Ref. TLC1204, August 2022);
- **Jenkins Design Services** *Topographical Survey* (SI-00-DR-A-0810, November 2022) and *Proposed Site Plan Levels* (SI-00-DR-A-1005, July 2023); and
- **Landscape Architects** *Soft Landscape Specification* (MR22-112/101, October 2022).

This report pertains to a c. 0.58 Ha site located to the east of Bury Road, Radcliffe at the approximate post code M26 2WB. The National Ordnance Survey Grid Reference for the centre of the site is 378936E, 407645N. A site location plan is included in Appendix 2 (Drawing ref. *SI-01*).

The site currently comprises a vacant area of land covered in hardstanding, recently noted to have been used for storage of vehicles. Vegetation comprising established trees was noted along the northern and western site boundaries, with overgrowth noted in the northern site section. The site is noted to slope from the northern site corner (70.29m AOD) towards the rest of the site and the southern section (60.50m AOD). The site is accessed from Bury Road along the western site boundary. The site is bound by Newbridge Close and residential property to the north, Bury Road to the west and industrial buildings to the east and south. An aerial photo of the site is included below:



Figure 1: Aerial image of the site dated April 2022.

1.1 Scope

This *Remedial Strategy Report* has been undertaken to determine the remedial requirements of the site based upon the existing site investigation works. It is the client's intention to develop the site into a low-rise residential development comprising 30 No. low rise dwellings and apartments with associated private gardens, soft landscaping and access roads.

The proposed development plan is contained in Appendix 2. An extract of the proposed development plan is shown below:

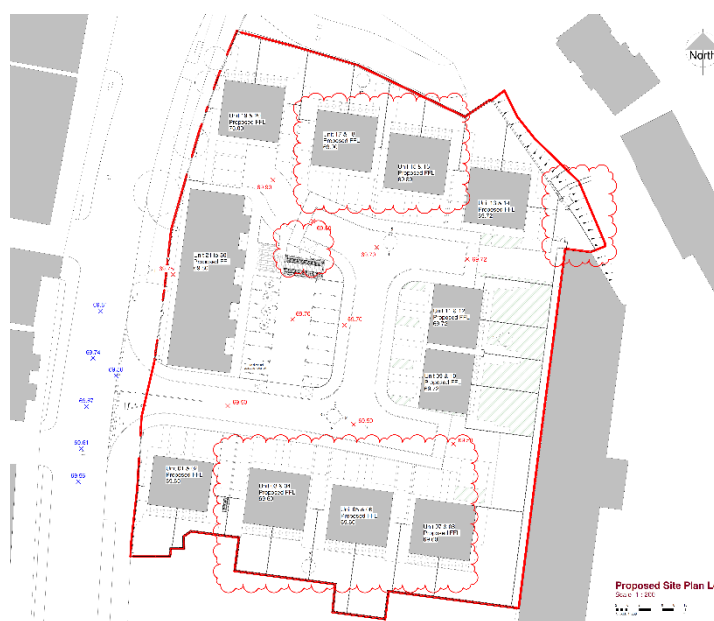


Figure 2: Extract of the proposed development plan (taken from Jenkins Design Services, Proposed Site Plan Levels, SI-00-DR-A-1005, dated July 2023).

1.2 Brief

This report has been undertaken following the findings and recommendations of the Westlakes Environmental *Phase 2 Ground Investigation Report* (Ref. 2300-001-001, January 2024). Based on the Westlakes Environmental ground investigation findings, this report will outline the remedial strategy with regard to human health, controlled waters and ground gas risk on site.

The limitations of the report are contained in Appendix 1.

1.3 Summary of Previous Phase 2 Investigation Findings

Westlakes Environmental have undertaken an intrusive investigation of the site in July 2023, comprising 11 No. machine excavated trial pits to depths of between 1.40m and 3.70m bgl (66.45m and 68.38m AOD), 5 No. cable percussive boreholes to depths of between 5.45m and 13.00 bgl (56.80m and 64.05m AOD), 2 No. of which have been followed on by rotary open hole boreholes to a maximum depth of 50.00m bgl (19.80m and 20.15m AOD). 4 No. boreholes were installed with a combined ground gas and groundwater monitoring well. Infiltration tests have been undertaken within 2 No. boreholes. 18 No. soil samples, 4 No. leachate samples and 3 No. water samples from across site have been submitted for environmental analysis. No human health exceedances were recorded within the natural soils on site.

Soil samples

The following table summarises the exceedances of human health GAC based on 2.5% organic matter content for Made Ground.

Location	Depth (m bgl)	Determinand	Concentration (mg/kg)	GAC (mg/kg)
TP04A	0.40	Lead	220	200
TP06	0.30		230	
TP07	0.70		230	
TP09	0.40		260	
BH03	1.00		460	
TP06	0.30	Arsenic	39	37
BH03	1.00		97	

BH03	0.60	Copper	5600	2400
TP06	0.30	Benzo(a)pyrene	5.7	2.7
TP10	0.50		11	
BH01	0.20		3.6	
BH03	1.00		2.8	
TP06	0.30	Benzo(b)fluoranthene	6.6	3.3
TP10	0.50		13	
BH01	0.20		3.9	
BH03	1.00		3.6	
TP06	0.30	Dibenz(a,h)anthracene	0.75	0.28
TP10	0.50		1.70	
BH01	0.20		0.59	
BH02	0.60		0.33	
BH03	1.00		0.48	

Asbestos was recorded within 1 No. sample (BH02 at 0.60m bgl). Chrysotile in bituminous form was encountered, quantified at 0.002% w/w. An Asbestos Management assessment using the CL:AIRE JIWG Decision Support Tool has been undertaken as part of the remedial recommendations and is detailed in Section 2.1.

As a result of the Westlakes Environmental works, remedial measures are required for the proposed soft landscaped areas to negate exposure pathway risks with existing site materials.

The risk of volatile / VOCs is regarded as negligible due to the lack of evidence for the potential sources of VOCs on site. Furthermore, chemical testing concluded that VOC and SVOC concentrations were recorded below or only slightly above the limit of detection. Consequently, contaminative pathways for vapours are not considered as the VOC/SVOC were found not to pose risk to human health.

Water samples

No. groundwater samples (BH01d at 1.85m bgl and BH03d at 2.77m bgl) and 1 No. surface water sample from the Withins Overflow stream channel to the north-east of the site were collected. Elevated concentrations of copper were noted, with

concentrations between 3.7µg/l and 3.9µg/l recorded within groundwater and 7µg/l within the surface water samples.

No significant contamination or other elevated concentrations of any determinand were recorded, with other values largely remaining below the laboratory limit of detection.

Leachate Samples

4 No. leachate samples were collected for laboratory environmental analysis. All samples were found to exceed the leachable chromium (III) potable water GAC (3.4µg/l), however this is solely due to the laboratory limit of detection being 5.0µg/l. Consequently, as the concentrations are not deemed to be significant, the exceedance can be discounted.

Elevated concentrations of copper were recorded, which are potentially able to migrate by leaching. These concentrations exceed the EQS GAC of 1µg/l for bioavailable copper. Consequently, the concentrations may pose a risk. However, based on the comparatively low concentrations of copper in the groundwater and surface water samples discussed above, it is possible that the elevated concentrations of copper occur in a discrete area. It is likely that the natural fine grained deposits may prevent the migration of contamination into the groundwater aquifer. As no significant contamination linkages exist and the potentially contaminated Made Ground may be removed for development purposes, the risk from copper leaching was deemed very low by Westlakes Environmental.

2.0 REMEDIAL STRATEGY FOR HUMAN HEALTH

The proposed development is to include private gardens and public open space. A Landscaping Plan is included within Appendix 2. The Westlakes Environmental Phase 2 Ground Investigation Report recommended a cover system in these areas to break any pathways between the existing site soils and the end user.

2.1 Asbestos Management – JIWG Decision Support Tool

Asbestos in bituminous form (chrysotile – concentration of 0.002% wt/wt) was encountered within 1 No. sample of coarse grained Made Ground. Based on the findings of the chemical laboratory the chemical laboratory test results, a risk assessment has been using the *JIWG Decision Support Tool for the Categorisation of Work Activities Involving Asbestos in Soil or Construction & Demolition Materials in accordance with CAR 2012* (FINAL Version 2.1, March 2017). The risk assessment has been included below:

Stage 1 Hazard Factors		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Bonded ACMs: cement, vinyl, composites, textured decorative coatings, bitumen products	1
Extent of degradation of ACMs at outset of work	Degraded (Significant degradation in ACM; material has lost its basic integrity)	3
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Non-friable ACM or ACM with fibres firmly linked in a matrix	0
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Very Low quantities - <0.001 to 0.01 %wt/wt	1
Sub-total		5
Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs		
Hazard ranking		Very low

Stage 2 Exposure Factors		Score
Anticipated airborne fibre concentration - Control Limit or SAL?	<0.01 fibres/ml	1
Anticipated duration of exposure to asbestos	> 2 hours in a 7 day period and Up to 10 hours in a day (e.g. full time occupational exposure)	4
Activity type and effect on deterioration of ACMs during work	Not low intensity, significant deterioration expected	4
Best description of primary host material matrix (soil/made ground)	Coarse to Fine Sand	2
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Very low	1
Sub-total		12
Exposure ranking		Medium
Combined hazard and exposure ranking		17 Low

Stage 3 Risk Assessment Outputs	
Probable Licensing Status	Non-Licensed Work
RPE*	EN149 type FFP3 disposable
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.

