



e3p

Validation Report
Land off Don Street, Middleton

Reference: 14-554-R8-1
Date: January 2024



REMEDIATION AND ENABLING WORKS VALIDATION PHASE 2A AND 3

Land off Don Street
Middleton
Greater Manchester
M24 2DB

Prepared for:



Report Ref: 14-554-R8-1
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1. INTRODUCTION

1.1. BACKGROUND

This report details the remediation and enabling works operations that Urban Regen undertook under the part-time supervision of E3P to facilitate the preparation of the low-rise residential development on land off Don Street, Middleton, Manchester, herein referred to as the site.

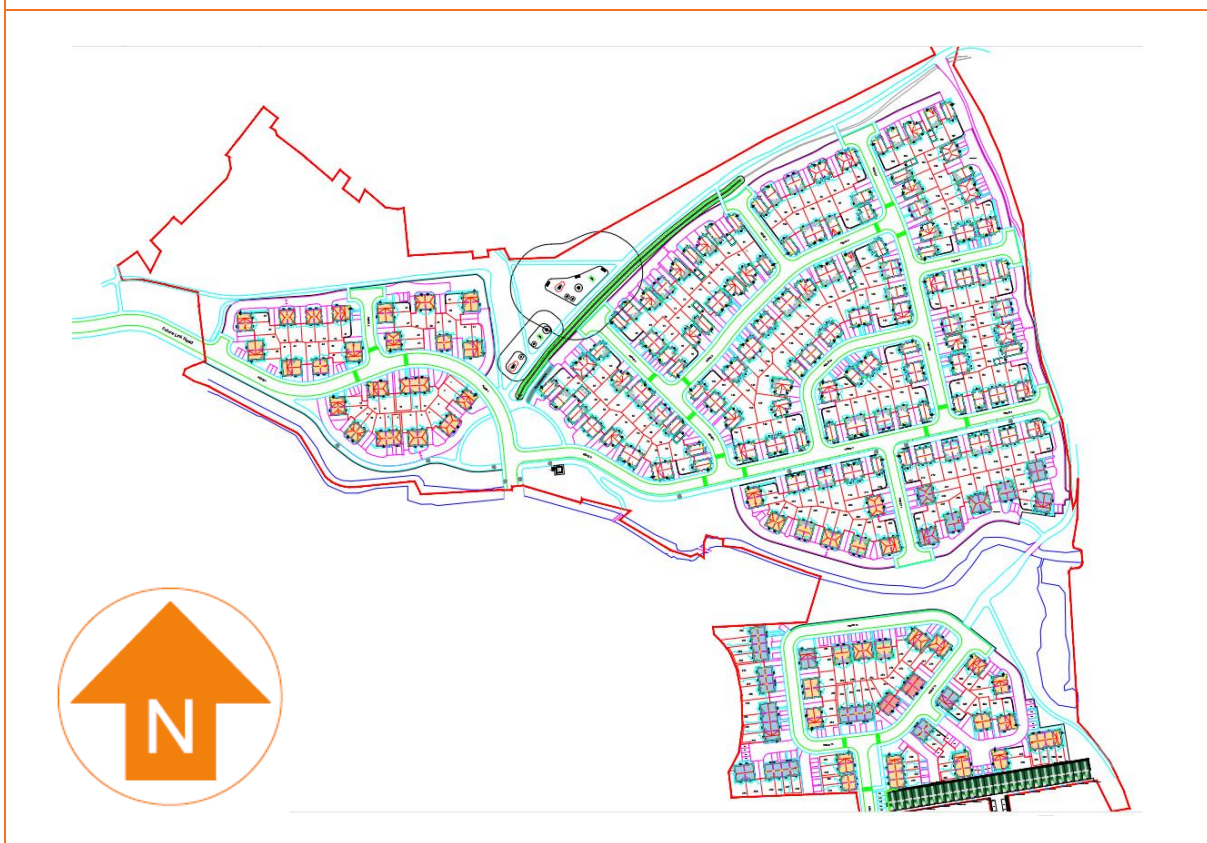
Kellen Homes appointed E3P as an independent Geo-Environmental Consultant for the site remediation, preparation/enabling, and validation works and the subsequent production of a suitably detailed report to ensure the satisfaction of the relevant planning conditions and geotechnical engineering requirements for Building Control, warranty providers and the future adoption of infrastructure by the Highways Authority and statutory service providers.

1.2. PROPOSED DEVELOPMENT

Kellen Homes intends to construct a low-rise residential development with associated gardens, estate roads and infrastructure. Drawing 14-554-002- (Appendix III) identifies the proposed development layout.

E3P has been provided with a draft planning layout (ref: 21/00744/FUL) detailing the proposed construction of 311 detached, semi-detached and terraced houses, with adopted estate roads and drainage infrastructure. A snapshot of the proposed development layout is indicated in Figure 1.1.

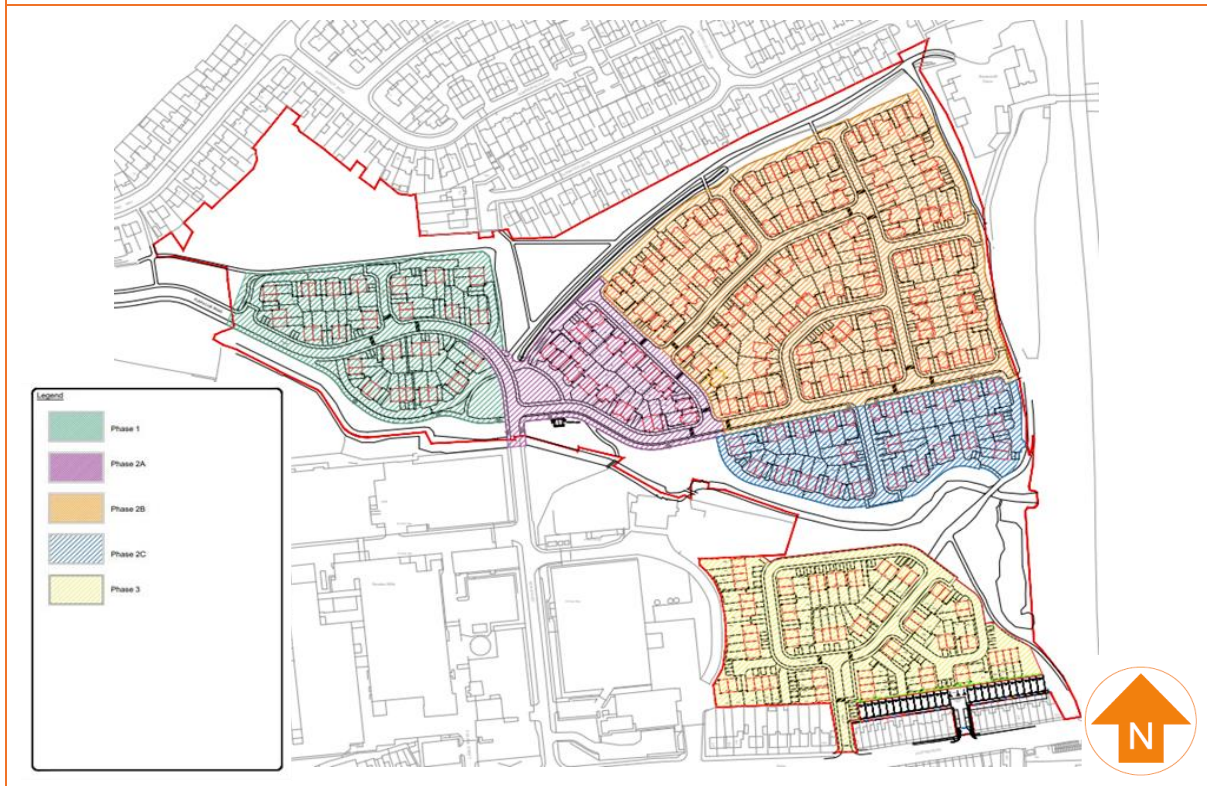
FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



At the time of writing, remediation works are ongoing, however, remediation and enabling works within Phase 1, 2A and 3 of the site have been completed. This report validates the remedial works undertaken within Phase 1, 2A and 3 only. Figure 1.2 shows the extent of the Phases on site.

For clarity, this report does not include validation of works undertaken within Phase 2B or 2C.

FIGURE 1.2 **SNAPSHOT OF PROPOSED DEVELOPMENT**



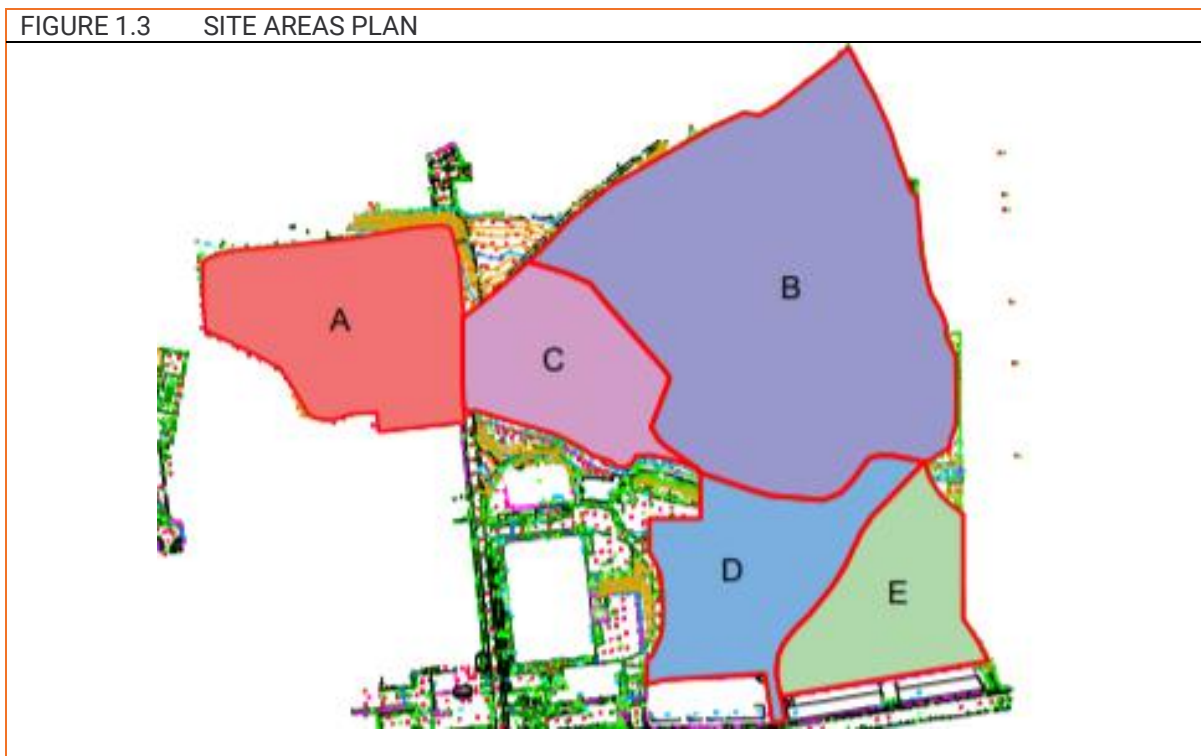
For ease, the site has been divided into the following 5 No. Discrete parcels in line with the previous report completed by Coopers in 2013. The parcels are:

- 📍 **Parcel A** - the former Rex Mill (Phase 1);
- 📍 **Parcel B** - former playing fields;
- 📍 **Parcel C** - apron between Rex Mill and former playing fields (Phase 2A);
- 📍 **Parcel D** - Wagon/trailer park, open ground and Hexpol car park (Phase 3); and
- 📍 **Parcel E** - Wooded area in the southeastern corner of the site (Phase 3).

A plan showing the defined parcels is presented in Figure 1.3.



FIGURE 1.3 SITE AREAS PLAN



1.3. SUMMARY OF PARTIES INVOLVED

Function/interest	Name of Party
Local Planning Authority	Rochdale Borough Council
Developer	Kellen Homes
Geoenvironmental Consultant	E3P
Main Contractor	Kellen Homes
Remediation/Enabling Works Contractor	Urban Regen
Human Health Regulator	Rochdale Borough Council
Controlled Waters and Waste Regulator	Environment Agency
Highways Adoption Authority	Rochdale Borough Council



1.4. PREVIOUS WORKS

The following previous phases of site investigation and assessment have been completed at the subject site:

- ✳ **REFA Consulting Engineers** – Ground Investigation Report. Report Reference: 05122, dated September 2006
- ✳ **Coopers** – Site Investigation Report. Report Reference: 5639si, dated 28th May 2013.
- ✳ **E3P Ltd** – Phase I & II Geoenvironmental Site Assessment Land off Don Street, Middleton Reference:14-554-R1-2 Date: December 2022
- ✳ **E3P Ltd** – Ground Gas Addendum Report Parcel A Don Street, Middleton Reference:14-554-R2-1 Date: December 2021
- ✳ **E3P Ltd** – Ground Gas Addendum Report Parcel D & E Don Street, Middleton Reference:14-554-R3-1 Date: December 2021
- ✳ **E3P Ltd** – Ground Gas Addendum Report Parcel B & C Don Street, Middleton Reference:14-554-R4-1 Date: December 2021
- ✳ **E3P Ltd** - Remediation & Enabling Works Strategy 14-554-R2 Rev 10, dated February 2023

Following the initial draft of the Remediation Strategy, E3P completed additional phases of intrusive investigation of the underlying coal seams. Drill and grout stabilisation of potential underground mine workings was required within Phase 1, 2A and 3; with stabilisation works undertaken by M&J Drilling in January and February 2023, under the supervision of E3P. The following E3P Reports outline the findings of supplementary works, required performance specifications for consolidation of abandoned workings, and mine workings stabilisation completion validation. They should be read in conjunction with this report.

