



e3p

Remediation and Enabling Works Strategy
Jersey Street, Ancoats

Reference:15-798-R3
Date: May 2023



REMEDIATION AND ENABLING WORKS STRATEGY

Jersey Street
Ancoats,
Manchester
M4 6JW

Prepared for:

Civic Engineers Ltd

Report Ref: 15-798-R3

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EXECUTIVE SUMMARY

Site Address	Works along Jersey Street, Ancoats, Manchester, M4 6JW (This report is pertinent to the bridge and canal arm remediation items only).
National Grid Reference	E 385241 N 398913
Site Area	0.12 Ha.
Background	This document provides a comprehensive specification for the land remediation and subsequent enabling earthworks including geotechnical performance criteria required to ensure the construction of the reengineered highway that will be geotechnically suitable for the proposed use. The specification defines the land remediation works required to ensure all potential unacceptable risk associated with identified contamination is addressed to ensure no complete pollution linkage upon completion of the development. Evidence currently confirms the presence of a canal arm and bridge structure that currently forms Jersey Street. This requires removal and remediation works before regeneration in the surrounding area can be progressed. As a result, there is a lift in the grade of the road to rise over the canal that will be made level during the works. In addition, it is necessary during the works to remove the canal infill materials due to their poor geotechnical parameters and contamination identified previously. This specification defines geotechnical parameters for the up-fill of soils as a structural fill, compaction of materials to construct a sub-base using stabilised and solidified recycled materials or imported aggregate and requirement for processing aggregates to ensure compliance with the necessary engineering properties.
Proposed Development	E3P understands that Civic Engineers are instructing works on behalf of Eric Wright Group and Manchester City Council. Portugal Street bounds the application site to the north, Wadeford Close to the east, and the Rochdale Canal to the south in Ancoats, Manchester. The proposals involve City Council improvements to the public realm within the Poland Street Zone as defined by the Poland Street Zone NDF and the Poland Street Zone Public Realm Strategy. The first phase of which incorporates the regrading of Jersey Street. For the avoidance of doubt, this report is pertinent to the requirements surrounding the Jersey Street regrading element only.
Site Investigation Reports & Assessment	This Remediation Strategy & Geotechnical Enabling Works Specification has been prepared in due consideration of the E3P Phase 2 Geoenvironmental Site Assessment (ref: 15-798-R2) dated January 2023 and Phase II ground Investigation report (13-729-R2-Parcel B) dated March 2021 prepared for Manchester Life. All Site Investigation reports should be read as a precursor to this document.



CONTAMINATED LAND ASSESSMENT

Human Health Risk Assessment	A Tier I human health risk assessment has been undertaken using the chemical analysis results of the soils and comparing them to the relevant Tier I criteria for commercial end use without plant uptake. This assessment has identified elevated contaminants of concern in samples obtained from the canal infill materials submitted for analysis. Analysis has indicated the presence of elevated metals, non-volatile PAHs, and non-volatile TPH compounds within the Made Ground. Naphthalene and mercury were also identified throughout the site. Exceedances in mercury were identified in TT102A at 1.20 m bgl. Elevated naphthalene was identified in TT101A at 1.20 m bgl, TT103A at 1.50 m bgl and TT104A at 2.20 m bgl. Exceedances of aromatic hydrocarbons TPH C12–C35 were noted in TT101A at 1.20 m bgl, TT102 A at 1.10 m bgl, TT103A at 1.50m and TT104A at 2.20m. Asbestos was identified in samples submitted for analysis by E3P. Asbestos in the form of amosite was noted in TT101A at 1.20 m bgl, TT102A at 1.10 m bgl and TT103A at 1.50 m bgl. Asbestos in the form of Chrysotile was also identified in TT104A at 2.20 m bgl. Given the soils' poor geotechnical characteristics, these materials are expected to be delineated, segregated and removed from the site during the works to eliminate the potential for future risk. It is anticipated that there will be fines 'sludge' at the base of the canal which will require removal in full.
Controlled Waters Risk Assessment	Given that the site is underlain by low-permeability, predominantly cohesive glacial till deposits, which will afford protection to the underlying secondary B and principal aquifer, further limiting vertical migration, there is considered to be a low risk to controlled waters and the wider environ as, in the absence of a groundwater potable abstraction, no complete pollutant linkage can be determined. Based on the expected development at the site, it is envisaged that during the excavation of materials, groundwater pumping will be required based on the existing high water table. This water will require appropriate discharge with permits where applicable. However, in this process much of the impacted groundwater will be pumped out and the source soils removed to appropriate facilities. Given the perched water currently held within the former canal, this will require pumping out with appropriate off-site disposal with the potential contaminant issues considered. It will be necessary to stank either end of the works to stop the ingress of water from the remaining canal arm and the existing canal (should this be occurring currently). Furthermore, processing/removal of Made Ground from the site during the same process will remove the potential for further leaching of contaminants out of the soils. Based on the above, there is considered to be no unacceptable level of risk to the controlled water receptors.



Ground Gas	Ground gas monitoring confirms that the site would be classed as Characteristic Situation 1, as such no gas protection measures will be required. As this report is pertinent to the new road there is no associated gas risk in this instance. Given the removal of impacted soils and water, Vapour membranes will not be required. However, it will be necessary to monitor excavations for elevated gasses and vapour.
Coal Mining and Historical Workings	No risk identified.
Invasive Plants	The remediation contractor should review all ecological reports and undertake their own surveys to confirm the presence of any invasive plant species and the requirement for treatment and eradication as part of their works.

GEOTECHNICAL ASSESSMENT

Relict Sub-Structures	Relict substructures, infrastructure and materials deemed geotechnically deleterious have been identified during the intrusive ground investigation including the bridge structure. The bridge is anticipated to be a series of parallel 'I' steel beams on which the roadbed has been constructed with a headwall at the east and western banks of the former canal. The former canal itself will then be beneath this likely to be of concrete and brick construction. All such materials will require removal from beneath proposed structures and infrastructure to the depths and extents as defined within this specification.
Adverse Ground Conditions	Site observations indicated that excavations should be feasible in the near surface with normal plant; however, obstructions were identified in the near surface, including former foundations. It is anticipated that any obstructions will be grubbed out during the reduced-level dig for the substructure works. Due to the depth and variability of the Made Ground and likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97. If local pumping of groundwater is required during the advancement of excavations for the proposed foundations, then consideration should be given to the potential for dewatering gravels in the surrounding areas that may cause structural damage to building substructures in close proximity to the site. Consideration for stanking the remaining buried canal should be undertaken to reduce the ingress of water during the works. It is considered likely that there will be presence of U1 (sludge) materials in the base of the canal which will require excavation and removal.
Proposed Structural Foundations	Given the proposed development, in this case being a re-graded highway there is no requirement for a foundation solution exactly and following the reengineering of materials backfilled into the void (following removal of impacted geotechnically poor materials) there is likely to be a suitable platform for road box construction. However, construction depths should take into account the presence of volumetric instability attributed to fluctuations in moisture content following removal, and load, of the canal.



Proposed Structural Foundations	In addition, consideration must also be given to the varying soil matrices and differing settlement characteristics and where a foundation spans two varying matrices, the sub-structure should be designed accordingly and specialist advice should be sought from a suitably experienced structural engineer with regard to allowable bearing capacity and settlements.
Highways and Infrastructure	All proposed, adopted roads will be constructed in accordance with the geotechnical engineering requirements as defined within the MCHW Series 600. Specific engineering and compaction of materials will be completed in strict accordance with the geotechnical specification contained within this report. All materials outside of structural/infrastructure development will be engineered and compacted to ensure consolidation associated with self-weight settlement is limited to < 50 mm in accordance with the E3P specification.

REMEDICATION AND ENABLING WORKS

Objectives	The remediation and enabling works will be delivered in a manner that will seek to ensure that the site is prepared to deliver the optimum solution for the proposed infrastructure and highway. The civil and structural engineer's drawings should be referenced to determine the proposed highway solution and ultimately the requirements for suitable construction.
Remediation and Enabling Works	This document provides a comprehensive specification for the regeneration of the land in a manner that will negate the identified pollutant and ensure the development is suitable for the proposed end use. The salient features of the Remediation & Enabling Works Strategy are summarised below: ✳ Implementing all work in strict accordance with UK Environmental Permitting and local planning authority requirements. ✳ Controlled removal of all trees and/or vegetation. ✳ Removal and treatment of all invasive plant species (as required) in accordance with specialist contractor method statement, validation and independent certification. ✳ Excavation and removal of all existing above and below-ground structures beneath the proposed structural foundation. ✳ Sorting, processing and segregation of all deleterious materials. ✳ Materials deemed unsuitable for retention are to be removed from the site. ✳ Location; isolation and management of any asbestos-impacted soils.
Remediation and Enabling Works	✳ Validation sampling to confirm all material retained on-site poses no risk to the identified receptors within the context of the CSM. ✳ Importation of chemically/geotechnically suitable materials (if required) to achieve the required development elevation. ✳ Removal of any previously unidentified contamination hotspots. ✳ Validation testing of materials placement to confirm suitability.



	All works are to be undertaken in strict accordance with UK Environmental Permitting and Local Planning Authority Requirements.
Geotechnical Engineering Requirements	The nominated earthworks and stabilisation contractor will be responsible for the placement and re-engineering of stiffened soil platform using engineered Class 1, 2 or 6 soils to be capped with an engineered sub-base to support a highway to adoptable standards in line with structural engineer scope and drawings. This performance specification defines the geotechnical compaction requirements for engineered soils and sub-bases to ensure compliance with the project engineering requirements.
Geotechnical Engineering Requirements	Preparation of Formation (all areas) - Prior to the placement of any soils, the formation area (reduced level excavation) will be assessed and certified as suitable to ensure that all identifiable soft spots or areas of variable strata have been identified, and engineered with a suitable soil or aggregate that has been compacted in accordance with the Geotechnical Performance Specification. In general, all soils (excluding certified recycled and quarried aggregates) must be engineered to achieve the following performance criteria: - Moisture content within tolerable limits. - CBR in excess of the performance requirements for each and every engineered soil layer; - Maximum deformation under Plate Load using applicable loading for each and every layer must not exceed maximum settlement tolerance within engineered fill and sub-base replacement; Highways – Engineering of a soil platform to ensure total settlement within tolerable limited in accordance to highway engineers drawing.



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1. INTRODUCTION

1.1. BACKGROUND

E3P has been instructed by Civic Engineers on behalf of Eric Wright Construction and Manchester Life to develop a remediation strategy and enabling earthworks performance specification for the proposed street and highway works at the site known as Jersey Street, located in the Ancoats area of central Manchester.

This document provides a comprehensive specification for the remediation and subsequent enabling earthworks, including geotechnical performance criteria required to ensure the construction of a geotechnically suitable adoptable highway re-grading.

The specification defines the land remediation works required to ensure all potentially unacceptable risk associated with identified contamination is addressed to ensure no complete pollution linkage upon completion of the works.

The existing Jersey Street raises slightly along its course due to a bridge crossing a former canal arm. The works include the removal of this bridge section and the regrading of the highways to a level. The canal arm is known to have been historically backfilled and saturated, likely as a result of poor disconnection from the existing open canal to the south of the subject site. A section of the canal is to be removed in full as part of the works, with the infill materials excavated and removed from the site. As such there will be a requirement to stank up either end of the canal connection with low permeability material and import chemically and geotechnically suitable infill materials to backfill the void.

This specification defines geotechnical parameters for the up-fill of soils as highway fill, compaction of materials to construct a sub-base using stabilised and solidified recycled materials or imported aggregate and requirement for processing aggregates to ensure compliance with the necessary engineering properties.

