



St. Modwen Developments Limited

Coed Darcy

Crymlyn Tip - Environmental Monitoring Annual Report

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I Introduction

I.1 Overview

This report has been prepared in line with Condition 4.2.2 (a) of Crymlyn Tip Environmental Permit EPR/AP3990LR and subsequent variations (the Permit), which states:

'4.2.2 A report or reports on the performance of the activities over the previous year shall be submitted to the Environment Agency [now Natural Resources Wales] by 31 January (or other date agreed in writing by [NRW] each year. The report(s) shall include as a minimum:

a) A review of the results of the monitoring and assessment carried out in accordance with this permit against the relevant assumptions, parameters and results in the risk assessments submitted in relation to this site and any agreed amendments thereto.'

This report covers the monitoring period January 1st 2022 to December 31st 2022.

I.2 Background

St. Modwen Developments Limited (St. Modwen) acquired responsibility for Crymlyn Tip (the Tip) in 2008, when they purchased the former Llandarcy Oil Refinery from BP. For the Tip to enter 'definitive' closure NRW must be satisfied that a Closure and Aftercare Management Plan has been produced.

St. Modwen appointed Englobe in 2022 to address Improvement Requirements IP1 and IP2 of permit EPR/AP3990LR, including preparation of a Closure and Aftercare Management Plan for agreement by NRW.

Works associated with IP1 and IP2 are reported under separate cover by Englobe and are subject to separate discussions with NRW.

I.3 Summary of Works

The environmental monitoring programme was initially undertaken by Atkins on behalf of St. Modwen until March 2019. From April 2019, PJA were appointed by St. Modwen to undertake elements of the monitoring and to prepare annual reports for submission to NRW.

PJA collect groundwater and surface water samples on a monthly basis as part of the monitoring programme.

GeoEnvironmental Applications Ltd (GAL) have been contracted by St. Modwen to manage the recovery of local free phase oil within the Tip and its peripheries. Alongside oil recovery, GAL carry



out groundwater level and free phase hydrocarbon monitoring within boreholes/sumps and obtain monthly gas readings from available boreholes within/surrounding the Tip.

A programme of environmental monitoring consistent with previous years has been undertaken during 2022.

I.4 Supporting Documents

The previous annual monitoring report covering the year 2021 was produced by PJA and submitted to NRW:

- PJA Crymlyn Tip Environmental Monitoring Annual Report. Ref: 04020-PJA-21-XX-RP-R-0063. Dated March 2022

Additional information relating to the history, operation, previous assessments, and risk assessments of the Tip are presented in the following reports:

- Atkins (2013) Coed Darcy – Hydrogeological Risk Assessment Crymlyn Tip;
- Atkins (2013) – Coed Darcy – Landfill Gas Risk Assessment and Gas Management Plan;
- Atkins (2017) – Coed Darcy Crymlyn Tip- Partial Surrender of Coed Darcy Wetlands. EPR/AP3990LR/S003 Site Condition Report. Ref 5041216-RAP-RPT-0001788;
- Atkins (2019) – Coed Darcy Crymlyn Tip – Environmental Permit Monitoring. Ref: 5041216. Dated: 31/01/2019;
- Natural Resources Wales (2019) – Compliance Assessment Report. Ref: CAR_NRW0034811. Dated: 13/03/2019;
- PJA (2019) – Coed Darcy – Crymlyn Tip Factual Summary Report, April – September 2019: Ref: 4020-PJA-19-XX-TN-R-005. Dated 22/10/2019; and
- PJA (2020) – Crymlyn Tip – Environmental Monitoring Annual Report. Ref: 04020/OUT/0027. Dated April 2020.
- Coed Darcy (2021) – Crymlyn Tip Environmental Monitoring Annual Report, February 2021 –Ref: 4020-PJA-20-XX-RP-R-0045
- PJA (2022) – Crymlyn Tip – Environmental Monitoring Annual Report. Ref: 04020-PJA-21-XX-RP-R-0063. Dated March 2022.

It is assumed that the reader has access to the above documentation and is familiar with previous assessments undertaken. This report is not intended to repeat or reproduce findings of previous assessments in any great detail.



I.5 Limitations

This report has been prepared by PJA, on behalf of St. Modwen, for submission to NRW. This report shall not be relied upon or transferred to any other parties. If an unauthorised third party comes into possession of this report, they rely on its contents at their own risk.

The findings within this report are based upon information gained from a variety of sources and field measurements as detailed within this report which PJA believes are reliable. Nevertheless, PJA cannot guarantee the authenticity or reliability of third-party information.

The conclusions made within this report are based on relevant guidance available at the time of writing.



2 Site Setting

2.1 Site Location and Description

The Tip is located in the historical 'Containment Area' in the western section of the wider Coed Darcy development at the former Llandarcy Oil Refinery. The 'Containment Area' also includes a series of lagoons and wetlands. The containment area is shown in Appendix A on PJA drawing 04020-A-0110-00: Notable Areas & NRW Discharge Consent Points.

The area covered by the Permit, and to which this report relates, is shown on drawing 04020-A-SK201-P2 and consists of the 'lower tip' in the west and the 'main tip' in the centre and east. To the north is Crymlyn Bog and to the south of the permitted area are the wetlands within the Containment Area which were surrendered from the Permit in 2017.

2.2 Brief Site History

When the refinery opened in the early 1920s the 'Containment Area' comprised a series of lagoons and wetlands, congruent with Crymlyn Bog. The lagoons were initially constructed during the operational years of the refinery and were intended to intercept oil, preventing it from entering Crymlyn Bog. There are three lagoons within the Containment Area: Crymlyn Bog Lagoon (approx. 10,500m³), South Bay (approx. 4,450m³) and West Bay (approx. 1,500m³).

Prior to the Second World War an ash bund was constructed around the Containment Area to provide a containment area for oil, which may have otherwise flowed into Crymlyn Bog if the tank farm area had been struck by bombs during the war. The ash bund also contained drainage systems, serving the southern half of the former refinery.

In 1977 a waste disposal licence was granted for the Containment Area. The licence granted the deposition of refinery waste, including both inert and potentially hazardous materials. Waste was filled in the area north of the wetlands. No waste has been accepted since 1999 and the landfill has been non-operational since July 2001.

Remedial works have taken place within the wetlands (South Bay, West Bay, and Crymlyn Bog Lagoon) between 2011 and 2015. These works were summarised as part of the submission for the partial surrender of the waterbodies from the permitted area. The partial surrender report (Atkins report reference- 5041216-RAP-RPT-0001788) was submitted to NRW and the Coed Darcy wetlands removed from the permitted area in 2017. The remaining permitted area is outlined in red on drawing 04020-A-SK201-P2.



3 Environmental Setting

3.1 Geology

Published British Geological Survey records indicate superficial deposits at the Tip to predominantly comprise Peat underlain by Devensian Till; however, Peat is absent from the eastern portion of the Tip. Bedrock of the Pennant Sandstone Formation underlies the superficial deposits.

Based on historical borehole logs Made Ground/waste thicknesses are variable but extend to depths in excess of 17mbgl locally. Made Ground generally comprises grey, brown, and black, sandy, gravelly clay, with sand, gravels, and cobbles. Gravels and cobbles consist of bricks, concrete, timber, metal, and ash. Much of the infill material is consistent with waste derived from refinery operations. There are areas where asbestos waste is reported to have been deposited as well as tank sludges, other industrial waste by-products, oil, and tar residues.

Available borehole logs are presented in Appendix B.

3.2 Hydrogeology

Peat is classified as Unproductive Strata and Till as a Secondary (Undifferentiated) Aquifer. The underlying bedrock is classified as a Secondary A Aquifer.

Following an investigation across the wider Llandarcy Oil Refinery, including the Tip, URS produced groundwater contour plots for the bedrock and superficial aquifers (URS Report: 39991-044-785: Final Factual Report Whole Site Investigation BP Llandarcy Refinery 12th August 2005). These plots indicated groundwater in the bedrock beneath the Tip to flow from south to north across the permitted area. Artesian and sub-artesian conditions may be present in the bedrock around the boundary between the Tip and Crymlyn Bog. Monitoring of shallow groundwater beneath the Tip indicates possible local radial flow although this may be distorted by the presence of residual oil and by the heterogeneous nature of the waste material.

For reference the groundwater contour plots taken from the original URS report are presented in Appendix C.

3.3 Hydrology

A 'peripheral trench' separating the Tip from Crymlyn Bog to the north is a narrow channel that intercepts groundwater flowing to the north from the Tip. A plywood wall in the trench traps free phase oil, whilst allowing groundwater to flow underneath the plywood into the bog. Oil is periodically collected from the trench (and from sumps and boreholes within the Tip) and sent for offsite processing.



Three water bodies located in the south of the wider Containment Area, namely South Bay, West Bay and Crymlyn Bog Lagoon, were surrendered from the Permit in 2017.

3.3.1 South Bay

South Bay has a capacity of approximately 4,450m³ and is located to the south of the Tip. The waterbody was originally created to intercept uncontrolled discharge of free product from the refinery and prevent it from entering Crymlyn Bog.