- ✳ **E3P Ltd** – Supplementary Assessment Don Street, Middleton Reference:14-554-L5-2 Date: January 2023
- ✳ **E3P Ltd** – Performance Specification for Consolidation Of Abandoned Mine Workings, Reference: 14-554-R6-2, Date
- ✳ **E3P Ltd** – Mine Specification Completion Report Reference:14-554-R5-2 Date: June 2023

Following the completion of drill and grout works on site phased ground gas monitoring was undertaken in agreed locations with the EHO across Phase 1 (Parcel A). Phase 2A (Parcel C) and Phase 3 (Parcels D & E).

- ✳ **E3P Ltd** – Ground Gas Addendum Report (Post-Grouting), Parcel A, Don Street, Middleton Reference: 14-554-R5-1, Date October 2023
- ✳ **E3P Ltd** – Ground Gas Addendum Report (Post-Grouting), Parcel C, D & E, Don Street, Middleton Reference: 14-554-R4-1, Date May 2023 (PHASE 2A & 3)

The above documents should be read in conjunction with this Validation Report.



2. SUMMARY OF REMEDIATION AND ENABLING WORKS OBJECTIVES

The proposed remediation activities were detailed within the E3P Remediation and Enabling Works Strategy (14-554-R2 Rev 10; dated February 2023) and supplementary supporting documents provided by E3P.

This report has been prepared to document the completion of all necessary land remediation and enabling works and to record the presence of any variation in ground conditions or previously unidentified sources of potential contamination, environmental impact or potential nuisance to the wider environ.

The Remediation and Enabling Works elements are summarised below:

- ✿ RE-1 – Pre-commencement Supplementary Site Investigation
- ✿ RE-2 – Pre-commencement Regulatory Compliance
- ✿ RE-3 – Decommission of Historical Abstraction Wells
- ✿ RE-4 – Temporary De-watering from Excavations to Combined Sewer
- ✿ RE-5 – Assessment of On-site Bunds
- ✿ RE-6 – Environment and Nuisance Control
- ✿ RE-7 – Minimise Risk to Infrastructure and River Irk
- ✿ RE-8 – Identification, Isolation and Treatment of Invasive Plants
- ✿ RE-9 – Site Clearance Operations
- ✿ RE-10 – River Corridor Watching Brief
- ✿ RE-11 – Delineation of WS17
- ✿ RE-12 – Recovery of Topsoil within Parcel B
- ✿ RE-13 – Delineation, Excavation and Treatment of Identified Asbestos Impact
- ✿ RE-14 – Delineation, Excavation, Treatment and Disposal of Potential Volatile Contaminants
- ✿ RE-15 – Speciation of Mercury
- ✿ RE-16 – Excavation, Breaking and Processing of All Above- and Below-Ground Structures
- ✿ RE-17 – Investigation of Potentially Impacted Soils
- ✿ RE-18 – Delineation, Excavation and Treatment of Infilled Historical Ponds and Streams
- ✿ RE-19 – Delineation, Excavation and Treatment of Former Historic Landfill Materials
- ✿ RE-20 – Removal of Deleterious Material
- ✿ RE-21 – Cut-And-Filling of MADE GROUND to Development Levels
- ✿ RE-22 – Placement and Compaction of Upfill Material to Facilitate Ground Improvement by VSC
- ✿ RE-23 – Construction of Temporary Working Platform
- ✿ RE-24 – Replacement of Materials, Geotechnical Engineering Requirements
- ✿ RE-25 – Preparation of Ground for Vibro-Stone Columns Within Tree Influence
- ✿ RE-26 – Importation of Bulk Fill
- ✿ RE-27 – Post Remediation Gas Monitoring Parcel A



- ✿ RE-28 – Preparation of Garden for Cover System
- ✿ RE-29 – Provision of Subsoil
- ✿ RE-30 – Provision of Topsoil
- ✿ RE-31 – Independent Validation: Watching Brief
- ✿ RE-32 – Waste Soils Surplus to Requirements
- ✿ RE-33 – Validation of Materials for Potable Water Supply Infrastructure
- ✿ RE-34 – Production of Drill and Grout Specification
- ✿ RE-35 – Landfill Treatment
- ✿ RE-36 – Remedial Verification Report

3. SECOND PHASE MITIGATION AND MANAGEMENT – BUILD PHASE

A second post-demolition phase of works will be required to ensure the proposed development is constructed in a manner that incorporates the required mitigation measures to ensure the development is compliant with UK Building Regulations and the Local Authority Planning requirements.

These obligations are specified in more detail within Section 5 and will be validated under a separate cover.



4. DETAILED REMEDIATION AND ENABLING WORKS ACTIVITIES

The focus of the remediation and enabling works is to address the contaminant issues previously identified within the site investigations that presented an unacceptable risk to human health following the redevelopment of the site.

For completeness, each of these activities has been discussed below within the context of the actual remediation works that were undertaken on site. This report will only discuss the remediation works pertaining to Parcel A, C, D and E, (Phase 1, 2A and 3) outlined in section 1.2.

The Remediation and Site Enabling works commenced on the 26th October 2022 and were completed in Phase 1, 2A and 3 by the 21st November 2023.

Remediation and site enabling works are ongoing within Phase 2B and 2C, and an updated validation report will be issued upon completion of work in these areas.

RE-1 – PRE-COMMENCEMENT SUPPLEMENTARY SITE INVESTIGATION

DATE OF WORKS UNDERTAKEN

Area 1-4 (Figure 4.1): February 2022 to May 2022
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Area 5 (Figure 4.1): February 2023

PHOTOGRAPHS

Plate 1 - 5

SUPPORTING DOCUMENT

E3P Letter Report: 14-554-L1-2, Supplementary Site Assessment Letter, June 2022

CHEMICAL TESTING

Area 1-4 (Figure 4.1): i2 Analytical Report: 22-39659 and 22-57918
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Area 5 (Figure 4.1): i2 Analytical Report: 23-21617

GEOTECHNICAL TESTING

Area 1-4 (Figure 4.1): PSL Report: PSL22/1231

Area 5 (Figure 4.1): PSL Report: PSL23/1434

OVERVIEW OF WORKS

Background

The original E3P, Coopers and REFA site investigations were limited due to the presence of buildings, allotments and densely vegetated areas. Five areas were identified requiring further investigation to determine ground conditions and geotechnical constraints and to undertake further chemical analysis.
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The locations of areas that required further investigation are shown in Figure 4.1 (overleaf) and have been numbered Area 1 to Area 5.
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Works Undertaken

Areas 1-4

Within Areas 1-4, as shown on Figure 4.1 overleaf, multiple phases of supplementary trial pitting were undertaken on the 8 th and 9 th of February 2022, 8 th of March 2022 and 10 th May 2022 to record ground conditions and obtain geotechnical and geochemical samples. Additional investigation of potential peat deposits in Area 3 (Phase 2A) were undertaken within these phases of supplementary trial pitting.
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The further investigation did not identify any true peat deposits, only very soft to soft clays with a shear strength value (Cu) of less than 30 kN/m², the material is not suitable for vibro stone columns and requires removal with granular replacement during remedial works in this area.

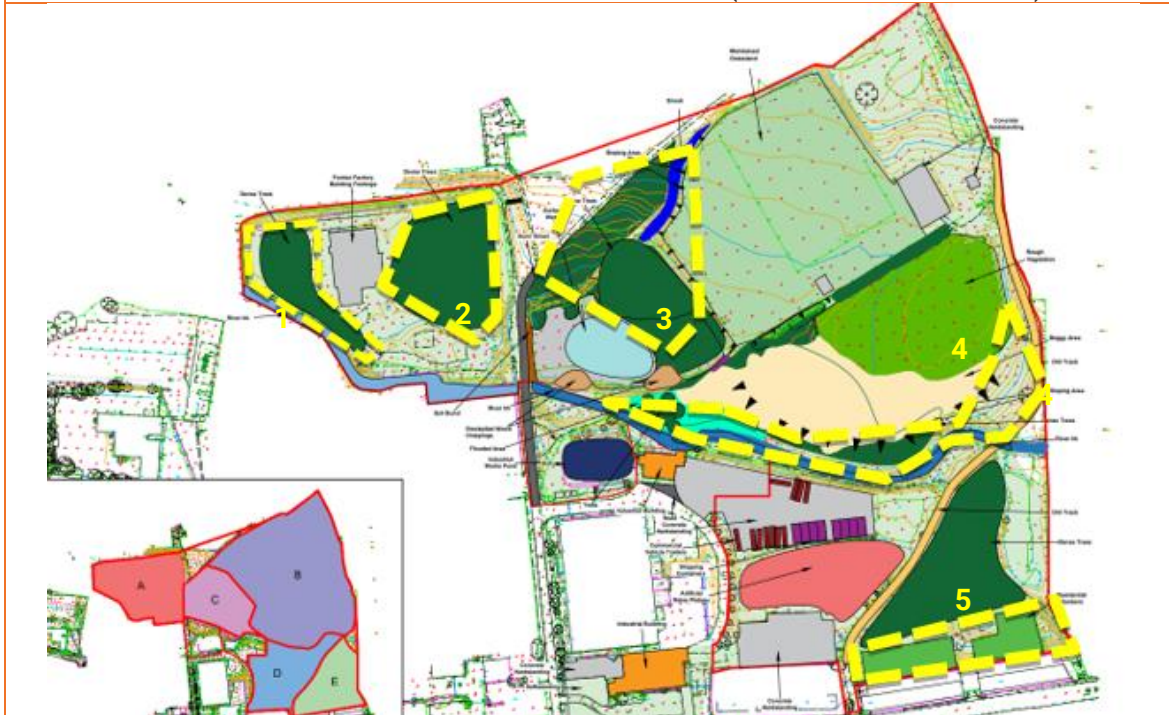
The findings of these investigations, inclusive of exploratory hole logs and chemical/geotechnical results, are presented in E3P letter report 14-554-L1-2, Supplementary Site Assessment Letter, June 2022. The E3P Remediation Strategy (report ref: 14-554-R2, dated February 2023) was updated in October 2022 (Rev5) in line with findings of the supplementary site investigations.

Granular replacement of soft organic clays in Area 3 (Phase 2A) was completed in January and February 2023.

Area 5

Urban Regen demolished and removed the former allotment sheds in December 2022. Following removal of the structures in this area E3P undertook a series of window samples on 16th of February 2023 to record ground conditions and obtain in-situ geotechnical data of the underlying soils to aid in foundation design. Window samples (WS901 to WS909) recorded Made Ground of soft to firm gravelly sandy clay to depths between 0.20 m and 2.30 m bgl overlying loose to medium dense medium SAND deposits. Subsequent trial pitting was undertaken on the 6th of March 2023 within this area to obtain chemical and geotechnical lab samples, in total six soil samples were sent for chemical analysis. Chemical analysis (i2 Report: 23-21617) identified minor exceedances of non-volatile PAHs benzo(b)fluoranthene and benzo(a)pyrene within shallow Made Ground deposits between 0.25 m and 0.30 metres below ground level (m bgl) within Allotment 101 and Allotment 103 samples. Non-volatile PAHs have primary exposure pathways related to dermal contact and ingestion of soils, the soils are to be used as upfill and therefore the presence of hardstanding and cover systems will ensure no viable pathway is present, as such, no future risk to human health is present.

FIGURE 4.1 – AREAS REQUIRING FURTHER INVESTIGATION (YELLOW DASHED AREAS)



Further Works

None.



RE-2 – PRE-COMMENCEMENT REGULATORY COMPLIANCE

DATE OF WORKS UNDERTAKEN

Prior to Commencement

OVERVIEW OF WORKS

The site was granted planning permission, with conditions, for residential development of up to 311 dwellings; with associated infrastructure, landscaping and access under application number 21/00744/FUL, with a decision issued on 13th September 2022.

Prior to the commencement of any works on site, E3P and Kellen Homes had extensive correspondence and consultation with the Environment Agency (EA) and Local Planning Authority (LPA). Full written approval of the E3P Remediation Strategy (Ref: 14-554-R2-Rev10, Dated February 2023) was obtained from the LPA and EA.

As 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 was obtained and kept up to date throughout the works (E3P document Ref: 14-554-R3, March 2023).

RE-3 – DECOMMISSION OF HISTORICAL ABSTRACTION WELLS

DATE OF WORKS UNDERTAKEN

N/A

OVERVIEW OF WORKS

No historical abstraction wells have been identified during the duration of the works. Therefore, no further action was taken.

RE-4 – TEMPORARY DE-WATERING FROM EXCAVATIONS TO COMBINED SEWER

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plates 6 - 7

SUPPORTING DOCUMENT

Urban Regen Dewatering Plan V1.2, Reference No: 367/004, dated January 2022

OVERVIEW OF WORKS

Background

Temporary dewatering will be required on the site from excavations.

