

Contaminated Land Remediation Strategy

Site: Ryebank Road, Chorlton
Reference: 17-403-R2-2
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TABLE OF CONTENTS

1. INTRODUCTION	4
1.1. Background	4
1.2. Site Details	4
1.3. Report Objectives	4
1.4. Scope of Works.....	4
1.5. Redevelopment Plan	5
1.6. Summary of Parties Involved.....	6
1.7. Regulatory Status	6
1.7.1. Planning Application.....	6
2. SITE SYNOPSIS	7
2.1. Summary Of Previous Works.....	7
2.2. Site Setting.....	8
2.3. Summary of Reported Ground Conditions	9
3. E3P CONTAMINATION RISK ASSESSMENT	11
3.1. Background	11
3.2. Human Health Risk Summary	11
3.3. Controlled Waters Contamination Risk Summary	14
3.3.1. COntrolled Waters Assessment.....	14
3.3.2. Detailed Controlled Waters Risk Assessment.....	14
3.4. Hazardous Ground Gas and Vapours.....	18
3.4.1. Radon.....	18
3.5. Potable Water Supply Infrastructure	18
4. PHASE 3 REMEDIATION OPTIONS APPRAISAL	19
4.1. Overview.....	19
4.2. Determination of Sufficiency of Information	19
4.3. Contaminants of Concern (COC)	20
4.4. Identification of Feasible Remediation Options	23
4.4.1. Objectives.....	23
4.4.2. Available Technologies.....	23
4.4.3. Selection of Remediation Technology Options	25
4.5. Summary of Preferred Remediation Options.....	28
4.5.1. CL: AIRE DoW CoP Materials Management Plan	28
5. REMEDIATION AND SITE-ENABLING WORKS.....	29
5.1. Remediation and Enabling Works.....	29
5.1.1. RE 1: Pre-Commencement Regulatory Compliance	29
5.1.2. RE 2: Further Sampling (Previously Inaccessible Areas).....	30
5.1.3. RE 3: Independent Validation and Site Supervision	30
5.1.4. RE 4: Environment and Nuisance Control	31
5.1.5. RE 5: Risk to Infrastructure and Nico Ditch	31
5.1.6. RE 6: Surface Water Management Plan.....	31
5.1.7. RE 7: Site Clearance Operations.....	31
5.1.8. RE 8: Identification, Isolation and Treatment of Invasive Plants	32
5.1.9. RE 9: Delineation, Excavation and Treatment of Identified Asbestos Impact	33
5.1.10. RE 10: Further Assessment of Mercury.....	34
5.1.11. RE 11: Excavation, Breaking and Processing of All Above and Below Ground Structures	35
5.1.12. RE 12: Delineation, Excavation and Treatment of Infilled Historical Clay Pits and Ponds	36
5.1.13. RE 13: Importation of Materials for Use in Construction	36
5.1.14. RE 14: Preparation of Cover System.....	37



5.1.15.	RE 15: Stockpile Arrangement	38
5.1.16.	RE 16: Provision of Subsoil	39
5.1.17.	RE 17: Waste Soils Surplus to Requirements	39
5.1.18.	RE 18: General Validation of Stockpiled Materials and Turnover Requirements	39
5.1.19.	RE 19: Validation of Materials for Potable Water Supply Infrastructure	40
5.1.20.	RE 20: Post Remediation and Enabling Works Ground Gas Monitoring and Further Assessment	41
5.1.21.	RE 21: Remedial Verification Report	41
5.1.22.	RE 22: Remediation Project Change, Adjustment and Updates to Required Works	42
5.2.	Verification Plan	43
5.2.1.	Validation Sampling Protocol	43
5.2.2.	Implementation of the Verification Plan	44
5.2.3.	Risk-Based Assessment For Non Conformance	44
5.2.4.	Remediation Objective Review	44
5.3.	Remediation Contractor's Site Management and Responsibility	45
6.	MATERIALS MANAGEMENT & LEGISLATIVE COMPLIANCE.....	46
7.	RECORD KEEPING AND VERIFICATION	47
7.1.	Record-Keeping	47
7.2.	Verification Report.....	47
8.	CONTINGENCY PLAN	49
8.1.	Previously Unidentified Contaminants	49
8.2.	TPH Impact	49
9.	SECOND PHASE, MITIGATION AND MANAGEMENT	50
9.1.	Overview of Full Project Requirements	50
9.2.	Cover System	50
9.3.	Placement Of Cover System	51
9.3.1.	Procedure for Placement of Chemically Suitable Cover System	52
	APPENDIX I LIMITATIONS.....	55
	APPENDIX II GLOSSARY	61
	APPENDIX III DRAWINGS	64
	APPENDIX IV E3P REMEDIATION/ VALIDATION CRITERIA.....	66
	APPENDIX V E3P MATERIAL IMPORT CRITERIA	71
	APPENDIX VI CONTRACTOR PRE-COMMENCEMENT CHECK SHEET	73
	APPENDIX VII CONTRACTOR COMPLETION CHECK SHEET	76



DRAWING LIST

17-403-001 - Site Location Plan
17-403-002 - Proposed Development Plan
17-403-003 - Historical Features Plan
17-403-004 - Site Features Plan
17-403-007 - Depth of Made Ground Plan
17-403-010 - Conceptual Site Model
17-403-014 - Contamination Exceedances Plan – Human Health
17-403-024 - Combined Plan (Historical Features, EHLP and Proposed Development)
17-403-027 - Contamination Exceedances Plan – Controlled Waters
17-403-031 - Exploratory Hole (Site Constraints) Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P has been instructed by Step Places, Southway Housing Trust and Manchester Metropolitan University to develop a contaminated land remediation strategy for the proposed residential development on a parcel of land to the north of Ryebank Road and Longford Road, Chorlton (Ryebank Road, Chorlton-cum-Hardy, Manchester M21 9LU).

This report is intended for submission to the regulatory bodies to outline the necessary remediation and enabling works required to render the site suitable for future residential development.

This report has additionally been prepared to highlight the contractor's requirements.

1.2. SITE DETAILS

Site Address	Land north of Ryebank Road / Longford Road, Chorlton, Manchester, M21 9LU
National Grid Reference	E 381090, N 394580
Site Area	4.6 Ha.

All acronyms used within this report are defined in the glossary presented in APPENDIX II.

A site location plan is presented in APPENDIX III as Drawing 17-403-001.

1.3. REPORT OBJECTIVES

This report presents a remediation strategy for approval as part of the planning application and will be brought forward in accordance with this strategy to discharge relevant aspects of a standard contamination planning condition.

To achieve this objective, the report presents details of the remedial objectives; presents the findings of a remedial options appraisal, describes how the remediation of the site will be undertaken, and specifies how the works will be validated. In addition, the strategy explains how the works will be permitted under the current regulatory regime.

This document, therefore, describes the steps that need to be taken during the enabling works and construction phases to prepare the site for a residential end use.

This working document may need to be updated, in agreement with the relevant regulatory authorities at any stage during development, depending on the conditions encountered.

This document does not cover geotechnical enabling works, ground gas mitigation, surface water management or asbestos management, which will be addressed under a separate report cover.

1.4. SCOPE OF WORKS

This report has been written in general accordance with Land Contamination: Risk Management (LCRM) (Environment Agency, July 2023). The scope of this Remediation Strategy and Remedial Options Appraisal comprises:



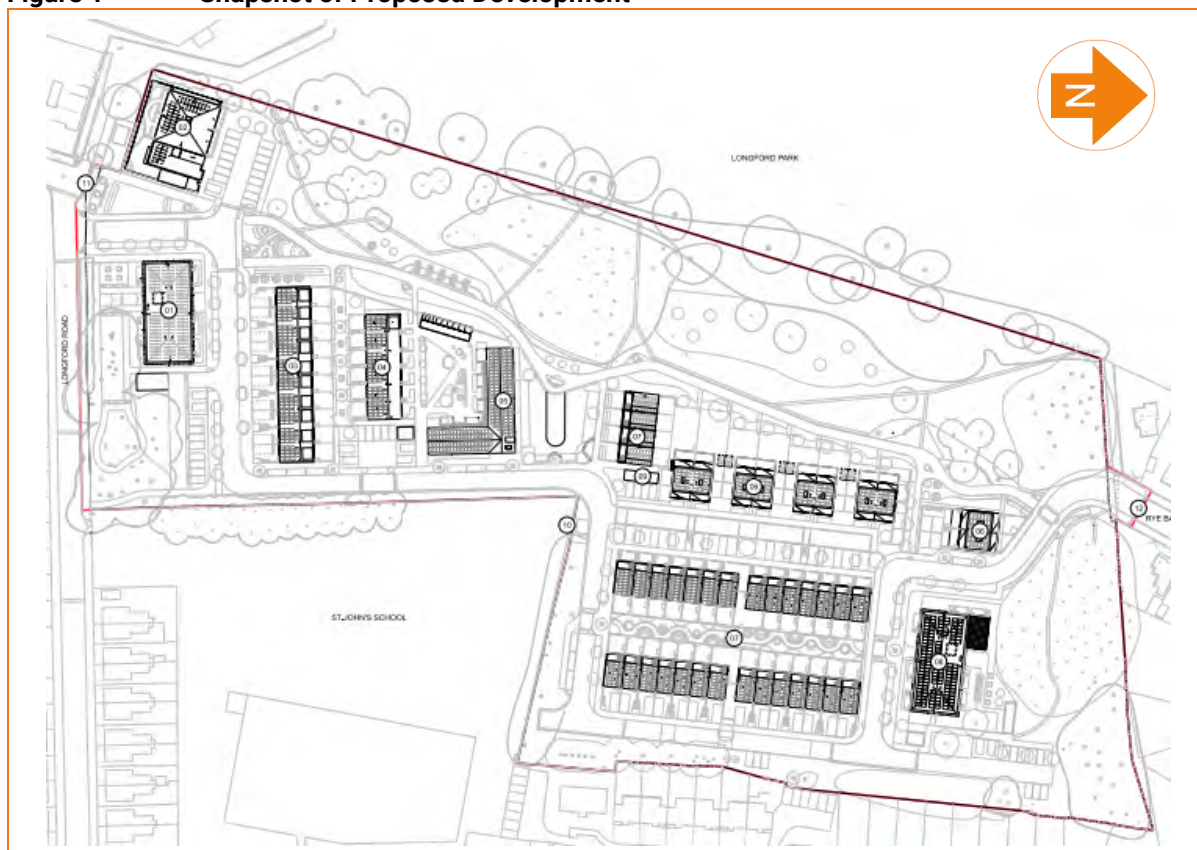
- ✳ A summary of background information and the conceptual model;
- ✳ An overview of the results of risk assessment undertaken at the site;
- ✳ Identification of geotechnical constraints;
- ✳ A remediation options assessment including a selection of final remediation options; and,
- ✳ A methodology and verification requirement for remediation works.

1.5. REDEVELOPMENT PLAN

E3P understand that the proposed development comprises a residential development including access, car parking provision, landscaping, sustainable drainage features and other associated works. Drawing 17-403-002 (Appendix III) identifies the proposed development layout.

A snapshot of the proposed development layout is indicated in Figure 1.

Figure 1 Snapshot of Proposed Development





1.6. SUMMARY OF PARTIES INVOLVED

FUNCTION/INTEREST	NAME OF PARTY
Local Planning Authority	Manchester City Council
Developer	Step Places, Southway Housing Trust and Manchester Metropolitan University
Geoenvironmental Consultant	E3P
Main Contractor	Step Places, Southway Housing Trust and Manchester Metropolitan University
Remediation/Enabling Works Contractor	TBC
Human Health Regulator	Manchester City Council
Controlled Waters and Waste Regulator	Environment Agency
Highways Adoption Authority	Manchester City Council

1.7. REGULATORY STATUS

1.7.1. PLANNING APPLICATION

Step Places, Southway Housing Trust and Manchester Metropolitan University is in the process of submitting a detailed planning application to the local planning authority for the proposed redevelopment of the site for low-rise residential housing with associated adopted estate roads and infrastructure.

It is presumed that as part of the planning approval process, the planning authority will undertake consultation with the pertinent statutory consultees, which will include:

- ✚ Environmental health/contaminated land officer at the local authority (or external adviser); and,
- ✚ Environment Agency planning liaison.

This report is subject to the approval of the regulators. No remediation works should commence before all pre-commencement conditions have been discharged following liaison with the relevant regulatory authorities.

It should be noted that aspects of environmental permitting and waste regulation cannot be registered until planning permission has been granted.



2. SITE SYNOPSIS

2.1. SUMMARY OF PREVIOUS WORKS

Table 1 summarises the phases of Geoenvironmental Assessments that have previously been carried out at the site.

Table 1 **Summary of Previous Works**

AUTHOR	TITLE / REFERENCE	CLIENT	DATE
WSP Parsons Brinckerhoff	Geoenvironmental Appraisal (Report Ref: 70014100)	Manchester Metropolitan University	September 2015
WSP Parsons Brinckerhoff	Environmental Input (Report Ref: 70014100)	Manchester Metropolitan University	October 2015
E3P	Phase I Geoenvironmental Site Assessment (Report Ref: 13-533-R1-2)	Manchester Metropolitan University	March 2020
E3P	Phase II Geoenvironmental Site Assessment (Report Ref: 13-533-R2-2)	Manchester Metropolitan University	March 2020
E3P	Human Health Risk Assessment Report (Report Ref: 13-533-R3-3)	Manchester Metropolitan University	August 2020
E3P	Ground Gas and Vapour Assessment Report (Report Ref: 13-533-R4-1)	Manchester Metropolitan University	October 2020
E3P	Remediation and Enabling Works Strategy (Report Ref: 13-533-R5-1)	Manchester Metropolitan University	October 2020
E3P	Phase II Geoenvironmental Site Assessment (Report Ref: 17-403-R1-4)	Step Places, Southway Housing Trust and Manchester Metropolitan University	February 2025
E3P	Detailed Controlled Waters Risk Assessment (Report Ref: 17-403-L2-1)	Step Places, Southway Housing Trust and Manchester Metropolitan University	January 2025

The assessment of the potential risk of contaminated land within the context of the proposed residential development is included in the documents listed in Table 1. To inform the preparation of the remediation strategy, the pertinent points from the above reports are summarised within Section 2.

To avoid doubt, the above reports should be read as a precursor to and in conjunction with this document.



2.2. SITE SETTING

Table 2 Description and Setting

Current Occupancy/Use	The subject site is an irregularly shaped parcel of land located to the north of Ryebank Road / Longford Road in Chorlton referred to as Ryebank.	
	The site is surfaced by overgrown grasses and semi mature and mature trees, which are notably dense around the perimeter of the site. The Nico ditch is known to intersect the centre of the site which is thought to form part of a linear earthwork stretching across Manchester (9.7 km).	
	There are no structures present on site, however an area of hardstanding is present to the southeast of the site. A bund surfaced by grass is located adjacent to the area of hard standing in the southeast of the site.	
	The site is predominantly flat in topography but gradually falls from south to north.	
Environmental Setting	Superficial Geology	Glaciofluvial Sheet Deposits (Northwest) – SAND and GRAVEL Glacial Till (Majority of site) – SAND, GRAVEL and CLAY
	Bedrock Geology	Wilmslow Sandstone Formation – SANDSTONE
	Hydrogeology	The site is predominantly underlain by a Secondary Undifferentiated aquifer with a Secondary A aquifer in the northwest of the site within the drift geology, overlying a Principal aquifer (bedrock geology). There are three groundwater abstraction points situated within 1 km of the site which are operated by Trafford Metal Finishers Manchester Ltd utilised as process water. The three abstraction licenses relate to these boreholes.
	Surface Waters	The Nico Ditch (referred to as a drain) intersects the centre of the site however it is noted to be dry. A drain is located 156 m west of the site. Moreover, United Utilities has indicated that the route of the Thirlmere Aqueduct runs across the northern boundary of the site. Longford Brook (culverted) is located circa 210 m west of the site. Longford Brook historically flowed through the site; however, it has since been diverted southwards and is assumed to be culverted within the area of the Nico Ditch.
Site History	Historical mapping suggests that the site was undeveloped agricultural land with Longford Brook traversing the site west to east. In the mid 1800's two ponds were present in the southern sector of the site. In the early 1900's residential properties were present in the south-east of the site; furthermore, a brick works is present along the eastern boundary of the site. Mapping from 1930 to 1938 identifies large clay pits in the north and south of the site and two further ponds in the north of the site, with embankments present across the entire site likely to be indicative of areas of excavation. Mapping from 1950 shows all previous features to no longer be present indicating these have been infilled, with a drain traversing the site west to east. An unspecified building was present in the west of the site from mapping dated 1971-1981 and was demolished at some point between 2003 and 2005.	
Landfill Sites and Waste Sites	There are no current or historical recorded landfill sites within 250 m of the subject site. However, mapping circa the early to mid-20th century indicates that the site has been subject to historical infilling (pits, quarries, pond, marsh, river, streams). Historical mapping shows significant topographical changes, steep slopes, infilled clay pits and ponds within the site boundary. There are also ten locations of potentially infilled land within 250 m of the site from historical mapping dating 1848 to 1955.	



