



e3p

Validation Report
Land off Don Street, Middleton

Reference: 14-554-R8-2
Date: November 2024



REMEDIATION AND ENABLING WORKS VALIDATION

Land off Don Street
Middleton
Greater Manchester
M24 2DB

Prepared for:



Report Ref: 14-554-R8-1
Date Issued: November 2024

E3P

Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

+ 44 (0) 161 707 9612
<https://e3p.co.uk>

Registered in England
CRN: 08725262

QUALITY ASSURANCE

PROJECT NUMBER	14-554		
VERSION	Version 1	Version 2	
REMARKS	Phase 1, 2A and 3	Complete Site	
DATE	January 2024	November 2024	
PREPARED BY	G. Calvert	G. Calvert	
QUALIFICATIONS	BSC(Hons), FGS	BSC(Hons), FGS	
CHECKED BY	M. Dee	M. Dee	
QUALIFICATIONS	MESci (Hons), FGS	MESci (Hons), FGS, MIEnvSc	
AUTHORISED BY	M. Dyer	M. Dyer	
QUALIFICATIONS	BSc(Hons), FGS, AIEMA, MIEnvSc, CEnv	BSc(Hons), FGS, AIEMA, MIEnvSc, CEnv	

TABLE OF CONTENTS

1. INTRODUCTION	3
1.1. Background	3
1.2. Proposed Development.....	3
1.3. Summary of Parties Involved.....	5
1.4. Previous Works	6
2. SUMMARY OF REMEDIATION AND ENABLING WORKS OBJECTIVES	7
3. SECOND PHASE MITIGATION AND MANAGEMENT – BUILD PHASE.....	8
4. DETAILED REMEDIATION AND ENABLING WORKS ACTIVITIES	9
RE-1 – Pre-commencement Supplementary Site Investigation	9
RE-2 – Pre-commencement Regulatory Compliance	11
RE-3 – Decommission of Historical Abstraction Wells	11
RE-4 – Temporary De-watering from Excavations to Combined Sewer	11
RE-5 – Assessment of On-site Bunds.....	12
RE-6 – Environment and Nuisance Control	13
RE-7 – Minimise Risk to Infrastructure and River Irk	13
RE-8 – Identification, Isolation and Treatment of Invasive Plants	15
RE-9 – Site Clearance Operations	16
RE-10 – River Corridor Watching Brief	17
RE-11 – Delineation of WS17	17
RE-12 – Recovery of Topsoil within Parcel B	18
RE-13 – Delineation, Excavation and Treatment of Identified Asbestos Impact	18
RE-14 – Delineation, Excavation, Treatment and Disposal of Potential Volatile Contaminants	20
RE-15 – Speciation of Mercury.....	23
RE-16 – Excavation, Breaking and Processing of All Above- and Below-Ground Structures	24
RE-17 – Investigation of Potentially Impacted Soils.....	25
RE-18 – Delineation, Excavation and Treatment of Infilled Historical Ponds and Streams	26
RE-19 – Delineation, Excavation and Treatment of Former Historic Landfill Materials	28
RE-20 – Removal of Deleterious Material.....	32
RE-21 – Cut-And-Filling of MADE GROUND to Development Levels	32
RE-22 – Placement and Compaction of Upfill Material to Facilitate Ground Improvement by VSC	35
RE-23 – Construction of Temporary Working Platform	37
RE-24 – Replacement of Materials, Geotechnical Engineering Requirements	38
RE-25 – Preparation of Ground for Vibro-Stone Columns Within Tree Influence	40
RE-26 – Importation of Bulk Fill	40
RE-27 – Post Remediation Gas Monitoring.....	41
RE-28 – Preparation of Garden for Cover System	43
RE-29 – Provision of Subsoil	43
RE-30 – Provision of Topsoil.....	44
RE-31 – Independent Validation: Watching Brief	45
RE-32 – Waste Soils Surplus to Requirements	46
RE-33 – Validation of Materials for Potable Water Supply Infrastructure	46
RE-34 – Production of Drill and Grout Specification.....	48
RE-35 – Landfill Treatment.....	48
RE-36 – Remedial Verification Report	49
5. POST REMEDIATION BUILD PHASE REQUIREMENTS	50
5.1.1. Procedure for Placement of Chemically Suitable Cover System.....	50
5.2. Ground Gas Protection Measures	53



5.3. Potable Water Supply – Contaminant Assessment Criteria55

APPENDIX I LIMITATIONS..... 56

APPENDIX II GLOSSARY 58

APPENDIX III DRAWINGS 61

APPENDIX IV CHEMICAL TESTING RESULTS 62

APPENDIX V PHOTOGRAPHS 63

APPENDIX VI GEOTECHNICAL TESTING RESULTS..... 96

APPENDIX VII CONTROLLED WATERS EXCEEDANCES AND MBAT 97

APPENDIX VIII FORENSIC ANALYSIS OF TREATED FINES..... 98



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.