Works Undertaken

Urban Regen provided a dewatering plan for the operations on site. The management of temporary discharge of surface water was managed in accordance with the Urban Regen Dewatering Plan (Reference No: 367/004, dated January 2022), which permitted a discharge rate for discharge to the Sewer at 25m³ / Day at a maximum rate of 50 litres per second (this is lower than the discharge rate provided for the planned development in the Flood Risk Assessment of 81.5 litres per second)



Don Street, Middleton

Remediation and Enabling Works Validation

January 2024

In line with the dewatering plan, silt busters were present on site throughout the works for use in excavations below the water table. Additionally, silt fencing was erected along the boundary of the River Irk during active works and routinely inspected and replaced as necessary.

Further Works

None.

RE-5 – ASSESSMENT OF ON-SITE BUNDS

DATE OF WORKS UNDERTAKEN

20th January 2023 – 9th February 2023

CHEMICAL TESTING

I2 Analytical Reports- 23-13977-1 and 23-17093-1

OVERVIEW OF WORKS

Background

Prior to works on-site bunds of unknown material were present along Don Street which were moved to allow access to the site.

Works Undertaken

On the 20th of January 2023 6 samples were taken of stockpiled banded material. Three soil samples were taken to the east of Don Street within Phase 2A (Bunds 101-103) and three soil samples were taken to the west within Phase 1 (Bunds 104-106). Samples were sent to i2 Analytical, an accredited UKAS laboratory, for analysis.

Results of the chemical analysis identified minor exceedances of human health targets of non-volatile PAHs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenz(a,h)anthracene with a single exceedance of arsenic within Bund 102. Non-volatile PAHs and arsenic have primary exposure pathways related to dermal contact and ingestion of soils, for sustainability the soils are to be used as upfill and therefore the presence of hardstanding and cover systems will ensure no viable pathway is present, as such, no future risk to human health is present.

To determine the risk to controlled waters a return visit was conducted on the 9th of February 2023 to collect a leachate sample of the bund material (I2 report 23-17093), leachate analysis confirmed no exceedance of Environmental Quality Standards for arsenic or PAHs, and therefore is not deemed a risk to controlled waters.

Given the above, the banded material was used in the filling operations across the site.

Further Works

None.

RE-6 – ENVIRONMENT AND NUISANCE CONTROL

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 6-8



OVERVIEW OF WORKS

Background

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

Overview of Works

All works were completed in a manner as not to create any structural risk to the adjacent highways. During remediation, works were restricted to between 8.00am and 5.30pm.

A road sweeper was present part-time to keep the access and Don Street clean and clear of debris during the importation of materials to the site.

Heras fencing was erected around the site boundary with appropriate health and safety signage. Throughout the works scrap metal, timber/wood and waste streams were segregated and placed into allotted skips for removal off-site.

Further Works

On-going security, signage, waste segregation and use of road sweeper during remedial works in Parcels 2B and 2C.

RE-7 – MINIMISE RISK TO INFRASTRUCTURE AND RIVER IRK

DATE OF WORKS UNDERTAKEN

Throughout

SUPPORTING DOCUMENT

E3P Letter Report: 14-554-L5-2, Supplementary Assessment, January 2023

PHOTOGRAPHS

Plate 7

CHEMICAL TESTING

I2 Analytical Reports- 22-13819, 22-94224, 22-96550, 22-97417, 23-10325, 23-17113, 23-23922, 23-28809, 23-31387, 23-33820, 23-36456, 23-38629, 23-41138, 23-44133, 23-47847 and 23-50844

OVERVIEW OF WORKS

Background

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

Works Undertaken

Following consultation with the Environmental Agency in 2022, additional rounds of surface and ground water monitoring were undertaken by E3P in June 2022 and October 2022 to fully determine the risk to controlled waters. This included the installation of new monitoring wells in the previous REFA monitoring locations to obtain representative groundwater samples within the former Rex Mill area of site. The findings of this report are presented under a separate cover (E3P Letter Report: 14-554-L5-2, Supplementary Assessment, January 2023) that should be read in conjunction with this validation report.

Throughout the works monthly water sampling was undertaken at locations agreed with the Environmental Agency prior to works commencing, sample locations are given in Figure 4.2. During remedial works immediately adjacent to the river corridor and within the historic landfill area, biweekly surface water sampling was undertaken at the aforementioned locations.



Sample locations as follows:

- Point 1 – Downstream River Irk
- Point 2 – Mid site, River Irk after Hexpol Works
- Point 3 – Mid site, River Irk after "Landfill area"
- Point 4 – Upstream River Irk
- Point 5 – Pound (East of Phase 3)

Samples were scheduled for a full suite of analysis, including heavy metals, suspended solids, PAH and TPH.

In March 2023 no safe access was available to the pond due to overgrowth of vegetation, as such, no water samples were collected for the pond in May 2023. A path through the vegetation was cut in June 2023 and pond samples were obtained; however, bolted fencing and overgrown vegetation was in place from July 2023, as such, no surface water sampling within the pond (Point 5) was undertaken from this time onward.

Water samples taken from the River Irk and eastern pond recorded minor heavy metal (zinc, copper, cyanide, nickel and lead) exceedances in comparison to Environmental Quality Standards (EQS). A summary of EQS exceedances is given in Appendix VII.

Cyanide EQS exceedances were generally recorded within all sampling locations across the majority of monitoring visits, with no obvious increase between upstream and downstream values recorded, indicating this was natural in the watercourse or the source was located upstream.

For exceedances of copper, nickel and zinc, a metal bioavailability assessment (M-BAT) was undertaken and updated following each monitoring visit, a copy of the M-BAT is presented in Appendix VII. The M-BAT assessment has shown that copper, nickel and zinc are not considered bioavailable in the adjacent pond or River Irk, due to the risk characteristic ratio (RCR) values being below 1, for the majority of visits and locations. However, RCR values above 1 were recorded for locations highlighted yellow in Appendix VII, indicating that heavy metals were potentially bioavailable and therefore a potential risk to aquatic life. With regard to RCR values above 1, bioavailable zinc exceedances noted on 14th April 2023 relate to the monitoring location immediately after the Hexpol works outflow and is deemed to be related to the works outflow rather than ongoing site works given the lack of bioavailable exceedances across the wider site. Copper and nickel exceedances on May 25th 2023 are noted at all sampling locations, with no obvious increase between upstream and downstream values recorded, indicating this was natural in the watercourse or the source was located upstream. Copper exceedances on 7th July were noted after the Hexpol works outflow and downstream of this, indicating the works outflow is the likely source.

Sampling shows that the site works have not had a detrimental impact on the adjacent watercourse.

Further Works

Water sampling of the River Irk to continue until remediation and enabling works are completed across the site.

RE-8 – IDENTIFICATION, ISOLATION AND TREATMENT OF INVASIVE PLANTS

DATE OF WORKS UNDERTAKEN

Throughout

SUPPORTING DOCUMENT

Knotweed Eradication Report: IWMP2255A, dated October 2023



CHEMICAL TESTING

I2 Analytical Report 23-28847

OVERVIEW OF WORKS

Background

Invasive plant species have historically been identified along the River Irk. The remediation contractor must satisfy themselves with respect to the extent of all species deemed invasive prior to the commencement of works on site.

Works Undertaken

Urban Regen contractor employed Knotweed Eradication, a qualified invasive species expert, to investigate the presence of invasive plant species on or adjacent to the site. Knotweed Eradication undertook a site inspection in November 2021 and identified four areas of Japanese knotweed impact within the site boundary. Japanese Knotweed-contaminated material was demarked and signed to avoid any cross-contamination prior to the material being removed from site to a licensed landfill. The location of knotweed stands is shown on Figure 4.3, overleaf, presented in Knotweed Eradication Report Ref: IWMP2255A, dated October 2023.

Japanese Knotweed impacted materials were excavated under the supervision of Knotweed Eradication in April and May 2023. Material excavated in April 2023 was placed in a temporary stockpile area on visqueen sheeting, tested by E3P, and subsequently removed from site. Impacted material excavated in May 2023 was placed directly into wagons and removed from site. A validation report was prepared by Knotweed Eradication (IWMP2255A, dated October 2023) that is available upon request to Kellen Homes or Urban Regen.

FIGURE 4.3 – JAPANESE KNOTWEED LOCATIONS



Additionally, Himalayan balsam was identified along the river bank of the River Irk, where identified Urban Regen employed invasive species specialist to undertake a pick and removal from the bank. Further information of invasive species removal and Duty of Care notes are available upon request to Urban Regen.

Further Works

None.

RE-9 – SITE CLEARANCE OPERATIONS

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 9-12

OVERVIEW OF WORKS

Background

General site clearance and provision of welfare, offices and site security are to be determined as per the contract requirements.

Works Undertaken

Provision of welfare, offices and site security by Urban Regen and Kellen Homes throughout the works.

No buildings were present on site prior to works commencing.

Within Phase 1 and Phase 3 concrete slabs and asphalt hardstanding were present and required removal. E3P observed the hardstanding being broken out and inspected soils beneath the slabs. No visual or olfactory evidence was identified directly underlying the historic slabs in Phase 1 or Phase 3. The hardcore arisings from historic slab removal were crushed and screened on site for re-use within the development upfill and temporary works mats.

Within Phase 3 allotment gardens and associated sheds were present within the south eastern corner, which were demolished and removed by Urban Regen in December 2022.

Within Phase 1 and 2A trees were removed by a specialist contractor, shredded and subsequently removed off-site with the bulk of the tree removal works undertaken in October 2022 and continuing throughout as required.

Across the wider site areas of dense vegetation were present. Where previous self-seeded vegetation was present the material was excavated to the base of shallow root beds, stockpiled separately as per the MMP and subsequently removed from the site.

Natural topsoil from Phase 2B was stripped and stockpiled on site as per the MMP for re-use within the proposed development.

Throughout the enabling works, scrap metal, vegetation and other waste streams were separated from demolition materials and placed into allocated skips for subsequent disposal off-site.

Further Works

None.



RE-10 – RIVER CORRIDOR WATCHING BRIEF

DATE OF WORKS UNDERTAKEN

July 2023 – December 2023

OVERVIEW OF WORKS

Background

A watching brief was required to determine if any action was taken within the river corridor between the Landfill in Parcel B (Phase 2C) and the River Irk. If visual or olfactory evidence of contamination is identified this will require assessment, delineation and validation.

Works Undertaken

E3P undertook a watching brief during enabling works within the landfill area (Phase 2C) immediately adjacent to the river corridor. No visual or olfactory contamination was identified along this boundary, therefore further investigation was not required.

Furthermore, a tree protection order (TPO) was in place on the trees which lined the boundary of the landfill and the river corridor. Therefore, this order prevented excavations to take place within the river corridor and the area remains undisturbed.

Further Works

None

RE-11 – DELINEATION OF WS17

DATE OF WORKS UNDERTAKEN

November 2022

PHOTOGRAPHS

Plate 13

CHEMICAL TESTING

I2 Analytical Report 22-95809-1

OVERVIEW OF WORKS

Background

Elevated concentrations of TPH have been identified within Coopers Borehole WS17, which is located just outside the site boundary of Parcel D (Phase 3).

Works Undertaken

E3P attended site on the 3rd of November 2022, as per the remediation strategy a trench was excavated along the western boundary of Parcel D (Phase 3) within close proximity of WS17. The trench was advanced to a depth of 1.50 m bgl. A perched groundwater strike was noted at the base of the trench, however, not enough water was present to obtain a sample. As such, soil samples were taken from the side and base of the excavation with the arisings stockpiled on Visqueen awaiting results.

Soil samples did not identify elevated TPH values above the level 3 remedial target concentrations for the general made ground with respect to controlled waters for Parcel A, C, D & E (Phase 1, 2A, 2B and 3) as per Appendix IV of the E3P Remediation Strategy (Ref 14-554-R2 Rev 10, dated February 2023). Additionally, no visual or olfactory evidence or point source was noted, given that WS17 is located off site, and no TPH impact was recorded within the site boundary, no further remedial works are required.



Further Works
None.

RE-12 – RECOVERY OF TOPSOIL WITHIN PARCEL B

DATE OF WORKS UNDERTAKEN

19th of December 2022

PHOTOGRAPHS

Plate 14-15

CHEMICAL TESTING

I2 Analytical Report - 22-14259-1

OVERVIEW OF WORKS

Background

Previous investigations identified the topsoil from the northern third of Parcel B (Phase 2B) may be suitable for re-use in garden cover system.

Works Undertaken

Urban Regen undertook a topsoil strip in Parcel B (Phase 2B) in November 2022, Urban Regen stockpiled natural site won topsoil's from within Parcel B (Phase 2B) in line with the MMP.

E3P attended site on the 19th of December 2022 and obtained 10 topsoil samples from the stockpiled topsoil. In line with the specified frequencies within the remediation strategy this covers 500m³ of topsoil (1 sample per 50m³).

Chemical analysis did not identify any exceedances when compared to human health remediation target for use within 600m cover system and are therefore soils are suitable for use in private gardens.

Further Works

Ongoing sampling (1 per 50m³).

