



Remediation and Enabling Works Strategy
Goulden Street, Manchester

Reference:12-728-R3-1
Date: March 2021



REMEDIATION AND ENABLING WORKS STRATEGY

Goulden Street
Manchester
M4 5EH

Prepared for:

**Ridge and Partners LLP
&
Mulbury City**

Report Ref: 12-728-R3-1
Date Issued: 2nd March 2021



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QUALITY ASSURANCE

PROJECT NUMBER	12-728-R3-1		
VERSION	Version 1		
REMARKS	Final		
DATE	2 nd March 2021		
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EXECUTIVE SUMMARY

Site Address	Goulden Street, Manchester, M4 5EH
National Grid Reference	E384710, N398890
Site Area	0.13 Hectares
Background	E3P has been instructed by Mulbury City, on behalf of their client to develop a Remediation and Enabling Works Strategy for the proposed residential apartment building with ground floor commercial units at the site located to the east of Goulden Street, Manchester. The E3P Remediation and Enabling Earthworks Strategy has been produced in due consideration of the Phase II Geo-Environmental Site Assessment dated February 2021 (Ref: 12-728-R2) and contaminated land assessments previously undertaken by E3P on behalf of the client.

CONTAMINATED LAND RISK ASSESSMENT

Human Health Risk Assessment	The preliminary Tier I human health risk assessment identified the presence of elevated heavy metals, asbestos, non-volatile PAHs and local total mercury and naphthalene hotspots. The risk to chronic human health associated with the elevated concentrations of inorganic heavy metals and non-volatile PAH can be mitigated through the capping of the material by the structure or hardstand. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH and TPH compounds could be mitigated through the capping of the material by the structure or hardstand, alternatively the installation of a suitable cover system in any landscaping and public open space to remove the potential for direct exposure to impacted soils. However, due to the presence of elevated naphthalene concentrations at four locations and total mercury in TP105, E3P would recommend that during the reduced level dig for the removal of obstructions and sub-structure works, the impacted Made Ground soils should be removed for off-site disposal. Asbestos in the form of chrysotile has also been identified within the Made Ground at TT102C and WS103, and it must be assumed further trace fibres are present within the wider Made Ground deposits. The removal of shallow Made Ground would also remove the source of asbestos across the site prior to the entire site being capped by the proposed structure. Further localised unidentified contaminant impact cannot be discounted; therefore, the site remediation and enabling works will be completed under the supervision of an independent geoenvironmental engineer. In the event of any as yet unidentified / unexpected source impact being observed, samples will be subject to laboratory testing to inform robust risk assessment and, where necessary, remediation action.
Controlled Waters Risk Assessment	The site is not considered to pose an unacceptable level of risk to controlled waters.
Ground Gas	Ground gas monitoring (thus far) has indicated the site would be classed as Characteristic Situation 1, suggesting no gas protection measures will be required.



Coal Mining and Historical Workings	The site is not considered to be at risk of subsidence relating to historic mining or quarrying-related issues.
Invasive Plants	No invasive plant species have been observed based on the works to date.
Potable Water Supply	Based on the assessment of current site conditions it is likely that barrier pipe will be required for the proposed development. This will need to be confirmed upon completion of the further chemical analysis via a UK WIR risk assessment.

GEOTECHNICAL ASSESSMENT

Relict Sub-Structures	Relict foundations and sub-structures (basement) are known to be present underlying the site. The chimney structure will be retained, as such the base need to be protected during the enabling works. All such features will require removal from beneath proposed structures and infrastructure to the depths and extents as defined within this specification.
Adverse Ground Conditions	Consideration for removal of obstructions and processing of Made Ground in proximity to the perimeter wall and existing chimney to ensure these structures are not damaged or undermined.
Proposed Foundations	The overarching aim of the remediation and enabling earthworks will be the construction of a development platform that will ensure suitability of the site for a residential apartment building constructed on piled foundations. Where structures are to be supported by the use of a pile foundation, all newly placed material will be engineered to ensure no unacceptable long-term consolidation/settlement that would induce negative skin friction and subsidence to external hardstand.
Highways and Infrastructure	All proposed adopted roads, where present, 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.



REMEDIATION 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 foundation solution for the proposed structures, infrastructure and highways and mitigate the identified environmental issues. The structural engineer's drawings should be referenced to determine the proposed foundation solution.
Remediation and Enabling Works	The site remediation and enabling works strategy provides a comprehensive specification for the regeneration of the land to negate identified pollutant linkages and construct a development platform that will be geotechnically suitable for the proposed end use. The salient features of the remediation and enabling works strategy are summarised as follows: ✳ Implementing of all works in strict accordance with UK Environmental Permitting and local planning authority requirements; ✳ Removal of demolition rubble and waste stockpiles in a legislatively compliant manner; ✳ Removal of all hardstand, relict foundations and buried features in their entirety; ✳ Removal of shallow Made Ground soils (asbestos / volatile compounds) in a controlled manner; ✳ Removal of all materials considered geotechnically deleterious; ✳ Excavation and processing of Made Ground in a controlled manner with the sorting, processing and segregation of identified deleterious materials to geotechnical specification; ✳ Validation sampling and leachate testing to confirm material retained on site poses no unacceptable risk to the residential end users, controlled waters or wider environ; and ✳ Construction of temporary working platform; Replacement of material in accordance with the E3P enabling specification and engineering requirements.

BUILD PHASE REQUIREMENTS

Summary of Build-Phase Mitigation Requirements	The developer's works will also include the completion of the following additional elements: ✳ Construction of appropriate potable water supply infrastructure; and ✳ Installation of a chemically suitable topsoil in raised planter beds.
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DRAWING LIST

14-728-001	Site Location Plan
14-728-002	Proposed Development Plan
14-728-003	Historical Features Plan
14-728-004	Site Features Plan
14-728-005	Exploratory Hole Location Plan
12-728-006	Depth of Made Ground Plan
12-728-010	Conceptual Site Model
12-728-018	Contamination Exceedances Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P has been instructed by Ridge and Partners LLP, on behalf of their client (Mulbury City), to develop a remediation strategy and enabling works strategy for the proposed residential development at a parcel of land located off Goulden Street, Manchester; herein referred to as *the site*.

1.2. REPORT OBJECTIVES

- ✿ The objectives of this report are to:
- ✿ Prepare 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.

1.3. 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.

1.4. PREVIOUS WORKS

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

E3P - *Phase I Geo-Environmental Site Assessment*. Ref No: 12-728-R1, dated December 2019. Prepared for Mulbury City; and

E3P - *Phase II Geo-Environmental Site Assessment*. Ref No: 12-728-R2, dated February 2021. Prepared for Mulbury City.



