



**REMEDIATION VALIDATION
REPORT
Escrow Site 1
(Rectifier Yard)**

For

LK Management Ltd

March 2020

20/0626/01.3

**Orthios Eco Park
Former Penrhos Works
Holyhead
LL65 2UX**

Geo² Remediation Ltd

LK Management Ltd

Remediation Validation Report - Escrow Site 1 (Rectifier Yard)

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Revision Log

Version	Issue Date	Detail	Approved
1	25/02/20	Initial Release	A Wilson
2	04/03/20	Following review comments.	A Wilson
3	05/03/20	Revised following further LKM comments	A Wilson

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1.0 Introduction

This document details the remediation works undertaken for LK Management Ltd ('LKM') at the Escrow Site 1 (to be referred to in this report as the 'Rectifier Yard'), Orthios Eco Park, Former Penrhos Works, Holyhead, LL65 2UX. These remediation works comprised the construction of a network of remediation wells, abstraction of identified gross contamination and subsequent injection of a chemical oxidant.

Monitoring and maintenance of the remediation plant, along with environmental sampling of the groundwater was periodically undertaken to assess the progress of the project. Environmental data is presented later in the report.

In addition, environmental monitoring was also undertaken at the site to ensure identified receptors were not at risk from the remediation work on site.

2.0 Historic Site Setting

2.1 Site Details

The Rectifier Yard is located in the south east of the wider former Penrhos Works site, to the south and the west of the A5 at Penrhos, east of Holyhead. The approximate National Grid Reference of the Rectifier Yard is 226610E, 381082N. Figure 1 details the location of the wider site, with Figure 2 showing the location of the Rectifier Yard within the wider site.

The Rectifier Yard has historically contained rectifiers, transformers, a control building and a building owned and operated by National Grid. It is understood that a Transformer fire caused a spill of transformer oil into the ground and free product was present.

2.2 Previous Works

A number of previous reports have been undertaken for the site by LKM and should be considered in conjunction with this report. These include:

- Preliminary Risk Assessment (PRA) report (Ref: CL-602-LKC 14 1181-01 R1, 8th March 2016)
- Phase 2 Geoenvironmental Investigation and Risk Assessment (Ref: CL-602-LKC 14 1181-02, 29th April 2016)
- Laboratory Bench Scale Chemical Oxidation Study report (Ref: A161201, March 2017)
- Remediation Pilot Study report (Ref: 17.0626, May 2017)
- Delineation Investigation and Risk Assessment Report (Ref: CL-602-LKC 14 1181-04, June 2017)
- Remediation Strategy (Ref: CL-602-LKC 14 1181-07 R0, 30th June 2017)

2.3 Ground Conditions

Historical investigations of the Rectifier Yard have allowed for the sub surface to be characterised in detail. Ground conditions as outlined in the LKM Remediation Strategy are as follows:

The ground conditions underlying the Rectifier Yard site generally comprised made ground underlain by superficial sandy clay and silt, or silty sand. The superficial deposits were predominately underlain by weathered schist which was generally recovered as sandy clayey gravel of mica schist.

The schist bedrock was highly micaceous and the shallow bedrock was predominately found to be moderate to highly fractured. The deeper schist bedrock showed a lesser degree of fracturing with predominately sub-horizontal fracturing noted.

Shallow boreholes (window sample boreholes) generally refused on dense weathered schist or the underlying schist bedrock.

The depth of made ground and superficial deposits, including weathered schist, varies from west to east with depth to bedrock and thickness of weathered/broken schist generally deeper in the centre of the Rectifier Yard.

2.4 Identified Impact and Conclusions

Visual and olfactory evidence of hydrocarbon contamination was identified throughout ground investigation of the Rectifier Yard, with the LKM delineation investigation identifying evidence of hydrocarbon impact in both made ground and underlying natural deposits. The locations of these investigation points are indicated on Figure 3 in Appendix A.

Rock cores of the schist bedrock were also recovered and examined, with no evidence of hydrocarbon impact present.

Detailed assessment of soil and groundwater sampling is present in section 2.4 of the LKM Remediation Strategy, with the conclusions stating:

The hydrocarbon plume in the groundwater in the Rectifier Yard, the source of which is assumed to be the release of transformer oils following the fire in 2008, is present in shallow groundwater within the variably permeable superficial deposits.

The results of the intrusive investigation indicate that the hydrocarbon contamination has not migrated downwards to the groundwater within the underlying bedrock.

There is also no evidence that the hydrocarbon plume has extended or migrated laterally beyond the boundaries of the Rectifier Yard. However, the distribution of the hydrocarbon contamination in the shallow groundwater compared to the results of Golders previous investigations does indicate that there has been some migration of the plume towards the northwest in the direction of assumed groundwater flow, albeit slowly.

Based on the findings of the current investigation, LKM agree with the controlled waters risk assessment by Golders for the permit surrender in 2013 in that the groundwater hydrocarbon contamination in the Rectifier Yard does not constitute a significant risk to the most sensitive receptor, the Irish Sea.

However, for betterment purposes LKM recommended that remediation under the ALARP principle is undertaken in the shallower groundwater body in the Rectifier Yard.

The delineation investigation succeeded in refining the plume within the superficial deposits as indicated on the attached Figure 5, in Appendix A. Baseline groundwater condition data has been referenced on Table 2, overleaf and complete dataset is included in Appendix B.

3.0 Remediation Strategy

3.1 Remediation Strategy Aims

Following on from the delineation of the impact at the site, the Remediation Strategy outlined the following aim:

The identified key contaminants in this area are considered to be hydrocarbons with identified Light Non-Aqueous Phase Liquids (LNAPLs) noted in several locations throughout the available dataset. The objective of these remediation works is to remove all measurable LNAPL and achieve a significant reduction in residual dissolved phase contaminant concentrations within the groundwater under the ALARP principle.

It is understood that this has been agreed with regulators.

3.2 Proposed Works

The Pilot Study and Laboratory Bench Scale Chemical Oxidation Study indicated that all areas of the Rectifier Yard have a high primary permeability within the superficial deposits (where the bulk of the impact is present), which indicates that a pumped solution will act as a suitable means of recovering free product and dissolved range hydrocarbons. Subsequent Chemical Oxidation trials demonstrated that a Peroxide based oxidant will then provide a highly effective means of treating the residual dissolved phase hydrocarbon impact.

Therefore, following a review of all available investigation data for the Rectifier Yard and the results of the pilot study the following remediation methods are considered to be the most effective to achieve betterment in the Rectifier Yard:

- **Dual Phase Vacuum Extraction (DPVE)** to recover LNAPL and hydrocarbon impacted groundwater.
- **In-Situ Chemical Oxidation (ISCO)** to treat soil sorbed and groundwater borne dissolved phase contamination.

Further details on these methods are included in Section 4.1.2 and 4.1.3 of the LKM Remediation Strategy.

3.3 Geo² Remediation Responsibilities

The principal responsibilities of Geo² which were outlined before the project commenced comprised:

- Approval and licensing of the proposed treatment by regulators;
- Installation of a network of remediation wells across the identified plume area;
- The design, installation and operation of a DPVE system to removal gross contamination;
- Monitoring and maintenance of the system during the treatment programme;
- Application of a Chemical Oxidant to treat residual contamination;
- Validation sampling following completion of works;
- Provision of remediation report.

The remediation system was operated and managed by a WAMITAB accredited manager from Geo².

4.0 Site Remediation

4.1 Licensing

As the area to be treated was greater than 1,000m³, the remediation programme was required to be undertaken under a deployment of an Environmental Permit.

Geo² currently hold an Environmental Permit (No. QP3592ZY) and have four WAMITAB COTC accredited Technically competent managers for the treatment of contaminated land who have between 10 and 20 years' experience each within the contaminated land remediation industry.

A Permit for the deployment was granted by Natural Resources Wales on the 17th January 2018 (ref: PAN-002177).

Additionally, as the existing discharge license for the site did not cover these activities, a separate trade effluent discharge license was applied for and granted on the 5th February 2019 (permit number EPR/BB3191HJ).

Terms of both licenses were followed throughout the works.

4.2 Works Undertaken

4.2.1 Installation of Remediation Wells

In line with the Remediation Strategy, prior to deployment of the DPVE system a network of remediation wells was installed across the treatment area. Figure 6, appended, shows the location of these wells.

Drilling works took place between the 27th November 2018 and the 5th December 2018, under the supervision of Geo² engineers. In total 14 wells were installed (RW1-RW14), with each well being installed with response zones designed to target the impacted shallow groundwater within the superficial deposits.

4.2.2 LNAPL Recovery

Prior to commencement of the DPVE programme monitoring indicated a maximum thickness of 720mm of free product in the area to be targeted. The DPVE system was operated in this area between the 20th May and the 30th August, at the end of which, no free product was present within any wells. Since this time no rebound of LNAPL has been observed in any location.

Further details on the methodology followed is included in section 4.1.2 of the LKM Remediation Strategy and details on volumes abstracted and treated are included in section 5.1.

4.2.3 Chemical Oxidation

Chemical Oxidation works were undertaken following completion of the DPVE programme, between the 2nd September and the 11th September. During this period 30m³ of peroxide based oxidant (as defined in the Bench Scale study) was injected into the sub surface, at a concentration of 5% (giving an overall volume of oxidant solution injected of 600m³) using the existing treatment well network (RW series).

Further details on the methodology followed is included in section 4.1.3 of the LKM Remediation Strategy.

4.3 Monitoring

Following completion of the chemical oxidation programme, a series of groundwater samples were taken in order to assess the success of the treatment programme when compared with baseline samples taken prior to commencement of treatment. Samples were taken on the 23rd October 2019, 6th November 2019, 4th December 2019 and the 14th January 2020.

Groundwater samples were taken using low flow techniques in order to ensure a minimum of disturbance to the water column during sampling. This allows for representative samples to be taken.

All samples were then submitted to an appropriately accredited laboratory for analysis in line with that specified in the LKM Remediation Strategy.

5.0 Laboratory Testing and Results

5.1 Volumes Treated

Prior to operation of the DPVE system, free product, at thicknesses up to 720mm were present in the treatment area. Following three months operation of the DPVE plant, no measurable thicknesses of free product remained in any well. Since this time no rebound of LNAPL has been observed in any location.