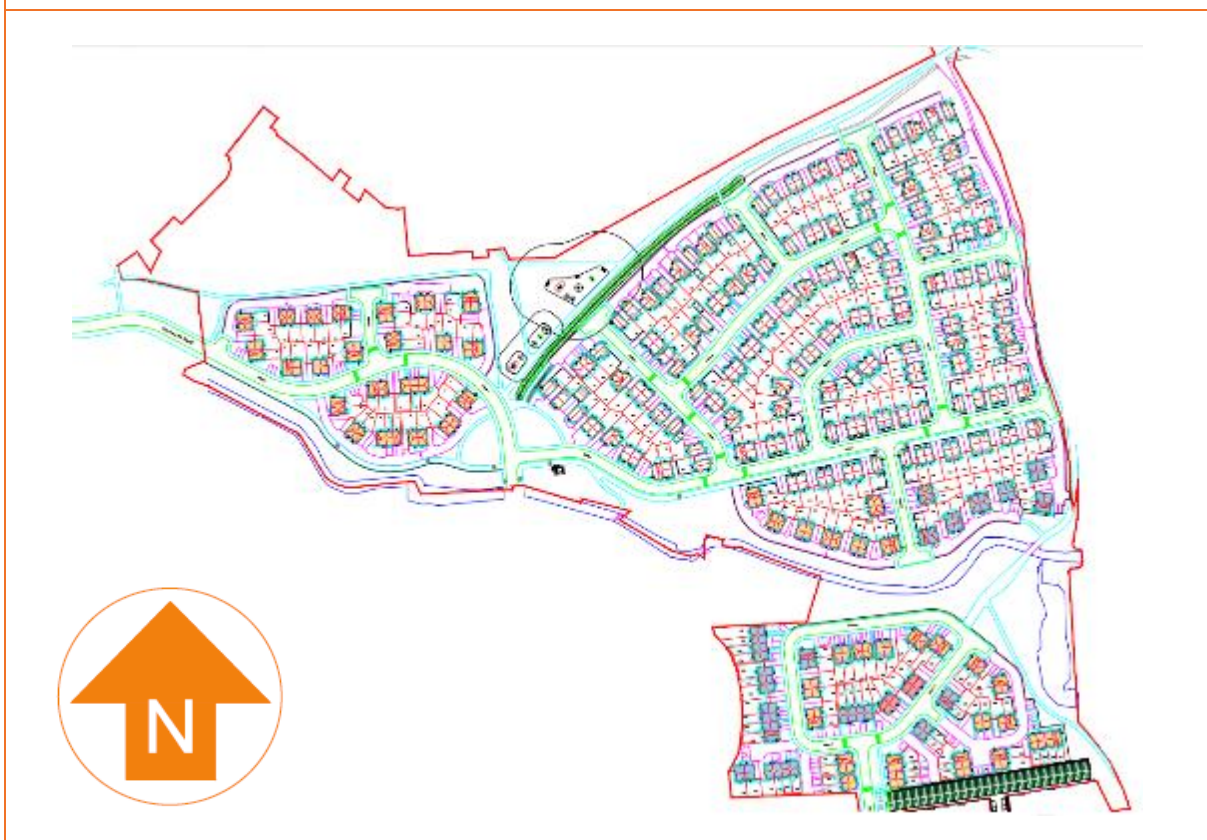
Kellen Homes appointed E3P as an independent Geo-Environmental Consultant for the site remediation, preparation/enabling, and validation works and the subsequent production of a suitably detailed report to ensure the satisfaction of the relevant planning conditions and geotechnical engineering requirements 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.

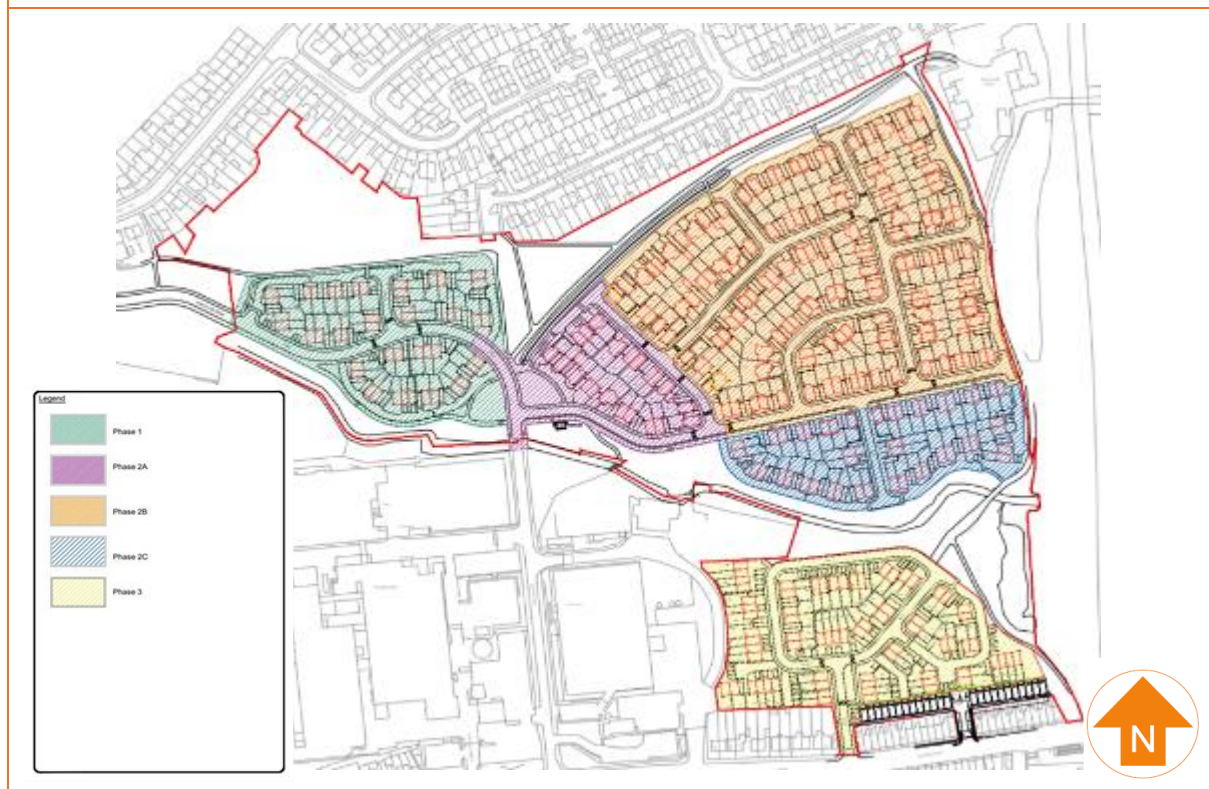
E3P has been provided with a draft planning layout (ref: 21/00744/FUL) detailing the proposed construction of 311 detached, semi-detached and terraced houses, with adopted estate roads and drainage infrastructure. A snapshot of the proposed development layout is indicated in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



