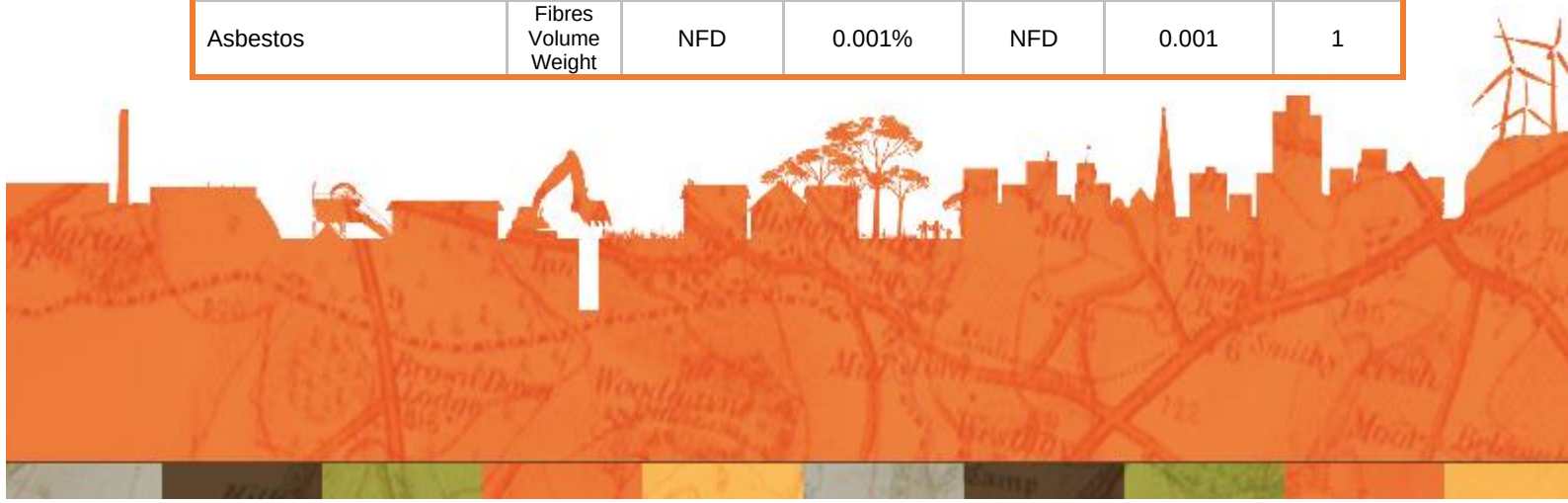


APPENDIX IV E3P REMEDIATION & VALIDATION CRITERIA



Human Health Remediation Targets – Low Rise Residential End Use

Determinand	Units	Within 600mm Cover System (Garden)	Hard Standing and >600mm of cover system	Public Open Space 300mm Cover	Public Open Space >300mm	Pathway
Arsenic	mg/kg	37 ⁽ⁱ⁾	40 ⁽ⁱⁱ⁾	79 ⁽ⁱⁱⁱ⁾	640 ^(iv)	1
Cadmium	mg/kg	11 ⁽ⁱ⁾	85 ⁽ⁱⁱ⁾	120 ⁽ⁱⁱⁱ⁾	532 ^(iv)	1
Chromium (Hexavalent)	mg/kg	6 ⁽ⁱ⁾	6 ⁽ⁱⁱ⁾	7.7 ⁽ⁱⁱⁱ⁾	220 ^(iv)	1
Lead	mg/kg	210 ^(vi)	330 ^(vii)	760 ^(viii)	760 ^(viii)	1
Elemental Mercury	mg/kg	1.2 ⁽ⁱ⁾	1.2 ⁽ⁱⁱ⁾	16 ⁽ⁱⁱⁱ⁾	30 ^(iv)	2
Nickel	mg/kg	180 ⁽ⁱ⁾	180 ⁽ⁱⁱ⁾	230 ⁽ⁱⁱⁱ⁾	3400 ^(iv)	1
Selenium	mg/kg	250 ⁽ⁱ⁾	430 ⁽ⁱⁱ⁾	1100 ⁽ⁱⁱⁱ⁾	1800 ^(iv)	1
Copper	mg/kg	2400 ⁽ⁱ⁾	7100 ⁽ⁱⁱ⁾	12000 ⁽ⁱⁱⁱ⁾	44000 ^(iv)	1
Zinc	mg/kg	3700 ⁽ⁱ⁾	40000 ⁽ⁱⁱ⁾	81000 ⁽ⁱⁱⁱ⁾	170000 ^(iv)	1
Phenol	mg/kg	280 ^{(i)(xi)}	280 ^{(xiv)(xi)}	760 ^{(iii)(xi)}	760 ^{(iv)(xi)}	2
Naphthalene	mg/kg	2.3 ^{(i)(xi)}	2.3 ^{(xiv)(xi)}	1200 ^{(iv)(xi)}	1200 ^{(iv)(xi)}	2
Acenaphthylene	mg/kg	170 ^{(i)(xi)}	500 ^(v)	15000 ^{(iii)(xi)}	29000 ^{(iv)(xi)}	3
Acenaphthene	mg/kg	210 ^{(i)(xi)}	500 ^(v)	15000 ^{(iii)(xi)}	29000 ^{(iv)(xi)}	1
Fluorene	mg/kg	170 ^{(i)(xi)}	500 ^(v)	9900 ^{(iii)(xi)}	20000 ^{(iv)(xi)}	1
Phenanthrene	mg/kg	95 ^{(i)(xi)}	500 ^(v)	3100 ^{(iii)(xi)}	6200 ^{(iv)(xi)}	3
Anthracene	mg/kg	500 ^{(i)(xi)}	500 ^(v)	74000 ^{(iii)(xi)}	150000 ^{(iv)(xi)}	3
Fluoranthene	mg/kg	280 ^{(i)(xi)}	500 ^(v)	3100 ^{(iii)(xi)}	6300 ^{(iv)(xi)}	3
Pyrene	mg/kg	500 ^{(i)(xi)}	500 ^(v)	7400 ^{(iii)(xi)}	15000 ^{(iv)(xi)}	3
Benzo(a)Anthracene ^(c)	mg/kg	7.2 ^{(i)(xi)}	11 ^{(ii)(xi)}	29 ^{(iii)(xi)}	49 ^{(iv)(xi)}	3
Chrysene	mg/kg	15 ^{(i)(xi)}	30 ^{(ii)(xi)}	57 ^{(iii)(xi)}	93 ^{(iv)(xi)}	3
Benzo(b)Fluoranthene ⁽ⁱⁱⁱ⁾	mg/kg	2.6 ^{(i)(xi)}	3.9 ^{(ii)(xi)}	7.1 ^{(iii)(xi)}	13 ^{(iv)(xi)}	3
Benzo(k)Fluoranthene ⁽ⁱⁱⁱ⁾	mg/kg	77 ^{(i)(xi)}	110 ^{(ii)(xi)}	190 ^{(iii)(xi)}	370 ^{(iv)(xi)}	3