In total 2,146m³ of free product and contaminated groundwater was abstracted and treated during operation of the DPVE system, with recovered free product quarantined in an oil water separator.

It is not possible to estimate volumes of free product recovered in total due to volatilisation of hydrocarbons throughout the DPVE process.

5.2 Sampling Strategy

A number of sampling locations were agreed prior to treatment works. These were selected in order to give coverage of the entire identified plume area.

However, during the treatment programme, a number of wells were damaged or demonstrated significant silting within the well, meaning that alternative nearby wells were substituted. Should appropriate alternative wells not be available, the silted well was monitored, but not always sampled if insufficient water was available to permit representative sampling, in line with best practice.

To ensure all wells were accurately identified throughout the works, these were surveyed in, wells have been renamed by Geo² during works. Prior to and during these works some wells have become lost or damaged and have been substituted where appropriate by relevant nearby wells to represent the same area, the following details allow direct comparison with the following dataset (and attached lab certificates) and allow these to be correlated with the dataset included within the Remediation Strategy. The selected wells were:

- OBR5
- OBR7 (silted up during treatment, replaced by RW3)
- OBR11 (replaced by RW7 due to silting up during treatment)
- OBR14
- OBR18 (Could not be sampled on one monitoring trip due to low water volumes)
- OBR19
- OBR21

Additionally, OBR17 was added following treatment in order to allow for fuller characterisation of results in the most impacted area and due to silting of OBR18.

Well have been selected to represent the conditions across the plume area as indicated in the Remediation Strategy, targeting the most heavily impacted locations.

Table 1, below, indicates which historical locations the wells used for validation sampling most correlate to:

Monitoring Location	Historical Location	Justification for selection
OBR5	WS306a	Edge of superficial plume
RW3	AAM-REC11(s)	Area of previously identified free product
RW7	WS303	Centre of superficial plume
OBR14	AAM-REC01	Area of previously identified free product
OBR18	AAM-REC03	Area of previously identified free product
OBR19	AAM-REC06	Area of previously identified free product
OBR21	GABH05	Area of previously identified free product

Table 1: Current and historical sampling well comparison

In order to obtain samples which are most representative of the groundwater, it was proposed to use low flow sampling techniques throughout the monitoring programme.

This method discretely pumps from the target zone of the well, operating at a very low speed, meaning that the volume of purge water can be reduced, minimising disturbance within the water column. Water quality indicators are measured during sampling and when stability is achieved samples are taken.

This method allows for better sample consistency and minimises the amount of sediment in samples, therefore giving results reflective of the true groundwater condition.

5.3 Baseline Sampling Results

Prior to commencement of the DPVE programme a set of baseline samples were taken from existing monitoring wells across the treatment area, as reported in the LKM Remediation Strategy. This would allow for comparison to be made with validation samples taken post treatment.

Results of baseline sampling are shown in Table 2, below, the full dataset is included in the appendix. It should be noted that LNAPL was present in this area at the time of sampling.

Determinand	Units	WS306a	AAM REC 11(s)	WS303	AAM REC 03	GABH05
Aliphatic TPH >C5-C6	µg/l	<0.10	<0.10	<0.10	<0.10	<0.10
Aliphatic TPH >C6-C8	µg/l	<0.10	<0.10	<0.10	<0.10	<0.10
Aliphatic TPH >C8-C10	µg/l	8.4	<0.10	<0.10	<0.10	1,100
Aliphatic TPH >C10-C12	µg/l	<0.10	1,200	26	3.3	1,100
Aliphatic TPH >C12-C16	µg/l	<0.10	6,600	1,000	4,000	180,000
Aliphatic TPH >C16-C21	µg/l	<0.10	190,000	3,600	53,000	2,700,000
Aliphatic TPH >C21-C35	µg/l	<0.10	96,000	1,300	32,000	1,300,000
Total Aliphatic Hydrocarbons	µg/l	8.4	300,000	6,000	89,000	4,200,000
Aromatic TPH >C5-C7	µg/l	<0.10	<0.10	<0.10	1	<0.10
Aromatic TPH >C7-C8	µg/l	<0.10	<0.10	<0.10	<0.10	<0.10
Aromatic TPH >C8-C10	µg/l	36	1,300	<0.10	<0.10	2,500
Aromatic TPH >C10-C12	µg/l	110	<0.10	1.3	0.67	<0.10
Aromatic TPH >C12-C16	µg/l	870	1,800	180	690	25,000
Aromatic TPH >C16-C21	µg/l	520	<0.10	140	6,400	4,200
Aromatic TPH >C21-C35	µg/l	<0.10	12,000	87	2,900	150,000
Total Aromatic Hydrocarbons	µg/l	1,500	15,000	410	10,000	180,000
Total Petroleum Hydrocarbons	µg/l	1,500	310,000	6,400	100,000	4,400,000

Table 2: Selected Baselines from Remediation Strategy

5.4 Post Treatment Results

Several months of post-chemox groundwater validation monitoring has been undertaken to gauge the success of this approach.

Chemical injection works were completed from 2nd to the 11th of September 2019, with initial validation sampling undertaken between October 2019 and January 2020.

Results of the laboratory analysis of the groundwater validation samples, together with comparison of these values to baseline, is provided in Tables 3 to 7, below:

Determinand	Units	OBR5 WS306a	OBR7 AAM REC 11(s)	RW7 WS303	OBR14 AAM REC01	OBR18 Nr AAM REC 03	OBR19 AAM REC 06	OBR21 GABH05
Aliphatic TPH >C5-C6	µg/l	<1	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C6-C8	µg/l	<1	<1	<1	<1	<1	1	<1
Aliphatic TPH >C8-C10	µg/l	<5	<25	<5	<5	<5	<250	<5
Aliphatic TPH >C10-C12	µg/l	<5	75	<5	<5	<5	<250	<5
Aliphatic TPH >C12-C16	µg/l	8	1,760	22	12	317	22,700	35
Aliphatic TPH >C16-C21	µg/l	33	19,500	64	77	3,564	233,000	367
Aliphatic TPH >C21-C35	µg/l	18	10,800	46	34	1,883	108,000	198
Total Aliphatic Hydrocarbons	µg/l	59	32,200	132	122	5,765	363,000	601
Aromatic TPH >C5-C7	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C7-C8	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C8-C10	µg/l	14	34	22	9	11	312	11
Aromatic TPH >C10-C12	µg/l	6	87	33	<5	23	362	7
Aromatic TPH >C12-C16	µg/l	14	1,660	160	10	162	13,800	39
Aromatic TPH >C16-C21	µg/l	31	13,200	1,090	29	1,108	117,000	276
Aromatic TPH >C21-C35	µg/l	20	4,640	1,093	17	467	36,400	126
Total Aromatic Hydrocarbons	µg/l	85	19,600	2,399	65	1,771	168,000	459
Total Petroleum Hydrocarbons	µg/l	144	51,800	2,532	187	7,536	531,000	1,060

Table 3: Validation Sampling Results 1, 09.10.19

Determinand	Units	OBR5	RW7	OBR14	OBR17	OBR19	OBR21
		WS306a	WS303	AAM REC 01	AAM REC03	AAM REC 06	GABH05
Aliphatic TPH >C5-C6	µg/l	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C6-C8	µg/l	<1	<1	<1	2	<1	<1
Aliphatic TPH >C8-C10	µg/l	<5	<5	<5	<500	<50	<5
Aliphatic TPH >C10-C12	µg/l	<5	15	<5	<500	<50	16
Aliphatic TPH >C12-C16	µg/l	<5	171	12	15,541	3,047	250
Aliphatic TPH >C16-C21	µg/l	10	1,572	139	196,170	41,731	2,405
Aliphatic TPH >C21-C35	µg/l	9	721	78	117,437	22,975	1,100
Total Aliphatic Hydrocarbons	µg/l	19	2,478	229	329,148	67,753	3,770
Aromatic TPH >C5-C7	µg/l	<1	<1	<1	<1	<1	<1
Aromatic TPH >C7-C8	µg/l	<1	<1	<1	<1	<1	<1
Aromatic TPH >C8-C10	µg/l	51	19	14	<500	<50	19
Aromatic TPH >C10-C12	µg/l	23	25	8	<500	<50	27
Aromatic TPH >C12-C16	µg/l	69	102	19	7,089	504	129
Aromatic TPH >C16-C21	µg/l	85	541	68	82,589	8,635	757
Aromatic TPH >C21-C35	µg/l	75	148	27	25,913	2,807	182
Total Aromatic Hydrocarbons	µg/l	302	835	135	115,591	11,945	1,114
Total Petroleum Hydrocarbons	µg/l	322	3,314	364	444,739	79,698	4,884

Table 4: Validation Sampling Results 2, 06.11.19

Determinand	Units	OBR5	RW7	OBR14	OBR17	OBR18	OBR19	OBR21
		WS306a	WS303	AAM REC 01	AAM REC03	Nr AAM REC03	AAM REC 06	GABH05
Aliphatic TPH >C5-C6	µg/l	<1	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C6-C8	µg/l	<1	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C8-C10	µg/l	<5	<5	<5	<50	<5	<25	<5
Aliphatic TPH >C10-C12	µg/l	<5	7	<5	<50	<5	<25	5
Aliphatic TPH >C12-C16	µg/l	6	32	157	4,940	36	738	11
Aliphatic TPH >C16-C21	µg/l	43	28	1,516	49,200	337	8,990	22
Aliphatic TPH >C21-C35	µg/l	25	31	773	25,800	196	4,700	19
Total Aliphatic Hydrocarbons	µg/l	73	98	2,445	79,900	568	14,400	57
Aromatic TPH >C5-C7	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C7-C8	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C8-C10	µg/l	42	27	9	<50	11	<25	12
Aromatic TPH >C10-C12	µg/l	30	118	8	228	61	<25	73
Aromatic TPH >C12-C16	µg/l	63	509	115	3,670	191	387	172
Aromatic TPH >C16-C21	µg/l	41	764	785	21,400	182	3,550	72
Aromatic TPH >C21-C35	µg/l	54	329	150	4,910	57	857	53
Total Aromatic Hydrocarbons	µg/l	231	1,747	1,067	30,200	502	4,790	382
Total Petroleum Hydrocarbons	µg/l	304	1,846	3,512	110,000	1,070	19,200	439