RE-13 – DELINEATION, EXCAVATION AND TREATMENT OF IDENTIFIED ASBESTOS IMPACT

DATE OF WORKS UNDERTAKEN

8th of November 2022 – 13th of March

PHOTOGRAPHS

Plate 16-18

CHEMICAL TESTING

I2 Analytical Report - 22-95879-1 (WS402) *Arisings and N/E/S/W/BASE*

I2 Analytical Report - 23-11122-3 (WS402) *South A and B*

I2 Analytical Report - 22-98397-1 (TP48) *Arisings and N/E/S/W/BASE*

I2 Analytical Report - 22-97516-1 (TP305 And TP516) *Arisings and N/E/S/W/BASE*

I2 Analytical Report - 23-22839-1 (WS203) *Arisings and N/E/S/W/BASE*



OVERVIEW OF WORKS

Background

Locations requiring hotspot delineation due to quantification being above limit of detection ($>0.001\%$) are:

- ✳ WS402 1.20 m bgl (0.001%) - Parcel A
- ✳ TP516 at 0.80m bgl (0.001 %) – Parcel A
- ✳ TP305 at 0.50 m bgl (0.002%) - Parcel B & C
- ✳ WS203 at 1.50 m bgl (0.002%) - Parcel D & E

Further investigation and quantification are required where asbestos was identified at Coopers TP48 in Parcel D & E.

Works Undertaken

Phase 1 (Parcel A)

On the 8th of November 2022 an area of approximately 5.0 m by 5.0m was excavated in the vicinity of WS402. Samples of the sides, base and arisings of the excavation were obtained for further analysis. Results of the chemical analysis did not identify asbestos fibres within the north, east, base arisings of the excavation (I2 Analytical report- 22-95879-1). Asbestos fibres of chrysotile and amosite were identified with the southern wall with a quantification of 0.127%. Within the western wall amosite was detected, quantification identified that $<0.001\%$ of contained asbestos. The pit was surveyed in and backfilled with the asbestos free made ground arisings. E3P returned to site on 6th January 2023 and excavated a further circa 5.00m south of the previous excavation, inclusive of the area comprising the previous southern pit wall. Additional samples were obtained from the southern wall of the extended excavation with one sample positive for chrysotile and amosite and crocidolite loose fibres, quantified $<0.001\%$ (I2 Analytical report- 23-11122-3). Arisings of the extended excavation were removed from site. Where soils recorded asbestos values $<0.1\%$ these were used as upfill below 1.00 m in phase one in line with the asbestos conceptual site model.

On the 16th of November 2022 an area of approximately 5.0 m by 5.0 m in the vicinity of TP516 underwent excavation and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis identified asbestos fibres of chrysotile and amosite within the northern and southern wall of the excavation with quantification identifying that $<0.001\%$ of these samples contained asbestos (I2 Analytical report- 22-97516). This material was used as made ground upfill within Phase 1, with soils placed at least one metre below ground level in order to remove the risk to future end users in line with the asbestos conceptual site model.

Phase 2 (Parcels B & C)

On the 16th of November 2022 an area of approximately 5.0 m by 5.0 m in the vicinity of TP305 underwent excavation and further analysis with samples of sides, base and arisings of the excavation taken. Results of the chemical analysis identified asbestos fibres of chrysotile and amosite within the north (0.001%), west ($<0.001\%$), south ($<0.001\%$) and arisings (0.002%) of the excavation (I2 Analytical report- 22-97516). Given all soils contained $<0.1\%$ asbestos, this material was used as made ground upfill within Phase 2, with soils placed at least one metre below ground level in order to remove the risk to future end users in line with the asbestos conceptual site model.

Phase 3 (Parcels D & E)

On the 21st of November 2022 an area of approximately 5.0 m by 5.0 m in the vicinity of TP48 underwent excavation and further analysis with samples of sides, base and arisings of the excavation



taken. Results of the chemical analysis identified asbestos fibres of chrysotile and amosite within the eastern wall of the excavation, quantification identified that <0.001% of these sample contained asbestos. As such, this material was used as made ground upfill within Phase 3, with soils placed at least one metre below ground level in order to remove the risk to future end users in line with the asbestos conceptual site model.

On the 13th of March 2023 an area of approximately 5.0 m by 5.0 m in the vicinity of WS203 underwent excavation and further analysis with samples of sides, base and arisings of the excavation taken. Results of the chemical analysis identified asbestos fibres of chrysotile and amosite within the northern and southern walls of the excavation. Quantification identified that <0.001% of the southern wall and 0.002% of the northern wall contained chrysotile asbestos. Given all soils contained <0.1% asbestos, this material was used as made ground upfill within Phase 3, with soils placed at least one metre below ground level in order to remove the risk to future end users in line with the asbestos conceptual site model.

Further Works

None.

RE-14 – DELINEATION, EXCAVATION, TREATMENT AND DISPOSAL OF POTENTIAL VOLATILE CONTAMINANTS**DATE OF WORKS UNDERTAKEN**

November 2022 – March 2023

PHOTOGRAPHS

Plate 19-25

CHEMICAL TESTING

I2 Analytical Report- 23-22451-1 (TP204 and BH2)
I2 Analytical Report- 23-26216-1 (TP1)
I2 Analytical Report- 22-14305-1 (TP5, TP6, BH4 and BH1)
I2 Analytical Report- 22-97516-1 (TP11 and TP41)
I2 Analytical Report- 22-97517-2 (BH1 BH3)
I2 Analytical Report- 23-28075-1 (TP351)
I2 Analytical Report- 22-95884-1 (TP409, WS5)
I2 Analytical Report- 22-11549-2 (TP409 Delineation and WS5 Delineation)

OVERVIEW OF WORKS**Background**

E3P has identified elevated levels of naphthalene, and low-end TPH above human health targets for residential end retention within plots and/or within gardens and landscaped areas. Such contaminants present a potential volatilisation to indoor air risk. These elevated concentrations have only been identified within isolated areas of the site and are therefore potentially localised hotspots as outlined below:

Elevated naphthalene has been identified within:

- 📍 TP409 at 2.20 m bgl (14 mg/kg) - Parcel D & E
- 📍 Coopers TP11 at 0.15 m bgl (3.2 mg/kg) – Parcel B & C
- 📍 Coopers WS5 at 1.30 -1.90 m bgl (2.8 mg/kg) – Parcel D & E



- ✿ TP204 at 0.80 m bgl (5 mg/kg) - Parcel A
- ✿ Coopers TP1 at 0.50 m bgl (4.8 mg/kg) - Parcel A
- ✿ REFA TP5 at 0.50 m bgl (3.1 mg/kg) – Parcel A
- ✿ REFA TP6 at 0.30 m bgl (5.0 mg/kg) – Parcel A
- ✿ REFA BH1 at 0.50-1.00 m bgl (10 mg/kg) – Parcel A
- ✿ REFA BH2 at 0.50-1.00 m bgl (3.1 – 8.5 mg/kg) – Parcel A
- ✿ REFA BH3 at 0.50-1.00 m bgl (4.1 – 6.1 mg/kg) – Parcel A
- ✿ REFA BH4 at 0.50-1.00 m bgl (3.4 – 4.9 mg/kg) – Parcel A

Elevated volatile TPHs have been identified within:

- ✿ TP204 at 0.80 m bgl (9100 mg/kg) - Parcel A

Works Undertaken

Phase 1 (Parcel A)

On the 15th of November 2022 an area of approximately 5.0 m by 5.0 m in the vicinity of BH1 and BH3 underwent hotspot removal and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis did not identify any exceedances of naphthalene within the sides or base of the excavation. Therefore, no further action was required.

On the 7th of March 2023 an area of approximately 5.0 m by 5.0 m in the vicinity of TP1 underwent a hotspot removal and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis did not identify any exceedances of naphthalene within the sides or base of the excavation. Therefore, no further action was required.

On the 9th of March 2023 an area of approximately 8.0 m by 8.0 m in the vicinity of TP204 and BH2 underwent a hotspot removal and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis did not identify any exceedances of naphthalene or TPHs within the sides or base of the excavation. Therefore, no further action was required.

On the 19th of December 2022 an area of approximately 5.0 m by 5.0 m in the vicinity of BH4, TP5 and TP6 underwent separate hotspot removals and further analysis with samples of the sides, base and arisings of all excavations taken. Results of the chemical analysis identified exceedances of naphthalene within the northern wall of BH4 (3.5mg/kg) and the southern wall of TP5 (4.8mg/kg). However, due to the soil organic matter (SOM) content being recorded above 2.5% (3.78%) the chemical results were compared to modified naphthalene screening values for 2.5% SOM (5.6mg/kg). Results of the chemical analysis did not identify any exceedances of naphthalene within the sides or base of the excavation at TP6. Using the modified naphthalene value, no exceedance of human health screening criteria were recorded and no further works were required.

All excavations arisings from volatile hotspots within Phase 1 (Parcel A) were stockpiled and removed from site by Urban Regen. E3P undertook a watching brief and PID sampling during the turnover of Made Ground Soils in Phase 1 (Parcel A). No visual or olfactory evidence of contamination was noted during the turnover of soils, no point source was identified. Additionally, no PID readings were noted > 50 ppm, as such, soils outside of hotspot areas were used within the upfill of the development platform in Phase 1.



Phase 2A (Parcel C)

On the 16th of November 2022 an area of approximately 5.0 m by 5.0m in the vicinity of TP11 underwent a hotspot removal and further analysis with samples of the sides, base and arisings taken. Results of the chemical analysis showed the SOM to be above 2.5% (5.5%) and therefore the modified screening value of 5.6 mg/kg naphthalene was utilised during assessment. No exceedances of the human health screening target were recorded and therefore no further action was required.

E3P undertook a watching brief and PID sampling during turnover of Made Ground soils in Phase 2A (parcel C) in the vicinity of TP522, TP523, TP609 and TP611 where odours had been noted. No visual or olfactory evidence of contamination was noted during the turnover of soils, no point source was identified. Additionally, no PID readings were noted > 50 ppm, as such, soils outside of hotspot areas were used within the upfill of the development platform in Phase 2A.

All excavations arisings from volatile hotspots within Phase 2A (Parcel C) were stockpiled and removed from site by Urban Regen.

Phase 3 (Parcel D and E)

On the 8th of November 2022 an area of approximately 5.0 m by 5.0m in the vicinity of WS5 and TP409 underwent a hotspot removal(s) with samples of the sides, base and arisings of both exactions taken. Results of the chemical analysis identified exceedances of naphthalene within all sides and base of the excavation with WS5 and within the northern, eastern, western, arisings and base of TP409. However, due to the soil organic matter (SOM) value above 2.5% which allowed the modified naphthalene of screening value of 5.6mg/kg. Using the modified naphthalene value further delineation was required to the base and southern wall of WS5. This was undertaken on the 19th of December 2022, results from the chemical analysis did not identify any exceedances, therefore no further delineation was required and the arisings were removed off site. Using the modified naphthalene value further delineation was required to the northern wall of TP409. This was undertaken on the 1st of December 2022, results from the chemical analysis did not identify any exceedances, therefore no further delineation was required, and the arisings were removed off site.

During supplementary works exceedances of naphthalene were noted within TP351 in Parcel E. On the 11th April 2023 an area of approximately 5.0 m by 5.0m in the vicinity of TP351 underwent a hotspot removal and further analysis with samples of the sides, base and arisings taken. No exceedances of the human health screening target were recorded and therefore no further action was required.

E3P undertook a watching brief and PID sampling during turnover of Made Ground soils in Phase 3 (Parcel D and E) in the vicinity of TP44 where odours had been noted. No visual or olfactory evidence of contamination was noted during the turnover of soils, no point source was identified. Additionally, no PID readings were noted > 50 ppm, as such, soils outside of hotspot areas were used within the upfill of the development platform in Phase 3.

All excavations arisings from volatile hotspots within 3 (Parcel D and E) were stockpiled and removed from site by Urban Regen.

Further Works

None.



RE-15 – SPECIATION OF MERCURY

DATE OF WORKS UNDERTAKEN

November 2022 – April 2023

PHOTOGRAPHS

Plate 16-31

CHEMICAL TESTING

I2 Analytical Report: 22-97517-2 (BH1, BH3, TP8 and TP342)
I2 Analytical Report: 22-97516-1 (TP519 and TP27)
I2 Analytical Report: 23-28075 -1 (TP501, TP505+TP25, TP507 and WS2)
I2 Analytical Report: 23-22451-1 (BH2)

OVERVIEW OF WORKS

Background

Elevated total mercury has been identified within the Made Ground deposits in TP342 (Parcel B & C) and TP501, TP505, TP507 (Parcel B & C), TP519 (Parcel A). This will require speciation to assess if elemental mercury is above the GAC of 1.2 mg/kg.

In addition to the above, elevated concentrations of total mercury were identified within Coopers TP25, TP27, WS2 and REFA TP8, BH1, BH2, BH3.

During remediation and enabling works, speciated mercury analysis should be completed to assess whether elemental mercury is present which may pose a risk to future site users through vapour inhalation.

Works Undertaken

E3P attended site on the 15th of November 2022 and excavated an area of approximately 5.0 m by 5.0 m in the vicinity of BH1, BH3, TP8 and TP342 as part of a hotspot removal and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis within BH1 and TP8 did not identify any exceedances of mercury within the sides or base of the excavation. Therefore, no further action was required. Within the base of BH3 mercury was recorded above the GAC (7.1 mg/kg) specification was undertaken and elemental mercury was recorded below the GAC (1.164 mg/kg) and therefore no volatile risk is present. Within all the side walls and arisings of TP342 mercury was recorded above the GAC (4.5 to 6.4 mg/kg) specification was undertaken on the highest mercury result (6.4 mg/kg in the western pit wall) and elemental mercury was recorded below the GAC (0.887 mg/kg) and therefore no volatile risk is present.

