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Land off Lathbury Road, Harpurhey

Remedial Strategy Report

For: John Southworth Builders Ltd.

**JOHN
SOUTHWORTH** 
BUILDING FUTURES TODAY

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1.0 INTRODUCTION

This Remedial Strategy Report has been prepared at the request of John Southworth Builders Ltd. Instructions to proceed with this report were received in October 2024.

This report follows the findings and recommendations and should be read in conjunction with the following reports:

- **Curtins** Phase 1 Preliminary Risk Assessment, Blencarn Walk (Ref: 77873-CUR-00-XX-RP-GE-017, Rev: V01, Dated: 10 May 2021)
- **E3P** Preliminary Site Investigation Summary, Lathbury Road, Manchester (Dated: 31st July 2023)
- **E3P** Phase II Geoenvironmental Site Assessment Lathbury Road, Manchester (Ref: 16-718-R1-1, Dated: September 2023)
- **E3P** Ground Gas Addendum Report, Lathbury Road, Manchester (Ref: 16-718-R2, Dated: November 2023)

This report pertains to a rectangular shaped c. 0.12 Ha site located to the north east of Lathbury Road, Harpurhey, at the approximate post code M9 5GF. The National Ordnance Survey Grid Reference for the centre of the site is 385908e, 400897N. A site location plan is included in Appendix 2 (Drawing ref: *SI-01*).

The site currently comprises a grassed vacant area of land with dense vegetation and established trees along the site boundaries. The site is accessed via Lathbury Road off the south western boundary. The site is bound by residential property to the north east and north west, Carisbrook Street to the south east and Lathbury Road to the south west. An aerial photo of the site is below:

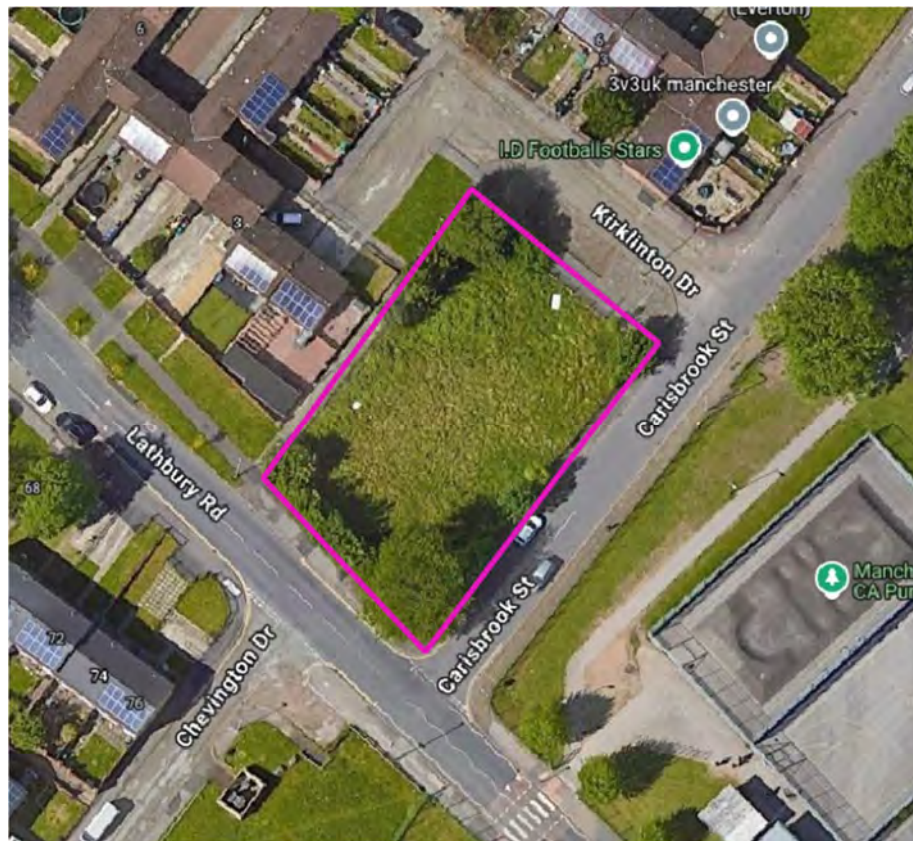
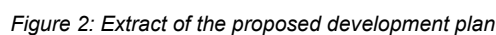


Figure 1: Aerial image of the site dated 2024

1.1 Scope

This Remedial Strategy Report has been undertaken to determine the remedial requirements of the site based upon the previous site investigation works. It is the client's intention to develop the site into a low-rise residential development comprising 6 No. low rise dwellings with associated private gardens, soft landscaping and access roads. The proposed development plan is contained in Appendix 2. An extract is shown below:



Ground Conditions

The ground conditions encountered were as follows:

- **Made Ground (Reworked Topsoil)** comprising dark brown slightly silty clayey fine to medium SAND with occasional rootlets and frequent roots to a maximum depth of 0.50m bgl, underlain by:
- Variable **Made Ground** comprising dark brown, clayey, silty SAND, BRICK and CONCRETE fill and very soft to soft greyish black to brown gravelly CLAY or clayey SAND with frequent brick, concrete, slag, metal, clinker, ceramic and shells, and occasional wood, glass, ash and plastic to a maximum depth of 3.70m bgl, underlain by:
- **Glacial Till** comprising stiff, brown mottled grey, slightly sandy, silty CLAY with occasional thin beds of yellowish brown SILT to a depth of at least 5.45m bgl, underlain by:
- **Chester Formation** comprising reddish brown SANDSTONE.

Contamination

8 No. soil samples from across site have been submitted for environmental analysis. Numerous GAC exceedances were recorded including arsenic, lead, mercury, PAHs and TPH fractions. All GAC exceedances were recorded within the Made Ground.

Asbestos in the form of loose amosite fibres (0.002%) was also identified within Made Ground in TP101 1.00m bgl.

An Asbestos Management Risk 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.

Remedial measures are required within the private gardens and proposed soft landscaped areas to negate exposure pathway risks with existing site materials. The remedial measures required are outlined in Section 2.2.

The below table summarises the findings of the chemical analysis of the samples.