1.2. SITE DETAILS

The 'Site' comprises a section of Jersey Street at the eastern end running east to west. Jersey Street is located in eastern Ancoats, Manchester City Centre.

The site includes a section of Jersey Street and associated pavements and highway furniture over circa 138m chainage. It is understood that these works are required as 1st phase supporting works in order to redevelop parcels of land in the surrounding area.

Jersey Street currently rises over a historic bridge over a canal arm that must be removed in full, and the highway regraded to allow the redevelopment of the wider area.

1.3. REPORT OBJECTIVES

The objectives of this report are to:

- ✳ Prepare an overview of contaminated land remediation requirements;
- ✳ Evaluate feasible remedial technologies;
- ✳ Assess the most-appropriate earthworks solution to ensure the delivery of the optimum development platform;



- ✳ Define validation criteria to demonstrate the successful implementation of a site remediation and enabling works plan;
- ✳ Specify geotechnical engineering performance requirements; and
- ✳ Ensure the safe, cost effective and regulatory compliant redevelopment of the site.

1.4. SCOPE OF WORKS

The development of the risk management strategy for the subject site includes the following tasks:

- ✳ Identification of the relevant pollutant linkages;
- ✳ Review of site characteristics;
- ✳ Identification of geotechnical constraints;
- ✳ Development of remedial objectives;
- ✳ Selection of appropriate remedial technology; and,
- ✳ Development of remedial strategy.

1.5. PREVIOUS WORKS

The following phases of geoenvironmental investigations have previously been carried out at the site:

- ✳ **E3P** Phase 2 Geoenvironmental Site Assessment (ref: 15-798-R2) dated January 2023 – Prepared for Civic consultants
- ✳ **E3P** Phase II ground Investigation report (13-729-R2-Parcel B) dated March 2021 – Prepared for Manchester Life.

To inform the assessment of the potential risk to contaminated land within the context of the proposed works and to inform the preparation of the remediation strategy, the pertinent points from the above report are summarised within Section 2.

For the avoidance of any doubt, the E3P Geo-Environmental Site Investigation Report should be read both as a precursor to and in conjunction with this document.

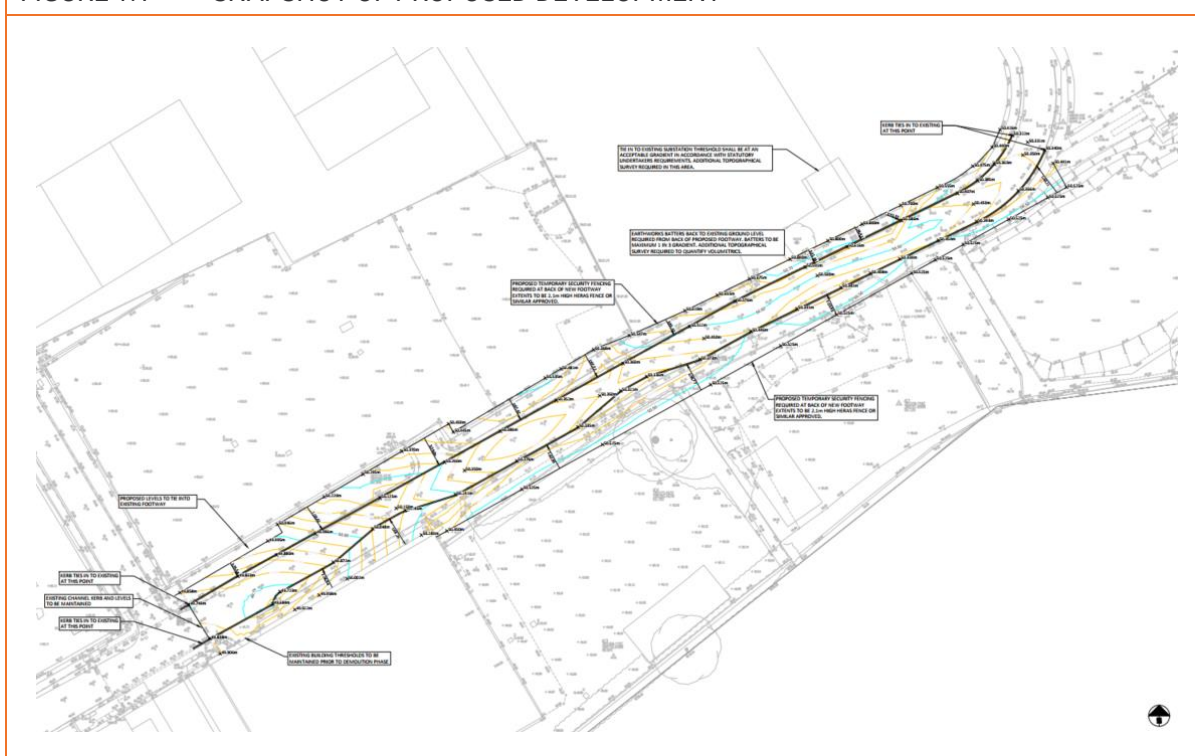
1.6. REDEVELOPMENT PLAN

Manchester City Council are updating their public realm in Ancoats. This report is pertinent to regrading of highway works along Jersey Street. Drawing 15-798-002 (Appendix III) identifies the proposed development layout.

A snapshot of the proposed development layout is indicated in Figure 1.1.



FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.7. SUMMARY OF PARTIES INVOLVED

Function/interest	Name of Party
Local Planning Authority	Manchester City Council
Developer	Manchester City Council
Geoenvironmental Consultant	E3P
Main Contractor	Eric Wright Group
Remediation/Enabling Works Contractor	TBC
Human Health Regulator	Manchester City Council
Controlled Waters and Waste Regulator	Environment Agency
Civil and Structural Engineer	Civic Consultants
Highways Adoption Authority	Manchester City Council

1.8. REGULATORY CORRESPONDENCE

Civic Engineers and their client are in the process of submitting a detailed planning application to the local planning authority for the proposed regrading and dressing works to an adopted highway including 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);
- ✳ Environment Agency planning liaison; and
- ✳ The Coal Authority.
- ✳ Highways Adoption Authority

1.9. SITE DETAILS

Site Address	Poland Street Zone area - with a specific focus on three character areas - Ancoats Green, Jersey Green and Prussia Street Arm Greenway, Ancoats, Manchester
National Grid Reference	E 385241 N 398913
Site Area	0.12Ha.

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

A site location plan is presented in Appendix VII as Drawing 15-798-001.

1.10. SITE SUMMARY

TABLE 1.1 SITE DESCRIPTION AND SETTING

Occupancy/Use	The 'Site' comprises a section of Jersey Street at the eastern end running east to west. Jersey Street is located in eastern Ancoats, Manchester City Centre. The site includes a section of Jersey Street and associated pavements and highway furniture over circa 138m chainage. It is understood that these works are required as 1st phase supporting works in order to redevelop parcels of land in the surrounding area. Jersey Street currently rises over a historic bridge over a canal arm that must be removed in full, and the highway reggraded to allow the redevelopment of the wider area The canal arm is known to have been historically backfilled and saturated, likely as a result of poor disconnection from the existing open canal to the south of the subject site.	
Environmental Setting	Drift Geology	Devensian Till - Diamicton
	Bedrock Geology	Manchester Marls Formation – MUDSTONE
		Collyhurst Sandstone Formation – SANDSTONE
	Hydrogeology	Chester Sandstone Formation - SANDSTONE
		Principal and Secondary B bedrock aquifer with a Secondary Undifferentiated superficial aquifer recorded. No active or historical abstraction points are located within 1 km of the site.



	Hydrology	The nearest surface water feature is the Rochdale Canal, located adjacent to the southern boundary of the site. Due to the local topography, any shallow groundwater if present, will likely flow in a south-easterly direction towards the canal.
	Flood Risk	Unaffected by flooding from rivers.
	Subsidence Hazard	No hazard was identified in data searches.
Site History	Historical mapping suggests that Jersey Street was present from the earliest mapping with the canal arm in place cutting through north-south. The land to the north is a wharf facilitated by the canal arm. It is therefore assumed that the bridge is in place from this depth. In the 1950's the site to the north was redeveloped into a singular factory building which is presumed the infilling date of the canal. It is assumed that over recent years jersey street has undergone an unknown number of resurfacing repairs utilising different ages and compositions of Ashphalt.	
Landfill Sites and Ground Gases	No landfill sites (current or historic) are located within 250 m of the site. The site has undergone some historic development and ground working; the Made Ground associated with the historic development may produce hazardous ground gases such as methane and carbon dioxide.	
Radon	Unaffected – no special precautions required.	

1.11. SUMMARY OF REPORTED GROUND CONDITIONS

E3P has recently prepared a supplementary Site Investigation Report (Ref: 15-798-R2, dated January 2023). The works were focussed mainly on ancoats green to the northeast of the subject site but included highway cores through Jersey Street. A previously completed site investigation (Ref: 13-729-R2 dated March 2021) of the land to the north of Jersey Street included a trial trench (TT) investigation of the infilled canal arm. The summary of reported ground conditions is given in Table 1.2.

TABLE 1.2 SUMMARY OF GROUND CONDITIONS

MADE GROUND	All four road cores completed along jersey street to the south of the site comprise a layer of asphalt from 0.00 – 0.20 m bgl. Asphalt was predominantly underlain by brown sandy gravel, with the exception of rc03 which was underlain by grey sandy gravel of concrete. The gravel consisted of sandstone, mudstone, coal, brick and concrete with fragments of ceramic and glass also being identified within this layer. The majority of exploratory holes were surfaced by concrete between ground level and 0.30 m bgl. Tt102b, tt103a, tt103b, tt104a and tt104b were all underlain by concrete slabs below ground level between 0.50 m and 1.20 m bgl. Made ground mainly comprised gravelly black ash with frequent cobbles with gravel of mudstone, concrete, brick and asphalt and cobbles of brick which was encountered between ground level and 2.50 m bgl. Gravelly ash which presented a strong hydrocarbon odour and sheen were encountered within tt101a, tt102a, tt104a, tp106, tp107, tp108, tp110 and ws109. Visual and olfactory contamination was present in the north and east of the site associated with the historically infilled canal.
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MADE GROUND	Large obstructions including brick and concrete were encountered within the majority of exploratory hole locations. A brick wall was encountered within the west and north of tt101b between ground level and 1.2 m. A brick wall was also encountered between the centre of tt101a and tt101b between ground level and 0.70 m bgl.
Topsoil	No topsoil is present in this area of the site.
Drift	Drift stratum beneath Jersey Street has not currently been exposed by E3P however, based on an investigation of the wider area, it is expected that the natural materials will comprise a firm to stiff brown gravelly clay.
Bedrock	The bedrock stratum has been identified through cable percussion termination at 10.00-13.80m bgl. BGS boreholes in the wider area suggest bedrock from 23.00m and as such the cable may be refused in very stiff stratum or over boulders.
Groundwater	The Canal Arm is known to be fully saturated due to poor disconnection from the existing canal to the south. As such, groundwater in this area is likely to be encountered from circa 0.70m bgl.



2. E3P CONTAMINATION RISK ASSESSMENT

2.1. BACKGROUND

E3P has previously completed a Tier 1 Qualitative Contaminated Land Risk Assessment to determine the potential risk to human health, controlled waters and the wider environ. 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.