3.3.2 West Bay

West Bay is approximately 1,500m³ in capacity and lies to the south west of the Tip. Similar to South Bay, West Bay was installed to intercept uncontrolled discharge of free product from the western section of southern tank farm and prevent it from entering Crymlyn Bog.

3.3.3 Crymlyn Bog Lagoon

Located to the south of the Tip, Crymlyn Bog Lagoon receives inputs from both South Bay and West Bay, prior to discharging into Crymlyn Bog. Discharge to the bog from Crymlyn Bog Lagoon is via a siphon valve and a historical oil-water interceptor located within the ash bund. The outfall from the siphon valve is a NRW consented discharge point, W3, under Environmental Permit EPR/ LB3293HN which is held by St. Modwen.



4 Surface Water and Groundwater Monitoring and Sampling

4.1 Monitoring and Sampling Locations

Current sampling locations are shown on PJA drawing 04020-A-SK201-P2 in Appendix A and are summarised in Table 1.

Table 1: Summary of Monitoring and Sampling Locations

Location ID	Monitoring Type	Response Zone
SW1 –SW6	Surface water	Surface water
Sumps 14 – 21 & 24-28	Groundwater monitoring and oil recovery	Made Ground
CBH2	Groundwater monitoring	Made Ground
CBH13	Groundwater monitoring	Made Ground
CBH16 (Blocked from August 2022)	Groundwater monitoring	Made Ground
CBH19	Groundwater monitoring	Made Ground
CBH20	Gas, groundwater monitoring and sampling	Made Ground
CBH23	Gas, groundwater monitoring and sampling	Made Ground
CBH25	Groundwater monitoring	Made Ground and Peat
CBH28	Groundwater monitoring	Made Ground
CBH29	Groundwater monitoring and sampling	Made Ground
CBH30	Groundwater monitoring	Made Ground
CBH32	Gas and groundwater monitoring	Made Ground
CBH33	Groundwater monitoring	Made Ground
CBH34	Groundwater monitoring	Made Ground
CBH36	Groundwater monitoring	Made Ground
CBH37	Groundwater monitoring	Made Ground
CBH38	Groundwater monitoring	Made Ground
CBH39	Groundwater monitoring	Made Ground
CBH42	Groundwater monitoring	Made Ground
CBH43	Groundwater monitoring	Made Ground
CBH46	Groundwater monitoring and sampling	No borehole log
CBH47	Groundwater monitoring	Made Ground
CBH49	Gas and Groundwater monitoring	Made Ground
CBH51	Gas and groundwater monitoring	Made Ground
CBH52	Gas, groundwater monitoring and sampling	Made Ground
CBH57	Gas, groundwater monitoring and sampling	Made Ground
CBH59	Groundwater monitoring	Made Ground
CBH60	Groundwater monitoring	Made Ground
CBH61	Groundwater monitoring	Made Ground and Peat
CBH64	Groundwater monitoring and sampling	Made Ground and Peat
CBH65	Groundwater monitoring	Made Ground and Peat
CARW008	Gas, groundwater monitoring and sampling	Made Ground
CARW009	Gas, groundwater monitoring and sampling	Made Ground and Silt



Location ID	Monitoring Type	Response Zone
CARW034	Groundwater sampling	Made Ground and Silt
CARS026	Groundwater monitoring	No borehole log
MSMW034D	Groundwater monitoring and sampling	Mudstone (Coal Measures Formation)
MSMW034S	Groundwater monitoring and sampling	Gravel (Glacial Deposits)
MSMW035	Groundwater monitoring	Sandstone (Coal Measures Formation)
MSMW91	Gas, groundwater monitoring and sampling	Gravel (Glacial Deposits)
MSMW155D	Gas, groundwater monitoring and sampling	No borehole log (presumed bedrock)
MSMW155S	Gas, groundwater monitoring and sampling	No borehole log (presumed superficial deposits)
MSMW226	Groundwater monitoring	Made Ground
MSMW227	Groundwater monitoring	Made Ground
MSMW231	Gas and groundwater monitoring	Made Ground
MSMWs232	Groundwater monitoring	Made Ground
MSMW238	Groundwater monitoring	Made Ground

GAL carry out field measurements, monitoring of the groundwater levels and record gas readings from locations installed with a gas bung and tap using a GA5000 gas analyser. PJA carry out monthly groundwater and surface water sampling. Sampling is carried out using a peristaltic pump where possible or bailer where excessive groundwater depth or the presence of free phase prevent the use of the pump.

4.2 Laboratory Analysis

A total of 124 groundwater samples and 59 surface water samples were scheduled for the following suite of laboratory analysis during 2022:

- pH
- Ammoniacal Nitrogen as N;
- Chloride;
- Dissolved and total metals (arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc);
- Hardness (total as CaCO₃ unfiltered);
- Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG);
- BTEX compounds (Benzene, Toluene, Ethylbenzene and Xylenes)*;
- MTBE (methyl tertiary butyl ether)*; and
- Polycyclic Aromatic Hydrocarbons (PAH) (aqueous).

*analysis not scheduled on samples collected between July and December due to a scheduling error as a result of a change in laboratories.



4.3 Surface Water Sampling Regime

The six surface water locations, SW1 to SW6, were all sampled on ten occasions during 2022, with the exception of SW1 during the monitoring round undertaken on 2nd August, due to the sample point being dry.

Groundwater Sampling Regime

Table 2 shows when each of the groundwater locations has been sampled over the course of 2022. During each sampling visit, collection of groundwater samples is attempted from a number of locations within and surrounding the Tip to provide good spatial distribution. During some sampling rounds it may not have been possible to obtain a sample because of any one or a combination of the following factors:

- difficulty in obtaining a sample due to the presence of free phase hydrocarbons; or
- sampling equipment error.

Table 2: Groundwater Sampling Regime

Sampling location	26/01	09/03	31/03 - 06/04	04/05 – 06/05	31/05	28/06	02/08	11/10	16/11	07/12
CBH20	×	✓	✓	✓	✓	✓	✓	×	×	✓
CBH23	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CBH29	×	×	×	✓	✓	✓	✓	×	✓	✓
CBH43	×	×	×	✓	✓	✓	✓	×	×	×
CBH46	✓	✓	✓	✓	✓	×	×	✓	×	✓
CBH52	✓	✓	×	×	×	×	×	×	×	×
CBH57	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CBH64	✓	×	✓	✓	✓	✓	✓	✓	✓	✓
CARW008	✓	✓	✓	✓	✓	✓	✓	×	✓	✓
CARW009	✓	✓	✓	✓	×	✓	✓	✓	✓	✓
CARW034	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MSMW091	×	×	×	✓	×	✓	✓	✓	✓	✓
MSMW155S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MSMW155D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MSMW034S	✓	✓	×	✓	✓	×	×	✓	×	✓
MSMW034D	✓	✓	✓	✓	✓	✓	✓	✓	×	✓

✓ groundwater sample taken

× groundwater sample not taken

Groundwater and surface water monitoring data is not available for two occasions in 2022. Samples obtained during February 2022 were not collected by the laboratory courier and therefore did not undergo laboratory analysis. It was not possible to carry out monitoring and sampling during September 2022 because of Covid-19 illness.



5 Groundwater and Non-aqueous Phase Liquid Monitoring Results

5.1 Introduction

Groundwater level and non-aqueous phase liquid (NAPL) monitoring was undertaken in boreholes and sumps at the Tip during 2022. PJA Drawing 04020-A-SK201-P2 which shows all monitoring locations is presented in Appendix A.

Available borehole logs, presented in Appendix B, have been reviewed to identify response zones for each of the monitoring locations. Response zones are constructed within either waste material, superficial deposits, or bedrock. In a small number of locations, the response zone spans Made Ground and the upper strata of the superficial deposits.

5.2 Groundwater Level Monitoring

Monthly groundwater level monitoring was carried out across a total of 44 borehole locations during 2022. A summary of the groundwater levels recorded during 2022 is provided in Table 3.

5.3 Non-Aqueous Phase Liquid Levels (NAPL)

Light non-aqueous phase liquids (LNAPL) have been recorded in boreholes and/or sumps during 2022. A summary of LNAPL recorded in boreholes is presented in Table 4. LNAPL recorded in sumps is presented in Table 5.

No suspected dense non-aqueous phase liquids (DNAPL) were detected in any monitoring locations during 2022.