Determinand	Concentration (mg/kg)	Assessment Criteria (mg/kg)	Location and Depth (m bgl)
Arsenic	62	37	TP105 at 1.00m
	47		TP102 at 2.50m
	41		TP101 at 1.00m
Lead	1500	200	TP105 at 1.00m
	660		TP102 at 2.50m
	540		WS102 at 2.80m
	450		TP101 at 1.00m
	300		TP103 at 1.80m
	210		TP102 at 0.30m
Total Mercury	53	1.2	TP105 at 1.00m
	6.9		TP103 at 1.80m
	6.9		WS102 at 2.80m
	3.2		TP102 at 2.50m
Elemental Mercury	1.8	1.2	TP101 at 1.00m
	10.71		TP105 at 1.00m
Naphthalene	130	2.3	WS102 at 2.80m
	63		TP103 at 1.80m
	4		TP101 at 0.30m
	3.7		TP105 at 0.30m
Phenanthrene	420	95	WS102 at 2.80m
	270		TP103 at 1.80m
Fluoranthene	340	280	WS102 at 2.80m
Benzo(a)Anthracene	150	7.2	WS102 at 2.80m
	100		TP103 at 1.80m
	23		TP101 at 1.00m
	15		TP105 at 1.00m
Chrysene	150	15	WS102 at 2.80m
	100		TP103 at 1.80m
	22		TP101 at 1.00m
	15		TP105 at 1.00m
Benzo(b)Fluoranthene	130	2.6	WS102 at 2.80m
	99		TP103 at 1.80m
	22		TP101 at 1.00m
	16		TP105 at 1.00m
	5.2		WS101 at 1.50m
	3.8		TP102 at 0.30m
	3.0		TP104 at 0.35m
Benzo(a)Pyrene	130	2.2	WS102 at 2.80m
	89		TP103 at 1.80m
	20		TP101 at 1.00m
	13		TP105 at 1.00m
	4.0		WS101 at 1.50m
	3.4		TP102 at 0.30m
Indeno(123-cd)Pyrene	2.5	27	TP104 at 0.35m
	59		WS102 at 2.80m
Dibenzo(a,h)Anthracene	41	0.24	TP103 at 1.80m
	18		WS102 at 2.80m
	13		TP103 at 1.80m
	3.2		TP101 at 1.00m
	1.8		TP105 at 1.00m
	0.6		TP102 at 0.30m
	0.43		TP104 at 0.35m
TPH C16 – C21 Aromatic	0.4	260	WS101 at 1.50m
	330		TP102 at 2.50m
	290		TP103 at 1.80m

Ground Gas

E3P undertook 9 No. ground gas monitoring visits and recorded elevated concentrations of carbon dioxide up to a maximum concentration of 8.2% (v/v), however, no methane or flow rates above detection limits were recorded (0.1% v/v and 0.1l/hr). The results are summarised below:

Gas Monitoring Well	Response Zone (m bgl)	Steady O ₂ Concentration (%)	Peak CO ₂ Concentration (%)	Peak CH ₄ Concentration (%)	Atmospheric Pressure (mbar)	Steady Gas Flow (l/hr)
WS102	1.00 – 3.00	11.4 – 21.1	<0.1 – 8.2	<0.1	990 - 1011	<0.1
WS104	1.50 – 5.00	12.4 – 21.2	<0.1 – 5.3	<0.1	990 - 1011	<0.1
WS106	1.00 – 3.00	13.4 – 21.2	<0.1 – 4.6	<0.1	990 - 1011	<0.1

Consequently, based on the above, E3P stated that the site falls in line with Characteristic Situation 2, requiring ground gas protection measures including a vapour resistant membrane due to the elevated concentrations of volatile contaminants recorded (naphthalene, elemental mercury and SVOCs). The ground gas protection measures are outlined in Section 3.3.

2.0 REMEDIAL STRATEGY FOR HUMAN HEALTH

As discussed in section 1.3, due to the human health GAC exceedances for the *residential with plant uptake scenario* recorded within the Made Ground and the recorded presence of asbestos, remedial measures are required for the proposed development. A clean cover system will be required in private gardens and areas of soft landscaping in order to break the contaminative linkages. Details of the required clean cover system are included below.

2.1 Asbestos Management – JIWG Decision Support Tool

Asbestos in the form of loose amosite fibres (0.002%) was identified within Made Ground in TP101 1.00m bgl. Consequently, the Made Ground on site is considered unsuitable for re-use within 600mm bgl of the proposed rear gardens and 450mm of the proposed soft landscaping areas.

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 undertaken based on the worst case identified 0.002% amosite loose fibres. The risk assessment has been included below:

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)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs at outset of work	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
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		11
Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs		
Hazard ranking		Medium

Stage 2 Exposure Factors		Score
Anticipated airborne fibre concentration - Control Limit or SAL?	<0.001 fibres/ml	0
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)	Made Ground - Recycled Aggregate, Track Ballast	4
Respirable fibre index for ACM - RIVM report 711701034 (2003)	High	4
Sub-total		16
Exposure ranking		High
Combined hazard and exposure ranking		27 Medium

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 5.

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

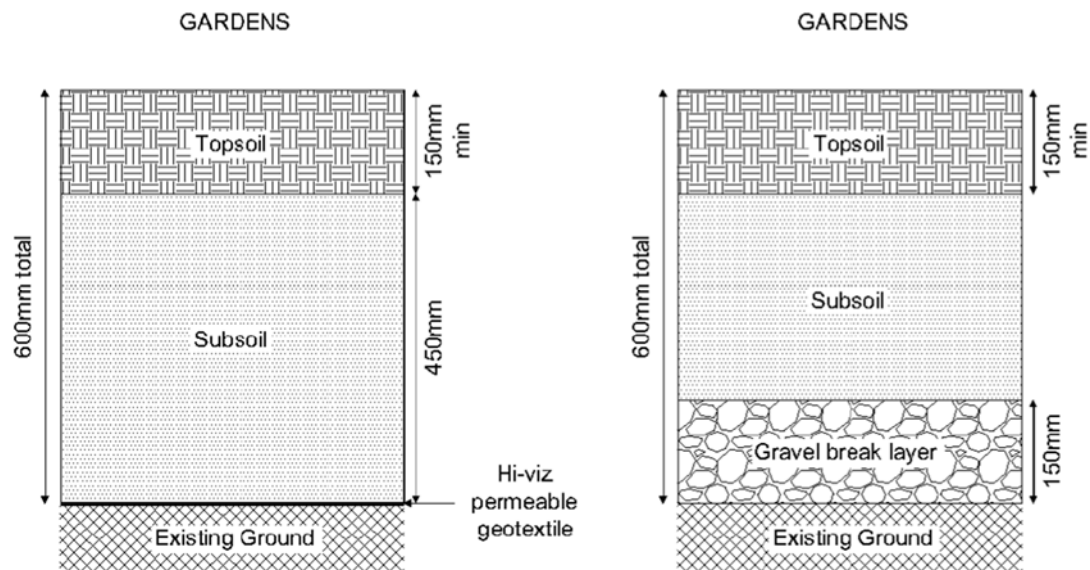
2.2 Installation of a Clean Cover System

Made Ground containing human health GAC exceedances including asbestos is present below finalised garden levels at depths shallower than 600mm (450mm in areas of soft landscaping) across the site. The following procedure is outlined for use in all private gardens and in areas of soft landscaping:

1. Excavate to 600mm bgl in private gardens (450mm in soft landscaping areas).
2. A 600mm clean cover system is recommended to be added to the proposed private gardens (450mm in soft landscaping areas). 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 (450mm in areas of soft landscaping), underlain by;
 - A high vis geotextile marker;

- Validate in line with the below strategy.