2.2. HUMAN HEALTH RISK SUMMARY

The E3P Tier 1 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:

- ✳ Lead;
- ✳ Arsenic;
- ✳ Zinc;
- ✳ Mercury;
- ✳ Asbestos (Amosite and Chrysotile Fibres);
- ✳ Naphthalene;
- ✳ Phenanthrene;
- ✳ Benzo(a)Anthracene;
- ✳ Chrysene;
- ✳ Benzo(b)Fluoranthene;
- ✳ Benzo(k)Fluoranthene;
- ✳ Benzo(a)Pyrene;
- ✳ Indeno(123-cd)Pyrene
- ✳ Dibenzo(a,h)Anthracene;
- ✳ TPH C12-C16 (aromatic);
- ✳ TPH C16-C21 (aromatic);
- ✳ TPH C21-C35 (aromatic)

Naphthalene and mercury were also identified throughout the site. Exceedances in mercury were identified in TT102A at 1.20 m bgl. Elevated naphthalene was identified in TT101A at 1.20 m bgl, TT103A at 1.50 m bgl and TT104A at 2.20 m bgl.



Exceedances of aromatic hydrocarbons TPH C12–C35 were noted in TT101A at 1.20 m bgl, TT102 A at 1.10 m bgl, TT103A at 1.50m and TT104A at 2.20m.

Asbestos was identified in six samples out of eight submitted for analysis by E3P. Asbestos in the form of amosite was noted in TT101A at 1.20 m bgl, TT102A at 1.10 m bgl and TT103A at 1.50 m bgl. Asbestos in the form of Chrysotile was also identified in TT104A at 2.20 m bgl.

In relation to these exceedances, the following can be determined:

- ✿ The main exposure pathways based on the Tier I exceedances are:
 - Soil ingestion;
 - Vapour inhalation (indoor);
 - Dust inhalation
 - Dermal contact and ingestion;
- ✿ The exceedances for all determinands are associated within Made Ground deposits.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

All the identified elevated concentrations have primary exposure pathways related to inhalation of particulates and dermal contact and ingestion. The risk to chronic human health associated with the elevated concentrations of non-volatile PAH compounds and Heavy Metals could be mitigated through placement beneath hard standing. However, it is understood currently that the intention will be to remove impacted materials in full, classify the materials for off-site disposal and remove the materials in their entirety to remove any potential for direct exposure to impacted soils.

This will also manage the risk from all other contaminants identified in the previous investigations associated with the Made Ground within the infilled canal arm.

2.3. CONTROLLED WATERS CONTAMINATION RISK SUMMARY

E3P completed a Tier 1 Controlled Water Risk Assessment as part of the E3P Geoenvironmental Site Assessment, the findings of which are summarised as follows:

- ✿ pH
- ✿ Arsenic;
- ✿ Lead;
- ✿ Naphthalene;
- ✿ TPH C12-C16 (Aromatic);
- ✿ TPH C16-C35 (Aromatic);
- ✿ TPH C12-C16 (Aliphatic);
- ✿ TPH C16-C21 (Aliphatic);
- ✿ TPH C21-C35 (Aliphatic).



In the case of Leachate results, the aggressive nature of the test does not replicate the natural environmental setting and may force compounds into a solution that wouldn't otherwise be at the site.

Heavy Metals identified above could be considered (in low volume) to have low mobility and low solubility, reducing their potential to migrate in solution should the conditions arise.

Given that the site is underlain by low-permeability, predominantly cohesive glacial till deposits, which will afford protection to the underlying secondary B and principal aquifer, further limiting vertical migration, there is considered to be a low risk to controlled waters and the wider environment as, in the absence of a groundwater potable abstraction, no complete pollutant linkage can be determined.

Based on the expected development at the site, it is envisaged that the canal arm at either end will be stanked either by an interlocking sheet pile or an alternative low permeability option. This will limit water ingress during the works and sever the migration pathway within the groundwater to the adjacent existing canal in the long term.

Furthermore, the works will include removing any impacted soils from this section of the canal, further reducing the contamination load within the infilled canal.

During the excavation of materials, groundwater pumping will be required based on the existing high water table. This water will require appropriate discharge with permits where applicable. However, in this process much of the impacted groundwater will be pumped out and the source soils removed to appropriate facilities.

Given the perched water currently held within the former canal, this will require pumping out with appropriate off site disposal with the potential contaminant issues considered removed.

Furthermore, processing/removal of Made Ground from site during the same process will remove the potential for further leaching of contaminants out of the soils.

2.4. GROUND GAS

Following a phase of ground gas monitoring, the area to the north confirmed CS1 classification would be suitable for the site.

Given the highway construction considered herein there is no future risk in this regard as no viable plououton pathway exists.

However, in consideration of the VOCs identified within the Made Ground access and ingress to confirmed spaces should still be considered a risk during the works and appropriately assessed.

2.5. POTABLE WATER SUPPLY INFRASTRUCTURE

A contaminant risk assessment completed in accordance with the UKWIR assessment framework identified elevated concentrations of potentially volatile/soluble hydrocarbon compounds and it will be necessary to delineate the impacted soils where present at locations that could potentially impact the potable water infrastructure should be suitable to remediation with robust validation testing.

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



3. SITE REMEDIATION AND ENABLING WORKS

3.1. REMEDIATION OPTIONS APPRAISAL

A remediation options appraisal has been completed in accordance with the principles as set out within the Environment Agency publication Land Contamination: Risk Management (LC:RM)(updated May 2020).

The LC: RM 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 options.

3.2. 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.

Intrusive ground Investigation works completed to date is considered limited in order to fully understand the risks to future end users, controlled waters and the wider environ. However, due to the access limitations and the site conditions, the ability to gather further detailed information is considered largely unviable.

In this instance, it is considered that there is sufficient information to inform the detailed site characterisation which has determined that the primary pollution risk is associated with the presence of landfill material with variable matrices within three definitive locations (Landfill 1, 2 & 3) located on-site.

Extensive near-surface ground investigations have been completed within the areas of significant pollution risk with further deep investigation within the landfill.

3.3. REQUIREMENT FOR REGULATORY CONTROL

The processing of recycled aggregates will be completed using LAPC Part B licensed plant 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 requirements of the WRAP protocol and the E3P validation testing requirements and as such would not be deemed to be a waste material.

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 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 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 IV of this report.

Noise Restrictions

Numerous sensitive receptors are identified in the form of residential dwellings to the periphery of the area that will be subject to remediation works. The Environmental Permit will seek to limit noise impact to the identified receptors.

The contractors environmental plan of works will include boundary noise monitoring stations to assess the noise impact, daily monitoring and mitigation measures to ensure no unacceptable degree of impact to the identified receptors. Given that noise impact can be controlled, this is not considered a limiting factor in the selection of the correct remediation option.

Weather Conditions

Given the size and scale and variable remediation works required, it will be possible to ensure that the programme allows for a differentiation in operations to ensure works can proceed in areas depending on the prevailing weather for a specific period of time.

3.4. CONTAMINANTS OF CONCERN (COC)

3.4.1. METALS, PAH, NON-VOLATILE HYDROCARBON (PETROLEUM RANGE) COMPOUNDS

The human health risk drivers for the carcinogenic PAHs and metal CoC are:

- ✿ Direct contact with the soil source by groundworkers and future site workers; and
- ✿ Ingestion of impacted soils by groundworkers and future site workers.

Impacted materials are to be removed from the site and so there is not considered to be a long term issue. In the short term, works should be completed with appropriate PPE to mitigate the risk.

3.4.2. ASBESTOS

Asbestos has been identified within the Made Ground soils at the subject site. It is expected that on extraction the soils will be saturated and so the release of asbestos fibres low likelihood

It should be assumed that asbestos fibres are present throughout the Made Ground on site. The risk to chronic human health associated with the elevated concentrations of loose chrysotile and fibres (<0.001%) can be mitigated through the installation of a suitable cover system in all proposed landscaping and hardstanding to remove any potential for direct exposure to impacted soils.

Where asbestos is identified at concentrations above <0.001%, a hotspot excavation will be required and the impacted Made Ground will require placement >1.00m beneath an area of low sensitivity such as public open space in accordance with the E3P conceptual site model (Figure 2.1).

All ACM-impacted soils must be managed so as to ensure no airborne fibre release during construction or placement of impacted material in such a manner as to ensure no future exposure risk.

Soils will be placed in areas of no unacceptable future risk in accordance with the E3P validation method.



If any visible pieces of asbestos-containing material are identified during the site remediation and enabling work, this material must be dealt with in strict accordance with the Control of Asbestos Regulations (CAR) 2012, UK Waste Management Legislation and the Environmental Protection Act 1994. Due to the close proximity of residential dwellings, asbestos in air monitoring in accordance with HSG248 may be required to confirm that no asbestos fibres have been generated from the enabling works activities.

Impacted materials are to be removed from the site and so there is not considered to be a long term issue. In the short term, works should be completed with appropriate PPE to mitigate the risk

Should off-site disposal be required, then additional asbestos quantification and waste classification testing should be undertaken to ensure that it is classified correctly and disposed at a suitably licensed facility.

3.4.3. VOLATILE TPH, MERCURY, PAH, SVOC AND VOC

Volatile TPHs, naphthalene, mercury and chlorinated solvents have been identified which present a potential volatilisation risk.

Impacted materials are to be removed from the site and so there is not considered to be a long term issue. In the short term, works should be completed with appropriate PPE to mitigate the risk.

3.5. REMEDIATION OPTIONS

3.5.1. OBJECTIVES

The remediation works must be completed in a safe and sustainably, ensuring that the site's post-remediation condition poses no unacceptable risk to controlled waters or the wider environs. The developed Conceptual Site Model must ensure no complete pollutant linkage to ensure successful implementation.

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

The works should be designed and implemented to ensure no risk to an identified receptor during the works in terms of odour, air quality or noise impact.

Works should be designed, planned and implemented to ensure full compliance with all proper waste management and environmental permit legislation.

3.6. SUMMARY OF PREFERRED REMEDIATION OPTIONS

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

- 📦 **Offsite removal** of hazardous materials is required, this operation needs to be limited to materials that cannot be treated on-site to promote sustainability and ensure viable regeneration;

3.7. OVERVIEW OF WORKS

Prior to the commencement of works on site, the contractor must establish all necessary plant, equipment and site welfare facilities as is necessary to complete the contract within the agreed timescales to the rationale as outlined in the following subsections.



For the avoidance of any doubt, 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.

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 EA.

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 LPA and Environment Agency. Given the volumes of Cut/fill this is not considered likely.

RE-2 – Environmental and Nuisance Control

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

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

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

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

RE-3 – Risk to Infrastructure and Canal

Site works should be completed in a manner that ensures no risk of disturbance to the adjacent infrastructure.

Any works to be completed within the influence of the main canal may require the appropriate EA permit, this should be obtained prior to the commencement of any activities (including demolition). It should be noted that works to the main canal may be restricted during certain times of the year.



RE-4 – Identification, Isolation and Treatment of Invasive Plants

The remediation contractor must satisfy themselves with respect to 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. Once all 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 prior to 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.

RE-5 – Site Clearance Operations

Post-demolition general site clearance and provision of welfare, offices and site security are to be determined as per the contract requirements.

The site is partially overgrown with self-seeded vegetation with extensive above- and below-ground structures; this material 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.

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

All root networks are to be removed in accordance with the requirements of the NHBC/LABC.

RE-6 – Excavation, Breaking and Processing of All Above- and Below-Ground Structures

Obstructions, relict foundations and infrastructure (apart from live services) specifically bridge, deck and abutments are to be removed from the areas of proposed development, adopted highway and utilities infrastructure (road box) in their entirety.