Invasive Plant Species

The remediation contractor must satisfy themselves concerning the extent of all species deemed invasive prior to the commencement of works on site.

2.3. SUMMARY OF REPORTED GROUND CONDITIONS

E3P has prepared a detailed Site investigation report (Ref: 17-403-R1-3, dated November 2024). The summary of reported ground conditions is given in Table 3.

Table 3 **Summary of Ground Conditions**

Made Ground	Made Ground deposits were encountered within all exploratory hole locations from ground level to a maximum proven depth of 13.50 m bgl (CP202). The depth of Made Ground could not be determined within the majority of locations due to substantial depths of Made Ground and obstructions. The full depth of Made Ground was proven within seven locations where the cable percussive boreholes were advanced to depths in excess of 7.50 m bgl and within one window sample borehole (WS203) where the underlying natural superficial deposits were encountered. Made Ground generally comprised a reworked topsoil from ground level to a maximum proven depth of 0.30 m bgl. Reworked topsoil comprised brown slightly sandy gravelly clay with frequent rootlets, with gravel of sandstone and mudstone and rare to frequent fragments of brick and concrete. Within the 2019 site investigation cobble sized fragments of brick and concrete were encountered throughout the topsoil. Reworked topsoil was not encountered within TP129, TP130, WS112 and CP204 in the south of the site, which comprised asphalt to a maximum proven depth of 0.20 m bgl. Underlying the reworked topsoil and asphalt, Made Ground was predominantly granular, comprising either a black fine to medium gravelly sand or sandy gravel. Gravel is generally comprised largely of ash material with sandstone and mudstone, and frequent fragments of asphalt, brick, concrete, metal, and glass, with occasional cobbles of brick and concrete. During the 2019 investigation, isolated areas of reworked clay were identified in TP102, WS102, WS103, WS108 and WS112, encountered at depths of between 0.20-2.50 m bgl to a maximum depth of 3.45 m bgl and comprised a firm to stiff brown gravelly clay, with gravel of brick and concrete. White ash (likely calcium carbonate/incineration byproducts) in the form of a grey-blue clayey sand was encountered in pockets throughout the granular Made Ground mainly located in the northern sector of the site in TP111, TP113, TP115, TP120, TP129, to depths of between 1.20 m bgl and 2.20 m bgl. The white ash material was also encountered as bands in TP103 between 2.10 m and 2.40 m bgl, WS105 between 3.60 m and 4.00 m bgl and WS111 between 2.00 m and 2.80 m bgl. Interbedded clay was encountered within the 2024 investigation within TP201 and TP202, as well as WS201-WS203, WS205, WS207, CP201 and HP205. This clay generally comprised of a firm dark grey to brown gravelly clay, with gravel of mudstone with frequent fragments of brick, concrete, clinker, timber and ash inclusions. Strong hydrocarbon odours were noted throughout the site at depths typically in excess of 1.50 m bgl.
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Superficial	Superficial deposits were encountered within seven locations and were typically encountered at the base of the historic clay pits at depths between 7.50 m bgl and 13.50 m bgl. Typically, superficial deposits were only encountered within the cable percussive holes however, one location (WS203) in the southwest of the site which encountered natural superficial deposits at a shallower depth of 1.50 m bgl. Superficial deposits were proven to a maximum depth of 17.83 m bgl within CP202 with the presence of very stiff sandy CLAY. Natural superficial deposits encountered typically comprised a very stiff very high strength brown sandy CLAY with occasional boulders of sandstone. Shallower superficial deposits were encountered within WS203 in the south west of the site (located outside of the historically mapped clay pit) from 1.50 m bgl, which comprised a very soft to soft extremely low to very low strength brown sandy gravelly clay, with gravel of sandstone, mudstone and coal.
Bedrock	The solid geology was not encountered during the ground investigation. A BGS borehole record (BGS Reference: SJ89NW762) circa 600 m north of the site identified SANDSTONE bedrock at 27.00 m bgl.
Groundwater	Groundwater strikes were recorded between 1.20 – 13.00 m bgl.



3. E3P CONTAMINATION RISK ASSESSMENT

3.1. BACKGROUND

E3P has completed a Tier 2 Qualitative Contaminated Land Risk Assessment to determine the potential risk to human health, controlled waters, and the wider environment. This assessment is documented in full within the E3P Geoenvironmental Site Assessment report and, for clarity, is summarised in the following sections of this document.

3.2. HUMAN HEALTH RISK SUMMARY

The E3P Tier 2 Qualitative Human Health Risk Assessment identified concentrations of the following determinants at or above the screening criteria for the assessment of no unacceptable degree of risk to human health:

- ☛ Arsenic;
- ☛ Lead;
- ☛ Total Mercury;
- ☛ Copper;
- ☛ Asbestos;
- ☛ Naphthalene;
- ☛ Non-volatile PAHs (Phenanthrene, Benzo(a)Anthracene, Chrysene, Benzo(b)Fluoranthene, Benzo(a)Pyrene, Indeno(123-cd)Pyrene, Dibenzo(a,h)Anthracene); and,
- ☛ TPH Aromatic C12-C35

Soils which were also tested for SVOCs and VOCs and reported values above the LOD are listed within Table 4 below, and where possible these were compared against available GAC.

Table 4 Summary of SVOCs and VOCs identified above the LOD

DETERMINANT	UNIT	GAC LQM S4UL	CL:AIRE GAC	N	MC	LOC. OF EX	PL	ASSESSMENT
Benzene	mg/kg	0.087	-	4	0.05	N/A	4	No Further Action
Toluene	mg/kg	130	-	4	0.21	N/A	4	No Further Action
Ethylbenzene	mg/kg	47	-	4	0.36	N/A	4	No Further Action
p & m-xylene	mg/kg	56	-	4	1.7	N/A	4	No Further Action
o-xylene	mg/kg	60	-	4	0.97	N/A	4	No Further Action
Isopropyl benzene	mg/kg	-	27	4	0.073	N/A	4	No Further Action
1,2,4-Trimethylbenzene	mg/kg	-	2	4	6.5	CP203 5.00m	4	Further Action
n-Propylbenzene	mg/kg	No GAC Available		9	470 85	CP203 5.00m CP201 5.00m	4	Further Action
n-Butylbenzene	mg/kg	No GAC Available		4	25	CP201 5.00m	4	Further Action



DETERMINANT	UNIT	GAC LQM S4UL	CL:AIRE GAC	N	MC	LOC. OF EX	PL	ASSESSMENT
Sec-Butylbenzene	mg/kg	No GAC Available		9	210 30	CP203 5.00m CP201 5.00m	4	Further Action
2-Methylnaphthalene	mg/kg	No GAC Available		9	4.1 4.0 2.4 0.7 0.5	CP203 5.00m TP127 1.80m CP201 5.00m WS102 3.20m TP116 1.50m	4	Further Action
Carbazole	mg/kg	No GAC Available		7	8.2 2.6 4.1 2.3 1.1 0.4	CP201 5.00m CP203 5.00m TP116 1.50m TP127 1.80m WS102 3.20m TP120 2.10m	4	Further Action

Table 5 also includes a comparison of site concentrations against US EPA screening levels as an initial assessment to understand where contamination levels potentially present a significant risk in the context of the proposed residential end-use and appropriate pathways. Although these levels are not accepted as part of the overall risk assessment, where further information is not available in respect of a suitable guideline value these have been included for reference.

Table 5 Summary of SVOCs and VOCs identified above the LOD (USEPA Comparison)

DETERMINANT	UNIT	US EPA SCREENING LEVELS	N	MC	LOC. OF EX	PL	ASSESSMENT
n-Propylbenzene	mg/kg	3800*	9	470 85	CP203 5.00m CP201 5.00m	4	No Further Action
n-Butylbenzene	mg/kg	3900*	4	25	CP201 5.00m	4	No Further Action
Sec-Butylbenzene	mg/kg	7800*	9	210 30	CP203 5.00m CP201 5.00m	4	No Further Action
2-Methylnaphthalene	mg/kg	240*	9	4.1 4.0 2.4 0.7 0.5	CP203 5.00m TP127 1.80m CP201 5.00m WS102 3.20m TP116 1.50m	4	No Further Action
Carbazole	mg/kg	-	7	8.2 2.6 4.1 2.3 1.1 0.4	CP201 5.00m CP203 5.00m TP116 1.50m TP127 1.80m WS102 3.20m TP120 2.10m	4	Further Assessment

Notes

* = Source: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

Noncarcinogenic Screening Level for a child using a Target Hazard Index =1.

Further assessment of the identified SVOC/VOC compounds in accordance with the developed CSM identified potential vapour risks associated with the concentrations of n-Propylbenzene in CP203 and carbazole in CP201.

In the case of heavy metals, non-volatile PAH and heavy end TPH compounds, the viable exposure pathway is associated with direct contact, consumption of homegrown vegetables and ingestion of soil.



Elevated total mercury has been identified within Made Ground deposits within TP116, TP119, CP201, CP203 and WS204. As a conservative approach, the GAC for elemental mercury has been utilised in the absence of mercury speciation testing. If further testing confirms that no elemental mercury is present, a higher GAC can be used (30 mg/kg) therefore the samples currently exceeding for elemental mercury will fall below the threshold for organic mercury therefore no residual risk. Further speciation testing is required to confirm the above.

With regards to the elevated naphthalene (CP203), TPH Aromatic C12-C16 (WS204, TP119) and VOCs/SVOCs (CP201, CP203), these present a potential volatilisation to indoor air risk. These have been identified within localised areas at depths between 0.10 m bgl and 5.00 m bgl. Due to the depth of the exceedances (>5.00 m bgl) with no specific source identified, the contamination will require mitigation by installing vapour mitigation measures within all affected plots. A specialist gas and vapour protection design report will be required and will be presented under a separate cover.

Asbestos in the form of loose chrysotile, amosite and crocidolite fibres has been identified in the Made Ground across the site in WS101, WS102, WS110, WS112, WS201 and CP201 at depths of between 0.50 – 5.00 m bgl. Quantification has been carried out on all positive samples which indicates volumes of asbestos between 1.18% (WS101) to 0.01% (WS112). Asbestos quantification within WS110 has identified trace fibres (<0.001%).

Further to this ACM materials were identified around the periphery of the site, as well as intact pieces within the soils during the investigation.



3.3. CONTROLLED WATERS CONTAMINATION RISK SUMMARY

3.3.1. CONTROLLED WATERS ASSESSMENT

A Tier 2 Controlled Water Risk Assessment was completed by E3P as part of the E3P Geoenvironmental Site Assessment, the findings of which are summarised as follows:

- ✳ The Tier 2 controlled waters risk assessment identified elevated concentrations of heavy metals, TPH, PAHs, and VOCs/SVOCs.
- ✳ Low-permeability clay has been encountered beneath the Made Ground within the infilled clay pits, providing some protection to the underlying principal aquifer. BGS borehole records indicate that the bedrock (principal aquifer) is located approximately 27 m bgl, resulting in an approximate 10-15 m cover of low-permeability clay, which reduces downward migration. However, exceedances identified in groundwater samples taken from natural response zones (CP201 and CP204) beneath the infilled clay pits indicate that some downward migration may be occurring on-site.
- ✳ If low-permeability clay deposits are still present in the location of the Nico Ditch and culverted brook, they will provide some protection against contamination migration. Additionally, depending on the construction of the culvert, any concrete lining may also help prevent contamination migration to surface water.
- ✳ The site is currently unsurfaced therefore allows for unrestricted rainfall infiltration, which increases the risk of contaminant mobilisation into the groundwater. The proposed development will make 60% of the site impermeable, reducing the infiltration significantly. This reduction will decrease the risk of contaminant leaching into deeper aquifers, as less water will be available to dissolve and transport pollutants. The introduction of impermeable surfacing provides an effective engineering control, reducing groundwater contamination risks.
- ✳ The risk to controlled water receptors is considered moderate. Due to the presence of heavy metals and organic hydrocarbon compounds in the perched groundwater, careful consideration of risks to site operatives and the potential requirement for water pretreatment will be necessary.
- ✳ Given the presence of the culverted Longford Brook and the Nico Ditch across the centre of the site, a DQRA was recommended to determine practicable and deliverable remediation targets for the soils (considered a secondary source).

3.3.2. DETAILED CONTROLLED WATERS RISK ASSESSMENT

E3P has completed a detailed quantitative risk assessment to generate site specific remediation targets for the contaminants of concern. The assessment is detailed in full with report 17-403-L2-1, dated January 2025. A summary of the results and assessment is included below:

Table 6 Results of DQRA

CONTAMINANT	SOURCE CONCENTRATION USED IN RTM MODEL		LEVEL 3 REMEDIAL TARGET CONCENTRATION		
	SOILS (mg/kg)	GROUNDWATER (mg/l)	SOILS (mg/kg)	LEACHATE (mg/l)	LEACHATE (ug/l)
Source Area 1 – Infilled Clay Pit (Northern Sector)					
Arsenic	32	0.028	75.7	0.151	151
Copper	620	0.0091	3060	30.6	30600
Cyanide	120	0.081	76.4	0.762	762
Lead	1000	0.016	75.7	0.151	151



CONTAMINANT	SOURCE CONCENTRATION USED IN RTM MODEL		LEVEL 3 REMEDIAL TARGET CONCENTRATION		
	SOILS (mg/kg)	GROUNDWATER (mg/l)	SOILS (mg/kg)	LEACHATE (mg/l)	LEACHATE (ug/l)
Nickel	33	0.022	152	0.304	304
Zinc	1000	0.048	6.31	0.165	165
Naphthalene	0.72	0.0034	9930	251	251000
TPH Aromatic C5-C7	<1.0	0.007	19.8	4.55	4550
TPH Aromatic C8-C10	29	0.012	1.44 E+04	1.49 E+04	1.49 E+07
TPH Aromatic C10-C12	20	0.048	3.5 E+05	2290	2290000
Phenol	<0.50	0.017	2.09 E+12	1.07E+12	1.07E+15
Source Area 1 – (10 m x 10 m grid)					
Arsenic	32	0.028	1150	2.31	2310
Copper	620	0.0091	46700	466	466000
Cyanide	120	0.081	1170	11.6	11600
Lead	1000	0.016	1150	2.31	2310
Nickel	33	0.022	2320	4.64	4640
Zinc	1000	0.048	96.2	2.52	2520
Naphthalene	0.72	0.0034	2.12 E+05	5370	5.37E+06
TPH Aromatic C5-C7	<1.0	0.007	361	82.9	82900
TPH Aromatic C8-C10	29	0.012	1.04 E+06	1.07 E+04	1.07 E+07
TPH Aromatic C10-C12	20	0.048	7.47 E+06	4.87E+04	4.87E+07
Phenol	<0.50	0.017	9.66 E+13	4.93E+13	4.93E+16
Source Area 2 – Infilled Clay Pit (Southern Sector)					
Arsenic	150	0.018	384	0.768	768
Copper	2600	0.0075	15500	155	155000
Chromium (III)	46	0.0057	18600	3.87	3870
Chromium (VI)	<0.50	0.020	4.66	0.256	256
Cyanide	73	0.16	388	3.87	3870
Lead	1100	0.026	384	0.768	768
Manganese	-	0.88	1940	3.87	3870
Nickel	110	0.019	772	1.54	1540
Zinc	2500	0.53	32	0.838	838
Naphthalene	19	0.27	283	7.15	7150
TPH Aromatic C5-C7	2.3	0.011	8.10	1.86	1860
TPH Aromatic C8-C10	53	0.39	26800	276	276000
TPH Aromatic C10-C12	40	0.43	9950	64.9	64900
TPH Aromatic C12-C16	200	0.22	3080	10.1	10100
Trichloromethane	<0.001	0.0091	68100	2.08 E+04	2.08 E+07
Benzene	0.05	0.13	8.10	1.86	1860
p-xylene	1.7	0.10	8.44 E+04	3080	3.08E+06
m-xylene	1.7	0.10	9.25 E+04	3080	3.08E+06
o-xylene	0.97	0.078	5320	203	203000
Source Area 2 – (10 m x 10 m grid)					
Arsenic	150	0.018	5750	11.5	11500
Copper	2600	0.0075	2.33 E+05	2320	2.32E+06
Chromium (III)	46	0.0057	2.78 E+05	58	58000
Chromium (VI)	<0.50	0.020	69.8	3.83	3830
Cyanide	73	0.16	5810	58	58000
Lead	1100	0.026	5750	11.5	11500
Manganese	-	0.88	29000	58	58000
Nickel	110	0.019	11600	23.1	23100
Zinc	2500	0.53	479	12.5	12500
Naphthalene	19	0.27	4330	110	110000



CONTAMINANT	SOURCE CONCENTRATION USED IN RTM MODEL		LEVEL 3 REMEDIAL TARGET CONCENTRATION		
	SOILS (mg/kg)	GROUNDWATER (mg/l)	SOILS (mg/kg)	LEACHATE (mg/l)	LEACHATE (ug/l)
TPH Aromatic C5-C7	2.3	0.011	123	28.2	28200
TPH Aromatic C8-C10	53	0.39	4.11E+05	4250	4.25E+06
TPH Aromatic C10-C12	40	0.43	1.52 E+05	995	995000
TPH Aromatic C12-C16	200	0.22	4.63 E+04	152	152000
Trichloromethane	<0.001	0.0091	1.12 E+06	3.43 E+05	3.43 E+08
Benzene	0.05	0.13	11.4	2.62	2620
p-xylene	1.7	0.10	1.32 E+06	4.80 E+04	4.80 E +07
m-xylene	1.7	0.10	1.44 E+06	4.80 E+04	4.80 E +07
o-xylene	0.97	0.078	8.10 E+04	3.09 E+03	3.09 E+06

Site Specific Remedial Targets (SSRTs) have been produced from the P20 RTM.