Table 3: Summary of Recorded Groundwater Levels in Boreholes

Monitoring Locations	Response Zone	Depth to Base	Maximum Recorded Water Level		Minimum Recorded Water Level		Average	Variability
			Depth	Month	Depth	Month		
CBH2	Waste/Made Ground	5.00m bgl	2.48m bgl 11.18m aod	October	1.24m bgl 12.42m aod	November	1.79m bgl	1.24m
CBH13	Waste/Made Ground	10.70m bgl	7.98m bgl 7.30m aod	January	6.92m bgl 8.36m aod	September	7.43m bgl	1.06m
CBH16	Waste/Made Ground	7.80m bgl	6.03m bgl 8.52m aod	May	5.03m bgl 9.52m aod	January	5.67m bgl	1.00m
CBH19	Waste/Made Ground	10.25 m bgl	8.75m bgl 7.06m aod	January	7.58m bgl 8.23m aod	February	8.17m bgl	1.17m
CBH20	Waste/Made Ground	7.72m bgl	6.78m bgl 8.84m aod	June	4.60m bgl 11.02m aod	December	6.06m bgl	2.18m
CBH23	Waste/Made Ground	7.15m bgl	6.21m bgl 8.39m aod	October	4.92m bgl 9.68m aod	September	5.48m bgl	1.29m
CBH25	Waste/Made Ground and Peat	8.00 m bgl	7.73m bgl	March	6.39m bgl	November and December	7.06m bgl	1.34m
CBH28	Waste/Made Ground	11.74m bgl	8.95m bgl	April and June	8.54m bgl	February	8.83 m bgl	0.41m
CBH29	Waste/Made Ground	9.54m bgl	6.69m bgl	June	6.69m bgl	June	6.69 m bgl	0.00m
CBH30	Waste/Made Ground	4.58m bgl	4.57m bgl	February	1.53m bgl	April	2.73 m bgl	3.04m
CBH32	Waste/Made Ground	11.75m bgl	9.45m bgl 7.23m aod	July	7.16m bgl 9.52m aod	November	8.53m bgl	2.29m
CBH33	Waste/Made Ground	Unknown	6.54m bgl	February	2.09m bgl	April	3.48m bgl	4.45m
CBH34	Waste/Made Ground	Unknown	2.45m bgl	March	2.35m bgl	June	2.39m bgl	0.10m
CBH36	Waste/Made Ground	11.54m bgl	10.19m bgl	April	9.67m bgl	June	9.89 m bgl	0.52m
CBH37	Waste/Made Ground	10.95m bgl	2.12m bgl	June	2.12m bgl	June	2.12 m bgl	0.00m
CBH38	Waste/Made Ground	4.03m bgl	2.64m bgl	April	2.36m bgl	May	2.45m bgl	0.28m
CBH39	Made Ground	12.10m bgl	9.68m bgl	February	6.73m bgl	September	8.32m bgl	2.95m
CBH42	Waste/Made Ground	6.46m bgl	2.05m bgl	February and May	1.73m bgl	March	1.98 m bgl	0.32m
CBH43	Waste/Made Ground	4.87m bgl	1.45m bgl	May	0.78m bgl	February	1.27 m bgl	0.67m



Monitoring Locations	Response Zone	Depth to Base	Maximum Recorded Water Level		Minimum Recorded Water Level		Average	Variability
			Depth	Month	Depth	Month		
CBH46	No borehole log	9.00m bgl	5.50m bgl	November	2.35m bgl	September	3.62m bgl	3.15m
CBH47	Waste/Made Ground	7.00m bgl	5.92m bgl 8.66m aod	January	5.44m bgl 9.14m aod	February	5.68m bgl	0.48m
CBH49	Waste/Made Ground	5.00m bgl	3.27m bgl 10.56m aod	August	0.63m bgl 13.20m aod	March	2.67m bgl	2.64m
CBH51	Waste/Made Ground	7.03m bgl	6.96m bgl 7.88m aod	July	5.87m bgl 8.97m aod	November	6.54m bgl	1.09m
CBH52	Waste/Made Ground	6.20m bgl	5.63m bgl 9.33m aod	July	0.64m bgl 14.32m aod	August	3.73m bgl	4.99m
CBH57	Waste/Made Ground	10.09m bgl	7.23m bgl 8.82m aod	July	4.98m bgl 11.07m aod	August	6.25m bgl	2.25m
CBH59	Waste/Made Ground	10.97m bgl	9.83m bgl	April	8.21m bgl	February	9.43 m bgl	1.62m
CBH60	Waste/Made Ground	10.92m bgl	8.93m bgl	April	8.72m bgl	March	8.86 m bgl	0.21m
CBH61	Waste/Made Ground and Peat	Unknown	2.64m bgl	May	2.39m bgl	June	2.48 m bgl	0.25m
CBH64	Waste/Made Ground and Peat	5.36m bgl	3.43m bgl	April	2.34m bgl	February	3.01 m bgl	1.09m
CBH65	Waste/Made Ground and Peat	7.14m bgl	2.37m bgl	June	2.37m bgl	June	2.37 m bgl	0.00m
CARW008	Waste/Made Ground	3.46m bgl	2.48m bgl 8.82m aod	November	0.59m bgl 10.71m aod	October	0.80m bgl	1.89m
CARW009	Waste/Made Ground and Silt	3.10m bgl	2.52m bgl 8.81m aod	November	0.73m bgl 10.60m aod	October	1.00m bgl	1.79m
CARS026	No borehole log available	12.54m bgl	1.86m bgl	June	1.86m bgl	June	1.86m bgl	0.00m
MSMW034S	Gravel (Glacial Deposits)	9.00m bgl	Groundwater constantly at ground level – 9.00m water column.					
MSMW034D	Mudstone (Coal Measures)	13.50m bgl	Groundwater constantly at ground level – 13.50m water column.					
MSMW035	Sandstone bedrock	11.04m bgl	1.07m bgl	June	1.07m bgl	June	1.07m bgl	0.00m
MSMW91	Gravel (Glacial Deposits)	4.08m bgl	2.59m bgl 7.50m aod	July	1.35m bgl 8.74m aod	February	2.04m bgl	1.24m
MSMW155S	Presumed Superficial Deposits	8.82m bgl	0.89m bgl	June and November	0.69m bgl	February	0.77m bgl	0.20m



Monitoring Locations	Response Zone	Depth to Base	Maximum Recorded Water Level		Minimum Recorded Water Level		Average	Variability
			Depth	Month	Depth	Month		
			8.33m aod		8.53m aod			
MSMW155D	Presumed Bedrock	11.64m bgl	0.63m bgl 8.75m aod	July	0.27m bgl 9.11m aod	November	0.44m bgl	0.36m
MSMW226	Waste/Made Ground	7.74m bgl	8.21m bgl	April	5.45m bgl	February	7.28m bgl	2.76m
MSMW227	Waste/Made Ground	12.17m bgl	10.02m bgl	April and May	9.34m bgl	March	9.75m bgl	0.68m
MSMW231	Waste/Made Ground	10.87m bgl	7.64m bgl	July	6.25m bgl	October	7.02m bgl	1.39m
MSMWs232	Waste/Made Ground	10.74m bgl	7.79m bgl	April	4.63m bgl	February	7.03m bgl	3.16m
MSMW238	Waste/Made Ground	8.80m bgl	7.34m bgl 7.51m aod	April	3.94m bgl 10.91m aod	September	6.04m bgl	3.40m

Table 4: Summary of Recorded LNAPL in Boreholes

Borehole ID	Response Zone	Depth to base	Number of LNAPL Occurrences	LNAPL Depths		Average Depths
				Minimum (date)	Maximum (date)	
CBH2	Waste/Made Ground	5.00m bgl	12/12	1.21m (November 2022)	2.26m (October 2022)	1.70m
CBH13	Waste/Made Ground	10.70m bgl	12/12	6.87m (September 2022)	7.38m (December 2022)	7.12m
CBH16	Waste/Made Ground	7.80m bgl	6/7 (Borehole obstructed September to December 2022)	4.87m (January 2022)	5.93m (June 2022)	5.51m
CBH19	Waste/Made Ground	10.25 m bgl	2/2 (Borehole obstructed March to December 2022)	7.44m (February 2022)	7.59m (January 2022)	7.52m
CBH20	Waste/Made Ground	7.72m bgl	1/12	4.59m (December 2022)		
CBH23	Waste/Made Ground	7.15m bgl	1/12	5.41m (December 2022)		
CBH25	Made Ground and Peat	8.00 m bgl	11/12	6.34m (December 2022)	7.36m (July 2022)	6.92m