This report refers to Phases 1, 2A, 2B, 2C and 3 throughout, and Figure 1.2 shows the extent of the Phases on site.

FIGURE 1.2 **SNAPSHOT OF PROPOSED DEVELOPMENT**



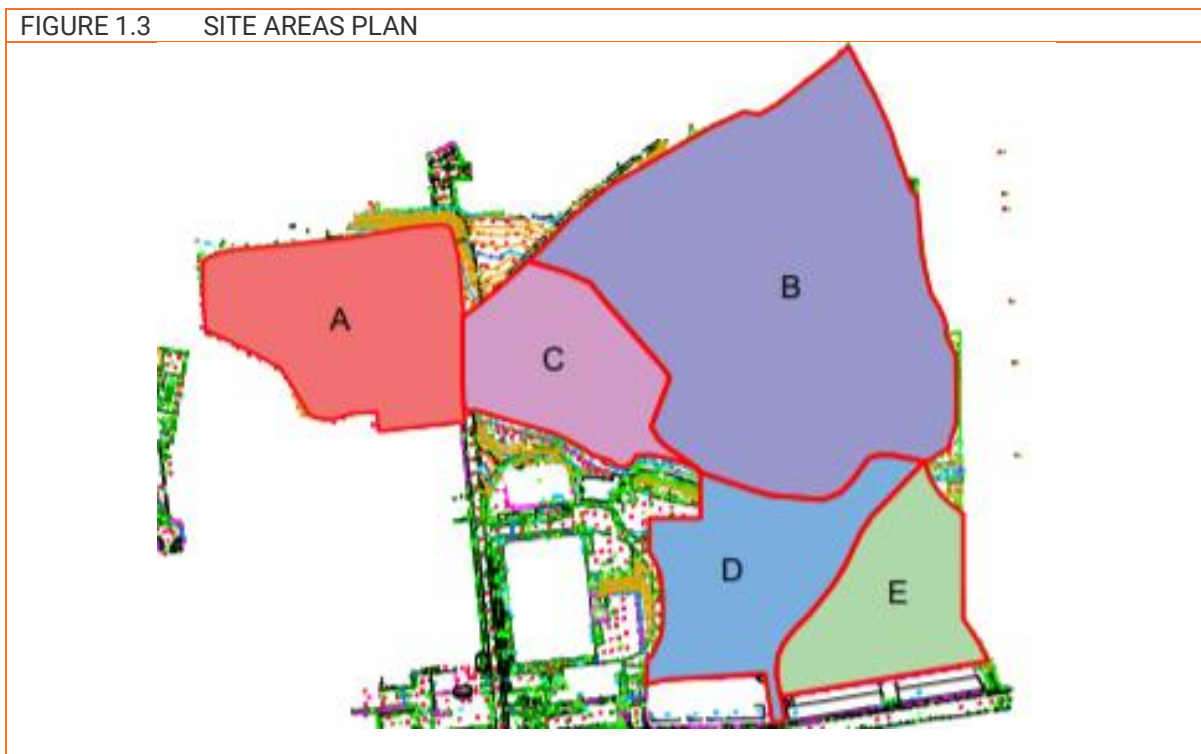
For ease, the site has been divided into the following 5 No. Discrete parcels in line with the previous report completed by Coopers in 2013. The parcels are:

- 📍 **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 environment.

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



-  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.

The Remediation and Site Enabling works commenced on the 26th October 2022 and were completed in by February 2024.