Where the existing contaminant concentration, identified during the various phases of intrusive investigation, exceeds the remedial target value, the value has been highlighted in orange where the exceedances appear to be present.

Source Area 1 – Infilled Clay Pit (Northern Sector)

The results of the modelling have generated two sets of site specific screening values; one utilising a modelled 10 x 10m grid and a second set using the actual measured area of the site area, in order to ensure a suitable and deliverable remediation and validation programme.

The results of the P20 modelled for the source area indicate that elevated concentrations of cyanide, lead and zinc have been recorded in soil samples when compared to the Level 3 remediation targets. When modelled on a 10 x 10m grid, only zinc exceeds the Level 3 concentration.

Varying the time since the pollutant entered the groundwater suggests that zinc would not reach the receptor until circa 52,000 years based on calculations within the model (10 x 10 m grid). Therefore, this shows that there is no significant risk to the controlled waters receptors from the existing soil concentrations and remediation works are not considered to be required.

The concentrations in groundwater/leachate samples do not exceed SSRTs, therefore remediation works are not considered to be required.

Source Area 2 – Infilled Clay Pit (Southern Sector)

The results of the modelling have generated two sets of site specific screening values; one utilising a modelled 10 x 10m grid and a second set using the actual measured area of the site area, in order to ensure a suitable and deliverable remediation and validation programme.

The results of the P20 modelled for the source area indicates that elevated concentrations of lead and zinc have been recorded in soil samples when compared to the Level 3 remediation targets. When modelled on a 10 x 10m grid, only zinc exceeds the Level 3 concentration.

Varying the time since the pollutant entered the groundwater suggests that zinc would not reach the receptor until circa 10,500 years based on calculations within the model (10 x 10 m grid). Therefore, this shows that there is no significant risk to the controlled waters receptors from the existing soil concentrations and remediation works are not considered to be required.



The application of the Level 3 RTM values has been integral to determining the potential risks posed by contaminants in soil and groundwater. The modelling specifically assessed the potential for contaminant migration and the subsequent risks to controlled waters. The results from Source Area 1 (northern sector) and Source Area 2 (southern sector) consistently show that, while elevated concentrations of metals such as zinc, lead, and cyanide were recorded in the soils, these compounds exhibit limited mobility due to their largely insoluble nature.

For example, zinc, when modelled under the 10 x 10 m grid scenario, was found to exceed the Level 3 RTM values in the soil. However, the calculated time for this contaminant to reach the Principal Aquifer – a critical receptor – is approximately 52,000 years. This extensive timescale clearly indicates that the migration of zinc through the groundwater is not a significant concern, as it would take an exceedingly long period for the contaminant to reach the aquifer at concentrations that could cause harm.

Similarly, for Source Area 2, elevated concentrations of lead and zinc were detected in the soils. When the model was applied to a 10 x 10 m grid, zinc exceeded the Level 3 RTM values, but the modelling suggests that the time for zinc to reach the receptor is approximately 10,500 years. This similarly long timeframe further reinforces that there is minimal risk of significant contamination migration, particularly in comparison to the typical lifespan of development projects.

The very slow travel times of these largely insoluble contaminants, coupled with the presence of low-permeability layers within the site that inhibit downward migration, significantly reduce the overall risk of contamination reaching controlled waters. The calculated migration times demonstrate that these compounds will not reach critical receptors within any relevant operational or environmental timeframe.

Therefore, based on these modelling results, the risk from these contaminants is deemed negligible, and the proposed remediation measures – such as further monitoring and potential localised remediation are more than sufficient to mitigate any long-term risks associated with the identified contaminants. These findings validate the decision that no major remediation efforts are necessary for the impacted areas of the site. The Level 3 RTM values, alongside the modelling of travel times, provide clear assurance that the site can be safely developed without posing a significant risk to the controlled waters or the broader environment.

The report's assessment highlights that the current unsurfaced state of the site allows unrestricted rainfall infiltration, which increases the risk of contaminant mobilisation and leaching into the groundwater. The proposed development, with 60% of the site made impermeable, will significantly reduce infiltration by 2,185 m³ per year per acre. This will lower the hydraulic connectivity between surface water and groundwater, thus mitigating the mobilisation of contaminants, such as PAHs and TPHs, present in the Made Ground.

By reducing infiltration, this strategy represents the most sustainable remediation solution. It addresses the risk of contamination migration at its source, providing a long-term, cost-effective measure. The contaminants will be confined closer to the surface, allowing for effective surface-level remediation and reducing the need for costly groundwater treatment, ensuring both environmental compliance and sustainable development.

In the context of the developed site Conceptual Site Model (CSM), the reduction in infiltration ensures that there is no significant risk to a viable receptor. The contaminants present within the Made Ground will remain confined to the surface, with limited potential for migration to the underlying aquifers or surface water features. This confirms that, following the proposed development and mitigation measures, the site poses no risk to controlled waters or any other viable receptors.



3.4. HAZARDOUS GROUND GAS AND VAPOURS

Ground gas has been assessed as part of the E3P Geoenvironmental Site Assessment. The assessment was completed in accordance with the methodology outlined in the CIRIA publication C665, utilising the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV).

The site, comprising a unfilled clay pits with significant methane identified, is classified as Characteristic Situation 3 (CS3) in accordance with BS 8485:2015+A1:2019. Although methane concentrations are elevated (between 5% and 60%), there is no evidence of substantial gas outflow, even during periods of rapidly falling barometric pressure. This indicates that the gas is predominantly residual rather than actively migrating. The material within the clay pit dates back to the 1950s, meaning the primary phase of gas generation from organic decomposition has long since ceased. Over time, most methane will have naturally vented or dissipated. The classification as CS3 reflects the moderate to high gas risk due to elevated methane concentrations, requiring appropriate protective measures despite the low current outflow rates and limited active gas generation.

In accordance with BS 8485:2015+A1:2019 and CIRIA C748 (2014), gas mitigation measures must be designed by a suitably qualified specialist to ensure they address the specific risks of the site. A detailed design report will be required, outlining the proposed gas protection measures, the rationale for their selection, and how they align with the risk classification. This should be accompanied by a robust validation plan to confirm the correct installation and performance of the mitigation measures, ensuring the long-term safety of the development and compliance with relevant standards and regulations.

The vapour risk assessment confirms that all properties should be constructed with the installation of mitigation measures that protect against aromatic hydrocarbons and chlorinated compounds, as well as ground gases.

Following remediation and enabling works it would be beneficial to complete post remediation ground gas and vapour monitoring to confirm the residual site condition which will fully inform the design of the mitigation measures to ensure no intrusion of geogenic methane and carbon dioxide, aromatic hydrocarbon and VOC compounds.

The details of the ground gas mitigation requirements will be detailed within a Gas Protection Design Report.

3.4.1. RADON

The site is located within an area where less than 1% of homes are estimated to be at or above the Action Level. No radon protection measures are required.

3.5. POTABLE WATER SUPPLY INFRASTRUCTURE

A contaminant risk assessment completed in accordance with the UKWIR assessment framework should be completed and will be addressed under separate cover. Chemical analysis to date suggests that barrier pipe is likely to be required.



4. PHASE 3 REMEDIATION OPTIONS APPRAISAL

4.1. OVERVIEW

A remediation options appraisal has been completed in accordance with the principles as set out within the Environment Agency publication Land Contamination: Risk Management (LCRM) (July 2023).

LCRM requires that the following tiered assessments are followed to ensure sufficiently detailed and robust appraisal of remediation options to inform the selection of the preferred approach and utilisation of the correct technologies to promote safe and sustainable land remediation:

- ✦ Identification of feasible remediation technologies;
- ✦ Detailed evaluation of viable options; and,
- ✦ Selection of appropriate remediation option.

4.2. DETERMINATION OF SUFFICIENCY OF INFORMATION

Prior to the commencement of the tiered assessment of remediation options, it is a requirement to assess the sufficiency of available information and validity of the risk-based assessment on which the remediation options appraisal is based.

The phases of the investigation were limited in the west, along the northern boundary and periphery of the site due to the presence of dense vegetation. Aspen Grove is present in the north of the site, which was inaccessible to machinery during the works due to the densely vegetated nature of the area. Further to this, sewer and gas pipelines were present to the west of the site, which required a buffer zone limiting investigation in this area. The Thirlmere aqueduct to the north of the site had a buffer zone of 20m.

Dense vegetation along the route of the Nico Ditch meant that vehicular access to the north was limited.

Further investigation of inaccessible areas and delineation of clay pits is required to provide further site characterisation.



4.3. CONTAMINANTS OF CONCERN (COC)

Following the completion of the intrusive investigation, assessment and the completion of a developed conceptual site model, Table 7 below summarises the contaminants of concern for which a Remediation Options Appraisal has been developed.

Table 7 Summary of Contaminants of Concern

CONTAMINANT OF CONCERN	LOCATION/DEPTH	MATERIAL TYPE	EXPOSURE PATHWAY
Heavy Metals (Arsenic, Lead)	WS102 3.20 m	Made Ground	Direct contact of soil by future residents Direct ingestion of soil by future residents
	WS201 2.80 m		
	WS202 3.00 m		
	WS204 1.70 m		
	WS204 3.50 m		
	WS206 0.80 m		
	WS207 2.80 m		
	TP101 0.10 m		
	TP105 0.10 m		
	TP119 0.10 m		
	TP120 2.10 m		
	TP125 2.10 m		
	TP127 1.80 m		
	TP128 0.80 m		
	TP202 0.10 m		
	TP202 1.00 m		
	TP201 2.00 m		
	CP201 5.00 m		
	CP203 5.00 m		
	CP203 13.20 m		
Total Mercury	CP201 5.00 m	Made Ground	Potentially volatile
	CP203 13.20 m		
	WS204 1.70 m		
	TP116 1.50 m		
	TP119 0.10 m		



CONTAMINANT OF CONCERN	LOCATION/DEPTH	MATERIAL TYPE	EXPOSURE PATHWAY
Non-volatile PAHs	TP101 0.10 m TP103 1.30 m TP105 0.10 m TP116 1.50 m TP119 0.10 m TP120 2.10 m TP125 0.10 m TP127 1.80 m TP128 0.80 m TP202 1.00 m CP201 5.00 m CP203 5.00 m WS102 3.20m WS201 2.80 m WS202 3.00 m WS203 2.50 m	Made Ground/Natural Clay	Direct contact of soil by future residents Direct ingestion of soil by future residents
Naphthalene	CP203 5.00 m	Made Ground	Vapour inhalation by future residents Vapour dispersion to proposed dwellings
Asbestos	WS101 1.80 m (1.18 %) WS201 2.80 m (0.70 %) CP201 5.00 m (0.65 %) WS102 3.20 m (0.04 %) WS112 2.30 m (0.01 %) WS110 0.50 m (<0.001 %)	Made Ground	Inhalation of dust/fibres by future residents
TPH Aromatic C12-C16	WS204 3.50 m TP119 0.10 m	Made Ground	Vapour inhalation by future residents Vapour dispersion to proposed dwellings
TPH Aromatic C16-C35	TP116 1.50 m TP119 0.10 m WS201 2.80 m WS204 3.50 m	Made Ground	Direct contact of soil by future residents Direct ingestion of soil by future residents



CONTAMINANT OF CONCERN	LOCATION/DEPTH	MATERIAL TYPE	EXPOSURE PATHWAY
n-Propylbenzene	CP203 5.00 m	Made Ground	Vapour inhalation by future residents Vapour dispersion to proposed dwellings
Carbazole	CP201 5.00 m	Made Ground	Vapour inhalation by future residents Vapour dispersion to proposed dwellings
Hazardous Ground Gases and Vapours	All	Made Ground	Vapour inhalation by future residents



4.4. IDENTIFICATION OF FEASIBLE REMEDIATION OPTIONS

4.4.1. OBJECTIVES

The remediation works must be completed in a safe and sustainable manner that ensures that the post-remediation condition of the site poses no unacceptable risk to controlled waters or the wider environment.

The developed Conceptual Site Model must ensure no complete pollutant linkage to ensure successful implementation.

The remediation works must be completed in a manner that promotes sustainable re-use of material in a manner that minimises waste and maximises retention of material on-site.

4.4.2. AVAILABLE TECHNOLOGIES

Potential remedial technologies that can be applied to remediate the identified contaminants of concern (Table 7) are summarised in Table 8, overleaf. The remedial techniques considered would potentially break any source-pathway-receptor linkages, thereby reducing the risk to human health and controlled waters.



Table 8 **Soil Remediation Technologies**

REMEDIAL TECHNOLOGY	CLASSIFICATION	APPLICATION	MEDIUM	LINKAGE ELEMENT AFFECTED
Cover system	Containment	In situ	Soil	Pathway interruption
Excavation and offsite disposal	Civil Engineering	Ex situ	Soil/groundwater	Removes source
Pathway Interruption – Specialist Mitigation by ventilation and impermeable barriers	Physical Pathway Interruption	Design of buildings with passive ventilation and specialist membranes	Hazardous gasses and vapour.	Source / Pathway interruption
Reduction of permeable areas	Civil Engineering	Design of development	Soil/groundwater	Source / Pathway interruption



4.4.3. SELECTION OF REMEDIATION TECHNOLOGY OPTIONS

Several remedial technologies have been considered in addressing the contaminant linkages of concern identified at the site as summarised in Table 9, overleaf.

In order to assess which of these technologies are most viable for this particular project, each technology has been reviewed on the basis of applicability, permissibility, cost, timescale and acceptability (including sustainability).

A combination of remediation solutions and technologies will be required to address and treat the numerous contamination issues identified on this site.

Aspects of sustainable remediation are also included within the review element of applicability.

Sustainable remediation is, 'the practice of demonstrating, in terms of environmental, economic and social indicators, that the benefit of undertaking remediation is greater than its impact and that the optimum remediation solution is selected through the use of a balanced decision-making process', (as defined within 'A Framework for Assessing the Sustainability of Soils and Groundwater Remediation', produced by Sustainable Remediation Forum UK, dated March 2010).



Table 9 Assessment of Remediation Technologies Applicability

REMEDIAL TECHNOLOGY	APPLICABILITY	REGULATORY APPROVAL / PERMITS	COST	TIME-FRAME	SCORE	SUITABILITY COMMENT
Cover system	5	5	5	5	20	Essential remediation solution to remove direct exposure pathways.
Excavation and offsite disposal	5	5	1	5	16	Limited by the cost being prohibitive. Small quantities of material that cannot be treated will be removed. Likely to form one aspect of the remediation approach.
Pathway Interruption – Specialist Mitigation by Ventilation and Impermeable Barriers	5	5	2	5	17	Essential remediation solution to remove direct exposure pathways.
Reduction of permeable areas	5	5	5	5	20	Essential remediation solution to remove direct exposure pathways.