E3P attended site on the 16th of November 2022 and excavated an area of approximately 5.0 m by 5.0 m in the vicinity of TP519 and TP27 as part of a hotspot removal and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis within TP27 did not identify any exceedances of mercury within the sides or base of the excavation. Therefore, no further action was required. Within the northern wall of TP519 mercury was recorded marginally above the GAC (1.5 mg/kg), it is unlikely that the elemental mercury will exceed the GAC and therefore no volatile risk is present. Within all the remaining side walls, base and arisings of TP519 mercury was recorded below the GAC and therefore no risk is present.

E3P attended site on the 9th of March 2023 and excavated an area of approximately 5.0 m by 5.0 m in the vicinity of BH2 as part of a hotspot removal and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis BH2 did not identify any exceedances of mercury within the sides or base of the excavation. Therefore, no further action was required.



E3P attended site on the 11th of April 2023 and excavated an area of approximately 5.0 m by 5.0 m in the vicinity of TP501, TP505+TP25, TP507 and WS2 as part of a hotspot removal and further analysis with samples of the sides, base and arisings of the excavation taken. Results of the chemical analysis within TP501, TP507 and WS2 did not identify any exceedances of mercury within the sides or base of the excavation. Therefore, no further action was required. Within the base, south and west of TP505+TP25 mercury was recorded above the GAC (1.3 to 4.5 mg/kg), specification was not undertaken given mercury values of higher exceedances (TP342) did not record elemental mercury above the GAC and therefore no volatile risk is deemed present. Within the arisings of TP505+TP25 mercury was recorded above the GAC (7.2 mg/kg), to ensure no future indoor volatile risk these soils were used as upfill beneath areas of POS.

Further Works

None.

RE-16 – EXCAVATION, BREAKING AND PROCESSING OF ALL ABOVE- AND BELOW-GROUND STRUCTURES**DATE OF WORKS UNDERTAKEN**

Throughout

PHOTOGRAPHS

Plate 32-35

CHEMICAL TESTING**Site Won General Backfill**

I2 Analytical – 23-23959-1

GEOTECHNICAL TESTING**Site Won Generated 6F2**

PSL Report- PSL8101 Don Street- (Crush 001 Parcel C)

PSL Report- PSL0368 - Don Street-(Crush 002 Parcel A)

PSL Report- PSL1056 - Don Street-(Crush 003 and 004 Parcel D and E)

Murray Rix Report: MRN 4588/48 – Parcel A Crush

OVERVIEW OF WORKS**Background**

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

Works Undertaken

Prior to E3Ps attendance areas of hardstanding and concrete slabs were still in situ.

Removal of concrete slabs and oversized material started within Phase 3 (Parcels D and E), before moving into Phase 1 (Parcel A). All sub-structures were excavated using controlled mechanical techniques under the strict control of the Urban Regen Site Manager and under part time supervision of E3P.

The site was subject to a turnover to the top of natural stratum to ensure the full removal and excavation of all below-ground obstructions and relict foundations and slabs. This process allowed for the removal of any oversize materials and the identification of any previously unidentified areas of contamination. However, no unexpected visual or olfactory contamination was noted, furthermore, E3P undertook PID sampling of soils beneath slabs with no elevated PID readings recorded.



Inert suitable oversized hardcore materials were stockpiled prior to crushing/processing to nominal 6F5 grading with chemical validation in accordance with the validation sampling protocol (1 per 1000m³). Chemical analysis confirmed suitability for use.

Particle size distribution testing showed the crushed material complied with 6F5 grading (Murray Rix Report: PSL22/8101, PSL23/0368, PSL23/1056 and MRN 4588/48).

Any steel re-enforcements present within the concrete hardstanding, or waste in the form of wood, scrap metal, plastic was removed prior to the crushing of demolition material stockpiles and allocated to skips for subsequent disposal.

The provided Urban Regen Depth of turnover drawing denotes the full extent of turnover to confirm removal of foundations and slabs.

Further Works

Excavation, breaking and processing of oversized materials within Phase 2B and 2C.

RE-17 – INVESTIGATION OF POTENTIALLY IMPACTED SOILS

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 36-39

CHEMICAL TESTING

I2 Analytical - 22-95877-1 (409 and TP411)

I2 Analytical - 22-96290-1 (TP522, TP609 and TP611)

I2 Analytical - 23-14757-1 (Tank Parcel C N/E/S/W/BASE/ARISINGS)

OVERVIEW OF WORKS

Background

Hydrocarbon odours have been identified across the site, in particular in the following locations:

✳ Coopers - TP44, WS17, WS18

✳ E3P – WS202B, WS203, TP204, TP348, TP409, TP411, TP501, TP503, TP504, TP506, TP510, TP516, TP522, TP523, TP604, TP609, TP611, TP704, CP401

These areas require further investigation to see if there is a risk posed to site end users or controlled waters assessment. If visual/olfactory evidence of contamination is identified, this will be the subject of further investigation including laboratory analysis and subsequent assessment of risk within the context of the agreed parameters. Where a theoretical risk to either human health, controlled waters or the wider environs is identified, appropriate remediation works are to be instigated.

Works Undertaken

E3P attended site throughout November 2022 and undertook trial pits within the location of all aforementioned locations. E3P inspected soil arisings, excavation pit walls and undertook PID monitoring at all locations. With the exception of TP522, TP609 and TP611 (within Phase 2A) and TP409 and TP411 (Phase 3), no visual or olfactory evidence of contamination was noted, additionally, no elevated (>5 PPM) PID readings were recorded.



Don Street, Middleton

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Within TP522, TP609 and TP611 (Phase 2A) and TP409 and TP411 (Phase 3), a slight hydrocarbon/organic odour was noted within excavation arisings, however, no elevated PID recordings were recorded. Given the presence of a slight odour a sample of the arisings at TP409, TP411, TP522, TP609 and TP611 was sent for chemical analysis. Chemical analysis did not record any exceedances for remedial thresholds (for placement below hardstanding or clean cover systems) and as such soils were confirmed to be suitable for use as upfill.

Along the boundary of Don Street within Parcel C a previously unidentified tank was uncovered during the turnover works, denoted on the sample location plan in Appendix III. The tank was removed, and chemical samples were obtained from the sides and base of the excavation to determine whether any leaching had occurred into the surrounding soils. During the excavation no visual or olfactory contamination was noted. Results from the chemical analysis did not exceed remediation thresholds and therefore soils were used in the upfill of Phase 2A.

Further Works

None.

RE-18 – DELINEATION, EXCAVATION AND TREATMENT OF INFILLED HISTORICAL PONDS AND STREAMS

DATE OF WORKS UNDERTAKEN

November 2022 - December 2023

PHOTOGRAPHS

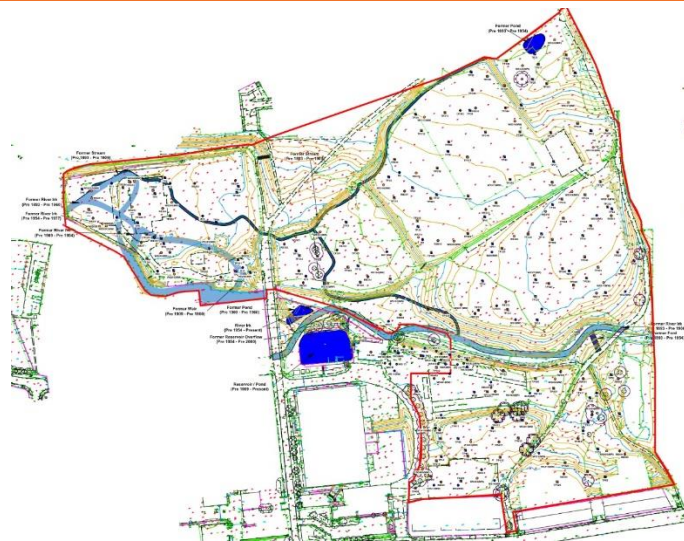
Plate 40

OVERVIEW OF WORKS

Background

The location of known historic infilled ponds, streams and rivers are identified within the E3P Historical Features Plan (Drawing 14-554-003) in Appendix III and in Figure 4.4 below.

FIGURE 4.4 LOCATION OF IDENTIFIED INFILLED PONDS, STREAMS AND RIVERS



Overview of Works

Within Phase 1 a former stream and historical River Irk layout is present through much of the south and west of the parcel. E3P maintained part time supervision during turnover in this parcel, no soft



alluvial deposits or geotechnically unsuitable material resembling historic river or stream deposits was noted, as such, it is assumed this was grubbed out prior to the construction of the former Rex Mill. No further works were required in this area.

The “former stream” marked across the northern boundary of Phase 2 is present on site as a seasonal drainage ditch. This stream is culverted below Phase 2C and connects to the River Irk. The culvert was located and not disturbed during works, no additional works are required in relation to this stream.

A historically infilled pond is present in the north east, located within Phase 2B. Remedial works relating to this pond will be covered in an updated validation report upon completion of remediation and enabling works within this area.

Further Works

Delineation, excavation and backfill of the historic pond material within Phase 2B.

RE-19 – DELINEATION, EXCAVATION AND TREATMENT OF FORMER HISTORIC LANDFILL MATERIALS

DATE OF WORKS UNDERTAKEN

June 2023 - Present

OVERVIEW OF WORKS

Works within the former landfill area are ongoing and outside the current revision of this report. Following completion of works in Phase 2B and 2C an updated revision will be made to the remediation validation report inclusive of works undertaken within the historic landfill area.

RE-20 – REMOVAL OF DELETERIOUS MATERIAL

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 41-43

OVERVIEW OF WORKS

Background

The E3P Ground Investigation identified plastic sheeting and other potentially deleterious wastes across all parcels albeit minimal across the majority of the site.

All potentially deleterious materials will be delineated, stockpiled and removed from the site by the contractor to a licensed waste facility.

Works Undertaken

E3P maintained part-time supervision during excavation and turnover works, E3P witnessed the separation of deleterious materials with materials segregated and placed in appropriate skips or stockpiles. Following the screening of material, no deleterious material was identified by E3P within placed materials.

All potentially deleterious materials including wood, roots, metal, plastic and building waste was delineated, stockpiled and removed from the Site by the contractor to a licensed waste facility.



Further Works

Removal of deleterious material from within Phase 2B and 2C.

RE-21 – CUT-AND-FILLING OF MADE GROUND TO DEVELOPMENT LEVELS

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 44-50

CHEMICAL TESTING

i2 Analytical Report - 22-14722 and 22-14849 (Phase 1 Made Ground)
i2 Analytical Report - 23-35715, 23-38015 and 23-38628 (Phase 1 Natural Class 1A)
i2 Analytical Report - 23-14763 and 23-15243 (Parcel 2A Import)
i2 Analytical Report - 23-28846 (Phase 2A [C1-C3], Phase 3 [D1-D5 & E1-E3])
i2 Analytical Report - 23-46719 (Phase 3)

GEOTECHNICAL TESTING

PSL Report – PSL7966 (Phase 1)
Murray Rix Report – MRN 4287/110 (Parcel 2A Bulkfill 001-007).
PSL Report – PSL6972, PSL7079 and PSL7248 (Phase 3)
NNDG Plan and Results (Appendix III and IV)
Urban Regen CBR Plan and results (Appendix III and IV)

OVERVIEW OF WORKS

Background

Prior to enabling works, the site topography was undulating. As such, a significant phase of cut and fill works were required to construct a development platform.

The overarching aim of the remediation and enabling earthworks will be the construction of a development platform that will ensure suitability for vibro stone columns (VSC). Depending on ground conditions, it is likely that VSC can be used in all areas where the Made Ground depth does not exceed 8 m.

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

Works Undertaken

The area was subject to a process of enabling earthworks completed by the appointed contractor, Urban Regen, under the supervision of E3P. The ground levels for the subject site were subject to cut and fill as summarised below:

- ✿ Cut From Phase 2B
- ✿ Fill within Phase 1 and Phase 2C (material sourced from Phase 2)
- ✿ Cut and Fill (balance) within Phase 3

In order to provide the final development platforms there was a requirement to undertake a significant cut and filling process of Made Ground across the site. Excavated materials and imported materials



were used to build final development levels. The area was subject to a process of enabling earthworks completed by the appointed contractor, Urban Regen, under the part time supervision of E3P. The ground levels for the subject site were subject to cut and fill with circa 165,000 m³ of material turned over.

All unsuitable materials were removed in their entirety to ensure the removal of relict hardstanding, foundations and infrastructure. Soils from within areas of reduced level excavation underwent careful selection prior to placement in a manner that accords with the geotechnical engineering specification & contamination compliance criteria in areas of upfill.

Where the proposed enabling works levels required the current landform to be cut, extreme care was taken so as not to disturb the underlying stratum prior to the placement of the appropriate platform, in compliance with the E3P Geotechnical Specification. Where the development levels required material to be filled, site-derived Made Ground and natural clays and sands were utilised. Where there was a shortfall of material (Phase 2A) imported 6F5 material was utilised to build up levels. Upfill materials were sorted in a controlled manner prior to replacement, in accordance with the requirements of the specification for the intended land use.

All soils were tested at 1 per 1000 m³ in accordance with the agreed specification. Across the site upfill recorded minor exceedances against generic assessment criteria for non-volatile PAH (Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Benzo(a)anthracene and Benzo(a)pyrene). All identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion. Soils were used as upfill and therefore any risk to human health is mitigated by the installation of a chemically suitable cover systems within all proposed garden areas and areas of soft standing, additionally, where hardstanding is present (plots, driveways and roads) the pathway is cut. Therefore no risk will be present and the soils are suitable for use.