RE-1 – PRE-COMMENCEMENT SUPPLEMENTARY SITE INVESTIGATION

DATE OF WORKS UNDERTAKEN

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

The locations of areas that required further investigation are shown in Figure 4.1 (overleaf) and have been numbered Area 1 to Area 5.
--

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. 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/m ² , 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).

Urban Regen obtained a Standard Rules Permit (SR2008No27 - mobile plant for the treatment of soils and contaminated material, substances or products) to treat soils within Phase 2C (former landfill). The EA confirmed an agreement to the deployment of mobile plant to undertake waste remediation operations at Don Street under Reference: EB3704LN/W0009 – EAWML 105688 on 13th February 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 from excavations will be required on the site in isolated areas.

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).

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.

Works Undertaken

All works were completed in a manner so as not to create any structural risk to the adjacent highways. During remediation, works were largely 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

None.

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

12 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, 23-50844, 23-53489, 23-55330, 23-58057, 23-60519, 23-65120, 23-67947, 23-71240, 23-73916, 23-76378 and 24-77486

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 groundwater 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 upon with the Environmental Agency prior to the commencement of the work. 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 locations agreed with the EHO and EA. Sample locations are given on Drawing 14-554-026 in Appendix III and summarised below:

- 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 – Pond (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 to determine the risk to the aquatic environment. 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 VIII, indicating that heavy metals were potentially bioavailable during these times posing 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 are 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. Nickel and zinc are bio-available in upstream samples on the 18th December 2023, however, the values do not exceed EQS thresholds and are only present upstream.

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

Further Works

None.



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.

Across the site 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

April 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 former 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.

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 remained undisturbed.

Furthermore, biweekly water sampling of the River Irk was undertaken throughout works to the historic landfill (RE-7), water sampling shows that the site works have not had a detrimental impact on the adjacent watercourse.

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

Eurofins Report - 24-14785-1

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.

To date, a total of 15 topsoil samples have been submitted for analysis, at a frequency of 1 per 50m³ in line with the E3P remediation strategy, covering 750 m³ of site won topsoil.

Analysis for topsoil undertaken by 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.

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 2023

PHOTOGRAPHS

Plate 16-18



CHEMICAL TESTING

I2 Analytical Report - 22-95879-1 (WS402) *Arising and N/E/S/W/BASE*
I2 Analytical Report - 23-11122-3 (WS402) *South A and B*
I2 Analytical Report - 22-98397-1 (TP48) *Arising and N/E/S/W/BASE*
I2 Analytical Report - 22-97516-1 (TP305 And TP516) *Arising and N/E/S/W/BASE*
I2 Analytical Report - 23-22839-1 (WS203) *Arising 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.



Throughout treatment works within the historic landfill soils in Phase 2C, rare asbestos-containing material (ACM) was identified during screening works. Visual asbestos was picked, double bagged and removed from site. Remaining treated fine soils were sampled at 1 per 500m³, trace asbestos was identified throughout the treated Made Ground soils (37 of 74 samples) and quantified as containing between <0.001 % to 0.011 % (Stockpile 3A) loose fibres of chrysotile and amosite. Since the trace volumes did not exceed 0.1%, this material was used as upfill within Phase 2C, 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 as agreed with the EA and LPA.

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 19-24

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 arising 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 25-27

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 28-34

CHEMICAL TESTING

I2 Analytical – 23-23959-1 (SW Crush 001-003)

I2 Analytical – 23-53714-1 (SW Crush 101-103)

I2 Analytical – 23-51281-1 (6F Road 6-8)

I2 Analytical – 23-41866-1 (LF Crush 101-103)

I2 Analytical – 23-23959-1 (LF Crush 007-009)

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

Murray Rix Report: MRN 4588/74 – Parcel B Crush

Murray Rix Report: MRN 4588/151 – Parcel B 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) and Phase 2 (Parcel B-C). 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.

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

None.

RE-17 – INVESTIGATION OF POTENTIALLY IMPACTED SOILS

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 35-39

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.

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 41-43

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



Works Undertaken

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. The pond was delineated in January 2024 through mechanical excavation by Urban Regen under the supervision of E3P. The feature was excavated to a maximum of 2.17 m with geotechnically unsuitable organic material removed from the base and side walls chased out and stockpiled on site for removal. The excavation was surveyed and shown to be located within the rear gardens of Plots 104-105. The excavation has been left low for the placement of surplus civil arisings to be deposited and engineered to development levels. The feature is noted on Urban Regen AsBuilt Drawing Sheet 2 of 10 (APPENDIX III).

Further Works

Backfill and engineering of civil arisings placed within historic in Phase 2B.



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

DATE OF WORKS UNDERTAKEN

April 2023 – December 2023

SUPPORTING DOCUMENTS

14-554-L5-2 Supplementary Assessment (January 2023)

PHOTOGRAPHS

Plate 64-80

CHEMICAL TESTING

I2 Analytical Reports: 23-30021-2, 23,30824-1, 23-31573-1, 23-32252-1, 23-32496-1, 23-35733-1, 23-350005-1, 23-35717-1, 23-37201-1, 23-38013-1, 23-39718-1, 23-40134-1, 23-41466-1, 23-41964-1, 23-52298-1, 23-54571-1, 23-41964-2, 23-23716-2, 23-23402-2, 23-57174-1, 23-60537-1, 23-46404-1, 23-51249-1, 23-50909-1, 23-63462-1, 23-53528-1, 23-57174-1, 23-60537-1, 23-59928-1, 23-54566-1, 23-58048-1, 23-62548-1, 23-59928-1, 23-65157-1, 23-71252-1, 23-73588-1.