Note for Table 9 The scoring methodology is presented below

SCORE	APPLICABILITY	PERMISSIBILITY	COST	TIMEFRAME	ACCEPTABILITY (INCLUDING SUSTAINABILITY)
0	Not applicable, available or implementable	No chance of obtaining a permit			N/A
1	Not widely used and probably not applicable	Permitting will probably be difficult	Very High	Treatment time does not meet the client's requirements	N/A
2	Widely used but probably not applicable or not widely used and may not be applicable	Permitting may be difficult	High	Treatment time almost meets the client's requirements	N/A
3	Widely used but may not be applicable or not widely used but probably applicable	No permitting problems	Moderate	Treatment time meets the client's requirements	N/A
4	Widely used and probably applicable or not widely used but proven and applicable		Low		N/A
5	Widely used, proven and applicable		Very Low		N/A



Considerations	Contaminant type; Soil conditions; Groundwater considerations; Availability; Proven track record; Requirements for additional treatment; Whether technology is implementable at the site; Ability to attain remediation goals.	Emissions; Discharges; Noise; Planning; Mobile Treatment License; Environment Agency.	Indicative costs data from professional experience.	Site requirement for treatment within 12 months.	Client acceptance; Regulatory acceptance; Site acceptance; Other potential stakeholders' acceptance.
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4.5. SUMMARY OF PREFERRED REMEDIATION OPTIONS

Based on the options appraisal, it is considered that the following combination of remediation technologies provides the most sustainable, viable and economical solutions that will ultimately result in the successful remediation of the site:

- ✦ The construction of a designed and validated clean **cover system** ensures no direct exposure pathway to future receptors.
- ✦ Construction of dwellings with **specialist membranes** and mitigation measures to ensure no ingress of volatile phase hazardous compounds into a dwelling; and,
- ✦ **Off-site removal** of hazardous materials which cannot be treated (if required). This operation needs to be limited to materials that cannot be treated on-site to promote sustainability and ensure viable regeneration; and,
- ✦ **Reduction in permeable areas** through construction of the development and areas of impermeable surfacing to reduce leaching and mobilisation of determinants.

4.5.1. CL: AIRE DOW COP MATERIALS MANAGEMENT PLAN

Where necessary, operations as outlined within the remediation enabling works rationale summarised in this report may be subject to regulation using the appropriate environmental permit, standard rules exemption and materials management plan, to be created in accordance with version 2 of the CL:AIRE *Definition of Waste: Code of Practice (DoW CoP)*.

It is noted that if the material is to be imported utilising the CL:AIRE DoW CoP from an alternative development site, then only chemically certified, clean, naturally occurring material can be transferred.

The MMP will be created with due consideration of all proposed remediation and enabling works operations prescribed within this document and will be undertaken by a qualified person with a signed declaration submitted to the EA prior to the reuse of materials on the site.

The importation of material for use within the proposed construction of a development platform will be subject to compliance with the E3P protocol for the importation of materials as set out within the specification for material import included within APPENDIX V of this report.

The deposited made ground on-site is not classified as waste under the Control of Pollution Act 1974, as there was no formal waste management licence issued for its placement. In the absence of regulatory designation as a waste, the material does not fall within the legal framework governing waste disposal and management. Given this, a CL:AIRE Definition of Waste: Development Industry Code of Practice (DoW CoP) Materials Management Plan (MMP) is an appropriate mechanism for reusing site-won materials.

The DoW CoP allows for the legitimate reuse of materials where they are demonstrated to be suitable for use, pose no unacceptable risk to human health or the environment, and are used in line with an approved remediation or earthworks strategy. Compliance with the DoW CoP ensures that material movements are properly recorded, tracked, and managed in accordance with industry best practice, avoiding the unnecessary classification and regulatory burden associated with waste management legislation.



5. REMEDIATION AND SITE-ENABLING WORKS

The proposed operations as set out herein, document the required performance objectives and validation sampling protocols; however, the specific methods of work deployed to ensure the remediation objectives are achieved in a compliant manner on-site, will be the responsibility of the appointed contractor.

5.1. REMEDIATION AND ENABLING WORKS

5.1.1. RE 1: PRE-COMMENCEMENT REGULATORY COMPLIANCE

Prior to commencement of any works on site, all reports relating to the assessment of risk to contaminated land should be submitted to the regulatory authorities to gain written approval.

All relevant Standard Rules Permits should be registered with the Environment Agency by the contractor.

The LAPC Part B Notification for deployment of mobile crushing plant should be implemented prior to the establishment of equipment on site.

If the proposed volume of soils to be reused (excluding crushed materials) exceeds the parameters of the Standard Rules Permit, a CL:AIRE Materials Management Plan (MMP) qualified declaration should be made by the contractor, having obtained full written approval for the remediation strategy from the Local Planning Authority and Environment Agency.

It is not anticipated that there will be any requirement to treat any materials on-site (such as hydrocarbon-impacted soil or groundwater); however, should any previously unidentified contamination be encountered, the contractor must either notify E3P and, if appropriate, relevant regulators of their intention to complete a minor works operation or arrange for the deployment of the appropriate environmental permit for the specified operation.



5.1.2. RE 2: FURTHER SAMPLING (PREVIOUSLY INACCESSIBLE AREAS)

Following the removal of dense vegetation that is not intended to be retained in the west, at the northern boundary and site periphery, further sampling is recommended to provide further site characterisation.

The further sampling will be completed in conjunction with remediation and enabling works. Samples should be sent for a full suite of analysis to include heavy metals, asbestos, hydrocarbons and speciated PAHs. If material is identified that poses a risk within the context of the developed CSM, it will be delineated by close centred sampling prior to either placement in an area of no sensitivity or removal from site.

If any as yet unidentified contamination is identified, this will be the subject of further investigation including laboratory analysis and subsequent assessment of risk within the context of the agreed parameters. Where a theoretical risk to either human health, controlled waters or the wider environs is identified, appropriate remediation works are to be instigated by the placement of clean cover systems to break the pathway or delineation and source removal where required.

Snapshot of Ground Investigation Limitations Plan



5.1.3. RE 3: INDEPENDENT VALIDATION AND SITE SUPERVISION

It will therefore be necessary to instigate the site-wide remediation and enabling works with advice from a suitably qualified and independent specialist that is familiar with this report. The specialist is required to attend the site on a part-time basis in order to record ground conditions and to monitor progress and quality of works completed by the contractor.

Frequencies of site attendance may need to change depending on specific operations that are being completed.



5.1.4. RE 4: ENVIRONMENT AND NUISANCE CONTROL

The LCRM requires that due consideration be given to the following key issues which will impact the appropriate selection of suitable remediation options.

Management of all works is required to ensure that no environmental nuisance is created through dust emissions, noise or vibration levels.

All works are to be completed in a manner so as not to create any structural risk to the adjacent highways.

Temporary works are to be implemented as necessary to support excavations throughout the works.

In the event that a complaint is made with respect to dust emissions, noise or vibration levels, remedial measures and a programme of ongoing monitoring should be agreed upon with the local authority and implemented on-site.

5.1.5. RE 5: RISK TO INFRASTRUCTURE AND NICO DITCH

Site works should be completed in a manner that ensures no risk of disturbance to the adjacent infrastructure and Nico Ditch which bisects the centre of the site.

5.1.6. RE 6: SURFACE WATER MANAGEMENT PLAN

Prior to works commencing on site, a Surface Water Management Plan (SWMP) should be prepared. All works should be completed in accordance with the SWMP to ensure water management is effectively controlled throughout the remediation process to minimise any potential impacts on hydrology and the wider environ.

5.1.7. RE 7: SITE CLEARANCE OPERATIONS

Vegetation should be removed in a controlled manner with full compliance with any ecological mitigation measures that are required for the works. Any such measures are outside the scope of this report.

Any above-ground waste/fly tipping – contractor should visit site and determine waste materials and responsible.



All vegetation should either be stockpiled at a pre-agreed location or alternatively removed from site in accordance with waste permitting regulations.

5.1.8. RE 8: IDENTIFICATION, ISOLATION AND TREATMENT OF INVASIVE PLANTS

The remediation contractor must satisfy themselves concerning the extent of all species deemed invasive prior to the commencement of works on site. The contractor shall employ a suitably qualified expert to investigate the presence of invasive plant species on or adjacent to the site. If invasive plant species are identified, these will be treated in strict accordance with an approved method statement to be submitted to the supervising consultant for review before the instigation of any works.

Where invasive plant species are identified at the site boundary, a suitable barrier shall be installed to prevent any future reinfestation of the subject site.

Upon completion of the eradication of all invasive species, a validation report should be prepared documenting all identified invasive plant species, their location and the treatment methodology. Where materials are removed from site, all waste transfer notes/duty of care certificates should be included within the validation statement.



5.1.9. RE 9: DELINEATION, EXCAVATION AND TREATMENT OF IDENTIFIED ASBESTOS IMPACT

Asbestos in the form of loose chrysotile, amosite and crocidolite fibres has been identified in the Made Ground across the site in WS101, WS102, WS112, WS201 and CP201 at depths of between 0.50 – 5.00 m bgl. Quantification has been carried out on all positive samples which indicates volumes of asbestos between 1.18% (WS101) to 0.01% (WS112). Asbestos quantification within WS110 has identified trace fibres (<0.001%). Further to this ACM materials were identified around the periphery of the site, as well as intact pieces within the soils during the investigation.

Due to the nature and age of the filled material, it must be assumed that trace fibres are present throughout the Made Ground. The E3P Developed Conceptual Site Model (APPENDIX III) demonstrates a suitable method for the management of soils to negate any future risk.

The contractor must ensure that all personnel working on site are trained in the identification of Asbestos Containing Materials (ACM) and the risks associated with impacted soils.

Where any visual evidence of ACM is identified, these materials should be carefully segregated and removed from the soil matrices (if/where possible).

Validation sampling of the processed Made Ground should be completed to demonstrate compliance with the developed conceptual site model.

This process should be completed under strict controls to be devised and employed by the nominated contractor to ensure no potential for fibre release into ambient air.

Reassurance air testing in accordance with the requirements of HSG248 should be completed during the operation to move the soils to demonstrate the deployment of the required control procedures and safe working methods.

An Asbestos Management Plan will be required and completed under separate cover.

Snapshot of Asbestos Impact





5.1.10. RE 10: FURTHER ASSESSMENT OF MERCURY

Elevated total mercury has been identified within Made Ground deposits within TP116, TP119, CP201, CP203 and WS204.

Further speciation testing should be completed to confirm the type of mercury present and whether it presents a vapour risk. Should it be vapour risk, this will be mitigated by the installation of suitable vapour proof membranes within the proposed structures. If potentially volatile mercury remains, this will be considered in the vapour risk and mitigation design for dwellings.

If further testing confirms that no elemental mercury is present, a higher GAC can be used (30 mg/kg) therefore the samples currently exceeding for elemental mercury will fall below the threshold for organic mercury, therefore there would be no residual risk.

Snapshot of Mercury Exceedances





5.1.11. RE 11: EXCAVATION, BREAKING AND PROCESSING OF ALL ABOVE AND BELOW GROUND STRUCTURES

Obstructions, relict foundations and infrastructure (apart from live services) are to be removed from the areas of proposed residential development, including plot footprints, rear gardens, private driveways, adopted highway and utility infrastructure (road box) in their entirety.

Artificially hard materials should be broken out and crushed. Stockpiles will be made, validation testing undertaken, and site-won material reused on-site where required. Materials will be processed as per the specifications provided in a Geotechnical Earthworks Specification using the licensed plant.

The E3P drawings denote the extent of known historic features with obstructions; however, it will be the contractor's responsibility to remove all obstructions.

Obstructions encountered within the near-surface soils will be chased to their full depth and removed; if not possible, the obstruction must be surveyed with the location communicated to E3P, the client and the developer.

Where natural soils are present at a relatively shallow depth, extreme care should be taken to ensure that the natural cohesive deposits remain undisturbed with a full reduced-level survey to be completed to map the depth of filled/processed material.

The extent of turnover will be dictated by the final foundation solution and will be subject to re-engineering in accordance with a geotechnical design report, to be completed under a separate cover.



5.1.12. RE 12: DELINEATION, EXCAVATION AND TREATMENT OF INFILLED HISTORICAL CLAY PITS AND PONDS

Prior to the commencement of the main earthworks (where possible), all known former infilled clay pits and ponds should be identified and demarked and investigated to assess the nature of materials and the extent of any deleterious elements.

The highwall of the former clay pits should be identified following the removal of dense vegetation which previously inhibited the investigation, to ensure plots do not span varying matrices and are at risk of differential settlement.

The location of known historic infilled clay pits and ponds are identified within the E3P Historical Features Plan (Drawing 17-403-003 in APPENDIX III).

All materials that are deemed to be organic – and thus exhibiting unsatisfactory geotechnical properties must be removed, with the resulting excavation to be backfilled with materials deemed compliant with the Geotechnical Performance Specification with appropriate compaction for the intended land use.

A suitably qualified geotechnical engineer will need to monitor the works and confirm when all unsuitable material has been excavated and removed from beneath any proposed structure or infrastructure.

Snapshot of Former Clay Pits and Ponds



5.1.13. RE 13: IMPORTATION OF MATERIALS FOR USE IN CONSTRUCTION

Where there is a net shortfall of material required to achieve the proposed ground levels, it will be necessary to import natural inert soils and aggregate as per the engineering requirements.

Imported material must be certified as suitable for use in strict accordance with the chemical and geotechnical performance criteria, and in conjunction with the required duty of care notes and waste transfer exemption.

If recycled aggregates are imported, then laboratory testing should be completed to demonstrate compliance with the Waste and Resources Action Programme (WRAP) protocol.



Where inert soils are imported, laboratory testing should be completed in accordance with the requirements of the pertinent environmental permit (i.e. U1 Standard Rules) or CL:AIRE MMP for the reuse of clean, naturally occurring soils.

5.1.14. RE 14: PREPARATION OF COVER SYSTEM

Where the remediation technology has been identified for soft-standing cover systems, it will be the contractor's responsibility to prepare the area to facilitate the placement of the clean cover system during the development phase of the works.

The preparation of the areas requiring clean cover is critical in ensuring delivery of the site in a manner that will ensure no risk to the proposed end users.

Where Made Ground is deemed unsuitable for retention in a garden, the area will be subject to a reduced-level dig to remove unsuitable material to a level that would allow the placement of the cover system or verified natural stratum (whichever is the shallower) underlain by a suitable break layer.

Excavated soil will be stockpiled pending the results of the appropriate validation testing (to be completed in accordance with this specification) prior to reuse in an area of no sensitivity or, where necessary, this material will be removed from the site following UK waste management legislation.

Tree root protection zones are present on site surrounding all mature trees which are to be retained as part of the development. Due to the tree root protection areas, limited soils can be excavated to install a full depth clean cover system.

All visible asbestos fragments within POS/tree root protection areas will require hand picking, the top 150 mm of existing soil will then require testing to confirm the asbestos quantification. A minimum of 100 mm clean certified topsoil and grass/turf will be required overlying the existing ground where <0.001 % asbestos is identified. If greater concentrations of asbestos are identified, the depth of clean cover may need to be increased. Assessment following testing will be completed to determine the requirement for a geotextile break layer.

The placement of certified subsoil and topsoil will be completed as part of the developer works/build-phase mitigation plan. All garden areas where a cover system is required will be subject to plot-specific independent validation by E3P.

The DEFRA / Environment Agency guidance states '*that conflicts of interest in verification should be avoided. A contractor certifying their own work is considered to be a conflict of interest and is not good practice. If verification is carried out by the same company (or related company) that carried out the work, then the process, results and report will need to be audited by an independent consultant*' (Environment Agency, 2010a).



5.1.15. RE 15: STOCKPILE ARRANGEMENT

Whenever it is envisaged that the use of the materials will occur in excess of one year from being stockpiled/stored, a time limit has to be agreed with the Environment Agency. The decision relating to the length of storage will be made within the context of the extant planning permission or agreed programme of works. Supporting information may be requested by the Environment Agency in the form of the Soil Resource Plan.

The proposed location of any stockpiles must be pre-agreed with the developer and remediation engineer prior to stockpiling commencing.

Soil will be stripped or excavated during the construction process. In order to enable its reuse on-site at a later stage, soil needs to be stored in temporary stockpiles to minimise the surface area occupied, and to prevent damage from the weather and other enabling works/construction activities.

Stockpiled soil must not be vulnerable to compaction or erosion; must not cause pollution to surrounding watercourses; and must not increase flood risk to the surrounding area.

Soils will not be stockpiled within 8 m of surface water features, will not block surface runoff pathways, and will preferably be located in Flood Zone 1. In addition, sufficient gaps will be left in/between stockpiles so as to not impede flood flow pathways.

Stockpiles must be appropriately marked out and clearly signed to ensure that they are easily identifiable for reinstatement.

Soil should be stored in an area of the site where it can be left undisturbed and will not interfere with site operations. Ground to be used for storing the topsoil should be cleared of vegetation and any waste arising from the development.

The locations and footprints of each stockpile will be accurately recorded on a plan of appropriate scale. Marker posts will be provided in locations which have been surveyed and recorded to provide volumes for each stockpile type. Photographic records of stockpiles will be provided at the point of handover to the developer

Stockpiling should follow the guidance set out in Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites with the appropriate method adopted based on the soil type for the creation of stockpiles (method 1 or 2).