Table 5: Validation Sampling Results 3, 04.12.19

Determinand	Units	OBR5	RW7	OBR14	OBR17	OBR18	OBR19	OBR21
		WS306a	WS303	AAM REC 01	AAM REC 03	Nr AAM REC03	AAM REC 06	GABH05
Aliphatic TPH >C5-C6	µg/l	<1	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C6-C8	µg/l	<1	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C8-C10	µg/l	<5	<5	<5	<50	<25	<100	<5
Aliphatic TPH >C10-C12	µg/l	<5	<5	<5	<50	<25	<100	<5
Aliphatic TPH >C12-C16	µg/l	<5	12	27	2,350	1,200	6,200	12
Aliphatic TPH >C16-C21	µg/l	63	75	311	25,800	11,900	70,800	79
Aliphatic TPH >C21-C35	µg/l	32	73	148	13,100	5,200	32,800	44
Total Aliphatic Hydrocarbons	µg/l	95	161	487	41,258	18,345	109,786	134
Aromatic TPH >C5-C7	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C7-C8	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C8-C10	µg/l	<5	<5	<5	169	120	223	<5
Aromatic TPH >C10-C12	µg/l	<5	20	<5	222	55	213	14
Aromatic TPH >C12-C16	µg/l	5	98	14	2,880	614	3,350	43
Aromatic TPH >C16-C21	µg/l	22	405	82	14,700	4,090	25,000	62
Aromatic TPH >C21-C35	µg/l	28	491	27	5,700	1,490	9,880	91
Total Aromatic Hydrocarbons	µg/l	55	1,014	122	23,651	6,368	38,666	210
Total Petroleum Hydrocarbons	µg/l	150	1,174	609	64,909	24,713	148,452	344

Table 6: Validation Sampling Results 4, 15.01.20

Determinand	Units	OBR5	RW3	RW7	OBR14	OBR18	OBR19	OBR21
		WS306a	AAM REC 11s	WS303	AAM REC 01	Nr AAM REC 03	AAM REC 06	GABH05
Aliphatic TPH >C5-C6	µg/l	<1	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C6-C8	µg/l	<1	<1	<1	<1	<1	<1	<1
Aliphatic TPH >C8-C10	µg/l	<5	<5	<5	<5	<5	<10	<5
Aliphatic TPH >C10-C12	µg/l	<5	<5	<5	<5	<5	<5	<5
Aliphatic TPH >C12-C16	µg/l	<5	6	10	<5	<5	15	<5
Aliphatic TPH >C16-C21	µg/l	<5	36	75	<5	<5	191	<5
Aliphatic TPH >C21-C35	µg/l	6	29	56	<5	12	211	<5
Total Aliphatic Hydrocarbons	µg/l	6	71	141	<5	12	425	<5
Aromatic TPH >C5-C7	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C7-C8	µg/l	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C8-C10	µg/l	<30	<30	<30	<30	<30	<30	<30
Aromatic TPH >C10-C12	µg/l	6	32	43	<5	25	8	<5
Aromatic TPH >C12-C16	µg/l	21	365	365	<5	108	48	12
Aromatic TPH >C16-C21	µg/l	36	920	893	<5	102	274	29
Aromatic TPH >C21-C35	µg/l	36	500	548	<5	62	271	19
Total Aromatic Hydrocarbons	µg/l	108	1,836	1,871	<5	307	627	74
Total Petroleum Hydrocarbons	µg/l	114	1,907	2,012	<10	319	1,052	74

Table 7: Validation Sampling Results 5, 04.02.20

Overall the data set shows very significant reductions in total hydrocarbon contaminant loading across the treatment area, demonstrating the successful removal of free product and reduction of gross dissolved phase product from the source areas of the site. Key observations include the following:

- All free product was removed by the DPVE system prior to chemical oxidation, meaning that the ongoing source of dissolved phase contamination was removed.
- All locations show significant reductions in dissolved phase contamination, with betterment clearly demonstrated across the contaminant plume.
- Figures 7 and 8, overleaf, show overall TPH concentrations across the site in a baseline condition and after the chemical oxidation, with significant reductions in overall hydrocarbon loading achieved across the treatment area. The areas of elevated contamination present have decreased, indicating a reduction in plume size.
- Although some samples demonstrate increases in some hydrocarbon bandings when compared to baseline (in particular Aromatic C16-C21), it should be noted that free product was present in this area prior to treatment, which was likely to be acting as an ongoing source. Subsequent LNAPL removal from all these locations and Chemical Oxidation has demonstrably achieved an overall TPH reduction in these locations.

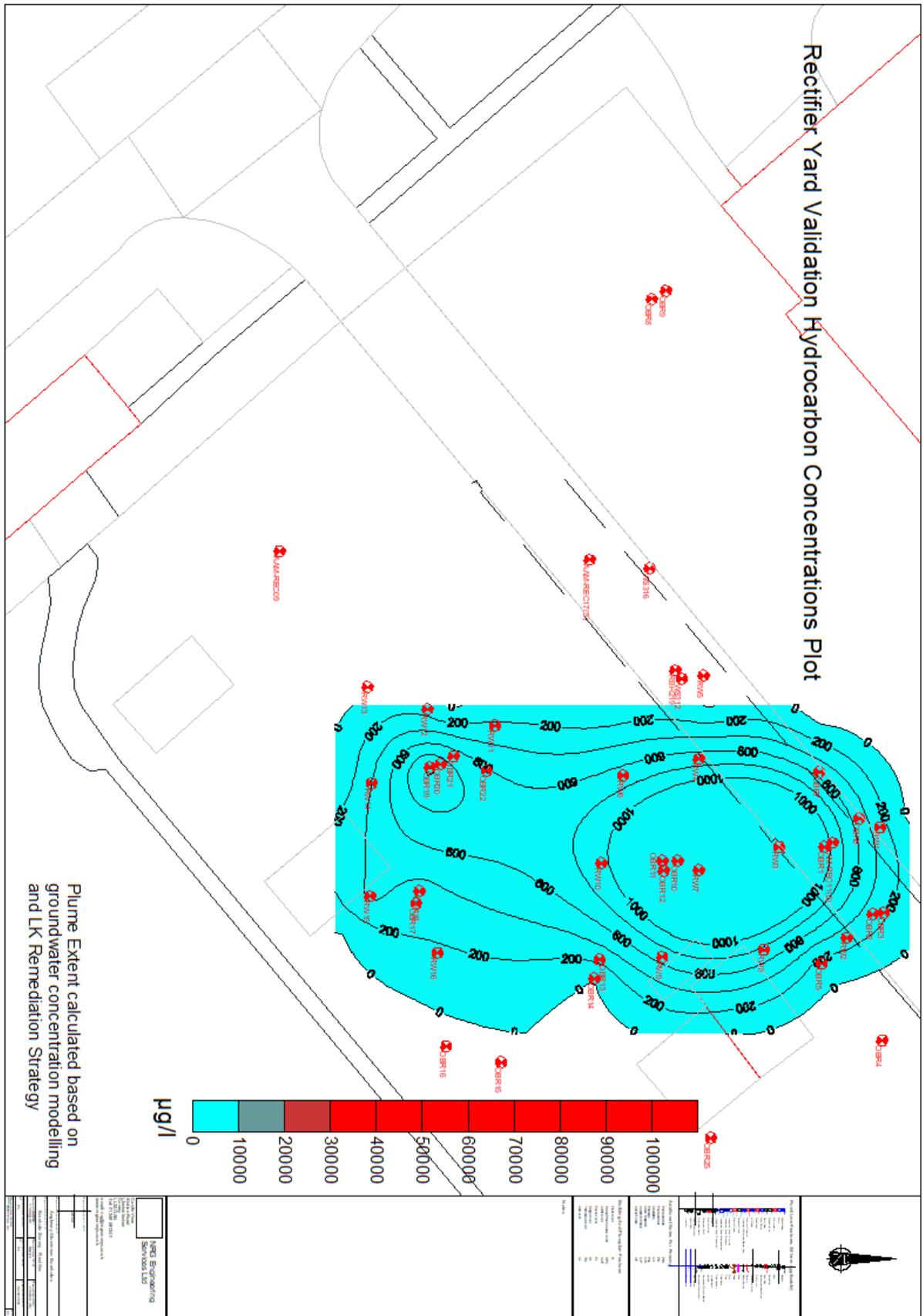


Figure 8. Validation Condition

Table 8, below, shows a summary of averaged site conditions from within the defined plume area (showing elevated concentrations) at the baseline condition (not including NAPL) and compares them to average post remediation validation sampling. A percentage reduction is shown for each contaminant, with an average reduction in TPH loading of in excess of 95%

However, it should also be noted that free product (LNAPL) was present in a number of locations prior to remediation, so the actual worst-case pre-remediation conditions indicate that far greater betterment has been achieved.

Determinand	Units	Worst Pre Remediation value	Worst Post Validation value	Maximum Reduction (%)
Aliphatic TPH >C5-C6	µg/l	<0.10	<1	-
Aliphatic TPH >C6-C8	µg/l	<0.10	<1	-
Aliphatic TPH >C8-C10	µg/l	1,100	<5	>95
Aliphatic TPH >C10-C12	µg/l	1,200	<5	>95
Aliphatic TPH >C12-C16	µg/l	180,000	10	>95
Aliphatic TPH >C16-C21	µg/l	2,700,000	191	>95
Aliphatic TPH >C21-C35	µg/l	1,300,000	211	>95
Total Aliphatic Hydrocarbons	µg/l	4,200,000	425	>95
Aromatic TPH >C5-C7	µg/l	1	<1	-
Aromatic TPH >C7-C8	µg/l	<0.10	<1	-
Aromatic TPH >C8-C10	µg/l	2,500	<30	>95
Aromatic TPH >C10-C12	µg/l	110	43	61
Aromatic TPH >C12-C16	µg/l	25,000	365	>95
Aromatic TPH >C16-C21	µg/l	6,400	920	86
Aromatic TPH >C21-C35	µg/l	150,000	548	>95
Total Aromatic Hydrocarbons	µg/l	180,000	1,871	>95
Total Petroleum Hydrocarbons	µg/l	4,400,000	2,012	>95

Table 8: Summary of Results

6.0 Environmental Site Monitoring

Environmental monitoring was undertaken to ensure vapours, odour and noise would not cause an issue for site workers and neighbouring residents during the remediation works. In line with the conditions of the Environmental Permit, locations around the perimeter of the site were chosen to undertake the environmental monitoring and each monitoring round was undertaken during site activities. In line with current Environmental Permitting regulations, all records will be stored at Geo²'s offices for 6 years.