GEOTECHNICAL TESTING

Murray Rix Reports: MRN 4588-47, MRN 4588-48, MRN 4588-50, MRN 4588-56, MRN 4588-62, MRN 4588-64, MRN 4588-68, MRN 4588-72, MRN 4588-73, MRN 4588-74, MRN 4588-85, MRN 4588-86, MRN 4588-105, MRN 4588-106, MRN 4588-107, MRN 4588-121, MRN 4588-140A, MRN 4588-148, MRN 4588-151, MRN 4588-210, MRN 4588-213.

OVERVIEW OF WORKS

Background

A historic landfill is recorded on-site within Parcel B. As part of the remediation works, the landfill area will be processed in order to ensure the remaining soils don't pose a risk to human health or controlled waters. Human health screening levels have been developed for the site; following discussion with the EA it was decided that Level 3 Site Specific Remediation Targets for controlled waters were required for the landfill material. The Assessment for how these were generated is presented within letter report 14-554-L5 dated 22nd November 2022 which should be read in conjunction with this report.

Once excavated, the waste was sorted to remove any hazardous elements and materials that can be recycled in a regulatory compliant manner. The material will then be subject to further testing to assess its suitability to remain on site.

Works Undertaken

Urban Regen obtained a Standard Rules Permit (SR2008No27 - mobile plant for the treatment of soils and contaminated material, substances or products) to treat soils within Phase 2C (former landfill). The EA confirmed agreement to the deployment of mobile plant to undertake waste remediation operations at Don Street under Reference: EB3704LN/W0009 – EAWML 105688 on 13th February 2023.

Prior to treatment works commencing heras fencing was erected around the perimeter of the historic landfill area. A processing, storage and impacted soils area was set up and sign posted. The impacted soils area consisted of a bunded and clay lined above ground storage pit, with visqueen membrane across the base and side walls to prevent any potential cross contamination. Temporary waste bins (skips) were set up and marked to accept anticipated waste streams generated through the treatment process.



Treatment of the historic landfill commenced in the west of the landfill in April 2023 and progressed eastward until completion in December 2023. The treatment of soils was split into four operations as outlined below.

- ✳ Operation 1 – Primary Physical Treatment
- ✳ Operation 2 – Manufacture of Recycled Aggregates
- ✳ Operation 3 – Validation of Fines
- ✳ Operation 4 – Solidification & Stabilisation of Fines

Operation 1 - Primary Physical Treatment

Made ground materials within the landfill were excavated to the top of natural material. Large, clearly identifiable waste material types (brick, metal, timber etc) were removed by the plant operator and segregated in readiness for further treatment where appropriate (see operation 2) or removal from site. Where wastes were to be removed from site, they were placed within temporary storage skips based on material type (metal, wood, general waste) prior to removal.

The remaining soils were then fed via a hopper onto a three way screening system that formed a >50mm stockpile, 20 – 50mm stockpile and <20 mm fines stockpile. Within the larger waste stockpiles (>20 mm), operatives manually removed clearly identifiable waste fractions such as metal, timber, visual ACM and general waste (plastic and textile) into temporary waste skips for removal from the site. Inert fractions such as stone, concrete and brick were stockpiled on-site for further recycling (operation 2). The fine product (<20 mm) was stored as per the MMP in 1000m3 stockpiles for further validation testing (operation 3). Circa 37,000m3 of fine soils were processed, with each 1000m3 stockpile (37 in total) tracked from origin, stockpile location and final placement by the Urban Regen surveyor.

Operation 2 - Manufacture of Recycled Aggregates

The WRAP Quality Protocol for the manufacture of recycled aggregates from inert waste is a protocol that allows defined inert waste materials to be regarded as having achieved 'end of waste' status in line with Article 6 of the Waste Framework Directive 2008.

Following the removal of all oversized material from within the landfill, in November 2023 inert oversized fractions (brick, stone and concrete), segregated during the initial physical treatment (Operation 1), were crushed on site to manufacture a suitable 6F5 recycled aggregate product. Prior to loading the crusher, an Urban Regen operative undertook a final visual inspection to remove any non-conforming materials for placement into temporary waste containers as per Operation No. 1. The crusher teeth were set to meet the maximum particle size of the required product specification (125mm for 6F5).

Following crushing the recycled aggregate product was tested as per Section 4.9, Table 4.2 within the E3P Remediation Strategy (Report Ref: 14-554-R2 Rev 10, dated February 2023). Testing is summarised below:

- ✳ Particle Size Distribution - 1 per week
- ✳ Particle Density and Water Absorption – 1 per month
- ✳ Resistance to Fragmentation (LA Co-efficient) – 1 per 6 months
- ✳ Classification of Constituents (inclusive of bitumen content) – 1 per month
- ✳ Water Soluble Sulphate – 1 per month

Geotechnical testing was undertaken by Murray Rix UKAS accredited geotechnical laboratory with results confirming suitability for the recycled aggregate as a 6F5 product. Results are provided on geotechnical laboratory certificates MRN 4588/151 and MRN 4588/74 in Appendix VI.