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

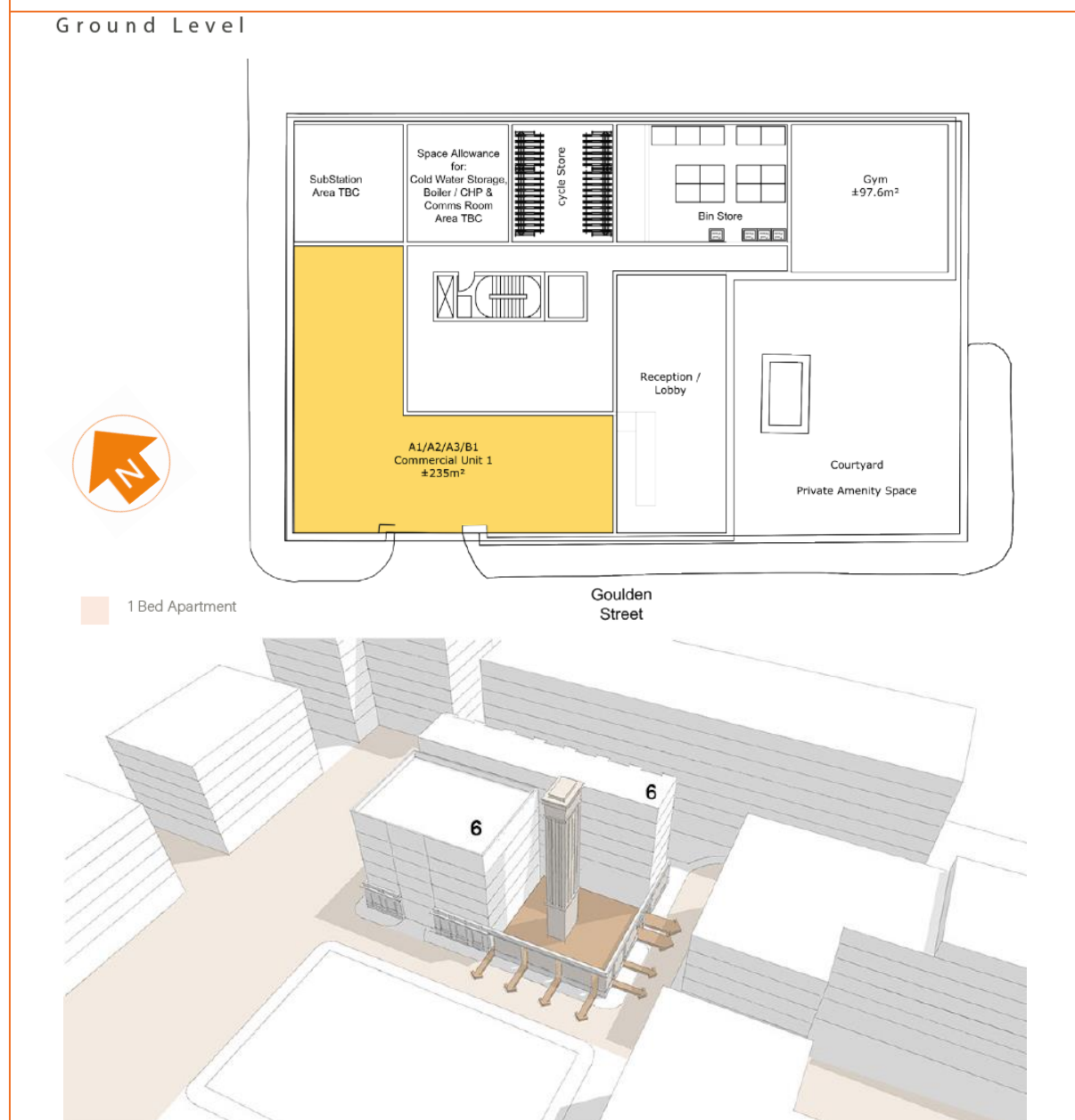
For the avoidance of any doubt, the E3P reports should be read both as a precursor to and in conjunction with this document.

1.5. REDEVELOPMENT PLAN

The scheme will involve the erection of an 8-storey residential building (Use Class C3) comprising 73 residential units, with ground floor commercial use (Classes A1, A2, A3, B1 and D1 (excluding Places of Worship)); alterations to the retained perimeter wall and chimney including the introduction of a light box; disabled car parking, highways, landscaping and other associated works.

The proposed development layout is indicated in Figure 1.1 below and Appendix III.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.6. SUMMARY OF PARTIES INVOLVED

FUNCTION/INTEREST	NAME OF PARTY
Local Planning Authority	Manchester City Council
Developer	Mulbury City
Geoenvironmental Consultant	E3P
Main Contractor	ADM Regeneration
Remediation/Enabling Works Contractor	ADM Regeneration
Human Health Regulator	Manchester City Council
Controlled Waters and Waste Regulator	Environment Agency
Highways Adoption Authority	Manchester City Council

1.7. REGULATORY CORRESPONDENCE

Mulbury City are in the process of submitting a detailed planning application to the local planning authority for the proposed redevelopment of the site for a residential apartment with ground floor commercial units.

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

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

1.8. SITE DETAILS

Site Address	Goulden Street, Manchester, M4 5EH
National Grid Reference	E384710, N398890
Site Area	0.13 Hectares

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

A Site Location Plan is presented in Appendix III as Drawing 12-728-001.



1.9. SITE SUMMARY

TABLE 1.1 SITE DESCRIPTION AND SETTING

Occupancy / Use	The subject site is currently unoccupied; however, relict structures indicate historical industrial development at the site including a brick chimney in the central sector of the site. In addition to relict structures hardstanding and stockpiles of demolition rubble are also present. The site boundary is marked by a high brick and stone wall, with metal sheeting on the northeast boundary	
Environmental Setting	Drift Geology	Glacial Till - BGS indicate the presence of Clay.
	Bedrock Geology	Chester Formation - Sandstone.
	Hydrogeology	Superficial – Secondary Undifferentiated; and Bedrock – Principal Aquifer. The site is not located within a Groundwater Source Protection Zone. The nearest potable groundwater abstraction borehole is located c. 901m northwest of the site subject site.
	Hydrology	There are no surface watercourses within influencing distance of the site (<250 m radius).
	Flood Risk	The site is classified as being unaffected by flooding from rivers (Flood Zone 1).
	Subsidence Hazard	None identified in the data searches.
Site History	The site has been occupied by amenity and industrial buildings throughout its mapped history, including police station, ambulance station and garage. Most of the former buildings have been demolished, however, a perimeter high wall remains and a chimney structure in the central sector.	
Landfill Sites and Ground Gases	No present or historic landfill sites are recorded within 250 m of the site.	
Radon	Unaffected – No special precaution required.	
Coal Mining / Land Stability	The site is not located within an area deemed to be at risk from ground instability arising from historic coal mining activities.	
Brine Workings	The site is not located within an area deemed to be at risk from ground instability arising from historic brine pumping activities and/or salt extraction.	
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential development have been identified within influencing distance of the subject site.	



1.10. SUMMARY OF REPORTED GROUND CONDITIONS

E3P has prepared a detailed Site Investigation Report (Ref: 12-728-R1, dated February 2021). The summary of reported ground conditions is given in Table 1.2.

TABLE 1.2 SUMMARY OF GROUND CONDITIONS

MADE GROUND	MADE GROUND – 0.0 M BGL TO 4.6 M BGL Made Ground deposits were encountered within all exploratory hole locations to depths of between 1.20 m and 4.60 m bgl, although, in general, made ground was encountered to a depth of between 1.00 m and 3.00 m bgl. Made Ground deposits generally comprise reworked clay with brick and concrete rubble from the demolition of historic structures. The base of the made ground was not encountered in TP101, TT101A, TT101B and TT102C due to instability and the presence of rubble. A number of stockpile of demolition rubble are present at the site, which will require further investigation.
Topsoil	None present.
Drift	DRIFT – 1.20 m bgl to 26.50 m bgl Drift deposits were encountered within the majority of exploratory locations with the exception of TP101, TT101A, TT101B and TT102C where the full depth of Made Ground could not be proven. The drift deposits were encountered to 26.50 m bgl (RBH101) and generally comprise firm low strength to very stiff very high strength red brown gravelly CLAY with gravel of sandstone. Brown clayey fine to medium SAND was encountered in CP101 between 14.10 to 14.90 m bgl. This was underlain by very stiff very high strength CLAY. Soft black silty CLAY with an organic odour was identified in WS101 between 3.00 to 3.20 m bgl, directly beneath the Made Ground.
Bedrock	SOLID A red brown SANDTONE was recorded at 26.50 m bgl to a proven termination depth of 35.50 m bgl.
Groundwater	GROUNDWATER Groundwater level monitoring (to date) has recorded groundwater at depth of between 0.78 m bgl and 4.20 m bgl.