Borehole ID	Response Zone	Depth to base	Number of LNAPL Occurrences	LNAPL Depths		Average Depths
				Minimum (date)	Maximum (date)	
CBH28	Waste/Made Ground	11.74m bgl	5/5 (Borehole not accessible in January and July to November 2022. Borehole obstructed in April 2022)	8.28m (February 2022)	8.92m (June 2022)	8.66m
CBH32	Waste/Made Ground	11.75m bgl	12/12	6.87m (December 2022)	8.86m (July 2022)	8.05m
CBH33	Waste/Made Ground	Unknown	4/4 (Borehole obstructed from June to December 2022)	2.19m (March 2022)	6.52m (February 2022)	2.87m
CBH34	Waste/Made Ground	Unknown	5/5 (Borehole not accessible January, February, and July to November 2022)	2.28m (December 2022)	2.43m (March 2022)	2.33m
CBH36	Waste/Made Ground	11.54m bgl	6/6 (Borehole not accessible in January and July to November 2022)	8.86m (February 2022)	9.72m (May 2022)	9.50m
CBH37	Waste/Made Ground	10.95m bgl	3/3 (Borehole obstructed in February, March, and May and borehole was not accessible between July and November 2022)	2.03m (April 2022)	2.13m (December 2022)	2.07m
CBH38	Waste/Made Ground	4.03m bgl	6/6 (Borehole not accessible January and July to November 2022)	2.32m (May 2022)	2.62m (April 2022)	2.43m
CBH39	Waste/Made Ground	12.10m bgl	12/12 (Oil present, but too viscous to measure between April and August)	6.48m (September 2022)	9.06m (October 2022)	8.03m
CBH42	Waste/Made Ground	6.46m bgl	6/6 (Borehole not accessible in January and July to November 2022)	1.53m (March 2022)	2.07m (December 2022)	1.84m
CBH46	Waste/Made Ground	9.00m bgl	12/12	2.28m (September 2022)	5.38m (November 2022)	3.52m
CBH47	Waste/Made Ground	7.00m bgl	2/2 (Borehole obstructed from March to December 2022)	5.43m (February 2022)	5.86m (January 2022)	5.65m
CBH48	Waste/Made Ground		4/4 (Borehole obstructed from January to August 2022. Oil too viscous to measure from September to December 2022)	-	-	-
CBH49	Made Ground	5.00m bgl	12/12	0.59m (March 2022)	3.21m (August 2022)	2.56m



Borehole ID	Response Zone	Depth to base	Number of LNAPL Occurrences	LNAPL Depths		Average Depths
				Minimum (date)	Maximum (date)	
CBH51	Waste/Made Ground	7.03m bgl	12/12	5.62m (November 2022)	6.89m (July 2022)	6.37m
CBH52	Waste/Made Ground	6.20m bgl	9/12	3.25m (October 2022)	5.61m (July 2022)	4.50m
CBH57	Waste/Made Ground	10.09m bgl	1/12	5.66m (December 2022)		
CBH59	Waste/Made Ground	10.97m bgl	6/6 (Borehole not accessible in January and July to November 2022)	8.17m (February 2022)	9.92m (April 2022)	9.44m
CBH60	Waste/Made Ground	10.92m bgl	5/5 (Borehole not monitored in January, July to November 2022. Borehole obstructed in April 2022)	8.52m (December 2022)	8.75m (May and June 2022)	8.62m
CBH61	Waste/Made Ground and Peat	Unknown	5/5 (Borehole not accessible January, February, and July to November 2022. Oil too viscous to measure in March 2022)	2.31m (April 2022)	2.61m (May 2022)	2.41m
CARW008	Waste/Made Ground	3.46m bgl	2/12	0.64m (January 2022)	0.68m (September 2022)	0.66m
CARW009	Made Ground	3.10m bgl	4/12	0.81m (June 2022)	1.08m (September 2022)	0.92m
MSMW226	Waste/Made Ground	7.74m bgl	1/5 (Borehole not accessible in January and July to November 2022. Borehole obstructed in December 2022)	9.68m (April 2022)		
MSMW227	Waste/Made Ground	12.17m bgl	6/6 (Borehole not accessible in January, July to November 2022)	8.73m (April 2022)	10.14m (December 2022)	9.54m
MSMW231	Waste/Made Ground	10.87m bgl	12/12	5.94m (October 2022)	7.23m (July 2022)	6.67m
MSMWs232	Waste/Made Ground	10.74m bgl	1/6 (Borehole not accessible in January and between July and November 2022)	8.92m (April 2022)		
MSMW238	Waste/Made Ground	8.80m bgl	12/12	3.36m (September 2022)	7.28m (April 2022)	5.79m



Table 5: Summary of Recorded LNAPL in Sumps

Sump ID	Response Zone	Number of LNAPL Occurrences	NAPL Depth		Average Depth
			Minimum (date)	Maximum (date)	
18	Waste/Made Ground	12/12	1.48m (September 2022)	3.46m (January 2022)	2.81m
19	Waste/Made Ground	12/12	2.28m (January 2022)	3.21m (July 2022)	2.61m
20	Waste/Made Ground	7/12	3.82m (September 2022)	4.21m (August 2022)	4.07m
21	Waste/Made Ground	11/12	2.43m (August 2022)	3.18m (June 2022)	2.65m
24	Waste/Made Ground	1/12	1.60m (March 2022)		
25	Waste/Made Ground	10/12	1.57m (September 2022)	2.16m (July 2022)	1.86m
27	Waste/Made Ground	11/12	2.41m (May 2022)	3.38m (June 2022)	2.87m
28	Waste/Made Ground	1/12	3.03m (January 2022)		

N.B. Only sumps where NAPL was detected are shown in Table 5.

5.4 Groundwater and LNAPL Levels Discussion

5.4.1 Groundwater Levels

A review of groundwater level monitoring data collected over the monitoring period shows that generally the lowest levels were recorded in summer months, and the highest levels generally in February 2022.

There is an average variability of 1.40m between the lowest and highest recorded groundwater level in any location which shows a decrease to the degree of groundwater level variability recorded in 2021 (2.57m) and 2020 (2.70m).

Boreholes CBH52 (4.99m) and CBH33 (4.45m) exhibited the greatest variability in recorded groundwater levels. Borehole CBH52 is located in the central area of the Tip where a high degree of local heterogeneity would be expected in the waste material. CBH33 is located in the western area of the Tip in an area where saturated ash deposits are prevalent.

Boreholes CBH34 and MSMW155S recorded the smallest variability in groundwater levels of 0.10m and 0.20m respectively. Borehole CBH34 is located in a similar area to CBH33, where soils comprise ash deposits. Borehole MSMW155S is located to the south west of the landfill area.

5.4.2 Light Non-Aqueous Phase Liquid (NAPL) Levels and Distribution

LNAPL has been detected in 34 boreholes out of 43 monitored during 2022. Boreholes where no LNAPL was detected were: MSMW91, MSMW155D, MSMW155S, MSMW035, CBH29, CBH30, CBH43, CBH64 and CBH65. Boreholes MSMW91, MSMW155D, and MSMW155S are located in the south west of the Tip outside the main landfilled area, with response zones installed in superficial deposits and bedrock. Boreholes MSMW035, CBH29, CBH30, CBH43, CBH64, and CBH65 are located in the south east of the eastern area of the Tip with response zones installed in sandstone, waste/made ground, and peat.

The greatest recorded LNAPL thickness of 1.40m was recorded in CBH32 in March 2022. CBH32 is located in the northern region of the main landfill area. LNAPL thicknesses of 1.11m and 1.14m were recorded in MSMW238 and CBH39 respectively in January (MSMW238) and February (CBH39). Both MSMW238 and CBH39 are situated within the main landfill area of the Tip.

The least LNAPL was recorded in boreholes CBH2, CBH39, CBH46, CBH47, CARW008 and CARW009, where 0.01m of oil was recorded on several occasions throughout the year. CBH2, CBH39, CBH46, and CBH47 are located within the main landfill area of the Tip. CBH2 is located centrally within the Tip, whilst CBH39, CBH46 and CBH47 are located in the eastern area of the Tip. CARW008 and CARW009 are situated outside of the main landfilled area. All six boreholes are located within waste/Made Ground deposits. The small amount of free product recorded in these locations may be a result of the heterogenous nature of the waste materials and oil distribution.

LNAPL has been detected in eight sumps during 2022. The greatest thickness of LNAPL in sumps was recorded in November when a 0.30m thickness of LNAPL was recorded in Sump 19. The lowest thickness of LNAPL (0.01m) was recorded in several sumps (Sump 20, Sump 25, Sump 27, and Sump 28) at various points throughout the year.

6 Groundwater and Surface Water Quality Assessment

6.1 Assessment Criteria

Results from laboratory analysis of groundwater and surface water samples obtained during 2022 have been screened against relevant Water Quality Standards.

Groundwater data have principally been screened against threshold concentrations ('Drinking Water Standards') in The Water Supply (Water Quality) Regulations 2018, and also against Environmental Quality Standards (EQS) in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. The threshold concentrations in The Water Supply (Water Quality) Regulations 2018 have been used to give a broad indication of overall groundwater quality, however they are overly conservative in this instance, because groundwater is not abstracted from the Tip for water supply purposes. The use of EQS is considered to be overly conservative because EQS apply to the receiving surface water.

Surface water data have been screened against EQS in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Both surface water and groundwater data have been screened against the specified petroleum hydrocarbon emission limit in environmental permit EPR/LB3293HN for the site drainage from Coed Darcy. Whilst the permit emission limit is not strictly applicable to the SW1-SW6 surface water monitoring locations, or to groundwater in the Tip, it has been used to identify the presence of elevated concentrations of petroleum hydrocarbons in proximity to Crymlyn Bog. The Environmental Permit EPR/ LB3293HN emission limit for 'visible oil and grease' of 5,000 µg/l in surface water has been used to assess total petroleum hydrocarbon concentrations.