Stockpiled material that may pose a risk to the environment will be required to be stored within an impermeable bunded area that is adequately sealed with a membrane sufficient to prevent rainfall from entering the bund or stockpile. Typically sheeting is laid to lap over the extent of the bund sidewalls and sealed with soil around the periphery.

Stockpiled soils will require chemical analysis at the frequency defined within Table 10 based on the soil type and use.



5.1.16. RE 16: PROVISION OF SUBSOIL

Chemical analysis of the natural clay superficial deposits has identified these soils to be acceptable and do not pose a risk to the site however given the significant depths these have been encountered; it is unlikely to be a sustainable and viable source of subsoil. Further sampling will be required to understand if any shallow natural superficial deposits are available/suitable for re-use within the proposed cover system. Therefore, there may be a requirement to import subsoil during the build phase.

The garden and landscaped areas will require depth validation to satisfy the requirement of the Council of Mortgage Lenders (CML) in order to demonstrate that the appropriate thickness has been provided as a growing medium.

Sub-soil stockpiles should be placed in areas that will ensure no 'cross contamination' from materials with significant anthropogenic influence on-site.

5.1.17. RE 17: WASTE SOILS SURPLUS TO REQUIREMENTS

In the event that a surplus of excavation material is present on site, this, in most cases, will be deemed to be a waste in accordance with the Waste Framework Directive (Article 3(1) Waste Framework Directive 2008/98/EE). The waste producer – but ultimately, the landowner – is responsible for the compliant disposal of such materials.

A formal waste classification assessment must be undertaken, irrespective of any future options or considerations for those materials that will be removed from the site. Waste classification should only be made following the Environment Agency *Technical Guidance WM3 – Guidance on the Classification and Assessment of Waste*.

To remove the surplus material from the site it will either need to be sent to a disposal site (landfill), to a permitted treatment facility or, dependent on the waste classification assessment, it may be suitable for use on a permitted land improvement or restoration operation.

Subject to suitability, these soils can be transferred to the receiving site, subject to an approved permit or materials management plan following guidance in the CL:AIRE *Definition of Waste: Code of Practice*.

5.1.18. RE 18: GENERAL VALIDATION OF STOCKPILED MATERIALS AND TURNOVER REQUIREMENTS

Further investigation is required within areas that were previously inaccessible to provide further site characterisation. The appropriate remediation actions have been defined within this strategy to ensure that the site will be suitable for the intended use.



There is no requirement for further general testing of either Made Ground or natural soils, which will be nominally turned over, processed or subject to a direct cut / fill as part of the enabling earthworks.

Where materials are subject to specific stockpiling (Made Ground or Natural), such materials will be subject to the geo-chemical validation requirements for the re-use of stockpiled materials.

5.1.19. RE 19: VALIDATION OF MATERIALS FOR POTABLE WATER SUPPLY INFRASTRUCTURE

Elevated concentrations of potentially volatile/soluble hydrocarbon compounds have been identified that will necessitate the use of protected water supply pipe-work.

All materials where organic hydrocarbon impact is identified at concentrations above the UKWIR assessment criteria for a polyurethane pipe within the proposed locality of potable water supply infrastructure should be delineated and removed by the remediation contractor under the supervision of the Geoenvironmental consultant.

Validation sampling should be completed at 10 m chainage at depths of 0.75 m and 1.50 m within the locality of the potable supply pipes where impacted material is removed, with samples analysed for all pertinent volatile and semi-volatile hydrocarbons and, where necessary, chlorinated/halogenated compounds.

Upon successful remediation of all impacted materials, the post-remediation validation testing will be reviewed by a qualified person to inform an updated UKWIR assessment to be reviewed and approved by the statutory adoption authority.

If unacceptable concentrations remain following remediation, then potable water infrastructure should be constructed in accordance with a suitably robust risk assessment and design compliant with UKWIR.

Where imported material is required to construct the potable water infrastructure pipework, this material will need to comply the requirements of UKWIR pipework thresholds for the specified pipework. Failure to meet the required specification may necessitate further remedial works.



5.1.20. RE 20: POST REMEDIATION AND ENABLING WORKS GROUND GAS MONITORING AND FURTHER ASSESSMENT

Following remediation and enabling works it would be beneficial to complete post remediation ground gas and vapour monitoring to confirm the residual site condition which will fully inform the design of the mitigation measures to ensure no intrusion of geogenic methane and carbon dioxide, and aromatic hydrocarbon compounds.

Following the construction of the development platform, a minimum of 8 no. monitoring wells will be required to be installed with response zones in the remediated Made Ground.

Continuous ground gas monitoring over a four week period is recommended. Longer interval monitoring periods may be required at the behest of the local authority.

The post remediation and enabling works ground gas monitoring regime will need to be agreed with the local authority prior to the installation of the monitoring wells.

5.1.21. RE 21: REMEDIAL VERIFICATION REPORT

Collation of information relating to site clearance, chemical testing, remedial works, remedial verification, material movements and waste transfer documentation is required, where appropriate.

Complete remedial validation is to be reported in line with regulatory guidance. This will include a detailed risk assessment. The report will be submitted to the local authority for approval following completion.

The Verification Report will conclude the site remediation and enabling works with the Build Phase validation to be produced separately.



5.1.22. RE 22: REMEDIATION PROJECT CHANGE, ADJUSTMENT AND UPDATES TO REQUIRED WORKS

LCRM states the following with respect to the completion of remediation works:

- ✳ Ensure remediation is done in line with the remediation strategy and regulatory controls
- ✳ React to testing results or monitoring data promptly
- ✳ Manage unexpected contamination
- ✳ Allow time to get and interpret the data without delaying progress
- ✳ Use a different solution or contingency measure if the data shows that the remediation is not working
- ✳ Ensure any method statements are correct and kept up to date

Remediation work is an iterative process, and as such, it will be managed by the specialist contractor on site, the supervising engineer, the professional project team and the client.

Where possible, regulatory authorities will be informed of ongoing changes to the project and specific remediation requirements; however, works must be allowed to proceed under professional judgment without the requirement to revise the formal remediation strategy.

All project adjustments will be fully documented and detailed within the validation report. For absolute clarity, professional judgement will be made by Chartered professionals supervising the remediation works. It is considered that there is no requirement for any revision to a Remediation Strategy on the basis that adjustments are made due to unforeseen circumstances, which are reviewed and approved by a Chartered professional within the project team. The approved remediation strategy is an iterative document that allows flexibility and changes based on specific circumstances.

5.2. VERIFICATION PLAN

5.2.1. VALIDATION SAMPLING PROTOCOL

In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be subject to movement under the protocols outlined within this remediation and enabling works strategy or for materials to be imported onto site to facilitate the proposed residential development.

Soil samples destined for chemical analysis will be collected at regular intervals in appropriate sampling containers. All samples will subsequently be stored in cooled boxes prior to submission to a UKAS or MCERTS-accredited laboratory.

All samples will be collected using appropriate personal protective equipment (PPE) and sampling equipment, which will be cleaned at each sampling location to remove the risk of cross-contamination.

The sampling frequency for materials to be managed under the remediation strategy is presented in Table 10. The validation sampling protocol has been developed utilising guidance from the Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG) due to wide usage of this guidance amongst Regulatory Authorities.

Table 10 Specification of Chemical Validation Laboratory Analysis

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Site-Generated		
Site-Generated 6F2	1 Sample per 500 m ³	A/B/C/D
Site-Won Made Ground General Backfill	1 Sample per 250 m ³ where visual and/or olfactory impact is identified	F
Stockpiled Made Ground General Backfill	1 Sample per 1000 m ³	A/B/C/D
Stockpiled Made Ground General Backfill	1 Sample per 2000 m ³	G
Stockpiled Natural Backfill	1 Sample per 2000 m ³	A/B/C/D
Site-Generated Subsoil (Cover system)	1 Sample per 100 m ³	A/B/C/D
Imported		
Recycled Aggregate	1 Sample per 500 m ³	A/B/C/D
Virgin Quarried Aggregate	2 samples per source	D
Subsoil Greenfield Source (Cover system)	1 Sample per 200 m ³ (minimum 3 from source)	A/B/C/D
Subsoil Brownfield Source (Cover system)	1 Sample per 50 m ³ (minimum 6 from source)	A/B/C/D
Topsoil Greenfield Source (Cover system)	1 Sample per 200 m ³ (minimum 3 from source)	A/B/C/D
Topsoil Brownfield Source (Cover system)	1 Sample per 50 m ³ (minimum 6 from source)	A/B/C/D
General Engineering Fill (Class 1 and 2 Soil)	1 Sample per 1000 m ³	A/B/C/D

Notes:

Suites of Analysis:

A. Speciated PAH.

B. Speciated TPH (C5-C35, BTEX, MTBE).

- C. Asbestos (ID).
- D. CLEA Inorganic Heavy Metals.
- E. SVOC/VOCs
- F. On-Site Screening for VOC Using Calibrated PID.
- G. Leachate Analysis of Inorganic Heavy Metals, TPH, Sulphate and PAH.
- H. Asbestos Quantification

5.2.2. IMPLEMENTATION OF THE VERIFICATION PLAN

Implementing the verification plan is an iterative process, with the process only complete when you have ended monitoring or sampling and produced the verification report.

In accordance with LCRM, all relevant data as set out in the verification plan will be collected to ensure verification reporting accurately reflects all works carried out.

Performance against all remediation criteria will be assessed to ensure that the remediation objectives are being achieved. This may be a complex operation where criteria relate to several remediation activities, phases or timescales, and a phased approach may be taken if prior agreement has been sought from the relevant regulatory authorities.

5.2.3. RISK-BASED ASSESSMENT FOR NON CONFORMANCE

Where the material is found to contain concentrations of potential contaminants at levels in excess of the site-specific screening criteria (as detailed within APPENDIX IV), E3P will undertake further assessment and recommendations on the appropriate use for the material in question, which may involve the disposal of such materials off-site to a suitable waste management facility.

5.2.4. REMEDIATION OBJECTIVE REVIEW

A contingency plan is provided in Section 8 of this report to identify what action to take if results fall outside of the acceptable limits. It is possible that remediation objectives and criteria may need to be reviewed to modify the remedial process or consider other options.

Data that may lead to a further review include:

- ✳ A change in conditions such as temperature or pH.
- ✳ A decline in contaminant concentrations not as predicted.
- ✳ A contaminant plume that does not shrink or stabilise as predicted during monitored natural attenuation (MNA) or in situ treatment.
- ✳ A diminishing return in efficiency for example, in soil vapour extraction, air sparging or pump and treat.
- ✳ A change in groundwater flow or head-up gradient of a slurry wall or permeable reactive barrier.
- ✳ A failure to prevent the migration of ground gases for example, by passive venting, containment or active abstraction.

Any changes to the original remediation objectives will be justified, recorded and agreed with the details provided in the verification report upon completion of the remediation works.

5.3. REMEDIATION CONTRACTOR'S SITE MANAGEMENT AND RESPONSIBILITY

The appointed remediation contractor will take full and overarching responsibility for all methods of work required to complete the site remediation and enabling operations to ensure the delivery of the site and the completion of the objectives in a safe, legislatively compliant manner that ensures no pollution to the subject site or the wider environs.

For individual remediation operations as set out within this performance specification, the contractor will provide site-specific methods of work for individual operations pertaining to the removal and treatment of contaminated liquids and soils. For each operation as set out herein, the contractor will provide a written methodology of works to be supplied to the supervising Geoenvironmental engineer prior to the instigation of operations on site.

The site manager will be responsible for documentation of each day's activities with a full recorded schedule of works completed and corresponding site-specific method statements that have been utilised to ensure the completion of the task to the required standard.

6. MATERIALS MANAGEMENT & LEGISLATIVE COMPLIANCE

The processing of recycled aggregates will be completed using LAPC Part B licenced plan with the appropriate deployment notification to the local authority prior to commencement of works. All materials that are recovered as recycled aggregate will be compliant with the E3P validation testing requirements and as such would not be deemed to be a waste material where there is a certainty for their reuse on site.

A U1 Exemption will be registered for the site, which allows the reuse of up to 5000 T of prescribed material within construction, with up to 25,000 T of material permissible to be reused in the construction of roads. It should be noted that only 1000 T of material described as sand, stones or clay soil classified as waste can be reused with a U1.

A T5 Exemption, allowing for the screening and recovery of up to 5000 T of permissible material for subsequent reuse in construction, will also be registered.

All materials that are recovered under the WRAP protocol, U1 or T5 exemptions must be analysed to demonstrate that they are both chemically and structurally suitable for use within the context of the development.

The relevant LAPC, U1, T5 and WRAP licenses, exemptions and protocols provide the legislative framework for material compliance during the site remediation and enabling works to be completed by the specialist contractor and validated by E3P.

Where necessary, operations as outlined within the remediation enabling works rationale summarised in this report may be subject to regulation using the appropriate environmental permit, standard rules exemption and materials management plan, to be created in accordance with version 2 of the CL:AIRE *Definition of Waste: Code of Practice (DoW CoP)*.

Under the Waste Framework Directive, certain waste materials, even once processed under exemptions, continue to be classified as waste until they have fully recovered or are no longer a waste for other reasons. To facilitate the reuse or recovery of these waste materials, it is essential the correct framework is in place, including appropriate exemptions, permits or quality protocols.

It is noted that if the material is to be imported utilising the CL:AIRE DoW CoP from an alternative development site, then only chemically certified, clean, naturally occurring material can be transferred.

If required, the MMP will be created with due consideration of all proposed remediation and enabling works operations prescribed within this document and will be undertaken by a qualified person with a signed declaration submitted to the EA prior to the reuse of materials on the site.

The importation of material for use within the proposed construction of a development platform will be subject to compliance with the E3P protocol for the importation of materials as set out within the specification for material import included in APPENDIX V of this report.



7. RECORD KEEPING AND VERIFICATION

7.1. RECORD-KEEPING

During the remediation and site enabling works, the contractor will undertake the following record-keeping protocols:

- ✳ Detailed site diary including material movements;
- ✳ Sampling register, testing results, photographs, details of locations of contaminated soils (drawings), details of hotspot removals, details of consignment notes of any hydrocarbon-impacted material that is required to be disposed of off-site; and
- ✳ Detailed surveys (volumes).

Record-keeping on site, in particular movements and analysis of specific material types, will be in the form of site diaries and a remediation excavation record. This record will remain on site and will be completed by the E3P on-site engineer during the remediation and site enabling works.

7.2. VERIFICATION REPORT

Following the completion of the remediation works and the provision of site records from the contractor, to demonstrate that all of the remediation works have been undertaken in accordance with the Remediation and Enabling Works Strategy, E3P will provide a Verification Report.

The report will provide a summary of the key elements of work and will be referenced to the agreed redevelopment strategy and planning requirements with supporting information presented within appendices.

The Verification Report will be based upon LCRM (July 2023) and will incorporate a summary and commentary of, where applicable:

- ✳ Background information on the site;
- ✳ Statutory and regulatory requirements;
- ✳ Details of the remediation required;
- ✳ Decision records covering agreements with regulators;
- ✳ Records of works undertaken and associated validation and monitoring records obtained from the contractor (chemical and geotechnical testing data, import sources, consignment notes etc);
- ✳ E3P's supervision records;
- ✳ Detailed drawings showing all sampling locations for chemical and geotechnical validation sampling;
- ✳ Specialist contractor's validation reports for particular elements of work;
- ✳ Detailed surveys of all excavations and production of as-built drawings;



- ✿ Final status of remediation and achievement of remedial objectives to satisfy planning conditions; and,
- ✿ Additional risk assessments/non-scheduled reactive works undertaken or details of any unexpected contamination.

On completion of the verification works, the appropriate documentation will be forwarded to the client and the regulatory authorities.

In most cases, a Verification Report will be produced once the remediation works have been completed, however, there may be instances where the remediation is phased and separate Verification Reports may be required.

E3P considers that with the adoption of the above best practices, the site can be safely redeveloped. The site enabling works process and the presence of any residual contamination (if this is the case) should be recorded for future reference by landowners/occupiers. Future development at the site where this may result in penetration of new areas of hardstanding should be subject to no-less-stringent measures with respect to assessment and, where appropriate, monitoring, than those set out herein.



8. CONTINGENCY PLAN

8.1. PREVIOUSLY UNIDENTIFIED CONTAMINANTS

Should significantly impacted material be encountered during the development, then it will be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.

Once the laboratory analysis of the material is available, an assessment will be undertaken to determine whether it can be retained on-site as part of the material management plan or whether it should be disposed of off-site.

Depending on the nature of any such impact, it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in situ.

Any amendments to the original remediation objectives will be justified, recorded and included in the Verification Report.

8.2. TPH IMPACT

TPH impacted soils have been identified across the site. It is recognised that there are some data gaps, therefore it is necessary to ensure a contingency is in place in the event that unexpected TPH impact is encountered.