Chemical samples were obtained of the site won crush at a frequency of 1 per 1000m³ in accordance with the E3P remediation strategy (Report Ref: 14-554-R2 Rev 10, dated February 2023). Trace chrysotile and amosite asbestos (0.014 % - 0.003 %) were identified in three of six samples, however, given the quantity (<0.1% asbestos) these soils are deemed to be suitable for placement below hardstand in line with the asbestos conceptual site model. Additionally, minor exceedances of non-volatile PAH's (benzo[b]fluoranthene, benzo[a]pyrene and Dibenzo[a,h]anthracene) were identified within the recycled aggregate. Non-volatile PAH's identified have primary exposure pathways related to dermal contact and ingestion. Soils were placed below hardstanding (plots, driveways and roads) that will serve to cut the exposure pathway. Therefore, no future risk will be present, and the soils are considered suitable for use.

Operation 3 – Validation Of Fines

Following Operation 1, "batches" of treated fine soils (<20mm) were separated into 1000m³ stockpiles, demarked, geotechnically, forensically and chemically tested to ensure suitability. A total of 37 stockpiles were formed with the following validation testing and frequency completed in order to meet and 'end of waste' criteria as prior to placement within Parcel 2C.

Chemical Analysis

Chemical analysis including US EPA16 speciated PAHs, TPH C5-C35, asbestos ID, CLEA inorganic metals, semi volatile organic compounds (SVOC) and volatile organic compounds (VOC) was undertaken at 1 per 500 m³. Chemical analysis was compared to 'target' levels provided in Appendix IV.3 (Site Specific End of Waste Criteria) and Appendix IV.4 (Level 3 Remedial Target Concentrations For The Former Landfill Area With Respect To Controlled Waters) within the E3P Remediation Strategy. The 'target' level for asbestos was raised from 0.001% as recorded within Appendix IV.3, to the human health upfill threshold of 0.1 % following agreement with the EHO and EA.

Chemical analysis confirmed the soils suitability for use with regard to end of waste, controlled waters and human health. The results of the chemical analysis are summarised below:

- ✳ No exceedance of site specific end of waste criteria (Remediation Strategy Appendix IV.3).
- ✳ Occasional minor exceedances of heavy metals (zinc, lead and arsenic) in comparison to remedial target concentrations with respect to controlled waters (Remediation Strategy Appendix IV.4). In these instances, leachate samples were obtained and recorded heavy metals below EQS values. Additionally, water sampling of the adjacent River Irk (primary controlled water receptor) showed the site works had not had a detrimental impact on the adjacent watercourse (RE-7 and RE-10). Given that no detrimental impact was recorded during active disturbance of these soils, soils are considered a very low risk to controlled waters once the soils are placed and not disturbed. Furthermore, leachate analysis confirms that the low-solubility heavy metals are unlikely to be mobilised.
- ✳ Occasional minor exceedances of heavy metals (arsenic and lead) and non-volatile PAH (Benzo[a]pyrene, Benzo[b]fluoranthene and Dibenzo[a,h]anthracene) have been recorded in comparison to human health remediation targets (Remediation Strategy Appendix IV.1). Non-volatile PAHs and heavy metals 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.
- ✳ Rare exceedances of naphthalene in comparison to human health remediation targets (Remediation Strategy Appendix IV.1) were recorded in SP25 and SP32. Naphthalene has a primary pathway through vapour inhalation. Both stockpiles were placed in a dedicated laydown area and subject to further mechanical treatment. Following this process, stockpiles were re-sampled by E3P. For both SP25 and SP32 re-tests, naphthalene was recorded below the human health threshold and soils deemed suitable for use.



- ✳ Minor concentrations of SVOC's 2-Methylnaphthalene, Dibenzofuran and Carbazole above the laboratory limit of detection (LOD) were recorded occasionally throughout the sampling. The aforementioned compounds do not have published threshold's, E3P has undertaken an internal risk assessment of SVOC's 2-Methylnaphthalene, Dibenzofuran and Carbazole and determined that there is no vapour risk to human health with respect to these compounds. This assessment has been agreed with the EHO. Additionally, 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, there is no future risk to human health.

Forensic Analysis

Based on Table 4.4 within the E3P Remediation Strategy and RB17 Appendix C, E3P undertook forensic analysis at one per 1000m³ to assess the volume of undesirables. E3P obtained forensic samples across the stockpiles from a minimum of 10 random locations to obtain a representative sample.

Samples were screened with a 10mm sieve with oversized materials remaining on the sieve split based on waste type with und

In line with the remediation strategy requirements, one sample per month was submitted to Murray Rix UKAS accredited laboratory and scheduled for classification of constituents testing to confirm the E3P forensic testing findings.

Furthermore, E3P undertook a visual inspection of each stockpile (surpassing the 1 per 1000m³ requirement) prior to sampling to ensure soils were visually clear of waste streams.