**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)

***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis

A copy of this JIWG asbestos risk assessment is contained in Appendix 3.

The above JIWG risk assessment concludes that re-use of the Made Ground would be non-notifiable, non-licensed work, but would require the use of EN149 type FFP3 disposable face masks and manual / localised dust suppression and localised and basic personal decontamination facilities.

Therefore, if these protection measures are followed, then the Made Ground can be reused outside of the proposed gardens and soft landscaping, i.e., beneath cover systems or hardstanding.

2.2 Installation of a Clean Cover System

The following Landscaping Plan shows location of the proposed private rear gardens (red), private front gardens (blue) and Public Open Space (POS_{resi} – green). The below remedial recommendations will refer to the landscaping designations in the below extract.



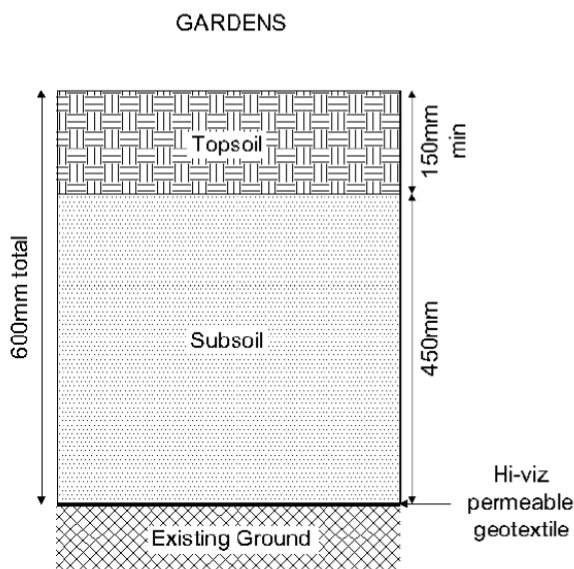
Figure 3: Extract of SI-02 Landscaping Plan (May 2024). Red = private rear gardens, Blue = private front gardens and Green = public open space.

It may not be feasible to achieve the required cover system thicknesses as detailed below within the areas circled on Figure 3 above due to their small size (maximum width of 2m), particularly if services are present in front 'garden' areas. Additionally, in the areas circled, hedges, bushes or shrubs are proposed rather than grassed areas so cover system validation pits will likely not be feasible. The cover systems in these areas should be installed as deep as is practicable to facilitate shrub growth, but depth checks will not be undertaken as part of validation works.

Made Ground containing asbestos and exceeding GACs with respect to human health is present below finalised garden levels at depths shallower than 600mm (300mm in public open space) across the site. The following procedure is outlined for use in all private gardens and in public open space:

1. Excavate to 600mm bgl in private (front and rear) gardens (300mm in public open space).
2. A 600mm clean cover system is recommended to be added to the proposed private (front and rear) gardens (300mm in public open space). This is to consist of:
 - No less than 150mm and no more than 300mm suitable topsoil, underlain by;
 - Suitable subsoil to a total (topsoil + subsoil) depth of 600mm (300mm in public open space), underlain by;
 - A high vis geotextile marker;
 - Validate in line with the below strategy.

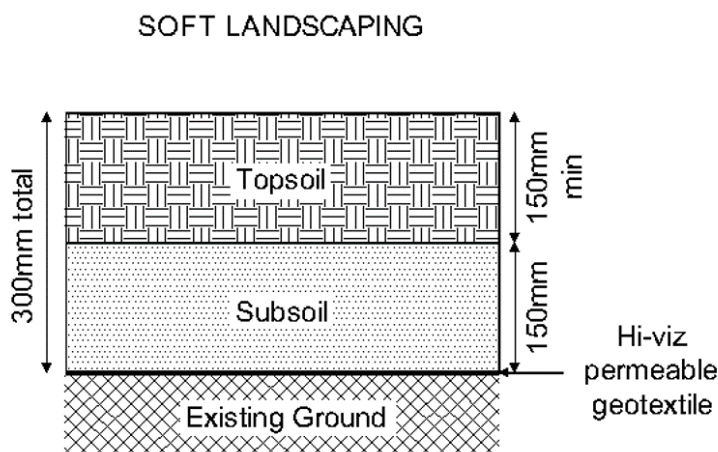
This is shown diagrammatically below:



The cover system for the soft landscaping is to be 300mm thick, due to the presence of asbestos on site, and consist of:

- A minimum of 150mm suitable topsoil, underlain by;
- Suitable subsoil, to a total thickness of 300mm.

This is shown diagrammatically below:



Soils for use in the above recommended cover system must be validated as detailed below to ensure their suitability for use.

2.3 Validation of Clean Cover System

The installation of the clean cover system must be verified in accordance with NCLOG 'A Regulator's Guide to Cover Systems and their Verification' (2024). Once the 600mm clean cover system is installed to break contaminative linkages (300mm in public open space), validation requirements include:

- Details of the source of the cover material;
- Chemical test results to demonstrate that the soil is free from contamination and 'suitable for use' in-line with the below chemical testing suites and rates.
- Waste transfer notes to provide evidence of source; and
- Confirmation of cover depth by either measurement tape or topographical survey with photographs at a frequency of one pit per plot.

No topsoil or subsoil is present on-site therefore all topsoil and subsoil will need to be imported and this must be validated as detailed below to ensure its suitability for use (i.e., no glass or plastic is to be included and meets chemical testing acceptability criteria).

Imported topsoil and subsoil is required to be tested at source prior to import to confirm suitability. All topsoil and subsoil, whether site-won or imported is required to be tested at the following frequency:

Source	Material End Use	Sampling Frequency ¹	Testing Suites ³ (see below)
Greenfield Source:	Topsoil	1 per 200m ³	A, B, C, D, F
	Subsoil	1 per 200m ³	A, B, C, D, F
Brownfield Source:	Topsoil	1 per 50m ³	A, B, C, D, F, H
	Subsoil	1 per 100m ³	A, B, C, D, F
	General Fill ²	1 per 1000m ³	A, B, C, E, G

- 1) Minimum 3 samples regardless of volume.
- 2) 'General Fill' is material used primarily to raise levels, specifically not within areas of private gardens, public open space, or soft landscaping, e.g. 6F2.
- 3) In addition to the standard suites given, the laboratory testing suite should include any additional contaminants of concern based on the source of the samples.

Testing Suites:

- A. Asbestos ID, Asbestos quantification.
- B. pH, total and free cyanide, soluble sulfate, organic matter.
- C. Arsenic, Beryllium, Boron, Cadmium, Chromium (III and VI) Copper, Lead, Inorganic Mercury, Nickel, Selenium, Vanadium, Zinc.
- D. Speciated PAHs: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene.
- E. Total (non-speciated) PAHs.
- F. Speciated Total Petroleum Hydrocarbons (TPH): Aliphatic >EC5 - EC6, >EC6 - EC8, >EC8 - EC10, >EC10 - EC12, >EC12 - EC16, >EC16 - EC21, >EC21 - EC35, and > EC35 - EC44, and Aromatic >EC5 - EC7, >EC7 - EC8, >EC8 - EC10, >EC10 - EC12, >EC12 - EC16, >EC16 - EC21, >EC21 - EC35, > EC35 - EC44.
- G. Total Petroleum Hydrocarbons (TPH): TPH EC6 – EC40.
- H. BTEX: Benzene, Toluene, Ethylbenzene, p- & m-xylene, o-xylene. Methyl tertiary butyl ether (MTBE).