If any unexpected impact is identified, in accordance with the validation protocols detailed within the earlier stages of this report, samples of the materials will be analysed to assess the requirement for treatment. If this is required, the impacted materials will be transported in covered wagons to the designated treatment area. Remediation will be undertaken with the view to be able to sustainably re-use these soils on site where possible.



9. SECOND PHASE, MITIGATION AND MANAGEMENT

9.1. OVERVIEW OF FULL PROJECT REQUIREMENTS

The risk to chronic human health associated with the elevated concentrations of inorganic heavy metals, non-volatile PAH and TPH compounds can be mitigated through the installation of a suitable cover system in all proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils.

The ground gas assessment conducted so far has classified the site as Characteristic Situation 3 (CS3) based on GSV values. Considering the characteristics of the site and the presence of infilled clay pits throughout most of the development area, a minimum classification of CS3 should be applied to all proposed buildings to mitigate the risk of gas intrusion and accumulation.

The vapour risk assessment confirms that all properties should be constructed with the installation of mitigation measures that protect against aromatic hydrocarbons and chlorinated compounds, as well as ground gases.

Following remediation and enabling works it would be beneficial to complete post remediation ground gas and vapour monitoring to confirm the residual site condition which will fully inform the design of the mitigation measures to ensure no intrusion of geogenic methane and CO₂, and aromatic hydrocarbon compounds.

In accordance with BS 8485, gas mitigation measures must be designed by a suitably qualified specialist to ensure they address the specific risks of the site. A detailed design report will be required, outlining the proposed gas protection measures, the rationale for their selection, and how they align with the risk classification. This should be accompanied by a robust validation plan to confirm the correct installation and performance of the mitigation measures, ensuring the long-term safety of the development and compliance with relevant standards and regulations.

9.2. COVER SYSTEM

This document details the construction works that are required to ensure full compliance with the remediation Strategy, Regulatory Authorities, Building Control and Warranty Providers;

The following should be implemented during the build phase of the development:

- ✚ Laboratory testing of the imported topsoil;
- ✚ Chemical validation of any additional subsoil imported for use within soft landscaping;
- ✚ Placement and validation of topsoil and subsoil underlain by 100 mm granular no dig layer within gardens and areas of soft landscaping.
- ✚ Placement of a minimum 100 mm chemically validated topsoil layer within tree root protection zones. Requirement for geotextile membrane to be determined following analysis of surface soils.



This section covers the build phase requirements with regards cover systems for soft landscaping however in relation to any further build phase validation items such as ground gas mitigation, this will be completed under a separate cover.

9.3. PLACEMENT OF COVER SYSTEM

The remediation and enabling works strategy for the site, concerning the health of the future site users, includes the provision of a chemically suitable clean material to be installed in all soft landscaped areas. The construction of the clean cover/placement of clean material shall be in accordance with Table 11.

Table 11 Construction and Validation of Cover System

SOFTSCAPE TYPE	DEPTH		BREAK LAYER Y/N/TYPE	VALIDATION FREQUENCY	TESTING SUITE	VALIDATION DOCUMENTATION
	TOPSOIL	SUBSOIL				
Back garden	150	450	Y (100 mm no dig gravel layer)	1 per plot	A/B/C/D	Validation Letter
Front garden	150	300	Y (100 mm no dig gravel layer)	1 per 10 plots	A/B/C/D	Validation Letter
LEAP (parkland)	Minimum 300mm clean cover		N	1 per 625 m ²	A/B/C/D	Validation Letter
Functional POS	Minimum 300mm clean cover		N	1 per 2000 m ²	A/B/C/D	Validation Letter
None Functional POS	N/A		N	N/A	A/B/C/D	N/A

Tree root protection zones are present on site surrounding all mature trees which are to be retained as part of the development. Due to the tree root protection areas, limited soils can be excavated to install a full depth clean cover system.

All visible asbestos fragments within POS/tree root protection areas will require hand picking, the top 150 mm of existing soil will then require testing to confirm the asbestos quantification. A minimum of 100 mm clean certified topsoil and grass/turf will be required overlying the existing ground where <0.001 % asbestos is identified. If greater concentrations of asbestos are identified, the depth of clean cover may need to be increased.

In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be imported or re-used on-site.

Subsoil and topsoil shall be free from deleterious materials, including building materials (e.g. bricks, concrete, plaster), timber, plastics, glass, metal fragments, and other unsuitable elements. Compliance will be assessed visually during sampling and inspection of the cover system to confirm the absence of these contaminants. BS 3882 testing will not be undertaken to verify compliance.

Testing requirements for topsoil and sub-soil are presented in Table 12. It should be noted that the testing requirements are in-line with the Manchester City Council cover system requirements.



Table 12 Specification for Soil Testing

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Subsoil Greenfield Source	1 Sample per 200 m ³ (minimum 3 from source)	A/B/C/D
Subsoil Brownfield Source	1 Sample per 50 m ³ (minimum 6 from source)	A/B/C/D
Topsoil Greenfield Source	1 Sample per 200 m ³ (minimum 3 from source)	A/B/C/D
Topsoil Brownfield Source	1 Sample per 50 m ³ (minimum 6 from source)	A/B/C/D
General Engineering Fill (Class 1 and 2 Soil)	1 Sample per 1000 m ³	A/B/C/D

Notes

Suites of Analysis:

- A. Speciated PAH.
- B. Speciated TPH (C5-C35).
- C. Asbestos (ID).
- D. CLEA Inorganic Heavy Metals.

9.3.1. PROCEDURE FOR PLACEMENT OF CHEMICALLY SUITABLE COVER SYSTEM

Garden and landscaped areas need to be backfilled with validated subsoil, and topsoil overlaying this. A 100 mm granular no dig layer is required.

The placement of clean material in soft landscaping will be undertaken during the build phase works of the project.

The placement of subsoil and corresponding validation will be documented within the Garden Validation Letters (to be issued on completion of the contractor's works).

If proposed utilities are to be placed within the cover system, the clean cover should be placed prior to installation of these utilities.

If natural drift deposits are encountered, excavation can cease here.

E3P will collect photographic evidence of the placement of certified topsoil and subsoil on completion of construction works. This element will also be checked by the Building Control Officer as part of the site completion prior to issuing of a CML certificate.

The garden validation procedure is detailed in Table 13.

Table 13 Garden Validation Procedure

PROCEDURE	METHOD
Chemical Validation	Imported sub-soils and topsoil will need to be chemically analysed to confirm suitability for use with the proposed cover system prior to installation and completion of the garden systems. E3P will issue an email to the appropriate party with an assessment of the chemical suitability of both sub-soils and top soils. If acceptable the materials can be installed to the required depth at which time the plot will be deemed complete following a validation procedure by a suitability qualified E3P engineer.



PROCEDURE	METHOD
Trial Holes	Trial holes are deemed necessary for all plots and must be advanced at random and should reveal the underlying break layer.
Validation	Photographic evidence will be taken by E3P of the topsoil placement demonstrating the depth of topsoil and practical completion of works are required for each and every plot. For plots where sub-soil depths require validation by E3P during the build phase, photographs will be taken and collated by E3P. It should be noted that cover systems should be installed as late as possible in the build programme to reduce the risk of cross-contamination.
Validation Certificate	Once the photographs of the placement of topsoil (over the clean material) have been provided, E3P will issue a plot-specific validation certificate to demonstrate that the required subsoil and topsoil have been placed in the required garden plots along with the chemical analysis.
Completion Report	Upon completion of all garden and landscaped areas within the development, a Completion Report will be issued providing the confirmation that all remediation requirements have been achieved.

Figure 2 provides an example of a garden validation certificate that will be required for each plot.



Figure 2 Example of Plot Cover System Validation

Plot Validation		20 / 20 (100%)
Plot Validation 1		5 / 5 (100%)
Plot Number	117	
Is Plot Ready	Yes	
Installation Standard	Pass	
Depth of Cover System Materials (record the depth and support with Photo down the hole)		1000
		
Photo 1	Photo 2	
Depth of Topsoil (mm)	150	
Depth of Subsoil (mm)	850	
Depth of Cover System at Ground Level (Photo)	☒	
		
Photo 3		
Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo)	☒	
		
Photo 4		
Soil suitable	Yes	
Geotextile membrane present	N/A	

END OF REPORT

APPENDIX I

LIMITATIONS





GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P "Terms of Business" or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.
2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.
3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.
4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEOENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

5. Coverage: This section covers reports with the following titles or combination of titles: Phase 1; Desktop Study; Geoenvironmental Assessment; Development Appraisal; Preliminary Environmental Risk Assessment; Constraints Report; Due Diligence Report; Geotechnical Development Review; Environmental Statement; Environmental Chapter; Baseline Environmental Assessment; Project Scope Summary Report (PSSR), Program Environmental Impact Report (PEIR), Geotechnical Development Risk Register; Agricultural Land Assessment; Mineral Safeguarding Assessment; Desk Top Coal Mining Risk Assessment; Hydrogeological Appraisal; Construction Environmental Management Plan; and Site Water Management Plan.
6. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.
7. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.
8. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.



9. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and does not constitute or replace full and proper surveys completed by suitably qualified and experienced specialists in these fields.
10. E3P does not warrant work/data undertaken/provided by others.

INTRUSIVE INVESTIGATION REPORTS

11. Coverage: The following report titles (or combination) may cover this category of work: Geoenvironmental Site Investigation; Geotechnical Assessment; GIR (Ground Investigation Reports); Preliminary Environmental And Geotechnical Risk Assessment; Preliminary Summary; Coal Mining Risk Assessment, Ground Gas Addendum; and, Geotechnical Risk Register.
12. The investigation has been undertaken to provide information concerning either:
 - I. The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
 - II. Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.
13. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.
14. Unless otherwise specified in the scope of works, any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.
15. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.
16. For geotechnical investigations, the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.
17. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.



18. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.
19. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, E3P has used reasonable skill and care to extrapolate conditions between these points based on assumptions to develop our interpretation and conclusions.
20. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation and at the time of the investigation.
21. Conditions can change between investigation points both spatially and over time and these interpretations should therefore be considered indicative. The assessment of extreme weather events and their impact on ground conditions is not within the scope of E3P's work.
22. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated with the risk assessment process have been outlined within the body or associated appendix of the report.
23. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.
24. Where soil contamination concentrations recorded as part of this investigation are used for commentary on the potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed and the waste classification and any subsequent disposal option agreed upon with licenced subcontractors and/or the relevant regulators.
25. The results of the asbestos testing are factually reported and interpretation is given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and/or trace loose asbestos fibres within the soil matrix at the site.
26. If costs have been included in relation to additional site works, and/or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.



EUROCODE 7: GEOTECHNICAL DESIGN

27. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.
28. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIATION AND ENABLING WORK STRATEGY REPORTS

29. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected based on the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.
30. The outputs of the Detailed Quantitative Risk Assessments are based upon the manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.
31. Before adoption on-site, assessment criteria will need to be discussed and agreed upon with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of E3P. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.
32. E3P does not accept liability for any subcontract work that has not been completed in strict accordance with an approved E3P Remediation and Enabling Works Strategy.

GEOTECHNICAL DESIGN REPORT (GDR)

33. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.



MONITORING (INCLUDING REMEDIATION MONITORING REPORTS AND BUILD PHASE MITIGATION)

34. These reports are factual and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of earthworks or remedial works.
35. The data is presented and will be compared with assessment criteria.

APPENDIX II

GLOSSARY





TERMS

ACM	Asbestos-containing material	MMP	Materials management plan
ADS	Acoustic design statement	ND	Not detected
AST	Above-ground storage tank	NDP	Nuclear density probe
BGS	British Geological Survey	NMP	Noise management plan
BSI	British Standards Institute	NPSE	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	NR	Not recorded
MRA	Mining Remediation Authority	PAH	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	PCB	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	PI	Plasticity index
CIRIA	Construction Industry Research Association	PID	Photo ionisation detector
CLEA	Contaminated land exposure assessment	POS	Public open space
CML	Council of Mortgage Lenders	PPE	Personnel protective equipment
CoC	Contaminants of concern	ProPG	Professional practice guidance
CSM	Conceptual site model	QA	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	SGV	Soil guideline value
DWS	Drinking water standard	SPH	Separate-phase hydrocarbon
EA	Environment Agency	SPT	Standard penetration test
EQS	Environmental quality standard	SVOC	Semi-volatile organic compound
FFL	Finished floor level	TPH	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	UKWIR	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	UST	Underground storage tank
HCV	Health criteria value	VCC	Vibro-concrete column
ICSM	Initial conceptual site model	VOC	Volatile organic compound
LEL	Lower explosive limit	VRSC	Vibro-replacement stone columns
LMRL	Lower method reporting limit	VSC	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	WHO	World Health Organisation
MCV	Moisture condition value	WRAP	Waste and Resources Action Programme
MIBK	Methyl isobutyl ketone	WTE	Water table elevation





m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection
PFAS	Per- and Polyfluoroalkyl Substances	MTBE	Methyl tert-Butyl Ether
EP	Environmental Permit	WFD	Waste Framework Directive
WML	Waste Management Licence		



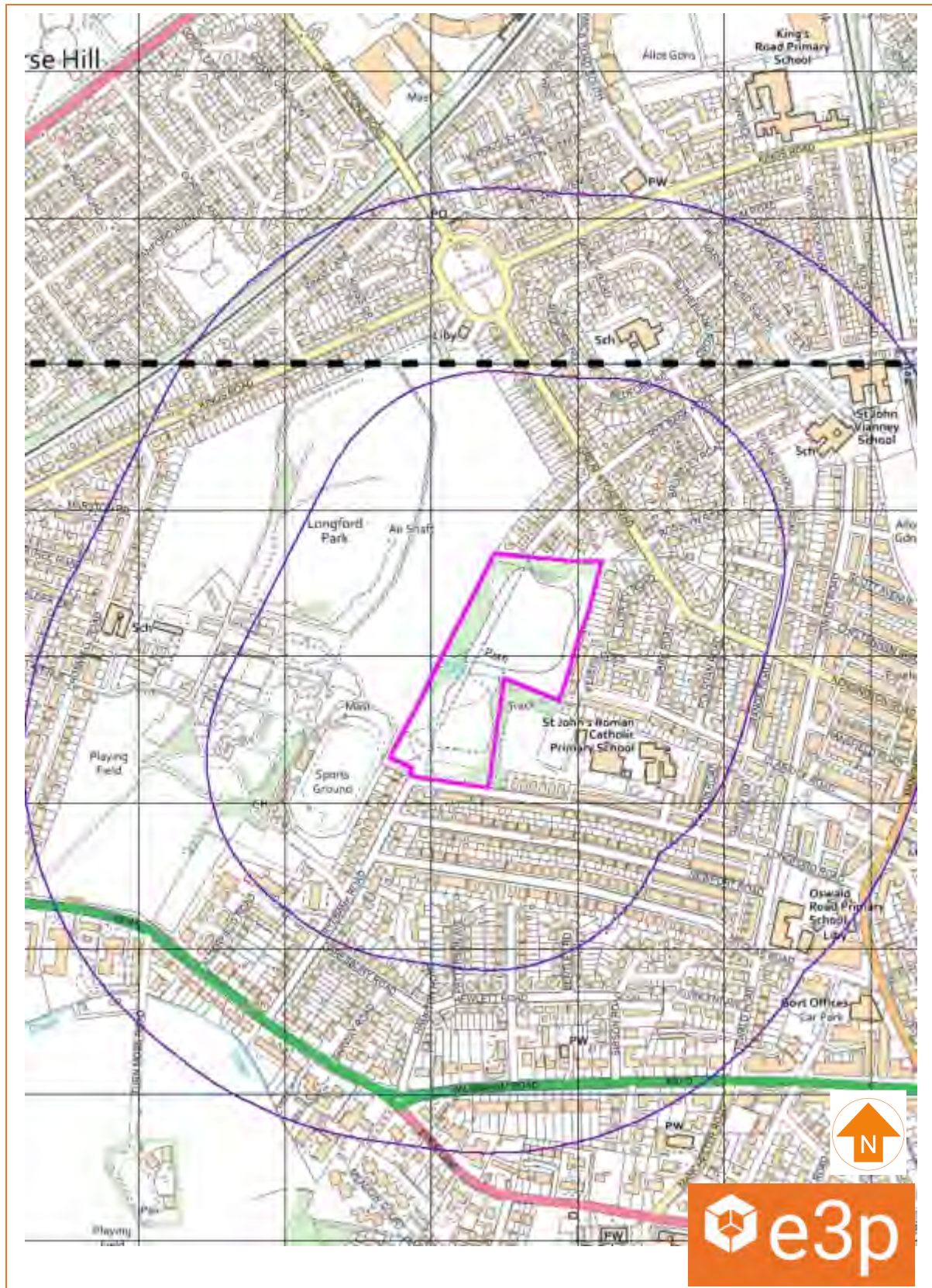
APPENDIX III

DRAWINGS





DRAWING 17-403-001 – SITE LOCATION PLAN





Notes:					
P1	REVC	14.02.2025	TG	ND	BH
P1	REVB	11.02.2025	OW	ND	BH
P1	REVA	25.09.2024	OW	ND	BH
Phase	Issue	Date	Drawn	Checked	PM