2. E3P CONTAMINATION RISK ASSESSMENT

2.1. BACKGROUND

E3P has 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:

- ✳ Arsenic;
- ✳ Lead;
- ✳ Total mercury;
- ✳ Naphthalene;
- ✳ Benzo(a)Anthracene;
- ✳ Benzo(b)Fluoranthene;
- ✳ Benzo(a)Pyrene;
- ✳ Dibenzo(a,h)Anthracene;
- ✳ Hydrocarbon Fractions C16-C21 (aromatic); and
- ✳ Chrysotile.

The exceedances for all determinands are associated with Made Ground deposits, with the exception of the lead exceedance in the natural clay in TT103B at 2.90 m bgl.

The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH and TPH compounds can be mitigated through the capping of the material by the structure or hardstand, alternatively the installation of a suitable cover system in any landscaping and public open space to remove the potential for direct exposure to impacted soils.

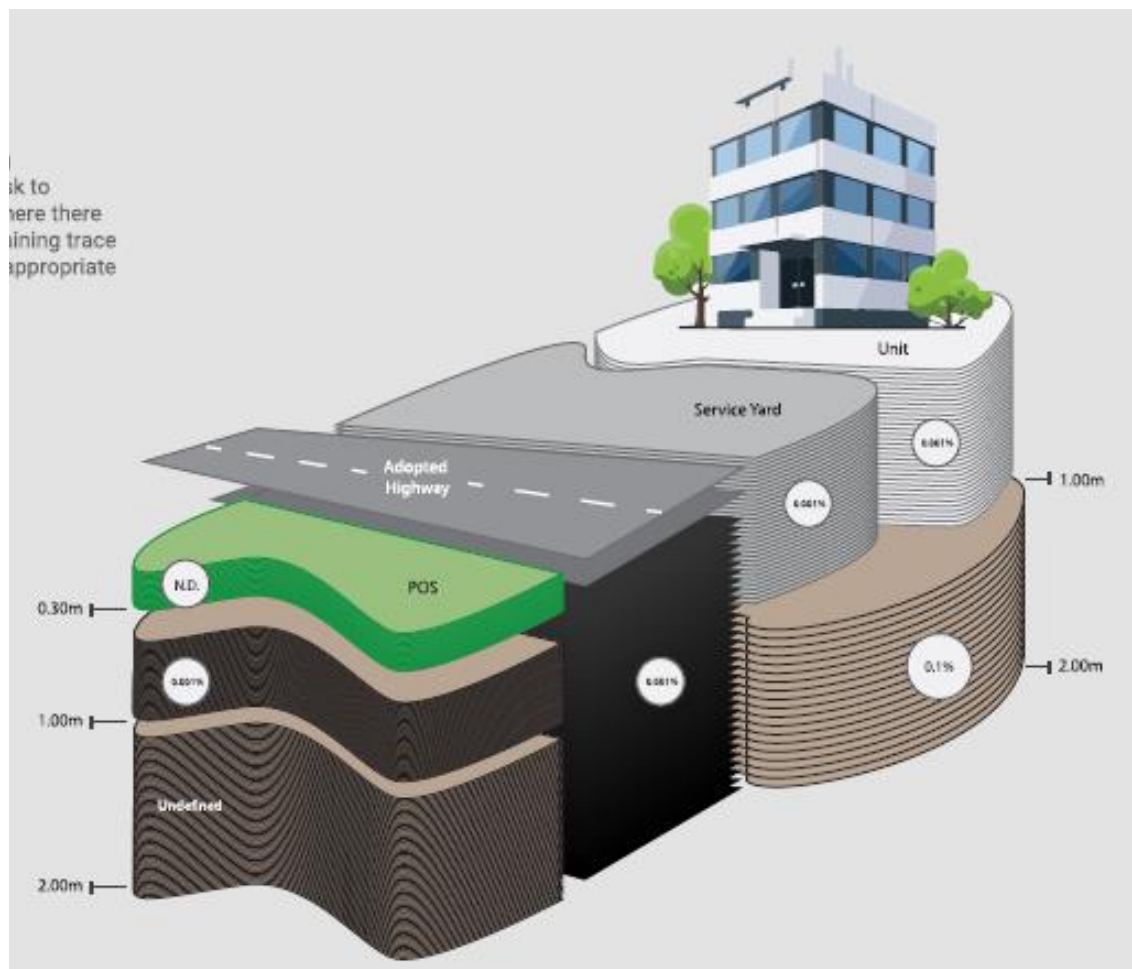
However, due to the presence of elevated naphthalene concentrations at four locations and total mercury in TP105, E3P would recommend that during the reduced level dig for the removal of obstructions and sub-structure works, the impacted Made Ground soils should be removed for off-site disposal.

Asbestos in the form of chrysotile has also been identified within the Made Ground at TT102C and WS103, and it must be assumed further trace fibres are present within the wider Made Ground deposits. The removal of shallow Made Ground would also remove the source of asbestos across the site prior to the entire site being capped by the proposed structure.



Asbestos quantification confirms that only trace fibres are present, and no visual signs of ACM were encountered during the ground investigation. If any impacted Made Ground soils do remain on-site, the material should be managed according to the asbestos risk mitigation conceptual site model shown in Figure 2.1 overleaf.

FIGURE 2.1 ASBESTOS RISK MITIGATION CONCEPTUAL SITE MODEL



Notes

ND None Detect

0.001% Soils may contain $\leq 0.001\%$ asbestos using composite testing to ensure there is no potential risk to human health. This value is present within areas where there may be a short term low level exposure of soils containing trace asbestos fibres by construction workers where an appropriate level of asbestos management is employed (dust suppression)

0.1% Soils at a depth of $>1.00\text{m}$ bgl may contain $<0.1\%$ asbestos using composite testing where they will not be likely to be disturbed in the future and will therefore be in an area of low sensitivity. Risk assessment completed in accordance with Asbestos JIWG risk assessment tools.

Undefined- this will be dependent upon soils encountered during earthworks, which may be placed at these depths to ensure no potential risk to human health.

With the exception of the natural clay in TT103B, chemical analysis of the natural clay drift deposits has identified these soils to be acceptable for use as subsoil within the proposed landscaped areas; however, further chemical validation samples will be required to confirm this.

There are no suitable sources of topsoil available on the site.

If sub-soil is to be removed from site, a U1 Exemption or a CL:AIRE MMP for the direct transfer of naturally occurring soils will be required.

If any material is removed for off-site disposal a WM-3 waste classification will be required.



It is therefore concluded that the site will be suitable for the proposed residential end use subject to the completion of the supplementary assessments and the following build-phase mitigation items:

- ✚ Use of potable water supply infrastructure that will be compliant with United Kingdom Water Infrastructure Risk (UKWIR) assessment criteria; and
- ✚ Removal of shallow Made Ground soils for off-site disposal prior to being capped by the proposed structure.

2.3. CONTROLLED WATERS CONTAMINATION RISK SUMMARY

The Tier I Controlled Water Risk Assessment has identified exceedances of the DWS threshold values for lead and selenium. The inorganic determinands identified are typically of low solubility and therefore mobility, with their absence in the remaining leachate and groundwater samples suggesting that the impact is localised, and therefore the potential for migration is limited.