Once tested, the results are to be compared against the following Acceptability Criteria:

Suite	Determinand (mg/kg unless stated)	Acceptability Criteria for:			
		Private Gardens	Public Open Space (residential)	Soft Landscaping or Public Open Space (Park)	General Fill
A	Asbestos (%)	ND	ND	ND	<0.001 – 0.01%
B	pH	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>5 - <10 ⁽³⁾
	Total Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Free Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Soluble Sulfate (mg/l)	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾
C	Arsenic	37	79	170	640
	Beryllium	1.7	2.2	63	12
	Boron	290	21000	46000	240000
	Cadmium	11	120	560	190
	Chromium (III)	910	1500	33000	8600
	Chromium (VI)	6	7.7	220	33
	Copper	2400	12000	44000	68000
	Lead	200 ⁽¹⁾	630 ⁽¹⁾	1300	2330 ⁽¹⁾
	Inorganic Mercury	40	120	240	1100
	Nickel	130	230	800	980
	Selenium	250	1100	1800	12000
	Vanadium	410	2000	5000	9000
	Zinc	3700	81000	170000	730000
D	Naphthalene	2.3	4900	1200	
	Acenaphthylene	170	15000	29000	
	Acenaphthene	210	15000	29000	
	Fluorene	170	9900	20000	

	Phenanthrene	95	3100	6200	
	Anthracene	2400	74000	150000	
	Fluoranthene	280	3100	6300	
	Pyrene	620	7400	15000	
	Benzo(a)anthracene	7.2	29	49	
	Chrysene	15	57	93	
	Benzo(b)fluoranthene	2.6	7.1	13	
	Benzo(k)fluoranthene	77	190	370	
	Benzo(a)pyrene	2.2	5.7	11	
	Indeno(1,2,3-cd)pyrene	27	82	150	
	Dibenz(a,h)anthracene	0.24	0.57	1.1	
E	Benzo(ghi)perylene	320	640	1400	
	Total PAHs				1000 ⁽⁴⁾
F	TPH-CWG - Aliphatic >EC5 - EC6	42	570000	95000	
	TPH-CWG - Aliphatic >EC6 - EC8	100	600000	150000	
	TPH-CWG - Aliphatic >EC8 - EC10	27	13000	14000	
	TPH-CWG - Aliphatic >EC10 - EC12	130	13000	21000	
	TPH-CWG - Aliphatic >EC12 - EC16	1100	13000	25000	
	TPH-CWG - Aliphatic >EC16 - EC21	65000	250000	450000	
	TPH-CWG - Aliphatic >EC21 - EC35				
	TPH-CWG - Aliphatic > EC35 - EC44	65000	250000	450000	
	TPH-CWG - Aromatic >EC5 - EC7	70	56000	76000	
	TPH-CWG - Aromatic >EC7 - EC8	130	56000	87000	
	TPH-CWG - Aromatic >EC8 - EC10	34	5000	7200	
	TPH-CWG - Aromatic >EC10 - EC12	74	5000	9200	
	TPH-CWG - Aromatic >EC12 - EC16	140	5100	10000	
	TPH-CWG - Aromatic >EC16 - EC21	260	3800	7600	
	TPH-CWG - Aromatic >EC21 - EC35	1100	3800	7800	
	TPH-CWG - Aromatic > EC35 - EC44	1100	3800	7800	
G	TPH > EC6 - EC40				5000 ⁽⁴⁾
H	Benzene	0.087	72	90	
	Toluene	130	56000	87000*	
	Ethylbenzene	47	24000	17000*	
	p & m-xylene	56	41000	17000*&***	
	o-xylene	60	41000	17000*	
	MTBE (Methyl Tertiary Butyl Ether)	LOD ⁽³⁾	LOD ⁽³⁾	LOD ⁽³⁾	

LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015) used unless stated:

- 1) Category 4 Screening Levels (March 2014)
- 2) CL:AIRE Soil GAC for Human Health Assessment (January 2010)
- 3) In-house screening criteria used as no GAC methodology currently exists
- 4) Hazardous waste thresholds. This limit only applies to imported material, not to in-situ soil.

Assumed 1% SOM (most conservative) for those values dependent upon SOM.

ND = Not Detected

LOD = Limit of Detection

*Exceeds vapour saturation limit

**Exceeds solubility saturation limit

The above acceptability criteria for PAHs for imported topsoil and subsoil are based on the published LQM/CIEH S4ULs (2015) for each individual PAH and not based on the Category 4 Screening Level using benzo(a)pyrene as a surrogate marker. This is as the source of the imported material is unknown therefore using the surrogate marker approach may not be suitable as the distribution of PAHs in the imported material may not be similar to those in the Culp et al. (1998)¹ study. Once chemical testing had been undertaken on imported soil and the distribution of PAHs compared to the distribution in the Culp et al. (1998) study, it may be suitable to use the surrogate marker approach / C4SL.

¹ Culp et al. (1998), *A comparison of the tumors induced by coal tar and benzo[a]pyrene in a 2-year bioassay*, **Carcinogenesis**, vol.19, no.1, pp.117–124.

In addition to the chemical suitability of soils, they should be demonstrated to be suitable from both horticultural and health and safety perspectives. Soils for garden and landscaping use should meet BS8601:2013 (Specification for Subsoil) and BS3882:2015 (Specification for Topsoil) to ensure suitable for planting. Section 6.3 of BS8601:2013 states the following for depths of subsoil and topsoil on a landscaped site:

On a landscaped site, the combined minimum depth of subsoil and topsoil placed shall be 450mm for grass, 600mm for shrubs and 900mm for trees.

The depth of topsoil spread should not normally exceed 300mm. The British Standards also stress the requirement for both topsoil and subsoil to be present to create a healthy environment with a sustainable drainage system.

Soils for garden and landscaping should also meet the characteristics presented in BS3882:2015 (Specification for Topsoil) with regards to visible contaminants and sharps. Visible contaminants must be <0.5% m/m, in air-dried soil, of which plastics must be <0.25% m/m. There must be zero sharps in 1kg air-dried soil.

- A visible contaminant is defined as an 'undesirable potentially injurious foreign object discernible by the naked eye (examples include metal objects, plastics, treated wood, textiles and sharp fragments of ceramics and glass)'.
- A sharp is defined as 'a sharp inorganic contaminant such as a glass fragment, nail or needle that can cause physical injury to the hands of a user of topsoil when handling it without protective gloves'.

3.0 REMEDIAL STRATEGY FOR GROUND GAS PROTECTION

3.1 Ground Gas Risk Assessment

Previous Ground Gas and Groundwater Monitoring

Westlakes Environmental have undertaken 6 No. ground gas and groundwater monitoring visits between 9th August and 6th October 2023. 6 No. boreholes have been installed with a combined ground gas and groundwater monitoring well. The response zones of the installed wells are detailed below.

Location	Depth (m bgl)	Stratum
BH01s	0.50 – 1.50	Made Ground
BH01d	1.50 – 5.00	Natural Sand / Gravel
BH02	0.50 – 1.50	Made Ground
BH03s	0.50 – 2.00	Made Ground
BH03d	2.50 – 3.50	Natural Sand / Gravel
BH04	0.50 – 1.40	Made Ground

The results of a programme of 6 No. ground gas and groundwater monitoring visits undertaken by Westlakes Environmental over 3 No. months are detailed in the below tables.

Location	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Flow (l/hr)	Steady State Flow (l/hr)
BH01s	0.0	1.0 – 2.6	17.2 – 19.8	0.1 – 0.2	0.1 – 0.3
BH01d	0.0	0.1 – 1.1	13.2 – 20.2	0.0 – 0.4	0.0 – 0.4
BH02	0.0	3.4 – 5.8	9.4 – 13.2	0.1 – 0.3	0.1 – 0.3
BH03s	0.0	0.2 – 3.2	15.4 – 19.3	0.1 – 0.3	0.0 – 0.3
BH03d	0.0	0.1 – 4.6	13.9 – 19.9	-4.3 – 0.1	-1.6 – 0.1
BH04	0.0	1.4 – 2.8	11.3 – 17.6	0.0 – 0.3	0.0 – 0.3

Location	Response Zone (m bgl)	Depth (m bgl)
BH01s	0.50 – 1.50	1.15 – 1.52
BH01d	1.50 – 5.00	1.74 – 2.11
BH02	0.50 – 1.50	1.00 – 1.66
BH03s	0.50 – 2.00	DRY
BH03d	2.50 – 3.50	2.66 – 2.88
BH04	0.50 – 1.40	DRY – 1.00

The results of the 6 No. ground gas monitoring visits undertaken by Westlakes Environmental have been assessed in accordance with BS 8485 (2015) + A1 (2019). The characteristic Gas Screening Value (GSV) is calculated by dividing the maximum methane or carbon dioxide concentration by 100 and multiplying by the maximum steady flow rate recorded at the same monitoring point (the instrument detection limit of 0.1 l/hr is utilised when below detection limit flow rates are recorded). If required, the worst case GSV can be calculated by dividing the maximum carbon dioxide and methane concentration by 100 and multiplying by the maximum steady flow rate on-site.

Ground gas monitoring has recorded a maximum peak carbon dioxide concentration of 5.8% v/v. No methane was detected, therefore the value of 0.1 used was utilised to calculate the on-site GSV.

A maximum steady flow rate of 0.4l/hr were recorded on-site. The GSV and the worst case GSV for carbon dioxide at the site can be calculated as $(5.8/100)*0.4=0.0232\text{l/hr}$.