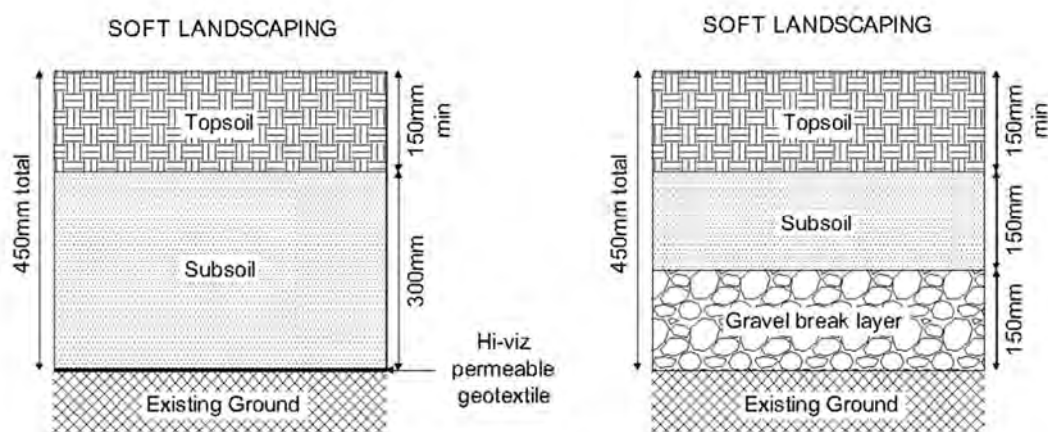
This is shown diagrammatically below:



The cover system for the soft landscaping is to be 450mm 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 450mm.

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

Once the 600mm clean cover system is installed to break contaminative linkages (450mm in areas of soft landscaping), 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;
- Confirmation of cover depth by either measurement tape or topographical survey with photographs at a frequency of one pit per three plots.

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 in line with Manchester City Council Planning and Contaminated Land Technical Guidance (Dated February 2021).:

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	
	Benzo(ghi)perylene	320	640	1400	
E	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.

2.4 Validation Report

Once complete, the information gathered as recommended in Section 2.3 should be compiled into a validation report for the site, detailing the completion of the remedial and verification measures.

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.

The validation report shall include, as a minimum, the following:

- Site Name / location, developer name, development use
- Plot No / description of landscaped area (incl. plan of inspection areas) and National Grid Reference
- Inspection visit date
- Description of remediation (as per agreed Remediation Strategy including depths / thickness checks, topographical readings)
- Material tracking information (including way tickets etc.)
- Name of groundwork's remediation contractor
- Name of supervising environmental consultant
- Site Specific chemical analysis results
- Verification Photographs (inc. remarks)
- Pass/fail and if material fails, how will this be managed i.e. removed, treated
- Detail any further remedial works and/or inspection
- 'Signed off'

3.0 REMEDIAL STRATEGY FOR GROUND GAS PROTECTION

Based on the E3P ground gas monitoring results, the site has been designated as Characteristic Situation 2 (CS2). In accordance with BS8485 (2015) + A1 (2019), the proposed houses are **Type A** buildings and therefore, the ground gas protection measures must achieve a minimum of **3. 5 points**.

It should also be noted that concentrations of volatile determinands including elemental mercury and naphthalene were recorded at concentrations above human health GACs across the site and therefore pose a vapour risk. Consequently, the ground gas protection measures will need to include a **vapour resistant membrane**.

3.1 Design of Ground Gas Protection Measures

Due to the presence of more than 600mm of Made Ground, suspended floor slabs will be required in the proposed development; it is unknown whether this will be precast segmental (beam and block) or cast in-situ suspended floor slab. Therefore, two options for the proposed construction elements to achieve the required 3.5 points score are given below:

		BS:8485 (2015) + A1 (2019) Scores	Floor Slab Design Options			
			Pre-cast Beam and Block Suspended Slab		Cast In-situ Suspended Slab	
			Design Choice	Score	Design Choice	Score
Floor Slab	Precast suspended segmental subfloor	0	✓	0		
	Cast in-situ ground bearing floor slab (with only nominal mesh reinforcement)	0.5				
	Cast in-situ monolithic reinforced ground bearing raft or reinforced cast in-situ suspended floor slab with minimal penetrations	1 or 1.5*			✓	1.5
Ventilation	Pressure relief pathway	0.5			✓	0.5
	Passive sub-floor dispersal layer	1.5 or 2.5**	✓	2.5		
	Active dispersal layer	1.5 to 2.5				

	Active positive pressurisation	1.5 to 2.5				
Membra	Ground gas and VOC resistant membrane***	2	✓	2	✓	2
Total Points Achieved			4.5		4.0	

* To achieve a score of 1.5 the raft or suspended floor slab should be well reinforced to control cracking and have minimal penetrations cast in.

** 2.5 points = very good performance. 1.5 points = good performance.

*** To achieve the 2 points the gas membrane must meet all criteria set out in BS:8485 (2015) + A1 (2019) Table 7.

3.2 Floor Slab Details

Beam and block suspended floor slabs (such as Litecast or Jetfloor) are to be utilised for this proposed residential development, as such construction is deemed adequate for the CS2 designation of the development. The below cross-section details the elements of construction required for the proposed floor slabs.

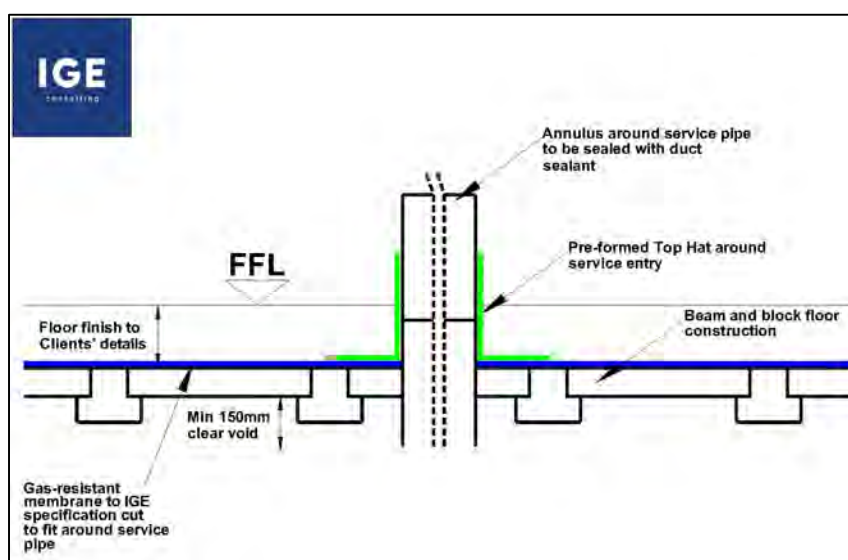


Figure 3: Service entry detail including pre-formed top hat (green) and location of ground gas-resistant membrane (blue). This drawing is not to scale. Use detailed dimensions only.

