Remediation and Enabling Works Strategy

Site: Pitsford Road, Miles Platting
Reference: 17-302-R3-1
Date: May 25



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DRAWING LIST

17-302-001 - Site Location Plan
17-302-002 - Proposed Development Plan
17-302-003 - Historical Features Plan
17-302-004 - Site Features Plan
17-302-005 - Exploratory Hole Location Plan
17-302-006 - Depth of MADE GROUND Plan
17-302-010 - Conceptual Site Model
17-302-015 - Development Constraints Plan
17-302-001 - Coal Mining Issues Plan

1. INTRODUCTION

1.1. BACKGROUND

E3P has been instructed by Bellway Homes to develop a remediation and enabling works strategy for the proposed residential development at the site known as Pitsford Road, Miles Platting, Manchester.

E3P understands that Bellway Homes is submitting a planning application for the proposed redevelopment of the site in June 2024. This report is intended for submission to the regulatory bodies to outline the necessary remediation and enabling works required to render the site suitable for future residential development.

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

The site is classified as Category 2. Therefore, a stand-alone Geotechnical Design Report and accompanying Geotechnical Specification is required to ensure compliance with NHBC Chapter 4.6. This document will be prepared by E3P and issued under a separate cover in due consideration of the detailed development design.

1.2. SITE DETAILS

Site Address	Pitsford Road, Miles Platting, Manchester, M40 8GS
National Grid Reference	E 386174, N 400168
Site Area	2.57 Ha

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

A site location plan is presented in Appendix III as Drawing 17-302-001.

1.3. REPORT OBJECTIVES

This report aims to present a remediation and enabling works strategy to discharge relevant aspects of a standard contamination planning condition.

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

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

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

This document does not cover the following reports which will likely be required and therefore will be addressed under a separate report cover:

- Detailed Coal Mining Risk Assessment
- Geotechnical Design Report (GDR)

- Geotechnical Earthworks Specification
- Performance Specification for Consolidation of Abandoned Mine Workings
- Gas Protection Design Report

1.4. SCOPE OF WORKS

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

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

1.5. REDEVELOPMENT PLAN

Bellway Homes proposes to construct circa 89 low-rise residential dwellings with associated access roads, parking, landscaping and adopted drainage infrastructure.

E3P has been provided with a draft planning layout (drawing ref: 17-302-002) detailing the proposed construction of low-rise residential housing, with adopted estate roads and drainage infrastructure.

Figure 1 indicates the proposed development layout which is included in Appendix III.

Figure 1 Snapshot of Proposed Development



1.6. SUMMARY OF PARTIES INVOLVED

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

1.7. REGULATORY STATUS

1.7.1. PLANNING APPLICATION

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

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

It is understood that the following regulatory authorities will be consulted as part of the planning process:

- Local Authority Environmental Health Officer
- Environment Agency
- Coal Authority

2. SITE SYNOPSIS

2.1. SUMMARY OF PREVIOUS WORKS

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

Table 1 Summary of Previous Works

PREPARED BY	TITLE	DATE	REFERENCE	PREPARED FOR
E3P	Phase II Geoenvironmental Site Assessment	February 2023	16-148-R2-1	Bellway Homes
E3P	Supplementary Phase II Geoenvironmental Site Assessment	May 2024	17-302-R2-1	Bellway Homes

The assessment of the potential risk of contaminated land within the context of the proposed residential development is included in the documents listed in Table 1. To inform the preparation of the remediation strategy, the pertinent points from the above reports are summarised in sections 2 and 3.

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

2.2. SITE SETTING

Table 2 Site Description and Setting

Current Site Use	The subject site is a rectangular shaped parcel of land located to the northeast of Manchester City Centre in Miles Platting. The site is currently unoccupied with the exception of the Network Rail Access track in the north of the site. The south of the site is adjacent to Network Rail land and the Huddersfield Main Line. The site is bound to the north and west by Pitsford Road and the A6010 respectively. The site is covered in dense vegetation with self-seeded semi-mature/mature trees and rough scrub. Japanese knotweed has been identified in several areas along the northern boundary and the north of the site. The only existing structures are metal fencing identified around the site, and a brick wall along the southwest boundary. Small relic structures and piles of rubble are noted to the southwest of the site in particular that are considered evidence of historic structures in this area. No further structures have been identified within the site boundary. The site has been artificially raised and levelled to facilitate the construction of historical railway sidings at the subject site, creating an embankment and steep slope on the north, west and eastern sides. This embankment raises the site by up to 5m from the surrounding highway (circa 63.65m AOD – 68.70m AOD). On the railway side (southeast) a topographical data point isn't currently available but lidar of the area suggests this is level with the existing railway features to the south. Street lighting is present along the northwest boundary of the site along Pitsford Road along with utility service infrastructure in this area.

Environmental Setting	**Drift Geology**	Devensian Till – CLAY and GRAVEL
	Bedrock Geology	Pennine Middle and Upper Coal Measures Formation – MUDSTONE, SILTSONE and SANDSTONE
	Hydrogeology	Unclassified aquifer (drift) over secondary A aquifer (bedrock). The site is not located within a Source Protection Zone
	Surface waters	There are no surface water features within 250 m of the site.
Site History	A review of the pertinent Ordnance Survey mapping suggests that the site comprised agricultural land circa 1848 until circa 1891 when the site was raised and levelled to allow the construction of railway sidings to the north of the main line with associated small buildings in the south of the site. Further development to the sidings continued in the early 1900s. Various small structures were erected and removed between 1908 and 1980, particularly in the west of the site. The railway sidings were fully removed from the site by circa 1985. The site has been disused from circa 1985 to the present day therefore dense vegetation is now present across the site including semi-mature and mature trees.	
Invasive Plant Species	Japanese Knotweed has been identified on the northern boundary along the embankment off Pitsford Road and in the northeast of the site.	

2.3. SUMMARY OF REPORTED GROUND CONDITIONS

E3P has prepared detailed site investigation reports (Ref: 16-148-R2-1 dated February 2023 and 17-302-R2 dated April 2024). The summary of reported ground conditions is given in Table 3.

Table 3 Summary of Ground Conditions

MADE GROUND	MADE GROUND deposits were encountered within all exploratory hole locations. The MADE GROUND was not fully penetrated within any of the trial pit locations and was only proven in WS107, WS110, WS1112 and CP101-103 (inclusive). MADE GROUND deposits generally comprise black gravelly sand with gravels of sandstone and mudstone. Fragments of brick, clinker, slag, ash, ceramic, plastic, timber and glass were all encountered throughout this layer. Granular MADE GROUND was underlain by a brown mottled grey slightly sandy slightly gravelly reworked clay. The gravels comprise mudstone, sandstone and coal with fragments of ash, clinker, brick, slag, plastic, glass and timber. A surface covering of reworked topsoil is present across the site, with a maximum thickness of 0.10m. This material is believed to be formed from the natural degradation of plant matter over the recent 50 years and it is not thought to have been anthropogenically placed onsite. A pocket of brown fibrous peat was encountered within WS106 between 2.00 m and 2.10 m bgl. The peat was not encountered in TP111 to the west or TP113 to the east of this position or any other positions completed across the site. This suggests that the peat is an isolated pocket of organic-rich material deposited in a localised load during the upfill works.

MADE GROUND Contd.	Sweet odours have been noted within fill deposits in TP111 (2.90— 3.80 m bgl), TP114 (0.20—0.70 m bgl), TP118 (2.20—2.85 m bgl) and TP120 (3.20—3.70 m bgl). Further organic odours were noted within WS111 4.40— 5.45 m bgl. A hydrocarbon odour was encountered within TP209 between 0.20 – 0.70 m bgl.
Topsoil	No naturally occurring topsoil that would be deemed suitable for reuse has been identified within any of the exploratory hole locations.
Drift	Natural drift deposits were only encountered within six of the 43 exploratory hole locations predominantly in the northeast (WS107, WS110, WS1112 and CP101, 102 and 103). The drift deposits were consistent across the site being formed of brown mottled grey stiff high strength to very stiff high strength CLAY.
Bedrock	The solid bedrock geology has not been encountered during the previous site investigation works. A BGS borehole situated 139 m to the northeast of the site has identified SHALE bedrock circa 29.00 m bgl.
Groundwater	Perched groundwater within the MADE GROUND was encountered between 0.40 – 4.00 m bgl during the 2022 site investigation. No groundwater strikes were recorded during the 2024 site investigation. It is likely that the seasonal fluctuations on site are resulting in varying levels of perched water within the MADE GROUND.

3. E3P CONTAMINATION RISK ASSESSMENT

3.1. BACKGROUND

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

3.2. HUMAN HEALTH RISK SUMMARY

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

- Lead;
- Arsenic;
- Mercury;
- Copper;
- Zinc;
- Asbestos;
- Benzo(a)anthracene;
- Chrysene;
- Benzo(b)Fluoranthene;
- Benzo(a)Pyrene;
- Dibenzo(a,h)Anthracene.

Heavy metals and non-volatile PAHs have been identified above the GAC therefore mitigation will be required to remove the pathway to the future end user in the form of a clean cover system across the site.

Low levels of VOCs and SVOCs have been identified above the laboratory limit of detection, however, based on a review of relevant toxicology data, the levels present on-site are not deemed to pose a risk to the development.

Total Mercury has been identified within several samples however mercury speciation undertaken during the previous site investigation works confirmed that the levels of elemental mercury were below the GAC of 1.2 mg/kg therefore the overall risk is deemed low.

Naphthalene has been identified above the GAC (SOM 1%) however all samples where exceedances have been identified have a SOM in excess of 2.5% therefore the GAC can be increased. There are no exceedances when compared against GACs with higher SOM values therefore the risk is deemed low.

Asbestos has been identified in several locations with concentrations ranging from 0.003% to 0.077%.

Visual ACM and asbestos sheeting have been identified on site. This will require removal by a specialist contractor. Asbestos impacted soils should be dealt with in line with the Asbestos Conceptual Site Model.

3.3. CONTROLLED WATERS CONTAMINATION RISK SUMMARY

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

- The site is underlain by a secondary A bedrock aquifer. There are no surface water features within 250 m of the site and therefore the Secondary A aquifer has been assessed as being the main receptor.
- A comparison of leachate samples has not identified any elevated concentrations of organic compounds that would exceed the screening criteria for either an environmental quality system or a more conservative potable water supply.
- The only identified source of potential contamination is the infilled material that has been placed across the site; however, this was inert in composition and, as such, the potential for leachate or dissolved phase contamination generation is classified as low.

Given the absence of any notable source of potential contamination within the MADE GROUND, it is considered that the site poses a very low risk in terms of pollution to controlled waters and the wider environ.

3.4. HAZARDOUS GROUND GAS

Ground gas has been assessed by E3P as part of the E3P Geoenvironmental Site Assessment. The assessment was completed in accordance with the methodology outlined in the CIRIA publication C665, utilising the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV). Ground gas risk assessment is developed in accordance with BS8485 (+A1 2019).