Artificially hard materials should be broken out and crushed (or removed from site). 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 Section 5 using 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 in accordance with the engineers dismantling drawings.

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.

RE-7 – Delineation, Excavation and Treatment of Infilled Historical Canal

During the main earthworks (where possible), all known former infilled canal areas should be clearly identified and demarked and investigated to assess the nature of materials and extent of any deleterious elements.

The location of known historic infilled canals is identified within the E3P Historical Features Plan (Drawing 13-729-003 in Appendix III and in Figure 3.4.

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 E3P 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.

FIGURE 3.4 LOCATION OF IDENTIFIED INFILLED CANAL



RE-8 – Removal of Deleterious Material

The E3P Ground Investigation identified potentially deleterious wastes within the infill across the site. All potentially deleterious materials will be delineated, stockpiled and removed from site by the contractor to a licensed waste facility. Prior to the commencement of the main works, the contractor, under the supervision of E3P, will undertake to complete further confirmatory ground investigations to satisfy themselves with regard to the extent of any buried anthropogenic deleterious materials that are unsuitable for retention.

RE-9 – Cut-And-Filling of MADE GROUND to Development Levels

The Made Ground is noted to be present to substantial depth in some areas of the site (> 2 m). It is considered that it will be possible to engineer granular Made Ground to treat the currently unknown potential for differential settlement and ensure a uniform safe allowable bearing pressure (ABP) in the order of 50 kN/m² through the course of the highway section.

Where the proposed enabling works levels require the current landform to be cut, extreme care should be taken so as not to disturb the underlying stratum prior to the placement of the appropriate platform, in compliance with the E3P Geotechnical Specification.

Where the development levels require material to be filled, site-derived or imported Made Ground must be sorted in a controlled manner prior to replacement, in accordance with the requirements of this specification for the intended land use.

The maximum dry density must be determined in laboratory conditions utilising UKAS-accredited testing prior to the commencement of filling and compaction works. In-situ density testing is required to demonstrate compliance with the E3P Geotechnical Performance Specification.

RE-10 – Replacement of Materials, Geotechnical Engineering Requirements

Material is to be backfilled in strict compliance with the E3P Geotechnical Engineering Specification as presented in detail within Section 5 of this report, which generally requires the reinstatement and compaction criteria presented in Table 3.1.

RE-11 – Importation of Bulk Fill

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 (Section 5).

Imported material must be certified as suitable for use in strict accordance with the E3P chemical and geotechnical performance criteria (See Section 5) 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.

RE-12 – Independent Validation: Watching Brief

Given the site history and potential contamination sources identified within the ICSM, a degree of uncertainty remains with regard to the potential for as yet unidentified contamination impact within the near-surface soils and groundwater.

It will therefore be necessary to instigate the site-wide remediation and enabling works under the supervision of a suitably qualified and independent specialist. The specialist is required to attend site as and when appropriate to monitor works, record ground conditions and fully investigate all potential sources of as yet unidentified contamination.

RE-13 – 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 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 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.

The preferred alternative approach would be to locate a site in the locality that requires soils to achieve required development levels. 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*.

RE-14 – Validation of Materials for Potable Water Supply Infrastructure

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. For the avoidance of doubt, the PE thresholds are presented in Section 9.3. Failure to meet the required specification may necessitate further remedial works.

The site has been identified as suitable for PE pipework. It is essential that any materials imported to the site for the purpose of potable pipework installation meet the criteria of PE pipework as presented within UKWIR guidelines. The for avoidance of doubt these guidelines are presented in Section 9.3. Failure to meet the required specification may necessitate further remedial work.

RE-15 – 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.

3.8. 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 development.

Upon removal of the hotspot of unsuitable made ground in the northern sector, validation samples will be collected from the base (two samples) and sidewalls (four samples) of the excavation to reasonably demonstrate no residual impact to the underlying strata.

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/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.

A detailed copy of E3P Ltd sampling methodology, QA procedures and laboratory chain of custody forms will be documented within the site records and presented with the final validation report for the site.

Where material is found to contain concentrations of potential contaminants at levels in excess of the site-specific screening criteria (as detailed within Appendix III), 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.

The sampling frequency for materials to be managed under the remediation strategy is presented within Table 3.2.



TABLE 3.2 SPECIFICATION OF CHEMICAL VALIDATION LABORATORY ANALYSIS

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Site-Generated		
Site-Generated 6F2	1 Sample per 1000 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	G
Site-Won MADE GROUND General Backfill	1 Sample per 1000 m ³	A/B/C/D
Site-Won MADE GROUND General Backfill	1 Sample per 2000 m ³	I
Site-Won Natural Backfill	1 Sample per 2000 m ³	A/B/C/D
Imported		
6F5	1 Sample per 1000 m ³	A/B/C/D
Subsoil Greenfield Source* (150 mm Cover)	1 Sample per 200 m ³	A/B/C/D
Subsoil Brownfield Source (150 mm Cover)	1 Sample per 50 m ³	A/B/C/D
Topsoil Greenfield Source (150 mm Cover)	1 Sample per 200 m ³	A/B/C/D
Topsoil Brownfield Source (150 mm Cover)	1 Sample per 50 m ³	A/B/C/D
General Engineering Fill (Class 1 and 2 Soil)	1 Sample per 1000 m ³	A/B/C/D
Imported Brownfield Material	1 Sample per 1000 m ³	I

Notes

***for any landscaping completed with the works.**

Suites of Analysis:

- A. Speciated PAH.
- B. Speciated TPH (C5-C35).
- C. Asbestos (ID).
- D. CLEA Inorganic Heavy Metals.
- E. Speciated PAH, Banded TPH and VOCs.
- F. SVOC/Speciated TPH.
- G. On-Site Screening for VOC Using Calibrated PID.
- H. Leachate 2:1 Speciated PAH and Banded TPH.
- I. Leachate Analysis of Inorganic Heavy Metals, TPH, Sulphate and PAH.

All analysis prescribed above to be completed by UKAS-accredited laboratory.

3.9. REMEDIATION CONTRACTORS 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 and every 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.



4. MATERIALS MANAGEMENT AND LEGISLATIVE COMPLIANCE

The processing of recycled aggregates will be completed using LAPC Part B licensed plant 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 requirements of the WRAP protocol and the E3P validation testing requirements and as such would not be deemed to be a waste material.

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 licences, exemptions and protocols provide the legislative framework for material compliance during the site remediation and enabling works to be completed by the specialist contractor under the supervision or 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)*.

It is noted that if 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 reuse of materials on the site.

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



5. ENVIRONMENTAL MONITORING AND VALIDATION

5.1. SITE MANAGEMENT

The tracking of materials will be based on the following hierarchy:

- ✿ The principal contractor will have the responsibility for setting out areas of the site on the basis of the contract specification.
- ✿ Operatives will have instructions only to excavate and to emplace materials in specified areas as assigned by the site manager/foreman.
- ✿ The site manager (employed by the principal contractor) will issue daily instructions to drivers regarding the placement of materials sourced from specific stockpiles or areas, ensuring that appropriate documentary evidence is collected that details which materials are going where and why.
- ✿ An E3P consultant, who will be in attendance as required, will:
 - Inspect the excavation areas and certify that the correct materials are being excavated;
 - Conduct spot checks on loaded vehicles to ensure compliance with this remediation strategy; and
 - Ensure that any loads that fail visual, olfactory or spot checks either remain on the vehicle or, if unloaded, are excavated and set aside. This material will be treated according to the recommendations of the E3P site engineer.
- ✿ E3P will conduct an audit of waste consignment notes. All material imported and removed from site will have duty of care/consignment notes, copies of which will be retained on site by the site manager.
- ✿ Materials directly reusable will be incorporated into the earthworks, subject to operational conditions and phasing of excavations, in which case they will be stockpiled prior to final placement.

5.2. COMPLETION

Following the completion of the remediation works, a report will be compiled by the environmental consultant detailing all site enabling works undertaken, waste consignment notes, and all site investigations, laboratory test certificates and validation testing undertaken.

A certificate of completion of earthworks should be included within the report which should then be issued to the local authority for their approval.

E3P considers that with the adoption of the above best practices the site can be safely redeveloped. The site enabling works process and 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.



5.3. MITIGATION OF RISK FROM SOILS WITH ASBESTOS FIBRES

5.3.1. PRE-COMMENCEMENT WORKS

Prior to the commencement of works, the following requirements must be satisfied:

- ✳ Induction of all people that will be involved with the proposed site works; and
- ✳ All methodologies must be agreed upon by all parties involved.

5.3.2. CONTROL, MONITORING AND REPORTING OF GENERAL AERIAL EMISSIONS FROM DUST AND PARTICULATES

DAMPING DOWN OF SOILS – MITIGATE PARTICULATE (DUST) EMISSION

During excavation, as outlined within the detailed working methodologies, soils will be regularly damped down using water to control the generation of dust (this may also comprise precipitation). The contractor will determine the best form of dust suppression to be used when a detailed programme has been issued.

If any previously unidentified asbestos-containing materials are identified, these should be dealt with in strict accordance with the *Control of Asbestos Regulations* (2012) and industry best practice as detailed in CIRIA 733.

GENERAL CONTROL OF DUST

The following control measures should be utilised to ensure that dust levels are kept to a minimum at all times:

- ✳ Where necessary, haul roads, work areas and stockpiles will be damped down with water spray.
- ✳ The application of water to haul roads, work areas and stockpiles should be closely monitored by the resident engineer to ensure that soils are not saturated and, therefore, that the potential for water run-off is appropriately mitigated.
- ✳ Once completed, any stockpiles will be sealed by compacting at the surface.
- ✳ Vehicle speeds and movements on site will be kept to a minimum (< 5 mph) during civil excavation works to reduce the potential to generate dust.



PERSONAL PROTECTIVE EQUIPMENT (PPE)

In accordance with the HSE *Guidance Note em6: Asbestos Essentials, Personal protective equipment (including RPE)*, E3P recommend that all site operatives present within the work area where potential asbestos-impacted soils are being excavated are supplied with the following personal protective equipment:

Overalls:

- ✳ Disposable overalls.
 - Type 5 (BS EN ISO 13982-1) is suitable.
 - Cotton overalls hold dust and need specialist laundering.
- ✳ Waterproof overalls for outdoor work.
- ✳ Use oversized overalls - this will help to prevent ripping at the seams.
- ✳ If the cuffs are loose, seal them with tape.
- ✳ Avoid wearing a long-sleeved shirt as these are difficult to cover properly.
- ✳ Wear the overall legs over footwear as tucking them in lets dust into footwear.
- ✳ Wear the hood over the RPE straps.

Failure to utilise and correctly employ PPE will result in immediate cessation of works. Works will not be permitted to recommence until the individual has undergone further training in the use of PPE or the individual is removed from the works area.

At this current time, with the levels of ACM identified within the soils, the above-listed PPE is not considered to be required for all site personnel during the entire management of these soils.

When handling asbestos-impacted soils during the enabling works, asbestos monitoring works should be conducted in accordance with, but not limited to, the following HSE legislation and guidance:

- ✳ *Health & Safety at Work Act 1974;*
- ✳ *The Control of Asbestos Regulations 2012;*
- ✳ CL:AIRE, 2016. *Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance;*
- ✳ *Approved Code of Practice L143 Work with materials containing asbestos;*
- ✳ *Management of Health and Safety at Work Regulations 1999;*
- ✳ *HSE Guidance Note HSG248 Asbestos, the analysts guide to sampling and analysis;*
- ✳ *HSE Guidance Note HSG247 Asbestos: The licensed contractors' guide;* and
- ✳ *CIRIA 733 Asbestos in soil and made ground: a guide to understanding and managing risks.*



If required, air monitoring in accordance with HSG248 will be undertaken intermittently throughout the duration of the works at a frequency to be determined by the contractor, entirely dependent on whether asbestos-impacted soils are being handled at any given time. In general terms, during any one monitoring period, ten standard monitoring pumps will be run throughout the day, for the appropriate time period to achieve the required limit of detection. These slides will be analysed immediately by the on-site UKAS-accredited laboratory.