3.3 Ground Gas Membrane Installation Guidance

Some example membranes which meet the above required specification include:

- Visqueen 'Gas Barrier' (blue), NOT Visqueen 'Low Permeability Membrane' (yellow);
- Monarflex 'Reflex Super';
- Radbar 'Amber 2 Foil Barrier';
- Juta 'GP1'; and
- Alderburgh 'Alderprufe GRA'.

Installation accessories will also be necessary, including:

- Jointing tape (double sided, gas resistant tape), or hand welding equipment;
- Pre-formed top hats;
- Jubilee clips;
- Although not essential, gas resistant 'detail tape' is an easy way to install complex joints such as corners and non-standard service entries.

All membrane installation must be undertaken to manufacturer's specification. An example of correct installation is shown in Appendix 3 – *it must be noted that this is a Visqueen information sheet, however, whilst this is considered a good example, IGE do not endorse any specific brand and the methods can be applied to any membrane brand.*

All service entry points should be fitted with pre-formed gas resistant 'top hats'. Top hats should be sealed to the pipe and gas membrane utilising double sided jointing tape and fixed with a jubilee clip. An example of the method of installation of these top hats is shown above.

Adequate ventilation through internal obstructions is to be installed in line with the above recommendations. Joints between sheets of gas membrane should be lapped (minimum overlap of 150mm) and taped between sheets with appropriate double-sided tape in accordance with the manufacturer's recommendations.

A set of example photographs of good practice installation are contained in Appendix 3.

3.4 Verification Plan

The verification of the gas resistant membrane should be carried out in line with Manchester City Council Planning and Contaminated Land Technical Guidance (Dated February 2021).

It is unknown which construction company are appointed to install the gas protection measures. The installers should be appropriately trained and experienced in the installation of ground gas resistant membranes.

In line with CIRIA C735 (2014), an independent verifier should be appointed to verify the installation of the gas protection measures. A visual inspection method, including pick testing, should be undertaken and this is recommended to be carried out at every plot. This must be undertaken following the laying of the beam and block pre-cast floor units and laying of the gas membrane, but prior to laying insulation and finishes. The independent verifier should:

- Identify that the correct membrane has been used, including sealing / jointing tape and pre-formed components e.g. tophats, corners.
- Inspect the general condition of the membrane for rips, tears and punctures.
- Check that all jointing has been carried out to the manufacturer's specification.
- Check that the membrane has been installed correctly across cavities, including correct jointing in these areas.
- Check that top hats have been correctly installed around service entries, including jubilee clips around the pipe and correct lapping and jointing to the membrane at the base.
- Check that vents have been installed around the perimeter of the building in sufficient number and in the correct locations, including inspecting the condition i.e., not blocked or otherwise restricted.
- Check the presence of a clear void or gravel layer, depending which of the above two options are chosen, including measuring that this is of a sufficient depth and the void / gravel layer has not been filled or otherwise compromised. Check that internal sleeper walls are also vented to provide adequate flow-through within the void so that none of the walls are blocking off unvented sections within the void.
- Take photographs to provide evidence of the above.

The verifier should make an appropriate record of the above information for inclusion within a validation report.

3.5 Verification Report

The verification of the gas protection measures should be carried out in line with Manchester City Council Planning and Contaminated Land Technical Guidance (Dated February 2021).

The verification report shall include, as a minimum, the following:

- Objectives of the verification.
- A brief overview of the site conditions and summary of the ground gas regime.
- A description of the installation, including gas-resistant membrane manufacturer and type used (including sealing / jointing tape and pre-formed components e.g. top hats, corners). The manufacturer specification / datasheet shall be included.
- Installer and verifier and credentials of such organisations, i.e. level of competency of installer – NVQ Level 2 or general groundworker.
- Detailed description of any deviations from the specification provided in this report, with explanation and justification of such deviations.
- As-built construction drawings and product specifications of components used.
- A description of the verification approach – in this case visual inspection, including pick testing, at a rate of one per plot.
- Verification evidence – in this case photographic evidence of each verified plot at the frequency outlined above.
- Any record of relevant communications with regulatory bodies.
- Verification conclusions, including any future monitoring or management requirements (anticipated none in this case due to passive approach), and limitations of the measures installed.

When the above has been completed and prior to occupation, this information should be compiled in a validation / completion report which should be submitted to and approved in writing by the local planning authority and insurer.

Radon

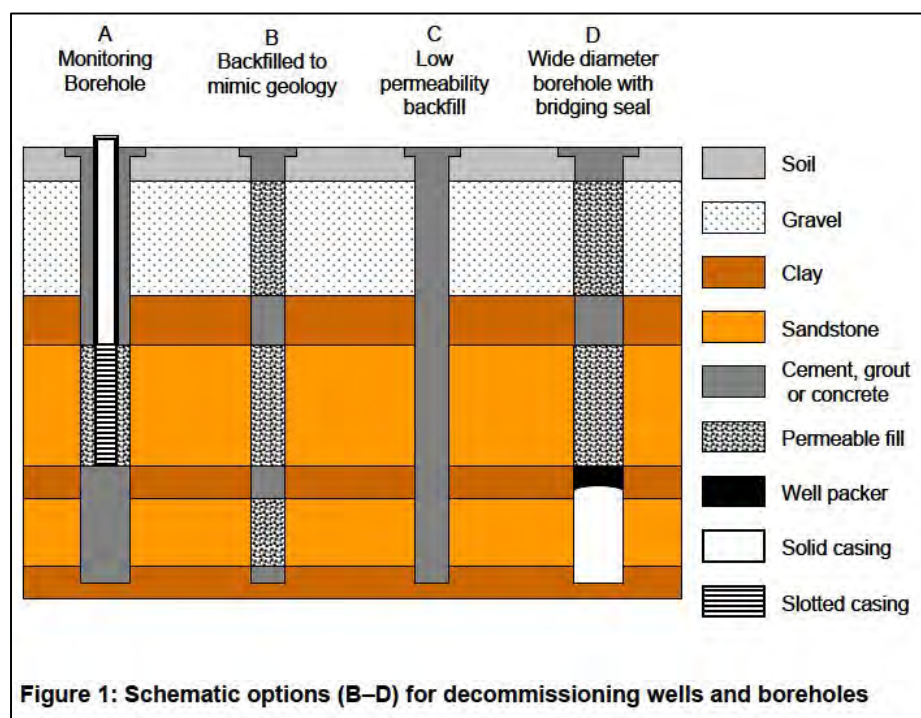
A site specific radon report was obtained for the site by E3P which concluded that the site lies within an area where less than 1% of homes are above the Action Level, consequently, no radon protection measures are required.