The GSV and the worst case GSV for methane can be calculated as $(0.1/100)*0.4=0.0004\text{l/hr}$.

As a result of the Westlakes Environmental ground gas monitoring and the Conceptual Site Model (CSM) of the development, the site was deemed consistent with the **Characteristic Situation (CS) 1** and **'Green'** under the **NHBC Traffic Light System** with respect to ground gas risk by Westlakes Environmental.

Consequently, no ground gas measures are required for the proposed development.

As concentrations of carbon dioxide above 5% were detected within BH02, the increase of the site classification to Characteristic Situation (CS) 2 (Amber) classification was considered. The readings from BH02 were noted to slightly exceed 5%, the highest concentration being 5.8%. As the Made Ground was not recorded to contain any organic-rich and putrescible materials and is likely to be removed as part of the development, it was deemed unlikely that the Made Ground poses a significant ground gas risk and therefore Westlakes Environmental did not increase the classification.

The Conceptual Site Model diagram is contained within Appendix 2.

Radon

According to the findings of the Westlakes Environmental Phase 2 Ground Investigation Report, the site is located within an area where less than 1% of homes are above the action level.

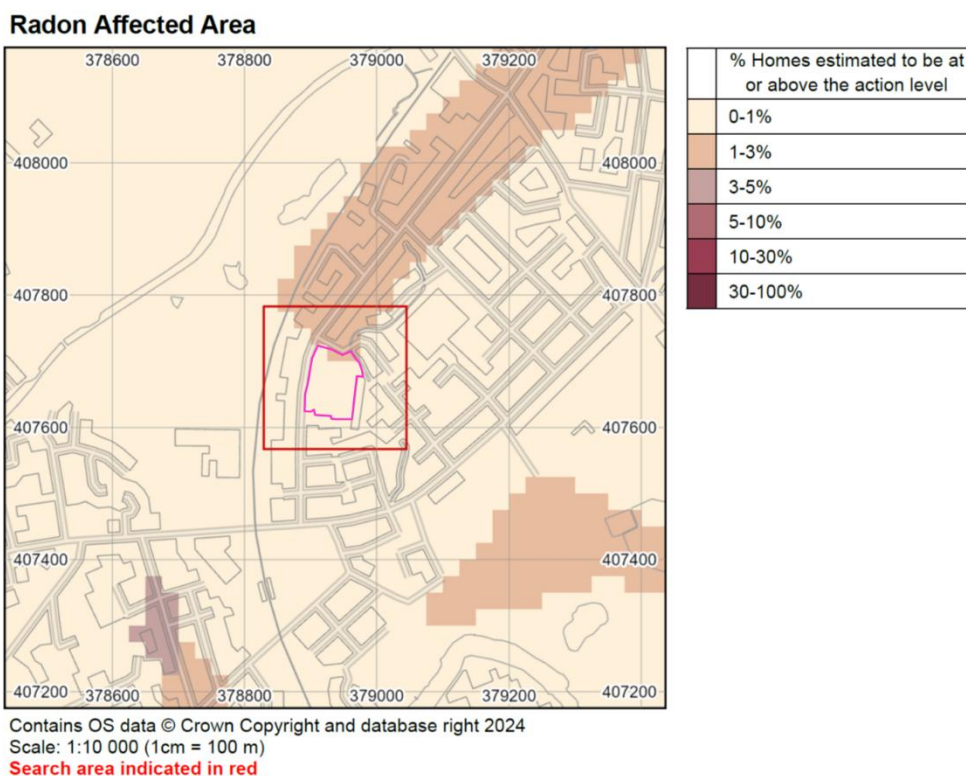


Figure 4: The site-specific radon affected areas map with the wider search area highlighted in red and the site area highlighted in pink.

A BGS site-specific Radon GeoReport (Ref. BGS_338527/54402, dated 03 June 2024) has been obtained for the site. The report indicates that the majority of the

site lies within an area, where less than 1% of homes are above the action level. The northernmost site section along the northern site boundary was recorded to fall within an area where between 1% and 3% of homes are above action level. Consequently, BR211 (2023) indicates that no radon protection measures are required in the construction of new dwellings or extensions.

3.2 Coal Mining and Mine Gas Risk Assessment

Westlakes Environmental did not undertake a Coal Mining and Mine Gas Risk Assessment, as a result IGE Consulting have undertaken this assessment. The site lies within the Coal Authority Reporting Area however it does not lie within a Development High Risk Area. The nearest Development High Risk Area is located 115m to the south-west of the site, associated with a nearby mine entry. 2 No. nearest Coal Authority recorded coal outcrops are located within 147m to the east and 197m to the west of the site. Based on the location of the outcropping seams it is possible that a coal seam dips in the direction of the site, therefore a coal seam may be present below site, however it is not expected at shallow depths (less than 30m bgl).

There are no mine entries located on site. The nearest mine entry is located within 115m to the south-west of the site. An inferred fault is located adjacent to the northern site boundary; it is possible that the fault is also present below site.

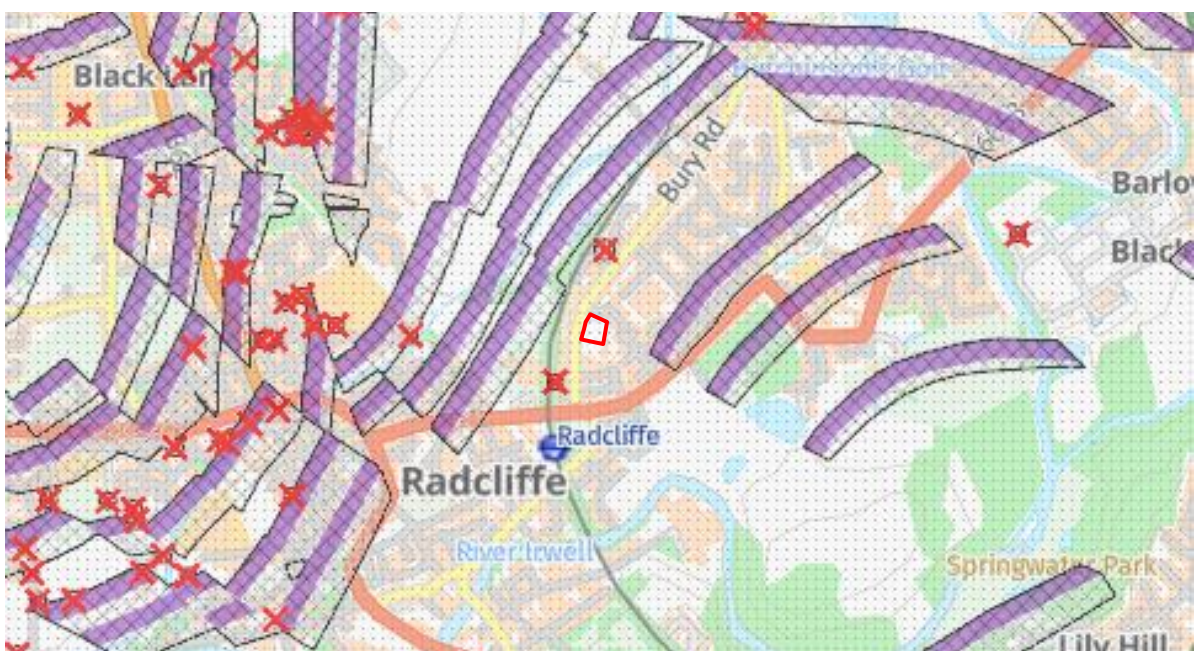


Figure 5: An extract from the Coal Authority online viewer map showing mine entries (red cross) coal outcrops (purple) and Development High Risk Areas (black hatch), dated 29.05.2024.



Figure 6: The BGS 1:50,000 bedrock geological map of the site with the inferred fault marked in thin grey lines and inferred coal seams marked in thick black lines. Green = Peel Hall Rock (sandstone). Grey = Pennine Middle Coal Measures (mudstone, siltstone and sandstone).