Once any monitoring has been analysed by the on-site UKAS-accredited laboratory, the results will be delivered to the resident engineer who will then follow the correct site procedure. The results will then be included within the verification report.



6. GEOTECHNICAL ENGINEERING SPECIFICATION

6.1. E3P GEOTECHNICAL ENGINEERING SPECIFICATION

The overarching philosophy of the site-enabling works will be the delivery of the following:

- ✿ The complete footprint of the proposed highway will be subject to a process of enabling earthworks to remove existing structures in their entirety as well as all Made Ground and organic materials, prior to the completion of site wide cut / fill utilising naturally occurring and recycled materials to construct the development platform. All material will be placed and engineered in accordance with this specification to ensure compliance as a structural upfill;
- ✿ Where Class 1 & 2 materials are used in the cut / fill earthworks, stabilisation agents such as lime may be required to control the moisture content and ensure compaction as engineered structural fill;
- ✿ All hard materials will be processed as a Class 6 recycled material for subsequent compaction;

The contractor should employ a suitably experienced engineer to be present on site during earthwork operations to ensure soil suitability, placement, compaction and testing is undertaken in accordance with this specification and to ensure that any unforeseen circumstances, such as adverse weather, do not compromise the earthworks process.

Works should be halted during periods of intermittent or prolonged rainfall to ensure the materials are not placed in a manner that would result in softening of either the formation or the newly placed material. It will be the contractor's responsibility to determine appropriate weather conditions and determine the suitability of works.

Particular attention must be given to variable weather conditions when re-engineering fine grained soils as a moisture content fluctuation (2% +/-) of the tolerable limit will result in unacceptable degree of compaction loss without appropriate modification and stabilisation. The contractor will be responsible for extensive control testing to demonstrate that the optimum moisture content for all engineering material is within the pre-defined control limits.

Where relict structures / infrastructure has been removed, the reduced level excavation should be formed in a manner where the sides are graded at no greater than a 45o angle (or otherwise artificially supported) that will facilitate the resulting backfilling of the excavation with Class 1 / 2 or 6 soils that are to be engineered to achieve the required performance specification.

The contractor will be responsible for proof rolling and where necessary Ground Improvement in the sub-stratum to ensure it is compacted with all potential variable stratum or soft spots to be removed and replaced with material that is engineered in accordance with the requirements of this specification.

The contractor will undertake to provide a detailed survey of all reduced-level excavations with survey positions of a maximum 25m grid increasing to 5m centres where a change in topography greater than 500mm occurs at any one point. The reduced level survey is to be provided to the supervising engineer for review and approval prior to the backfill of the excavation and placement of structural fill material.

In general, all soils (excluding certified recycled and quarried aggregates) must be engineered to achieve the following performance criteria:



- ✿ Moisture content to be within 2% (+/-) of the defined optimum / control value;
- ✿ CBR to meet the required performance spec for the relevant stratum in each and every engineered soil layer; and,
- ✿ Maximum deformation under Plate Load to meet the geotechnical specification within each and every compacted layer.

6.2. LOCALLY-WON FILL MATERIAL

It is proposed to upfill and level the site with material won from the development area. From the site-specific investigations undertaken to date, it is expected that the majority of the soils won from the processing of demolition material will be granular and cohesive soil matrices.

Due to climatic weather conditions and variance in long-term differential settlement associated with even well-compacted granular soils, and the need to facilitate future re-engineering using vibro-replacement stone columns to support a shallow reinforced strip foundation, it is essential that the cut-and-fill process is well controlled and materials are placed/compacted in accordance with this specification.

Where site-won materials are to be used as fill to achieve the required development platform, they must be compacted to ensure in-situ densities that are in excess of 95% of the maximum dry density, as determined using a 4.5 kg laboratory Proctor test.

Materials should only be compacted when the actual moisture content is within 2% ($\pm$) of the optimum for the soil matrices as determined by laboratory bench testing.

6.3. CLASSIFICATION OF FILL MATERIAL

This specification should be read in conjunction with the following:

- ✿ The Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works, Series 600, Earthworks as amended in February 2016; and
- ✿ BS 1377-1:2016 Methods of test for soils for civil engineering purposes. General requirements and sample preparation

6.3.1. GENERAL CLASSIFICATION

The contractor should ensure that all earthworks materials comply with Clause 601 of the *Specification for Highway Works* and shall fall into one of the following general classifications as defined in Table 6/1 of the *Specification for Highway Works*.

- ✿ General granular fill (Class 1);
- ✿ General cohesive fill (Class 2), excluding Class 2A and 2E; or
- ✿ Selected granular fill (Class 6).

Materials can be engineered in accordance with the Methods for General Cohesive Fill (Class 1 or 2) however it is essential the performance criteria of a Class 7A Material is achieved.



6.3.2. USE OF FILL MATERIAL

In addition to any grading requirement, the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness, except that cobbles having an equivalent diameter of more than 150mm shall not be deposited within the restored surface level unless directed otherwise by the Engineer.

Un-burnt colliery spoil, pulverised fuel ash or furnace bottom ash shall not be used as a fill material.

Prior to the additional of any stabilising agents, laboratory bench testing will be undertaken in accordance with the method and rationale as outlined within the DMRB HA74/07.

For any stabilisation works, certain limiting factors must be considered by the contractor in their design:

- ✿ Soils can only be stabilised through the addition of lime/OPC when the ambient air temperature is >7 degrees; and,
- ✿ Ground temperatures cannot fall below 3 degrees.

In addition to any grading requirement for a material type, the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness, except that cobbles having an equivalent diameter of more than 150mm shall not be deposited within the restored surface level unless directed otherwise by the Engineer.

It is understood that the materials will comply to a highways specification outlined by the civil engineer. As such it is expected that the materials will be within tolerable moisture limits as outlined in the specification.

Though unlikely, where any cohesive materials are utilised as backfill, prior to the commencement of any works, the following laboratory tests are to be completed by the contractor to demonstrate the suitability of materials for use as fill to highways.

Pre-Commencement Earthworks Testing Frequency / Performance

To determine the geotechnical classifications of any material to be placed and compacted in layers, representative samples will be taken at a frequency of **1 per 2,000m³** and submitted for particle size distributions (PSDs). Maximum Dry Density and Natural and Optimum Moisture Content determinations.

To determine the geotechnical classifications of any cohesive material to be placed and compacted in layers, representative samples will be taken (following removal of any inclusions of oversize material, metal, timber, plastic, etc.) at a frequency of **1 per 1,000m³** and submitted for liquid and plastic limits, plasticity index and natural moisture content determinations. Organic matter determinations shall be prescribed at the discretion of the supervising consultant, dependent on visual observations.

Representative samples of all proposed backfill shall be taken at a frequency of **1 per 3000m³ (minimum 3nr)** and submitted for Dry Density / Optimum Moisture Content analysis using either a 4.5Kg or 2.5kg rammer to determine the optimum moisture content and maximum dry density for the engineering of structural fill.

For an unaltered fill material to be deemed suitable for use, the natural moisture content must be within 2% (+/-) of the optimum to achieve the required maximum dry density. Where the laboratory test indicates that the soil parameters are outside this requirements, stabilising agents should be added to assess suitability for use to the contractors own design.



6.4. GENERAL PERFORMANCE REQUIREMENTS – ENGINEERED FILL

The contractor shall employ only plant and working methods which are suited to the materials to be handled and traversed. The contractor shall be responsible for maintaining the nature of the acceptable material so that when it is placed and compacted it remains acceptable in accordance with the Contract.

Fill to Adopted highway – Completion of necessary cut / fill works, compaction of shallow granular soils and subsequent construction of a soil platform to ensure a net safe Allowable Bearing Pressure or CBR value in accordance with the civil and structural engineers designs. It is expected that backfill will require a CBR in the region of 5% and the underside of asphalt will be in the region of 15% CBR value..

The contractor will be responsible for proof rolling and where necessary Ground Improvement in the sub-stratum to ensure it is compacted with all potential variable stratum or soft spots to be removed and replaced with material that is engineered in accordance with the requirements of this specification.

In general, all soils (excluding certified recycled and quarried aggregates) must be engineered to achieve the following performance criteria:

-  Moisture content to be within tolerable limits as outlined by the civil and structural engineer;
-  CBR to meet the required end product spec for the relevant stratum in every engineered soil layer; and,
-  Maximum deformation under Plate Load to meet the geotechnical specification within each and every compacted layer.



TABLE 3.1 SPECIFICATION FOR GEOTECHNICAL ENGINEERING WORKS - GROUND BEARING FLOOR SLAB

CONSTRUCTION DETAIL	MATERIAL	TEST TYPE	FREQUENCY / 1 PER:	PERFORMANCE REQUIREMENT
MOT Sub-Base (Engineers Drawing)	MOT – Type 1	Max Deformation & CBR by Plate Load	1000 m ²	CBR to be >15% (civil/structural engineer design)
		PSD	1000 m ³	Type MOT 1 Grading
		Frost Susceptibility	5000 m ³	<5% Heave
300mm Engineered Capping	Stabilised Subbase Replacement or Suitable Aggregate	Max Deformation & CBR by Plate Load	2000 m ²	>15% & <5mm settlement 50kN/m ² (civil/structural engineer design)
		CBR by DCP	1000 m ²	>15%
		In-situ Density by NNDGT or SRD	625 m ²	>95% of Max DD (4.5kg)
Engineered Structural Up-Fill (Stabilised to control moisture as required)	Engineered Cohesive	In-situ Density by NNDGT or SRD	625 m ²	>95% of Max DD (4.5kg) <5% Air Voids
		Max Deformation & CBR by Plate Load	4000 m ² (placed)	>4%
		CBR by DCP	1000 m ³	>4%
		Odometer (core)	10,000 m ³	<0.1 m ² /MN
	Engineered Granular	In-situ Density by NNDGT or SRD	650 m ²	>95% of Max DD (4.5kg)
		Max Deformation & CBR by Plate Load	4000 m ² (placed)	>4%
		CBR by DCP	1000 m ³	>4%
Base of Formation	Granular or Cohesive	CBR by DCP	4000 m ²	>4%
		Hand Shear vane	500 m ²	Cu >30kN/m ²



TABLE 3.2 SPECIFICATION FOR GEOTECHNICAL ENGINEERING WORKS – ADOPTED HIGHWAY

CONSTRUCTION DETAIL	MATERIAL	TEST TYPE	FREQUENCY / 1 PER:	PERFORMANCE REQUIREMENT
MOT Sub-Base (Engineers Drawing)	MOT – Type 1	Max Deformation & CBR by Plate Load	1000 m ²	CBR to be >30% (structural engineer design)
		PSD	1000 m ³	Type DOT 1 Grading
		Frost Susceptibility	5000 m ³	<5% Heave
300mm Engineered Capping	Stabilised Subbase Replacement or Suitable Aggregate	Max Deformation & CBR by Plate Load	1000 m ²	>30% & <6mm settlement 50kN/m ² (civil/structural engineer design)
		CBR by DCP	1000 m ²	>15%
		In-situ Density by SRD or NNDGT	650 m ²	>95% of Max DD (4.5kg)
Base of Formation	Granular or Cohesive	CBR by DCP	1000 m ²	>4%

Notes:

Maximum dry density shall be determined by obtaining representative samples of all material that will be engineered using laboratory determinations to confirm the Optimum Moisture Content & Maximum Dry Density for soils in either the unaltered or modified (stabilised) state.