Benzo(a)Pyrene ^(vii)	mg/kg	2.2 ^{(i)(xi)}	3.2 ^{(ii)(xi)}	5.7 ^{(iii)(xi)}	11 ^{(iv)(xi)}	3
Indeno(123-cd)Pyrene	mg/kg	27 ^{(i)(xi)}	45 ^{(ii)(xi)}	82 ^{(iii)(xi)}	150 ^{(iv)(xi)}	3
Dibenzo(a,h)Anthracene	mg/kg	0.24 ^{(i)(xi)}	0.31 ^{(ii)(xi)}	0.57 ^{(iii)(xi)}	1.1 ^{(iv)(xi)}	3
Benzo(ghi)Perylene	mg/kg	320 ^{(i)(xi)}	360 ^{(ii)(xi)}	640 ^{(iii)(xi)}	1400 ^{(iv)(xi)}	3
TPH C ₅ -C ₆ (aliphatic)	mg/kg	42 ^{(i)(xi)}	42 ^{(ii)(xi)}	42 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₆ -C ₈ (aliphatic)	mg/kg	100 ^{(i)(xi)}	100 ^{(ii)(xi)}	100 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aliphatic)	mg/kg	27 ^{(i)(xi)}	27 ^{(ii)(xi)}	27 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aliphatic)	mg/kg	130 ^{(i)(xi)}	130 ^{(ii)(xi)}	130 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₁₂ -C ₁₆ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10000 ^{(xiv)(xi)}	1
TPH C ₁₆ -C ₂₁ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10000 ^{(xiv)(xi)}	1
TPH C ₂₁ -C ₃₅ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10000 ^{(xiv)(xi)}	1
TPH C ₅ -C ₇ (aromatic)	mg/kg	70 ^{(i)(xi)}	370 ^{(ii)(xi)}	370 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₇ -C ₈ (aromatic)	mg/kg	130 ^{(i)(xi)}	860 ^{(ii)(xi)}	860 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aromatic)	mg/kg	34 ^{(i)(xi)}	47 ^{(ii)(xi)}	47 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aromatic)	mg/kg	74 ^{(i)(xi)}	250 ^{(ii)(xi)}	250 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	2
TPH C ₁₂ -C ₁₆ (aromatic)	mg/kg	140 ^{(i)(xi)}	1800 ^{(ii)(xi)}	1800 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	1
TPH C ₁₆ -C ₂₁ (aromatic)	mg/kg	260 ^{(i)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	1
TPH C ₂₁ -C ₃₅ (aromatic)	mg/kg	1000 ^{(xiv)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10000 ^{(xiv)(xi)}	1
Asbestos	Fibres Volume Weight	NFD	0.001%	NFD	0.001	1