For all stockpiles unacceptable materials were confirmed to comprise <1% of the total volume of the sample and therefore suitable to achieve end of waste status. A materials forensic constituents' certificate confirming suitability is provided for each stockpile in Appendix VIII. Where classification of constituents was undertaken by the geotechnical laboratory, E3P did not undertake additional in-house forensic assessment. Classification of constituent testing is provided in Appendix VI.

Geotechnical Analysis

E3P undertook geotechnical testing to confirm compliance with SHW600 for class Class 1 or Class 2 soils. Sampling, analysis and approval were undertaken prior to any backfilling into the former landfill void spaces. Geotechnical sampling was undertaken in accordance with Section 4.9, Table 4.3 in the E3P Remediation Strategy (Report Ref: 14-554-R2 Rev 10, dated February 2023). Testing is summarised below:

- ✳ Particle Size Distribution - 1 per 1000m³
- ✳ Water Content – 1 per 1000m³
- ✳ Classification of Constituents (inclusive of bitumen content) – 1 per month
- ✳ Total Sulphur and Sulphide – 1 per 1000m³

Geotechnical testing was undertaken by Murray Rix UKAS accredited geotechnical laboratory with results confirming suitability for Class 2C, with the exception of SP20, which was Class 1A. Generally, soils were proven to be within 3% of the optimum moisture content. Sulphide was recorded between <0.01 – 0.04 % across the stockpiles, with total sulphur recorded between <0.1 – 0.2 %. Results are provided on geotechnical laboratory certificates in Appendix VI.

Geotechnical test results confirmed the soils to be geotechnically suitable as engineered Class 2 products.

Operation 4 – Solidification & Stabilisation of Fines

As per Operation 3, fine soils were compliant with end of waste criteria and do not pose a future human health or controlled waters risk. As such, solidification/stabilisation (S/S) treatment was not required to reduce mobility or bind contaminants within the soils.



The bulk of the landfill works were completed during the drier months (April-October 2023), during the wetter months (November-December 2023) placement and engineering of soils was only undertaken during dry weather periods. Stockpiles were sealed and soils were generally recorded to be within 3% of the optimum moisture content. Where soils were recorded to be sufficiently wet of the optimum 1-2% of OPC was added to improve the moisture content to allow suitable engineering in line with MCHW Series 600.

Further Works

None.

RE-20 – REMOVAL OF DELETERIOUS MATERIAL

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 44-48

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.

Within the former landfill area (Parcel 2C), deleterious materials were removed and segregated in line with RE-19.

Further Works

None.

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

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 49-56

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)
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 (material sourced from Phase 2)
- ✧ Cut and Fill (balance) within Phase 3
- ✧ Cut and Fill (balance) within Phase 2C (former landfill)

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, Dibenzo(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.

Phase 2B comprised a cut exercise with natural soils encountered throughout. Soils generated during the cut process were utilised for upfill in Phase 1. Given the shallow depth of natural material and findings of the multiple phases of intrusive investigation, foundations in this area of the site are to comprise standard strip and mass trench foundations.

Phase 2C was upfilled with Class 2C made ground soils from the landfill treatment activities as described in RE-19. Fill materials were placed and 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, which is presented in Appendix VI. Chemical sampling of upfill from Phase 2C confirmed soils were suitable for use as upfill (RE-19).



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

None.

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

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 49-56

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)

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.

Plots within the majority of Phase 2B (former landfill) were prepared for a driven piled solution. However, plots immediately north of Road 3 were prepared for a VSC utilising class 2C product produced by the landfill treatment (discussed in RE-19). Where Class 2C Made Ground was placed NNDG testing was undertaken on layers to confirm >95% compaction. All results confirmed adequate compaction >95%.

Phase 2C, was an area of cut, standard strip and mass trench foundations are proposed to be set within the suitable natural soils.

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

None.



RE-23 – CONSTRUCTION OF TEMPORARY WORKING PLATFORM

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 57-58

CHEMICAL ANALYSIS

I2 Analytical Report - 23-19920 (Import 105-107 6F5)
I2 Analytical Report - 23-26301 (Import 108-109 6F5)
I2 Analytical – 23-23959-1 (SW Crush 001-003)
I2 Analytical – 23-53714-1 (SW Crush 101-103)
I2 Analytical – 23-41866-1 (LF Crush 101-103)
I2 Analytical – 23-23959-1 (LF Crush 007-009)

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
Murray Rix Report: MRN 4588/74 – Parcel B Crush
Murray Rix Report: MRN 4588/151 – Parcel B 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.

Works Undertaken

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 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

None.



RE-24 – REPLACEMENT OF MATERIALS, GEOTECHNICAL ENGINEERING REQUIREMENTS

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 49-56

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

OVERVIEW OF WORKS

Background

Upfill 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

Upfill 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 2B (former landfill) the development platform has been constructed with compacted upfill comprising site-derived Made Ground soils and natural subsoils from Phase 2B. Soils were formed as a product as per RE-19. The majority of Phase 2B was upfilled in a manner that ensures 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. Plots immediately north of Road 3 were prepared for a VSC utilising class 2C product produced by the landfill treatment (discussed in RE-19). Where Class 2C Made Ground was placed, in-situ density testing was undertaken on layers to confirm >95% compaction of the laboratory determined maximum (to ensure no creep settlement in engineered fill). All results confirmed adequate compaction >95% of the MDD. The results of the in-situ geotechnical tests confirm that all locations met the compaction specification and are presented in Appendix VI.