Within Phase 1 Made Ground was turned over to the top of natural, with the development platform constructed of upfill comprising site won Made Ground within Phase 1 and circa 6000m³ of granular (Class 1A) natural soils from across Phase 2. Phase 1 was upfilled for suitability for vibro stone columns (VSC). Site won Made Ground upfill was classified as 2C material and fell within ($\pm 2\%$) of the tolerable moisture limit (PSL Report – PSL7966). Class 2C Made Ground was placed outside of plot footprints and used as fill beneath roads, gardens and POS. Site won Class 1A soils were used to raise levels below plot footprints (plus circa 2m). Given the granular nature of the natural upfill, no requirement for in-situ density testing was required as per the E3P upfill specification. E3P undertook chemical sampling of the site won Made Ground (i2 Analytical Reports 22-14722 and 22-14849) and natural Class 1A soils (i2 Analytical Reports 23-35715, 23-38015 and 23-38628). Samples confirmed soils were suitable for use.

Within Phase 2A Made Ground was turned over to the top of natural, with the development platform constructed of upfill comprising site won Made Ground soils from Phase 2A and circa 2,880m³ of imported 6F5 from a source site named Lightmore. Phase 2A was upfilled for suitability for vibro stone columns (VSC). Site won Made Ground upfill was classified as 2C material generally within ($\pm 2\%$) of the tolerable moisture limit (MRN 4287/110), where soils were outside of tolerable moisture limits OPC was added to control moisture content to appropriate levels. Where Class 2C Made Ground was placed NNDG testing was undertaken to confirm >95% compaction. Given the granular nature of 6F5 material, no requirement for in-situ density testing was required in areas where 6F5 was used as upfill. E3P undertook chemical sampling of the imported 6F5 (i2 Analytical Reports 23-14763 and 23-15243, with results confirming imported soils were suitable for use as upfill. Chemical sampling of Made Ground upfill from Phase 2A confirmed soils were suitable for use as upfill. Chemical certificates are provided as i2 Analytical reports 23-28846 (C1-C3) in Appendix III.



Within Phase 3 Made Ground was turned over to the top of natural, with the development platform constructed with upfill comprising site won Made Ground soils and natural subsoils from Phase 3 with cut and fill in balance. Phase 3 was upfilled for suitability for driven piled solution. Fill materials were placed and nominally compacted in a manner that accords with the geotechnical engineering specification & contamination compliance criteria, in order to prepare the site for a piled foundation solution and achieve a 5% CBR. The results of the CBR tests confirm that all locations met the compaction specification and are presented within Appendix VI. Chemical sampling of upfill from Phase 3 confirmed soils were suitable for use as upfill. Chemical certificates are provided as i2 Analytical reports 23-28846 (D1-D5 and E1-E3) and 23-46719 in Appendix III. E3P undertook geotechnical sampling of the site won Made Ground, upfill was classified as 2C material and generally fell within ($\pm 2\%$) of the tolerable moisture limit (PSL Reports – PSL6972, PSL7079 and PSL7248), where soils were outside of tolerable moisture limits OPC was added to control moisture content to appropriate levels.

Plots that were due to have VSC / driven piled foundations were left 450 mm below the finished level, whilst gardens were finished to 600 mm below finished level.

All data and certificates are presented within Appendix IV and VI of this report.

Urban Regen has produced an As-Built Survey of each phase of the site, included within Appendix III.

Further Works

Cut and filling to create the development platform within Phase 2B and 2C.

RE-22 – PLACEMENT AND COMPACTION OF UPFILL MATERIAL TO FACILITATE GROUND IMPROVEMENT BY VSC

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 44-51

GEOTECHNICAL TESTING

PSL Report – PSL7966 (Phase 1)

Murray Rix Report – MRN 4287/110 (Parcel 2A Bulkfill 001-007).

PSL Report – PSL6972, PSL7079 and PSL7248 (Phase 3)

NNDG Plan and Results (Appendix III and IV)

Urban Regen CBR Plan and Results (Appendix III and IV)

OVERVIEW OF WORKS

Background

Where plots are to be prepared in a manner that will facilitate ground improvement by VSC, materials must be either compliant with the specified grading requirements for a nominally placed and tracked granular aggregate, or alternatively, they should be engineered to a defined geotechnical standard.

Works Undertaken

Where the proposed enabling works levels required the current landform to be cut, extreme care was taken so as not to disturb the underlying stratum prior to the placement of the appropriate platform, in compliance with the E3P Geotechnical Specification. Where the development levels required material to be filled, site-derived Made Ground, sand and imported 6F5 materials were sorted in a controlled manner prior to replacement, in accordance with the requirements of the specification for the intended land use.



Within Phase 1 Made Ground was turned over to the top of natural, with the development platform constructed of upfill comprising site won Made Ground within Phase 1 and circa 6000m³ of granular (Class 1A) natural soils from across Phase 2. Phase 1 was upfilled for suitability for vibro stone columns (VSC). Site won Made Ground upfill was classified as 2C material and fell within ($\pm 2\%$) of the tolerable moisture limit (PSL Report – PSL7966). Class 2C Made Ground was placed outside of plot footprints and used as fill beneath roads, gardens and POS. Site won Class 1A soils were used to raise levels below plot footprints (plus circa 2m). Given the granular nature of the natural upfill, no requirement for in-situ density testing was required as per the E3P upfill specification. In areas of tree influenced within these parcels turnover depths were locally deepened (where required) to remove cohesive deposits. The resultant void was infilled with granular material - Class 1A materials to prevent future heave issues.

Within Phase 2A Made Ground was turned over to the top of natural, with the development platform constructed of upfill comprising site won Made Ground soils from Phase 2A and circa 2,880m³ of imported 6F5 from a source site named Lightmore. Phase 2A was upfilled for suitability for vibro stone columns (VSC). Site won Made Ground upfill was classified as 2C material generally within ($\pm 2\%$) of the tolerable moisture limit (MRN 4287/110), where soils were outside of tolerable moisture limits OPC was added to control moisture content to appropriate levels. Where Class 2C Made Ground was placed NNDG testing was undertaken on layers to confirm >95% compaction. In areas of tree influenced within these parcels turnover depths were locally deepened (where required) to remove cohesive deposits. The resultant void was infilled with granular material - imported 6F5 to prevent future heave issues.

Within the north of Phase 2A, within an area formally occupied by trees and vegetation, a localised soft spot was encountered within natural clay deposits. In January 2023 E3P undertook a series of trial pits with in-situ hand shear vane testing undertaken to delineate the area of soft clay. In February 2023 Urban Regen excavated the soft clays with E3P in attendance undertaking a watching brief. Approximately 1000m³ of material was removed and stockpiled within Parcel B. The resultant void was infilled with imported granular (6F5 + quarried stone) materials nominally compacted to facilitate a VSC foundation.

Phase 3 was upfilled for suitability for driven piled solution

Plots that were due to have VSC / driven piled foundations were left 450 mm below the finished level.

The results of the CBR and NNDG tests confirm that all locations met the compaction specification and are given in Appendix III and IV.

Urban Regen has produced an As-Built Survey of the Phases completed to date, these are included within Appendix III.

Further Works

Preparation of VSC plots in line with the geotechnical specification within Phase 2B and 2C

RE-23 – CONSTRUCTION OF TEMPORARY WORKING PLATFORM**DATE OF WORKS UNDERTAKEN**

Throughout

PHOTOGRAPHS

Plate 52-53

CHEMICAL ANALYSIS

I2 Analytical Report - 23-23959-1



I2 Analytical Report - 23-19920 (Import 105-107 6F5)

I2 Analytical Report - 23-26301 (Import 108-109 6F5)

GEOTECHNICAL TESTING

PSL Report- PSL8101 Don Street- (Crush 001 Parcel C)

PSL Report- PSL0368 - Don Street-(Crush 002 Parcel A)

PSL Report- PSL1056 - Don Street-(Crush 003 and 004 Parcel D and E)

Murray Rix Report: MRN 4588/48 – Parcel A Crush

Urban Regen CBR Plan and Results (Appendix III and IV)

OVERVIEW OF WORKS

Background

Plots were prepared in a manner to facilitate a combination and driven piles, as such, a temporary working platform was required.

Overview of works

A temporary working platform was constructed comprising 300mm of 6F5 from site won and imported crush material. 6F5 was tested to confirm chemical suitability.

Particle size distribution testing of crush (PSL8101, PSL0368, PSL1056 and MRN 4588/48) confirmed compliance with 6F5.

Urban Regen had full-time supervision with E3P providing part-time supervision of the following:

- ✳ CBR plate load tests to be completed on roads and piling mats.
- ✳ Geotechnical testing of the site won material was undertaken for PSD.
- ✳ CBR tests were undertaken beneath roads and plots to ensure compaction of 5%.

The results of the CBR tests confirm that all locations met the compaction specification and are given in Appendix III and IV.

Further Works

CBR testing of piling mats and roads across Phase 2B and 2C.

RE-24 – REPLACEMENT OF MATERIALS, GEOTECHNICAL ENGINEERING REQUIREMENTS

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 44-51

GEOTECHNICAL TESTING

PSL Report – PSL7966 (Phase 1)

Murray Rix Report – MRN 4287/110 (Parcel 2A Bulkfill 001-007).

PSL Report – PSL6972, PSL7079 and PSL7248 (Phase 3)

NNDG Plan and Results (Appendix III and IV)

Urban Regen CBR Plan and Results (Appendix III and IV)



OVERVIEW OF WORKS

Background

Uppill material required to be backfilled in compliance with the E3P Geotechnical Engineering Specification for VSC and piled foundation, as presented in detail within Section 5 of the E3P Remediation and Enabling Works Strategy.

Works Undertaken

Uppill material was backfilled in compliance with the E3P Geotechnical Engineering Specification for a piled foundation, as presented in detail within Section 5 of the E3P Remediation and Enabling Works Strategy.

Where required, to achieve the proposed EWLs, Urban Regen undertook a process of fill works, with materials sourced from a combination of site-won natural subsoils and Made Ground soils as discussed earlier in this report (RE-21).

Within Phase 1 the development platform constructed of upfill comprising site won Made Ground within Phase 1 and circa 6000m³ of granular (Class 1A) natural soils from across Phase 2. Phase 1 was upfilled for suitability for vibro stone columns (VSC). Site won Made Ground upfill was classified as 2C material and fell within ($\pm 2\%$) of the tolerable moisture limit (PSL Report – PSL7966). Class 2C Made Ground was placed outside of plot footprints and used as fill beneath roads, gardens and POS. Site won Class 1A soils were used to raise levels below plot footprints (plus circa 2m). Given the granular nature of the natural upfill, no requirement for in-situ density testing was required as per the E3P upfill specification.

Within Phase 2A the development platform constructed of upfill comprising site won Made Ground soils from Phase 2A and circa 2,880m³ of imported 6F5 from a source site named Lightmore. Phase 2A was upfilled for suitability for vibro stone columns (VSC). Site won Made Ground upfill was classified as 2C material generally within ($\pm 2\%$) of the tolerable moisture limit (MRN 4287/110), where soils were outside of tolerable moisture limits OPC was added to control moisture content to appropriate levels. Where Class 2C Made Ground was placed NNDG testing was undertaken to confirm >95% compaction. Given the granular nature of 6F5 material, no requirement for in-situ density testing was required in areas where 6F5 was used as upfill.

Within Phase 2A a localised soft spot was encountered within natural clay deposits. In January 2023 E3P undertook a series of trial pits with in-situ hand shear vane testing undertaken to delineate the area of soft clay. In February 2023 Urban Regen excavated the soft clays with E3P in attendance undertaking a watching brief. Approximately 1000m³ of material was removed and stockpiled within Parcel B. The resultant void was infilled with imported granular (6F + quarried stone) materials nominally compacted to facilitate a VSC foundation.

Within Phase 3 the development platform constructed with upfill comprising site won Made Ground soils and natural subsoils from Phase 3 with cut and fill in balance. Phase 3 was upfilled for suitability for driven piled solution. Fill materials were placed and nominally compacted in a manner that accords with the geotechnical engineering specification & contamination compliance criteria, in order to prepare the site for a piled foundation solution and achieve a 5% CBR. The results of the CBR tests confirm that all locations met the compaction specification and are presented within Appendix VI. E3P undertook geotechnical sampling of the site won Made Ground, upfill was classified as 2C material and generally fell within ($\pm 2\%$) of the tolerable moisture limit (PSL Reports – PSL6972, PSL7079 and PSL7248), where soils were outside of tolerable moisture limits OPC was added to control moisture content to appropriate levels.

Urban Regen had full-time supervision with E3P providing part-time supervision of the following:



- ✿ General cut and fill of natural and anthropogenic soils in accordance with the E3P geotechnical & contamination performance criteria to create a development platform for a piled foundation.
- ✿ Management of all materials to maximise the retention of soils on site to ensure suitable development.
- ✿ Turnover of any Made Ground soils to remove slabs and foundations.
- ✿ CBR plate load tests to be completed on all roads and piling mats.
- ✿ NNDG testing on upfill to confirm compaction.
- ✿ Geotechnical testing of the site won material was undertaken for PSD.
- ✿ CBR tests were undertaken beneath roads and plots to ensure compaction of 5%.

The results of the CBR and NNDG tests confirm that all locations met the compaction specification and are given in Appendix III and IV.

Further Works

Remaining upfill material required to be backfilled in compliance with the E3P Geotechnical Engineering Specification.