The GSV has been compared to the criteria outlined with CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

No credible persistent source of hazardous ground gasses has been identified when considering the developed CSM. There is no putrescible material within the Made ground capable of generating a significant gas source attributed to biological processes, and there is no viable pathway for any thermogenic/geogenic gasses.

Ground gas monitoring and assessment suggest that the site can be predominantly classified as CS1, and in these areas, it is considered that gas protection measures will not be required.

It should be noted that the site is underlain by coal measures and further intrusive coal mining investigation works are to be undertaken to determine if the site is underlain by mine workings. If mine workings are identified beneath the site, ground gas protection measures will be required in line with Characteristic Situation 2 (CS2) as a minimum. Additional ground gas monitoring may also be required.

In the unlikely event that a risk of ground gases from coal mining is identified, a Gas Protection Design Report will be required.

3.4.1. RADON

The site is within an area where <1% of properties are above the action levels therefore no mitigation measures are required in relation to Radon.

3.5. POTABLE WATER SUPPLY INFRASTRUCTURE

A contaminant risk assessment completed in accordance with the UKWIR assessment framework should be completed and will be addressed under separate cover.

4. PHASE 3 REMEDIATION OPTIONS APPRAISAL

4.1. OVERVIEW

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

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

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

4.2. DETERMINATION OF SUFFICIENCY OF INFORMATION

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

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

4.3. CONTAMINANTS OF CONCERN (COC)

Following the completion of the intrusive investigation, assessment and the completion of a developed conceptual site model, Table 4 below summarises the contaminants of concern for which a Remediation Options Appraisal has been developed.

Table 4 Summary of Contaminants of Concern

CONTAMINANT OF CONCERN	LOCATION	DEPTH	MATERIAL TYPE	EXPOSURE PATHWAY
Heavy Metals	Site Wide	0.10 – 4.00 m	MADE GROUND	Direct contact with soil by future residents Direct ingestion of soil by future residents
Non-volatile PAHs	Site Wide	0.10 – 1.50 m	MADE GROUND	Direct contact with soil by future residents Direct ingestion of soil by future residents
Asbestos (Chrysotile)	TP203 TP204 TP208	0.60 0.10 0.40	MADE GROUND	Inhalation of dust/fibres by future residents

4.4. IDENTIFICATION OF FEASIBLE REMEDIATION OPTIONS

4.4.1. OBJECTIVES

The remediation works must be completed in a safe and sustainable manner that ensures that the post-remediation condition of the site poses no unacceptable risk to controlled waters or the wider environment. The developed Conceptual Site Model must ensure no complete pollutant linkage to ensure successful implementation.

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

4.4.2. AVAILABLE TECHNOLOGIES

Potential remedial technologies that can be applied to remediate the identified contaminants of concern (Table 4) are summarised in Table 5, overleaf. The remedial techniques considered would potentially break any source-pathway-receptor linkages, thereby reducing the risk to human health and controlled waters.

Table 5 Soil Remediation Technologies

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

4.4.3. SELECTION OF REMEDIATION TECHNOLOGY OPTIONS

Several remedial technologies have been considered in addressing the contaminant linkages of concern identified at the site as summarised in Table 6, overleaf.

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

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

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

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

Table 6 Assessment of Remediation Technologies Applicability

REMEDIAL TECHNOLOGY	APPLICABILITY	REGULATORY APPROVAL / PERMITS	COST	TIME-FRAME	SCORE	SUITABILITY COMMENT
Cover system	5	5	5	5	20	Essential remediation solution to remove direct exposure pathways.
Excavation and offsite disposal	5	5	1	5	16	Limited by the cost being prohibitive. Small quantities of material that cannot be treated will be removed. Likely to form one aspect of the remediation approach.
Barrier Pipe	5	5	3	5	18	Essential remediation solution to remove direct exposure pathways.

Note for Table 6 The scoring methodology is presented below

SCORE	APPLICABILITY	PERMISSIBILITY	COST	TIMEFRAME	ACCEPTABILITY (INCLUDING SUSTAINABILITY)
0	Not applicable, available or implementable	No chance of obtaining a permit			N/A
1	Not widely used and probably not applicable	Permitting will probably be difficult	Very High	Treatment time does not meet the client's requirements	N/A
2	Widely used but probably not applicable or not widely used and may not be applicable	Permitting may be difficult	High	Treatment time almost meets the client's requirements	N/A
3	Widely used but may not be applicable or not widely used but probably applicable	No permitting problems	Moderate	Treatment time meets the client's requirements	N/A
4	Widely used and probably applicable or not widely used but proven and applicable		Low		N/A
5	Widely used, proven and applicable		Very Low		N/A
Considerations	Contaminant type; Soil conditions; Groundwater considerations; Availability; Proven track record; Requirements for additional treatment; Whether technology is implementable at the site; Ability to attain remediation goals.	Emissions; Discharges; Noise; Planning; Mobile Treatment License; Environment Agency.	Indicative costs data from professional experience.	Site requirement for treatment within 12 months.	Client acceptance; Regulatory acceptance; Site acceptance; Other potential stakeholders' acceptance.

4.5. SUMMARY OF PREFERRED REMEDIATION OPTIONS

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

- The construction of a designed and validated clean **cover system** ensures no direct exposure pathway to future receptors;
- Removal of defined **contaminant hotspots** for off-site treatment with subsequent validation to demonstrate effective implementation;
- **Off-site removal** of hazardous materials which cannot be treated will be required, this operation needs to be limited to materials that cannot be treated on-site to promote sustainability and ensure viable regeneration;

4.5.1. CL: AIRE DOW COP MATERIALS MANAGEMENT PLAN

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

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

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

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

5. REMEDIATION AND SITE-ENABLING WORKS

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

5.1.1. RE 1: PRE-COMMENCEMENT REGULATORY COMPLIANCE

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

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

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

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

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

5.1.2. RE 2: INDEPENDENT VALIDATION AND SITE SUPERVISION

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

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

5.1.3. RE 3: ENVIRONMENT AND NUISANCE CONTROL

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

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

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

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

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

5.1.4. RE 4: RISK TO INFRASTRUCTURE

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

Ongoing consultation will be required with Network Rail and the Remediation Contractor/Developer to ensure all site activities are approved and in line with Network Rail regulations for construction activities adjacent to assets.



5.1.5. RE 5: SITE CLEARANCE OPERATIONS

The site is currently overgrown with semi-mature trees and self-seeded vegetation; this material should be removed in a controlled manner with full compliance with any ecological mitigation measures that are required for the works. Any such measures are outside the scope of this report.

Invasive species have been identified on site and should be dealt with in accordance to relevant guidance prior to any vegetation clearance within the affected areas.

All vegetation should either be stockpiled at a pre-agreed location or alternatively removed from site in accordance with waste permitting regulations. All root networks are to be removed in accordance with the requirements of the NHBC/LABC.

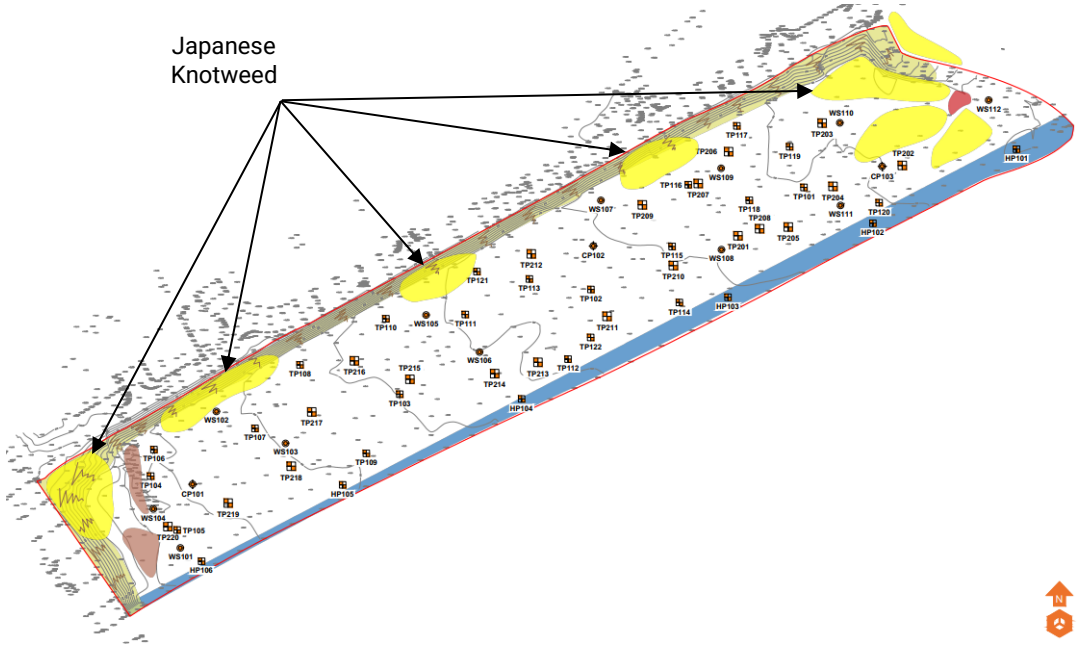
Above-ground waste/fly tipping has been identified on the site with Asbestos Containing Materials (ACMs) present. The contractor should visit site and determine waste materials and ensure all waste is removed and disposed of by a suitably licensed waste contractor. A suitably qualified contractor should be instructed to undertake controlled removal of the asbestos sheeting with removal to a suitably licensed waste facility.

5.1.6. RE 6: IDENTIFICATION, ISOLATION AND TREATMENT OF INVASIVE PLANTS

Invasive plant species have been identified on-site. The approximate locations are identified in yellow on the adjacent snapshot and included in Appendix III (Drawing Ref: 17-302-015). The remediation contractor must satisfy themselves concerning the extent of all species deemed invasive prior to the commencement of works on site. The contractor shall employ a suitably qualified expert to investigate the presence of invasive plant species on or adjacent to the site. Once all invasive plant species are identified, these will be treated in strict accordance with an approved method statement to be submitted to the supervising consultant for review before the start of any works.

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

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



5.1.7. RE 7: DELINEATION, EXCAVATION AND TREATMENT OF IDENTIFIED ASBESTOS IMPACT

Detectable asbestos fibres have been identified in discrete locations (TP203, TP204, TP208); however, due to the nature and age of the filled material, it must be assumed that trace fibres are present throughout the MADE GROUND.

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

A stockpile of fly tipped material is present adjacent to the access track in the north of the site with visible asbestos sheeting. A suitably qualified contractor should be instructed to undertake controlled removal of the asbestos sheeting with removal to a suitably licensed waste facility.