Within Phase 2C the works comprised cut operations, with surplus soils used to form the development platform across the wider site.

Within Phase 3 the development platform was constructed with upfill comprising site derived Made Ground soils and natural subsoils from Phase 3. Phase 3 was upfilled in a manner that ensures 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 completed on all roads and piling mats.
-  In-situ density testing (NNDGT) 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

None.



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

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 49-56

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 issues associated with volumetric instability in clay soils.

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, and in-situ hand shear vane testing was 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.

VSC plots in Phase 2C were outside the influence of trees. However, given the nature of the turnover works the Made Ground Soils were removed to the top of natural with the resulting void upfilled with Class 2C materials achieving >95% compaction of the Maximum Dry Density.

Phase 3 and 2C utilised a pre-cast piled foundation, and no further works were required in these areas.

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

None.

RE-26 – IMPORTATION OF BULK FILL

DATE OF WORKS UNDERTAKEN

January 2023



Don Street, Middleton

Remediation and Enabling Works Validation

November 2024

PHOTOGRAPHS

Plate 59

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 across the wider site.

Further Works

None.

RE-27 – POST REMEDIATION GAS MONITORING

DATE OF WORKS UNDERTAKEN

April 2023 to October 2024

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)

14-554-R9-1 October 2024 Parcel B



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 phased and 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).

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

Additional ground gas monitoring was undertaken within Phase 2B/C (Parcel B) July and August 2024. The full assessment is presented within E3P Ground Gas Addendum, 14-554-R9-1 October 2024 Parcel B.

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 completed phases 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

Further monitoring within the remaining area of Parcel B.

RE-28 – PREPARATION OF GARDEN FOR COVER SYSTEM

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plates 60-61

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

Across the site 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

None.

RE-29 – PROVISION OF SUBSOIL

DATE OF WORKS UNDERTAKEN

Throughout

PHOTOGRAPHS

Plate 62-63

CHEMICAL TESTING

i2 Analytical Report – 22-14266
Eurofins Report – 24-14785

OVERVIEW OF WORKS

Background

Natural drift deposits (predominantly granular soils) are deemed suitable for use within the upper 600 mm of clean cover in 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. To date, a total of 10 subsoil samples have been submitted for analysis, at a frequency of 1 per 250m3 in line with the E3P remediation strategy, covering 2,500 m3 of site won subsoil.



Analysis for subsoil undertaken 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

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 likely to be 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)

Eurofins Report - 24-14785

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.

To date, a total of 15 topsoil samples have been obtained from the stockpiled topsoil generated from Parcel 2B. In line with the specified frequencies within the remediation strategy this covers 750 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 1-63

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



None.

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

None.

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

UURA - Don Street Phase 2B and 2C – February 2024

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 2B is located within an area of cut, with natural soils present. Phase 2C is a former "landfill", soils in this area have been processed to ensure remaining soils do not pose a risk to human health or controlled waters with remaining soils falling below remedial and end of waste thresholds. Remedial works undertaken in line with RE-19, RE-35 and Section 4 of E3P Remediation and Enabling Works Strategy (Ref 14-554-r2-rev10, February 2023). The 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). A UKWIR assessment (14-554 - UURA - Don Street, Phase 2B and C – February 2024) was undertaken by E3P and recommended barrier pipe was used within Phase 2B and C of the development due to the presence of TPH above PE thresholds in the existing soils.

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
None.

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

April 2023 – December 2023

OVERVIEW OF WORKS

Background

Treatment of the former landfill will incorporate excavation of made ground materials from within the extent of the landfill boundary to the required depth.

Works Undertaken

Treatment of landfill soils was undertaken in line with methods and testing outlined in RE-19.

Further Works

None.



RE-36 – REMEDIAL VERIFICATION REPORT

DATE OF WORKS UNDERTAKEN

October 2022 – December 2023

PHOTOGRAPHS

Plate 1 - 80

OVERVIEW OF WORKS

This report outlines works undertaken relating to site clearance, chemical testing, remedial works, remedial verification and waste transfer.

This report should 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

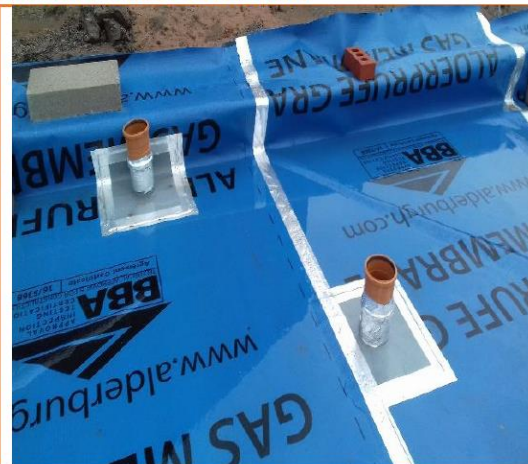
General Condition of Membrane-Good Condition



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