Notes 1

Asbestos will be screened visually on-site by a qualified environmental consultant and where potential ACM is identified representative samples will be subject to quantitative analysis of 5% volume by weight. Should any ACM be identified within the soil matrices, further detailed % assessment would be required when the reported laboratory result exceeds the limit of detection for the analytical method at 0.01% by volume (weight).

Notes 2

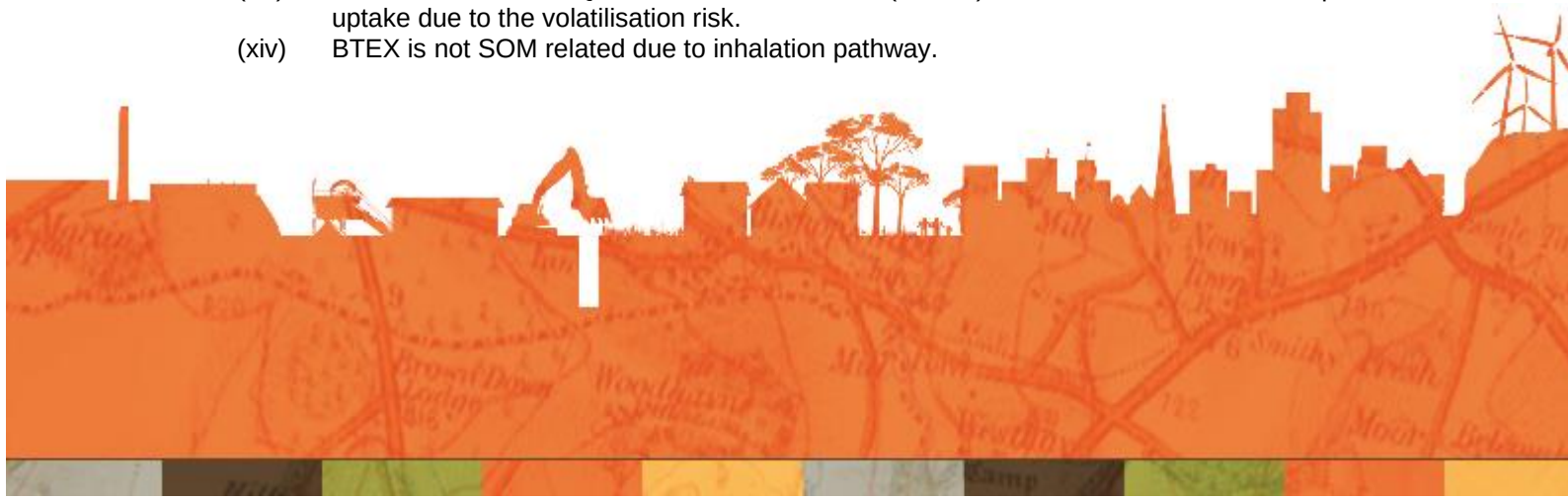
Excludes matrices where free product is observed;
Commercial Tier 1 GAC modelled to assume no exposure pathway; and,
No viable exposure pathway beneath hard standing and cover system.

Notes 3

Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation.