4.0 OTHER REMEDIAL REQUIREMENTS

4.1 Decommissioning of Boreholes

Ground gas monitoring wells are currently installed on site which need to be decommissioned prior to development.

Utilising guidance provided in the Environment Agency's '*Good practice for decommissioning redundant boreholes and wells*' (October 2012), it is prudent to secure redundant boreholes 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 Import of Materials

Recommendations for the verification of topsoil and subsoil are given above in Section 2.2. Any other soils to be imported as General Fill* should be tested at a rate of 1 per 1000m³ for Asbestos ID, pH, total and free cyanide, soluble sulphate, organic matter, Arsenic, Beryllium, Boron, Cadmium, Chromium (III and VI) Copper, Lead, Inorganic Mercury, Nickel, Selenium, Vanadium, Zinc and TPH screen (EC6 – EC40).

*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.

Once tested, the results are to be compared against the Acceptability Criteria detailed in Section 2.2. The validation requirements include:

- Details of the source and waste transfer notes to provide evidence of source.
- Chemical test results to demonstrate that the concentrations are below the Acceptability Criteria.

4.3.2 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.

4.3.3 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.

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 of 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, 2019) 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 118 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 170 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'.*

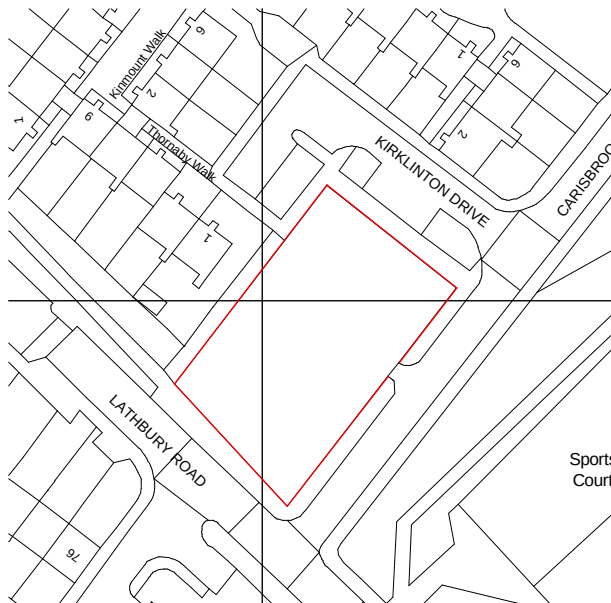
Paragraph 178 of the NPPF states that planning policies and decisions for developments should also ensure that:

- *'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.

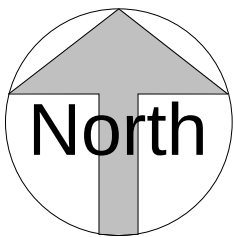
APPENDIX 2

FIGURES AND DRAWINGS

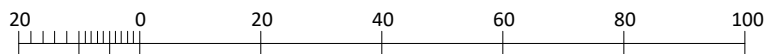


Location Plan

1 : 1250



— Site Edged Red



Rev	Date	Int	Description
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RIBA 
Chartered Practice

Client:
Jigsaw
Project:
Lathbury Road, Manchester

Job No:
3788

Scale @ A4:
1 : 1250

Description:
Location Plan

Drawn By: RA Checked By: VS Date: 24.02.23 Status Code: S2 Drawing No: **100** Rev:

Purpose of Issue:
Planning

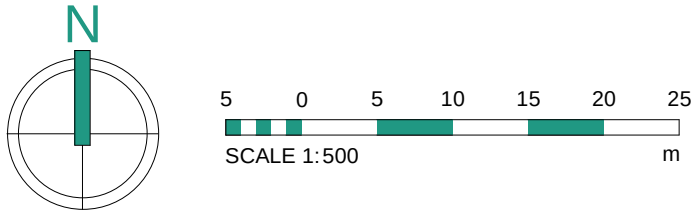
File Identifier:
LR-BTP-00-LP-DR-A-3788_100

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Do not scale from this drawing. Do not take measurements from the CAD base. Any discrepancies are to be reported to the architect for clarification.

All dimensions are to be checked on site prior to construction, manufacture of any components and ordering of materials and equipment.

All materials and workmanship to be in accordance with the current British Standards and codes of practice.



Rev	Date	Int	Description
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CLIENT:

Jigsaw

PROJECT:

Lathbury Road, Manchester

DESCRIPTION:

Existing Site Plan

PURPOSE OF ISSUE:

Planning

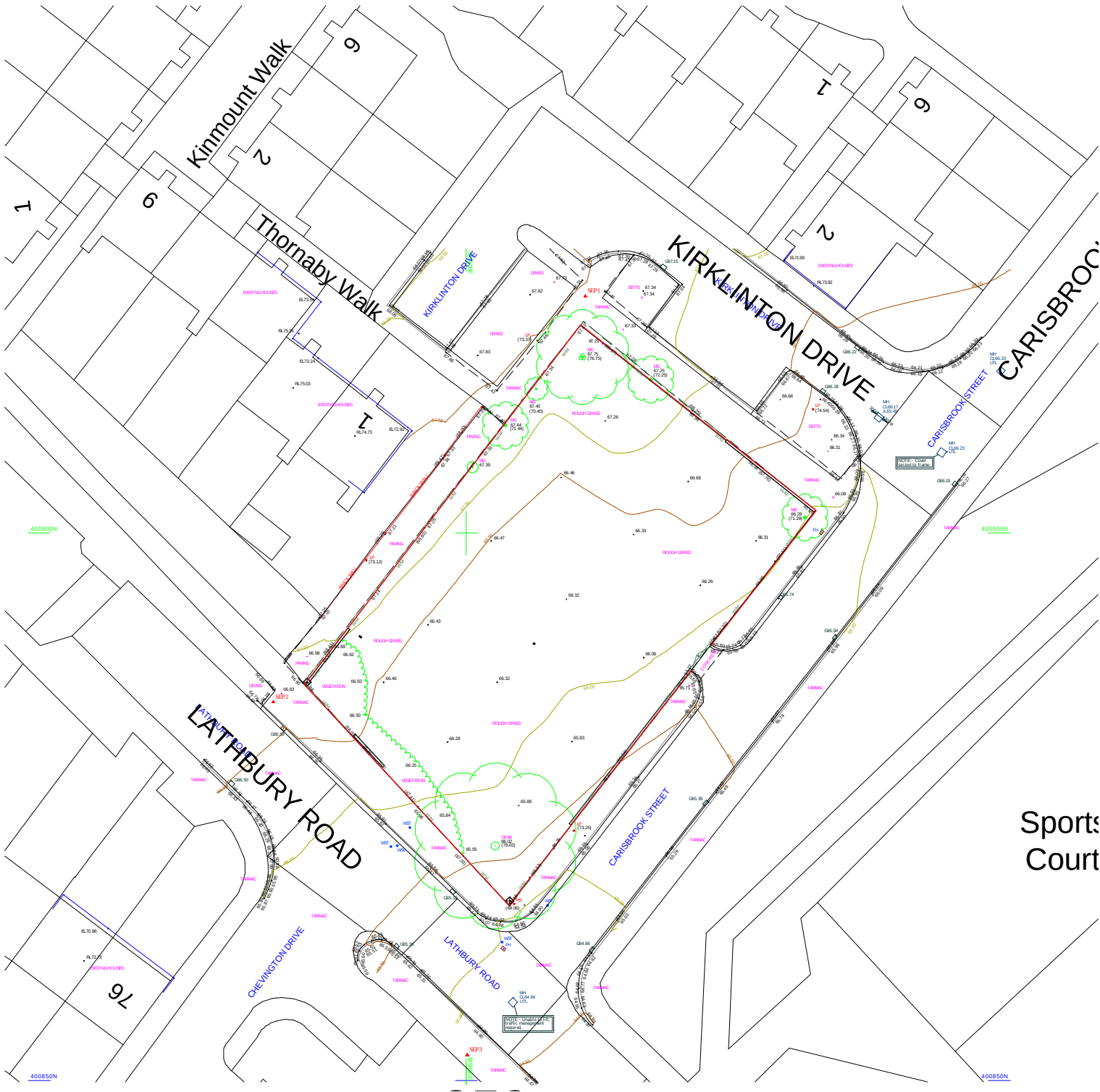
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3788	S2	101	

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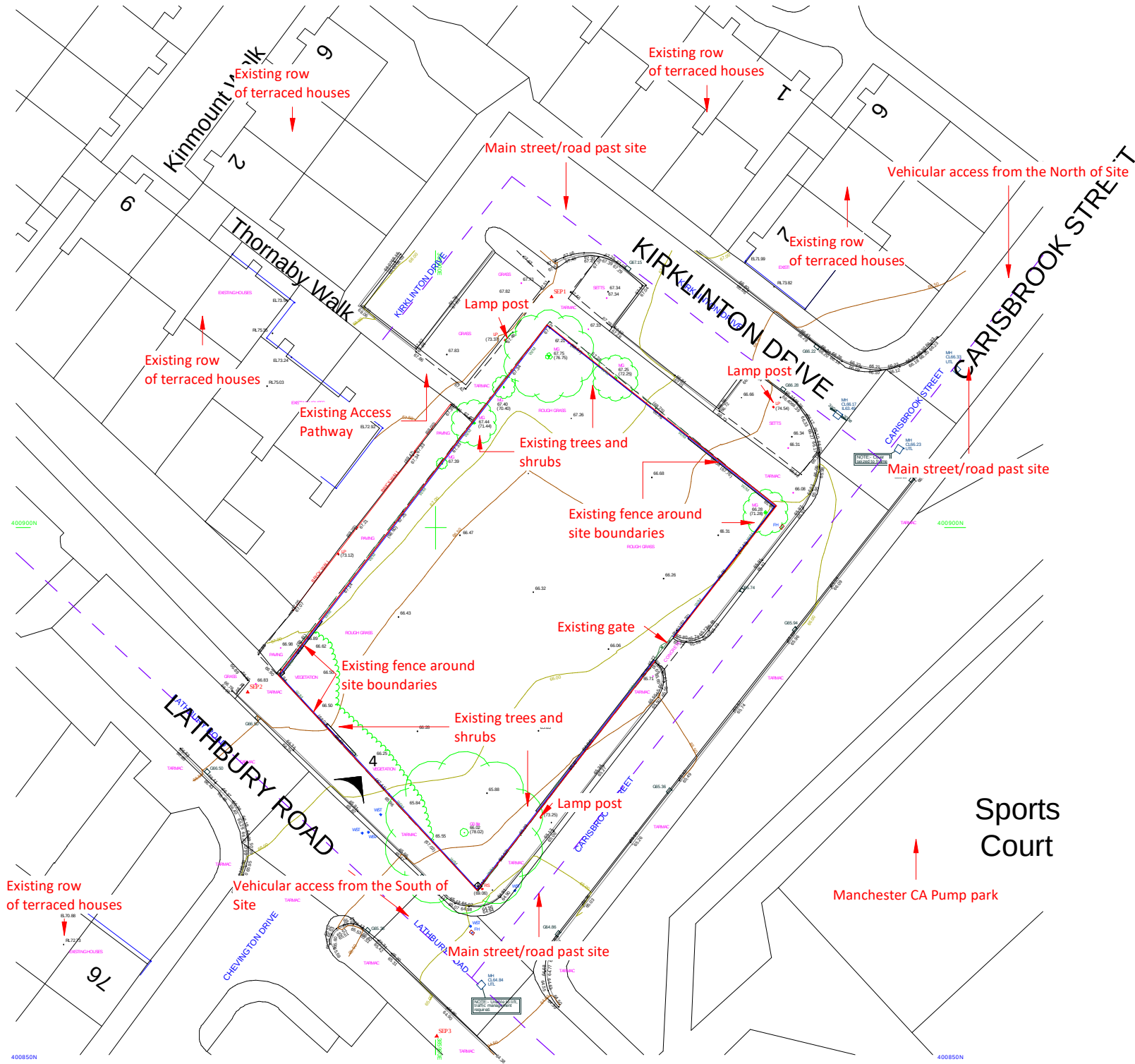
LR-BTP-00-SP-DR-A-3788_101

Elizabeth House 486 Didsbury Road Heaton Mersey Stockport SK4 3BS
0161 443 1221 info@bernardtaylor.co.uk www.btparchitects.co.uk



Existing Site Plan

1 : 500



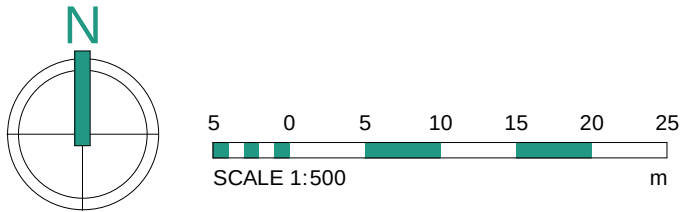
Constraints Plan
1 : 500

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All dimensions are to be checked on site prior to construction, manufacture of any components and ordering of materials and equipment.