Client:	Step Places, Southway Housing Trust and Manchester Metropolitan University
	Ryebank Fields
Job Title:	

Job No:	17-403
Drawing No:	002
Drawing Title:	

Date:	14.02.2025
Scale:	NTS@ A3
Proposed Development Plan	



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Urmston, Manchester, M41 7JQ
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Historical Features

Small Building Pre 1981 - Pre 2019

Former Pond Pre 1848 - Pre 1951 / Pre 1934 - Pre 1938

Former Houses Pre 1907 - Pre 1938

Former Road Pre 1907 - Pre 1938

Unspecified Building Pre - 1848 - Pre 1894

Unspecified Boundary (Met) Pre 1978 - Pre 2019

Former Clay Pits Pre 1934 - Pre 1938

Road/Hardstanding Pre 1978 - Present

Longford Brook Pre 1848 - Pre 1951

Former Field Boundary Pre 1848 - Pre 1896

Former Drain Pre 1848 - Present

Former Embankment Pre 1951 - Pre 2000

Former Clay pit/embankment Pre 1934 - Pre 1938

BGS Recorded Mineral Site (Former Clay Pit)

Notes:

P1	REVC	11.02.2025	OW	ND	ND
P1	REVB	30.10.2024	OW	ND	ND
P1	REVA	10.10.2024	OW	ND	BH
Phase	Issue	Date	Drawn	Checked	PM

Client:

Step Places, Southway Housing Trust and Manchester Metropolitan University

Job Title:

Ryebank Fields

Job No:

17-403

Drawing No:

003

Date:

11.02.2025

Scale:

NTS@ A3

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Site Features

Trees

Dense Brambles

Footpath

Evidence of Bonfire

Access

Dense Trees

Nico Ditch

Mound with Slope Direction

Manhole Cover

Gas Markers

Hard Standing

Aspen Grove

Notes:

P1	REVD	14.02.2025	OW	ND	BH
P1	REVC	24.10.2024	OW	ND	ND
P1	REVB	29.07.2024	OW	GC	BH
P1	REVA	05.07.2024	OW	ND	BH
Phase	Issue	Date	Drawn	Checked	PM

Client:

Step Places, Southway Housing Trust and Manchester Metropolitan University

Job Title:

Ryebank Fields

Job No:

17-403

Drawing No:

004

Drawing Title:

Site Features Plan

Date:

14.02.2025

Scale:

NTS@ A3

Environmental Engineering Partnership Ltd

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Location Symbols

- Approximate Window Sample Probehole Location (E3P Locations 2024)
- Approximate Trial Pit Location (E3P Locations 2024)
- Approximate Cable Percussive Borehole Location (E3P Locations 2024)
- Approximate Cone Penetrometer Test Location (E3P Locations 2024)
- Approximate Window Sample Probehole Location (E3P Locations 2019)
- Approximate Window Sample Probehole Location with Install (E3P Locations 2019)
- Approximate Trial Pit Location (E3P Locations 2019)
- Approximate Cable Percussive Borehole Location (E3P Locations 2019)

- IP Gas Pipe with 15m Easement
- Thirlmere Aquaduct with 20m Easement
- Sewer Easement with 15m Easement

Made Ground Depth (m)

- Depth of Made Ground 1.00 - 1.49m
- Depth of Made Ground 1.50 - 1.99m
- Depth of Made Ground 2.00 - 2.49m
- Depth of Made Ground 2.50 - 2.99m
- Depth of Made Ground 3.00 - 3.49m
- Depth of Made Ground 3.50 - 3.99m
- Depth of Made Ground 4.00 - 4.49m
- Depth of Made Ground 4.50 - 4.99m
- Depth of Made Ground <5.00m

Notes:

P1	REVC	11.02.2025	OW	ND	ND
P1	REVB	08.11.2024	OW	ND	ND
P1	REVA	10.10.2024	OW	ND	ND
Phase	Issue	Date	Drawn	Checked	PM

Client:

Step Places, Southway Housing Trust and Manchester Metropolitan University

Job Title:

Ryebank Fields

Job No:

17-403

Drawing No:

007

Date:

11.02.2025

Scale:

NTS@ A3

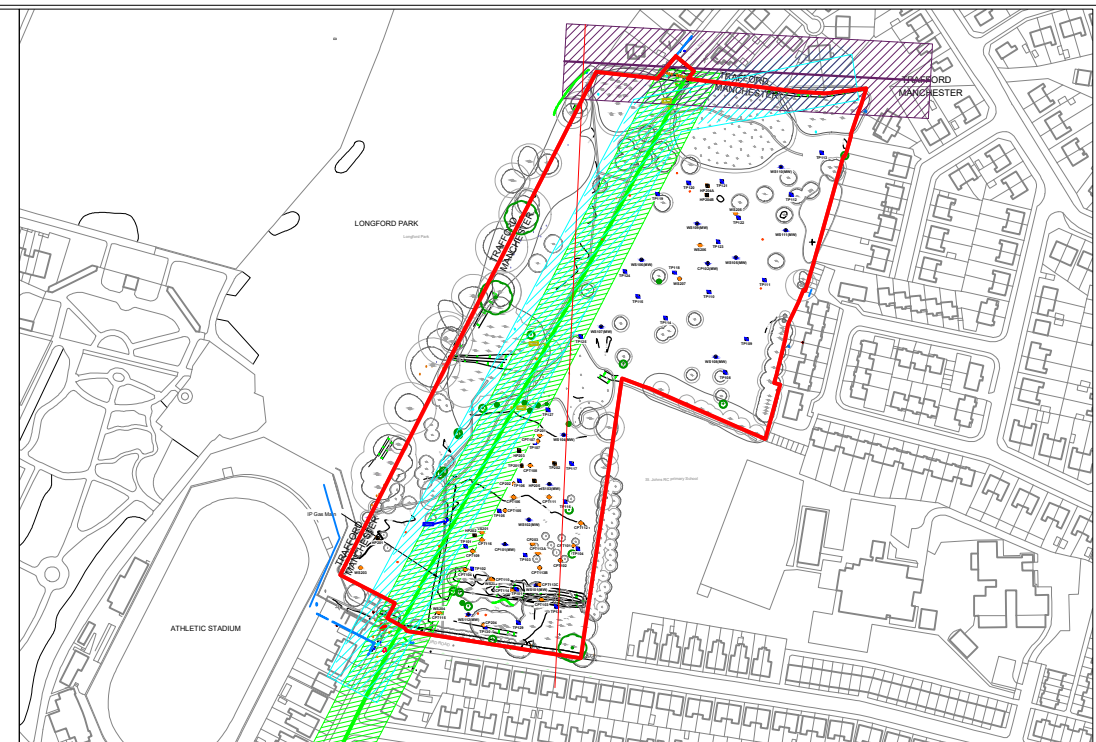
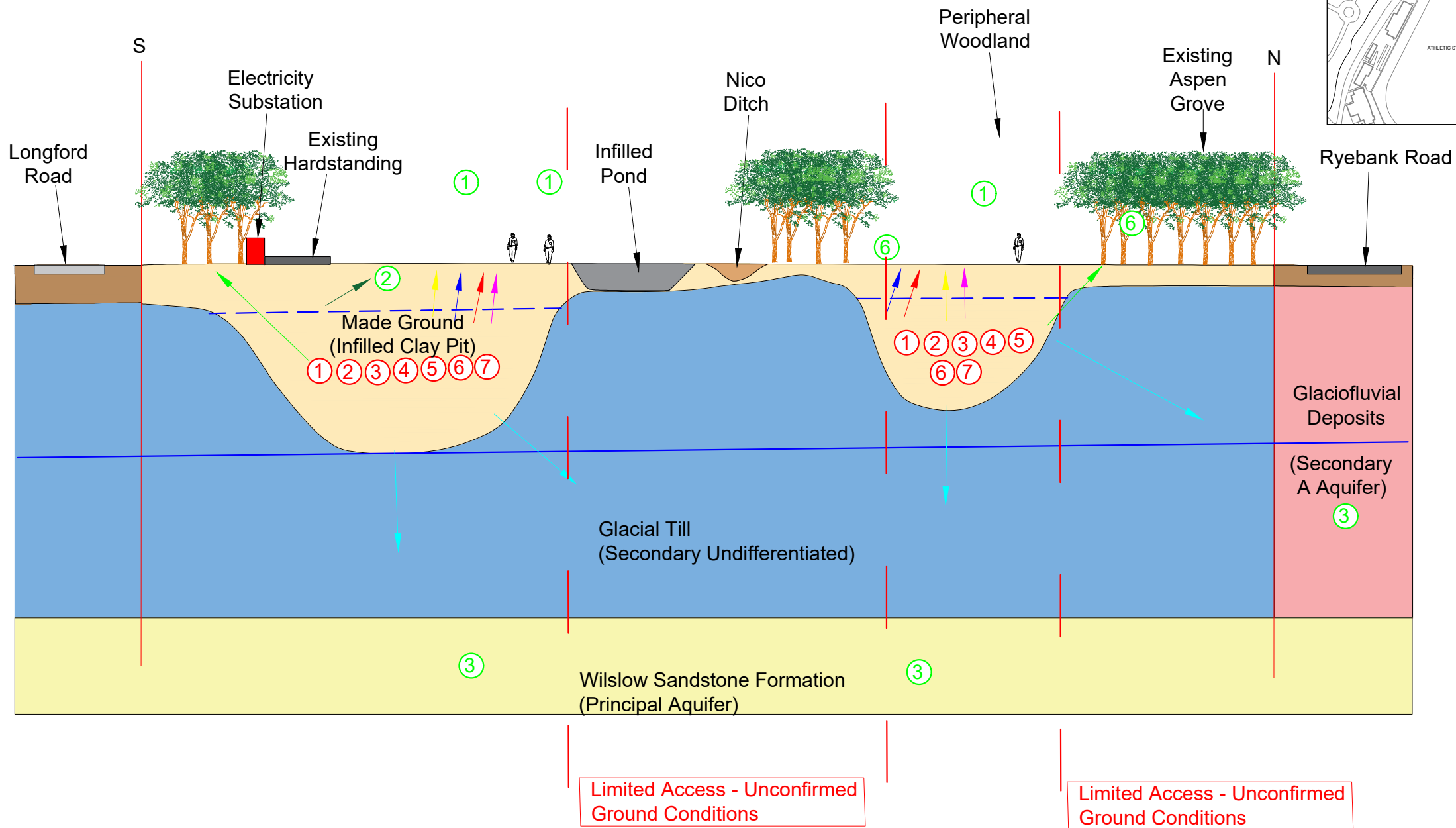
Drawing Title:

Depth of Made Ground Plan



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Geology Key

- Made Ground
- Glacial Till
- Wilslow Sandstone Formation
- Glaciofluvial Deposits
- Perched Ground Water
- Assumed True Groundwater

Sources

- Heavy Metals, Non Volatile PAH's, Non Volatile TPH's
- Asbestos
- Volatile Contaminants
- Ground Gases
- Mobile Contaminants (TPH, VOC)
- Sulphate
- Phytotoxic Contaminants

Pathways

- Dermal Contact / Ingestion
- Vapour Inhalation
- Inhalation / Accumulation
- Tainting of Water Supplies
- Dust Inhalation
- Vertical / Lateral Migration
- Sulphate Attack on Concrete
- Plant Uptake

Receptors

- Future End Users
- Water Pipes
- Groundwater (Secondary B Aquifer)
- Surface Water Features
- Off-site Receptors
- Building Structure
- Flora

Notes:

P1	REVA	24.03.2020	OW	ND	ND
Phase	Issue	Date	Drawn	Checked	PM

Client:
Step Places, Southway Housing Trust and Manchester Metropolitan University

Job Title:
Ryebank Fields

Job No:
17-403

Drawing No:
010

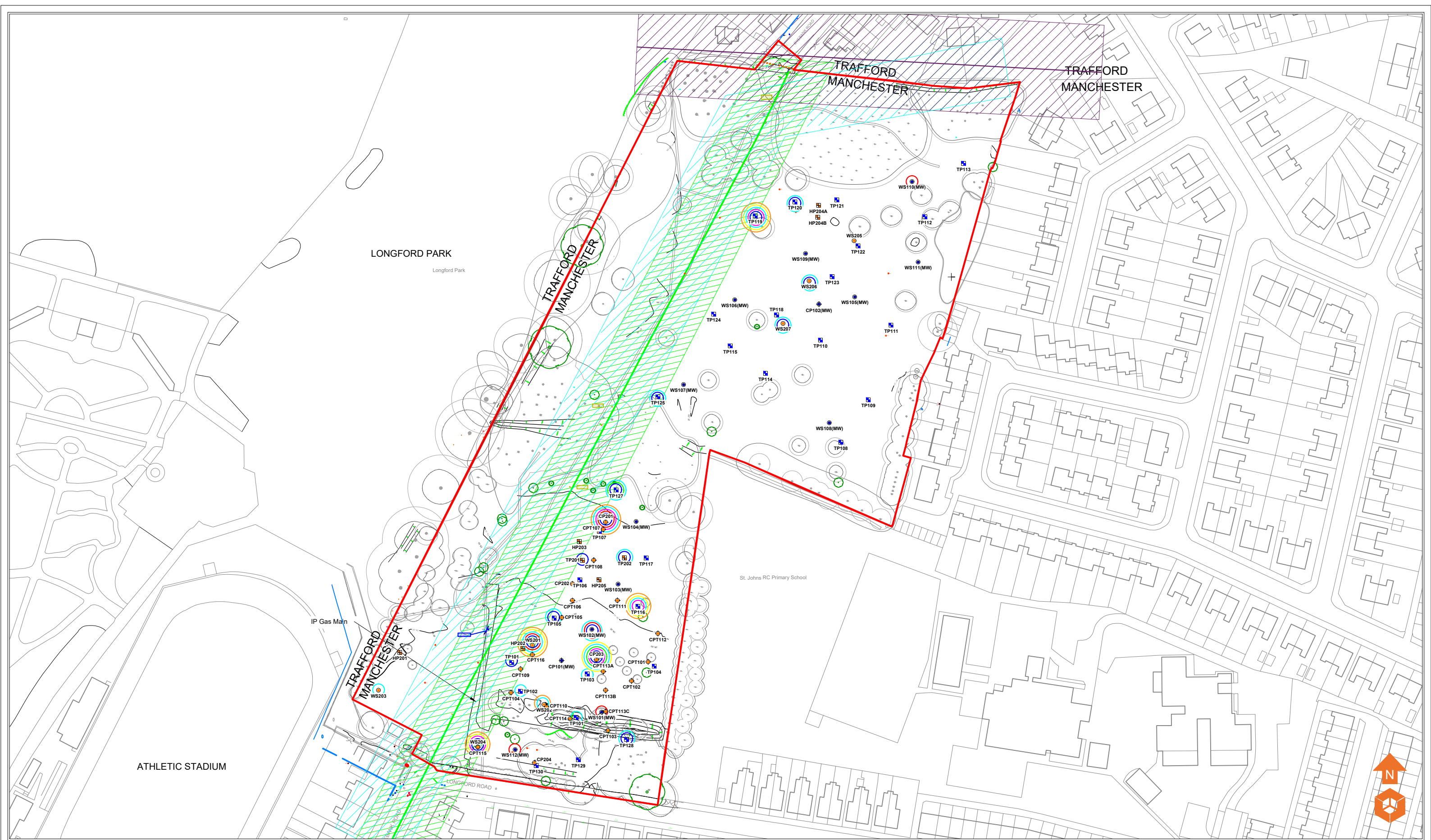
Date:
24.10.2024

Scale:
NTS

Drawing Title:
Conceptual Site Model

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- Location Symbols**
- WS201 Approximate Window Sample Probehole Location (E3P Locations 2024)
 - TP101 Approximate Trial Pit Location (E3P Locations 2024)
 - CP101 Approximate Cable Percussive Borehole Location (E3P Locations 2024)
 - CPT101 Approximate Cone Penetrometer Test Location (E3P Locations 2024)
 - WS101 Approximate Window Sample Probehole Location (E3P Locations 2019)
 - WS101(MW) Approximate Window Sample Probehole Location with Install (E3P Locations 2019)
 - TP101 Approximate Trial Pit Location (E3P Locations 2019)
 - CP101 Approximate Cable Percussive Borehole Location (E3P Locations 2019)