Copper, nickel and zinc have been screened against predicted no effect concentrations (PNEC) values derived from the metal bioavailability tool (M-BAT), taking account of the fact that the respective EQS for these substances relates to bioavailable concentrations. The measured dissolved organic carbon (DOC) concentration recorded within the receiving water body (Crymlyn Bog) exceeded the upper limit of the validated range for copper, nickel, and zinc. As a result, the site-specific PNEC for copper was calculated using a DOC concentration of 15mg/l and site-specific PNEC for nickel and zinc were calculated using a DOC concentration of 20mg/l. PNEC have been calculated using the average of pH and calcium values and the median DOC value recorded in Crymlyn Bog during 2022, in accordance with the WFD UKTAG M-BAT Method Statement (July 2014).

Laboratory analytical data screening is presented in Appendix D.

6.2 Groundwater

Comparison of laboratory analytical data for groundwater against UK Drinking Water Standards (DWS) indicates exceedances for arsenic, PAH compounds and benzene.

There were no exceedances of the available Maximum Allowable Concentration (MAC) EQS for metals with the exception of two exceedances of the MAC-EQS for mercury in CBH46 and a single exceedance of the MAC-EQS for cadmium in CBH29. Exceedances of the available MAC-EQS for PAH compounds were recorded and three exceedances of the MAC-EQS for benzene were recorded in groundwater from CBH46 only.

In relation to the available Annual Average (AA) EQS for metals, the average recorded cadmium and lead concentrations across the groundwater dataset marginally exceed the respective AA-EQS and the average recorded chromium concentration exceeds the AA-EQS in groundwater. The averaged recorded concentrations of fluoranthene, anthracene and benzo(a)pyrene recorded across the Tip exceed the respective AA-EQS.

The groundwater data are largely compliant with the calculated PNEC for copper, nickel and zinc, with the exception of two recorded zinc concentrations in CBH29 in May and June 2022.

The Environmental Permit emission limit of 5,000µg/l for 'visible oil and grease' in surface water has been used to make an indicative assessment of TPH concentrations in groundwater. The emission limit was exceeded in 16 groundwater samples, generally from boreholes CBH23, CBH46, CBH52 located centrally in the Tip. The emission limit was also exceeded in CARW034 and MSMW91, located to the south of the permitted area of the Tip.

The EQS for 'total ammonia as N' was exceeded based on a calculation of the 90th percentile value for groundwater across the Tip.

6.3 Surface Waters

Surface water data were largely compliant with MAC-EQS and AA-EQS during 2022.

A single exceedance of the MAC-EQS for mercury was recorded at SW1 in May 2022. A limited number of exceedances were recorded locally for the available MAC-EQS for PAH compounds in March 2022 and June 2022 at SW1, SW3, SW4 and SW5.

In relation to the available AA-EQS, the average recorded fluoranthene concentration exceeded the AA-EQS.

The surface water data are compliant with the calculated PNEC for copper, nickel and zinc.

The 90th percentile EQS for 'total ammonia as N' was exceeded at SW1, SW2, SW3, SW4 and SW5.

A single exceedance of the permit emission limit for oil and grease was recorded in SW1 in June 2022.

7 Landfill Gas

7.1 Landfill Gas Monitoring

Landfill gas monitoring was undertaken by GAL at 13 boreholes across the Tip and its surroundings, using a GA5000 gas analyser. Due to the age of a number of boreholes across the Tip, some headworks are noted to be damaged, and the boreholes therefore cannot be monitored for gas. Of the 13 boreholes that were monitored during 2022, ten are located within the Permit boundary, and three are located outside of the Permit boundary to the south and south west, as summarised in Table 6.

Table 6: Landfill Gas Monitoring Location Information

Monitoring locations in the Tip	Monitoring locations outside the Tip
CBH20	MSMW155S (located to the south west)
CBH23	MSMW155D (located to the south west)
CBH32	MSMW091 (located to the south west)
CBH49	
CBH51	
CBH52	
CBH57	
CARW008 (located outside fill area)	
CARW009 (located outside fill area)	
MSMW231	

7.2 Landfill Gas Concentrations

The minimum atmospheric pressure reading was recorded as 1002 millibars (mbar) in November 2022, whilst the highest atmospheric pressure was recorded as 1034 mbar in January 2022. Monitoring rounds carried out in June and October 2022 were carried out during falling atmospheric pressure events, which represent conditions when positive flow of landfill gas is most likely to be recorded. Landfill gas monitoring data is presented in Appendix E.

Methane (CH₄)

Based on the graph for boreholes in the Tip presented as Figure 2, methane concentrations during 2022 appear to show some variability. Generally, average methane concentrations within the Tip were below 10% with the exception of CBH20 which recorded concentrations ranging from 0.10% (February) to 52.70% (January). The lowest methane concentration of <0.1% was recorded across several monitoring locations in the Tip throughout the year.

Outside the Permit Area, a maximum methane concentration of 0.90% was detected in MSMW155S (assumed to be screened with a response zone in superficial deposits) in February 2022. The

minimum methane concentration of <0.1% was recorded outside the former landfill area in all three monitoring locations on multiple monitoring rounds. Stable recorded methane concentrations in boreholes located outside of the Permit area are shown on Figure 1.

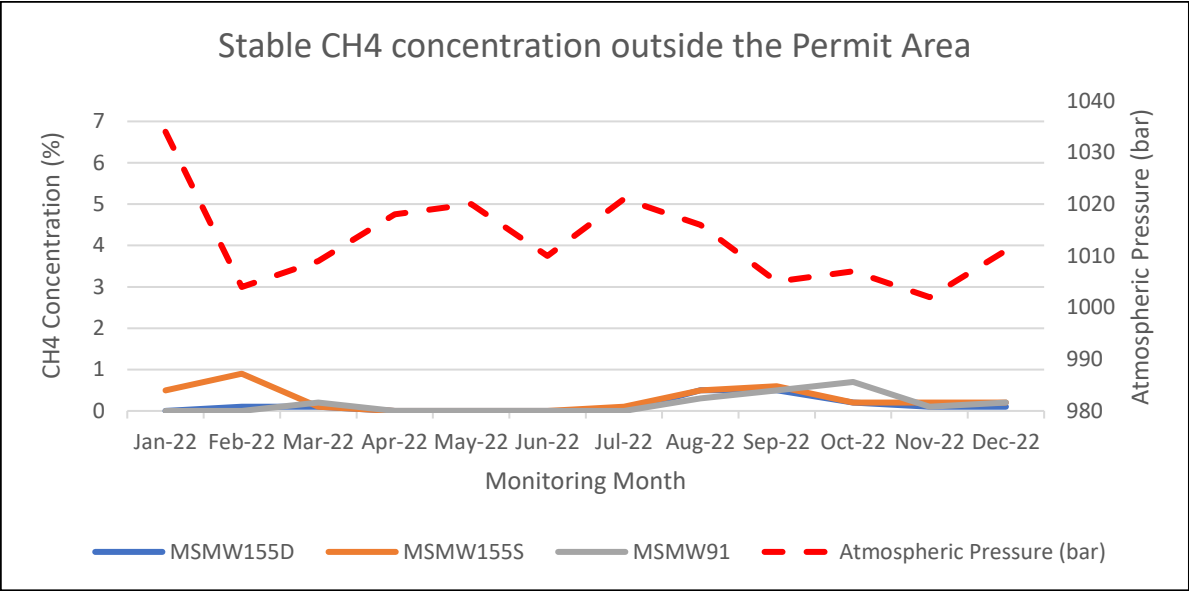


Figure 1: Methane concentrations in boreholes outside the Tip.

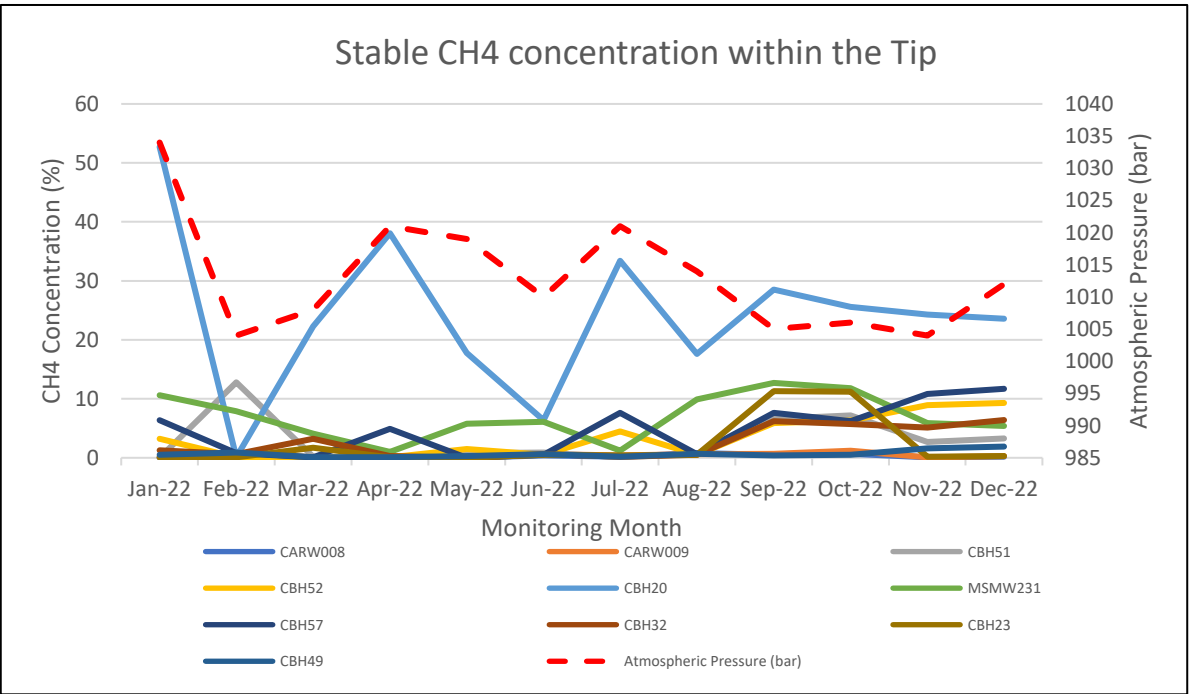


Figure 2: Methane Concentrations in Boreholes within the Tip.