RE-25 – PREPARATION OF GROUND FOR VIBRO-STONE COLUMNS WITHIN TREE INFLUENCE

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 48-51

OVERVIEW OF WORKS

Background

Where trees are present, or within their total zone of influence, the contractor must ensure that all cohesive soils are removed to the required depth with the subsequent replacement with a granular blanket to fully mitigate the potential for volumetric instability in the clay soils.

Works Undertaken

Coopers have completed the FZP for the site, this should be read in conjunction with this validation report. The Coopers FZP denotes plots affected by tree influence across the site.

Phase 1 and 2A utilised VSC foundations. In areas of tree influence within these parcels, turnover depths were locally deepened (where required) to remove cohesive deposits. The resultant void was infilled with granular material - Class 1A materials (Phase 1) and imported 6F5 (Phase 2A) to prevent future heave issues.



Within the north of Phase 2A, within an area formally occupied by trees and vegetation, a localised soft spot was encountered within natural clay deposits. In January 2023 E3P undertook a series of trial pits with in-situ hand shear vane testing undertaken to delineate the area of soft clay. In February 2023 Urban Regen excavated the soft clays with E3P in attendance undertaking a watching brief. Approximately 1000m³ of material was removed and stockpiled within Parcel B. The resultant void was infilled with imported granular (6F + quarried stone) materials nominally compacted to facilitate a VSC foundation.

Phase 3 utilised a pre-cast piled foundation and no further works were required in this area.

The site E3P site investigation (14-554-R1-2, December 2022) recorded the underlying clays to be of "low volume change potential" in accordance with the classification system utilised by the LABC/NHBC industry guidance.

As such, a relevant pile design was utilised to account for low volume change clays to prevent any potential heave.

Further Works

Suitable foundation/pile design in line with a low volume change potential clays for remaining plots.

RE-26 – IMPORTATION OF BULK FILL

DATE OF WORKS UNDERTAKEN

January 2023

PHOTOGRAPHS

Plate 54

CHEMICAL TESTING

I2 Analytical-23-14763-1 Don Street 14-554. – (Import 101-102)

I2 Analytical-2323-15243-1 Don Street 14-554.- (Import 103-104)

GEOTECHNICAL TESTING

Murray Rix – MRN 4643/3

OVERVIEW OF WORKS

Background

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

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

Works Undertaken

Up-filling with imported bulk fill was undertaken within Phase 2C (Parcel C). 6F5 material was imported by John O'Sheas. Invoices related to this material are available from the Remediation Contractor on request.

E3P undertook chemical sampling of the imported 6F5 (Import 101-104 and Import 105 6F5-107 6F5) for confirmation of use within site. Imported samples did not record any exceedances of remediation/validation values and therefore are suitable for use as upfill.

Grading certificates (MRN 4643/3) classified the material as 6F5.



No further import of bulk fill was required within Phase 1, 2C and 3.

Further Works

None.

RE-27 – POST REMEDIATION GAS MONITORING

DATE OF WORKS UNDERTAKEN

April 2023 to October 2023

SUPPORTING DOCUMENT

14-554-R5-1, October 2023 Parcel A (Phase 1)

14-554-R4-1, May 2023 Parcel C, D and E (Phase 2A and 3)

OVERVIEW OF WORKS

Background

Upon completion of the grouting works within the underlying coal seams and remediation works, further gas monitoring wells will need to be installed within Parcel A and a post remediation gas assessment undertaken.

Works Undertaken

Following completion of all remediation, enabling and drill and grout works, additional ground gas monitoring installations were installed with a four week gas monitoring program and further assessment undertaken. The location, frequency and duration of post remediation ground gas monitoring was agreed with the Rochdale Borough Council Environmental Health Officer in March 2023.

Additional ground gas monitoring was undertaken within Phase 2A (Parcel C) and Phase 3 (Parcel D and E) throughout April and May 2023. The full assessment is presented within E3P Ground Gas Addendum, 14-554-R4-1, May 2023 Parcel C, D and E (Phase 2A and 3). The report concludes the following:

- ✳ Ground gas monitoring suggests that Area C, D & E can be predominantly classified as CS1, and in these areas it is considered that gas protection measures will not be required.
- ✳ In the vicinity of D2, carbon dioxide has been identified above the 5% v/v threshold, however the GSV is noted to be within a CS1 classification. The LQM Gas Composition Tool (Figure 3.1) suggests that the concentrations are indicative of ambient air and air/CO₂ mixing. Within the NHBC Hazardous Ground Gas Guidance, April 2023 (Figure 3.2) D2 gas concentrations fall within the ternary plot zone indicative of biological respiration or oxidation of organic material within the ground – in this case likely associated with the Made Ground / Coal Measures. Given the onsite source and high sensitivity end use, to be appropriately conservative, CS2/ Amber 1 gas protection measures should be implemented on plots within this area (plots 242-251).



✿ In the vicinity of E1, methane has been identified above the 5% v/v threshold, with GSV noted to exceed the CS1 threshold on one occasion. E1 gas concentrations fall within the ternary plot zone indicative of very low rate of gas generation from Made Ground – low risk of emissions from the ground. The results also plot within the residual landfill gas generation or gas migration from off site source. Given E1 is located circa 150m south of the landfill, with the River Irk in between, it is considered unlikely gas concentrations are related to landfill gas migration. However, given the location of E1 along the south of the site, an offsite source cannot be discounted. Methane values above Amber 2 thresholds have been recorded within 2 visits. However, given the lack of steady flow recorded across all monitoring visits, very low rate of gas generation and low risk of emissions from the ground, CS2/Amber 1 ground gas protection measures are deemed to be sufficient to plots within this area (Plots 287-295).

✿ E3P Drawing 14-554-036 shows the proposed ground gas zoning plan.

Additional ground gas monitoring was undertaken within Phase 1 (Parcel A) throughout July and October 2023. The full assessment is presented within E3P Ground Gas Addendum, 14-554-R5-1, October 2023 Parcel A (Phase 1). The report concludes the following:

✿ The site is underlain by in-tact coal seams relating to the Cannel seams. In boreholes situated in the northwest of Parcel A, coal inferred to represent the Cannel coal seam was encountered, with a typical thickness, generally found to be 0.20 m to 0.50 m. Within the west of Parcel A the coal sub crops beneath the site at depths between 3.80 – 12.60 m bgl. A second seam is encountered between 18.00 m and 27.20 m bgl across Parcel A. in the southwest there was little evidence of a viable coal seam.

✿ The boreholes typically encountered solid drilling throughout the full depth of the borehole, with intact coal. Soft drilling was encountered within one location (borehole S19) within Parcel A encountered at a depth between ground level and 7.00 m bgl. Slight Mudstone returns were noted from 7.00m- 30.00m bgl. No lost flush or increased grout takes were recorded, as such, soft drilling in this location is not considered to be associated with historic workings. No evidence of coal workings was recorded within the remaining boreholes at Parcel A.

✿ The ground gas monitoring in Area showed A2 with slightly elevated levels (2.9% v/v) of methane and carbon dioxide. The gas risk assessment suggested that this is indicative of low level ground gas not capable of emitting at the surface, furthermore, methane was encountered on a singular occasion with no outflow. The developed site CSM suggests the absence of any unrecorded mine workings or a viable coal seam in the south west (Plots 7-13), therefore the developed site ground gas model does not identify the requirement for specialist mitigation measures in these isolated plots.

✿ Plots 1-6 and 14-18 are located within an area where the post remediation ground gas monitoring has not identified any elevated hazardous ground gasses of concern. However the presence of coal in this sector, deeper Made Ground and the proximity to the gas sources of the north suggests that a precautionary approach is required and these plots are to be classified as CS2.

✿ A3 recorded methane (58.7%v/v) and carbon dioxide (9.2% v/v) that meet CS3 classification due to methane concentrations. Given the lack of data available within wells A4 and A5 due to flooded response zones and destroyed wells, and location within close proximity to significant carbon dioxide and methane recorded within A3 and flooded A5 visits, precautionary CS3 measures are required in this area.



- ✿ In the vicinity of A3 and A5, carbon dioxide has been identified above the 5% v/v threshold and methane above the 2% v/v CS1 threshold. The GSV is noted to be within a CS1 classification in all locations. The LQM Gas Composition Tool (Figure 3.1) suggests that the concentrations are indicative of ambient air and air/CO2 mixing, with the exception of A3 that was indicative of geogenic gas, likely associated with the underlying coal seams. Within the NHBC Hazardous Ground Gas Guidance, April 2023 (Figure 3.2) A3 plots within the indicative of alluvium and hydrocarbon degradation which is likely associated with the historic use as a Mill and the underlying Coal Measures.

- ✿ E3P Drawing 14-554-036 shows the proposed ground gas zoning plan.

Prior to the installation of gas protective measures the ground gas zoning plan was agreed with the Rochdale Borough Council Environmental Health Officer in June 2023 (Phase 2A and 3) and October 2023 (Phase 1).

A snapshot showing the location of post remediation monitoring wells, and ground gas zoning plan within Phases 1, 2A and 3 is given as Figure 4.5 below and Drawing 14-554-036 in Appendix III.

FIGURE 4.5 – GROUND GAS LOCATION AND ZONING PLAN



Further Works

Additional ground gas monitoring/assessment within Phase 2B and 2C.

RE-28 – PREPARATION OF GARDEN FOR COVER SYSTEM

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plates 55



OVERVIEW OF WORKS

Background

As part of the land remediation works, garden areas will be prepared in a manner that will facilitate the placement of the clean cover system during the development phase of the works.

Works Undertaken

Within Phase 1, 2A and 3, all gardens were prepared to 600mm below finished level to allow the placement of a clean cover system. Levels of the gardens to regrade level were brought to the intended elevation with imported materials and site won Made Ground.

Further Works

Preparation of garden areas within Parcel 2B and 2C.

RE-29 – PROVISION OF SUBSOIL

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 56-57

CHEMICAL TESTING

i2 Analytical Report – 22-14266

OVERVIEW OF WORKS

Background

Natural drift deposits (predominantly granular soils) are deemed suitable for use within the upper 600 mm of clean cover to residential gardens and areas of soft landscaping. It is therefore deemed viable to reuse materials that are cut as part of the wider earthworks or through a soil inversion (regulated by an MMP) to generate the required volumes of material. However, a shortfall of material was recorded on site, as such, there was a need to import subsoil to site for use in the soft cover systems.

Works Undertaken

Site won subsoils have been generated from cut operations within natural strata within Phase 2B and from civil arising across the site. To date circa 5000 m3 of site won subsoil has been generated. E3P attended site on 20th December 2022 and obtained five samples of subsoils, accounting for 1,250 m3 of material in line with the testing frequency specified within the E3P Remediation Strategy (14-554-R2 Rev 10, dated February 2023).

Analysis for subsoil undertaken by i2 Analytical Laboratory using UKAS accredited methods where applicable. The chemical analysis suite comprises heavy metals, sulphates, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAHs), speciated and total Petroleum Hydrocarbons (TPH) and asbestos. No exceedances of human health screening values were recorded within the five samples, confirming the soils suitability for use within private garden cover systems (i2 Analytical Report – 22-14266). However, further testing of the material will be required at 1 per 250 m3, this will be recorded and issued on plot specific validation certificates throughout the build phase.

A total of 16,000 m3 of subsoil is required to complete the development, as such, import of naturally occurring suitable subsoil is required as works progress.

Sampling frequency following the agreed Remediation Strategy. Laboratory analysis certificates are provided in Appendix IV.



Further Works

Further validation testing of imported and site won subsoils. All garden areas where a cover system is required will be subject to plot specific independent validation. The subsoil source and associated chemical testing for soils used within plots will be issued as part of the garden validation letters for these plots.

RE-30 – PROVISION OF TOPSOIL

DATE OF WORKS UNDERTAKEN

December 2022 – January 2023

PHOTOGRAPHS

Plate 14-15

CHEMICAL TESTING

I2 Analytical Report - 22-14259-1 (Phase 2B)

I2 Analytical Report - 23-14759-1 (Phase 2A)

OVERVIEW OF WORKS

Background

Natural Topsoil from the northern third of parcel B (football pitch area) may be suitable for re-use in garden cover system. Further chemical analysis will be required to confirm this.

Import of suitable topsoil material for use within the proposed development will most likely be required.

Works Undertaken

Urban Regen undertook a topsoil strip in Parcel B (Phase 2B) and Parcel C (Phase 2A) in November 2022, Urban Regen stockpiled natural site won topsoil's from within Phase 2A and 3 separately in line with the MMP.

To date circa 5200 m3 of site won topsoil has been generated.

E3P attended site on the 19th of December 2022 and obtained 10 topsoil samples from the stockpiled topsoil generated from Parcel 2B. In line with the specified frequencies within the remediation strategy this covers 500 m3 of topsoil (1 sample per 50m3).

E3P attended site on the 30th of January 2023 and obtained 3 topsoil samples from the stockpiled topsoil generated from Parcel 2A. In line with the specified frequencies within the remediation strategy this covers 150 m3 of topsoil (1 sample per 50m3).

Analysis for subsoil undertaken by I2 Analytical Laboratory using UKAS accredited methods where applicable. The chemical analysis suite comprises heavy metals, sulphates, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAHs), speciated and total Petroleum Hydrocarbons (TPH) and asbestos.

Phase 2B topsoil recorded no exceedances of human health screening values within the 10 topsoil samples, confirming the soils suitability for use within private garden cover systems (i2 Analytical Report 22-14259). However, further testing of the material will be required at 1 per 50 m3, this will be recorded and issued on plot specific validation certificates throughout the build phase.