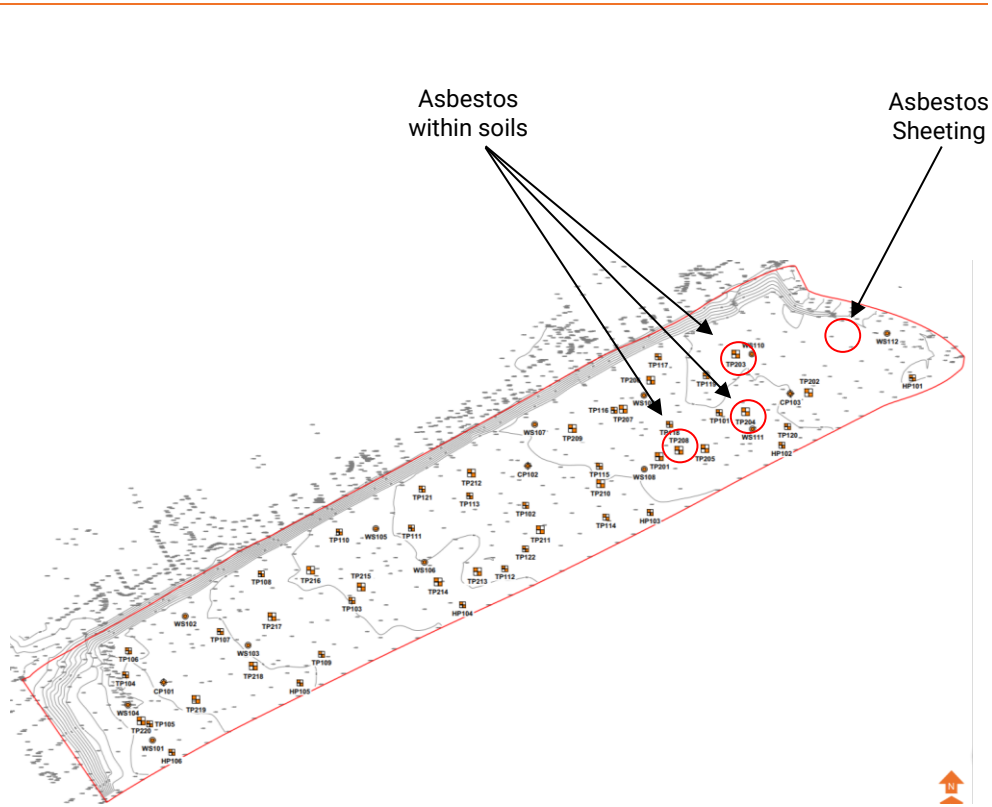
Where any visual evidence of ACM is identified, these materials should be carefully segregated and removed from the soil matrices (if/where possible).

Validation sampling of the processed MADE GROUND should be completed to demonstrate compliance with the developed conceptual site model (included in Appendix III as Drawing 17-302-018).

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

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

An Asbestos Management Plan will be completed under separate cover.



5.1.8. RE 8: EXCAVATION, BREAKING AND PROCESSING OF ALL ABOVE AND BELOW GROUND STRUCTURES

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

Artificially hard materials should be broken out and crushed. Stockpiles will be made, validation testing undertaken, and site-won material reused on-site where required. Materials will be processed as per the specifications outlined within the E3P Geotechnical Design Report (Report Ref: 17-302-R4) using the licensed plant.

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

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

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

5.1.9. RE 9: IMPORTATION OF MATERIALS FOR USE IN CONSTRUCTION

Where there is a net shortfall of material required to achieve the proposed ground levels, it will be necessary to import natural inert soils and aggregate as per the engineering requirements outlined within the E3P Geotechnical Design Report (Report Ref: 17-302-R4).

Imported material must be certified as suitable for use in strict accordance with the E3P chemical performance criteria and in conjunction with the required duty of care notes and waste transfer exemption. Materials must be suitable for use in accordance with the geotechnical performance criteria outlined within the E3P Geotechnical Design Report (Report Ref: 17-302-R4).

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

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

5.1.10. RE 10: PREPARATION OF COVER SYSTEM

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

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

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

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

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

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

5.1.11. RE 11: STOCKPILE ARRANGEMENT

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

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

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

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

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

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

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

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

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

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

Stockpiled soils will require chemical analysis at the frequency defined within Table 9 based on the soil type and use.

5.1.12. RE 12: PROVISION OF SUBSOIL

There are no suitable source of subsoil onsite.

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

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

5.1.13. RE 13: WASTE SOILS SURPLUS TO REQUIREMENTS

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

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

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

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

5.1.14. RE 14: GENERAL VALIDATION OF STOCKPILED MATERIALS AND TURNOVER REQUIREMENTS

The site has been characterised with respect to the potential pollution risks to all known receptors defined and understood; furthermore, the appropriate remediation actions have been defined within this strategy to ensure that the site will be suitable for the intended use.

There is requirement for further general testing of either MADE GROUND or natural soils, which will be nominally turned over, processed or subject to a direct cut / fill as part of the enabling earthworks.

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

5.1.15. RE 15: VALIDATION OF MATERIALS FOR POTABLE WATER SUPPLY INFRASTRUCTURE

A contaminant risk assessment, completed following the UKWIR assessment framework, identified elevated concentrations of potentially volatile/soluble hydrocarbon compounds that necessitate the use of protected water supply pipe-work.

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

Validation sampling should be completed at 10 m chainage at depths of 0.75 m and 1.50 m within the locality of the potable supply pipes where impacted material is removed, with samples analysed for all pertinent volatile and semi-volatile hydrocarbons and, where necessary, chlorinated/halogenated compounds.
Upon successful remediation of all impacted materials, the post-remediation validation testing will be reviewed by a qualified person to inform an updated UKWIR assessment to be reviewed and approved by the statutory adoption authority.

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

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

5.1.16. RE 16: REMEDIAL VERIFICATION REPORT

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

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

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

5.1.17. RE 17: REMEDIATION PROJECT CHANGE, ADJUSTMENT AND UPDATES TO REQUIRED WORKS

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

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

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

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

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

5.2. VERIFICATION PLAN

5.2.1. VALIDATION SAMPLING PROTOCOL

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

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

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

The sampling frequency for materials to be managed under the remediation strategy is presented in Table 7. The validation sampling protocol is in line with Manchester City Council (MCC) Planning and Contaminated Land Technical Guidance (Feb 2021).

Table 7 Specification of Chemical Validation Laboratory Analysis

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

Notes:
Suites Of Analysis:

A. *Speciated PAH.*
B. *Speciated TPH (C5-C35, BTEX, MTBE).*
C. *Asbestos (ID).*
D. *Clea Inorganic Heavy Metals.*
E. *SVOC/VOCS*
F. *On-Site Screening For VOC Using Calibrated PID.*
G. *Leachate Analysis Of Inorganic Heavy Metals, TPH, Sulphate And PAH.*
H. *Asbestos Quantification*

5.2.2. IMPLEMENTATION OF THE VERIFICATION PLAN

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

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

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

5.2.3. RISK-BASED ASSESSMENT FOR NON CONFORMANCE

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

5.2.4. REMEDIATION OBJECTIVE REVIEW

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

Data that may lead to a further review include:

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

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

5.3. REMEDIATION CONTRACTOR'S SITE MANAGEMENT AND RESPONSIBILITY

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

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

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

6. MATERIALS MANAGEMENT & LEGISLATIVE COMPLIANCE

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

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

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

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

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

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

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

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

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

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

7. RECORD KEEPING AND VERIFICATION

7.1. RECORD-KEEPING

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

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

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

7.2. VERIFICATION REPORT

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

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

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

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

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

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

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

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

8. CONTINGENCY PLAN

8.1. PREVIOUSLY UNIDENTIFIED CONTAMINANTS

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

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

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

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

9. SECOND PHASE, MITIGATION AND MANAGEMENT

9.1. COVER SYSTEM

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

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

- Laboratory testing of the imported topsoil;
- Chemical validation of any additional subsoil imported for use within soft landscaping;
- Placement and chemical validation of sub-soil within soft landscaping.
- Placement and chemical validation of imported topsoil within soft landscaping.
- Installation of ground gas protection measures (if required).

This section covers the build phase requirements with regards cover systems for soft landscaping however in relation to any further build phase validation items such as ground gas mitigation, this is available in a separate Build Phase Development Strategy.

9.2. PLACEMENT OF COVER SYSTEM

The remediation and enabling works strategy for the site, concerning the health of the future site users, includes the provision of a chemically suitable clean material to be installed in all soft landscaped areas. The construction of the clean cover/placement of clean material shall be in accordance with Table 8.

Table 8 Construction and Validation of Cover System

SOFTSCAPE TYPE	DEPTH		BREAK LAYER Y/N/TYPE	VALIDATION FREQUENCY	TESTING SUITE	VALIDATION DOCUMENTATION
	TOPSOIL	SUBSOIL				
Back garden	150	450	N	1 per plot	A/B/C/D	Validation letter
Front garden	150	450	N	1 per 10 plots	A/B/C/D	Validation letter
LEAP (parkland)	Minimum 300mm clean cover		N	1 per 625 m^2	A/B/C/D	Validation letter
Functional POS	Minimum 300mm clean cover		N	1 per 2000 m^2	A/B/C/D	Validation letter
None Functional POS	N/A		N	N/A	A/B/C/D	N/A
Tree/shrub pits	600-900mm clean cover		N			

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

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

Initial testing of site-won sub-soil to classify its re-use on site has been completed as part of the remediation works undertaken. Therefore, further analysis of sub-soil will be required to achieve the testing frequencies outlined within the remediation strategy and in the event of importation of additional material during construction.

Testing requirements for top-soil and sub-soil are presented in Table 9.

Table 9 Specification for Soil Testing

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Subsoil Greenfield Source	1 Sample per 200 m^3 (minimum 3 from source)	A/B/C/D
Subsoil Brownfield Source	1 Sample per 50 m^3 (minimum 6 from source)	A/B/C/D
Topsoil Greenfield Source	1 Sample per 100 m^3 (minimum 3 from source)	A/B/C/D
Topsoil Brownfield Source	1 Sample per 50 m^3 (minimum 6 from source)	A/B/C/D
General Engineering Fill (Class 1 and 2 Soil)	1 Sample per 1000 m^3	A/B/C/D

Notes
Suites of Analysis:
A. Speciated PAH.
B. Speciated TPH (C5-C35).
C. Asbestos (ID).
D. CLEA Inorganic Heavy Metals.

9.2.1. PROCEDURE FOR PLACEMENT OF CHEMICALLY SUITABLE COVER SYSTEM

Garden and landscaped areas need to be backfilled with validated subsoil, and topsoil overlaying this in line with Table 9. Topsoil is required to be confirmed as chemically suitable prior to placement. Where sub-soil is not placed during remediation and enabling works, E3P will be required to return to the site and undertake independent validation of the correct placement of sub-soil.

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

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

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

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

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

The garden validation procedure is detailed in Table 10.