The site is underlain by low-permeability, predominantly cohesive glacial till deposits to depths in excess of 20.0 m bgl. These cohesive deposits form an aquitard which will afford protection to the underlying Principal Aquifer in the sandstone bedrock.

Furthermore, there are no surface watercourses within influencing distance of the site, as such, based on the laboratory analysis and low sensitivity of the site with respect to groundwater and surface water receptors, there is considered to be a low risk to controlled waters as there exists no complete pollutant linkage.

2.4. GROUND GAS

Preliminary ground gas monitoring (to date) suggests that the site can be classified as CS1, and it is considered that gas protection measures will not be required, however, this is an interim assessment and will be confirmed on completion of the full gas monitoring programme.

2.5. POTABLE WATER SUPPLY INFRASTRUCTURE

Based on the assessment of current site conditions it is likely that barrier pipe may be required for the proposed development.

This will need to be confirmed upon completion of the further chemical analysis via a UK WIR risk assessment.



3. SITE REMEDIATION AND ENABLING WORKS

3.1. REMEDIATION TECHNOLOGY

Considering the site-specific conditions, including the nature of the identified impacts, the geology and the objectives of the remediation, the most-appropriate soil remedial technologies are:

- ✳ The shallow Made soils are impacted with naphthalene, total mercury, heavy metals, asbestos, non-volatile PAH and TPH compounds. Due to the small nature of the site and requirement to remove all existing obstruction, the most suitable remedial technology would be to excavate and remove the shallow Made Ground soils, which would service to remove the source entirely; and
- ✳ Construction of appropriate potable water supply infrastructure.

It is considered that these technologies and methodologies will address the identified active pollutant linkages.

3.2. 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.

The LAPC Part B Notification for deployment of mobile crushing plant should be implemented prior to the establishment of equipment on site, if required. However, this is not likely.

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.

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



RE-2 – Risk to Infrastructure

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

The chimney is to be retained and extreme care should be taken not to disturb the base or foundations.

RE-3 – Environment and Nuisance Control

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

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

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

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

No invasive plant species have been identified at the site to date. However, as the growth and spread of invasive species could have occurred since, the enabling works 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. If encountered, 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 any and 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 currently vacant, bound by a perimeter wall and capped with asphalt and concrete hardstanding. Stockpiles of reclaimed building material are present within the northern sector of the site. These materials should be stockpiled at a pre-agreed location or alternatively removed from site in accordance with waste permitting regulations.

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

Obstructions, relict foundations and infrastructure (apart from live services) are to be removed from the areas of proposed residential development, to include building footprints and landscaped areas.

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

Obstructions encountered within the near-surface soils (such as relict foundations) will be exposed and excavated 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 natural cohesive deposits remain undisturbed with a full reduced-level survey to be completed to map the depth of filled/processed material.

The chimney base and foundation also need to be protected throughout the enabling works.

RE-7 – Removal of Deleterious Material

The E3P Ground Investigation identified potentially deleterious wastes associated with the existing structures and historic construction activities.

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 regards to the extent of any buried anthropogenic deleterious materials that are unsuitable for retention within a low-rise residential development.



RE-8 – Construction of Temporary Working Platform

The proposed structures are to be prepared in a manner that will facilitate piled foundations, a temporary working platform will be constructed.

The specific design for such a platform should be obtained from E3P; however, as a minimum this will comprise:

- ✳ Proof rolling of the subgrade to ensure a California bearing ratio (CBR) > 3%; and
- ✳ Placement of 300 mm of certified 6F2 to be rolled and compacted to ensure a CBR > 6%.

The platform will require design upon receipt of the piling rig specification and pile layout design to ensure that a suitable platform design is adopted.

RE-9 – 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.

The proposed apartment building will be constructed on piled foundations (depth to be confirmed).

TABLE 3.1 GEOTECHNICAL ENGINEERING WORKS SCHEDULE

Land Use	Construction Requirement	Requirement
Footprint of Proposed Structure (2 m on All Elevations)	Pile Foundation	Backfill using general method compaction to CBR of 5%.
Highways	Adopted Estate Road/Drainage	Manual of Contract Documents for Highways Works (MCHW) Series 600 ensuring CBR > 5% in subgrade (engineered fill).
Public Open Space	N/A	Method compaction to ensure no settlement.

RE-10 – Provision of Topsoil

No topsoil deposits are present on site.

Therefore, there is a requirement to import suitable material for use within the proposed raised planter beds within the external areas of the development.

Topsoil will require testing in line with the schedule present within Section 3.5 and Table 3.2.

The landscaped areas will require depth validation to satisfy the requirements of the CML in order to demonstrate that the appropriate thickness has been provided.



RE-11 – 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-12 – 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-13 – Validation of Materials for Potable Water Supply Infrastructure

A contaminant risk assessment will be required this once the further analysis of soil underlying the current structure (currently inaccessible) is undertaken and measured against WIR thresholds in relation to the proposed pipelines depths.

Based on the assessment of current site conditions it is likely that standard PE type pipe will be required at the proposed residential development.

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

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



Upon successful remediation of any 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.

RE-14 – 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.

3.3. VALIDATION SAMPLING PROTOCOL

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

If any hotspots of unsuitable (impacted) Made Ground is to be undertaken, 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 overleaf.



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	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
Site-Generated Subsoil (450 mm Garden Fill / Cover)	1 Sample per 100 m ³	A/B/C/D
Site-Generated Topsoil Cover (150 mm Garden Cover)	1 Sample per 50 m ³	A/B/C/D
Hotspot Validation Samples	1 Sample per 10 m of linear excavation to base and sidewall	E/G
Imported		
6F2	1 Sample per 1000 m ³	A/B/C/D
Subsoil Greenfield Source (450 mm Garden Fill / Cover)	1 Sample per 200 m ³	A/B/C/D
Subsoil Brownfield Source (450 mm Garden Fill / Cover)	1 Sample per 50 m ³	A/B/C/D
Topsoil Greenfield Source (150 mm Garden Cover)	1 Sample per 200 m ³	A/B/C/D
Topsoil Brownfield Source (150 mm Garden 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

Notes

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. Lechate 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.



3.4. 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 of 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.



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.



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:

-  Preparation of building footprint (+ 2 m on all elevations) to be suitable for constructions with piled foundations; and
-  Engineer all areas of proposed adopted road and private drive to be compliant with the E3P Geotechnical Specification with CBR and elevation defined by the client.

In the event that it is not possible to prepare the site in a manner that will achieve the required foundation solution, the supervising engineer and client should be contacted at the first available opportunity.

The contractor should employ a suitably experienced engineer to be present on site during these 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 clay soils as a moisture content fluctuation ($\pm 2\%$) of the tolerable limit will result in an unacceptable degree of compaction loss.

6.2. LOCALLY WON FILL MATERIAL

E3P understand the site will be subject to a reduced level excavation to remove historic obstructions and foundations, in order to allow for piled foundations.

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 soil matrices with the natural drift being cohesive soils.

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 driven piles to support a suspended floor slab, 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

6.4. BS 1377-1:2016 METHODS OF TEST FOR SOILS FOR CIVIL ENGINEERING PURPOSES. GENERAL REQUIREMENTS AND SAMPLE PREPARATION 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).



TABLE 6.1 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 same grading size	> 5000 kg vibrating roller	250 mm	10
	1 C	Coarse gravels with many cobbles	> 5000 kg vibrating roller	400 mm	5
Cohesive Fill (Clay with Minor Sand and Gravel Component)	2 A	Wet Clay	> 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 150 mm 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.