Phase 2C topsoil recorded minor exceedances of non-volatile PAHs (Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenzo(a,h)anthracene) against human health screening criteria for private garden cover systems. However, no exceedances of public open space cover system values have been recorded (i2 Analytical Report 23-14759). As such, topsoil from Phase 2C was utilised within areas of public open space and soft landscaping across the development.

A total of circa 6,000 m³ of topsoil is required to complete the development, as such, import of naturally occurring suitable topsoil is required as works progress.

Sampling frequency following the agreed Remediation Strategy. Laboratory analysis certificates are provided in Appendix IV.

Further Works

Ongoing sampling of site won and imported topsoil (1 per 50m³). All garden areas where a cover system is required will be subject to plot specific independent validation. The topsoil source and associated chemical testing for soils used within plots will be issued as part of the garden validation letters for these plots.

RE-31 – INDEPENDENT VALIDATION: WATCHING BRIEF

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 1-57

OVERVIEW OF WORKS

Background

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

It will therefore be necessary to instigate the site-wide remediation and enabling works under the supervision of a suitably qualified and independent specialist.

Works Undertaken

E3P maintained a part-time watching brief throughout the duration of remediation and enabling works to monitor works, record ground conditions and fully investigate all potential sources of as yet unidentified contamination.

Further Works

Part time supervision of remedial works in Phase 2B and 2C.

RE-32 – WASTE SOILS SURPLUS TO REQUIREMENTS

DATE OF WORKS UNDERTAKEN

Throughout

CHEMICAL TESTING

RJT Consulting report dated 6th April 2023
I2 Analytical Report - 23-28847 (Knotweed 101)



OVERVIEW OF WORKS

Background

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.

Works Undertaken

Across the development the earthworks have been designed to be in balance, as such, soils generated from excavation activities (cut) have been re-used on site within the earthworks balance in areas requiring upfill, as such, no surplus soil generation was created.

The exception to the above is where hotspot arisings have been deemed unsuitable for use within the development and soils in areas affected by knotweed.

In relation to hotspot arisings, Urban Regen used results of the arisings obtained by E3P (Re points 13, 14, 15 and 17) and removed the soils to waste facilities.

Where soils were impacted with knotweed E3P undertook chemical analysis (I2 Analytical Report - 23-28847) and WM3 waste classification (RJT Consulting report dated 6th April 2023). Urban Regen then removed these soils to a licenced waste facility.

Deleterious materials, vegetation and small quantities of asbestos waste were removed from site by Urban Regen.

Waste consignment notes and tracking notes are available upon request to Urban Regen.

Further Works

Removal of waste or unacceptable soils within Phase 2B and 2C.

RE-33 – VALIDATION OF MATERIALS FOR POTABLE WATER SUPPLY INFRASTRUCTURE

DATE OF WORKS UNDERTAKEN

May 2023 to August 2023

CHEMICAL TESTING

i2 Analytical Report - 23-35715, 22-14849 & 23-38628 (Phase 1)

i2 Analytical Report - 23-28846-1, 23-26301-1, 23-19920-1, 23-15243-1 & 23-14763-1 (Phase 2A)

i2 Analytical Report - 23-28846 & 21-51712 (Phase 3)

SUPPORTING DOCUMENTS

14-554 - UURA - Don Street, Phase 1 - August 2023

UURA- Don Street Parcel - Phase 2A- Show Homes - May 23

UURA - Don Street Phase 3 - May 2023

OVERVIEW OF WORKS

Background

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



Works Undertaken

Phase 1 has been turned over to depths as per E3P drawing 037 attached and built up to levels of 90.10 - 92.65 AoD. Site won Made Ground Soils have been re-used at depth as bulk fill, approximately 2-3m below the proposed pipeline depth. The remaining upfill, inclusive of the material in which the pipe will be laid has been completed using site won natural sands from the wider site (Phase 2C and 3). Prior to placement in the upper 3m, site won natural sands were sampled (i2 Chemical Certificate - 23-35715, 22-14849 & 23-38628). A UKWIR assessment (14-554 - UURA - Don Street, Phase 1 - August 2023) was undertaken by E3P and recommended PE pipe was used within Phase 1 of the development.

Phase 2A has been turned over and upfilled with site won made ground soils and imported 6F5 material to raise levels within Parcel C. All import material is compliant with the remediation target values for human health stated in the Remediation Strategy. Within Phase 2 site levels have changed in line with FFLs given on Coopers Foundation Zoning Plan 5639/Fd/02 (March 2022) and a series of window samples were undertaken at FFL to obtain samples at pipeline depth in April 2023 (i2 Analytical - 23-28846-1, 23-26301-1, 23-19920-1, 23-15243-1 & 23-14763-1). A UKWIR assessment (14-554 - UURA - Don Street, Phase 2A – May 2023) was undertaken by E3P and recommended barrier pipe was used within Phase 2A of the development due to the presence of TPH above PE thresholds in the existing soils and imported soils that have been re-used across Phase 2A.

Phase 3 has been turned over and upfilled with site won Made Ground and natural soils. Within Phase 3 soils have been re used on site within the earthworks balance, as such, no shortfall or surplus soil generation. Site levels have changed in line with FFLs given on Coopers Foundation Zoning Plan 5639/Fd/02 (March 2022) and a series of window samples were undertaken at FFL to obtain samples at pipeline depth in April 2023 (i2 Analytical - 23-28846 & 21-51712). A UKWIR assessment (14-554 - UURA - Don Street, Phase 3 – May 2023) was undertaken by E3P and recommended barrier pipe was used within Phase 3 of the development due to the presence of TPH above PE thresholds in the existing soils that have been re-used across Phase 3.

Further Works

UKWIR assessment of soils at pipeline depth across Phase 2B and 2C and installation of appropriate water supply infrastructure.

RE-34 – PRODUCTION OF DRILL AND GROUT SPECIFICATION

DATE OF WORKS UNDERTAKEN

January 2023 - February 2023

SUPPORTING DOCUMENTS

E3P Performance Specification for the Consolidation of Abandoned Mine Workings : Report ref: 14-554-R6 Rev 2, February 2023

E3P Mine Workings Stabilisation Report : Report ref: 14-554-R5 Rev2, dated June 2023).

OVERVIEW OF WORKS

Background

Due to the sites location withing a Coal Authority Development High Risk Area associated with several coal seams sub-cropping beneath the Site, there is a requirement to complete drill and grout treatment works prior to development of the site. As such, a drill and grout specification should be agreed prior to stabilisation works.



Works Undertaken

E3P prepared a Performance Specification for the Consolidation of Abandoned Mine Workings (report ref: 14-554-R6 Rev 2). Treatment works were completed by M&J drilling in accordance with the specification between January 5th 2023 and February 21st 2023, under Coal Authority Permit 24676. Details and validation of the treatment works are reported in E3P Mine Workings Stabilisation Report (ref: 14-554-R5 Rev2, dated June 2023).

Further Works

None.

RE-35 – LANDFILL TREATMENT

DATE OF WORKS UNDERTAKEN

Ongoing

OVERVIEW OF WORKS

Works within the former landfill area are ongoing and outside the current revision of this report. Following completion of works in Phase 2B and 2C an updated revision will be made to the remediation validation report inclusive of works undertaken within the historic landfill area.

RE-36 – REMEDIAL VERIFICATION REPORT

DATE OF WORKS UNDERTAKEN

October 2022 – December 2023

PHOTOGRAPHS

Plate 1 - 57

OVERVIEW OF WORKS

This report serves as an interim pending the final completion of all enabling works across the wider site (Phase 2B and 2C).

Upon completion of all works a report of information relating to site clearance, chemical testing, remedial works, remedial verification, material movements and waste transfer documentation will be submitted to the local authority for approval following completion.



5. POST REMEDIATION BUILD PHASE REQUIREMENTS

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

- ✿ The following should be implemented during the build phase of the development:
- ✿ Chemical validation of any additional topsoil imported for use within gardens;
- ✿ Chemical validation of any additional subsoil imported for use within gardens;
- ✿ Placement and validation of sub-soil (clean material) in a 450mm layer within any plots where the material was not placed during the Remediation & Enabling works;
- ✿ Placement and validation of imported topsoil (clean material) in a 150mm later within all gardens and areas of soft landscaping; and,
- ✿ Installation and validation of ground gas plot specific protection measures.

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

5.1.1. PROCEDURE FOR PLACEMENT OF CHEMICALLY SUITABLE COVER SYSTEM

Garden and landscaped areas need to be backfilled with 450mm chemically validated subsoil, with 150mm topsoil overlaying this. Topsoil is required to be confirmed as chemically suitable prior to placement. Where sub-soil is not placed during Remediation & Enabling works, E3P will be required to return to site and undertake independent validation of the correct placement of sub-soil.

The placement of 600mm of clean material 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 150mm of certified topsoil and 450mm of 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 5.1.



TABLE 5.1 GARDEN VALIDATION PROCEEDURE

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 Countryside Properties Development Engineer 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 the all plots given that the 600mm cover system will need to be placed on each plot during the build phase.
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.
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 has 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.

Plate 1 provides an example of a garden validation photographs that will be required for each plot.



PLATE 1 EXAMPLE PLOT COVER SYSTEM VALIDATION

Plot No: 4 (Car Park Landscaping)

Depth of Strata (m bgl)	0.00-0.30	Validated TOPSOIL
<i>Depth of Cover System Materials</i>		<i>Depth of Cover System Materials</i>
		

Depth of Cover System at Ground Level and in Relation to Unit / Structure



5.2. GROUND GAS PROTECTION MEASURES

Post remediation ground gas monitoring was undertaken within Phase 1, 2A and 3.

Post remediation gas monitoring data within Phase 1 shows plots to vary between Characteristic Situation 1 and Characteristic Situation 3, with a plot specific ground gas zoning plan given as E3P drawing 14-554-036 in Appendix III.

Post remediation gas monitoring data within Phase 2A shows plots to fall within Characteristic Situation 1.

Post remediation gas monitoring data within Phase 3 shows plots to vary between Characteristic Situation 1 and Characteristic Situation 2, with a plot specific ground gas zoning plan given as E3P drawing 14-554-036 in Appendix III.

Where plots have been deemed to fall within Characteristic Situation 2 or 3, these plots will require specialist mitigation measures to be constructed in accordance with BS8485 (2015)+A1(2019).

The validation inspection is to include the items that are detailed within Table 5.2.

TABLE 5.2 GROUND GAS MITIGATION MEASURES VALIDATION ITEMS

INSPECTION	METHOD
Product Verification	Confirmation that suitable products have been installed to consist of photographs of product types, labels on packaging and delivery tickets.
Wall Cavity Inspection	Confirmation that gas membrane spans the external wall cavity above the periscopic vents.
General Condition	The membrane is to be inspected to ensure there are no tears, punctures or rips.
Jointing	The engineer is to check the overlaps between membranes are correctly sealed with sufficient overlaps.
Service Entry Points	Verification of the presence of preformed tophats sealed to the pipe and membrane as per the construction detail.
Passive Venting Systems	The engineer should verify the presence of vents at 2m centres on at least 3 of the external walls. Verification of the stone venting layer and presence of pipes to be supplied by photographic records from site.

Examples of gas membrane verification photographs provided in Plate 2.

It should be noted that these are for illustrative purposes only as each site will have a site-specific gas membrane specification.



PLATE 2 EXAMPLE GAS MEMBRANE VERIFICATION

Plot – 236

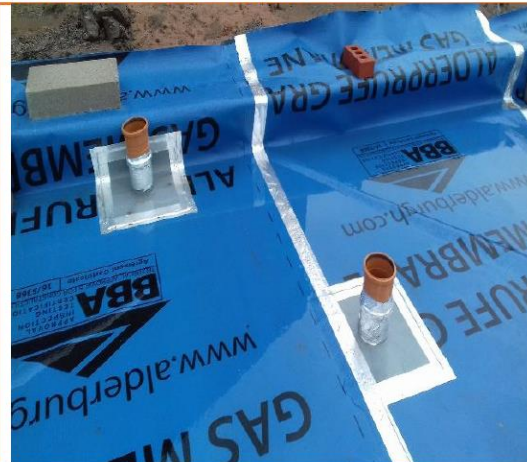
General Condition of Membrane-Good Condition



Verification of Joints and Seals-Good Condition



Verification of Service Penetrations-Good Condition



5.3. POTABLE WATER SUPPLY – CONTAMINANT ASSESSMENT CRITERIA

CONTAMINANT GROUP	PE-THRESHOLD ^A	MAXIMUM PERMISSIBLE CONCENTRATION AT PROPOSED PIPELINE DEPTH ^A	MAXIMUM PERMISSIBLE SITE CONCENTRATION ^A
Total VOC	0.5	N/A	N/A
Total BTEX And MTBE	0.1	N/A	N/A
Total SVOCs (Excluding PAH and those substances marked with an *)	2	N/A	< 0.3
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	< 0.1	< 0.1
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	5.7	5.7
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	49	149
Phenols (From SVOC Analysis)*	2	< 0.3	< 0.3
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	< 0.3	< 0.3

Notes

A. All concentrations in mg/kg.



END OF REPORT



APPENDIX I

LIMITATIONS

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



APPENDIX II

GLOSSARY

TERMS

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



Don Street, Middleton

Remediation and Enabling Works Validation

January 2024

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