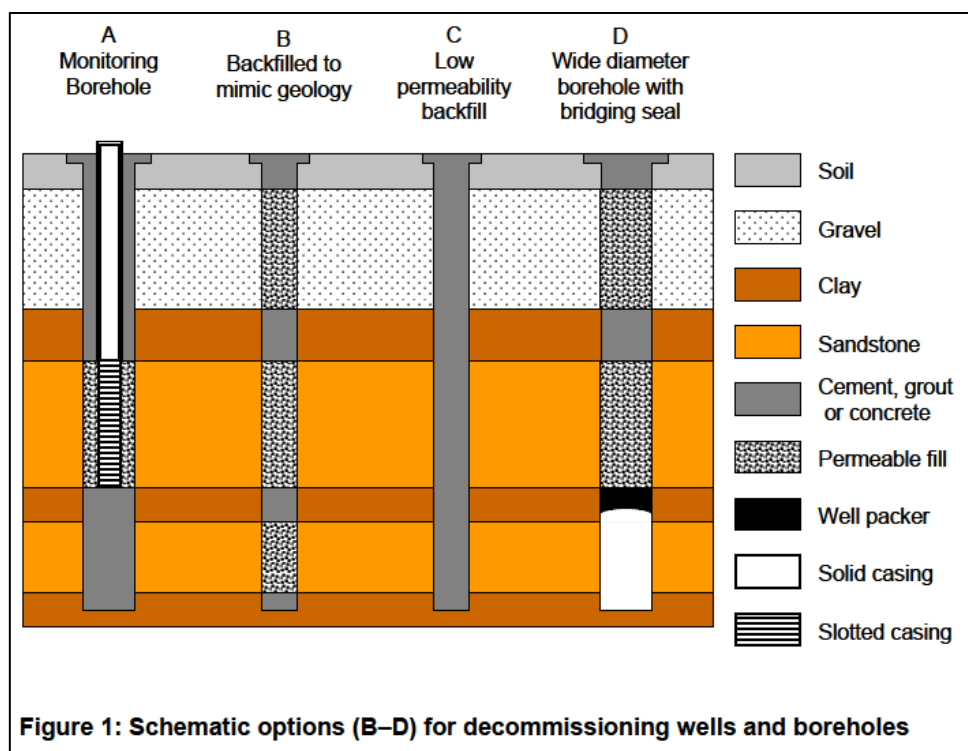
The expected coal seam below site has been recorded during the Westlakes Environmental ground investigation. It was encountered at depths of between 46.20m and 48.30m bgl and it is anticipated to be representative of the Park Yard (Ashclough) coal seam. Over 29m of bedrock overlies the encountered coal seam. It was noted to be intact and no evidence for underground workings or voids was noted. Due to the depth of the seam it is unlikely that any potential unrecorded shallow coal workings were active within the site boundaries, consequently, the mine gas risk associated with the coal seam recorded on site was deemed very low by Westlakes Environmental.

No feasible migration pathways have been identified Westlakes Environmental Phase 1 and Phase 2 reports, and the Park Yard coal seam is unlikely to pose risk to the proposed development due to the depth at which it occurs, as well as a considerable distance to rockhead above the seam. As a result of the above assessment and the findings of WML Phase 1 Desk Study and Preliminary Geoenvironmental Assessment and WML Geo-Environmental Investigation & Assessment, **the implementation of ground gas protection measures with respect to mine gas is not deemed necessary** for the proposed development.

4.0 OTHER REMEDIAL REQUIREMENTS

4.1 Decommissioning of Boreholes

It is imperative that all boreholes drilled into the site are located and appropriately grouted to negate any possible preferential ground gas pathways. Utilising guidance provided in the Environment Agency's '*Good practice for decommissioning redundant boreholes and wells*' (October 2012), it is prudent to secure redundant borehole to ensure that no groundwater pollution can occur. The Environment Agency (EA) offer advice on the methods of sealing wells to ensure that the preferential pathway is removed. The following diagram taken from the EA guidance shows a monitoring well (A) and 3 No. options for decommissioning (B, C and D):



It is considered prudent to utilise Option C – low permeability backfill, shown in the diagram above, to adequately seal the borehole. The guidance recommends that ‘the backfill materials must be clean, inert and non-polluting’, e.g. bentonite. It is recommended to remove the standpipe and seal with bentonite to ground level. This will be sufficient to prevent contaminant transport.

4.2 Definition of Waste: Code of Practice

Due to the recommended handling and re-use of excavated site-won materials, it is possible to avoid complex waste legislation by utilising the Definition of Waste: Code of Practice (2011, DoW:CoP). This allows assessment of whether or not excavated materials are waste, and when excavated and treated waste can be classified as 'no longer waste'.

It is recommended that in line with DoW:CoP, a robust, site-specific material management plan (MMP) may need to be emplaced and adhered to and verified in an appropriate verification report. This must be reviewed by a 'Qualified Person' who must provide a Declaration to the EA prior to works within the MMP being commenced.

4.3 Material Management

4.3.1 Export of Materials

Any soils to be removed from site must be classified in accordance with WM3 under the definition of waste and chemically tested to determine their destination, i.e. reuse or landfill. Waste ticket records must also be retained as proof of the export of materials from site.

4.3.2 Stockpile Management

During the course of the development there will be areas of stockpiled soils intended for use within the soft landscaping area. These will have been subjected to off-site testing and approved for use on site.

It is imperative that the stockpiles are well managed to avoid inadvertent mixing or depositing of surplus or deleterious materials that would compromise the continued use. We would recommend that the site management reviews the proposed positions for placement of stockpiles and places either fencing or warning signs to ensure compliance.

4.4 Discovery Strategy

In the event of unexpected contamination being discovered, the Discovery Strategy must be followed – this is contained in Appendix 4.

4.5 Design Variation

Following any variation in a finalised proposed development layout and / or detailed design including earthworks design it is recommended that the above conclusions are re-appraised to determine their suitability.

4.6 United Utilities Risk Assessment

A United Utilities Risk Assessment for water pipes (UURA) has been undertaken for the site and is contained in Appendix 5. The UURA concludes that barrier pipe will be required for water pipes on site.

APPENDIX 1

LIMITATIONS OF INVESTIGATION WORK AND REPORT

LIMITATIONS OF REPORT

This consultancy report was compiled and carried out by IGE Consulting Limited ('IGE') for the client, as defined in the main report (the 'client'), on the basis of a defined programme and scope of works and the terms of a contract between IGE and the client. IGE undertook this with all reasonable skill and care, taking into account the limits of the scope of works required by the client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between IGE and the client. IGE cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outwith the agreed scope of works.

Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices. This report may not be relied upon, or transferred to, by any other party without the written agreement of its author. If a third party relies on this report, it does so wholly at its own and sole risk and IGE disclaims any liability to such parties.

It is IGE's understanding that this report is to be used for the purpose described in the 'Brief' section of this report. That purpose was a significant factor in determining the scope and the services to be provided. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without IGE's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of IGE.

This report is a function of the date it was written and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of IGE. In the absence of such written advice of IGE, reliance on the report in the future shall be at the client's own and sole risk. Should IGE be requested to review the report in the future, IGE shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between IGE and the client.

The observations and conclusions described in this report are based solely upon the scope of works agreed between the client and IGE. IGE has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. IGE is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the agreed scope of works. For the avoidance of doubt, this report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species (e.g. Japanese Knotweed). It is recommended that the client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the suspected presence asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace full and proper surveys.

Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. The geo-environmental sections are written in broad agreement with BS 10175:2011+A2 2017.

LIMITATIONS OF INVESTIGATION WORK

Desk Study References

This report is based upon IGE's observations of existing physical conditions at the site gained from a walkover survey of the site together with IGE's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. Reliance has been placed on this publicly available data obtained from the sources identified in the main report. When using the information, it has been assumed that it is correct. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst IGE have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report. IGE did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services. IGE is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to IGE and including the doing of any independent investigation of the information provided to IGE except when otherwise provided in the terms of the contract between the client and IGE.

Historical Mapping

Historical Ordnance Survey maps do not provide a comprehensive description of a site history. They provide details of the site from a date prior to the publication of the map (i.e. a snapshot in time). The period between map editions can be substantial (i.e. several decades). Not all map series are available for every date range in many areas of the UK and therefore there will be gaps in this mapped record for some sites. Potentially contaminative land uses could have been present and removed during such periods and may therefore not form a part of this particular record. In addition, there will be potentially contaminative land uses which are not identified on the map records such as small scale storage / use of hazardous materials, illegal / unlicensed waste disposal activities etc. Different map series identify different features utilising different symbols which can result in features that remain on-site being removed from maps. Some features are also not mapped for security reasons (e.g. airfields and other military installations). These areas are mostly shown as blank areas on historical maps.

Site Walkover

During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.

Flooding

Flooding in this report is defined as flooding caused by the sea, ditches, rivers, streams, ponds, lakes, reservoirs and the like. It does not extend to flooding caused by surcharged piped drainage systems and investigations into flooding of this nature are excluded from this report.

Extent of Contamination Studies

Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities. The conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the reporting in full. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

Intrusive Investigation

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations, the potential exists for ground conditions to be encountered which are different to those considered in this report. The explored extent of the site area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters, based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Exploratory Holes

Where exploratory holes have been carried out as part of this investigation, the spacing has been determined to provide a reasonable indication of the general ground conditions across the site, but the number has ultimately been limited by commercial constraints. The findings of the exploratory holes relate specifically to the exploratory hole locations and are no absolute guarantee of the ground conditions between such locations. Due allowance should be made for the possibility of variation in conditions between exploratory hole locations.