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 6.2 COMPACTION / BACKFILL REQUIREMENTS

LAND USE REQUIREMENT	COMPACTION METHODOLOGY AND GENERAL PERFORMANCE CRITERIA
Piled Foundation	All plot footprint (+ 2 m) must be free of any deleterious elements, tree roots and obstructions > 150 mm. Where upfill is proposed, material is to be placed using method compaction specification to achieve a CBR as required by the developer for piling mat construction. Piling mat is to be placed and constructed in accordance with the approved geotechnical engineer's temporary works design.
Adopted Highways (+ 2 m from Back of Footpath)	<i>Method Compaction – MCHW Specification For Highway Works 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 – MCHW Specification For Highway Works Series 600</i> is to be followed to achieve a CBR > 5%.
Gardens, 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>MCHW Specification For Highway Works 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 *MCHW 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 6.3.

TABLE 6.3 COMPACTION/BACKFILL REQUIREMENTS

LAND USE	COMPACTION METHODOLOGY and GENERAL PERFORMANCE CRITERIA				
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: <table><tr><td>Test</td><td>Test Method</td></tr><tr><td>Plate Load Tests (Equivalent CBR of 5%)</td><td>BS 1377: Part 9</td></tr></table>	Test	Test Method	Plate Load Tests (Equivalent CBR of 5%)	BS 1377: Part 9	Clause 632 (BS 1377: Part 4)
Test	Test Method				
Plate Load Tests (Equivalent CBR of 5%)	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.					
Proctor Compaction Testing					

6.7. CURRENT AND PROPOSED SITE TOPOGRAPHY AND SLOPE INTERACTION

The site is currently flat and no overall changes in elevation are proposed.



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.



9. SECOND PHASE MITIGATION AND MANAGEMENT – BUILD PHASE

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

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

-  Laboratory testing of the imported topsoil; and
-  Placement and chemical validation of imported topsoil within landscaped planter beds.

The validation protocols are presented within the E3P Remediation and Enabling Works Strategy and are presented below.

9.1. PLACEMENT OF TOPSOIL IN RAISED PLANTER BEDS

The Remediation and Enabling Works Strategy for the site, with respect to human health of the future site users includes the provision of a chemically suitable clean material to be installed in the proposed planter beds.

In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be imported or re-used on site to confirm the proposed development will pose no unacceptable risk to human health or the wider environ.

Subsoil and topsoil shall be free of any deleterious materials, such as buildings materials, timber, plastics etc and conform to the requirements of BS 3882:2007.

Testing requirements for top-soil and sub-soil are presented in Table 9.1.

TABLE 9.1 SPECIFICATION FOR SOIL TESTING

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Subsoil Greenfield Source (Raised Planter Beds)	1 Sample per 200 m ³	A/B/C/D
Subsoil Brownfield Source (Raised Planter Beds)	1 Sample per 50 m ³	A/B/C/D
Topsoil Greenfield Source (Raised Planter Beds)	1 Sample per 200 m ³	A/B/C/D
Topsoil Brownfield Source (Raised Planter Beds)	1 Sample per 50 m ³	A/B/C/D



9.2. POTABLE WATER SUPPLY – CONTAMINANT ASSESSMENT CRITERIA

Table 9.2 provides a summary of the threshold concentrations that must not be exceeded within remediated ground at pipeline depth in order to PE pipe works to be acceptable for the proposed development.

TABLE 9.2 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold
Total VOC	0.5
Total BTEX And MTBE	0.1
Total SVOCs (Excluding PAH and those substances marked with an *)	2
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500
Phenols (From SVOC Analysis)*	2
Cresols and Chlorinated Phenols (From SVOC Analysis)	2
Ethers*	0.5
Nitrobenzene*	0.5
Ketones*	0.5
Aldehydes*	0.5
Amines	Fail

Upon completion of the remedial works a full UKWIR Risk Assessment should be undertaken.

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
m	Metres	ppm	Parts per million



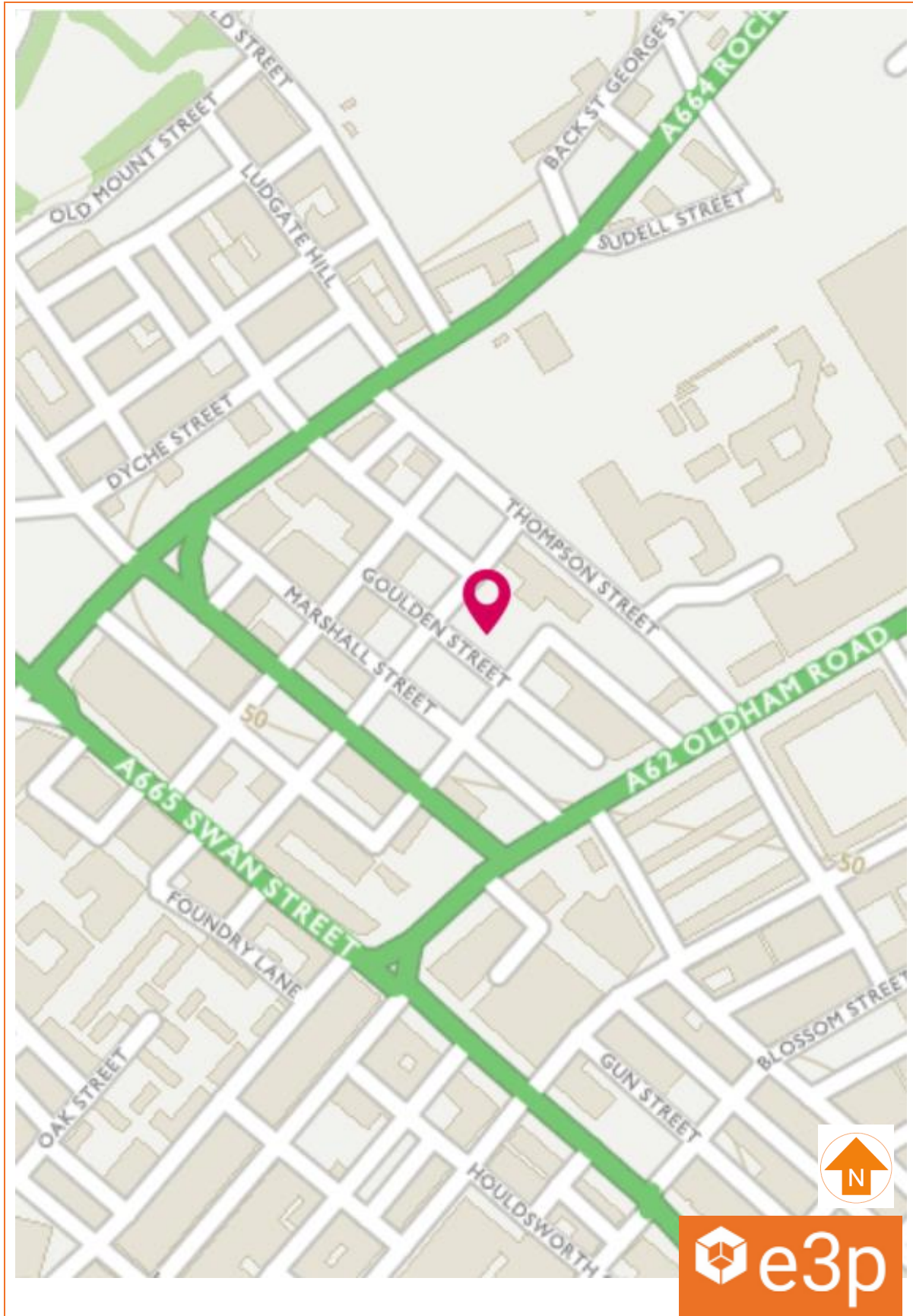
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons 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 12-728-001 – SITE LOCATION PLAN