6.1 Vapour and Odour Monitoring

Geo² conducted routine vapour monitoring around the perimeter of the site to establish whether vapour associated with the remediation was at an acceptable level for both site workers and neighbouring receptors. The locations of each vapour monitoring point are presented Appendix A and the results of the vapour monitoring survey are presented in Appendix D. It was found that vapour monitoring was at an acceptable level to both site users and identified receptors during the remediation works.

There was no evidence of any odours during the treatment period from any of the locations around the site.

6.2 Noise Monitoring

Geo² conducted routine noise monitoring around the perimeter of the site to establish whether noise was at an acceptable level for both site workers and neighbouring site users. It was found that noise levels were at an acceptable level to both site users and neighbouring site users during the remediation works.

6.3 Discharge Monitoring

In line with the requirements of the Discharge License, discharge samples were taken throughout the treatment programme. All discharge samples recorded results in line with the criteria set out in the discharge licenses, with no exceedances noted.

Certificates of discharge samples are included in Appendix B.

7.0 Demobilisation of Remediation System

Following the successful removal of free product and application of chemical oxidant, the DPVE and chemical injection plant were decommissioned.

All Geo² treatment equipment will be removed from site when regulatory sign off is achieved. Upon demobilisation from site, the site will be left secure, with all necessary licenses surrendered.

All wastes will be disposed of in line with current duty of care regulations, with records stored at Geo²'s office.

8.0 Conclusions

Approximately 7,946m³ of contaminated soil and groundwater has been treated at the Rectifier Yard (Escrow Site 1) at the former Penrhos works, Anglesey.

The DPVE system successfully recovered all LNAPL between 20th May and 30th August 2019, with no measured LNAPL detected in any location since.

Validation sampling undertaken following the completion of the Chemical Oxidation Application demonstrates substantial reductions of TPH concentrations within the dissolved phase in all locations with an averaged reduction in excess of 95%.

It is the opinion of Geo² that the above report demonstrates that in line with the aims of the LKM Remediation Strategy document, removal of free product and betterment of the dissolved phase hydrocarbon plume, in line with the principles of ALARP, has been achieved and successful remediation of the identified hydrocarbon contamination has taken place.

It is recommended that in line with best practice, any future groundwater monitoring at the site utilises low flow techniques. As detailed earlier in the report, this method allows for better sample consistency and minimises the amount of sediment in samples, therefore giving results reflective of the true groundwater condition and consistent with validation sampling.

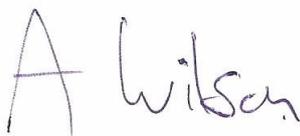
Regards,



Steven Jackson

05/03/2020
Date

This report was reviewed by



Adam Wilson

05/03/2020
Date

9.0 Limitations

Geo²'s conclusions, recommendations and opinions are based on information gathered at the time of the investigation from a variety of third party sources and from observations made during site reconnaissance and ground conditions encountered during the field work and on the results of laboratory and field tests performed during the investigation. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata and water conditions between or below intrusive locations. It should also be noted that groundwater levels may vary due to seasonal or other effects and may at times differ to those measured during the investigation.

A portion of this report is based solely upon information provided by third parties. The information has not been independently verified by Geo². Whilst this report and the opinions given in it are accurate to the best knowledge of Geo², Geo² cannot guarantee the completeness or accuracy of any descriptions, opinions or conclusions based solely upon information that has not been independently verified.

The recommendations contained within this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices and hydrological and engineering practices at this time. As such they are not a guarantee that the site is free of hazardous materials or conditions.

Geo² prepared this report for our Client; any third parties using this report do so entirely at their risk. Geo² makes no warranty or representation whatsoever, express or implied, with respect to the use by a third party of any information contained in this report or its suitability for any purpose. Geo² assumes no responsibility for any costs, claims, damages or expenses (including any consequential damages) resulting from the use of this report or any information contained in this report by a third party.

10.0 References

BGS

BGS Geology of Britain Viewer

British Standards Institute

BS10175:2011 “Investigation of potentially contaminated land sites – code of practice”.

Ciria

C552 Contaminated Land Risk Assessment: A guide to good practice.

CE Geochem

Laboratory Bench Scale Chemical Oxidation Study report (Ref: A161201, March 2017)

Environment Agency

CLR 11- Model procedures for the management of contaminated land.

Geo² Remediation Ltd

Laboratory Bench Scale Chemical Oxidation Study report (Ref: A161201, March 2017)

Remediation Pilot Study report (Ref: 17.0626, May 2017)

LK Management Limited

Preliminary Risk Assessment (PRA) report (Ref: CL-602-LKC 14 1181-01 R1, 8th March 2016)

Phase 2 Geoenvironmental Investigation and Risk Assessment (Ref: CL-602-LKC 14 1181-02, 29th April 2016)

Delineation Investigation and Risk Assessment Report (Ref: CL-602-LKC 14 1181-04, June 2017)

Remediation Strategy (Ref: CL-602-LKC 14 1181-07 R0, 30th June 2017)

Appendix A

Figures



Figure 1

Site Location

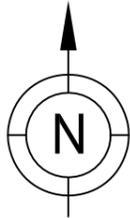


Figure 1: Site Location Plan, Anglesey Aluminium, Holyhead

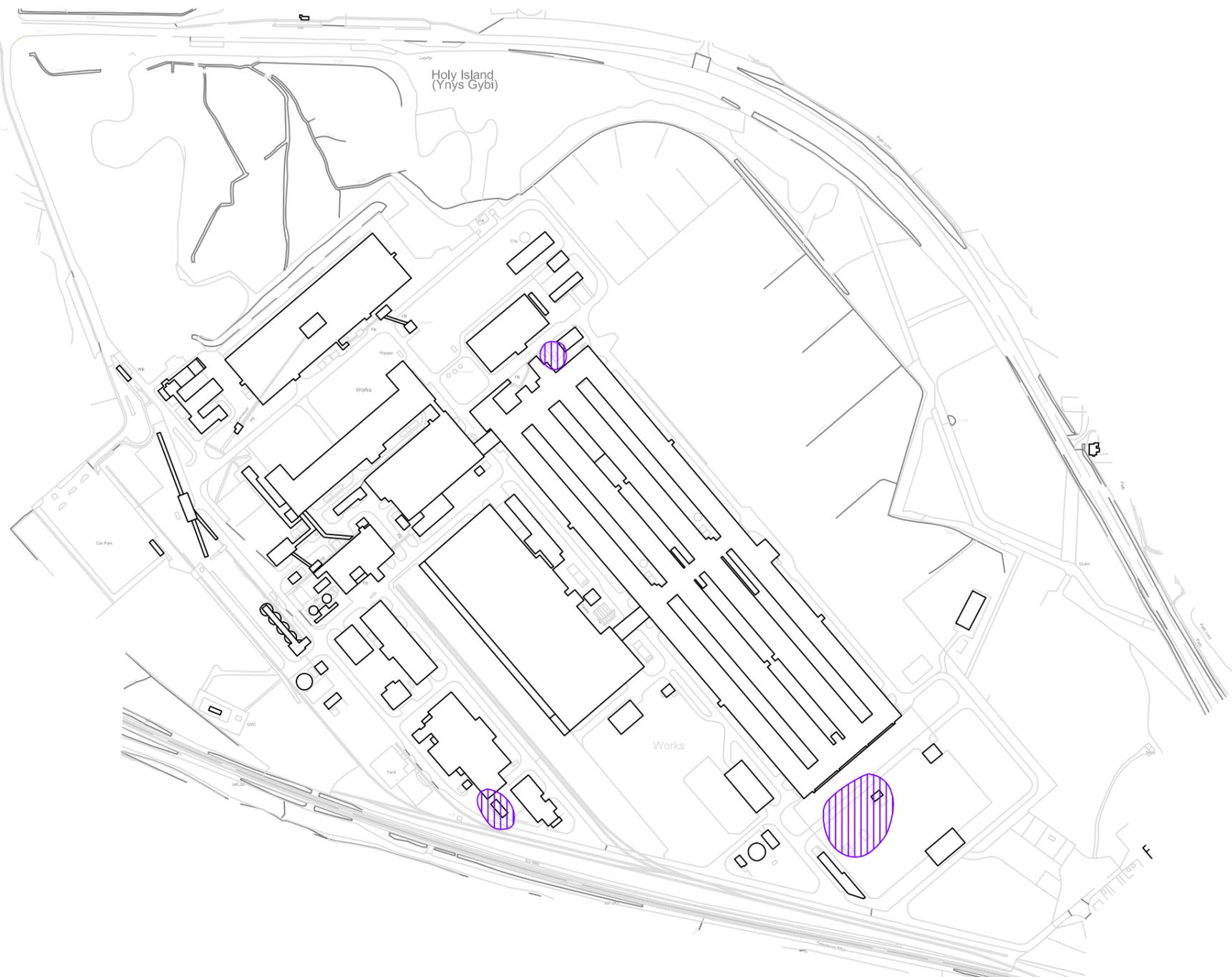
Drawn: June 2017 Scale: 1:25,000 @ A4 (see scale bar)

Figure 2

Plumes Across Anglesey Aluminium Site



Holy Island
(Ynys Gybi)



KEY



Escrow Sites

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client: **Orthios**

Site: **Anglesey Aluminium**

Title: **Escrow Sites**

Job No.: LKC 14 1181	Scale (See Scale Bar): 1:5000 @ A3	Figure: 2	Revision:
Drawn By: AC	Checked By: PQ	Drawn: May 2016	

Extract from: McCormick Architecture
Drawing Ref: A(100)04, RevC (25/02/15)