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; NA – Not Applicable (no exceedance of assessment criteria); Loc of MC = Location of Exceedances

- (i) Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use **with** plant uptake.
- (ii) Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use **without** plant uptake – these levels used below 600mm cover system within residential gardens as soils will be present within a residential setting yet soils will not be disturbed and garden plants will not reach these soils.
- (iii) Value derived from LQM Sutable 4 Use Levels (S4ULs) for Public open Space (POS) residential.
- (iv) Value derived from LQM Sutable 4 Use Levels (S4ULs) for Public Open Space (POS) park – these levels used below 300mm POS cover system as soils will not be disturbed by any future site users and exposure to these soils will be similar to a park end use.
- (v) Value derived from LQM Sutable 4 Use Levels (S4ULs) alongside assessment with WM3 to ensure that materials remaining on site do not exceed the WM3 toxicity criteria for hazardous waste.
- (vi) Value derived from Category 4 Screening Levels (C4SL) for residential land use **with** homegrown produce.
- (vii) Value derived from Category 4 Screening Levels (C4SL) for residential land use **without** homegrown produce.
- (viii) Value derived from Category 4 Screening Levels (C4SL) for Public open Space (POS) residential.
- (ix) Value derived from Category 4 Screening Levels (C4SL) for Public Open Space (POS) park.
- (x) Mercury – Based on elemental Mercury.
- (xi) PAH and TPH levels used are for 1% SOM.
- (xii) Xylenes based on p-xylene (o-xylene 2600mg/kg, m-xylene 3500mg/kg) and is capped by its solubility.
- (xiii) Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use **with** plant uptake due to the volatilisation risk.
- (xiv) BTEX is not SOM related due to inhalation pathway.



Remediation Targets – Comparison of Leachate Analysis with Tier 1 Screening Levels

DETERMINAND	UNITS	SCREENING VALUE
Arsenic	µg/l	50 ¹
Cadmium	µg/l	5 ²
Chromium	µg/l	2 ¹
Copper	µg/l	5 ^{1,3}
Total Cyanide	µg/l	1 ¹
Lead	µg/l	4 ¹
Mercury	µg/l	1 ²
Nickel	µg/l	50 ¹
Selenium	µg/l	100 ⁴
Zinc	µg/l	10 ⁵
pH	-	6-9
Naphthalene	µg/l	10 ¹
Benzo(a)pyrene	µg/l	0.05 ⁷
benzo[b,k]fluoranthene benzo[g,h,i]perylene & indeno(1,2,3-cd)pyrene	µg/l	0.10 ⁶
TPH C5-C6 (benzene)	µg/l	30 ¹
TPH C6-C8 (toluene)	µg/l	50 ¹
TPH C8-C10 (ethyl Benzene)	µg/l	20 ¹
TPH C10-C12 (xylene)	µg/l	30 ¹
TPH C12-C16 (naphthalene)	µg/l	10 ^{#1}
TPH C16-C35	µg/l	50 [#]

Notes

Solubility <0.01µg/l

1. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
2. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List I substances
3. Surface Waters (River Ecosystem) (Classification) Regulations 1994
4. WHO Guidelines for Drinking Water Quality. Third edition (2004)
5. Council Directive on the quality of fresh waters needing protection or improvement in order to support fish life (Freshwater Fish Directive)
6. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
7. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)



APPENDIX V E3P REMEDIATION MATERIAL IMPORT CONTROL



Material Import Quality Control Procedure

SITE OF IMPORTATION ADDRESS		 E3P HELIPORT BUSINESS PARK LIVERPOOL ROAD ECCLES MANCHESTER M30 7RU 0161 707 9612
Client		
Main Contractor		
Earthworks Contractor		
Haulier		
Date of Planned Import		
Overview of Planned Material Import		
Material Source (site of origin) & Postcode		
Site Investigation report	<i>Report Title & Reference:</i> <i>Date:</i> <i>Information supplied by:</i>	
Reason for generation of excess material at site of origin		
Chemical Test Results for Stockpile at site of origin	<i>Date:</i> <i>Laboratory Certificate ref:</i> <i>Organisation responsible for stockpile sampling:</i>	
Geotechnical Material Classification & Testing	<i>Delete as appropriate:</i> Class 1 / Class 2 / Class 6 / Topsoil	
Pictures of Material Stockpile Pending Transportation	<i>Delete as appropriate:</i> Yes / No	
Person or organisation responsible for ensuring Quality Control at site of origin.		
Quantity of material to be imported (m3).		
Proposed area of deposition (site of re-use)		
Waste Exemption / Permit or CL:AIRE MMP	<i>Delete as appropriate:</i> U1 Standard Rules / CL:AIRE MMP (Direct Transfer) / Bespoke	