Table 10 Garden Validation Procedure

PROCEDURE	METHOD
Chemical Validation	Imported sub-soils and topsoil will need to be chemically analysed to confirm suitability for use with the proposed cover system prior to installation and completion of the garden systems. E3P will issue an email to the appropriate party with an assessment of the chemical suitability of both sub-soils and top soils. If acceptable the materials can be installed to the required depth at which time the plot will be deemed complete following a validation procedure by a suitability qualified E3P engineer.
Trial Holes	Trial holes are deemed necessary for all plots and must be advanced at random.
Validation	Photographic evidence will be taken by E3P of the topsoil placement demonstrating the depth of topsoil and practical completion of works are required for each and every plot. For plots where sub-soil depths require validation by E3P during the build phase, photographs will be taken and collated by E3P. It should be noted that cover systems should be installed as late as possible in the build programme to reduce the risk of cross-contamination.
Validation Certificate	Once the photographs of the placement of topsoil (over the clean material) have been provided, E3P will issue a plot-specific validation certificate to demonstrate that the required subsoil and topsoil have been placed in the required garden plots along with the chemical analysis.
Completion Report	Upon completion of all garden and landscaped areas within the development, a Completion Report will be issued providing the confirmation that all remediation requirements have been achieved.

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

Figure 2 Example of Plot Cover System Validation

Plot Validation

20 / 20 (100%)

Plot Validation 1

5 / 5 (100%)

Plot Number	117
Is Plot Ready	Yes
Installation Standard	Pass
Depth of Cover System Materials (record the depth and support with Photo down the hole)	1000



Photo 1



Photo 2

Depth of Topsoil (mm)	150
Depth of Subsoil (mm)	850
Depth of Cover System at Ground Level (Photo)	☒



Photo 3

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo)	☒



Photo 4

Soil suitable	Yes
Geotextile membrane present	N/A

9.3. GROUND GAS PROTECTION MEASURES

No credible persistent source of hazardous ground gasses has been identified when considering the developed CSM. There is no putrescible material within the Made ground capable of generating a significant gas source attributed to biological processes, and there is no viable pathway for any thermogenic / geogenic gasses.

Ground gas monitoring and assessment suggest that the site can be predominantly classified as CS1, and in these areas, it is considered that gas protection measures will not be required.

It should be noted that the site is underlain by coal measures and further intrusive coal mining investigation works are to be undertaken to determine if the site is underlain by mine workings. If mine workings are identified beneath the site, ground gas protection measures will be required in line with Characteristic Situation 2 (CS2) as a minimum. Additional ground gas monitoring may also be required.

In the unlikely event that a risk of ground gases from coal mining is identified, a Gas Protection Design Report will be required.

For any properties requiring ground gas protection measures, these are to be constructed in accordance with BS8485 (2015)+A1(2019).

9.4. POTABLE WATER SUPPLY – CONTAMINANT ASSESSMENT CRITERIA

Table 11 provides a summary of the threshold concentrations that must not be exceeded within remediated ground at pipeline depth in order for PE pipe works to be acceptable for the proposed development.

Table 11 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

Based on the current ground conditions, historic land use of the site and in the absence of a completed UKWIR Assessment, an allowance should be made for full barrier pipe at this stage. Upon completion of the remedial works, a full UKWIR Risk Assessment should be undertaken.

END OF REPORT

APPENDIX I
LIMITATIONS



GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P “Terms of Business” or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.

3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.

4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEOENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

5. Coverage: This section covers reports with the following titles or combination of titles: Phase 1; Desktop Study; Geoenvironmental Assessment; Development Appraisal; Preliminary Environmental Risk Assessment; Constraints Report; Due Diligence Report; Geotechnical Development Review; Environmental Statement; Environmental Chapter; Baseline Environmental Assessment; Project Scope Summary Report (PSSR), Program Environmental Impact Report (PEIR), Geotechnical Development Risk Register; Agricultural Land Assessment; Mineral Safeguarding Assessment; Desk Top Coal Mining Risk Assessment; Hydrogeological Appraisal; Construction Environmental Management Plan; and Site Water Management Plan.

6. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.

7. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.

8. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

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

10. E3P does not warrant work/data undertaken/provided by others.

INTRUSIVE INVESTIGATION REPORTS

11. Coverage: The following report titles (or combination) may cover this category of work: Geoenvironmental Site Investigation; Geotechnical Assessment; GIR (Ground Investigation Reports); Preliminary Environmental And Geotechnical Risk Assessment; Preliminary Summary; Coal Mining Risk Assessment, Ground Gas Addendum; and, Geotechnical Risk Register.

12. The investigation has been undertaken to provide information concerning either:

    I. The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or

    II. Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

13. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

14. Unless otherwise specified in the scope of works, any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

15. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

16. For geotechnical investigations, the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

17. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

18. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

19. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, E3P has used reasonable skill and care to extrapolate conditions between these points based on assumptions to develop our interpretation and conclusions.

20. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation and at the time of the investigation.

21. Conditions can change between investigation points both spatially and over time and these interpretations should therefore be considered indicative. The assessment of extreme weather events and their impact on ground conditions is not within the scope of E3P's work.

22. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated with the risk assessment process have been outlined within the body or associated appendix of the report.

23. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

24. Where soil contamination concentrations recorded as part of this investigation are used for commentary on the potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed and the waste classification and any subsequent disposal option agreed upon with licenced subcontractors and/or the relevant regulators.

25. The results of the asbestos testing are factually reported and interpretation is given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and/or trace loose asbestos fibres within the soil matrix at the site.

26. If costs have been included in relation to additional site works, and/or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

27. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

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

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIATION AND ENABLING WORK STRATEGY REPORTS

29. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected based on the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

30. The outputs of the Detailed Quantitative Risk Assessments are based upon the manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

31. Before adoption on-site, assessment criteria will need to be discussed and agreed upon with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of E3P. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

32. E3P does not accept liability for any subcontract work that has not been completed in strict accordance with an approved E3P Remediation and Enabling Works Strategy.

GEOTECHNICAL DESIGN REPORT (GDR)

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

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS AND BUILD PHASE MITIGATION)

34. These reports are factual and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of earthworks or remedial works.

35. The data is presented and will be compared with assessment criteria.

APPENDIX II
GLOSSARY



TERMS

ACM	Asbestos-containing material	**MMP**	Materials management plan
ADS	Acoustic design statement	**ND**	Not detected
AST	Above-ground storage tank	**NDP**	Nuclear density probe
BGS	British Geological Survey	**NMP**	Noise management plan
BSI	British Standards Institute	**NPSE**	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	**NR**	Not recorded
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/m^3**	Milligram per metre cubed
% v/v	Percent volume in air	**m bgl**	Metres below ground level
mb	Millibars (atmospheric pressure)	**m bcl**	Metre below cover level
l/hr	Litres per hour	**mAOD**	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	**kN/m^2**	Kilonewtons per metre squared
ppb	Parts per billion	**µm**	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	**SSRT**	Site Specific Remediation Target
PSD	Particle Size Distribution	**DD**	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	**Mc**	Moisture Content
ρ	Bulk Density	**GPR**	Ground Penetrating Radar
NDP	Nuclear Density Probe	**FFL**	Finished Floor Level
LEL	Lower Explosive Limit	**UKWIR**	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	**LOD**	Limit of Detection
PFAS	Per- and Polyfluoroalkyl Substances	**MTBE**	Methyl tert-Butyl Ether
EP	Environmental Permit	**WFD**	Waste Framework Directive
WML	Waste Management Licence		

APPENDIX III
DRAWINGS



DRAWING 17-302-001 – SITE LOCATION PLAN



N

e3p



P1	REVA	11.04.2024	OW	HM	ND	
Phase	Issue	Date	Drawn	Checked	PM	

Notes:

Client:
Bellway Homes

Job No:
17-302

Date:
11.04.2024

Drawing No:
002

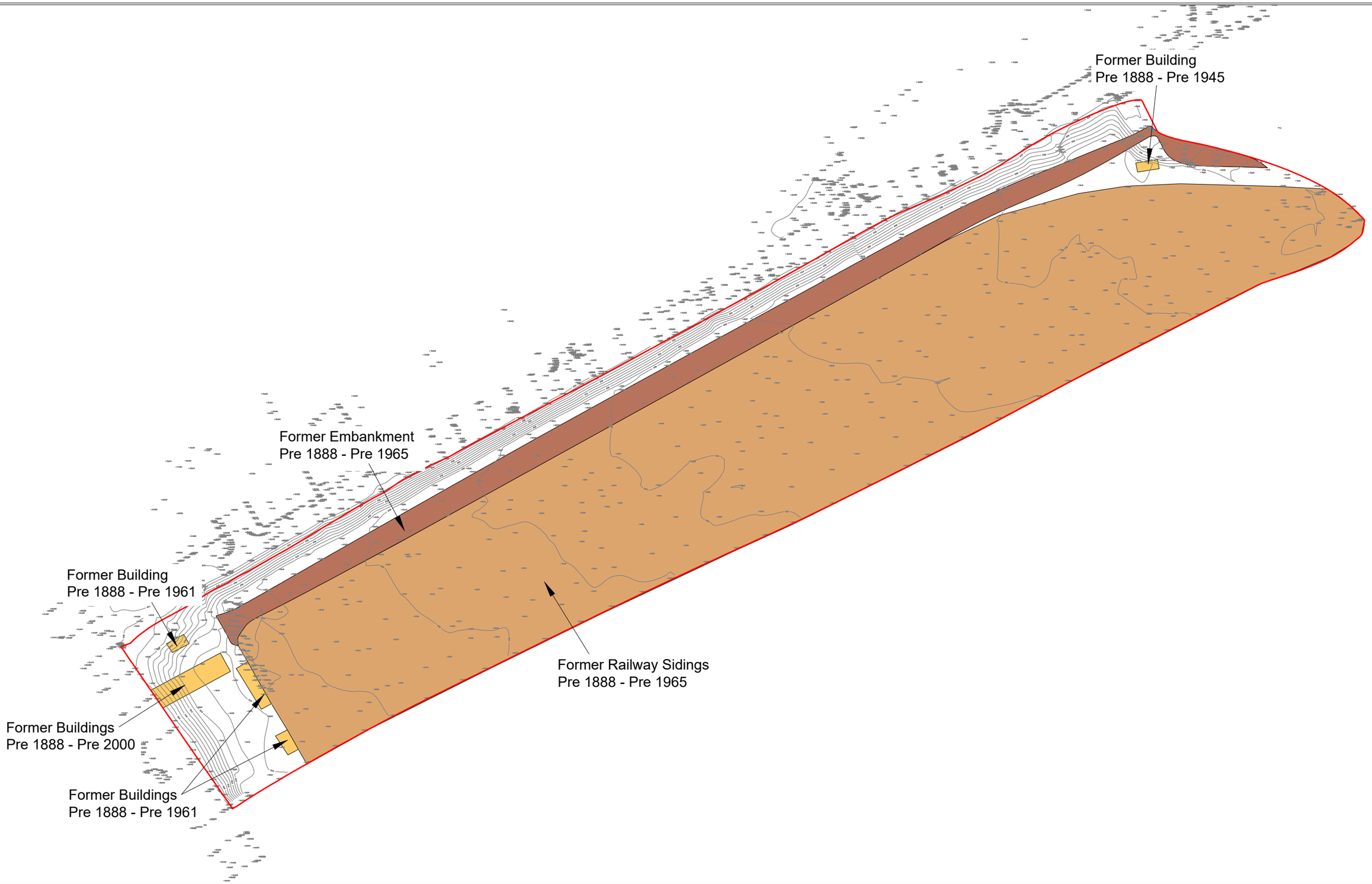
Scale:
NTS @ A3

Job Title:
Pitsford Road, Manchester

Drawing Title:
Proposed Development Plan

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Historical Features

- Former Buildings
- Former Railway Sidings
- Former Embankment

Notes:

P1	REVA	11.04.2024	OW	HM	ND
Phase	Issue	Date	Drawn	Checked	PM

Client: Bellway Homes

Job No: 17-302

Date: 11.04.2024

Drawing No: 003

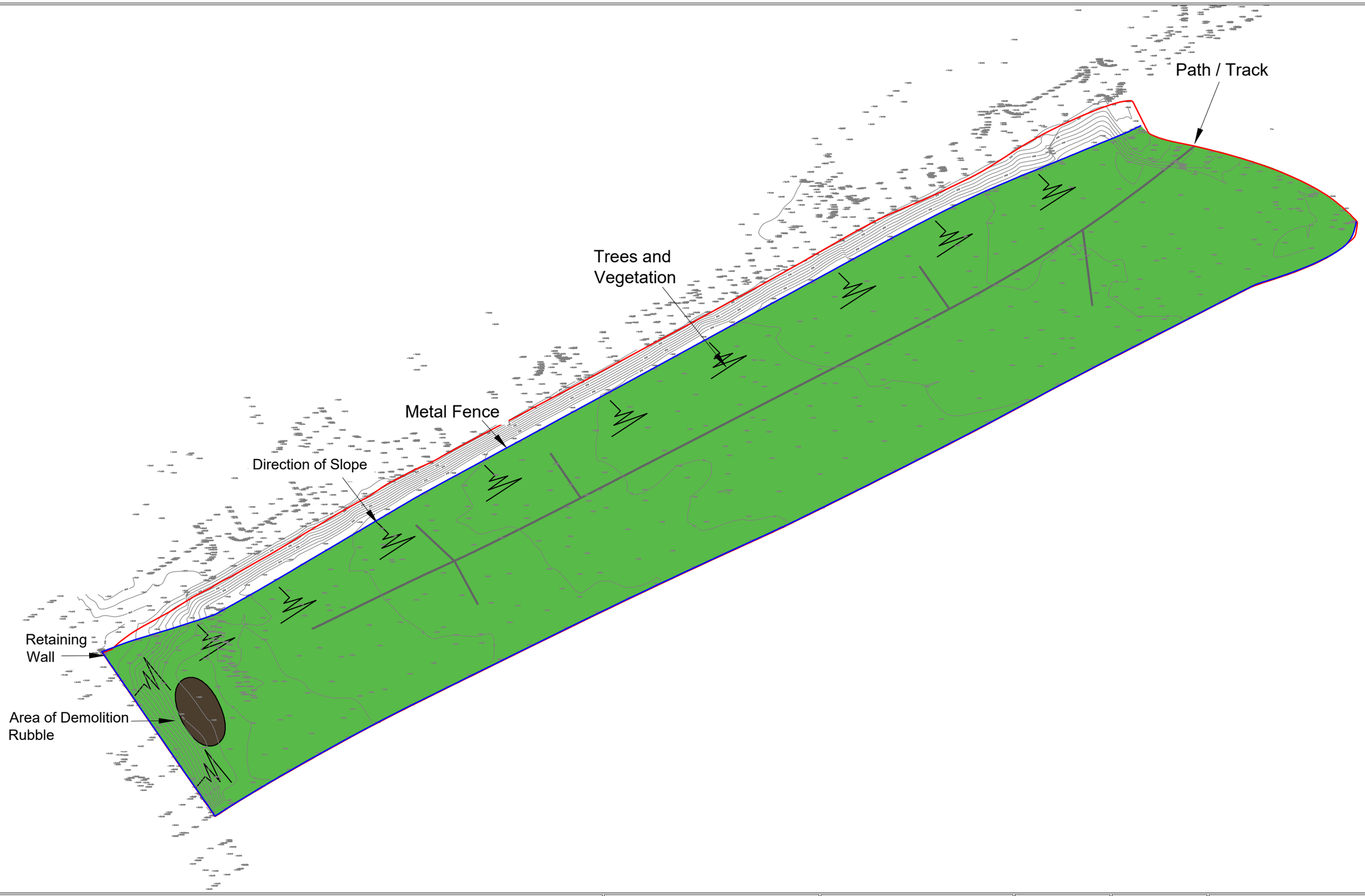
Scale: NTS @ A3

Job Title: Pitsford Road, Manchester

Drawing Title: Historical Features Plan

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Site Features

- Trees and Vegetation
- Path and Track
- Metal Fence
- Retaining Wall
- Knotweed
- Demolition Rubble
- Slope Direction

Notes:

P1	REVA	11.04.2024	OW	HM	ND
Phase	Issue	Date	Drawn	Checked	PM

Client: Bellway Homes

Job No: 17-302

Date: 11.04.2024

Drawing No: 004

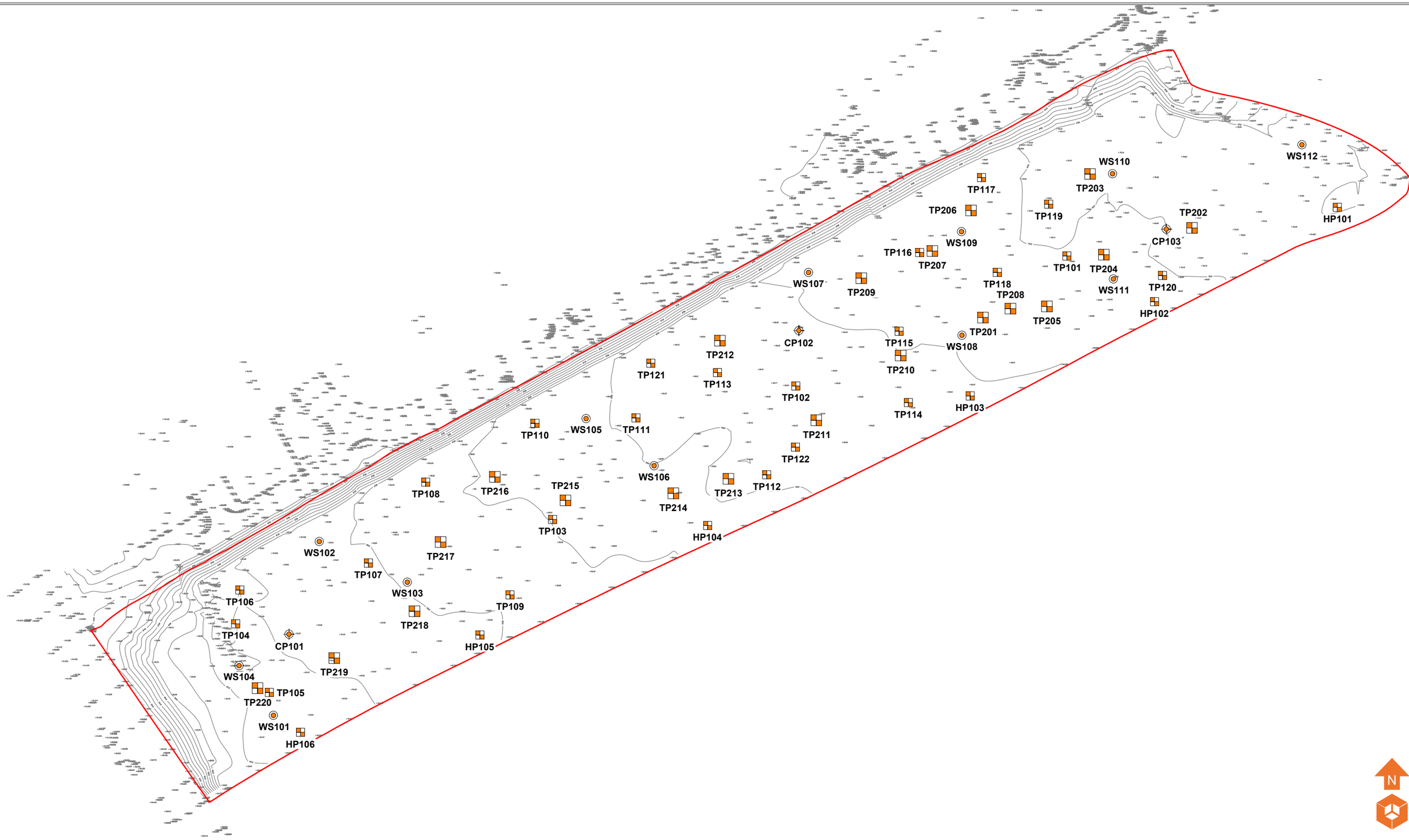
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Job Title: Pitsford Road, Manchester

Drawing Title: Site Features Plan

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Location Symbols

- Approximate Trial Pit Location (E3P Locations - February 2024)
- Proposed Window Sample Probehole Location (E3P Locations - Novemver 2022)
- Proposed Trial Pit Location (E3P Locations - Novemver 2022)
- Proposed Hand Pit Location (E3P Locations - Novemver 2022)
- Proposed Cable Percussive Borehole Location (E3P Locations - Novemver 2022)

Notes:

P1	REVA	08.04.2024	OW	HM	ND
Phase	Issue	Date	Drawn	Checked	PM

Client: Bellway Homes

Job No: 17-302

Date: 08.04.2024

Drawing No: 005

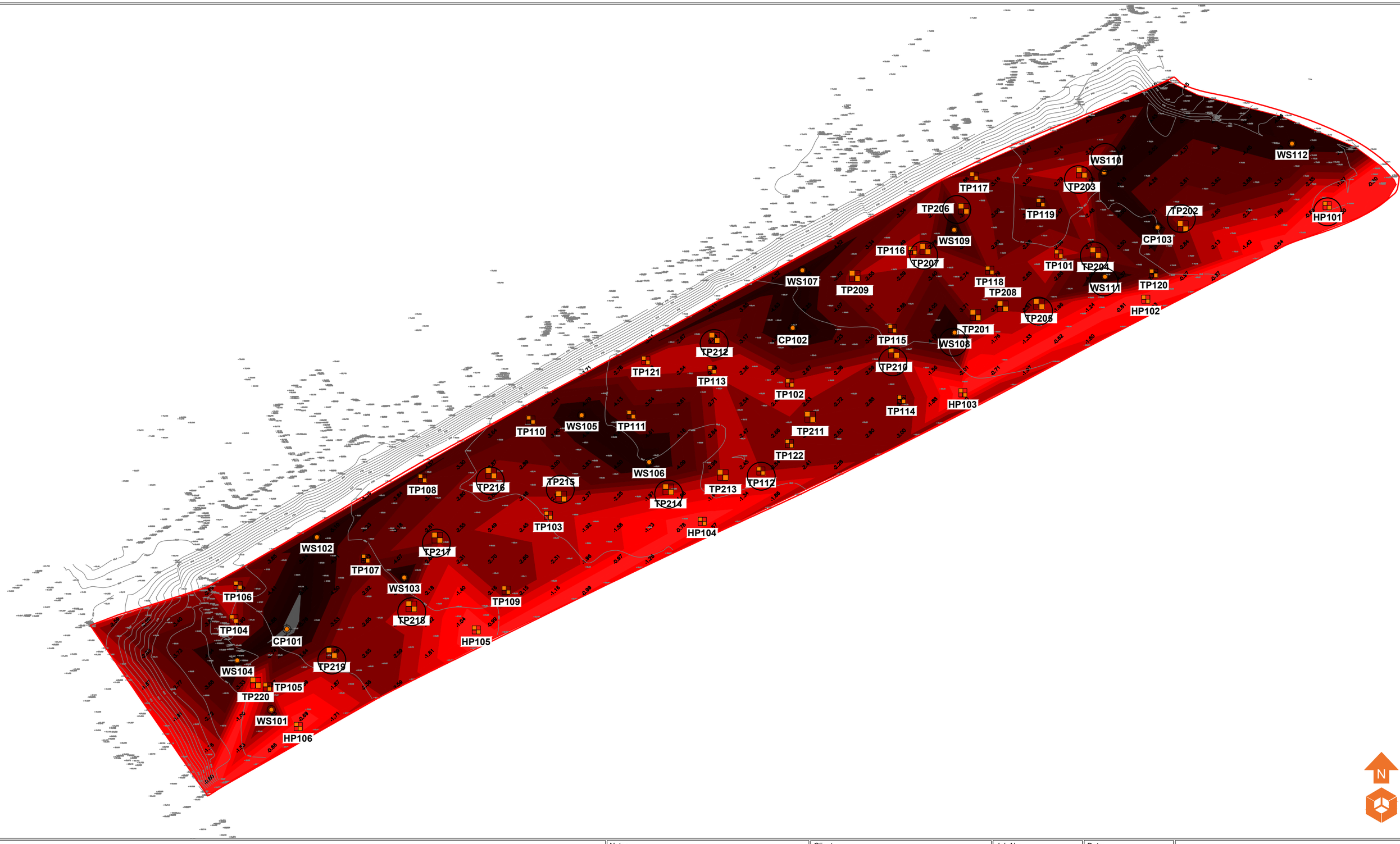
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Job Title: Pitsford Road, Manchester

Drawing Title: Exploratory Hole Location Plan

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Location Symbols

- TP101 — Approximate Trial Pit Location (E3P Locations - February 2024)
- WS101 — Approximate Window Sample Probehole Location (E3P Locations - Novemver 2022)
- TP101 — Approximate Trial Pit Location (E3P Locations - Novemver 2022)
- HP101 — Approximate Hand Pit Location (E3P Locations - Novemver 2022)
- CP101 — Approximate Cable Percussive Borehole Location (E3P Locations - Novemver 2022)
- Depth to Made Ground Not Proven

Made Ground Depth (m)

- Depth of Made Ground 0.00 - 0.40m
- Depth of Made Ground 0.50 - 0.99m
- Depth of Made Ground 1.00 - 1.49m
- Depth of Made Ground 1.50 - 1.99m
- Depth of Made Ground 2.00 - 2.49m
- Depth of Made Ground 2.50 - 2.99m
- Depth of Made Ground 3.00 - 3.99m
- Depth of Made Ground > 4.00m

Notes:

Phase	Issue	Date	Drawn	Checked	
P1	REVA	09.04.2024	OW	HM	ND

Client: Bellway Homes

Job No: 17-302

Date: 09.04.2024

Drawing No: 006

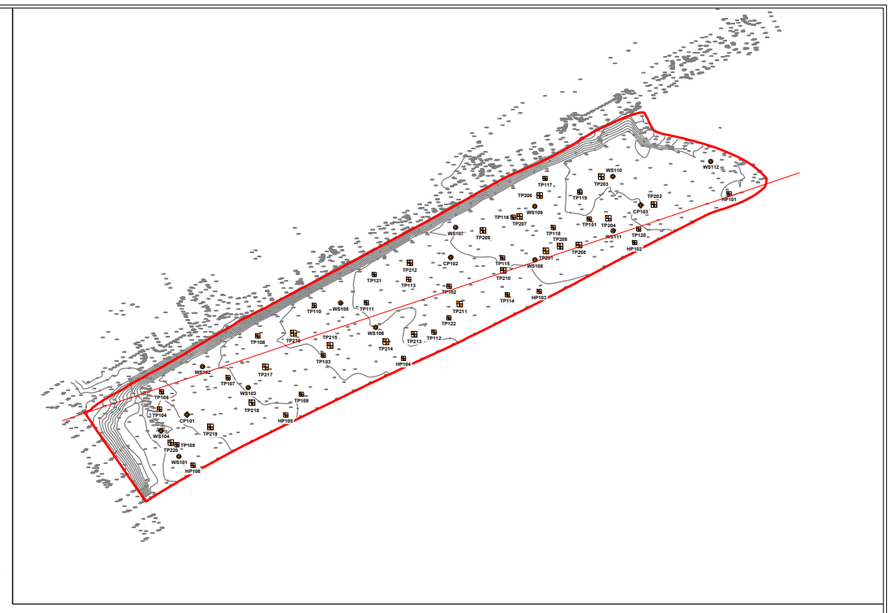
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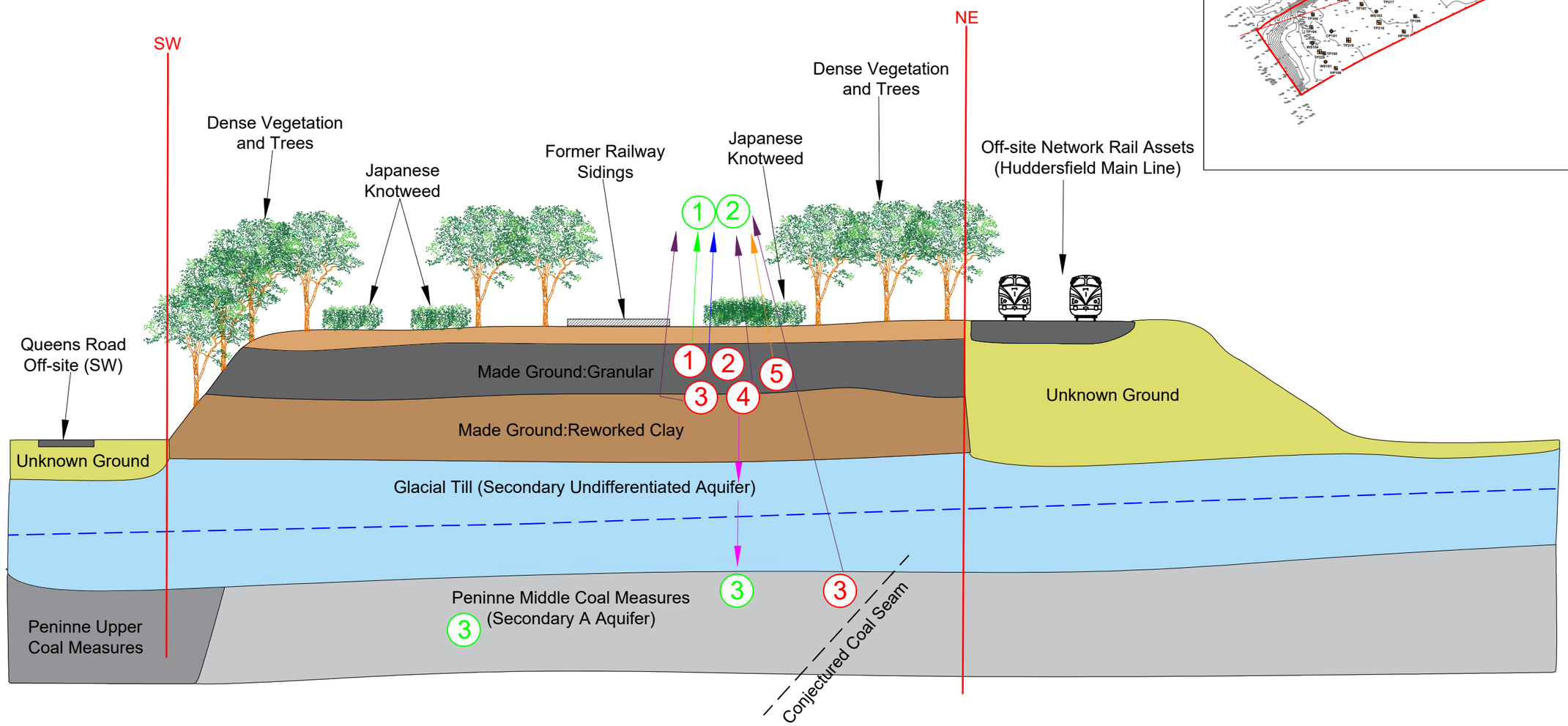
Job Title: Pitsford Road, Manchester

Drawing Title: Depth of Made Ground Plan

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Sources

1. Asbestos (Made Ground)
2. Metals/PAHs
3. Ground Gas (Made Ground and Coal Workings)
4. Volatile Contaminants (Made Ground)
5. Organic Contaminants

Pathways

- Dermal Contact / Ingestion
- Dust Inhalation
- Vapour/Gas Inhalation
- Downward Migration
- Plant Uptake
- Tainting Water Supply

Receptors

1. Future End Users
2. Construction Workers
3. Secondary A Aquifer (Bedrock)
4. Flora/Vegetation
5. Potable Water Supply

Notes:

Phase	Issue	Date	Drawn	Checked	PM
P1	REVB	02.05.2024	OW	ND	ND
P1	REVA	11.04.2024	OW	HM	ND