NOTES:
1. DO NOT SCALE FROM THIS DRAWING. ALWAYS WORK TO NOTED DIMENSIONS.
2. ALL SETTING OUT, LEVELS AND DIMENSIONS TO BE CHECKED ON SITE PRIOR TO THE INSTALLATION OF MATERIALS AND ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR IMMEDIATELY.
3. THIS DRAWING MUST BE READ WITH THE RELEVANT SPECIFICATION DOCUMENTS AND DETAIL DRAWINGS. ANY DISCREPANCIES MUST BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR IMMEDIATELY.
4. THIS DRAWING IS COPYRIGHT PROTECTED AND MAY NOT BE REPRODUCED IN WHOLE OR PART WITHOUT WRITTEN AUTHORITY.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

THIS DRAWING WAS PLOTTED ON:
02/10/2020

REVISION HISTORY				
DATE	REV	ZONE	DESCRIPTION	CHK
26/11/19	1		Update Terrace	MW
25/09/2020	2		Building floor plans and landscape updated. Landscape updated in line with consultation responses	MW

KEY

PLANNING APPLICATION BOUNDARY

HARDWORKS

- MACADAM** to adopted footways and service areas
Surface to adoptable standards where required
- CONCRETE SETT PAVING** to streets and spaces
- CLAY PAVING** to courtyards and streets
Natural clay paving laid in a herringbone arrangement
- FEATURE BANDING** to courtyards
Concrete paving laid in bands
- EXISTING WALL** existing wall to be retained

FURNITURE & LIGHTING

- TIMBER TOP SEATS** to raised steel planters
Proprietary seating units with timber elements
- CYCLE STANDS** to streets and courtyards
Proprietary cycle stands
- GATES** to courtyards and private spaces
Pedestrian pass gates and locking mechanisms as required
- UPLIGHTS** to structural columns and feature elements
In-ground LED uplights
- CATENARY LIGHTING** to courtyard spaces & roof terraces
Festoon/pea lights fixed to tensile wires

SOFTWORKS

- CLIMBING PLANTS** to all areas
Climbers on tensile wires
- PERENNIAL & GRASSES** to raised steel planters
Swathes of grasses

LEVELS

- EXISTING LEVEL** to be retained
- PROPOSED LEVEL** to all areas



ORIGINATOR

W layer studio	MANCHESTER The Barn	NEWCASTLE The Studio
T 01625 523 157	E One Hollin Lane	Low Shilford House
E manchester or newcastle@layer.studio	Styal	Stocksfield
	Cheshire	Northumberland
	SK9 4JH	NE43 7HW

CLIENT
Mulbury City

PROJECT
Goulden St
Manchester

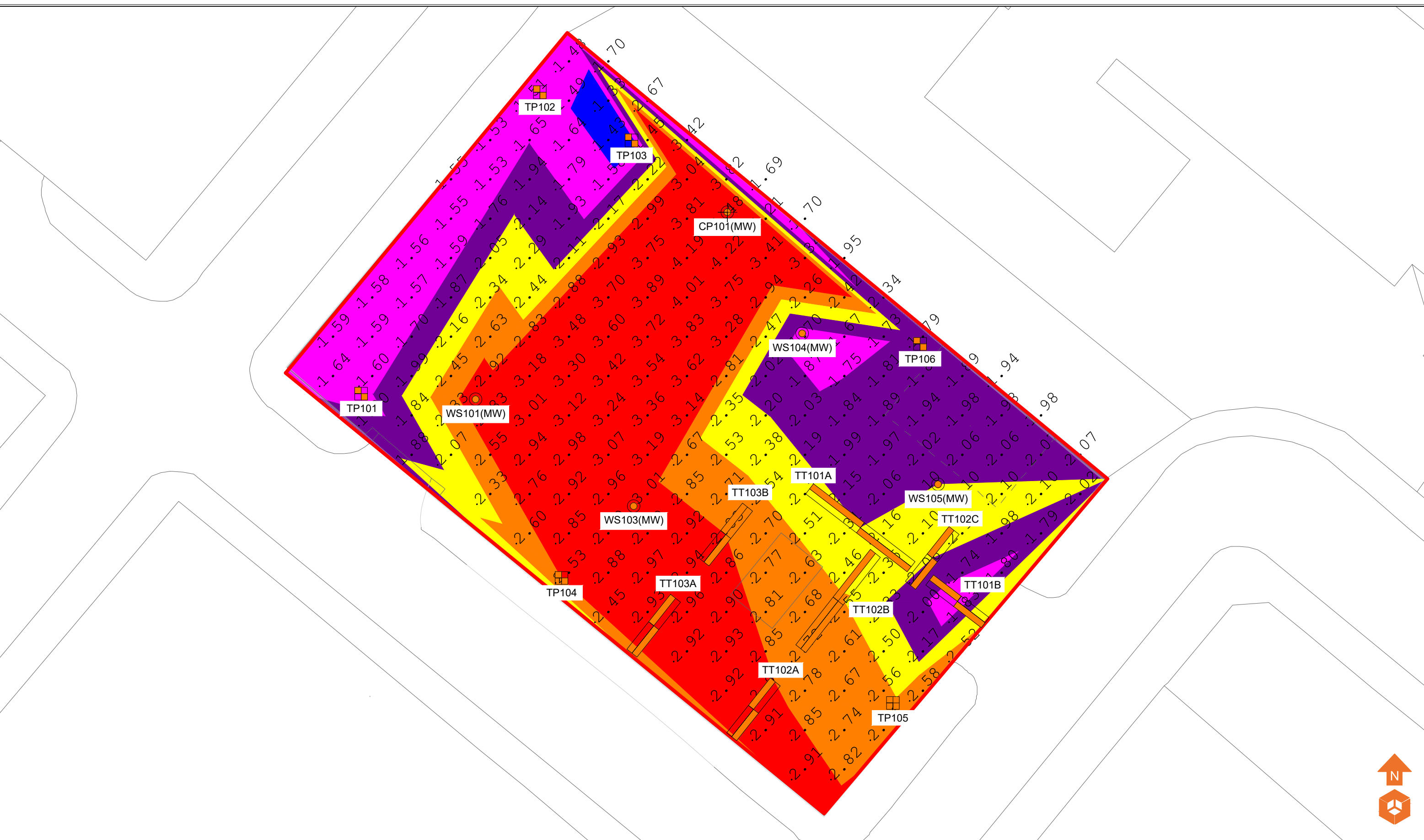
DRAWING TITLE
General Arrangement

DRAWING NUMBER	REV	STATUS
135-LYR-XX-ZZ-DWG-L-1001	2	Planning

SCALE	CREATED BY	CHECKED BY
1:100 @ A1	OK	MW



Location Symbols  Approximate Window Sample Probehole Location With Install  Approximate Trial Pit Location  Approximate Cable Percussive Borehole Location With Install	Notes:					Client: Scott Hughes Design		Job No: 12-728	Date: 17.09.2020	 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: 005	Scale: NTS	
	P1 P1 REVB REVA 18.09.2020 24.08.2020 HM HM EM MJ					Job Title: Goulden Street		Drawing Title: Exploratory Hole Location 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.
	Phase Issue Date Drawn Checked									