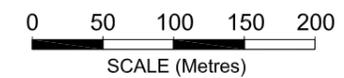
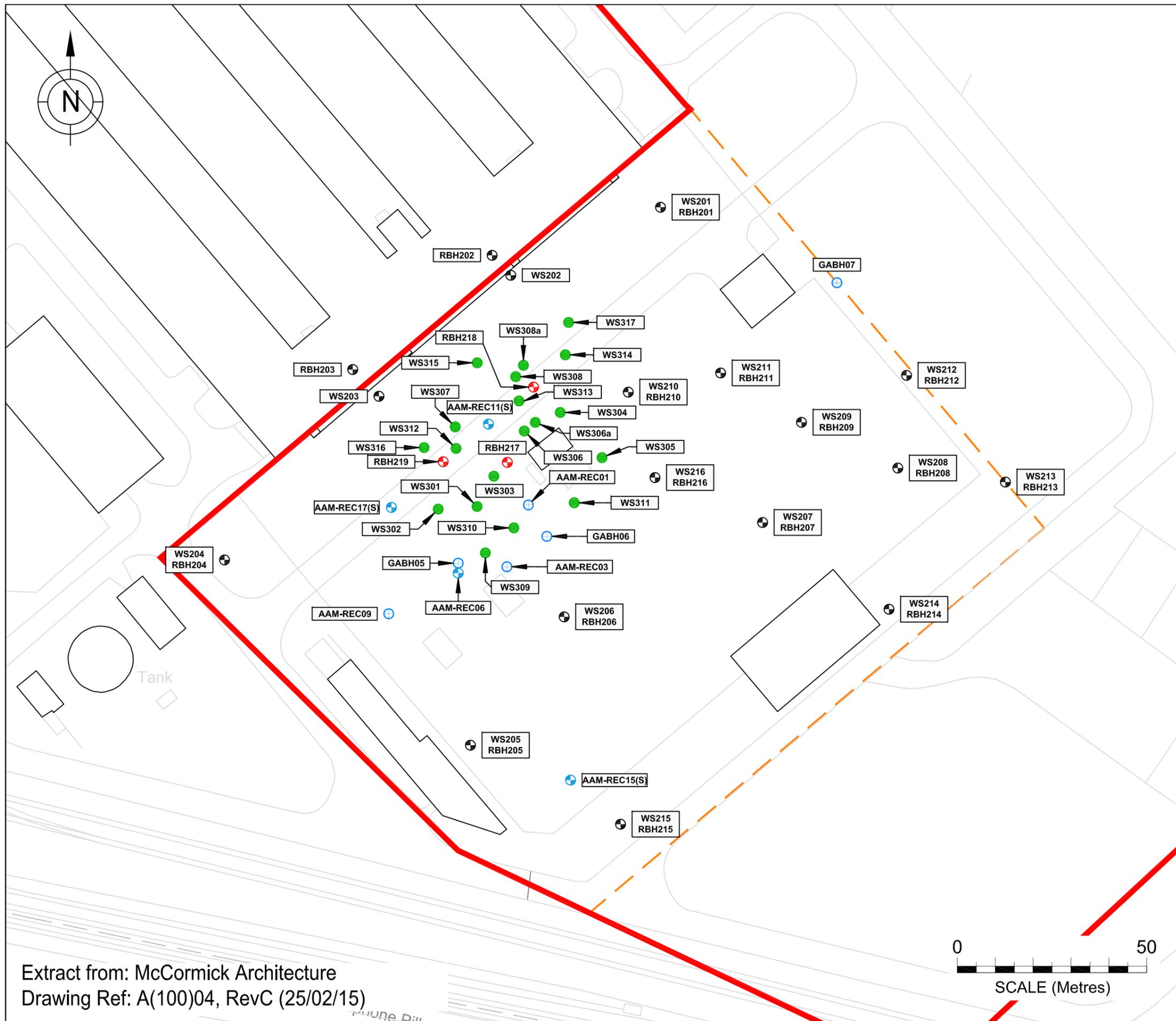


Figure 3

Historic SI Locations



- KEY**
-  Site Boundary
 -  Rectifier Yard Extents
 -  Dual Installation (Shallow & Deep)
 -  Installation (Deep)
 -  Existing Dual Installation (Shallow & Deep)
 -  Existing Monitoring Well (Shallow)
 -  Delineation Window Sample Borehole

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client:				Orthios	
Site:				Anglesey Aluminium, Holyhead	
Title:				Sampling Location Plan	
Job No.:	Scale (See Scale Bar):	Figure:	Revision:		
LKC 14 1181	1:1000 @ A3	3			
Drawn By:	Checked By:	Drawn:			
AC	AF	May 2016			

Extract from: McCormick Architecture
Drawing Ref: A(100)04, RevC (25/02/15)

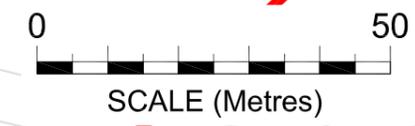
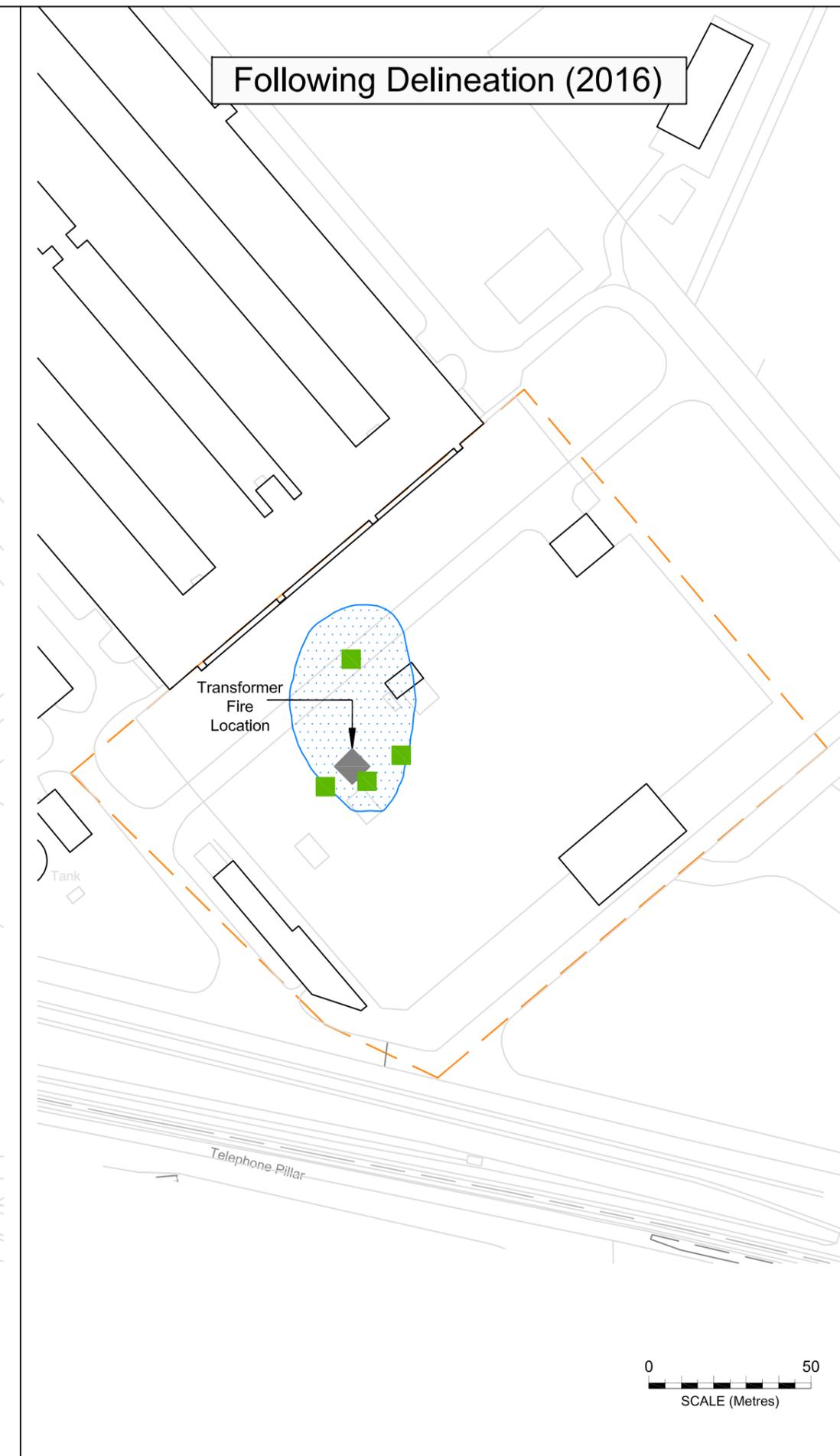
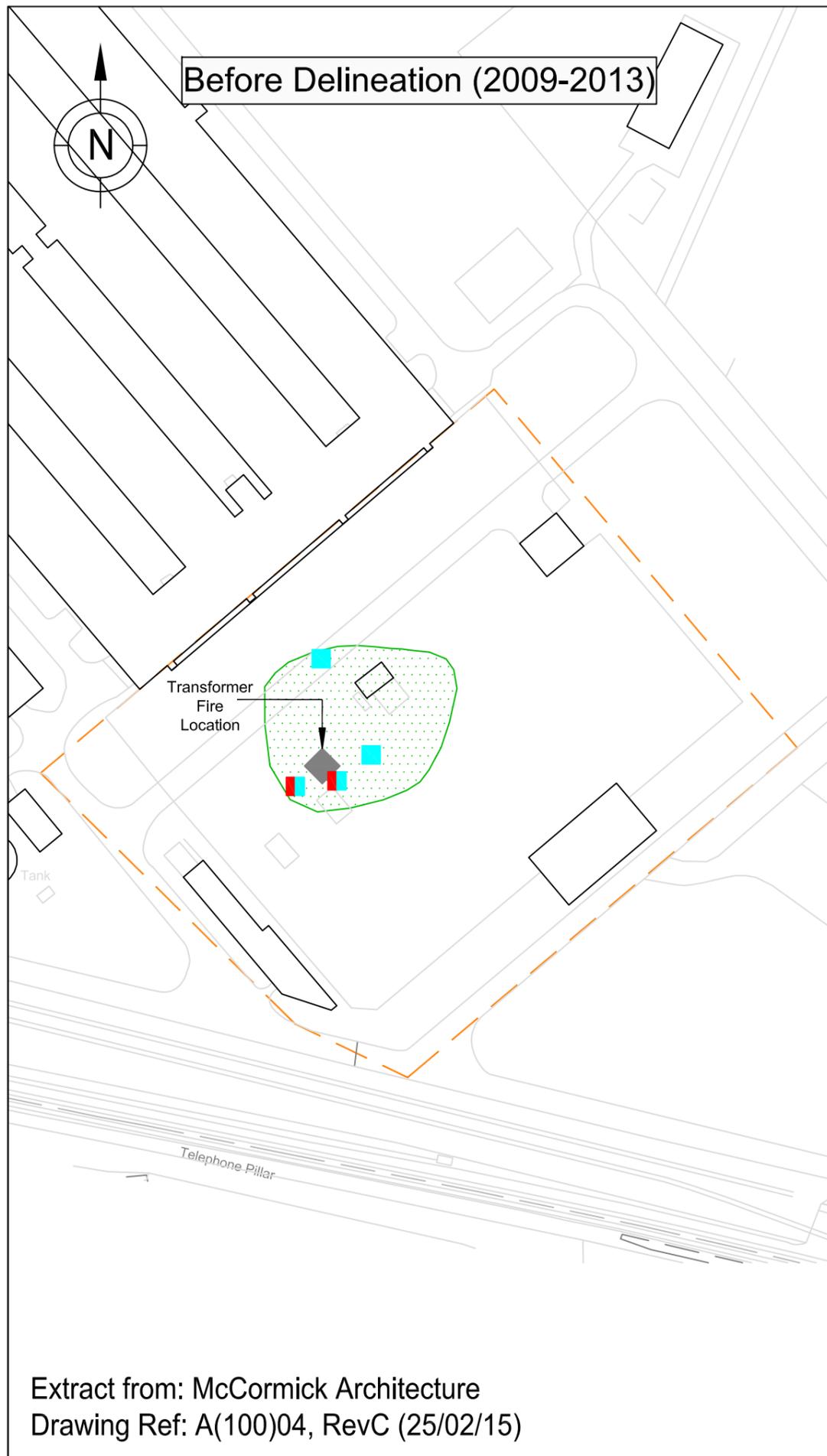