Client: Bellway Homes

Job No: 17-302

Date: 02.05.2024

Drawing No: 010

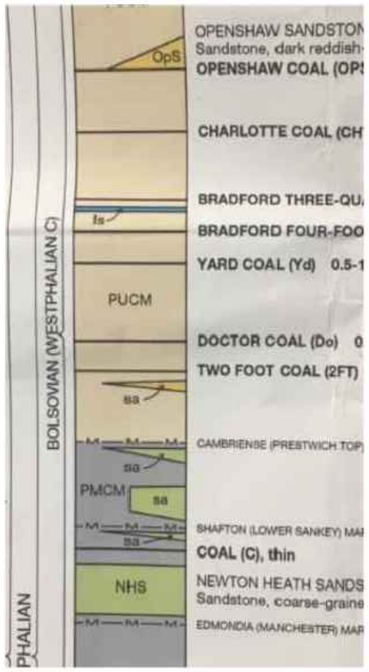
Scale: NTS

Job Title: Pitsford Road, Manchester

Drawing Title: Conceptual Site Model

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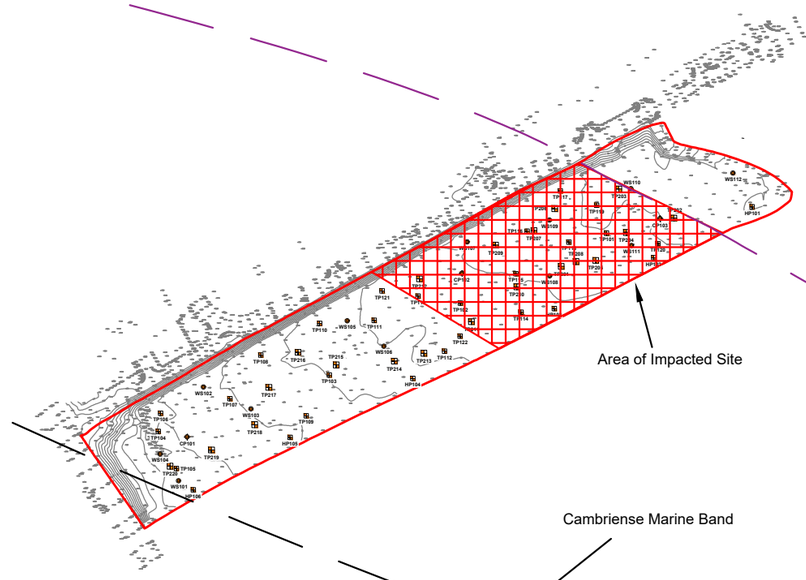
Located to the South West

Located to the South West

Suitated in South West of Site

Assumed Outcrop

Generalised Vertical Section
Taken from BGS Sheet SJ89NE



Area of Impacted Site

Cambriense Marine Band

Two Foot Mine

Bradford Four Foot

20°

25°

N

Coal Mining

- Dip and Direction
- Area of Impact
- Coal Seam
- Marine Band

Notes:

P1	REVA	03.05.2024	OW	ND	ND
Phase	Issue	Date	Drawn	Checked	PM

Client: Bellway Homes

Job No: 17-302

Date: 03.05.2024

Drawing No: 011

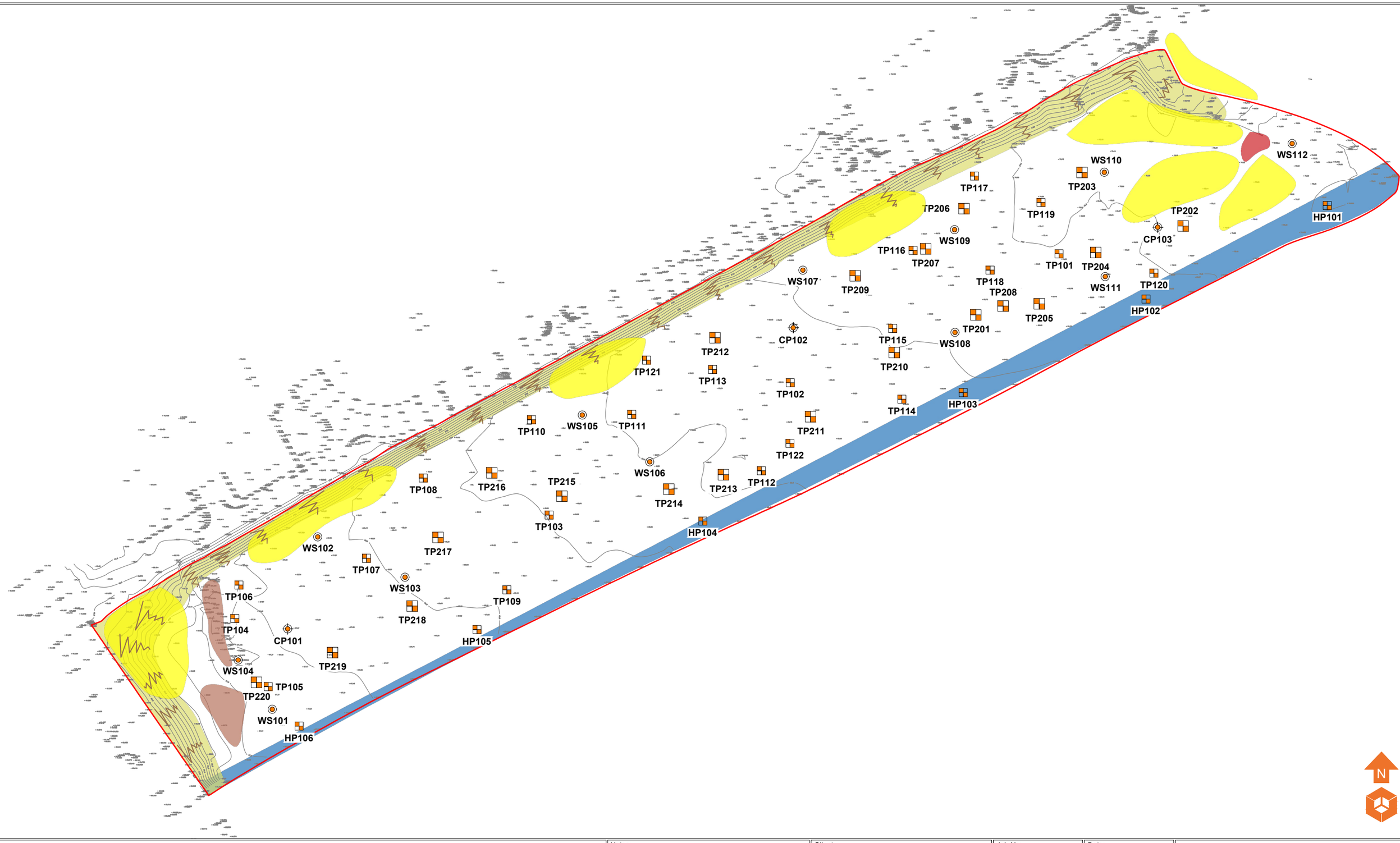
Scale: NTS @ A3

Job Title: Pitsford Road, Manchester

Drawing Title: Coal Mining Issues Plan

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Location Symbols

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- Approximate Window Sample Probehole Location (E3P Locations - Novemver 2022)
- Approximate Trial Pit Location (E3P Locations - Novemver 2022)
- Approximate Hand Pit Location (E3P Locations - Novemver 2022)
- Approximate Cable Percussive Borehole Location (E3P Locations - Novemver 2022)

Development Constraints

- Bounding with Network Rail Assets
- Slope/Embankment
- Japanese Knotweed
- Rubble/Relic Buildings
- Asbestos Sheeting

Notes:

Client: Bellway Homes

Job No: 17-302

Date: 02.05.2024

Drawing No: 015

Scale: NTS @ A3

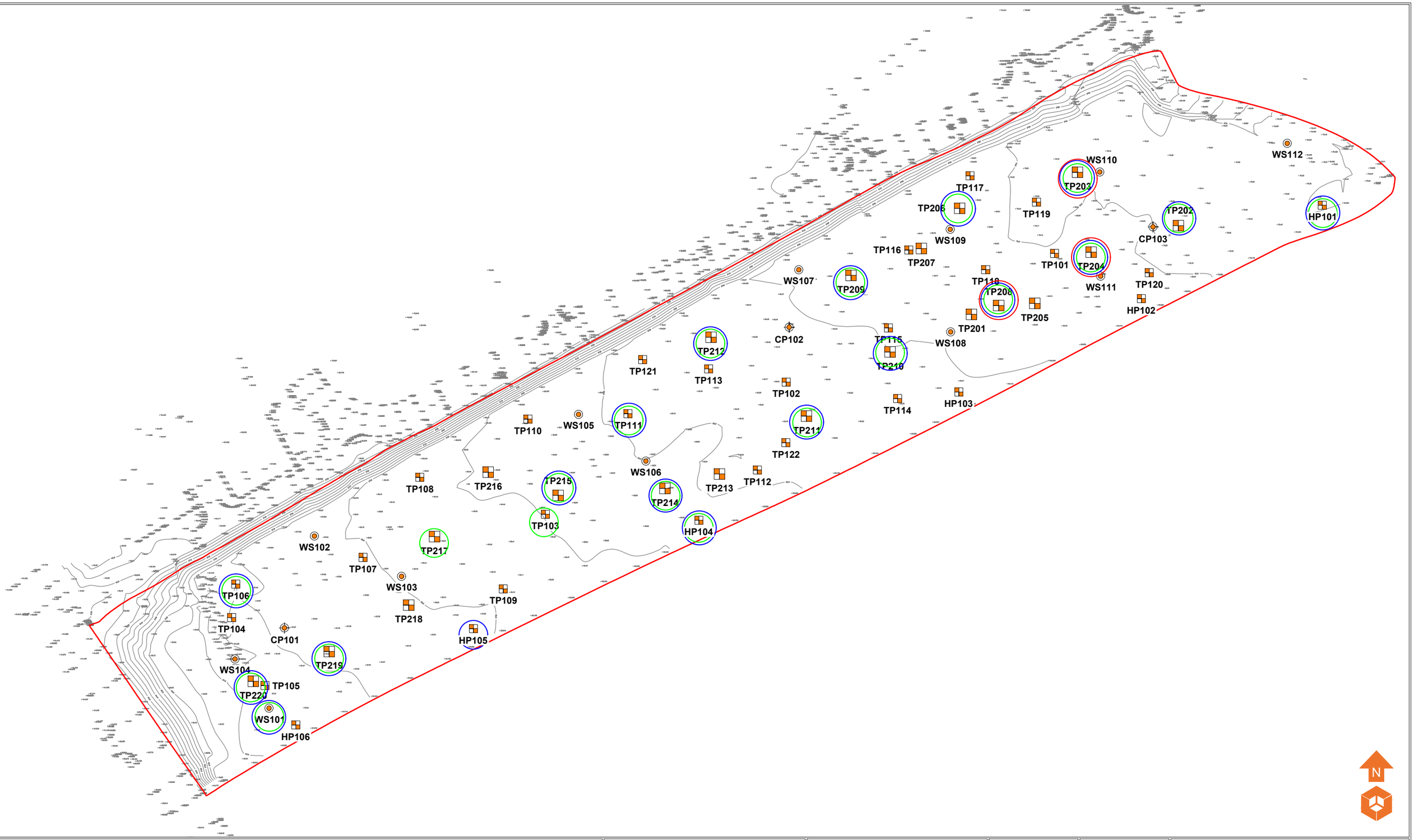
Phase	Issue	Date	Drawn	Checked	PM
P1	REVB	02.05.2024	OW	ND	ND
P1	REVA	11.04.2024	OW	HM	ND