Extent of Contamination Testing

The extent of contaminated land testing carried out on samples obtained from the site has been determined in accordance with the latest legal guidance issued by the government to provide, with reasonable certainty, the probable general levels of contamination present on site that could pose a significant hazard to human health or waters. The extent of site investigation works including chemical testing has also been limited by reasonable commercial constraints. Although extensive testing of samples has been carried out, the volume of samples taken for testing are a minute fraction of the total volume of soils and groundwater present on site. Therefore, there is a residual risk that undetected pockets of contamination may be present on site, situated between testing locations.

When investigating or developing potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and temporally. The absence of certain ground, ground gas, contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

Extent of Geo-Environmental Studies

This report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species e.g. Japanese Knotweed. It is recommended that the Client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the identification asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace a full and proper survey. If an Unexploded Ordnance (UXO) report has been obtained within the report, it has been so on the basis of Health and Safety concerns and no assessment has been made other than transcribing the recommendations of the sub-contractor contained within the report. In terms of a potential contaminative source, unless ordnance has been manufactured / stored on site, UXOs will only be determined as a contaminative source following a positive identification on site.

PLANNING CONTEXT

The National Planning Policy Framework (NPPF, 2023) states that the purpose of the planning system is to contribute to the achievement of sustainable development. In order to do this the planning system has three overarching objectives, one of which directly relates to the potential for pollution and contaminated land:

- ***'environmental objective - to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy'.***

In accordance with this environmental objective, Paragraph 124 clarifies that 'making effective use of land' includes to:

- ***'give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land'.***

In accordance with this environmental objective, Paragraph 180 clarifies that 'conserving and enhancing the natural environment includes:

- ***'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability'; and***
- ***'remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate'.***

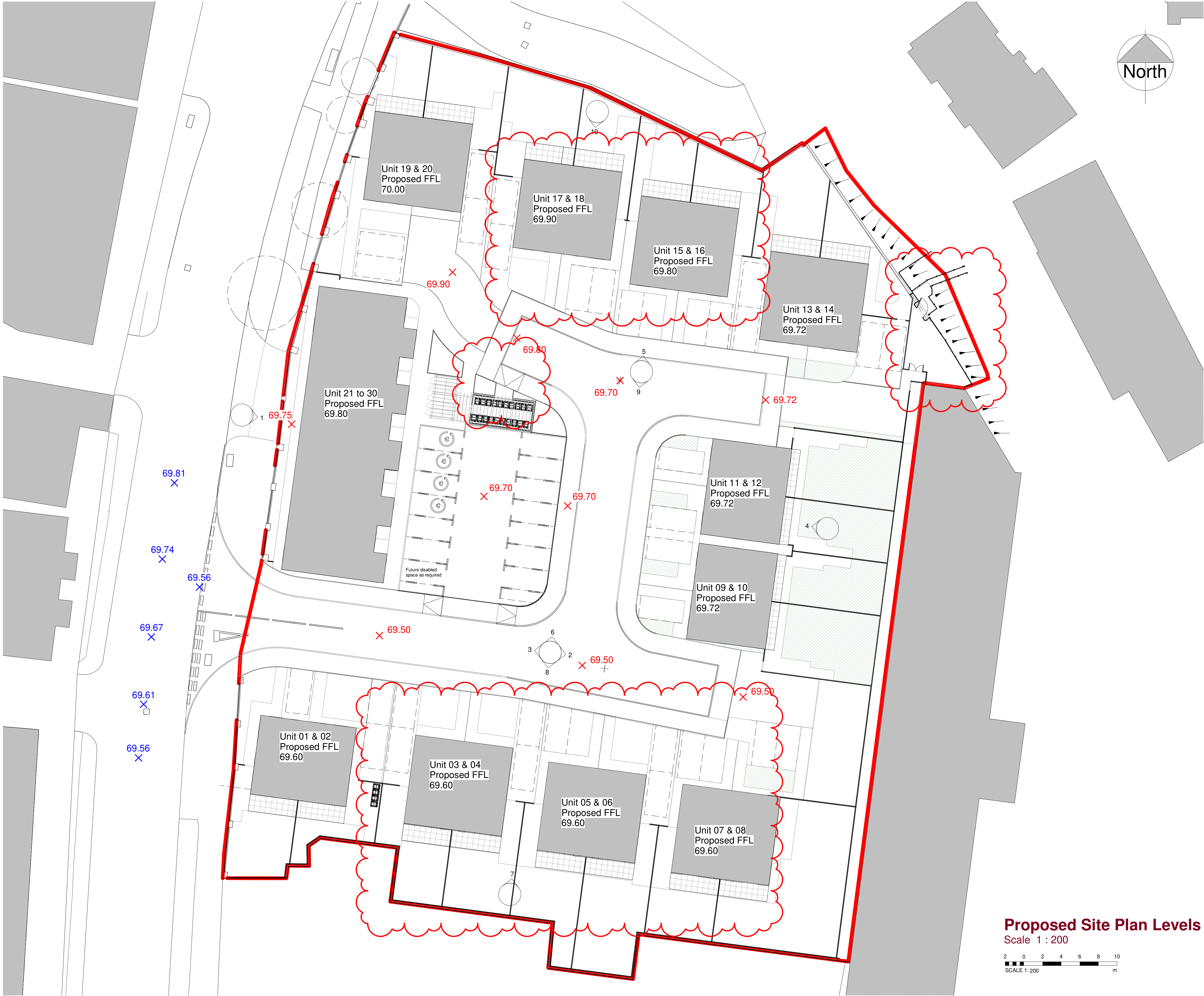
Paragraph 189 of the NPPF states that planning policies and decisions for developments should also ensure that:

- ***'a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation)'; and,***
- ***'after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990'; and***
- ***'adequate site investigation information, prepared by a competent person, is available to inform these assessments'.***

This report has been prepared and authorised by staff that are competent as defined in the NPPF.

APPENDIX 2

FIGURES AND DRAWINGS



© This Drawing & Design is the copyright of Jenkins Design Services Ltd and should not be reproduced without written consent.

Contractors are to check all levels & dimensions on site prior to site works commencing & report discrepancies to the Designers.