Figure 4

Plume Delineation Superficial



KEY

- Rectifier Yard Extents
- Estimated Plume Extent (Before Delineation)
- Plume Extent (After Delineation)
- Free Product (2009)
- Free Product (2013)
- Free Product (2016)
- Transformer Fire Location

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

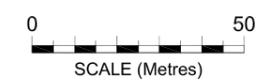


Client: **Orthios**

Site: **Anglesey Aluminium, Holyhead**

Title: **Hydrocarbon Distribution in Superficial Groundwater (Rectifier Yard)**

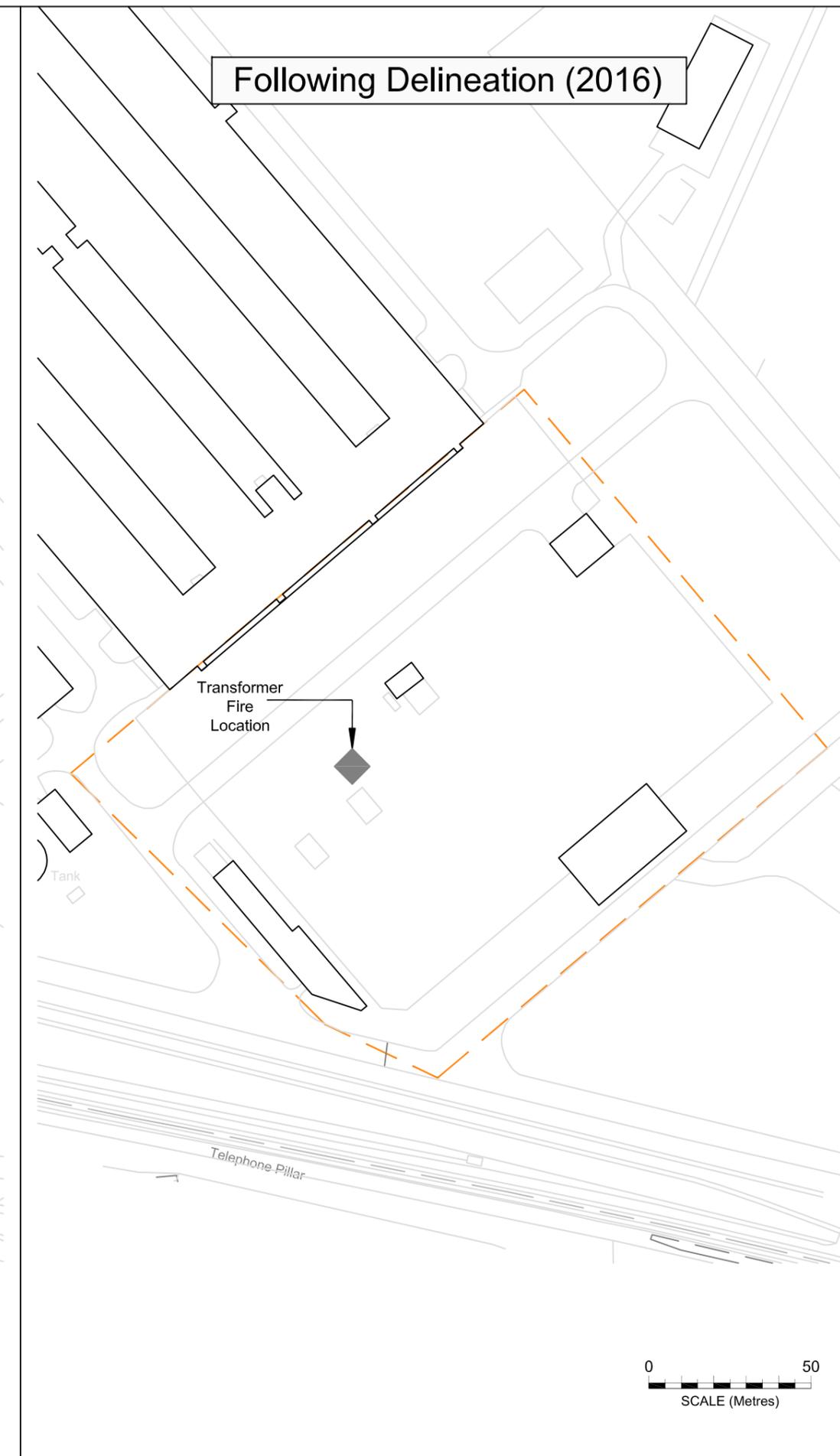
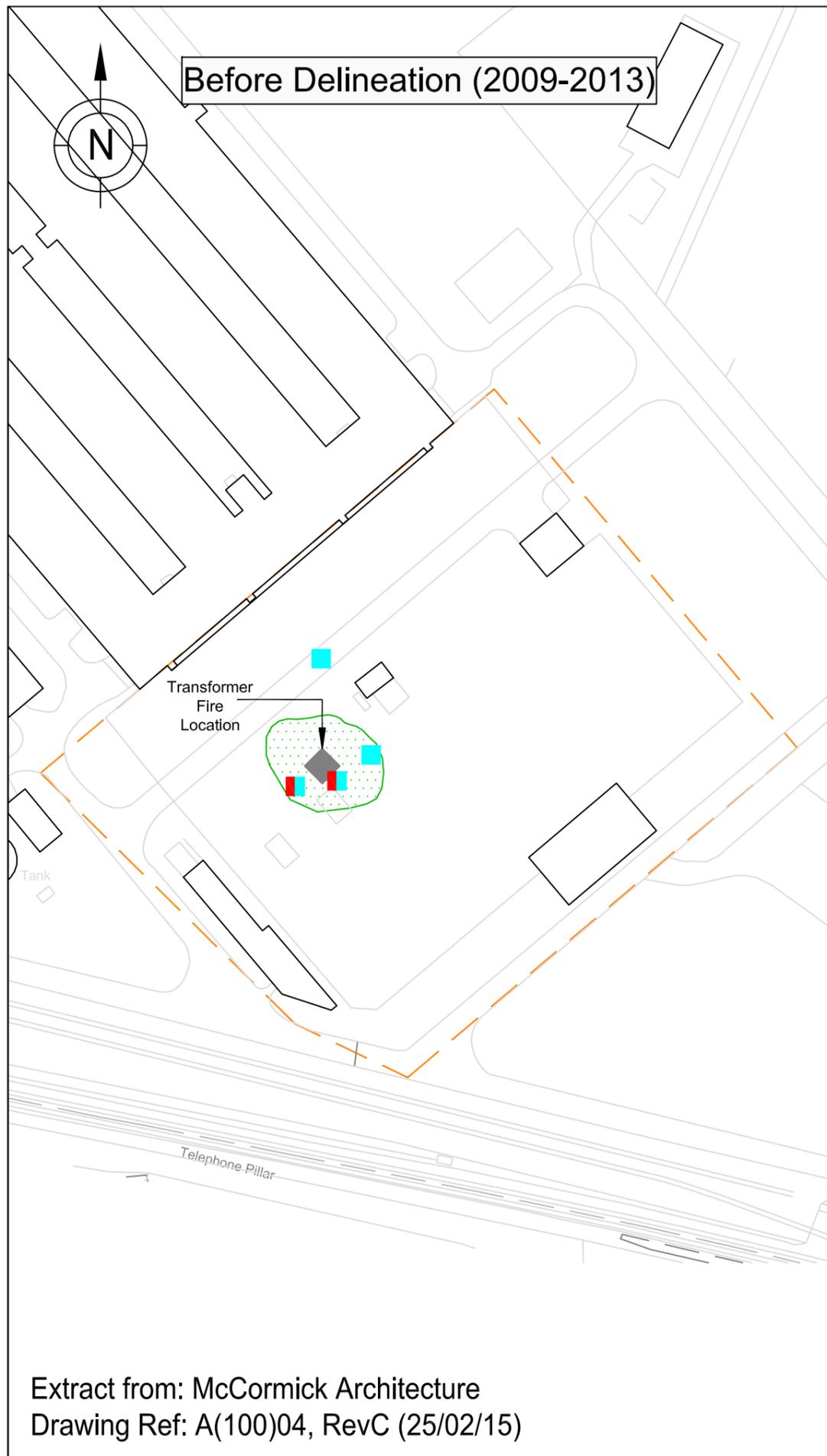
Job No.: LKC 14 1181	Scale (See Scale Bar): See Scale Bar	Figure: 4	Revision:
Drawn By: AC	Checked By: CH	Drawn: Jun 2017	