**APPENDIX VI
CONTRACTORS
PRE-START
DOCUMENT**





Old University Building
Liverpool Rd
Salford
M30 7RU

Manchester / London / Edinburgh
0161 707 9612

info@E3P.co.uk

Geotechnical Enabling Works Pre-Start Form

Prior to the commencement of any site remediation or enabling works, this form will be completed by E3P in the presence of the appointed contractor to ensure that all pertinent remediation and enabling works activities are fully discussed and understood. The Contractor

Activity	Testing Responsibility	Contractors Method Statement Required (Y/N)	Comment / Action
Deployment of Environmental Permit			Ref No:
Deployment of LAPC Part B – Mobile Plant Permit			Ref No:
CL:AIRE MMP & Qualified Person Declaration			Ref No:
Identification of all invasive plant species & Production of Eradication Plan with appropriate Supervision by Specialist;			Appointed Specialist:
Removal of all vegetation			Note disposal location:
Removal of all root bulbs and root networks			Note disposal location:
Identification of contamination hotspots, removal of material & stockpile.			Rationale:
Legislatively compliant procedure to deal with contamination excavated from hotspot.			Rationale:
Processing and recycling of aggregate with geotechnical and chemical validation testing.			Note stockpile location and anticipated volume:



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M30 7RU

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0161 707 9612

info@E3P.co.uk

Activity	Testing Responsibility	Contractors Method Statement Required (Y/N)	Comment / Action
Stockpiling of topsoil and certification of suitability for re-use			Stockpile Location:
Stockpiling of subsoil and certification of suitability for re-use			Stockpile Location:
Decommission of all redundant drainage infrastructure.			
Decommission of all former interceptors			
Decommission of all former above and below ground tanks			
Removal of all asbestos to a licensed facility			
Engineering of all plots for Shallow Spread Foundation in accordance with E3P Geotechnical Specification.			Plot No.
Engineering of all plots for VSC in accordance with E3P Geotechnical Specification.			Plot No.
Engineering of all plots for Pile Foundation in accordance with E3P Geotechnical Specification.			Plot No.
Engineering of all plots for Raft Foundation in accordance with E3P Geotechnical Specification.			Plot No.
Engineering of highways bulk upfill in accordance with E3P Specification with compliant validation testing			Uppill Specification
Engineering of highways sub-grade in accordance with E3P Specification with compliant validation testing			Uppill Specification
Engineering of highways capping in accordance with E3P Specification with compliant validation testing			Uppill Specification
Cut and fill the development site to clients required elevation with 'as built' survey.			Required formation elevations

**APPENDIX VII
CONTRACTORS
COMPLETION
DOCUMENT**





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Salford
M30 7RU

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0161 707 9612

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Geotechnical Enabling Works Completion Form

Upon completion of all site remediation and enabling works, this form will be completed by E3P in the presence of the appointed contractor to ensure that all pertinent geotechnical enabling works activities are complete or where a deviation from the specification has occurred, all future limitations and issues are documented for the clients record.

Activity	Complete			Signature (initial)
	Yes	No	N/A	
Eradication of all invasive plant species;				
Removal of all vegetation				
Removal of all root bulbs and root networks				
Stockpiling of topsoil and certification of suitability for re-use				
Stockpiling of subsoil and certification of suitability for re-use				
Stockpile all recycled aggregate with geotechnical and chemical validation testing.				
Removal of all relict foundations and infrastructure in their entirety				
Decommission of all redundant drainage infrastructure.				
Decommission of all former interceptors				
Decommission of all former above and below ground tanks				
Removal of all waste materials to a licensed facility				
Removal of all asbestos to a licensed facility				
Engineering of all plots for Shallow Spread Foundation in accordance with E3P Geotechnical Specification.				
Engineering of all plots for VSC in accordance with E3P Geotechnical Specification.				
Engineering of all plots for Pile Foundation in accordance with E3P Geotechnical Specification.				
Engineering of all plots for Raft Foundation in accordance with E3P Geotechnical Specification.				
Engineering of highways bulk upfill in accordance with E3P Specification with compliant validation testing				
Engineering of highways sub-grade in accordance with E3P Specification with compliant validation testing				
Engineering of highways capping in accordance with E3P Specification with compliant validation testing				
Cut and fill the development site to clients required elevation with 'as built' survey.				



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Post Remediation & Enabling Limitations

All and every deviation from the approved specification for works should be documented by the Remediation & Enabling Works Contractor below:

