



Verification Report

Clarendon Road Phase 3B

Mary Neuner Road

Wood Green

N22 6TZ

London

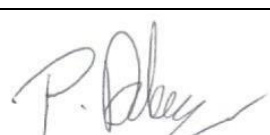
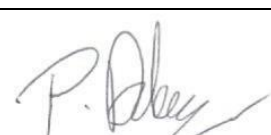
St William Homes LLP

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1 Introduction

Keltbray were instructed by St William Homes LLP (St William), the client, to complete a package of works at Clarendon Road Phase 3B, Mary Neuner Road, Wood Green, N22 6TZ, London (referred to hereafter as 'site'). Site location and layout drawings, including environmental monitoring locations and general area, are included in **Appendix A**.

This report aims to provide a detailed summary of the works completed by Keltbray between 30th October 2021 and 22st July 2022 and demonstrate compliance against the remediation objectives.

It is anticipated that this document will be issued as part of a wider Remediation Verification Report for approval/comment to London Borough of Haringey and the Environment Agency (EA) as statutory planning consultees to enable discharge of the relevant contaminated land-related planning condition(s). This document will also be issued to Atkins Ltd. (Atkins) as the client's appointed environmental consultant.

1.1 Background and Key Design Information

The Phase 3B development area is approximately 1.5 ha and includes the northern part of the former gasworks site. The site area is presented in drawing *CR3B-KRE-X-0001-GG-JH-2022*, **Appendix A**.

The site is bounded by Mary Neuner Road to the west, the Olympia trading estate to the north and residential properties on Hornsey Park Road to the east. The proposed development includes multiple residential blocks, as well as a large joint basement structure which covers the majority of the site. Residential blocks are scheduled of up to 13 storeys, and referred to Blocks D1, D2, D3, D4, E1, E2, E3 and F1. The remainder of the site area will comprise hard and soft landscaping, and pedestrian and vehicle access routes.

The ground conditions on site comprise Made Ground soils overlying London Clay (approximately 25m thick) which is underlain by the Lambeth Group, Thanet Sands and Chalk. The EA classifies the Lambeth Group and the Thanet Sands as a Secondary (A) Aquifers and the Chalk as a Principal Aquifer.

A culverted watercourse, the Moselle Brook, runs west to north east along the southern and eastern boundary. The EA classifies the Moselle Brook as a main river.

The site has been subject to past demolition and civilisation works, completed by National Grid Property Holdings (NGPH) under planning condition *HGY/2009/0503* and varied by *HGY/2013/2455*, *HGY/2016/0026* and *HGY/2016/166*. In 2017, GH1 and GH3 were demolished with GH3 partially infilled.

In 2020 Atkins were commissioned by St William to undertake additional assessment of the site and produce an appropriate remediation strategy and method statement. Subsequently Atkins produced the following reports:

- Geotechnical Site Assessment Report (*5192204_P3_GE_R001/2.0 February 2020*);
- Human Health Detailed Quantitative Risk Assessment (*5192201_P3_HHDQRA_Rev2, February 2020*);

- Controlled Water Detailed Quantitative Risk Assessment (5192204_P3_CWDQRA_Rev03, May 2020);
- Remediation Strategy (5192204_P3_RemStrat_Rev4, May 2020);
- Remediation Method Statement (5192204_P3_RMS_Rev4, May 2020); and
- Foundation Work Risk Assessment (5192204_P3_FWRA_Rev3, May 2020)

The Phase 3B site covers the entire area previously remediated by Keltbray in 2020, as well as an additional strip of land to the north. This area was subject to an additional investigation and interpretive reporting, with the same remediation methodology being applied. The foundation works risk assessment was also updated during this time. The following documents were produced for the additional Phase 3B area:

- Phase 3B, Site Investigation Factual Report (5196431, Phase 3B – Clarendon Road, Hornsey, Site Investigation Factual Report, Atkins, June 2021);
- Phase 3B, Site Investigation Interpretative Report (5196431, Phase 3B – Clarendon Road, Hornsey, Site Investigation Interpretative Report, Atkins, June 2021) ; and
- Foundation Works Risk Assessment (5192204, Phase 3 and 3B – Clarendon Road Hornsey, Foundation Works Risk Assessment, Atkins, June 2021)

1.1.1 Previous Remediation Works

In 2020 Keltbray completed the initial remediation works for the Phase 3 area which included stabilisation of grossly impacted material. These works were reported in a verification report:

- Phase 3, Verification Report (RE6075-VR-AH-November2020-03-Phase 3, Clarendon Road Phase 3, Verification Report, Keltbray, May 2021)

It is understood that, at the time of writing, the above report has not been submitted to the relevant planning authority and hence, to date, the relevant planning conditions have not been discharged. As such all basement construction works were undertaken under the same remediation requirements as detailed in the Remediation Strategy and Remediation Method Statement. The results of which are reported herein.

1.1.2 Conceptual Site Model

The potential contaminant linkages as identified by Atkins, which they considered to present a potentially unacceptable risk to human health and/or environmental receptors based on the site's intended future use are summarised in **Table 1**.

Table 1: Potential Contaminant linkages and Qualitative Risk Assessment – Pre-remediation

Source	Pathway	Receptor	Consequence	Likelihood	Risk Category
Residual contamination in Made Ground across the site associated with former Hornsey Gasworks	Ingestion / dermal contact / inhalation of contaminated soil / dust.	Future site users (commercial / residential)	Medium	Unlikely	Low
		Off-site workers and residents	Medium	Unlikely	Low
	Migration of organic contaminants through drinking water pipes.	Future site users (commercial / residential)	Medium	Unlikely	Low
	Accumulation and / or ignition of ground gas into buildings.	Future site users (commercial / residential)	Medium	Likely	Moderate
		Off-site residents	Medium	Unlikely	Low
	Migration and build-up of volatile vapours within structures followed by inhalation.	Future site users (commercial / residential)	Medium	Likely	Moderate
		Off-site residents	Medium	Unlikely	Low
	Migration and build-up of ground gas (CO ₂ and CH ₄) within structures.	Future site users (commercial / residential)	Medium	Unlikely	Low
	Leaching / Dissolution followed by Migration of NAPL/ contaminated perched water followed by chemical attack of materials.	Future on-site property (buildings / structures / services)	Medium	Unlikely	Low
	Leaching / dissolution of contaminants from contaminated soil / NAPL	Surface water (Moselle Brook)	Medium	Unlikely	LOW (moderate for ammonium, sulphate, and NAPL)
	Leaching / dissolution of contaminants from contaminated soil / NAPL followed by lateral migration within groundwater water.	Surface water (Moselle Brook)	Medium	Unlikely	LOW (moderate for ammonium, sulphate and NAPL)
	Man-made pathway developed during building works, e.g. foundation construction or drainage	Surface water (Moselle Brook)	Medium	Unlikely	Low

Source	Pathway	Receptor	Consequence	Likelihood	Risk Category
Localised asbestos contamination in Made Ground	Inhalation of contaminated soil/dust	Future site users (commercial / residential)	Severe	Unlikely	Moderate/Low
		Off-site works and residents	Severe	Unlikely	Moderate/Low
Residual contamination within the upper horizons of the London Clay.	Migration and build-up of volatile vapours within structures	Future site users (commercial/residential)	Mild	Unlikely	Very Low
		Off-site works and residents	Mild	Unlikely	Very Low
	Migration of organic contaminants through drinking water pipes.	Future site users (commercial/residential)	Medium	Unlikely	Low
	Leaching / dissolution from contaminated soil / NAPL	Surface Water (Moselle Brook)	Medium	Unlikely	LOW (moderate for ammonium, sulphate, and NAPL)
	Leaching / dissolution from contaminated soil / NAPL followed by migration within the groundwater.	Surface Water (Moselle Brook)	Medium	Unlikely	LOW (moderate for ammonium, sulphate, and NAPL)
		Secondary (A) Aquifer and Principal Aquifer within the Lambeth Group, Thanet Sands, and Chalk.	Medium	Unlikely	Low
	Migration of NAPL / contaminated perched water followed by chemical attack of materials	Future on-site property (buildings / structures / services)	Medium	Unlikely	Low
Contamination in groundwater above the London Clay.	Leaching / dissolution of contaminants from contaminated soil followed by lateral migration within water.	Surface water (Moselle Brook)	Medium	Unlikely	LOW (moderate for ammonium, sulphate, and NAPL)
		Secondary (A) Aquifer and Principal Aquifer within the Lambeth Group, Thanet Sands, and Chalk	Medium	Unlikely	Low
Site won soils placed within gas holder bases including those processed using solidification / stabilisation methodology	Inhalation of soil derived vapours	Future site users (commercial/residential)	Severe	Unlikely	Low
	Leaching / dissolution from contaminated soil / NAPL	Surface water (Moselle Brook)	Medium	Unlikely	LOW (moderate for ammonium, sulphate, and NAPL)
	Leaching / dissolution of contaminants from contaminated soil followed by lateral migration within groundwater.	Surface water (Moselle Brook)	Medium	Unlikely	LOW (moderate for ammonium, sulphate, and NAPL)
		Secondary (A) Aquifer and Principal Aquifer within the Lambeth Group, Thanet Sands, and Chalk	Medium	Unlikely	Low

Source	Pathway	Receptor	Consequence	Likelihood	Risk Category
Mobile free phase NAPL	Migration of free phase NAPL	Surface water (Moselle Brook)	Severe	Unlikely	Moderate/Low
Off-site contamination in perched groundwater associated with historical gasworks uses, railway sidings, and light industrial land uses.	Lateral migration in perched water followed by vapour inhalation.	Future site users (commercial/residential)	Medium	Unlikely	Low
	Leaching and dissolution from impacted soil and / followed by migration in groundwater	Surface water within the Moselle Brook culvert Secondary (A) Aquifer and Principal Aquifer within the Lambeth Group Thanet Sands and Chalk	Medium	Likely	Moderate
	Migration in groundwater	Surface within the Moselle Brook culvert	Medium	Unlikely	Moderate
		Secondary (A) Aquifer and Principal Aquifer within the Lambeth Group Thanet Sands and Chalk	Medium	Unlikely	Moderate

1.1.3 Scope of works

To address the identified pollution linkages, the following scope of works for the remediation was identified:

- Removal of redundant hardstanding, foundations, services and any potentially contaminative structures;
- Inspection and validation of excavation extents against Site Specific Assessment Criteria (SSAC);
- Segregation and disposal of generated arisings;
- Assessment and sampling of material destined for offsite disposal;
- Import and sampling of suitable recycled aggregates for pile platform construction; and
- Environmental monitoring for key factors including air quality, dust, noise and vibration.

As well as completing the above in line with the Remediation Strategy and Remediation Method Statement (RMS) Keltbray were also contracted to undertake the following:

- Sheet and contiguous piling to form the basement wall structures;
- Capping beam construction for basement structures D4 and E1, E2 & E4; and
- Groundwater monitoring and reporting on a biweekly basis during the remediation works and weekly during the piling works as specified in the FWRA. [This subsequently reduced to a monthly basis for 12 months following completion of piling works].

N.B In addition to the works outlined above, a Volatile Organic Compound (VOC) vapour and gas resistant membrane is also required to meet the requirements of Characteristic Situation 2. Part of this was installed in the capping beam constructed by Keltbray, however this is to be completed and reported by a third party in a separate verification report.

1.1.4 Key Stakeholders and Roles

The following stakeholders were involved in the works.

Table 2: Project Stakeholders and Roles

Role	Project Stakeholders	Contact
Client	St William Homes LLP	Timothy Collinson
Client's Environmental Consultant	Atkins Ltd	Anna Nash
Regulator (Controlled Waters)	Environment Agency	Themis Kantara
Regulator (Planning / Human Health)	London Borough of Haringey	Kenny Abere
Sewage Undertaker	Thames Water Utilities Ltd	Nick Gorham
Contractor	Keltbray Ltd	Joe Darcy

1.1.5 Remediation Strategy and Methodology

The RMS objectives were designed to mitigate identified risks and sever the identified pollution linkages. The strategy focused on removing sources of contamination such that residual ground conditions conformed to the SSAC.

As per the RMS, all soils were screened, stockpiled and assessed for reuse based on visual and olfactory evidence of contamination in addition to the SSAC's. The definitions of Visual and Olfactory evidence are summarised in **Table 3**. The SSAC are presented below in **Table 4**.

Table 3: Visual and olfactory indicators of contamination

Contaminant / Indicator	Criteria
Free cyanide	Visual: Blue oxide staining
PAHs and coal tar	Visual: Black liquid or semi-solid tar in veins or zone. Black/dark stained or coated surfaces Olfactory: strong hydrocarbon odour
TPH	Visual: Liquid oil, oil saturated solids in veins or zones. Black/dark stained or coated surfaces. Olfactory: strong hydrocarbon odour
Asbestos	Visual: ACM clearly observed as fragments or large fibre bundles within the soil

Table 4: Site Specific Assessment Criteria

Determinants	Soils SSAC	Leachate SSAC (mg/l)
Asbestos	<0.1% w/w	N/A
Sulphate	18,000 mg/kg	2,900
Total Ammonium	21.6 mg/kg	10.3

As the site will be capped with buildings, hardstanding and capping in soft landscaped area, material passing the leachate criteria only were considered suitable for reuse (as long as they also passed the visual and olfactory and PID assessment).

1.2 Verification Strategy and Methodology

The RMS stipulated the following verification requirements as presented in **Table 5**.

Table 5: Verification Strategy

Verification Strategy	Methodology
Validation of excavation base	Visual and olfactory inspection to confirm absence of gross contamination
	Validation testing to demonstrate compliance against SSAC's every 100m ²
Verification of placed site won material	Visual and olfactory inspection to confirm absence of gross contamination
	Verification testing to demonstrate compliance against SSAC's (1 sample per 250m ³).
Verification of imported material	Verification testing to demonstrate compliance against Target Import Criteria on a frequency of 1 sample per 250m ³ .

In addition to the above, material reused on site was also tested for the determinands presented in the Generic Assessment Criteria (GACs) for human health > 1 m suite. These results were for information only.

2 Detailed Descriptions of Works

As part of the contracted works the following activities were completed.

2.1 Pre-Mobilisation Works

Various licenses and consents were acquired to facilitate the works, details of which are provided below.

2.1.1 Mobile Treatment Permit

To permit treatment of material onsite a deployment (reference CB3902KF/W0045) was approved by the regulators against Keltbray's SR2008 No 27: mobile plant for treatment of soils and contaminated material, substances or products (more commonly referred to as a Mobile Treatment Permit or MTP). The approved deployment period commenced on 29th March 2022 and was valid for 52 weeks.

A full copy of the MTP, deployment application and a copy of the EA deployment letter CB3902KF/W0045 are included in **Appendix B**. Relevant correspondence between Keltbray and the EA is summarised in **Section 2.1.5**.

2.1.2 Materials Management Plan

To allow for the reuse of site-won material under the *CL:AIRE Definition of Waste: Development Industry code of Practice* (DoWCoP) a Materials Management Plan (MMP) was prepared and issued to a qualified person for declaration (*RE6089.MMP.071021.R2*). **Appendix B** contains the declaration (MMP ref: 2021-10-13 09:00:11).

This MMP was prepared for the reuse of material under Block D3 to achieve the required levels. A total volume of 538m³ was declared for this. Upon verification, a recorded volume of 178m³ of material reused was reported. The verification of this MMP is reported separately to CL:AIRE as report *KB-6089-MMP-VR-001 Keltbray, Clarendon Road Phase 3B, MMP Verification Report, August 2022*.

2.1.3 Discharge Consents

During the works, two applications were submitted and approved by Thames Water allowing discharge of water from the site under Discharge Consents TDEC2GK0 and TDEE0CX4. The locations of the on-site permitted discharge locations are shown in drawing *CR3B-KRE-X-0001-GG-JH-2022* included in **Appendix A**. Although two locations were permitted, water was only discharged via Mary Neuner Road under consent TDEC2GK0. Upon expiry this consent was renewed as TDEEE0DB9.

Copies of the consents and associated compliance limits are included within **Appendix B**. Further information of the subsequent testing and treatment of groundwater are described in **Section 4**.

2.1.4 Key Correspondence

Table 6 summarises the correspondence between Keltbray and the relevant authorities throughout the duration of the project.

Table 6: Correspondence with Regulators and Relevant Parties

Date	Summary	Correspondents
13/10/2022	MMP Declaration (Block D3) confirmation	CL:AIRE / Keltbray
25/10/2021	Discharge Consent (TDEE0CX4) – Brook Road granted	Thames Water / Keltbray
18/11/2021	Discharge Consent (TBEC2GK0) – Mary Neuner Road granted	Thames Water / Keltbray
29/03/2022	MTP CB3902KF/W0045 Deployment issue letter	Environment Agency / Keltbray
09/05/2022	Discharge consent (TDEE0DB9) - Mary Neuner Road extension granted	Thames Water / Keltbray

2.2 Site Establishment

Keltbray mobilised to site and established a site compound on 1st October 2021. Excavation works and breaking of hard standing began on the 4th October 2021.

2.2.1 Site Services

All live underground and aboveground services were removed by third parties contracted by the client prior to Keltbray taking occupation of the site.

2.3 Water Management

Perched groundwater had been encountered during the site investigation and previous works within the shallow Made Ground deposits. A water treatment system was set up to treat water before discharge. For treatment purposes a laminar flow settlement tank was used to remove sediment and then discharged into the Thames water asset. Periodic testing was undertaken of the discharged water. Results for this can be seen in **Appendix J**. In total 1,331m³ of water was discharged to sewer.

2.4 Borehole Decommissioning

Groundwater monitoring wells WS506, WS508, BH510, BH513 and BH514A were retained strategically from a previous phase, as specified within the Foundation Work Risk Assessment (FWRA) to allow continued monitoring of groundwater during the works at Phase 3B. Within Phase 3B, there were 2 boreholes which were decommissioned part-way through the works, namely BH514A and BH514B. BH514A was decommissioned due to performance issues and BH514B was decommissioned to prevent a potential contamination migration pathway when piling was undertaken in the immediate vicinity. All decommissioning works were completed in accordance with the EA *‘Good Practice for Decommissioning Redundant Boreholes and Wells’* and Section 6.5 of the FWRA. Boreholes were filled using grout to prevent any seeping of surface water or the upper water table water into the lower aquifer. Photographs documenting this activity are included within **Appendix C**.

The status of the wells across site is listed in **Table 7** below and shown in drawing *CR3B-KRE-X-0002-GG-JH-2022*, in **Appendix A**.

Table 7: Well Condition Summary

Well ID	Installed by	Status
WS506	Keltbray	Retained – handed over to follow on contractor
WS508	Keltbray	Retained – handed over to follow on contractor
BH510	Keltbray	Retained – handed over to St William
BH513	Keltbray	Retained – handed over to St William
BH514A	Keltbray	Decommissioned
BH514B	Keltbray	Installed and latterly decommissioned

2.5 Excavation Works

Basement excavation works were progressed across site following completion of the piled walls and associated capping beam constructions. This was undertaken from 1st of May 2022 to the 7th of July 2022.

To ensure that excavation validation samples were collected at the required frequency, the site was divided into a 10m by 10m grid. Due to the irregular shape of site, not all of these grid squares fell within the Phase 3 area. Drawing *CR3B-KRE-X-000-XX-DR-CE-2001* in **Appendix A** shows the validation grid system employed across the site.

2.5.1 Unexpected Contamination

During all remedial works, a continuous visual assessment of the excavation faces along with soil arisings was undertaken looking for any potential unexpected contamination. In accordance with the RMS, a full watching brief was conducted to identify any areas of previously undocumented gross contamination. Field grid validation sheets were completed during the excavation works and these are included in **Appendix D**.

Following excavation of the 'E' basement area, a cast iron former gas pipe transecting the site boundary and pile line was identified approximately 3m bgl. This crossed through the gap between two basement wall piles, with the majority of the pipe removed and sealed by one of the concrete piles. A section of dark staining and water seepage remained between the piles. Photo 10 in **Appendix C** shows this. Following waterproofing, this area will become fully sealed and groundwater will be prevented from migrating on to site, thus ensuring there is no ongoing risk to future site users or controlled water on site.

No other unexpected contamination, free phase product or contamination was identified during the excavation or piling works.

2.6 Material Management

During the works material was segregated in to 23 stockpiles based on contaminant profile and geological properties. A total 178m³ of material was reused on site.

All material reused was screened against the SSAC's to ensure suitability for reuse. This material came solely from SP7 – 6F2 material previously generated during earlier works onsite. Drawing CG3B-KRE-X-000-XX-M2-CE-1001 shows the location of reused material and is included in **Appendix A**.

All other excavated material and pile arisings were appropriately classified and removed from site. In total 38,400 m³ of material was removed from site.

Table 8: Stockpile Summary Table

Stockpile ID	Origin	Description	End Use	Volume (m3)
SP1	Road breakout	Tarmac and concrete	Disposal	144
SP2	Import	Pea Shingle	New Car Park	18
SP3	Import	Type 1	New Car Park	180
SP4	Import	6F5	New Car Park	792
SP5	Phase 3B	Made Ground	Disposal	4,680
SP6	D4 / E excavation	Clay - inert	Disposal	3,400
SP7	Old car park	6F2	Reuse under D3 and Pile Mat	2,900
SP8	Import	6F5	Pile mat	429
SP9	Pile Arisings	Pile Arisings	Disposal	2,100
SP10	Import	6F5	Disposal	460
SP11	E1 excavation	Made Ground	Disposal	6,300
SP12	E2 excavation	Made Ground	Disposal	2,600
SP13	Import	6F5	Pile Mat	520
SP14	Old car park	Made Ground	Disposal	1,800
SP15	E3/D4 excavation	Made Ground	Disposal	1,660
SP16	E1/E2 excavation	Clay - inert	Disposal	3,560
SP17	Pile cropping and obstructions	Concrete	Disposal	2,088

Stockpile ID	Origin	Description	End Use	Volume (m3)
SP18	Import	6F5	Pile mat	300
SP19	Import	6F5	Pile mat	200
SP20	E1/E2 dig	Clay - inert	Disposal	3,980
SP21	E3 dig / D4 dig	Clay - inert	Disposal	3,680
SP22	Import	6F5	Pile Mat	260
SP23	Pile Arising's	Pile Arising's	Disposal	1,760

2.7 Imported Material

In addition to the use of previous site generated 6F2 recycled aggregate, 6F5 was imported to site to construct the piling platforms. An estimated 2,925m³ of 6F5 (325 loads) was imported. **Appendix E** contains the Import Log.

All imported material was from WRAP quality protocol approved sites. **Appendix F** contains the WRAP quality protocol for these sites and a log of the imported loads. Imported material was stockpiled as SP2, 4, 8, 10, 13, 19, 18 & 22 and sampled to ensure compliance against the specified import criteria. These results are discussed in **Section 3.3**.

Table 9: Imported material summary table

Import Source	Number of loads	Volume (m ³)
6F5 (Pile mat)		
Camden Recycling	160	1,440
RMS Rainham	62	558
RMS Dagenham	8	72
RMS Silvertown	18	162
SRC Barking	4	36
Bexley recycling	17	153
Bretts (Hithertime)	58	522
Type 1 (Car park)		
Hanson	14	126
Aggregate Industry	6	54
Pea Shingle (Car park)		
Hanson	2	18

2.8 Off Site Disposal

To achieve the required basement void levels, a total of 4,645 loads were removed from site. This was predominantly soil and stones as well as other construction wastes removed from site. Waste transfer and consignment notes were completed for each load removed, a full copy of the export log is included in **Appendix G**.

The different waste streams and corresponding disposal facilities are summarised in **Table 10**. The receiving facility permits and waste carrier licenses can be found in **Appendix H**. Waste characterisation sampling is discussed in **Section 4**.

Table 10: Summary of EWC Codes and Disposal Facilities

Material Description	EWC Code	Final Destination	Permit Number	Total No. of Loads
Concrete	17 01 01	Camden Plant Ltd, Lower Hall Lane, Chingford, London, E4 8JG	DP3891NP/V002	205
Tarmacadam	17 03 01	Camden Plant Ltd	DP3891NP/V002	15
		RMS Sunshine Wharf	KB3136AM/V004	2
		Thames Wharf (Keltbray)	NP3696EG	1
Mixed Construction & Demolition waste	17 09 04	Powerday, Enfield Waste Management Facility	PP3093EE	30
Mixed Metals	17 04 07	EMR, 29 Bidder Street, Canning Town, London, E16 4SZ	QP3796NY	1
Non-hazardous soil and stones	17 05 04	Thames Wharf (Keltbray)	EPR/MB3437RG	4,295
		Wennington Quarry inert landfill	FB3507SP	
		RMS Sunshine Wharf (Silvertown)	KB3136AM/V004	
		Pinch Restoration (Gerpins Lane RM14 2XR)	DB3800MK/A001	
		Enfield Holly Hill Farm - Bund soil management area	FB3600TZ	
		Ingrebourne Valley Ltd (IVS)	EPR/AB3105HD/A001	
		Hithermoor Quarry (Brett's)	NCC/046128/2009 / AB3006CE/V004	
		Mohawk Wharf (KB)	FP3092LH/V004	
		Ockenden Area III Landfill	SP3999NT/A001	
		Orsett Quarry (Buckingham Hill) IVS	EPR/DB3102UX/A001	

3 Verification

Keltbray undertook verification sampling throughout the duration of the site works as per the requirements of the RMS. The subcontracted UKAS and MCERTS accredited laboratories used for all chemical and geotechnical testing are listed below.

Table 11: Analytical Laboratories Used

External Testing	Laboratory
Passive VOC analysis	Chemtest
Soil, leachate and water analysis	i2 Analytical
Geotechnical analysis	M&H Testing

To provide reassurance of removal of all gross contamination as required, validation inspection forms were completed for each grid square. All grid validation inspection forms can be found in **Appendix D**.

3.1 Excavation Validation

Validation of the remedial excavation was completed on a 10m x 10m grid with an initial visual and olfactory assessment to confirm removal of any residual contamination that may have been present. All samples were scheduled for analysis against the SSAC's.

A total of 79 validation soil samples were submitted for testing. Of the 79 samples analysed, no samples reported exceedances for sulphate or detected asbestos. 4 samples exceeded the criteria for total ammonium. These 4 samples were also submitted for leachate analysis. A summary of the leachate results is presented in **Table 12**. Verification sampling results can be found in **Appendix I**.

Table 12: Summary of Excavation Validation Soil Results

Determinand	Units	SSAC	Total No. of Samples	Minimum	Maximum	No. of exceedances	Location of exceedances (Sample ID)
Sulphate as SO ₄	mg/kg	18,000	79	700	9,600	0	N/A
Ammonium as NH ₄	mg/kg	21.6	79	0.6	48	4	I8, I7, N11, N12
Asbestos	%	0.1	79	Not detected	Not Detected	0	N/A

Table 13: Summary of Excavation Validation Leachate Results

Determinand	Units	SSAC	Total No. of Samples	Minimum	Maximum	No. of exceedances	Location of exceedances (Sample ID)
Sulphate as SO ₄	mg/l	2,900	4	118	454	0	N/A
Ammonium as NH ₄	mg/l	10.3	4	0.86	3.1	0	N/A

None of the 4 excavation validation leachate results exceeded the SSAC for sulphate or ammonium.

3.1.1 Previous Ammonium leachate failures

During the previous remediation works, 38 validation leachate results exceeded the ammonium SSAC. Additional investigation and risk assessment work was completed at the time to demonstrate the suitability of this material to remain in situ without posing a risk to controlled water or future site users. This was detailed in verification report *RE6075-VR-AH-November2020-03-Phase 3, Clarendon Road Phase 3, Verification Report, Keltbray, May 2021*.

With the additional excavation works required for the basement formation, further material has been removed including all previous validation results with additional validation samples collected from the new, lower excavation extents. All validation samples have passed the SSAC adding further assurance that no ongoing risk related to ammonium contamination remains at the site.

3.2 Material Reuse Verification

To verify the 178m³ of material reused, a total of 4 samples were taken from SP7 to ensure its suitability. Results were compared to the SSAC and the generic assessment criteria (GAC) for soil reused below 1.0m. All samples passed the SSAC and GAC for reuse. The testing undertaken satisfied the required frequency of one sample per 250m³.

Tables 14 and 15 summarise the results. All material reuse verification results are also included in **Appendix L**.

All these samples were also subjected to leachate analysis to assess their risk to controlled waters. Of the 4 reuse verification leachate samples taken, all passed the sulphate and ammonium reuse criteria.

Table 14: Summary of Material Reuse Verification Soil Results

Determinand	Units	SSAC	Total Samples	Minimum	Maximum	No. of exceedances	Location of exceedances (Sample ID)
Asbestos	%	0.1	4	0	0	0	N/A
Sulphate as SO ₄	mg/kg	18,000	4	110	330	0	N/A
Ammonium as NH ₄	mg/kg	21.6	4	<0.5	<0.5	0	N/A

Table 15: Summary of Material Reuse Verification Leachate Results

Determinand	Units	SSAC	Total Samples	Minimum	Maximum	No. of exceedances	Location of exceedances (Sample ID)
Sulphate as SO ₄	mg/l	2,900	4	0.0181	0.0548	0	N/A
Ammonium as NH ₄	mg/l	10.3	4	0.074	0.25	0	N/A

3.3 Imported Material Verification

To verify the 2,925m³ of 6F5 imported to site, 21 import verification samples were taken and screened against the import criteria. This represents 1 sample per 140m³ satisfying the 1 per 250m³ requirement.

All samples passed the import criteria. **Table 16** summarises the results, all import material verification test results are included in **Appendix L**.

Table 16: Summary of Import Verification Results

Determinand	Unit	Import Criteria	Total Samples	Min.	Max.	Number of Exceedances
General Inorganics						
Asbestos	%	0.10%	21	Not Detected	Not Detected	0
BTEX			21			0
Benzene	mg/kg	2.51	21	<1.0	<1.0	0
Toluene	mg/kg	315	21	<1.0	<1.0	0
Ethylbenzene	mg/kg	85.6	21	<1.0	<1.0	0
Xylenes	mg/kg	26.9	21	<1.0	<1.0	0
TPH Bands			21			0
TPH Aliphatic > C5-C6	mg/kg	42.9	21	<1.0	<1.0	0
TPH Aliphatic > C6-C8	mg/kg	99.6	21	<1.0	<1.0	0
TPH Aliphatic > C8-C10	mg/kg	13.9	21	<1.0	<1.0	0
TPH Aliphatic > C10-C12	mg/kg	141	21	<1.0	4.1	0
TPH Aromatic > C5-C7	mg/kg	2.51	21	<1.0	<1.0	0
TPH Aromatic > C7-C8	mg/kg	315	21	<1.0	<1.0	0
TPH Aromatic > C8-C10	mg/kg	22.8	21	<1.0	<1.0	0
TPH Aromatic > C10-C12	mg/kg	141	21	<1.0	2.4	0
PAHs						0
Naphthalene	mg/kg	5.68	21	<0.05	2.7	0
Other Organics						0
1,1-Dichloroethane	mg/kg	1.19	21	<0.001	<0.001	0
1,2-Dichloroethane (1,2-DCA)	mg/kg	0.0089	21	<0.001	<0.001	0
cis-1,2-Dichloroethene	mg/kg	0.0574	21	<0.001	<0.001	0
trans-1,2-Dichloroethene	mg/kg	0.0966	21	<0.001	<0.001	0
1,1,1-Trichloroethane (1,1,1-TCA)	mg/kg	3.2	21	<0.001	<0.001	0
1,1,2-Trichloroethane (1,1,2-TCA)	mg/kg	0.431	21	<0.001	<0.001	0
1,1,1,2-Tetrachloroethane	mg/kg	1.89	21	<0.001	<0.001	0
1,1,2,2-Tetrachloroethane	mg/kg	4.75	21	<0.001	<0.001	0
Trichloroethene (TCE)	mg/kg	0.0016	21	<0.001	<0.001	0
Tetrachloroethene (PCE)	mg/kg	0.678	21	<0.001	<0.001	0
Trichloromethane	mg/kg	0.472	21	<0.001	<0.001	0
Carbon Tetrachloride /	mg/kg	0.147	21	<0.001	<0.001	0
Vinyl Chloride (VC)	mg/kg	0.0003	21	<0.001*	<0.001*	0*
Phenol	mg/kg	621	21	<0.2	<0.2	0

* Criteria for VC is below the laboratory limit of detection. A reported <LOD was considered a pass.

3.4 Verification Sample Deviations

From 79 no. of the validation samples submitted for testing, 4 reported deviations following their analysis. These were chiefly due to either no date being supplied on the sample containers or incorrect containers being used.

Although the samples are noted as deviating, it is Keltbray's opinion that it is unlikely that lack of sample date resulted in any volatile holding times being exceeded as samples were dispatched to the laboratory either on the day of collection or following working day. With respect to the deviations associated to incorrect sample containers, these were principally due to only plastic tubs being used. Keltbray have confirmed with the laboratory (i2 Analytical) that the deviations would not have affected the results of the validation criteria, - ammonium and sulphate - total or leachate testing methods.

4 Waste Classification

54 no. waste classification samples were taken throughout the project to appropriately analyse and classify the waste generated. 48 no. of these were from the soils excavated from the basement works and pile arisings, with 6 samples taken from the discharged groundwater to ensure compliance against the discharge consent.

Tarmacadam was classified by PAH detecting marker spray, with testing showing low levels of PAH's present. **Table 17** summarises the waste classification samples taken, all waste classification results are included in **Appendix L**.

Table 17: Summary of Waste Classification Samples

Waste Stream	Number of laboratory tests	EWC Classification
Tarmac	N/A	17 03 02
Soil and Stones	48	17 05 04
Groundwater	6	19 13 08

4.1 Discharge Samples

1,331m³ of water was discharged to sewer during the works. This was water encountered during the excavation works and that which collected in the basement void during construction.

To ensure discharge water was compliant with the Thames Water discharge consent, discharge samples were collected and dispatched for analysis. All discharge samples passed the relevant criteria.

All discharged water was passed through a laminal flow settlement tank and regularly inspected to ensure discharge was compliant with the discharge requirements. Full copies of the analytical results are included in **Appendix J**.

Table 18: Summary of Discharge Water Samples

Type of sample	No. of samples	Sample IDs
Post-treatment discharge	6	Discharge – 1/2/3/4/5, SW01

One discharge sample, take on 26/11/2021 reported a deviation for exceeding holding time following analysis.

5 Environmental Controls and Monitoring

To ensure that the works had a minimal impact on surrounding receptors, environmental controls and monitoring were undertaken throughout Keltbray's time on site. Monitoring schedules and trigger levels for the different parameters as set out in previous documentation are detailed in **Table 19**, below.

Keltbray installed two continuous environmental monitoring stations (EMS) equipped with quantitative noise, dust and VOC monitors. These were located along the site boundary at sensitive locations to continually assess the impact of the works. The location of these is shown on drawing *CR3B-KRE-X-0001-GG-JH-2022*, in **Appendix A**.

Similarly, quantitative vibration monitoring was completed using separate mobile vibration monitors placed adjacent to sensitive receptors, including gas infrastructure and neighbouring residences. Both these systems included telemetry which allowed the upload of live data. The live data included trigger values to notify the project team of any elevated readings above the agreed trigger values.

Table 19: Environmental Monitoring schedule

Monitoring Locations	Parameter	Frequency	Trigger Values
2 No. environmental monitoring stations (EM1 and EM2)	Noise	Continuous quantitative	+5dB(A) above pre-construction
	Dust	Continuous quantitative	3 mg/m ³
	Odour/VOCs	Continuous quantitative and biweekly diffusion tubes	PID - 1 ppm TENAX >0.1 mg/m ³
	Vibration	Continuous quantitative	40mm/s

Daily qualitative monitoring of environmental impacts was undertaken using a numerical scale from 1 to 5. The corresponding control measures were implemented as required on site. The adopted scale and corresponding actions are detailed in **Table 20**.

Table 20: Qualitative monitoring assessment and action levels

Level	Qualitative Assessment	Action
1	No Noticeable Issue	No Action Required
2	Minor Issue	To be Monitored
3	Obvious Issue	Preventative Action to be Planned
4	Significant Issue	Working Methods to be Adjusted
5	Major Issue	Works Cease Immediately and Not Recommence Until Solution Implemented

Full copies of the daily qualitative environmental monitoring data is included in **Appendix L**. Data from the full time continuous environmental monitoring stations for dust, VOC, and noise is included as **Appendix M**.

5.1 Odours / Volatile Organic Compounds

Given the known contaminants present within the site boundary, qualitative and quantitative odour and VOC monitoring was completed. Qualitative monitoring was completed daily at the 2 locations in the form of 'sniff tests'. A trigger value of 3 was adopted to ensure that activities did not emit any unpleasant odours and appropriate control measures were put in place to mitigate any potential nuisance.

All qualitative odour assessment at the boundary monitoring points were reported as 1 'no noticeable issue' or 2 "minor issue". The minor issue was related to welding works outside of Keltbray's control. Any odorous materials encountered during the excavation works were subject to odour management at source, with mobile de-odourising units being deployed whenever needed. The amount of odorous material exposed or processed at any one time was limited as far as possible, excavation activities were carefully managed to minimise odour release.

Quantitative monitoring and spot checks were completed daily using a handheld PID at any point sources and across the works area to monitor VOC release. The two EMS at the site boundary continuously recorded VOC concentrations to monitor VOC release, issuing alerts when any exceedances above the 1 ppm trigger value were detected. VOC results are summarised in **Table 21**.

Table 21: Summary of VOC EMS monitoring data

Station Number ID	VOC (ppb)	
	EMS1	EMS2
Station Location	Offices	House
Minimum	0.0	0.0
Maximum	3.0	37.9
Average	0.2	0.5

In support of the PID monitoring, TENAX diffusion tubes were installed alongside the continuous monitoring stations at both environmental monitoring stations. Sampling was carried out from October 22nd 2021 adopting biweekly passive sampling periods. Results reported concentrations below the laboratory limit of detection for the majority of determinants with the exception of 4 detections of naphthalene, with a maximum of 0.6 µg/m³. The full analytical VOC reports are included in **Appendix N**.

5.2 Dust

The majority of daily qualitative dust results were recorded as 1 'no noticeable issue' with a few 2 'minor issue' noted during the dryer months. Therefore no further actions or mitigation was required. To reduce the risk of windblown dust during dry spells and high winds, jet washes and dust atomisers were deployed. These were operated on site during potential dusty activities such as breaking and muckaway.

Quantitative dust monitoring was completed as part of the continuous monitoring at EMS1 and EMS2, measuring PM₁₀. Results were compared against the trigger value of 3 mg/m³. All results reported below the site specific trigger value. Dust results are summarised in **Table 22** below.

Table 22: Summary of quantitative dust monitoring data

Station Number ID	PM10 (mg/m ³ AVG 15 mins)	
	EMS1	EMS2
Station Location	Offices	Houses
Minimum	0.001	0.0009
Maximum	3.20	0.5755
Average	0.010362	0.0074

The trigger value of 3mg/m³ was briefly exceeded at EMS1, however no visual dust could be seen and this was considered an erroneous reading.

5.3 Noise

Continuous quantitative noise monitoring was completed as part of the monitoring at both EMS1 and EMS2. Sound Pressure Level (SPL) readings were taken continuously and reported via the online monitoring system. **Table 23** summarises the results.

Occasional exceedances were detected mostly related to temporary noisy works in very close proximity to the respective monitoring stations. When detected, inspection of the cause and mitigations were put in place. Due to the siting of the monitors on the inside of the hoarding peak readings are likely over reporting and unlikely to have been as high as at the receptors, such as people's houses and surrounding businesses.

In addition, qualitative monitoring was undertaken to assess the impact of noisy work on surrounding receptors, this was completed daily at both boundary EMS locations. Qualitative results reported mostly 1 "no noticeable issue" or 2 "minor issues", with occasional 3 during locally noisy activities. These are detailed in **Appendix K**.

Table 23: Summary of noise results

Station Number ID	SPL (dB)	
	EMS1	EMS2
Station Location	Offices	Houses
Minimum	3	31.4
Maximum	96.6	104.1
Average	53.8	56

5.4 Vibration

Real-time vibration monitoring was carried out at using two vibration monitors located adjacent to sensitive receptors. One was located at each EMS1 and EMS2.

No vibration in excess of the trigger value were encountered during the works other than when the monitors were accidentally disturbed.

The full results of the vibration monitoring are reported in **Appendix M**.

5.5 Surface Water Monitoring of Moselle Brook

The Moselle Brook was sampled every two weeks during the remediation works and piling works and will continue to be monitored monthly for 3 months following completion of the Phase 3B enabling and piling works.

Samples were numbered MB.32 onwards as a continuation of the monitoring completed for the Phase 3 remediation works.

These samples are summarised in **Table 24**, below. Chemical results of the water samples taken are summarised in **Table 25**. Full analytical results are included within **Appendix O**.

Table 24: Summary of Surface Water Samples

Type of testing	No. of samples	Sample IDs
Surface water	21	MB32, MB33, MB34, MB35, MB36, MB37, MB38, MB39, MB40, MB41, MB42, MB43, MB44, MB45, MB46, MB47, MB48, MB49, MB50, MB51, and MB52

Table 25: Summary of Surface Water Results

Determinand	Units	Total samples	Minimum Concentration	Maximum Concentration	Average Concentration
TPH CWG	µg/l	21	<10	18	<10
PAH 16	µg/l	21	<0.16	11	<0.16
BTEX	µg/l	21	<1.0	7.9	<1.0
Ammonia	µg/l	21	110	24,000	9,317.2
Arsenic (dissolved)	µg/l	21	1.55	4.57	2.4
Cadmium (dissolved)	µg/l	21	0.02	0.03	<0.02
Chromium (hexavalent)	µg/l	21	<5.0	<5.0	0.03
Chromium (III)	µg/l	21	2.1	2.9	2.6
Chromium (dissolved)	µg/l	21	0.3	7	2.51
Copper (dissolved)	µg/l	21	2.1	8.4	5.2
Lead (dissolved)	µg/l	21	0.4	0.9	0.6
Mercury (dissolved)	µg/l	21	<0.05	0.06	<0.05
Nickel (dissolved)	µg/l	21	1.8	5.4	3.4
Selenium (dissolved)	µg/l	21	0.7	2	1.2
Zinc (dissolved)	µg/l	21	5.8	29	15.1
Free cyanide	µg/l	21	< 1	< 1	< 1
Total Cyanide	µg/l	21	1.6	93	22
Phenols (total)	µg/l	21	<10	39	28.5
Sulphate	µg/l	21	81.1	282	144.2
Sulphide	µg/l	21	<10	18	<10

5.6 Groundwater Monitoring

As per the requirements of the FWRA, groundwater monitoring was completed every two weeks during the remediation works, weekly during the piling works and will be completed monthly thereafter for 12 months.

Bi-weekly monitoring began on the 22th October 2021 after remediation works began on the 14th of October, increasing to weekly during deep level piling works between the 10th November and the 20th July 2022.

Throughout the 34 no. monitoring rounds groundwater recovery from the shallower boreholes installed within the Made Ground was limited. These monitoring wells were frequently found to run dry prior to stabilisation of field parameters and often insufficient sample volumes recovered for laboratory analysis.

Groundwater samples were more successfully recovered from the deeper boreholes, BH510, BH513, BH514 and later on from BH514B. All samples were recovered using low flow monitoring equipment except BH514 and BH514B. Low flow sampling equipment could not be advanced beyond 25m bgl within BH514, due to a kink or other defect within the standpipe. To avoid blocking the well it was discussed and agreed with the project team that BH514 would be sampled with micro-bailers in all further sampling events, to avoid equipment become wedged within the well. As such no flow cell field physiochemical parameters were collected for this location.

During the monitoring various other difficulties were encountered when monitoring BH514A, the pumps became stuck and so bailing was used, recovery was low and suspended solids noticeably increased. The well also found to be blocked and excavated and reinstated to remove this. Due to these issues the well was decommissioned and replaced with BH514B in close proximity. This well similarly suffered from difficulty easily inserting and retrieving the low flow bladder pump and so it was also sampled via micro-bailers. This work closely coordinated with the project team, with technical note *TN6089.002* included in **Appendix Q** providing further details of this aspect of the works and the results recorded from both of these wells.

All results from both BH514A and BH514B have been combined in the following summary and analysis to provide a complete set for this location. BH514A/B position centred within the basement excavation necessitated the decommissioning of the well prior to the construction of the basement slab and the replacement well, BH514B, was decommissioned on 28/06/2022.

Recovered samples were scheduled and tested against the specified suite of determinands. These results are summarised in **Table 26**. Field parameter for the low flow sampled boreholes are detailed in **Table 27**. Full copies of the analytical results and water quality parameter are included in **Appendices O and P** respectively. Wells not required for the monitoring were decommissioned as reported in **Section 2.4**.

Table 26: Summary of Deep Groundwater Results

Parameter	Units	Total samples	Action level	Minimum Concentration	Maximum Concentration	Average Concentration
TPH CWG	µg/l	111	10	<10	3,300	29.5
PAH 16	µg/l	111	0.16	<0.16	60.1	<0.16
BTEX	µg/l	111	1.0	<1.0	<1.0	<1.0
Ammonia	µg/l	111	2,420	24	91,000	3,551
Arsenic (dissolved)	µg/l	111	3.92	0.21	19.5	2.33
Cadmium (dissolved)	µg/l	111	0.08	0.02	0.39	0.11
Chromium (hexavalent)	µg/l	111	5.0	0	0	0.00
Chromium (III)	µg/l	111	2.75	2.4	8.3	5.21
Copper (dissolved)	µg/l	111	7.0	0.2	8.3	2.86
Lead (dissolved)	µg/l	111	6.0	0.6	57	6.79
Mercury (dissolved)	µg/l	111	0.66	0.2	2	0.51
Nickel (dissolved)	µg/l	111	21	0.05	0.5	0.16
Selenium (dissolved)	µg/l	111	26.4	0.7	58	7.43
Zinc (dissolved)	µg/l	111	47.3	0.7	23	2.73
Free cyanide	µg/l	111	2.2	1.1	69	12.61
Total Cyanide	µg/l	111	38.5	1.1	19,000	657
Phenols (total)	µg/l	111	10	10	83	10.07
Sulphate	µg/l	111	1	141	746,000	15,313
Sulphide	µg/l	111	5.0	<5.0	250	127.55

Table 27: Summary of Deep Groundwater Field Parameter Results

Parameter	Units	Total samples	Minimum	Maximum	Average
GW depth	m	111	30.9	40.3	33.5
NAPL present?	mm	111	0	0	0
DO	%	111	1.8	36.6	7.70
pH	pH Units	111	6.98	8.7	7.70
Temp	°c	111	4.8	16.7	10.06
EC	µS/cm	111	820	9660	3619.48
Redox	mV	111	-216.4	4770	200.75
Turbidity (TDS)	mg/L	111	1.7	38000	3272.94

Sample results exceeded the trigger values in the FRWA on several occasions.

Five samples taken from BH514A/B detected above the limit of detection for TPH at 150, 3357, 680, 44 and 100 µg/l. These were around the time of the difficulty sampling from BH514A and it's initial replacement with BH514B. Subsequent monitoring rounds reported TPH below the limit of detected. This further discussed in the technical note (**Appendix Q**) with further long term monitoring underway.

16 ammonia results were elevated above the 2,420 µg/l trigger value in BH514A/B. These were recorded in October 2021 to May 2022 and have no apparent correlation to Keltbray's works being undertaken on site, occurring before during and after piling and excavation works. All samples taken from the newly installed BH514B were below trigger values.

Arsenic, cadmium, chromium (III), copper, lead, selenium and mercury concentrations were also reported above the FWRA trigger values. These metal results did not show a clear trend or appear to correlate with each other. As reported previously the low trigger values for metals (below the WFD drinking water standards), and sporadic nature of the concentration detected, illustrate the low level of risk these detects represent.

Cyanide and free cyanide were both detected above the trigger values in BH514 and BH510. Results showed no correlation with the remediation or piling activities.

Three phenol results from BH514 were reported above the trigger value at 13 µg/l, with the highest being 83 µg/l on 26/11/21 and lowest 11 µg/l on 16/03/2021 (note: the laboratory limit is detection of 10 µg/l). All subsequent samples recorded less than the limit of detection.

All sulphate results were below the trigger values in all rounds except 4 samples from the rounds of the 15/05/2022 25/05/2022, and 14/06/2022 in BH510 and 14/03/2022 in BH514A. Samples from BH510 exceeded the trigger values by a small margin (5,090, 5,240 & 4,780 vs 4,474 µg/l trigger). The sample at BH514B exceeded the trigger value by several orders of magnitude. However, this sample was recovered

following the pump become stuck. All subsequent monitoring rounds returned to what were considered the 'normal range' reported across the duration of Keltbray's works. Ongoing monitoring will continue to monitor this.

Water quality parameters measured during monitoring showed fairly consistent results throughout the works. An elevated pH result of 8.7 was recorded in BH514 (on 22nd April 2022), however, this result is inconsistent with other groundwater parameters and is therefore thought to be a sampling error. Temperature readings were relatively consistent, however, hot and sunny weather did cause some elevated readings not considered to be truly representative of the aquifer conditions at depth. Turbidity was consistent across the well network from round to round except for a single recording of 38,000 mg/l on 2nd December 2021, this again is thought to be an error as the EC for the same monitoring round recorded only 1,100 μ S/cm.

Further data will continue to be obtained and analysed as the ongoing monitoring is completed. This will be reported fully following completion of the monitoring programme.

46 no. of the water monitoring samples submitted for testing reported deviations following their analysis. These were due to the holding times and in the majority of instances occurred during times when site, courier and laboratory operating times were disrupted i.e. during bank holidays. Although the samples are noted as deviating, after discussions with the laboratory it is Keltbray's opinion that it is unlikely that minor exceedances of holding times would have resulted in any significant under reporting of volatile determinands.

5.6.1 Ongoing Monitoring

As per the requirement of the FWRA and RMS, groundwater monitoring will continue for 12 months following completion of basement slab for D4 and E blocks. These works are scheduled for completion in December 2022 and so groundwater monitoring will continue to be carried out monthly until December 2023.

Following decommissioning of BH514B, deep boreholes BH510 and BH513 screened below the London Clay will continue to be monitored. As shown on drawing *CR3B-KRE-X-0002-GG-JH-2022*, **Appendix A**, these wells and shallow wells WS506 and WS508 remain on site. The full groundwater monitoring results for this post completion works will be reported under separate cover once completed.

6 Completed Works Status

Contractual remedial works (excluding on going groundwater monitoring) have been completed in Phase 3B in accordance to the Scope of Works as detailed in the Remediation Method Statement.

As detailed in the report residual ammonium contamination previously reported within a portion of the north west, and all other contamination encountered has been removed. Completion of these works has rendered the Phase 3 construction boundary suitable for onward development in accordance with planning Condition 31 of London Borough of Haringey Planning Permission reference HGY/2017/3117 and associated documentation.

6.1 Remaining Remedial Actions

Notwithstanding the above, completion of the following requirements of the Remediation Method Statement are still outstanding and are scheduled to be completed and reported by others:

- Placement of cover systems including marker layers and human health compliant fill including capillary break layer, sub-soil, top-soil and MOT Type 1 in areas of soft landscaping as required;
- Construction of a managed drainage system;
- Gas and vapour mitigation as required by the Remediation Strategy;
- Appropriate classification and management of any further arisings; and
- Remediation of the extended welfare area in the north west corner of the Site.

Appendix A Drawings

- I. SITE LAYOUT - CR3B-KRE-X-0001-GG-JH-2022
- II. BOREHOLES LOCATIONS - CR3B-KRE-X-0002-GG-JH-2022
- III. D3 AREA AS-BUILT - CG3B-KRE-X-000-XX-M2-CE-1001
- IV. BASE VALIDATION - CR3B-KRE-X-000-XX-DR-CE-2001
- V. FINAL TOPO – CR3B-KRE-X-000-M2-CE-1003
- VI. FINAL OBSTRUCTION PLAN – CR3B-KRE-X-000-XX-M2-CE-1033

Appendix B Permits and Licences

Appendix C Photographs

Appendix D Grid Validation Forms

Appendix E Import Log

Appendix F WRAP Documents

Appendix G Export Log

Appendix H Facility Permits and Waste Carrier Licences

Appendix I Verification Sampling Results

Appendix J Discharge Sample Results

Appendix K Verification Sampling Results

Appendix L Daily Environmental Monitoring Sheets

Appendix M EMS Data

Appendix N Tenax Tubes Monitoring Results

Appendix O Vibration Monitoring Data

Appendix P Field Parameter Data

Appendix Q Groundwater Laboratory Results

Appendix R Technical Note