Carbon Dioxide (CO₂)

Based on monitoring data presented in the graph below (Figure 4) stable carbon dioxide concentrations in the Tip ranged from <0.10% to 10.10%. The maximum carbon dioxide concentration of 10.10% was detected in CBH32 in December and the lowest concentration (<0.10%) detected in several monitoring locations across the Tip.

The maximum carbon dioxide concentration of 8.38% recorded outside of the Tip was in MSMW91 (screened in superficial deposits) in July 2022 and the lowest concentration of <0.1% was recorded in MSMW155S and MSMW155D at several points throughout 2022 (screened in superficial deposits and bedrock respectively). Figure 3 presents a graph showing stable recorded carbon dioxide concentrations outside the Permit area.

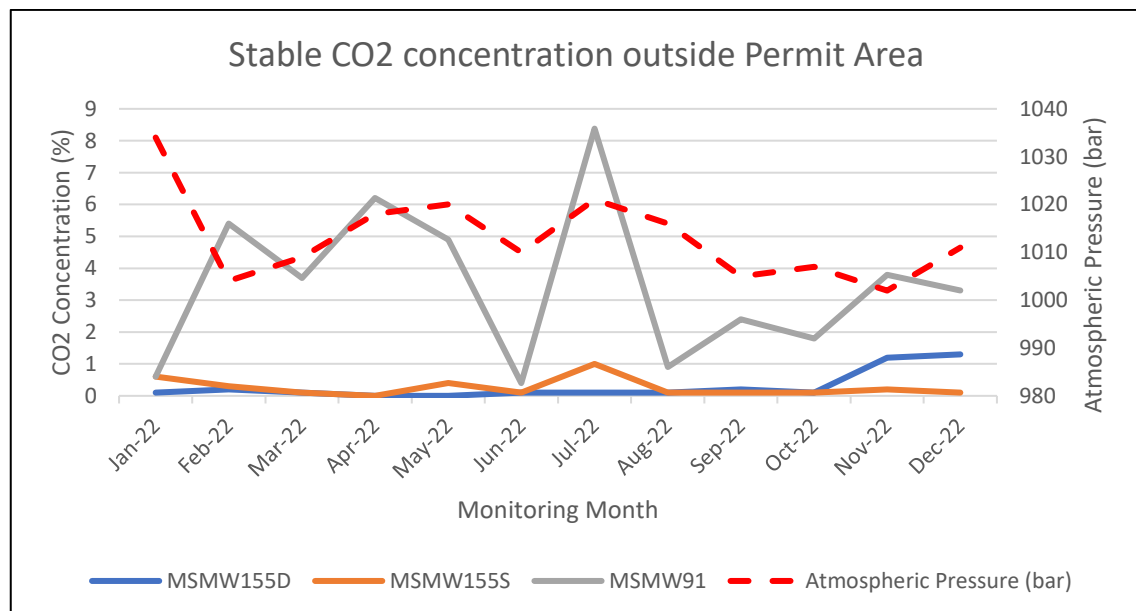


Figure 3: Carbon Dioxide Concentrations in Boreholes Outside the Tip.

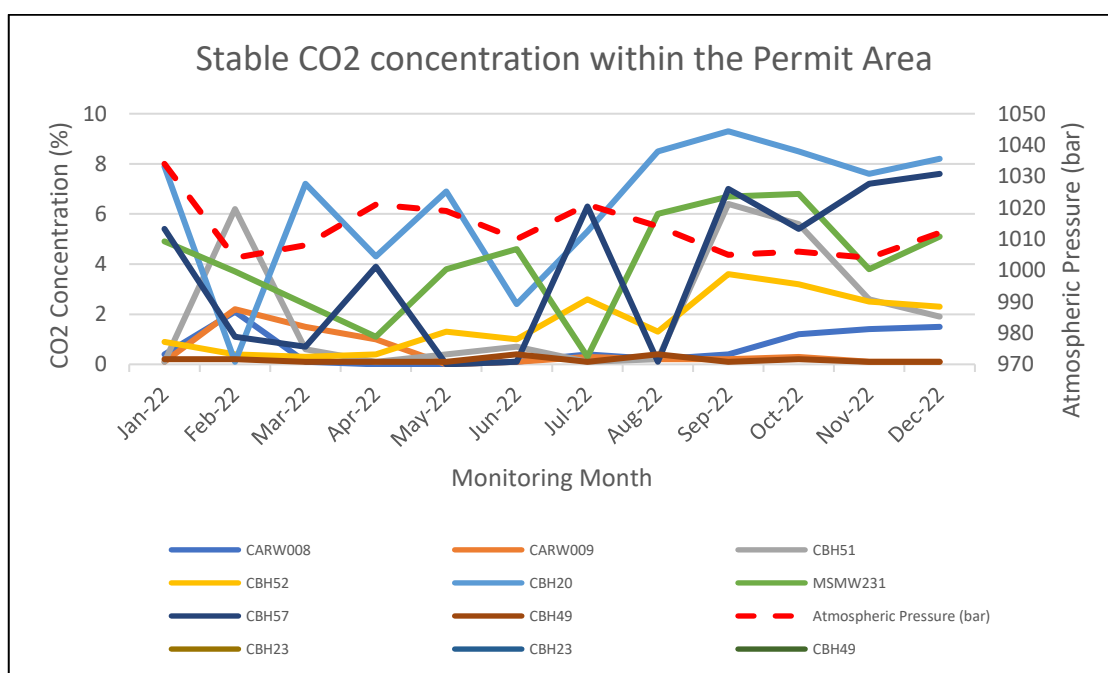


Figure 4: Carbon Dioxide Concentrations in Boreholes in the Tip.

Oxygen (O₂)

Oxygen concentrations recorded in the Tip shown on the graph presented as Figure 6 range from 0.10% to 22.30%, with the lowest concentration recorded in CBH20 in January, October and November as well as in CBH32 in September and October and in CBH57 in November. The maximum concentration of 22.30% was detected in CARW009 during October.

Outside of the Tip, oxygen concentrations shown in the graph presented as Figure 5 ranged from 0.60% to 23.40%. The minimum concentration of 0.60% was recorded in MSMW155S and MSMW155D in July and the maximum concentration of 23.40% was recorded in MSMW155D in June.

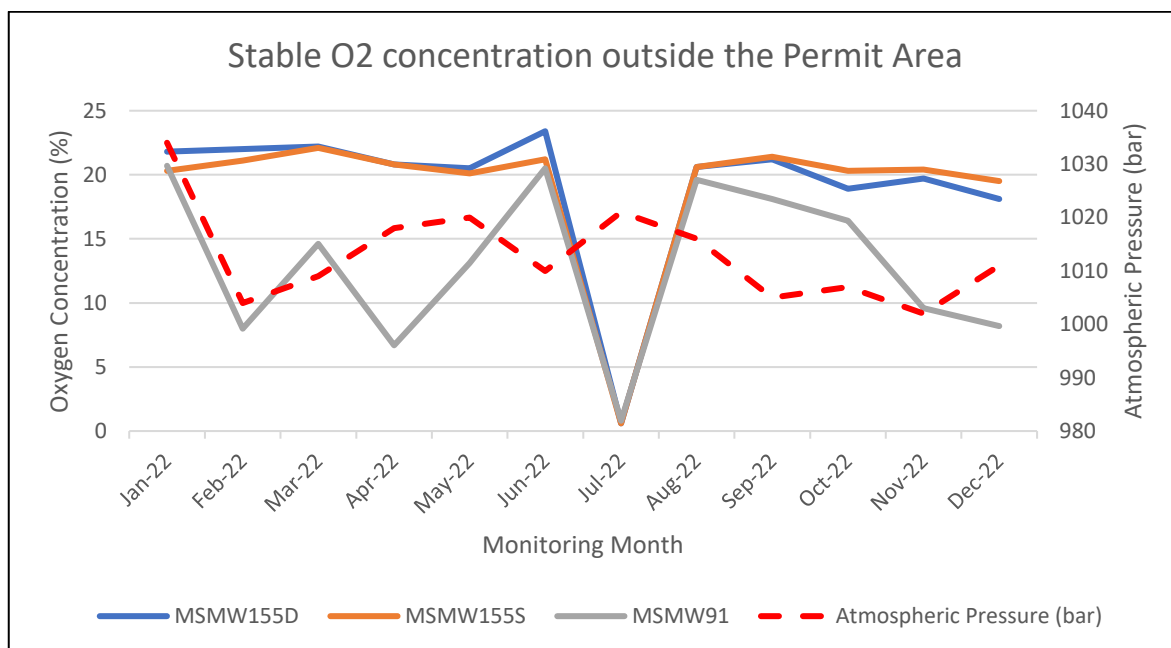


Figure 5: Oxygen Concentrations in Boreholes Outside the Tip.

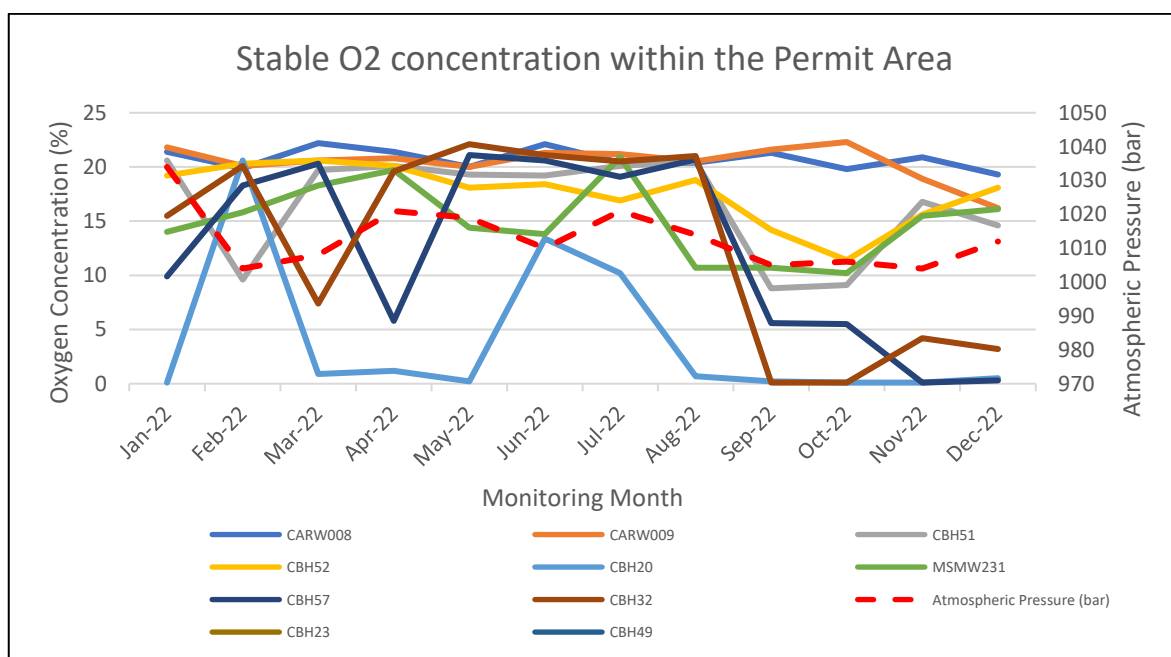


Figure 6: Oxygen Concentrations in Boreholes within the Tip.

Landfill gas monitoring results recorded during 2022 are summarised in Table 7.



Table 7: Landfill Gas Concentration Summary

Monitoring location	Location	Methane (%)		Carbon dioxide (%)		Oxygen (%)	
		Min	Max	Min	Max	Min	Max
CARW008	In waste on SE boundary	<0.1	0.8	<0.1	2.1	19.3	22.2
CARW009	In waste on SE boundary	<0.1	1.2	<0.1	2.2	16.2	22.3
CBH20	In waste within central section	0.1	52.7	0.1	9.3	0.1	20.6
CBH32	In waste within central section	<0.1	6.4	<0.1	10.1	0.1	22.1
CBH49	In waste within central section	<0.1	1.9	0.1	0.4	12.3	22.1
CBH51	In waste within central section	<0.1	12.8	0.1	6.4	8.8	20.6
CBH52	In waste within central section	<0.1	9.3	0.3	3.6	11.4	20.6
CBH57	In waste within central section	0.1	11.7	<0.1	7.6	0.1	21.1
CBH23	In waste within central section	<0.1	11.3	<0.1	8.2	2.1	21.8
MSMW231	In waste within central section	1	12.7	0.3	6.8	10.2	20.9
MSMW155s	Beyond W boundary of landfill area	<0.1	0.9	<0.1	1	0.6	22.1
MSMW91	Beyond W boundary of landfill area	<0.1	0.7	0.4	8.38	0.8	20.7
MSMW155d	Beyond W boundary of landfill area	<0.1	0.5	<0.1	1.3	0.6	23.4

8 Commentary

Groundwater levels, NAPL, groundwater quality, surface water quality and landfill gas have been monitored in and around the Tip during 2022.

Groundwater levels were generally most variable in boreholes located in the central area of the Tip during 2022, and least variable on the western and eastern margin of the Tip beyond the extent of the landfilled area.

Generally, more consistent occurrences and greater thicknesses of LNAPL were recorded in the central and eastern areas of the Tip. The area in the west (the 'Lower Tip') which has previously undergone removal of bulk sources of free phase hydrocarbons has recorded more sporadic instances of LNAPL in sumps.

DNAPL was not detected during monitoring rounds undertaken in 2022.

Exceedances of the DWS were recorded in groundwater for arsenic, PAH compounds and benzene. Local exceedances were recorded of the MAC-EQS for mercury, cadmium, PAH compounds and benzene. Marginal exceedances of the respective AA-EQS for cadmium and lead were recorded based on calculated mean groundwater concentrations, and calculated mean groundwater concentrations exceeded the respective AA-EQS for chromium and PAH compounds. Regarding bioavailable metals, two exceedances of the calculated PNEC for zinc were recorded. Exceedances of the environmental permit emission limit for petroleum hydrocarbons were recorded locally in groundwater and the calculated 90th percentile exceeds the relevant 'total ammonia as N' standard.

Surface water was largely compliant with the relevant standards during 2022. A single exceedance of the MAC-EQS was recorded for mercury in surface water, and local exceedances were recorded in surface water for PAH compounds. The calculated mean concentration in surface water exceeds the AA-EQS for fluoranthene, and the calculated 90th percentile value exceeds the 'total ammonia as N' standard. Concentrations of TPH in surface water samples were generally low, with the exception of a single exceedance of the permit emission limit for petroleum hydrocarbons at SW1 in June.

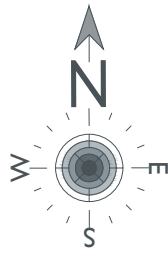
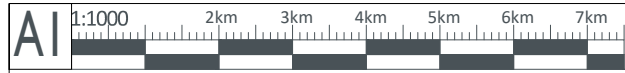
Consistent with the various potential sources of gases including the heterogeneous waste material, presence of free phase hydrocarbons, and organic-rich superficial deposits, methane and carbon dioxide have been recorded at variable concentrations during 2022.

Oil recovery will continue from the peripheral trench, sumps and wells in 2023, where LNAPL is consistently measured at recoverable thicknesses. Continued monitoring will show the impact this has on the NAPL distribution and thickness.