DO NOT SCALE FROM THIS DRAWING

PLANNING

Key: -

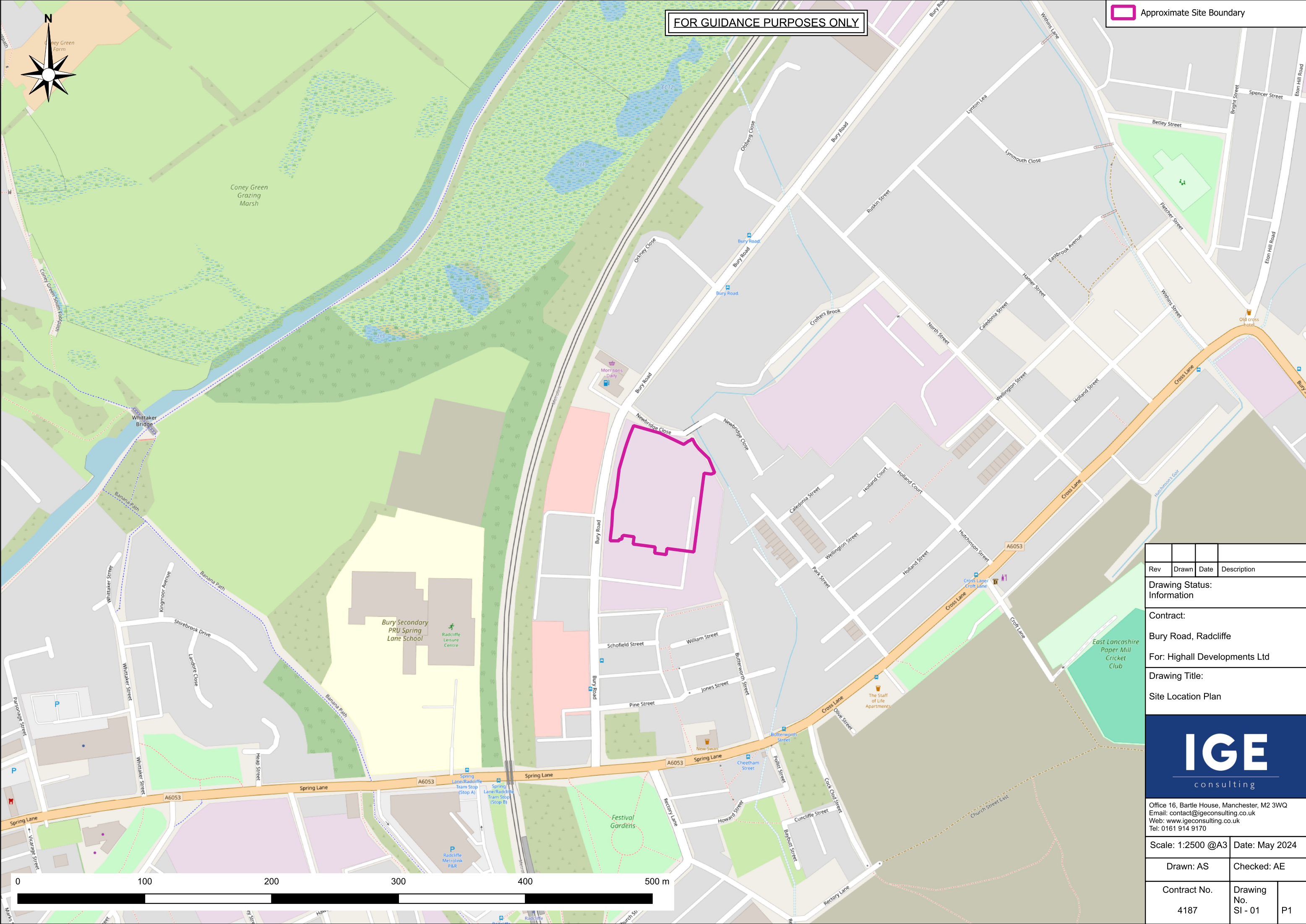
Existing Levels X 69.00

Proposed Levels X 69.00

C	Existing brook access revised in response to GMEU's comment. Units 3-8 & 15-18 repositioned to maximise the distance between rear of building to face of fencing. Dropped crossing to bin store added.	AL	TR	04.07.23
B	Shared drive width reduced to 4.8m in response to comments received from the Planning Officer	CM	TR	05.06.23
A	Length of units 3-8 and 13-20 increased.	AL	TR	10.03.23
Rev	Description	By	Chk	Date

Project:	Station works			
	Bury Road, Radcliffe, M26 2UA			
Title:	Proposed Site Levels			
Client:				
Drawn By:	CM	Checked By:	TR	on 04.07.23
Original Size:	A1	Project Number:	22049	
Drawing Number:	SI-00-DR-A-1005			REV C





FOR GUIDANCE PURPOSES ONLY

 Approximate Site Boundary

Rev	Drawn	Date	Description
-----	-------	------	-------------

Drawing Status:
Information

Contract:

Bury Road, Radcliffe

For: Highall Developments Ltd

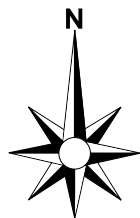
Drawing Title:

Site Location Plan



Office 16, Bartle House, Manchester, M2 3WQ
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk
Tel: 0161 914 9170

Scale: 1:2500 @A3		Date: May 2024	
Drawn: AS		Checked: AE	
Contract No. 4187		Drawing No. SI - 01	P1



FOR GUIDANCE PURPOSES ONLY

- Approximate Site Boundary
- Landscaping Plan**
- Private Rear Gardens
 - Private Front Gardens
 - Public Open Space - Soft Landscaping



A	JH	04/26	Updated to include fronts
Rev	Drawn	Date	Description

Drawing Status:
Information

Contract:

Bury Road, Radcliffe

For: Highall Developments Ltd

Drawing Title:

Landscaping Plan



Office 16, Bartle House, Manchester, M2 3WQ
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk
Tel: 0161 914 9170

Scale: 1:400 @A3

Date: May 2024

Drawn: AS

Checked: AE

Contract No.

4187

Drawing No.

SI - 02

P1

SOURCES

Sources
1. On-site Made Ground

Secondary Sources
2. Pooling beneath current and / or future foundations
3. Pooling in relative low points above low permeability deposits
4. Pooling within granular lenses within low permeability deposits

Ground Gas Sources
1. On-site Made Ground
2. Park Yard (Ashclough) coal seam

PATHWAYS

Pathways To Human Health
A. Dermal contact
B. Inhalation of soil dust and vapours
C. Ingestion of soil directly

Pathways To Controlled Waters
A. Vertical migration athrough coarse Made Ground and coarse soils.
B. Lateral migration along low permeability natural soils & pooling at relative low points.
C. Vertical migration along future foundations and pooling at base.
D. Migration through porous bedrock.
E. Overland flow.

Ground Gas Pathways
A. Preferential migration along foundations & service ducts.
B. Migration within groundwater.
C. Ingress through cavity walls and floors.
D. Inhalation of ground gas and vapours
E. Vertical migration through granular superficial deposits and granular pockets within cohesive superficial deposits.
F. Migration through installed boreholes.

RECEPTORS

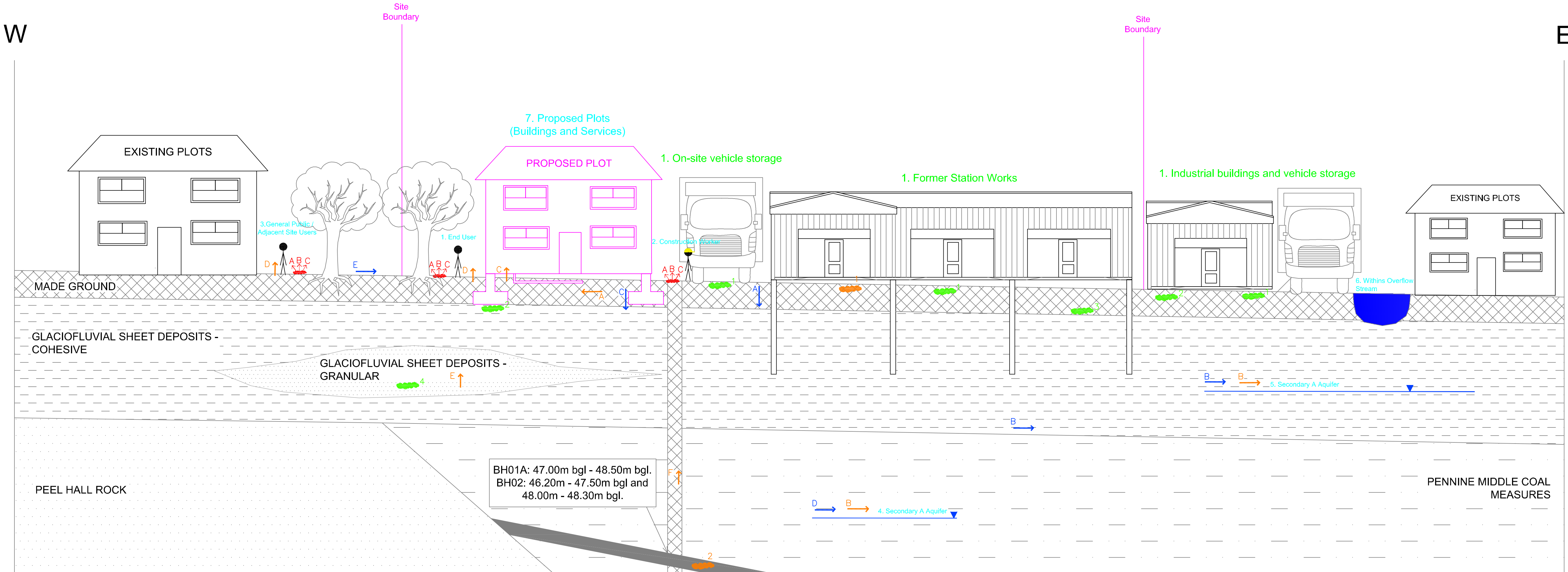
Receptors
1. End user
2. Construction workers
3. General public / adjacent site users
4. Secondary A aquifer in superficial deposits
5. Secondary A aquifer in bedrock
6. Surface water - site-adjacent Withins Overflow stream
7. Buildings and services

Notes

- 1 This drawings is indicative and not to scale.
2 This drawing is to be read in conjunction with all relevant Architects and Service Engineers drawings.

Key

- Made Ground
Glaciofluvial Sheet Deposits - Cohesive
Glaciofluvial Sheet Deposits - Granular
Pennine Middle Coal Measures Formation - Sandstone, Mudstone and Siltstone
Peel Hall Rock - Sandstone



Rev	Drawn	Date	Description
Drawing Status			
INFORMATION			

Contract
BURY ROAD, RADCLIFFE

FOR: HIGALL
DEVELOPMENTS LTD

Drawing Title
CONCEPTUAL SITE MODEL



Office 16, Bartle House, Manchester, M2 3WQ
email: contact@igeconsulting.co.uk
web: www.igeconsulting.co.uk
tel: 0161 914 9170

Scale	NTS	Date	MAY 2024
Drawn	AS	Checked	AE
Contract No.	4187	Drawing No.	SI-03
			P1

APPENDIX 3

CL:AIRE JIWG DECISION SUPPORT TOOL



Joint Industry Working Group
Asbestos in Soil and Construction & Demolition Materials

Project Reference	4187
Site Name	Bury Road, Radcliffe
Client	Highall Developments Ltd
Run by	AS
Date	29.05.2024
Scenario details	Construction work

Decision Support Tool for CAR2012 Work Categories

Stage 1

Hazard Factors

Score

Select ACM type (run model for each type to generate 'Worst Case' output)
Extent of degradation of ACMs at outset of work
Friability and degree of bonding by matrix (ACM matrix, not ground materials)
Distribution of Visible Asbestos Across Affected Area
Amount of asbestos fibre in selected ACM/fibre type as % of host material

Bonded ACMs: cement, vinyl, composites, textured decorative coatings, bitumen products	1
Degraded (Significant degradation in ACM; material has lost its basic integrity)	3
Non-friable ACM or ACM with fibres firmly linked in a matrix	0
No visible ACMs/fibre bundles	0
Very Low quantities - <0.001 to 0.01 %wt/wt	1

Sub-total

5

Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs

Hazard ranking

Very low

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.