Extract from: McCormick Architecture
Drawing Ref: A(100)04, RevC (25/02/15)

Figure 5

Plume Delineation Bedrock



KEY

	Rectifier Yard Extents
	Estimated Plume Extent (Before Delineation)
	Free Product (2009)
	Free Product (2013)
	Transformer Fire Location

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

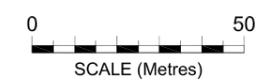


Client: **Orthios**

Site: **Anglesey Aluminium, Holyhead**

Title: **Hydrocarbon Distribution in Bedrock (Rectifier Yard)**

Job No.: LKC 14 1181	Scale (See Scale Bar): See Scale Bar	Figure: 6	Revision:
Drawn By: AC	Checked By: CH	Drawn: Jun 2017	



Extract from: McCormick Architecture
Drawing Ref: A(100)04, RevC (25/02/15)

Figure 6

Remediation Wells Locations

Appendix B

Laboratory Results and Certification



Baseline Data Set- reproduced from LK Remediation Strategy

	Units	GAB07	WS214	WS213	WS302	WS306a	WS307	WS317	GABH05	AAM-REC H(S)	WS201	WS202	WS203	WS205	WS206	WS216	AAM-REC03	AAM-REC09	WS303	WS304	WS305	Average
Aliphatic TPH >C5-C6	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	8.4	9.5	< 0.10	1100	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1100	1200	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.3	< 0.10	26	< 0.10	< 0.10	582
Aliphatic TPH >C12-C16	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	180000	6600	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	4000	< 0.10	1000	< 0.10	< 0.10	47900
Aliphatic TPH >C16-C21	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1000	< 0.10	2700000	190000	1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	53000	< 0.10	3600	< 0.10	< 0.10	491267
Aliphatic TPH >C21-C35	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	390	< 0.10	1300000	96000	300	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	32000	< 0.10	1300	< 0.10	< 0.10	238332
Total Aliphatic Hydrocarbons	µg/L	< 5.0	< 5.0	< 5.0	< 5.0	8.4	1400	< 5.0	4200000	300000	300	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	89000	< 5.0	6000	< 5.0	< 5.0	656673
Aromatic TPH >C5-C7	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	36	13	< 0.10	2500	1300	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	962
Aromatic TPH >C10-C12	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	110	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.67	< 0.10	1.3	< 0.10	< 0.10	37
Aromatic TPH >C12-C16	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	870	29	< 0.10	25000	1800	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	690	< 0.10	180	< 0.10	< 0.10	4762
Aromatic TPH >C16-C21	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	520	15	< 0.10	4200	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	6400	< 0.10	140	< 0.10	< 0.10	2255
Aromatic TPH >C21-C35	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	50	< 0.10	< 0.10	150000	12000	65	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2900	< 0.10	87	< 0.10	< 0.10	27517
Total Aromatic Hydrocarbons	µg/L	< 5.0	< 5.0	< 5.0	< 5.0	1500	110	< 5.0	180000	15000	65	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	10000	< 5.0	410	< 5.0	< 5.0	29584
Total Petroleum Hydrocarbons	µg/L	< 10	< 10	< 10	< 10	1500	1500	< 10	4400000	310000	370	< 10	< 10	< 10	< 10	< 10	100000	< 10	6400	< 10	< 10	688539

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/09662
Issue Number: 1
Date: 18 October, 2019

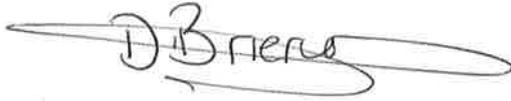
Client: Geo2 Remediation Ltd
Coniston House,
Louisa Street
Bradford
BD10 8NE

Project Manager: Adam Wilson/Peter Phillips/Sebastian Gledhill/Stev
Project Name: Angelsey
Project Ref: 626
Order No: 626
Date Samples Received: 14/10/19
Date Instructions Received: 15/10/19
Date Analysis Completed: 18/10/19

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Danielle Brierley
Client Manager

Envirolab Job Number: 19/09662

Client Project Name: Angelsey

Client Project Ref: 626

Lab Sample ID	19/09662/1	19/09662/3	19/09662/5	19/09662/7				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	OBR5	OBR14	OBR19	OBR7						
Depth to Top										
Depth To Bottom										
Date Sampled	09-Oct-19	09-Oct-19	09-Oct-19	09-Oct-19						
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW						
Sample Matrix Code	N/A	N/A	N/A	N/A						
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	1	<1				µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	<5	<250	<25				µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	<5	<250	75				µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	8	12	22700	1760				µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	33	77	233000	19500				µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	18	34	108000	10800				µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	59	122	363000	32200				µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	14	9	312	34				µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	6	<5	362	87				µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	14	10	13800	1660				µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	31	29	117000	13200				µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	20	17	36400	4640				µg/l	10	A-T-055w
Total Aromatics (w) _A	85	65	168000	19600				µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	144	187	531000	51800				µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w
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BTEX - o Xylene (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1	<1	<1				µg/l	1	A-T-022w

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 1155µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Geo2 Remediation Ltd, Coniston House,, Louisa Street, Bradford, BD10 8NE	Project No:	19/09662
Project:	Angelsey	Date Received:	15/10/2019 (am)
Clients Project No:	626	Cool Box Temperatures (°C):	14.2

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/10088
Issue Number: 1
Date: 04 November, 2019

Client: Geo2 Remediation Ltd
Coniston House,
Louisa Street
Bradford
BD10 8NE

Project Manager: Adam Wilson
Project Name: 0626
Project Ref: Not specified
Order No: 19/626/2288
Date Samples Received: 24/10/19
Date Instructions Received: 25/10/19
Date Analysis Completed: 04/11/19

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Iain Haslock
Analytical Consultant

Envirolab Job Number: 19/10088

Client Project Name: 0626

Client Project Ref: Not specified

Lab Sample ID	19/10088/1	19/10088/2	19/10088/3					Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	OBR18	OBR21	RW7 (OBR11)							
Depth to Top										
Depth To Bottom										
Date Sampled	23-Oct-19	23-Oct-19	23-Oct-19							
Sample Type	Water - EW	Water - EW	Water - EW							
Sample Matrix Code	N/A	N/A	N/A							
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	<5	<5					µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	<5	<5					µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	317	35	22					µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	3564	367	64					µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	1883	198	46					µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	5765	601	132					µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	11	11	22					µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	23	7	33					µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	162	39	160					µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	1108	276	1090					µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	467	126	1093					µg/l	10	A-T-055w
Total Aromatics (w) _A	1771	459	2399					µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	7536	1060	2532					µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1	<1					µg/l	1	A-T-022w

REPORT NOTES

General

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Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 1155µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

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Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Geo2 Remediation Ltd, Coniston House,, Louisa Street, Bradford, BD10 8NE	Project No:	19/10088
Project:	0626	Date Received:	25/10/2019 (am)
Clients Project No:		Cool Box Temperatures (°C):	13.9

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/10605
Issue Number: 1
Date: 18 November, 2019

Client: Geo2 Remediation Ltd
Coniston House,
Louisa Street
Bradford
BD10 8NE

Project Manager: Adam Wilson
Project Name: Anglesey
Project Ref: 626
Order No: 626
Date Samples Received: 08/11/19
Date Instructions Received: 08/11/19
Date Analysis Completed: 18/11/19

Prepared by:



Sophie France
Admin Assistant

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 19/10605

Client Project Name: Anglesey

Client Project Ref: 626

Lab Sample ID	19/10605/1	19/10605/2	19/10605/3	19/10605/4	19/10605/5	19/10605/6		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	OBR5	OBR14	OBR17	OBR19	OBR21	RW7				
Depth to Top										
Depth To Bottom										
Date Sampled	06-Nov-19	06-Nov-19	06-Nov-19	06-Nov-19	06-Nov-19	06-Nov-19				
Sample Type	Water - EW									
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A				
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	2	<1	<1	<1		µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	<5	<500	<50	<5	<5		µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	<5	<500	<50	16	15		µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	<5	12	15541	3047	250	171		µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	10	139	196170	41731	2405	1572		µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	9	78	117437	22975	1100	721		µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	19	229	329148	67753	3770	2478		µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	51	14	<500	<50	19	19		µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	23	8	<500	<50	27	25		µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	69	19	7089	504	129	102		µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	85	68	82589	8635	757	541		µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	75	27	25913	2807	182	148		µg/l	10	A-T-055w
Total Aromatics (w) _A	302	135	115591	11945	1114	835		µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	322	364	444739	79698	4884	3314		µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1	<1	<1	<1	<1		µg/l	1	A-T-022w

REPORT NOTES

General

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The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 1155µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Geo2 Remediation Ltd, Coniston House,, Louisa Street, Bradford, BD10 8NE	Project No:	19/10605
Project:	Anglesey	Date Received:	08/11/2019 (am)
Clients Project No:	626	Cool Box Temperatures (°C):	9.7

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/11632
Issue Number: 1
Date: 12 December, 2019

Client: Geo2 Remediation Ltd
Coniston House,
Louisa Street
Bradford
BD10 8NE

Project Manager: Adam Wilson/Sebastian Gledhill/Steven Jackson
Project Name: Angelsey
Project Ref: 626
Order No: 626
Date Samples Received: 06/12/19
Date Instructions Received: 07/12/19
Date Analysis Completed: 12/12/19