CBR by Plate Load will utilise a 450mm Plate with the test to be conducted in strict accordance with BS1377 (Part 9). Note this will mean the loading of the test until all movement of the plate has stopped, i.e. until the average settlement rate is less than 0.02mm per 5 minute interval. A minimum modelled load of 150Kn/m² will be applied to all PLT Testing for the purposes of this contract.

In-situ density method to be selected by the contractor with written approval required from the supervising organisation in terms of appropriateness of application.

The depth of differing stratum as indicated within the E3P specification is for guide purposes only and the contractor must refer to the Structural Engineers drawings for specific build up requirements.

Where soil is to be stabilised and used as an engineered fill material the contractor will be required to provide a site specific method statement for the proposed works to be fully inclusive of laboratory bench testing to demonstrate the suitability for use.



TABLE 3.3 E3P EARTHWORKS GEOTECHNICAL COMPACTION SPECIFICATION

SOIL/MATERIAL TYPE	CLASS	DESCRIPTION	COMPACTION EQUIPMENT	LAYER THICKNESS	ROLLER PASSES
Granular Fill (Sand and Gravel Matrices)	1 A	Sandy Gravel with some cobbles	> 5000 kg vibrating roller	225 mm	4
	1 B	Sand or Gravel of the same grading size	> 5000 kg vibrating roller	250 mm	10
	1 C	Coarse gravel with many cobbles	> 5000 kg vibrating roller	400 mm	5
Cohesive Fill (Clay with Minor Sand and Gravel Component)	2 A	Wet Clays	> 1000 kg vibrating tamping roller (sheep foot only)	100–225 mm	3
	2 B	Dry Clay	> 5000 kg vibrating roller or 1400 kg tamping (trench roller)	225 mm or 125 mm	4 or 12
	2 C	Gravelly Clay	> 5000 kg vibrating roller or 1400 kg tamping (trench roller)	225 mm or 125 mm	4 or 12
	2 D	Silty/Sandy Clay	> 5000 kg vibrating roller or 1400 kg tamping (trench roller)	225 mm or 125 mm	4 or 12
Recycled Aggregate Crush (< 125 mm Well Graded)	6F2	Any combination of inert hard materials, other colliery spoil, or rock with substantial amounts of clay-like component	> 5000 kg vibrating roller	250 mm	6



6.4.1. USE OF FILL MATERIALS

In addition to any grading requirement the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness except that cobbles having an equivalent diameter of more than 150mm shall not be deposited within the restored surface level unless directed otherwise by the Engineer.

Un-burnt colliery spoil, pulverised fuel ash or furnace bottom ash shall not be used as a fill material.

Prior to the additional of any stabilising agents, laboratory bench testing will be undertaken in accordance with the method and rationale as outlined within the DMRB HA74/07.

For any stabilisation works certain limiting factors must be considered by the contractor in their design:

-  Soils can only be stabilised through the addition of lime/OPC when the ambient air temperature is >7 degrees.
-  Ground temperatures cannot fall below 3 degrees.

In addition to any grading requirement for a material type the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness except that cobbles having an equivalent diameter of more than 150mm shall not be deposited within the restored surface level unless directed otherwise by the Engineer.

Prior to the commencement of any works, the following laboratory tests are to be completed by the contractor to demonstrate suitability of materials for use as a structural fill and where required to provide bench testing to confirm the applicability of stabilisation agents.

6.4.2. PRE-COMMENCEMENT EARTHWORKS TESTING FREQUENCY / PERFORMANCE

To determine the geotechnical classifications of any material to be placed and compacted in layers, representative samples will be taken at a frequency of 1 per 1,000m³ and submitted for particle size distributions (PSDs). Maximum Dry Density and Natural and Optimum Moisture Content determinations.

To determine the geotechnical classifications of any cohesive material to be placed and compacted in layers, representative samples will be taken (following removal of any inclusions of oversize material, metal, timber, plastic, etc.) at a frequency of 1 per 1,000m³ and submitted for liquid and plastic limits, plasticity index and natural moisture content determinations. Organic matter determinations shall be prescribed at the discretion of the supervising consultant, dependent on visual observations.

For an unaltered fill material to be deemed suitable for use, the natural moisture content must be within 2% (+/-) of the optimum to achieve the required maximum dry density. Where the laboratory test indicates that the soil parameters are outside this requirements, stabilising agents should be added to assess suitability for use to the contractors own design.



6.5. GENERAL REQUIREMENTS

The contractor shall employ only plant and working methods that are suited to the materials to be handled and traversed. The contractor shall be responsible for maintaining the nature of the acceptable material so that when it is placed and compacted it remains acceptable in accordance with the contract.

For the purposes of this contract, the proposed earthworks requirements have been split into distinct end use categories, with the corresponding requirements for the earthworks specification assigned to individual areas.

TABLE 3.4 COMPACTION/BACKFILL REQUIREMENTS

LAND USE requirement	COMPACTION METHODOLOGY and GENERAL PERFORMANCE CRITERIA
Adopted Highways (+ 2 m from Back of Footpath)	<i>Method Compaction – Highways Design Manual Series 600</i> is to be followed, with in-situ validation testing to meet requirement of adoptions authority. A CBR > 5% is required at subgrade formation (prior to placement of capping).
Estate Roads	<i>Method Compaction – Highways Design Manual Series 600</i> is to be followed to achieve a CBR > 5%.
Landscaping, POS and Other External Areas	Material is to be placed in layers not exceeding 300 mm and must be rolled using dedicated plant (no earth moving equipment) and in general compliance with the requirements of <i>Highways Design Manual Series 600</i> .

Acceptability shall be determined in accordance with Table 6/1 of the *Specification for Highway Works*.

Laboratory testing for the purposes of determining acceptability and compaction requirements will be conducted by the engineer.

Haulage of material to embankments or other areas of fill shall proceed only with sufficient spreading and compaction. Plant is operating at the place of deposition to ensure compliance with Clause 612 of the *Specification for Highway Works*.

No excavated acceptable material or unacceptable material required to be processed, other than surplus to the requirements of the contract, shall be removed from the site.

Where the excavation reveals a combination of acceptable and unacceptable materials, the contractor shall carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the unacceptable materials. Unless otherwise described in the contract, classes of fill material required to be deposited separately shall be excavated separately without contamination by other classes of material.

The contractor shall make their own arrangements for the stockpiling of acceptable material, and unacceptable material to be processed, and for the provision of site for this purpose.

The contractor shall ensure that they do not adversely affect the stability of excavations or fills by their methods of stockpiling materials, use of plant or siting of temporary buildings or structures.



Topsoil shall, wherever practicable, be used immediately after its stripping and, if not, shall be stored in stockpiles of heights not exceeding 2 m. Topsoil shall not be stockpiled for more than two years. Topsoil shall not be unnecessarily trafficked, either before stripping or when in a stockpile. Stockpiles shall not be surcharged or otherwise loaded and multiple handling shall be kept to a minimum.

Excavations requiring backfilling shall remain open only for the minimum period necessary.

The contractor shall keep earthworks free of water, including:

- ✿ Arranging the rapid removal of water:
 - shed on to the earthworks; and
 - entering the earthworks from any source;
- ✿ Provide, where necessary, temporary watercourses, drains, pumping and the like;
- ✿ Discharge accumulated water and groundwater into the permanent outfalls of the drainage system where practicable; and
- ✿ Provide adequate means for trapping silt on temporary systems discharging into permanent drainage systems.

The contractor shall carry out and maintain groundwater lowering or other treatment as required.

Where materials are designated either Class U1B or Class U2 (according to the *Specification for Highway Works*), the contractor shall carry out any special requirements for their handling. Where such materials are encountered during the progress of the works, the contractor shall make all necessary arrangements for their safe handling and disposal after consultation with the appropriate environmental authority.

6.5.1. CONSTRUCTION OF FILLS – HIGHWAYS

All fills shall be constructed:

- ✿ In the locations as shown in the contract drawings to the lines and levels stated therein;
- ✿ Of classes of material complying with this specification;
- ✿ By deposition, as soon as practicable after excavation, in layers to meet the compaction requirements as required for each class of material as specified; and
- ✿ To the requirements of this clause and any other requirements for fill in this specification.

Before commencing work on any area of fill, the contractor shall ensure that:



- ✿ The base is sound and stable by excavating and removing any topsoil as soft subsoil;
- ✿ Base layers are not exposed until the fill layer is ready for placement; and
- ✿ Uncompacted material on the side slopes of previously backfilled zones shall be removed and benches of between 1.0 m and 1.5 m height cut in compacted fill immediately prior to deposition of the new fill to ensure that the new backfill placed against the slope is properly integrated.

Whenever fill is to be placed on surfaces inclined at 1 vertical to 7 horizontal or steeper, the surface shall be benched immediately prior to deposition of the fill in order to achieve horizontal basal surfaces. The benches shall be between 1.0 m and 1.5 m in height.

Areas of fill shall, unless otherwise permitted by the engineer, be constructed evenly over their fullest possible extent and the contractor shall carefully control and direct construction plant and other vehicular traffic uniformly over the area of compacted fill. The minimum plan dimensions of any one panel of backfilling shall be properly integrated with areas of previous backfilling. Damage by construction plant and other vehicular traffic shall be made good by the contractor with material having the same characteristics and strength as the material had before it was damaged.

Temporary slopes within compacted and uncompacted backfill shall be formed at gradients that ensure stability.

6.5.2. CONSTRUCTION OF FILLS – ADOPTED HIGHWAYS, ESTATE ROADS AND CAR PARK

The contractor shall carry out compaction upon the materials that require to be compacted, as soon as practicable after deposition.

Compaction shall be either method as required for the classes of fill in Table 6/1 that require to be compacted.

The contractor shall obtain permission from the overseeing organisation before carrying out compaction requirements as listed in Table 6/1 for the class of material being compacted.

Method compaction shall be undertaken using the plant and methods appropriate to the compaction requirements as listed in Table 6/1 for the class of material being compacted.

Earthmoving plant shall not be accepted as compaction equipment nor shall the use of a lighter category of plant to provide any preliminary compaction to assist the use of heavier plant be taken into account when assessing the amount of compaction required for any layer.

If more than one class of material is being used in such a way that it is not practicable to define the areas in which each class occurs, the contractor shall compact with plant operating as if only the material which required the greater compaction effort is being compacted.

If the results of field tests show densities that indicate the state of the compaction to be inadequate, then if this is due to failure of the contractor to comply with requirements of the contract, the contractor shall carry out such further work as is required to comply with the contract.

Refer to Clause 612/10 of the *Specification for Highway Works* for definition of plant to be used in accordance with these specified works.



The contractor will be responsible for assessing the class of fill in accordance with Table 6/1 of the *Specification for Highway Works*. Table 6/4 of the *Specification for Highway Works* should then be employed to assess the method of compaction to be employed. The test results and method statements shall be submitted to the consulting engineers for approval.

6.5.3. UNACCEPTABLE MATERIAL

The contractor is solely responsible for ensuring full and detailed analysis of all reported ground conditions and areas of risk in terms of the potential for unacceptable material to be present within the proposed earthworks. Limitations in the available information should be highlighted to the supervising engineer prior to the commencement of earthworks. The contractor is to make full and unequivocal arrangements to investigate the potential presence for unsuitable materials within the earthworks and construction of highway fill. All unsuitable materials are to be identified for removal in accordance with this specification.