Location Symbols

Approximate Window Sample Probehole Location With Install

Approximate Trial Pit Location

Approximate Cable Percussive Borehole Location With Install

Made Ground Depth (m)

Depth of Made Ground 0.00 - 0.34m

Depth of Made Ground 0.35 - 0.69m

Depth of Made Ground 0.70 - 1.04m

Depth of Made Ground 1.05 - 1.39m

Depth of Made Ground 1.40 - 1.74m

Depth of Made Ground 1.75 - 2.09m

Depth of Made Ground 2.10 - 2.44m

Depth of Made Ground 2.45 - 2.79m

>2.80m color swatch"/>

Depth of Made Ground >2.80m

Notes:

P1	REVA	02.11.2020	HM	LM
Phase	Issue	Date	Drawn	Checked

Client:

Scott Hughes Design

Job Title:

Goulden Street

Job No:

12-728

Drawing No:

006

Job Title:

Depth of Made Ground Plan

Date:

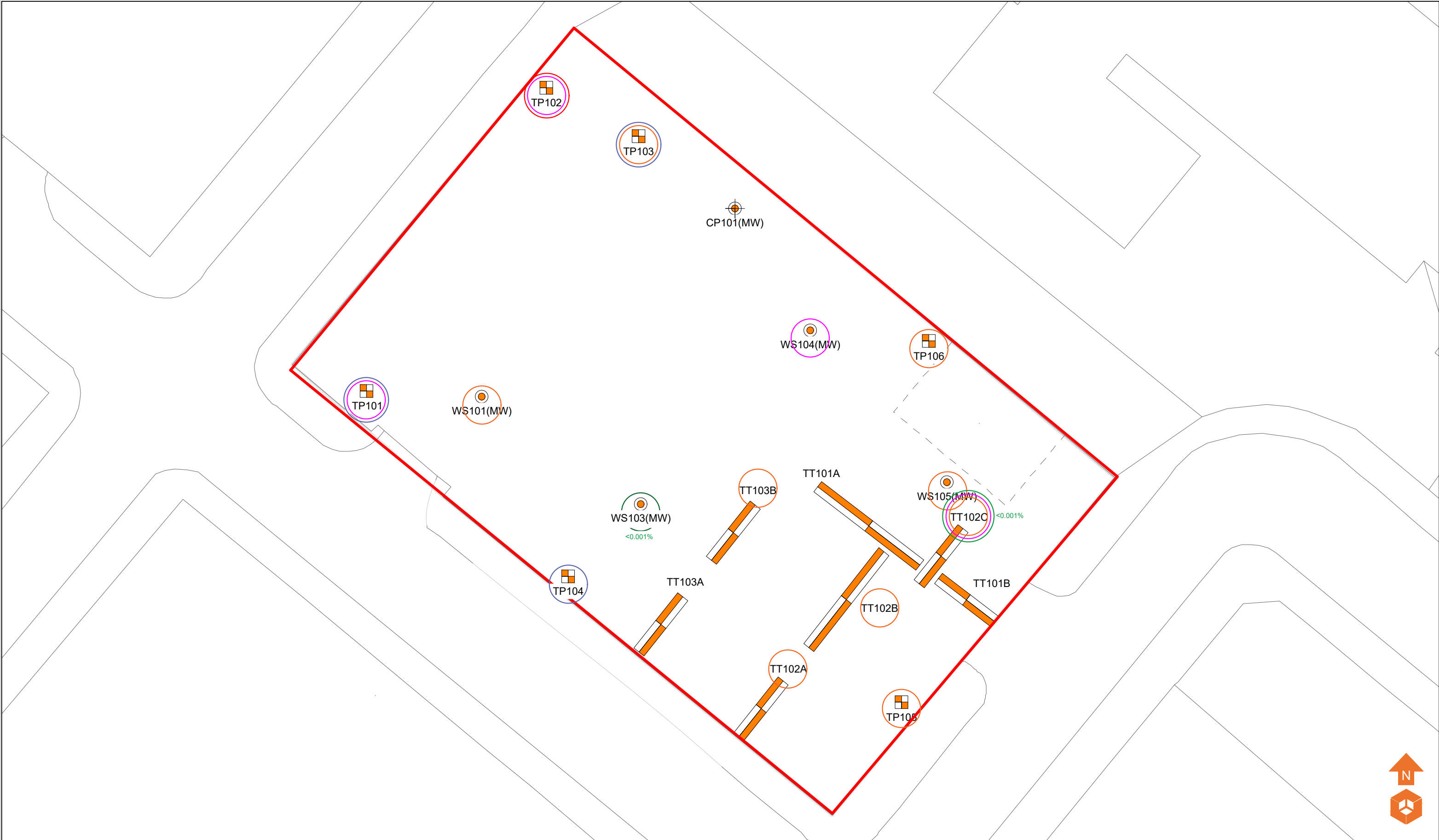
02.11.2020

Scale:

NTS

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.



Location Symbols WS101(MW) Approximate Window Sample Probehole Location With Install TP101 Approximate Trial Pit Location CP101(MW) Approximate Cable Percussive Borehole Location With Install Contamination Exceedances  Heavy Metals  Non Volatile PAH  TPH C16-C21  Asbestos  Napthalene					Notes:					Client: Scott Hughes Design		Job No: 12-728	Date: 06.11.2020	 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	
										Job Title: Goulden Street		Drawing No: 018		Scale: NTS	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	06.11.2020	LM	NS						Drawing Title: Contamination Exceedances Plan					
Phase	Issue	Date	Drawn	Checked											