- IP Gas Pipe with 15m Easement
- Thirlmere Aquaduct with 20m Easement
- Sewer Easement with 15m Easement
- 30m Badger Set Buffer

- Contamination Exceedances**
- Heavy Metals
 - Asbestos
 - Mercury
 - Naphthalene
 - Non Volatile PAHs
 - Volatile TPHs
 - Non Volatile TPHs

Notes:

P1	REVC	11.02.2025	OW	ND	ND
P1	REVB	08.11.2024	OW	ND	ND
P1	REVA	10.10.2024	OW	ND	ND
Phase	Issue	Date	Drawn	Checked	PM

Client:

Step Places, Southway Housing Trust and Manchester Metropolitan University

Job Title:

Ryebank Fields

Job No:

17-403

Drawing No:

014

Date:

08.11.2024

Scale:

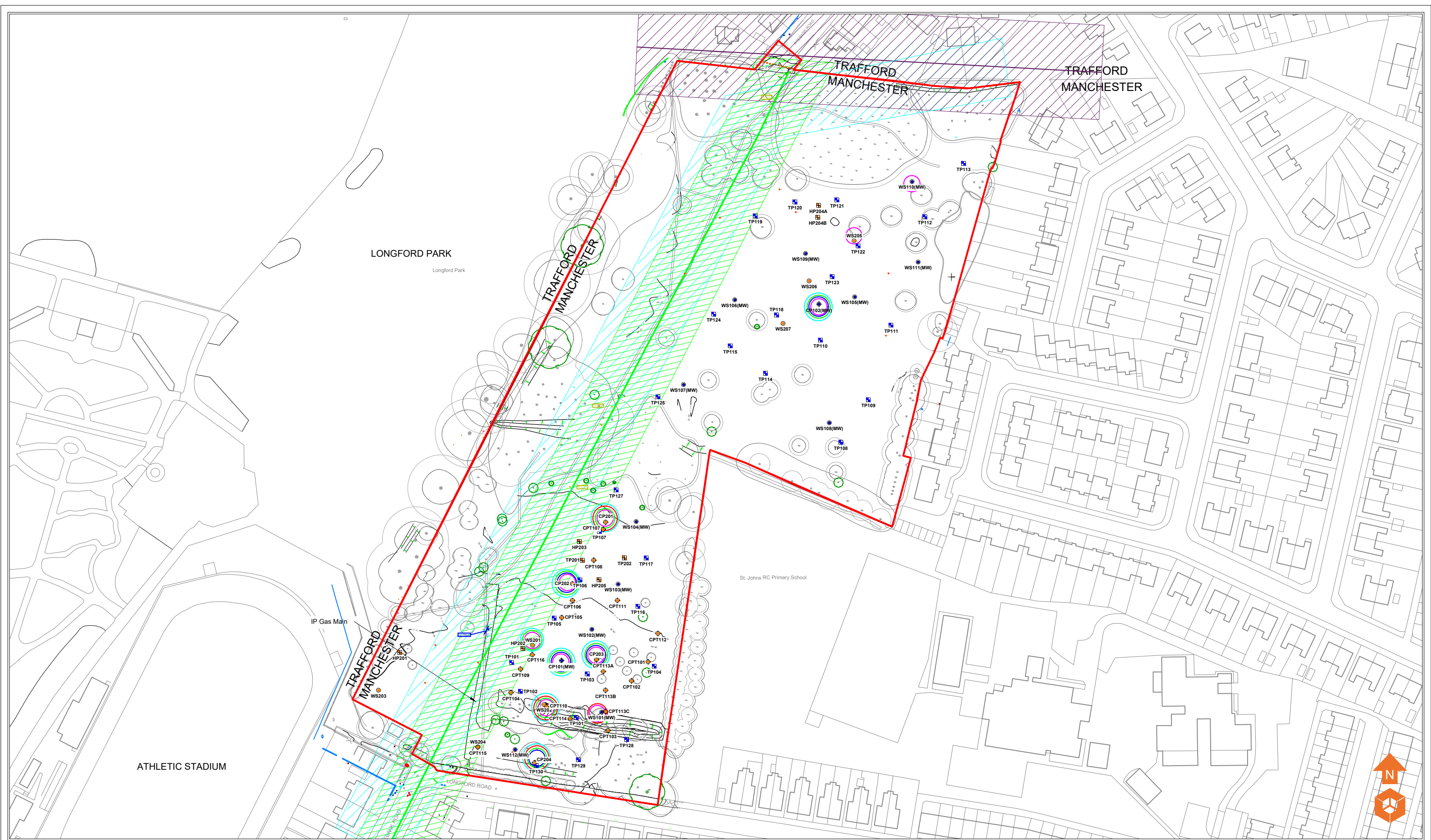
NTS@ A3

Drawing Title:

Contamination Exceedances Plan

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Location Symbols

- WS201 Approximate Window Sample Probehole Location (E3P Locations 2024)
- TP201 Approximate Trial Pit Location (E3P Locations 2024)
- CPT201 Approximate Cable Percussive Borehole Location (E3P Locations 2024)
- WS101 Approximate Window Sample Probehole Location (E3P Locations 2019)
- TP101 Approximate Trial Pit Location (E3P Locations 2019)
- CPT101 Approximate Cable Percussive Borehole Location (E3P Locations 2019)

- IP Gas Pipe with 15m Easement
- Thirlmere Aquaduct with 20m Easement
- Sewer Easement with 15m Easement

Controlled Waters Exceedances

- VOCs
- Heavy Metals
- TPHs
- PAHs
- Naphthalene

Notes:

P1	REVC	11.02.2025	OW	ND	ND
P1	REVB	08.11.2024	OW	ND	ND
P1	REVA	30.10.2024	OW	ND	ND
Phase	Issue	Date	Drawn	Checked	PM

Client:

Step Places, Southway Housing Trust and Manchester Metropolitan University

Job Title:

Ryebank Fields

Job No:

17-403

Drawing No:

027

Date:

11.02.2024

Scale:

NTS@ A3

Drawing Title:

Controlled Waters Contamination Exceedances Plan



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APPENDIX IV

E3P REMEDIATION/ VALIDATION CRITERIA





HUMAN HEALTH REMEDIATION TARGETS – LOW-RISE RESIDENTIAL END USE

DETERMINAND	UNITS	WITHIN COVER SYSTEM (GARDEN)	HARD STANDING AND BELOW COVER	PUBLIC OPEN SPACE COVER	BELOW PUBLIC OPEN SPACE COVER	PATH- WAY
Arsenic	mg/kg	37 ⁽ⁱ⁾	40 ⁽ⁱⁱ⁾	79 ⁽ⁱⁱⁱ⁾	170 ^(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	200 ^(vi)	310 ^(vii)	630 ^(viii)	1300 ^(viii)	1
Elemental Mercury	mg/kg	1.2 ⁽ⁱ⁾	1.2 ⁽ⁱⁱ⁾	16 ⁽ⁱⁱⁱ⁾	30 ^(iv)	2
Nickel	mg/kg	130 ⁽ⁱ⁾	180 ⁽ⁱⁱ⁾	230 ⁽ⁱⁱⁱ⁾	800 ^(iv)	1
Selenium	mg/kg	250 ⁽ⁱ⁾	430 ⁽ⁱⁱ⁾	1100 ⁽ⁱⁱⁱ⁾	1800 ^(iv)	1
Copper	mg/kg	2400 ⁽ⁱ⁾	7100 ⁽ⁱⁱ⁾	12,000 ⁽ⁱⁱⁱ⁾	44,000 ^(iv)	1
Zinc	mg/kg	3700 ⁽ⁱ⁾	40,000 ⁽ⁱⁱ⁾	81,000 ⁽ⁱⁱⁱ⁾	170,000 ^(iv)	1
Phenol	mg/kg	120 ^{(i)(xi)}	440 ^{(xiv)(xi)}	440 ^{(iii)(xi)}	440 ^{(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 ^(iv)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	3
Acenaphthene	mg/kg	210 ^{(i)(xi)}	500 ^(iv)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	1
Fluorene	mg/kg	170 ^{(i)(xi)}	500 ^(iv)	9900 ^{(iii)(xi)}	20,000 ^{(iv)(xi)}	1
Phenanthrene	mg/kg	95 ^{(i)(xi)}	500 ^(iv)	3100 ^{(iii)(xi)}	6200 ^{(iv)(xi)}	3
Anthracene	mg/kg	500 ^{(i)(xi)}	500 ^(iv)	74,000 ^{(iii)(xi)}	150,000 ^{(iv)(xi)}	3
Fluoranthene	mg/kg	280 ^{(i)(xi)}	500 ^(iv)	3100 ^{(iii)(xi)}	6300 ^{(iv)(xi)}	3
Pyrene	mg/kg	500 ^{(i)(xi)}	500 ^(iv)	7400 ^{(iii)(xi)}	15,000 ^{(iv)(xi)}	3
Benzo(a)Anthracene	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	mg/kg	2.6 ^{(i)(xi)}	3.9 ^{(ii)(xi)}	7.1 ^{(iii)(xi)}	13 ^{(iv)(xi)}	3
Benzo(k)Fluoranthene	mg/kg	77 ^{(i)(xi)}	110 ^{(ii)(xi)}	190 ^{(iii)(xi)}	370 ^{(iv)(xi)}	3
Benzo(a)Pyrene	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)}	10,000 ^{(xiv)(xi)}	2
TPH C ₆ -C ₈ (aliphatic)	mg/kg	100 ^{(i)(xi)}	100 ^{(ii)(xi)}	100 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aliphatic)	mg/kg	27 ^{(i)(xi)}	27 ^{(ii)(xi)}	27 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aliphatic)	mg/kg	130 ^{(i)(xi)}	130 ^{(ii)(xi)}	130 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₂ -C ₁₆ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₆ -C ₂₁ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C ₂₁ -C ₃₅ (aliphatic)	mg/kg					1
TPH C ₅ -C ₇ (aromatic)	mg/kg	70 ^{(i)(xi)}	370 ^{(ii)(xi)}	370 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₇ -C ₈ (aromatic)	mg/kg	130 ^{(i)(xi)}	860 ^{(ii)(xi)}	860 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aromatic)	mg/kg	34 ^{(i)(xi)}	47 ^{(ii)(xi)}	47 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aromatic)	mg/kg	74 ^{(i)(xi)}	250 ^{(ii)(xi)}	250 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2





TPH C ₁₂ -C ₁₆ (aromatic)	mg/kg	140 ^{(i)(xi)}	1800 ^{(ii)(xi)}	1800 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C ₁₆ -C ₂₁ (aromatic)	mg/kg	260 ^{(i)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C ₂₁ -C ₃₅ (aromatic)	mg/kg	1000 ^{(xiv)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
Asbestos	Fibres Volume Weight (%)	NFD	0.001%	NFD	0.001	4

Notes 1

NFD = No Fibres Detected

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 % 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.

No viable exposure pathway beneath hardstanding and cover system.

Notes 3

Main exposure pathways: 1 = soil ingestion, 2 = vapour inhalation (indoor), 3 = dermal contact and ingestion, 4 = dust inhalation.

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration, N/A = 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 600 mm 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 300 mm 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 2600 mg/kg, m-xylene 3500 mg/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 GROUNDWATER / LEACHATE ANALYSIS WITH TIER 2 SCREENING LEVELS

DETERMINAND	UNIT	EQS SCREENING VALUE ^{1, 2, 3}	DWS ^{3,4,5}
		AA	
Arsenic	µg/l	50	10
Cadmium	µg/l	0.08-0.25	5
Chromium (VI)	µg/l	3.4	–
Chromium (III)	µg/l	4.7	50
Copper	µg/l	1	2000
Total Cyanide	µg/l	1	50
Lead	µg/l	1.2	10
Mercury	µg/l	–	1.0
Nickel	µg/l	4	20
Selenium	µg/l	–	10
Zinc	µg/l	10.9	–
pH		6–9	
Naphthalene	µg/l	2	10*
Anthracene	µg/l	0.1	
Benzo[b]fluoranthene	µg/l	0.00017*	
Benzo[k]fluoranthene	µg/l	0.00017*	
Benzo(a)pyrene	µg/l	0.00017*	
Indeno(123-cd)pyrene	µg/l	0.00017*	
Benzo(ghi)pyrene	µg/l	0.00017*	
Fluoranthene	µg/l	0.0063	
Benzo(ghi)perylene	µg/l	1.7–4	1
TPH C5-C7 (benzene)	µg/l	10	
TPH C7-C8 (toluene)	µg/l	74	
TPH C8-C10 (xylene)	µg/l	30	
TPH C10-C12 (naphthalene)	µg/l	2	
TPH C12-C16	µg/l	–	
TPH C16-C35	µg/l	–	
TPH C5-C6	µg/l	–	
TPH C6-C8	µg/l	–	
TPH C8-C10	µg/l	–	
TPH C10-C12	µg/l	–	





DETERMINAND	UNIT	EQS SCREENING VALUE ^{1, 2, 3}	DWS ^{3,4,5}
		AA	
TPH C12-C16	µg/l	–	300
TPH C16 – C21	µg/l	–	300**
TPH C21-C35	µg/l	–	300**
Tetrachloroethylene	µg/l	0.4	10
Trichloroethylene	µg/l	10	10
Trichlorobenzene	µg/l	0.4	–
Trichloromethane	µg/l	2.5	–
Dichloromethane	µg/l	20	200
Carbon Tetrachloride	µg/l	12	3
Vinyl Chloride	µg/l	–	0.3

Notes

Solubility <0.01µg/l

AA – Annual Average

* Polycyclic aromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water

** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

1. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (legislation.gov.uk)
2. The Water Supply (Water Quality) Regulations 2018 (legislation.gov.uk)
3. Guidelines for drinking-water quality, 4th edition, incorporating the 1st addendum (who.int)
4. CL:AIRE publishes Petroleum Hydrocarbons in Groundwater guidance (claire.co.uk)
5. A total TPH criteria of 1000 mg/kg will act as a surrogate criterion for remaining aliphatic and aromatic TPH fractions.



APPENDIX V

E3P MATERIAL IMPORT CRITERIA



SITE OF IMPORTATION ADDRESS		E3P +44 (0) 161 707 9612 info@e3p.co.uk 
Client		
Main Contractor		
Earthworks Contractor		
Haulier		
Date of Planned Import		
Overview of Planned Material Import		
Material Source (Site of Origin) and Postcode		
Site Investigation Report	Report Title and Reference: Date: Information Supplied By:	
Reason for Generation of Excess Material at Site of Origin		
Chemical Test Results for Stockpile at Site of Origin	Date: Laboratory Certificate Ref: Organisation Responsible for Stockpile Sampling:	
Geotechnical Material Classification and Testing	Delete as Appropriate: Class 1 / Class 2 / Class 6 / Topsoil	
Pictures of Material Stockpile Pending Transportation	Delete as Appropriate: 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 Reuse)		
Waste Exemption/Permit or CL:AIRE MMP		Delete as Appropriate: U1 Standard Rules / CL:AIRE MMP (Direct Transfer) / Bespoke



APPENDIX VI

CONTRACTOR PRE- COMMENCEMENT CHECK SHEET





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.

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 and Qualified Person Declaration			Ref No:
Identification of All Invasive Plant Species and 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 and 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:
Stockpiling of Subsoil and Certification of Suitability for Reuse			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 Plots for Shallow Spread Foundation in Accordance with E3P Geotechnical Specification			Plot Numbers





Activity	Testing Responsibility	Contractors Method Statement Required (Y/N)	Comment/Action
Engineering of Plots for VSC in Accordance with E3P Geotechnical Specification			Plot Numbers.
Engineering of Plots for Pile Foundation in Accordance with E3P Geotechnical Specification			Plot Numbers
Engineering of Plots for Raft Foundation in Accordance with E3P Geotechnical Specification			Plot Numbers
Stockpiling of Topsoil and Certification of Suitability for Reuse			Stockpile location
Engineering of Highways Bulk Upfill in Accordance with E3P Specification with Compliant Validation Testing			Upfill specification
Engineering of Highways Subgrade in Accordance with E3P Specification with Compliant Validation Testing			Upfill specification
Engineering of Highways Capping in Accordance with E3P Specification with Compliant Validation Testing			Upfill specification
Cut-and-Fill the Development Site to Clients' Required Elevation with As-Built Survey			Required formation elevations



APPENDIX VII

CONTRACTOR

COMPLETION CHECK

SHEET





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 client's records.

Activity	Complete			Signature
	Yes	No	N/A	(initial)
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 reuse				
Stockpiling of subsoil and certification of suitability for reuse				
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 subgrade 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 client's required elevation with as-built survey				





POST-REMEDATION AND ENABLING LIMITATIONS

All and every deviation from the approved specification for works should be documented by the remediation and enabling works contractor below.