Unacceptable material Class U1A shall be:

Material which does not comply with the permitted constituents and material properties of MCHW Table 6/1 and contract specific Appendix 6/1 for acceptable material; and;

Material, or constituents of materials, composed of the following unless otherwise described in contract specific Appendix 6/1:

- ✚ Peat, materials from swamps, marshes and bogs;
- ✚ Logs, stumps and perishable material;
- ✚ Materials in a frozen condition;
- ✚ Clay having a liquid limit determined in accordance with BS 1377: Part 2, exceeding 90 or plasticity index determined in accordance with BS 1377: Part 2, exceeding 65; and,
- ✚ Material susceptible to spontaneous combustion except unburnt colliery spoil complying with sub-Clause 15 of this Clause;(ii)unacceptable material

Unacceptable material Class U1B shall be:

Contaminated materials, including controlled wastes (as defined in the Environmental Protection Act 1990 Part IIA) whose level of contamination is above that given either in contract specific Appendix 6/14 or in contract specific Appendix 6/15, but excluding all hazardous wastes (as Volume 1 Series 600 Specification for Highway Works Earthworks W2 Amendment – February 2016 defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive wastes (as defined in the Radioactive Substances Act 1993).3(02/16).

Unacceptable material Class U2 shall be:(i) hazardous waste (as defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive waste (as defined in the Radioactive Substances Act 1993).4(02/16).

Where required in contract, unacceptable material (other than Class U2) shall be processed by mechanical, chemical or other means to render the material acceptable for use in the permanent works in accordance with the requirements of Table 6/1 and contract specific MCHW Appendix 6/1.



6.6. EARTHWORKS MATERIAL TESTS

Prior testing of the potential sources of fill shall be undertaken by the contractor and submitted to the consulting engineers for approval. This testing shall include, but not necessarily be limited to, the compaction and backfill requirements detailed in Table 3.5.

TABLE 3.5 COMPACTION/BACKFILL REQUIREMENTS

TABLE 3.10 COMPACTION / BACKFILL REQUIREMENTS		COMPACTION METHODOLOGY and GENERAL PERFORMANCE CRITERIA
LAND USE		
Liquid and Plastic Limits		BS 1377: Part 2
Grading		BS 1377: Part 2
Uniformity Coefficient		Calculated from grading curve
Moisture Content Multi-point moisture condition value (MCV) (to assess optimum moisture content).		BS 1377: Part 2
Organic Matter (Maximum 2.5% Total Organic Content)		BS 1377: Part 3
Water Soluble Sulphate		TRL Report 447 Test No 1
Total Sulphate Content		TRL Report 447 Test No 4
Earthwork In-situ Tests Subsequent to the filling and compaction of the material, a series of in-situ tests shall be undertaken to confirm the success of the compaction process. This testing shall include, but necessarily be limited to, the following:		Clause 632 (BS 1377: Part 4)
Test	Test Method	
Plate Load Tests (Equivalent CBR)	BS 1377: Part 9	
Disposal of Materials The contractor shall be responsible for the safe disposal of any excess of unsuitable material found on the site.		
Max DD / OMC (Proctor) Compaction Testing		BS 1377: Part 4

The current and proposed site topography, changes in elevation and any existing or new slopes are beyond the scope of this specification. Where any earth slopes exceed a design gradient of 1(v) in 3(h) either on site or within the conjectured zone of structural influence, extreme care should be taken with a full and detailed geotechnical slope analysis to inform the retained design solution.



7. RECORD-KEEPING AND VERIFICATION

7.1. RECORD-KEEPING

During the course of the remediation and site enabling works, the on-site E3P consultant will undertake the following record-keeping protocols:

- ✳ Detailed daily site diary including material movements;
- ✳ Sampling register, testing results, photographs, details of locations of hydrocarbon-impacted 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 course of the remediation and site enabling works.

7.2. VERIFICATION

The records listed above will then be compiled into a validation report produced by E3P on completion of the remediation and site enabling works, clearly referencing the origin of the materials used and testing carried out to confirm its suitability for use, where required. E3P will also prepare an as-built development drawing clearly detailing the materials present on site to be cross referenced with the supporting validation documentation.

The validation report will include the following:

- ✳ Remediation strategy (including copies of confirmation from regulatory authorities agreeing criteria);
- ✳ Detailed surveys of all excavations and production of as-built drawings for the earthworks;
- ✳ Copy of consignment notes relating to the movement of wastes to a licensed waste management facility;
- ✳ Detailed drawings showing all sampling locations for both chemical and geotechnical testing;
- ✳ Chemical test results;
- ✳ Geotechnical test results;
- ✳ Details of qualified persons signed declaration; and
- ✳ Monitoring results if undertaken (e.g. asbestos in air, gas water).



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.

END OF REPORT



APPENDIX I

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. 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 do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



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
CA	Coal 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



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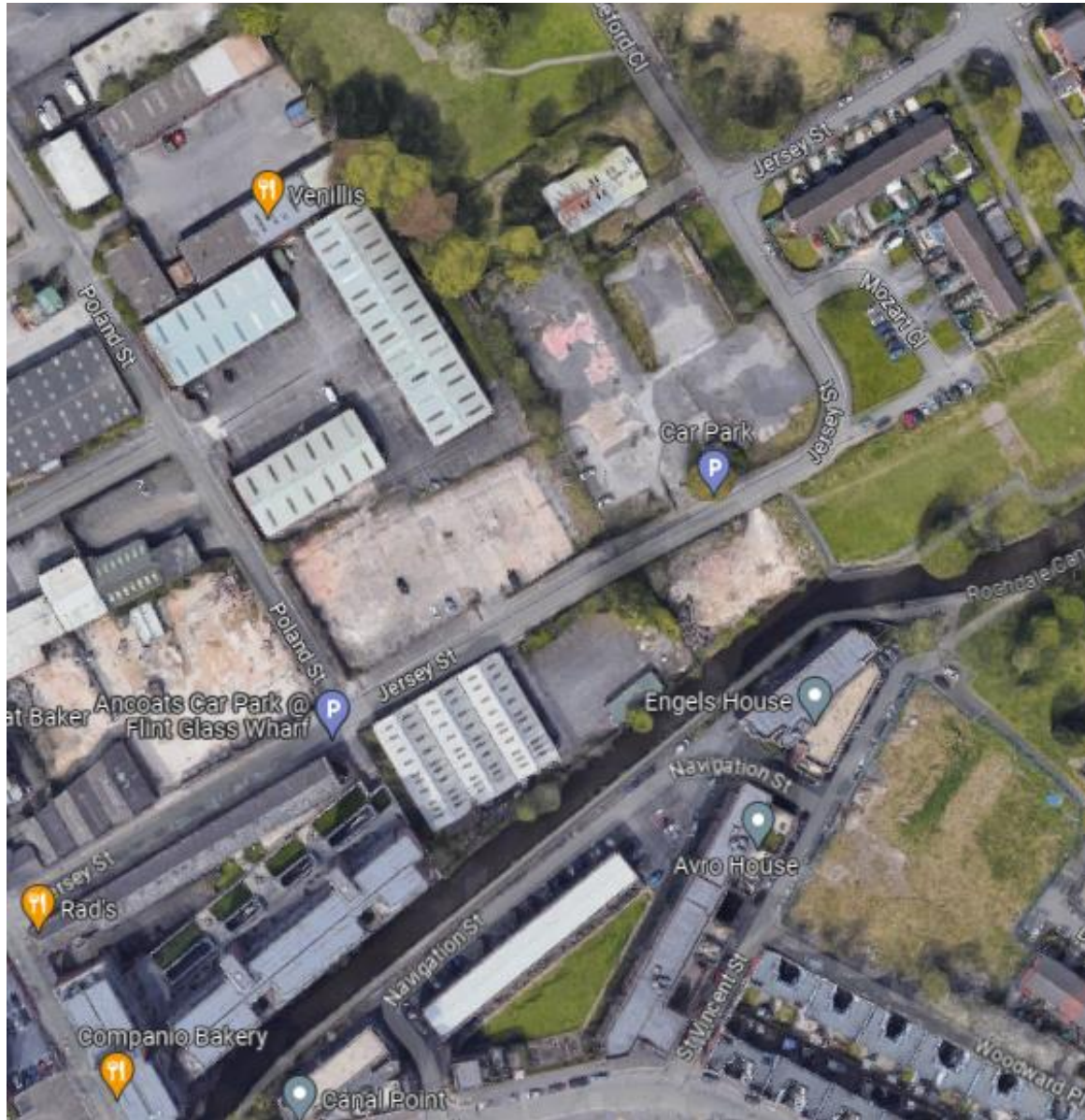
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts 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

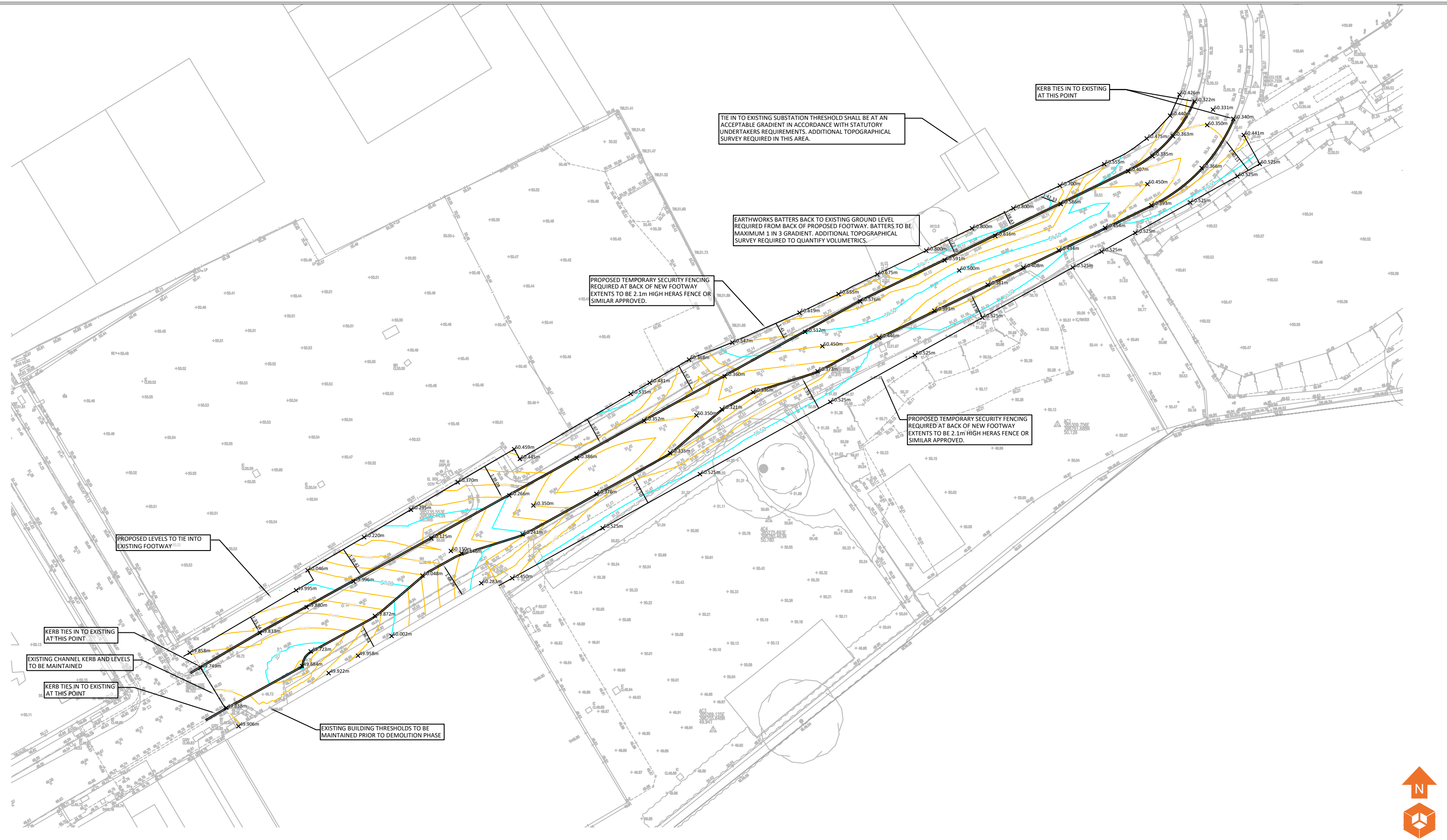


APPENDIX III

DRAWINGS

DRAWING 15-798-001 – SITE LOCATION PLAN





Notes:				
P1	REVA	10.05.2023	HM	RJW
Phase	Issue	Date	Drawn	Checked

Client:	Civic Engineers
Job Title:	Jersey Street, Ancoats

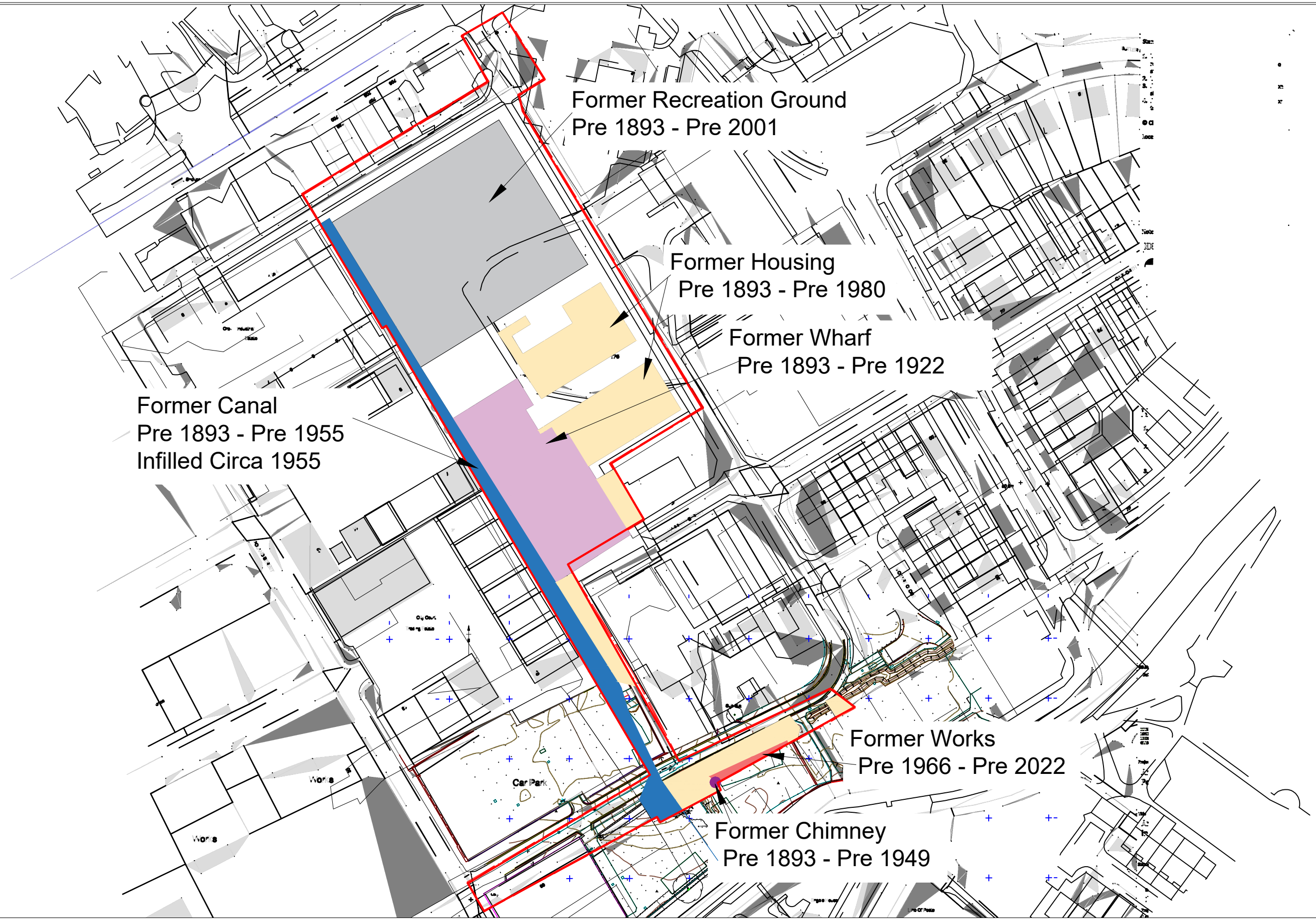
Job No:	15-798
Drawing No:	002

Date:	10.05.2023
Scale:	NTS@ A3



Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Site Features Former Canal Former Recreation Ground Former Chimney Former Housing Former Warf	Notes:					Client: Civic Engineers	Job No: 15-798	Date: 09.01.2023	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk											
							Drawing No: 003	Scale: NTS@ A3												
<table><tr><td>P1</td><td>REVA</td><td>09.01.2023</td><td>OW</td><td>HM</td></tr><tr><td>Phase</td><td>Issue</td><td>Date</td><td>Drawn</td><td>Checked</td></tr></table>						P1	REVA	09.01.2023	OW	HM	Phase	Issue	Date	Drawn	Checked	Job Title: Jersey Street, Ancoats		Drawing Title: Historical Features Plan		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.
P1	REVA	09.01.2023	OW	HM																
Phase	Issue	Date	Drawn	Checked																

APPENDIX IV E3P REMEDIATION/ VALIDATION CRITERIA

HUMAN HEALTH REMEDIATION TARGETS – INDUSTRIAL / COMMERCIAL USE

DETERMINAND	UNITS	WITHIN 300 mm COVER SYSTEM (POS)	UNDER HARD STANDING AND >300 mm TO 1.0M BELOW COVER SYSTEM	PATHWAY
Arsenic ^(vii)	mg/kg	79	640	1
Cadmium ^(vii)	mg/kg	120	190	1
Chromium (Hexavalent)	mg/kg	7.7	33	1
Lead ^(vii)	mg/kg	200	2300	1
Elemental Mercury	mg/kg	16	58	2
Nickel	mg/kg	230	980	1
Selenium	mg/kg	1100	12000	1
Copper	mg/kg	12000	68000	1
Zinc	mg/kg	81000	730000	1
Cyanide	mg/kg	791	791	1
Phenol	mg/kg	120	440	2
Asbestos	Fibres	NFD	≤0.001	4
Naphthalene	mg/kg	4900	190	2
Acenaphthylene	mg/kg	15000	83000	3
Acenaphthene	mg/kg	15000	84000	1
Fluorene	mg/kg	9900	63000	1
Phenanthrene	mg/kg	3100	22000	3
Anthracene	mg/kg	74000	520000	3
Fluoranthene	mg/kg	3100	23000	3
Pyrene	mg/kg	7400	54000	3
Benzo(a)Anthracene ^(c)	mg/kg	29	170	3
Chrysene	mg/kg	57	350	3
Benzo(b)Fluoranthene	mg/kg	7.1	44	3
Benzo(k)Fluoranthene	mg/kg	190	1200	3
Benzo(a)Pyrene	mg/kg	5.7	35	3
Indeno(123-cd)Pyrene	mg/kg	82	500	3
Dibenzo(a,h)Anthracene	mg/kg	0.57	3.5	3
Benzo(ghi)Perylene	mg/kg	640	3900	3
TPH C5-C6 (aliphatic)	mg/kg	570000	3200	2
TPH C6-C8 (aliphatic)	mg/kg	600000	7800	2
TPH C8-C10 (aliphatic)	mg/kg	13000	2000	2
TPH C10-C12 (aliphatic)	mg/kg	13000	9700	2
TPH C12-C16 (aliphatic)	mg/kg	13000	59000	2
TPH C16-C35 (aliphatic)	mg/kg	250000	1600000	1
TPH C5-C7 (aromatic)	mg/kg	56000	26000	1
TPH C7-C8 (aromatic)	mg/kg	56000	56000	2
TPH C8-C10 (aromatic)	mg/kg	5000	3500	2
TPH C10-C12 (aromatic)	mg/kg	5000	16000	2
TPH C12-C16 (aromatic)	mg/kg	5100	36000	1
TPH C16-C21 (aromatic)	mg/kg	3800	28000	1
TPH C21-C35 (aromatic)	mg/kg	3800	28000	1
1,2 Dichloroethene	mg/kg	29	0.67	1
Trichloroethane	mg/kg	140000	660	1
1122 Tetrachloroethane	mg/kg	1400	270	1
1112 Tetrachloroethane	mg/kg	1400	110	1
Tetrachloroethene	mg/kg	1400	19	1
Tetrachloromethane	mg/kg	890	2.9	1



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Trichloroethene (TCE)	mg/kg	120	1.2	1
Trichloromethane	mg/kg	2500	99	1
Chloroethene	mg/kg	3.5	0.059	1

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.

Tier 1 values for POS (resi) used for any imported soils used for cover system;

Commercial Tier 1 GAC modelled to assume no exposure pathway; and,

No viable exposure pathway beneath hard standing and cover system. Exceedance of target level should be subject to further risk assessment.

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 Suitable 4 Use Levels (S4ULs) for commercial end use with plant uptake.
- ii. Value derived from LQM Suitable 4 Use Levels (S4ULs) for commercial end use without plant uptake – these levels used below 300 mm cover system within commercial landscaping as soils will be present within a commercial setting yet soils will not be disturbed and garden plants will not reach these soils.
- iii. Value derived from LQM Suitable 4 Use Levels (S4ULs) for public open space (POS) commercial.
- iv. Value derived from LQM Suitable 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 Suitable 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 commercial land use with homegrown produce.
- vii. Value derived from Category 4 Screening Levels (C4SL) for commercial land use without homegrown produce.
- viii. Value derived from Category 4 Screening Levels (C4SL) for public open space (POS) commercial.
- 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 Suitable 4 Use Levels (S4ULs) for commercial 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 1 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	
TPH C5-C6 (benzene)	µg/l	10	1
TPH C6-C8 (toluene)	µg/l	74	700
TPH C8-C10 (ethyl benzene)	µg/l	20	300
TPH C10-C12 (xylene)	µg/l	30	500
TPH C12-C16	µg/l	2	90 ⁵
TPH C16-C35	µg/l	50#	90 ⁵
TPH C5-C6	µg/l	–	15000
TPH C6-C8	µg/l	–	15000
TPH C8-C10	µg/l	–	300
TPH C10-C12	µg/l	–	300
TPH C12-C16	µg/l	–	300



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DETERMINAND	UNIT	EQS SCREENING VALUE ^{1, 2, 3}	DWS ^{3,4,5}
		AA	
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

* Polyaromatic 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 Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
5. WHO Guidelines for Drinking Water Quality. Third edition (2004)



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



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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-REMEDICATION AND ENABLING LIMITATIONS

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