Job Title: Pitsford Road, Manchester

Drawing Title: Development Constraints Plan

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

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Location Symbols

- TP101 — Approximate Trial Pit Location (E3P Locations - February 2024)
- WS101 — Approximate Window Sample Probehole Location (E3P Locations - Novemver 2022)
- TP101 — Approximate Trial Pit Location (E3P Locations - Novemver 2022)
- HP101 — Approximate Hand Pit Location (E3P Locations - Novemver 2022)
- CP101 — Approximate Cable Percussive Borehole Location (E3P Locations - Novemver 2022)

Contamination Exceedances

- Heavy Metals
- Asbestos (0.003% - 0.077%)
- Non Volatile PAH

Notes:

P1	REVB	07.05.2024	OW	ND	ND
P1	REVA	09.04.2024	OW	HM	ND
Phase	Issue	Date	Drawn	Checked	PM

Client: Bellway Homes

Job No: 17-302

Date: 07.05.2024

Drawing No: 018

Scale: NTS @ A3

Job Title: Pitsford Road, Manchester

Drawing Title: Contamination Exceedances Plan

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APPENDIX IV
E3P REMEDIATION/ VALIDATION CRITERIA



HUMAN HEALTH REMEDIATION TARGETS – LOW-RISE RESIDENTIAL END USE

DETERMINAND	UNITS	WITHIN COVER SYSTEM (GARDEN)	HARD STANDING AND BELOW COVER	PUBLIC OPEN SPACE COVER	BELOW PUBLIC OPEN SPACE COVER	PATH-WAY
Arsenic	mg/kg	37(i)	40(ii)	79(iii)	170(iv)	1
Cadmium	mg/kg	11(i)	85(ii)	120(iii)	532(iv)	1
Chromium (Hexavalent)	mg/kg	6(i)	6(ii)	7.7(iii)	220(iv)	1
Lead	mg/kg	200(vi)	310(vii)	630(viii)	1300(viii)	1
Elemental Mercury	mg/kg	1.2(i)	1.2(ii)	16(iii)	30(iv)	2
Nickel	mg/kg	130(i)	180(ii)	230(iii)	800(iv)	1
Selenium	mg/kg	250(i)	430(ii)	1100(iii)	1800(iv)	1
Copper	mg/kg	2400(i)	7100(ii)	12,000(iii)	44,000(iv)	1
Zinc	mg/kg	3700(i)	40,000(ii)	81,000(iii)	170,000(iv)	1
Phenol	mg/kg	120(i)(xi)	440(xiv)(xi)	440(iii)(xi)	440(iv)(xi)	2
Naphthalene	mg/kg	2.3(i)(xi)	2.3(xiv)(xi)	1200(iv)(xi)	1200(iv)(xi)	2
Acenaphthylene	mg/kg	170(i)(xi)	500(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 C_5-C_6 (aliphatic)	mg/kg	42(i)(xi)	42(ii)(xi)	42(ii)(xi)	10,000(xiv)(xi)	2
TPH C_6-C_8 (aliphatic)	mg/kg	100(i)(xi)	100(ii)(xi)	100(ii)(xi)	10,000(xiv)(xi)	2
TPH C_8-C_{10} (aliphatic)	mg/kg	27(i)(xi)	27(ii)(xi)	27(ii)(xi)	10,000(xiv)(xi)	2
TPH C_{10}-C_{12} (aliphatic)	mg/kg	130(i)(xi)	130(ii)(xi)	130(ii)(xi)	10,000(xiv)(xi)	2
TPH C_{12}-C_{16} (aliphatic)	mg/kg	1000(xiv)(xi)	1000(xiv)(xi)	1000(xiv)(xi)	10,000(xiv)(xi)	2
TPH C_{16}-C_{21} (aliphatic)	mg/kg	1000(xiv)(xi)	1000(xiv)(xi)	1000(xiv)(xi)	10,000(xiv)(xi)	1
TPH C_{21}-C_{35} (aliphatic)	mg/kg					1
TPH C_5-C_7 (aromatic)	mg/kg	70(i)(xi)	370(ii)(xi)	370(ii)(xi)	10,000(xiv)(xi)	2
TPH C_7-C_8 (aromatic)	mg/kg	130(i)(xi)	860(ii)(xi)	860(ii)(xi)	10,000(xiv)(xi)	2
TPH C_8-C_{10} (aromatic)	mg/kg	34(i)(xi)	47(ii)(xi)	47(ii)(xi)	10,000(xiv)(xi)	2
TPH C_{10}-C_{12} (aromatic)	mg/kg	74(i)(xi)	250(ii)(xi)	250(ii)(xi)	10,000(xiv)(xi)	2
TPH C_{12}-C_{16} (aromatic)	mg/kg	140(i)(xi)	1800(ii)(xi)	1800(ii)(xi)	10,000(xiv)(xi)	1

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

Notes 1

NFD = No Fibres Detected

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

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

Notes 2
Excludes matrices where free product is observed.

No viable exposure pathway beneath hardstanding and cover system.

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

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

i. Value derived from LQM Suitable 4 Use Levels (S4ULs) for residential end use with plant uptake.
ii. Value derived from LQM Suitable 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 Suitable 4 Use Levels (S4ULs) for public open space (POS) residential.
iv. Value derived from LQM Suitable 4 Use Levels (S4ULs) for public open space (POS) park – these levels used below 300 mm POS cover system as soils will not be disturbed by any future site users and exposure to these soils will be similar to a park end use.
v. Value derived from LQM Suitable 4 Use Levels (S4ULs) alongside assessment with WM3 to ensure that materials remaining on site do not exceed the WM3 toxicity criteria for hazardous waste.
vi. Value derived from Category 4 Screening Levels (C4SL) for 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 GROUNDWATER / LEACHATE ANALYSIS WITH TIER 2 SCREENING LEVELS

DETERMINAND	UNIT	EQS SCREENING VALUE[1, 2, 3]		DWS [3,4,5]
		AA	MAC	
Arsenic	µg/l	50	–	10
Cadmium	µg/l	0.08-0.25	0.45-1.5	5
Chromium (VI)	µg/l	3.4	–	–
Chromium (III)	µg/l	4.7	–	50
Copper	µg/l	1	–	2000
Total Cyanide	µg/l	1	–	50
Lead	µg/l	1.2	14	10
Mercury	µg/l	–	0.07	1.0
Nickel	µg/l	4	34	20
Selenium	µg/l	–	–	10
Zinc	µg/l	10.9	–	–
pH	6–9			
Naphthalene	µg/l	2	130	10*
Anthracene	µg/l	0.1	0.1	
Benzo[b]fluoranthene	µg/l	0.00017*	0.017	
Benzo[k]fluoranthene	µg/l	0.00017*	0.017	
Benzo(a)pyrene	µg/l	0.00017*	0.27	
Indeno(123-cd)pyrene	µg/l	0.00017*	5*	
Benzo(ghi)pyrene	µg/l	0.00017*	5*	
Fluoranthene	µg/l	0.0063	0.12	
Benzo(ghi)perylene	µg/l	1.7–4	8.2–3	
TPH C5-C6 (benzene)	µg/l	10	50	1
TPH C6-C8 (toluene)	µg/l	74	–	700
TPH C8-C10 (ethyl benzene)	µg/l	20	–	300
TPH C10-C12 (xylene)	µg/l	30	–	500
TPH C12-C16	µg/l	2	130	90[5]
TPH C16-C35	µg/l	50#	50#	90[5]
TPH C5-C6	µg/l	–	–	15000
TPH C6-C8	µg/l	–	–	15000
TPH C8-C10	µg/l	–	–	300
TPH C10-C12	µg/l	–	–	300
TPH C12-C16	µg/l	–	–	300

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

Notes
Solubility <0.01µg/l
AA – Annual Average
MAC- Maximum Admissible Concentration
* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water
** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

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

APPENDIX V
E3P MATERIAL IMPORT CRITERIA



SITE OF IMPORTATION ADDRESS		**E3P** +44 (0) 161 707 9612 info@e3p.co.uk
Client		
Main Contractor		
Earthworks Contractor		
Haulier		
Date of Planned Import		

Overview of Planned Material Import	
Material Source (Site of Origin) and Postcode	
Site Investigation Report	**Report Title and Reference:** **Date:** **Information Supplied By:**
Reason for Generation of Excess Material at Site of Origin	
Chemical Test Results for Stockpile at Site of Origin	**Date:** **Laboratory Certificate Ref:** **Organisation Responsible for Stockpile Sampling:**
Geotechnical Material Classification and Testing	**Delete as Appropriate:** Class 1 / Class 2 / Class 6 / Topsoil
Pictures of Material Stockpile Pending Transportation	**Delete as Appropriate:** Yes / No
Person or Organisation Responsible for Ensuring Quality Control at Site of Origin	
Quantity of Material to Be Imported (m^3)	
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 Hotpots, Removal of Material and Stockpile			Rationale:
Legislatively Compliant Procedure to Deal with Contamination Excavated from Hotspot			Rationale:
Processing and Recycling of Aggregate with Geotechnical and Chemical Validation Testing			Note stockpile location and anticipated volume:
Stockpiling of Subsoil and Certification of Suitability for Reuse			Stockpile location:
Decommission of All Redundant Drainage Infrastructure			
Decommission of All Former Interceptors			
Decommission of All Former Above- and Below-Ground Tanks			
Removal of All Asbestos to a Licensed Facility			
Engineering of Plots for Shallow Spread Foundation in Accordance with E3P Geotechnical Specification			Plot Numbers

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

APPENDIX VII
CONTRACTOR COMPLETION CHECK SHEET



GEOTECHNICAL ENABLING WORKS COMPLETION FORM

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

Activity	Complete			Signature
	Yes	No	N/A	(initial)
Eradication of all invasive plant species				
Removal of all vegetation				
Removal of all root bulbs and root networks				
Stockpiling of topsoil and certification of suitability for reuse				
Stockpiling of subsoil and certification of suitability for reuse				
Stockpile all recycled aggregate with geotechnical and chemical validation testing				
Removal of all relict foundations and infrastructure in their entirety				
Decommission of all redundant drainage infrastructure				
Decommission of all former interceptors				
Decommission of all former above- and below-ground tanks				
Removal of all waste materials to a licensed facility				
Removal of all asbestos to a licensed facility				
Engineering of all plots for shallow spread foundation in accordance with E3P Geotechnical Specification				
Engineering of all plots for VSC in accordance with E3P Geotechnical Specification				
Engineering of all plots for pile foundation in accordance with E3P Geotechnical Specification				
Engineering of all plots for raft foundation in accordance with E3P Geotechnical Specification				
Engineering of highways bulk upfill in accordance with E3P Specification with compliant validation testing				
Engineering of highways subgrade in accordance with E3P Specification with compliant validation testing				
Engineering of highways capping in accordance with E3P Specification with compliant validation testing				
Cut-and-fill the development site to client's required elevation with as-built survey				

POST-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.