All materials and workmanship to be in accordance with the current British Standards and codes of practice.



Rev	Date	Int	Description
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btp
ARCHITECTS

RIBA
Chartered Practice

CLIENT:

Jigsaw

PROJECT:

Lathbury Road, Manchester

DESCRIPTION:

Constraints Plan

PURPOSE OF ISSUE:

Planning

DRAWN BY:	CHECKED	DATE:	SCALE @ A3:
RA	VS	24.02.23	1 : 500

JOB NO:	STATUS CODE:	DRAWING NO:	REV
3788	S2	104	

FILE IDENTIFIER:

LR-BTP-00-SP-DR-A-3788_104

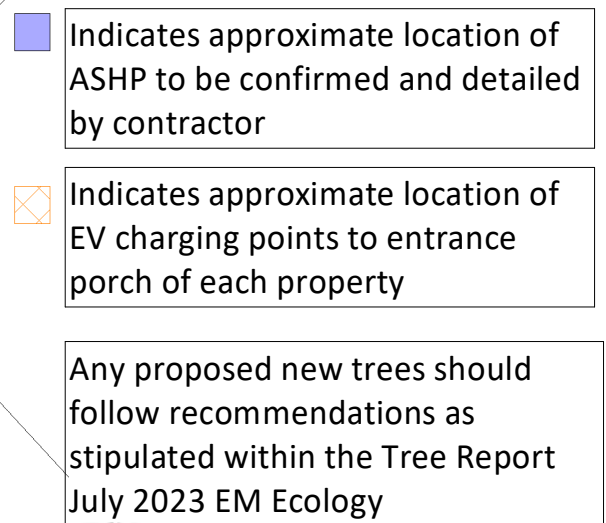
Elizabeth House 486 Didsbury Road Heaton Mersey Stockport SK4 3BS
0161 443 1221 info@bernardtaylor.co.uk www.btparchitects.co.uk

Fence Schedule			
Type	Length	Fence Height	Count
900mm	5.0	900.0	1
Fence - TSW 1800mm Trellis	30.4	1800.0	3
Fence - TSW 2100mm	41.3	2100.0	3
Total: 7	76.8		

Note:

- > Make allowance for Brick piers to front boundary wall at max. 2000mm centers
- > Timber walls refer to timber sheds and bin stores in rear gardens
- > Make allowance for metal gates to entrance footpaths and carparks if required
- > Make allowance for proprietary bin stores

1 : 200



Layout subject to confirmation of red line boundary, all statutory approvals including highways, planning and building regulations, relevant surveys and reports such as topographical, ecology, trees, ground investigation and flood risk.

Layout subject to confirmation of red line boundary, all statutory approvals including highways, planning and building regulations, relevant surveys and reports such as topographical, ecology, trees, ground investigation and flood risk.

btp
ARCHITECTS

RIBA 
Chartered Practice 

DESCRIPTION:

Schedules and Site Plan

Elizabeth House 486 Didsbury Road Heaton Mersey Stockport SK4 3BS
0161 443 1221 info@bernardtaylor.co.uk www.btparchitects.co.uk



Schedule of Accommodation

Affordable Rent			
3B5P Houses	3no.	96m ²	
2B4P Houses	3no.	83m ²	
TOTAL	6no		

Layout subject to confirmation of red line boundary, all statutory approvals including highways, planning and building regulations, relevant surveys and reports such as topographical, ecology, trees, ground investigation and flood risk.

20	15.12.23	JW	Affordable rent note added to schedule of accommodation
19	13.12.23	JW	Bin store to plot 1 updated
18	13.12.23	JW	Plot 1 bin store moved to front of property and boundary treatment updated
17	08.12.23	JW	Drawing package updated to show increased wall depth with 195mm reveal
16	04.12.23	JW	Boundary shown between plot 2 and 3 following planning officers comments
15	24.11.23	JW	ASHP shown indicatively, window reveal updated to show 195mm reveal and boundary updated following planning officers comments
14	15.11.23	JW	ASHP removed from site plan to be made an above ground condition as requested by contractor
13	14.11.23	JW	Boundary updated, ASHP labelled on plan and plot 4 carparking moved following planning officers feedback
12	30.10.23	JW	Drawings revised following planning officer feedback on 27.10.23
11	28.09.23	JW	Drawing revised to show existing tree (T2) retained and parking sizes updated following planning officers comments
10	04.09.23	HG	Drawings revised following feedback from planner
9	27.07.23	HG	Boundary treatment updated following client meeting
8	24.07.23	JW	House types and site plan updated following value engineering, and Ecology, Biodiversity and Tree Surveys.
7	18.04.23	HG	Layout updated in line with client comments following meeting
6	27.02.23	RA	Site layout amended
5	04.06.21	AP	GIA amended to correspond with the Manchester's emerging space standards
4	22.04.21	JP	Drawing revised to show amended SoA
3	17.02.21	ED	Drawing revised following feedback from LPA
2	10.12.20	JP	Drawing revised following meeting with LPA
1	07.12.20	ED	Drawing revised following initial feedback from LPA
Rev	Date	Int	Description



CLIENT:

Jigsaw Homes

PROJECT:

Lathbury Road, Manchester

DESCRIPTION:

Schedules and Site Plan

PURPOSE OF ISSUE:

Planning

DRAWN BY:	CHECKED	DATE:	SCALE @ A1:
ED	VS	29.10.20	1 : 200

JOB NO:	STATUS CODE:	DRAWING NO:	REV
3788	S2	105	20

FILE IDENTIFIER:

LR-BTP-00-SP-DR-A-3788_105.20

Area Schedule			
Type	Description	Area	
BTP - Adopted Footpath	Light Grey	8 m ²	
BTP - Car park	Brown	103 m ²	
BTP - Front Garden	Dark Green	171 m ²	
BTP - Plot Hardstanding	Light Grey	295 m ²	
BTP - Private Garden	Light Green	262 m ²	
Total: 13		838 m²	

Fence Schedule			
Type	Length	Fence Height	Count
900mm	5.0	900.0	1
Fence - TSW 1800mm Trellis	30.4	1800.0	3
Fence - TSW 2100mm	41.3	2100.0	3
Total: 7	76.8		