It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.



Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Stage 2

Exposure Factors

Score

Anticipated airborne fibre concentration - Control Limit or SALI?

<0.01 fibres/ml

1

Anticipated duration of exposure to asbestos

> 2 hours in a 7 day period and Up to 10 hours in a day (e.g. full time occupational exposure)

4

Activity type and effect on deterioration of ACMs during work

Not low intensity, significant deterioration expected

4

Best description of primary host material matrix (soil/made ground)

Coarse to Fine Sand

2

Respirable fibre index for ACM - RIVM report 711701034 (2003)

Very low

1

Sub-total

12

Exposure ranking

Medium

Combined hazard and exposure ranking

17

Low



Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Stage 3

Risk Assessment Outputs

Probable Licensing Status	Non-Licensed Work
RPE*	EN149 type FFP3 disposable
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.

**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)

***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis

APPENDIX 4

DISCOVERY STRATEGY



DISCOVERY STRATEGY

Office 16
Bartle House
Oxford Court
Manchester
M2 3WQ

Tel: 0161 914 9171
Email: contact@igeconsulting.co.uk
Web: www.igeconsulting.co.uk

What to Look Out For

Potentially contaminative material can be identified as follows:

- Appears oily / has an iridescent sheen
- Hydrocarbon odour e.g., oily or petroleum odour
- Solvent odour e.g., sharp or sweet odour
- Waste materials e.g., metals, plastic etc.
- Asbestos e.g., fibrous sheeting / roofing / board / lagging etc.
- 'Landfill' odour e.g., rotten / putrefying / leachate odour

Or any other material that looks man-made or does not match its surroundings – if in doubt, check.

Procedure for Discovery of Unexpected Contamination

If any of the above material is discovered, the following procedure must be carried out:

- a) Stop works in the area of the contamination discovery.
- b) Inform the Site Manager.
- c) Record the visual and olfactory evidence of contamination.
- d) Suitably qualified geo-environmental engineer to investigate the contamination; take samples, photographs and in-situ tests and discover the extents of the contamination, and to identify potential contaminants and specify chemical testing, if necessary.
- e) Either dig out the contaminated material and stockpile, on an impermeable membrane if necessary, or leave in-situ whilst awaiting chemical test results, if needed – whichever presents the least risk.



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- f) Suitably qualified geo-environmental engineer to re-visit the site's risk assessment, taking into account the newly discovered contamination and recommend remediation, if necessary, or other next steps.
- g) If the risk assessment and remediation strategy is changed as a result, the Local Authority and/or the Environment Agency should be informed and/or consulted.
- h) Lastly, undertake remediation of the affected area if this has been deemed appropriate.

Procedure for Discovery of an Unexpected Tank

Former industrial sites may contain unrecorded underground storage tanks (USTs).

Follow the below steps if a UST is found:

- a) Stop works in the area of the UST discovery.
- b) Inform the Site Manager.
- c) Suitably qualified geo-environmental engineer to investigate the tank, including measuring the size, contents, condition, and visual and olfactory evidence of contamination. Geo-environmental engineer to record the location of the tank on a site plan, take photographs, and sample the contents to send for chemical testing to determine the contents.
- d) Suitably qualified contractor to empty the tank and dispose of contents at a suitably licensed disposal facility.
- e) Suitably qualified contractor to undertake integrity testing in line with the 'Blue Book' method (APEA / EI '*Design, Construction, Modification, Maintenance and Decommissioning of Petrol Filling Stations*' 4th ed. (April 2018)), to determine whether the tank is intact or has been compromised.
- f) Suitably qualified geo-environmental engineer to undertake a risk assessment based on the contents of the tank and the results of the integrity testing, to determine whether to decommission the tank and leave in-situ or to remove the tank.
- g) Suitably qualified contractor to clean and 'inert' the tank, and provide a gas safe certificate, in line with the 'Blue Book' method.

- h) Suitably qualified contractor to either decommission the tank in-situ in line with the 'Blue Book' method or remove the tank and dispose of at an appropriate facility.
- i) If excavated and removed, suitably qualified geo-environmental engineer to investigate the base and the sides of the resultant excavations and if any contamination is found, undertake the Procedure for Discovery of Unexpected Contamination above.

APPENDIX 5

UNITED UTILITIES 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.

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.

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>)	Bury Road, Radcliffe
Development address	Land to the east of Bury Road, Radcliffe, M26 2WB.
OS Grid reference (<i>mid point</i>)	378936E, 407645N
Developer's name	Highall Developments Ltd
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> The site has most recently been utilised as a freight forwarding depot, where vehicles have been parked. The site has historically been used as an engineering works formerly known as Station Works, however former building have all been removed following a fire in 2012. In the western part of the site, a large spoil heap of mainly demolition rubble has been left post 2012 after demolition of Station Works buildings. An electricity substation (formerly located towards the central west of the site), and two above ground tanks (formerly in the far northeast of the site) have been present on site.	
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 intrusive works have been 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><tr><td>1</td><td>8</td><td>0</td><td>7</td><td>2</td><td>0</td><td>2</td><td>3</td></tr><tr><td>2</td><td>7</td><td>0</td><td>7</td><td>2</td><td>0</td><td>2</td><td>3</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>				1	8	0	7	2	0	2	3	2	7	0	7	2	0	2	3	D	D	M	M	Y	Y	Y	Y
1	8	0	7	2	0	2	3																										
2	7	0	7	2	0	2	3																										
D	D	M	M	Y	Y	Y	Y																										
At what level has groundwater been encountered?						<table><tr><td>1.00 - 2.70</td><td>metres below ground level or</td></tr><tr><td colspan="2">☐ Not encountered</td></tr></table>				1.00 - 2.70	metres below ground level or	☐ Not encountered																					
1.00 - 2.70	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>																																	
N/A																																	
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>																																	
N/A																																	
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>																																	
None completed.																																	
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>																																	
N/A																																	

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, 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.

PE Barrier Pipe (Type A) is deemed appropriate, as exceedances in SVOC concentrations were recorded within the proposed pipeline depths. Although the TPH concentrations were within the allowed limits, the concentrations were elevated, and due to the presence of shallow groundwater on site (between 1.00m and 2.70m bgl), barrier pipe is recommended.

Section 7: Risk assessor

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

Mr Andrew Edwards (CEnv Institution of Environmental Sciences)

Name and address of risk assessor's company

IGE Consulting Ltd.
First Floor,
15 Oxford Court,
Manchester, M2 3WQ

Date risk assessment performed

2 4 0 4 2 0 2 6

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 Mr Andrew Edwards CEnv

Company IGE Consulting Ltd.

Telephone 0161 914 9170

Date 2 4 0 4 2 0 2 6

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

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	0.005	Y	<0.005	<0.005	-
Total BTEX & MTBE		0.1	Pass	0.005 - 0.01	Y	<0.005 - <0.1	<0.005 - 0.1	-
Total SVOCs (excluding PAHs and those substances marked with an *)		2	Pass	0.005 - 0.3	Y	2.7	3.7	BH03 at 1.00m bgl, TP10 at 0.50m
EC5-EC10 aliphatic and aromatic hydrocarbons		2	Pass	0.1	Y	<0.1	<0.1	-
EC10-EC16 aliphatic and aromatic hydrocarbons		10	Pass	1 - 2	Y	9.1	17.9	-
EC16-EC40 aliphatic and aromatic hydrocarbons		500	Pass	10	Y	413.8	413.8	-
Phenols* (from SVOC analysis)		2	Pass	0.2	Y	<0.2	<0.2	-
Cresols and chlorinated phenols* (from SVOC analysis)		2	Pass	0.1 - 0.2	Y	<0.1 - <0.2	<0.1 - <0.2	-
Ethers*	Only where identified	0.5	Pass	0.1 - 0.3	Y	<0.1 - <0.3	<0.1 - <0.3	-
Nitrobenzene*		0.5	Pass	0.3	Y	<0.3	<0.3	-
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.

IGE

consulting

IGE Consulting Ltd, Office 16, Bartle House, Oxford Court, Manchester, M2 3WQ

Tel: 0161 914 9170

Email: contact@igeconsulting.co.uk