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Richard Wong
Client Manager

Envirolab Job Number: 19/11632

Client Project Name: Angelsey

Client Project Ref: 626

Lab Sample ID	19/11632/1	19/11632/2	19/11632/3	19/11632/4	19/11632/5	19/11632/6	19/11632/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	OBR5	OBR14	OBR17	OBR19	OBR21	RW7	OBR18			
Depth to Top										
Depth To Bottom										
Date Sampled	04-Dec-19									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	<5	<50	<25	<5	<5	<5	µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	<5	<50	<25	5	7	<5	µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	6	157	4940	738	11	32	36	µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	43	1516	49200	8990	22	28	337	µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	25	773	25800	4700	19	31	196	µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	73	2445	79900	14400	57	98	568	µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	42	9	<50	<25	12	27	11	µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	30	8	228	<25	73	118	61	µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	63	115	3670	387	172	509	191	µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	41	785	21400	3550	72	764	182	µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	54	150	4910	857	53	329	57	µg/l	10	A-T-055w
Total Aromatics (w) _A	231	1067	30200	4790	382	1747	502	µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	304	3512	110000	19200	439	1846	1070	µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w

REPORT NOTES

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The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

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All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 1155µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Geo2 Remediation Ltd, Coniston House,, Louisa Street, Bradford, BD10 8NE	Project No:	19/11632
Project:	Angelsey	Date Received:	07/12/2019 (am)
Clients Project No:	626	Cool Box Temperatures (°C):	9.8

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

FINAL ANALYTICAL TEST REPORT SUPPLEMENT TO TEST REPORT 20/00403/1

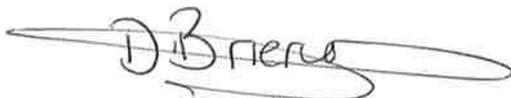
Amendments: Request for split report

Envirolab Job Number: 20/00403
Issue Number: 2-S1
Date: 27 January, 2020

Client: Geo2 Remediation Ltd
Coniston House,
Louisa Street
Bradford
BD10 8NE

Project Manager: Adam Wilson/Sebastian Gledhill/Steven Jackson
Project Name: Anglesey
Project Ref: 626
Order No: 626
Date Samples Received: 16/01/20
Date Instructions Received: 17/01/20
Date Analysis Completed: 23/01/20

Prepared by:



Danielle Brierley
Client Manager

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 20/00403

Client Project Name: Anglesey

Client Project Ref: 626

Lab Sample ID	20/00403/1	20/00403/2	20/00403/3	20/00403/4	20/00403/5	20/00403/6	20/00403/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	OBR5	OBR14	OBR17	OBR19	OBR21	RW7	OBR18			
Depth to Top										
Depth To Bottom										
Date Sampled	15-Jan-20									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	<5	<50	<100	<5	<5	<25	µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	<5	<50	<100	<5	<5	<25	µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	<5	27	2350	6200	12	12	1200	µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	63	311	25800	70800	79	75	11900	µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	32	148	13100	32800	44	73	5200	µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	95	487	41258	109786	134	161	18345	µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	<5	<5	169	223	<5	<5	120	µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	<5	<5	222	213	14	20	55	µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	5	14	2880	3350	43	98	614	µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	22	82	14700	25000	62	405	4090	µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	28	27	5700	9880	91	491	1490	µg/l	10	A-T-055w
Total Aromatics (w) _A	55	122	23651	38666	210	1014	6368	µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	150	609	64909	148452	344	1174	24713	µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w

REPORT NOTES

General

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A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 1155µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

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Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Geo2 Remediation Ltd, Coniston House,, Louisa Street, Bradford, BD10 8NE	Project No:	20/00403
Project:	Anglesey	Date Received:	17/01/2020 (am)
Clients Project No:	626	Cool Box Temperatures (°C):	13.9

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 20/01202
Issue Number: 1
Date: 12 February, 2020

Client: Geo2 Remediation Ltd
Coniston House,
Louisa Street
Bradford
BD10 8NE

Project Manager: Steven Jackson
Project Name: Rectifier
Project Ref: 0626
Order No: 0626
Date Samples Received: 06/02/20
Date Instructions Received: 07/02/20
Date Analysis Completed: 11/02/20

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Richard Wong
Client Manager

Envirolab Job Number: 20/01202

Client Project Name: Rectifier

Client Project Ref: 0626

Lab Sample ID	20/01202/1	20/01202/2	20/01202/3	20/01202/4	20/01202/5	20/01202/6	20/01202/7	Units	Limit of Detection	Method ref			
Client Sample No													
Client Sample ID	RW3	RW7	RW15	OBR5	OBR14	OBR18	OBR19						
Depth to Top													
Depth To Bottom													
Date Sampled	04-Feb-20												
Sample Type	Water - EW												
Sample Matrix Code	N/A												
Total Suspended Solids (w) [#]	21	17	<10	12	<10	15	424				mg/l	10	A-T-036w

Envirolab Job Number: 20/01202

Client Project Name: Rectifier

Client Project Ref: 0626

Lab Sample ID	20/01202/1	20/01202/2	20/01202/3	20/01202/4	20/01202/5	20/01202/6	20/01202/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	RW3	RW7	RW15	OBR5	OBR14	OBR18	OBR19			
Depth to Top										
Depth To Bottom										
Date Sampled	04-Feb-20									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	<5	<5	<5	<5	<5	<10	µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5	µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	6	10	10	<5	<5	<5	15	µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	36	75	115	<5	<5	<5	191	µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	29	56	104	6	<5	12	211	µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	71	141	228	6	<5	12	425	µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	<30	<30	<30	<30	<30	<30	<30	µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	32	43	7	6	<5	25	8	µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	365	365	25	21	<5	108	48	µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	920	893	86	36	<5	102	274	µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	500	548	83	36	<10	62	271	µg/l	10	A-T-055w
Total Aromatics (w) _A	1836	1871	212	108	<10	307	627	µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	1907	2012	440	114	<10	319	1052	µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1	<1	<1	<1	<1	<1	µg/l	1	A-T-022w

Envirolab Job Number: 20/01202

Client Project Name: Rectifier

Client Project Ref: 0626

Lab Sample ID	20/01202/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	OBR21									
Depth to Top										
Depth To Bottom										
Date Sampled	04-Feb-20									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
Total Suspended Solids (w) [#]	<10									

REPORT NOTES

General

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A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 1155µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Geo2 Remediation Ltd, Coniston House,, Louisa Street, Bradford, BD10 8NE	Project No:	20/01202
Project:	Rectifier	Date Received:	07/02/2020 (am)
Clients Project No:	0626	Cool Box Temperatures (°C):	7.2

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 19/07229
Issue Number: 1
Date: 06 August, 2019

Client: Geo2 Remediation Ltd
Coniston House,
Louisa Street
Bradford
BD10 8NE

Project Manager: Adam Wilson
Project Name: Rectifier
Project Ref: Not specified
Order No: 0626
Date Samples Received: 31/07/19
Date Instructions Received: 31/07/19
Date Analysis Completed: 06/08/19

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Iain Haslock
Analytical Consultant

Envirolab Job Number: 19/07229

Client Project Name: Rectifier

Client Project Ref: Not specified

Lab Sample ID	19/07229/1										
Client Sample No											
Client Sample ID	Discharge										
Depth to Top											
Depth To Bottom											
Date Sampled	30-Jul-19										
Sample Type	Water - EW										
Sample Matrix Code	N/A										
								Units	Limit of Detection	Method ref	
pH (w) _A [#]	7.59							pH	0.01	A-T-031w	
COD (settled) _A [#]	17							mg/l	6	A-T-034w	
BOD (settled, 5 day) _A	<1							mg/l	1	A-T-048	
Total Suspended Solids (w) _A [#]	<10							mg/l	10	A-T-036w	
Arsenic (dissolved) _A [#]	3							µg/l	1	A-T-025w	
Cadmium (dissolved) _A [#]	<0.2							µg/l	0.2	A-T-025w	
Copper (dissolved) _A [#]	23							µg/l	1	A-T-025w	
Chromium (dissolved) _A [#]	<1							µg/l	1	A-T-025w	
Lead (dissolved) _A [#]	<1							µg/l	1	A-T-025w	
Mercury (dissolved) _A [#]	<0.1							µg/l	0.1	A-T-025w	
Nickel (dissolved) _A [#]	2							µg/l	1	A-T-025w	
Selenium (dissolved) _A [#]	<1							µg/l	1	A-T-025w	
Zinc (dissolved) _A [#]	17							µg/l	1	A-T-025w	

Envirolab Job Number: 19/07229

Client Project Name: Rectifier

Client Project Ref: Not specified

Lab Sample ID	19/07229/1									
Client Sample No										
Client Sample ID	Discharge									
Depth to Top										
Depth To Bottom										
Date Sampled	30-Jul-19									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
TPH CWG (w)										
Ali >C5-C6 (w) _A [#]	<1							µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1							µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5							µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5							µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	<5							µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	8							µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	12							µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	20							µg/l	5	A-T-055w
Aro >C5-C7 (w) _A [#]	<1							µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1							µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	<5							µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	<5							µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	<5							µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	7							µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	12							µg/l	10	A-T-055w
Total Aromatics (w) _A	19							µg/l	10	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	39							µg/l	10	A-T-055w
BTEX - Benzene (w) _A [#]	<1							µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1							µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1							µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1							µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	<1							µg/l	1	A-T-022w
MTBE (w) _A [#]	<1							µg/l	1	A-T-022w

REPORT NOTES

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Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 1155µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	Geo2 Remediation Ltd, Coniston House,, Louisa Street, Bradford, BD10 8NE	Project No:	19/07229
Project:	Rectifier	Date Received:	31/07/2019 (am)
Clients Project No:		Cool Box Temperatures (°C):	20.1

Lab Sample ID	19/07229/1
Client Sample No	
Client Sample ID/Depth	Discharge
Date Sampled	30/07/19
Deviation Code	
A7 (no HNO3)	✓
A9 (no H2SO4)	✓

Key
A7 (no HNO3) *No HNO3 preserved bottle provided (dissolved metals will be deviating)*
A9 (no H2SO4) *No H2SO4 preserved bottle provided (phenols, ammonia, DOC, COD will be deviating)*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.