Boundary Wall Schedule			
Type	Length in m	Unconnected Height	Width
Rear Boundary Wall	19.8	2100.0	215.0
Rear Boundary Wall	0.2	2100.0	215.0
Timber wall	1.4	2100.0	100.0
Timber wall	2.5	1950.0	100.0
Timber wall	2.5	2100.0	100.0
Timber wall	1.4	2100.0	100.0
Timber wall	1.4	2100.0	100.0
Timber wall	2.5	1950.0	100.0
Timber wall	2.5	2100.0	100.0
Timber wall	1.4	2100.0	100.0
Timber wall	1.4	2100.0	100.0
Timber wall	2.5	1950.0	100.0
Timber wall	2.5	2100.0	100.0
Timber wall	1.4	2100.0	100.0
Timber wall	1.4	2100.0	100.0
Timber wall	2.5	1950.0	100.0
Timber wall	2.5	2100.0	100.0
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APPENDIX 3

EXAMPLE OF CORRECT GAS RESISTANT MEMBRANE INSTALLATION

Product Installation

How to lap and joint a membrane above a floor slab



Remove loose debris from the surface of the floor slab and unroll the first sheet of membrane. The surface of the slab should be smooth and free from projections or indentations – if very rough, apply a sand blinding.



Remove the protective paper from one side of the appropriate jointing tape and apply it to the first sheet, starting about 50mm from the edge. Ensure that all surfaces are dry for maximum adhesion.



Unroll the second sheet along the joint, overlapping the first by at least 150mm. Press firmly onto the double sided tape, gradually removing the protective paper.



Seal the edge of the overlap with appropriate sealing tape.

How to joint the cavity tray to the membrane at the floor perimeter



Install the DPC starting from the outside of the external wall, over the inner masonry leaf and finishing at least 200mm from the wall.



Just before the floor topping is applied (or floor slab is cast), clean any mortar droppings, or other debris from the DPC. Remove the protective paper from the appropriate jointing tape and apply the tape to the DPC, starting about 50mm from the edge.



Lay the membrane over the floor slab (or subfloor blinding), overlapping the DPC by at least 150mm. Press firmly onto the appropriate jointing tape, gradually removing the protective paper.

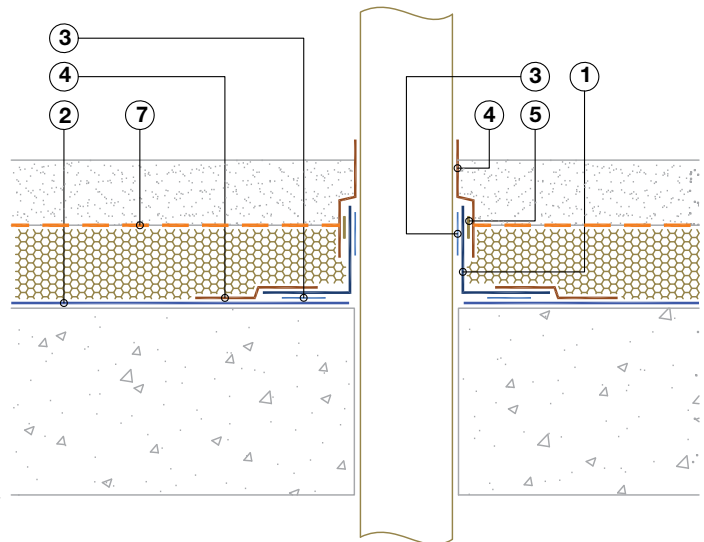


Seal the edge of the overlap with appropriate sealing tape.

Service Pipe Penetrations

Damp proof and airtight seals should be formed around all service entry points. Visqueen Top Hat Units are available for sealing around pipe units. The full system consists of:

- Rigid preformed pipe sleeve (top hat) unit – available for either 110mm, 135mm or 160mm
- External diameter pipes.
- Flexible preformed pipe sleeve (Top Hat) unit – supplied to suit pipe.
- External diameter as required.
- Double sided jointing tape.
- Girth lap tape.
- Foil lap tape – for gas applications.

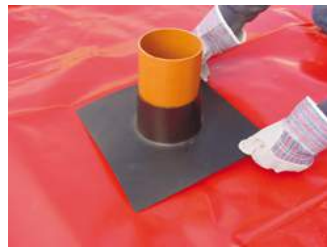


Key			
1	Preformed Pipe Sleeve	5	Jubilee Clip
2	Visqueen Gas Barrier	6	Visqueen TreadGUARD 1500
3	Visqueen Double Sided Tape	7	Visqueen Vapour Barrier
4	Visqueen GR Lap Tape	8	Smooth Sand Blinding Layer

How to install a top hat



Cut a circular hole in the membrane as close as possible to the pipe, or pipe socket. Ensure that pipe penetrations do not occur at joints in the membrane.



With the pipe in position, slide the Visqueen Preformed Top Hat Unit over the pipe (various diameters are available – 110mm being the most common).



Mark the extent of the square horizontal skirt over the membrane and also mark the line of the top of the top hat unit around the pipe.



Raise the top hat unit and cut four lengths of Visqueen Double Sided Jointing Tape, one for each side of the horizontal skirt. Allowing for an overlap at each corner. Cut one length to go round the pipe.



Start to remove the protective paper from the double sided tape around the pipe and raise it up at an angle so that it will project above the top hat unit when it is stuck to the membrane.



Release the protective paper from each of the four lengths of double sided tape. Lower the top hat unit, ensuring that the free end of the protective paper around the pipe is reachable, and seal the horizontal skirt to the membrane.



Gradually remove the remainder of the protective paper from the double sided tape around the pipe.



Seal the junction of the horizontal skirt and the membrane with the appropriate sealing tape and secure the top hat unit to the pipe with a jubilee clip.

APPENDIX 4

DISCOVERY STRATEGY



DISCOVERY STRATEGY

Office 11
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

CL:AIRE JIWG DECISION SUPPORT TOOL



Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Project Reference	4259
Site Name	Lathbury Road, Manchester
Client	John Southworth Builders Ltd.
Run by	AJ
Date	29-Oct-24
Scenario details	Re-use of Made Ground beneath hardstanding

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

Free dispersed fibres/fibre bundles

Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)

Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)

No visible ACMs/fibre bundles

Very Low quantities - <0.001 to 0.01 %wt/wt

2

4

4

0

1

Sub-total

11

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

Hazard ranking

Medium

No warranty, expressed or implied, or reliance, is provided in rela. on 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.

Stage 2

Exposure Factors

Score

Anticipated airborne fibre concentration - Control Limit or SALI?

<0.001 fibres/ml

0

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)

Made Ground - Recycled Aggregate, Track Ballast

4

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

High

4

Sub-total

16

Exposure ranking

High

Combined hazard and exposure ranking

27

Medium

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