APPENDIX IV E3P REMEDIATION/ VALIDATION CRITERIA

HUMAN HEALTH REMEDIATION TARGETS – RESIDENTIAL END USE

Determinand	Units	Within 600 mm Cover System (Garden)	HardStanding and >600 mm of cover	Public Open Space 300 mm Cover	Public Open Space > 300 mm	Path- way
Arsenic	mg/kg	37 ⁽ⁱ⁾	40 ⁽ⁱⁱ⁾	79 ⁽ⁱⁱⁱ⁾	640 ^(iv)	1
Cadmium	mg/kg	11 ⁽ⁱ⁾	85 ⁽ⁱⁱ⁾	120 ⁽ⁱⁱⁱ⁾	532 ^(iv)	1
Chromium (Hexavalent)	mg/kg	6 ⁽ⁱ⁾	6 ⁽ⁱⁱ⁾	7.7 ⁽ⁱⁱⁱ⁾	220 ^(iv)	1
Lead	mg/kg	210 ^(vi)	330 ^(vii)	760 ^(viii)	760 ^(viii)	1
Elemental Mercury	mg/kg	1.2 ⁽ⁱ⁾	1.2 ⁽ⁱⁱ⁾	16 ⁽ⁱⁱⁱ⁾	30 ^(iv)	2
Nickel	mg/kg	180 ⁽ⁱ⁾	180 ⁽ⁱⁱ⁾	230 ⁽ⁱⁱⁱ⁾	3400 ^(iv)	1
Selenium	mg/kg	250 ⁽ⁱ⁾	430 ⁽ⁱⁱ⁾	1100 ⁽ⁱⁱⁱ⁾	1800 ^(iv)	1
Copper	mg/kg	2400 ⁽ⁱ⁾	7100 ⁽ⁱⁱ⁾	12,000 ⁽ⁱⁱⁱ⁾	44,000 ^(iv)	1
Zinc	mg/kg	3700 ⁽ⁱ⁾	40,000 ⁽ⁱⁱ⁾	81,000 ⁽ⁱⁱⁱ⁾	170,000 ^(iv)	1
Phenol	mg/kg	280 ^{(i)(xi)}	280 ^{(xiv)(xi)}	760 ^{(iii)(xi)}	760 ^{(iv)(xi)}	2
Naphthalene	mg/kg	2.3 ^{(i)(xi)}	2.3 ^{(xiv)(xi)}	1200 ^{(iv)(xi)}	1200 ^{(iv)(xi)}	2
Acenaphthylene	mg/kg	170 ^{(i)(xi)}	500 ^(v)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	3
Acenaphthene	mg/kg	210 ^{(i)(xi)}	500 ^(v)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	1
Fluorene	mg/kg	170 ^{(i)(xi)}	500 ^(v)	9900 ^{(iii)(xi)}	20,000 ^{(iv)(xi)}	1
Phenanthrene	mg/kg	95 ^{(i)(xi)}	500 ^(v)	3100 ^{(iii)(xi)}	6200 ^{(iv)(xi)}	3
Anthracene	mg/kg	500 ^{(i)(xi)}	500 ^(v)	74,000 ^{(iii)(xi)}	150,000 ^{(iv)(xi)}	3
Fluoranthene	mg/kg	280 ^{(i)(xi)}	500 ^(v)	3100 ^{(iii)(xi)}	6300 ^{(iv)(xi)}	3
Pyrene	mg/kg	500 ^{(i)(xi)}	500 ^(v)	7400 ^{(iii)(xi)}	15,000 ^{(iv)(xi)}	3
Benzo(a)Anthracene	mg/kg	7.2 ^{(i)(xi)}	11 ^{(ii)(xi)}	29 ^{(iii)(xi)}	49 ^{(iv)(xi)}	3
Chrysene	mg/kg	15 ^{(i)(xi)}	30 ^{(ii)(xi)}	57 ^{(iii)(xi)}	93 ^{(iv)(xi)}	3
Benzo(b)Fluoranthene	mg/kg	2.6 ^{(i)(xi)}	3.9 ^{(ii)(xi)}	7.1 ^{(iii)(xi)}	13 ^{(iv)(xi)}	3
Benzo(k)Fluoranthene	mg/kg	77 ^{(i)(xi)}	110 ^{(ii)(xi)}	190 ^{(iii)(xi)}	370 ^{(iv)(xi)}	3
Benzo(a)Pyrene	mg/kg	2.2 ^{(i)(xi)}	3.2 ^{(ii)(xi)}	5.7 ^{(iii)(xi)}	11 ^{(iv)(xi)}	3
Indeno(123-cd)Pyrene	mg/kg	27 ^{(i)(xi)}	45 ^{(ii)(xi)}	82 ^{(iii)(xi)}	150 ^{(iv)(xi)}	3
Dibenzo(a,h)Anthracene	mg/kg	0.24 ^{(i)(xi)}	0.31 ^{(ii)(xi)}	0.57 ^{(iii)(xi)}	1.1 ^{(iv)(xi)}	3
Benzo(ghi)Perylene	mg/kg	320 ^{(i)(xi)}	360 ^{(ii)(xi)}	640 ^{(iii)(xi)}	1400 ^{(iv)(xi)}	3
TPH C₅-C₆ (aliphatic)	mg/kg	42 ^{(i)(xi)}	42 ^{(ii)(xi)}	42 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C₆-C₈ (aliphatic)	mg/kg	100 ^{(i)(xi)}	100 ^{(ii)(xi)}	100 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C₈-C₁₀ (aliphatic)	mg/kg	27 ^{(i)(xi)}	27 ^{(ii)(xi)}	27 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C₁₀-C₁₂ (aliphatic)	mg/kg	130 ^{(i)(xi)}	130 ^{(ii)(xi)}	130 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2



TPH C₁₂-C₁₆ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C₁₆-C₂₁ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C₂₁-C₃₅ (aliphatic)	mg/kg					1
TPH C₅-C₇ (aromatic)	mg/kg	70 ^{(i)(xi)}	370 ^{(ii)(xi)}	370 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C₇-C₈ (aromatic)	mg/kg	130 ^{(i)(xi)}	860 ^{(ii)(xi)}	860 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C₈-C₁₀ (aromatic)	mg/kg	34 ^{(i)(xi)}	47 ^{(ii)(xi)}	47 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C₁₀-C₁₂ (aromatic)	mg/kg	74 ^{(i)(xi)}	250 ^{(ii)(xi)}	250 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C₁₂-C₁₆ (aromatic)	mg/kg	140 ^{(i)(xi)}	1800 ^{(ii)(xi)}	1800 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C₁₆-C₂₁ (aromatic)	mg/kg	260 ^{(i)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C₂₁-C₃₅ (aromatic)	mg/kg	1000 ^{(xiv)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
Asbestos	Fibres Volume Weight (%)	NFD	0.001%	NFD	0.001	4

Notes 1

NFD = No Fibres Detected

Asbestos will be screened visually on site by a qualified environmental consultant and where potential ACM is identified, representative samples will be subject to quantitative analysis of % volume by weight.

Should any ACM be identified within the soil matrices, further detailed % assessment would be required when the reported laboratory result exceeds the limit of detection for the analytical method at 0.01% by volume (weight).

Notes 2

Excludes matrices where free product is observed.

Commercial Tier 1 GAC modelled to assume no exposure pathway.

No viable exposure pathway beneath hardstanding and cover system.

Notes 3

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

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration, N/A = Not Applicable (no exceedance of assessment criteria), Loc of MC = location of exceedances.

- i. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use with plant uptake.
- ii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use without plant uptake – these levels used below 600 mm cover system within residential gardens as soils will be present within a residential setting yet soils will not be disturbed and garden plants will not reach these soils.
- iii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for public open space (POS) residential.
- iv. Value derived from LQM Sutable 4 Use Levels (S4ULs) for public open space (POS) park – these levels used below 300 mm POS cover system as soils will not be disturbed by any future site users and exposure to these soils will be similar to a park end use.
- v. Value derived from LQM Sutable 4 Use Levels (S4ULs) alongside assessment with WM3 to ensure that materials remaining on site do not exceed the WM3 toxicity criteria for hazardous waste.



Goulden Street, Manchester

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March 2021

- vi. Value derived from Category 4 Screening Levels (C4SL) for residential land use with homegrown produce.
- vii. Value derived from Category 4 Screening Levels (C4SL) for residential land use without homegrown produce.
- viii. Value derived from Category 4 Screening Levels (C4SL) for public open space (POS) residential.
- ix. Value derived from Category 4 Screening Levels (C4SL) for public open space (POS) park.
- x. Mercury – based on elemental mercury.
- xi. PAH and TPH levels used are for 1% SOM.
- xii. Xylenes based on p-xylene (o-xylene 2600 mg/kg, m-xylene 3500 mg/kg) and is capped by its solubility.
- xiii. Value derived from LQM Suitable 4 Use Levels (S4ULs) for residential end use with plant uptake due to the volatilisation risk.
- xiv. BTEX is not SOM-related due to inhalation pathway.



REMEDIATION TARGETS – COMPARISON OF LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

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

Notes

Solubility < 0.01 µg/l.

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



APPENDIX V

E3P MATERIAL IMPORT CRITERIA

SITE OF IMPORTATION ADDRESS		E3P TAYLOR ROAD TRAFFORD PARK URMSTON MANCHESTER M41 7JQ +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			



Activity	Testing Responsibility	Contractors Method Statement Required (Y/N)	Comment/Action
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
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 VI 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-REMEDIATION AND ENABLING LIMITATIONS

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