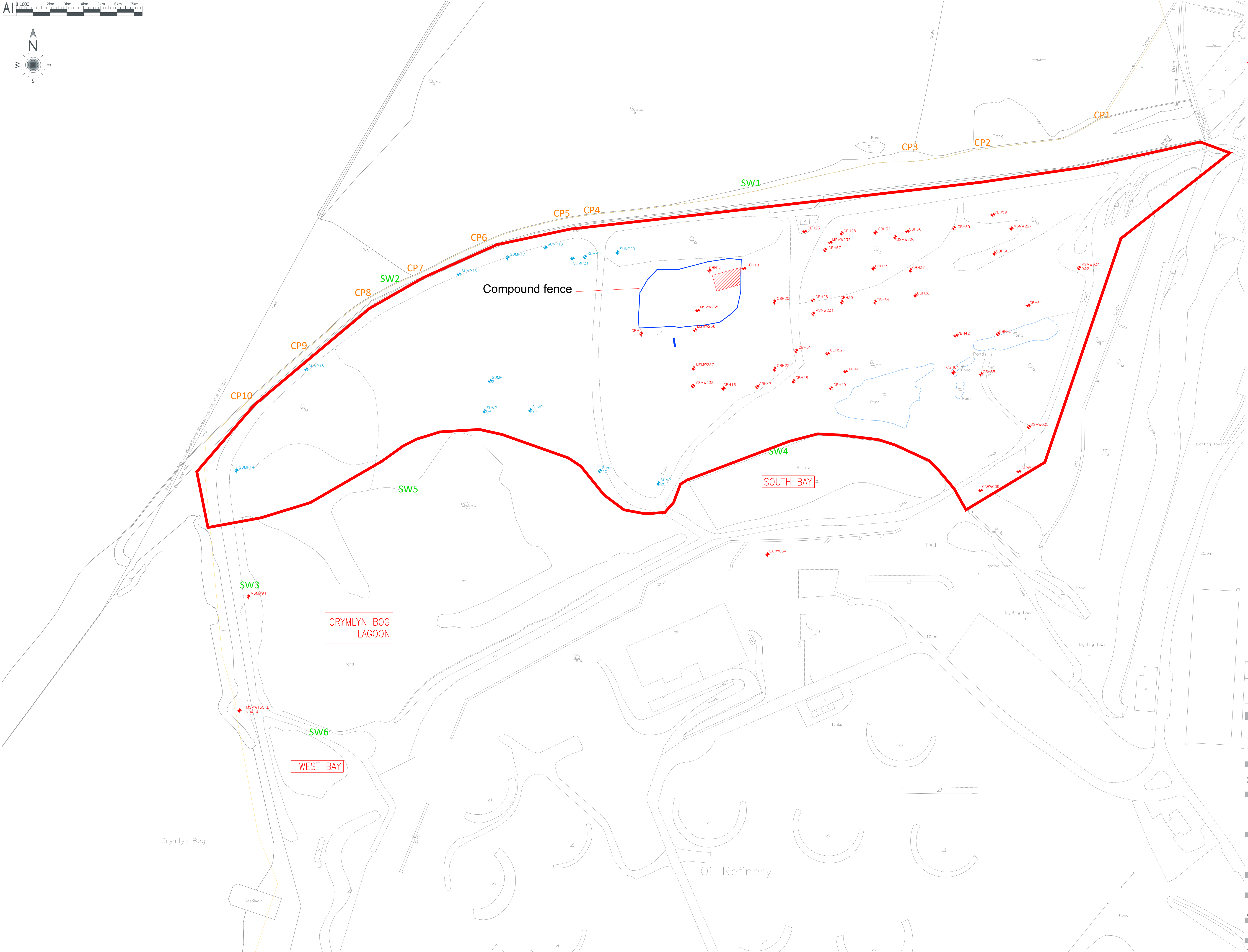
Discussions are ongoing regarding the Closure and Aftercare Management Plan and the overall restoration proposals, including the proposed monitoring strategies. Until agreement is reached with NRW, the current regime of groundwater level, NAPL, groundwater quality, surface water quality and landfill gas monitoring will continue throughout 2023.



Appendix A Site Plans



- NOTES**
- These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9
- KEY**
- Permit area
 - SW1 Surface water sampling locations
 - Groundwater monitoring/sampling locations
 - Sump locations
 - Collection point



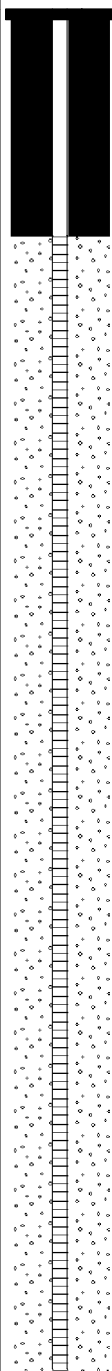
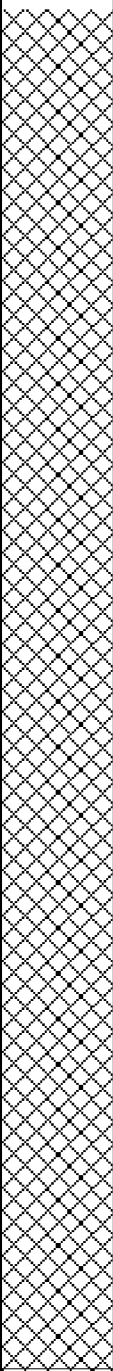
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P1	13/02/20	Added more boreholes to location plan	JP	
REV	DATE	REVISION NOTE	BY	
PJA Seven House - High Street Longbridge - Birmingham B31 2UQ - Tel: 0121 475 0234 Birmingham - Bristol Exeter - London - Reading pja.co.uk				
CLIENT				
St Modwen Development Ltd				
PROJECT				
Coed Darcy				
DRAWING TITLE				
Crymlyn Tip Monitoring Location Plan				
DRAWING ISSUE STATUS				
INFORMATION				
PJA JOB NO. SUB-CODE DRAWING NO. REVISION				
04020 - A - SK201 - P2				
Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction				
BIM DRAWING REFERENCE				
SCALE	DRAWN	REVIEWED	DATE	
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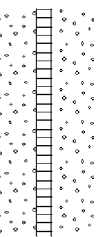
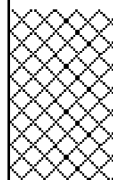
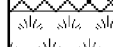
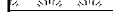
Appendix B Borehole Logs

Project No: C1296	Date: 27 Jan 2009	Easting: 270302.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195534.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.50 - 10.50m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste Tip Fill.			
					Continued next sheet			

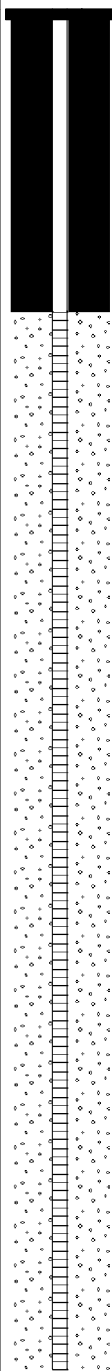
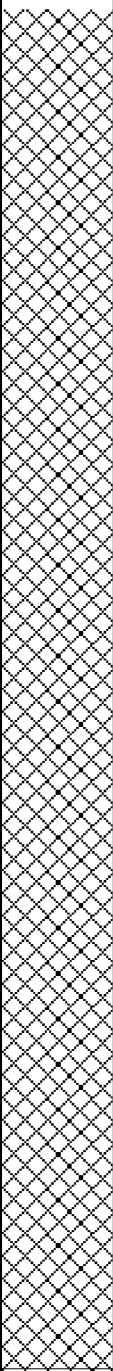
Comments:

Project No: C1296	Date: 27 Jan 2009	Easting: 270302.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195534.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.50 - 10.50m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9 10 11 12 13 14 15 16 17 18					MADE GROUND: Waste Tip Fill.			
					PEAT:	10.20		
					End of Borehole	10.50		

Comments:

Project No: C1296	Date: 29 Jan 2009	Easting: 270343.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195572.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste Tip Fill.			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
Continued next sheet								

Comments:

Design and Construct Remediation

Date: 29 Jan 2009

Easting: 270343.000

Project No: C1296

Engineer: MS

Northing: 195572.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

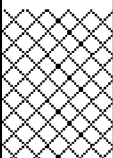
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
▽ 9.50m 9 10 11 12 13 14 15 16 17 18	<							

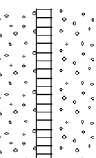
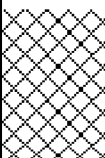
Comments:

Project No: C1296	Date: 9 Feb 2009	Easting: 270351.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195502.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste Tip Fill. Black oil			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
					Continued next sheet			

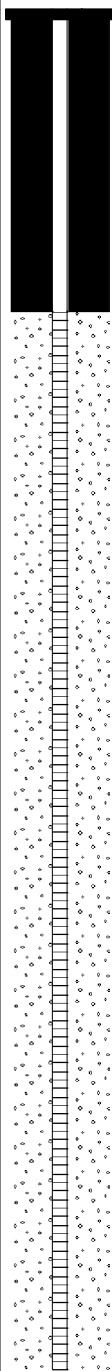
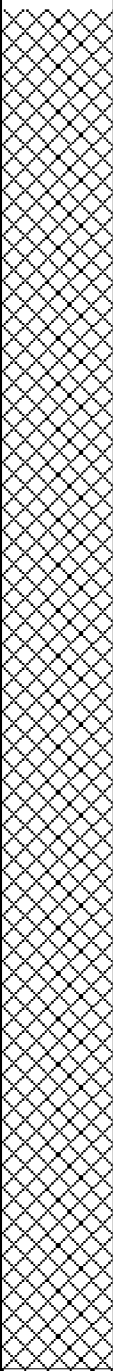
Comments:

Project No: C1296	Date: 9 Feb 2009	Easting: 270351.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195502.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste Tip Fill.			
10					End of Borehole	10.00		
11								
12								
13								
14								
15								
16								
17								
18								

Comments:

Project No: C1296	Date: 29 Jan 2009	Easting: 270362.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195572.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste tip Fill.			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
Continued next sheet								

Comments:

Design and Construct Remediation

Date: 29 Jan 2009

Easting: 270362.000

Project No: C1296

Engineer: MS

Northing: 195572.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

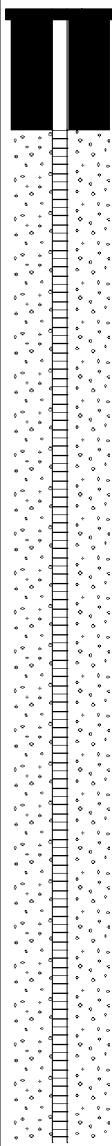
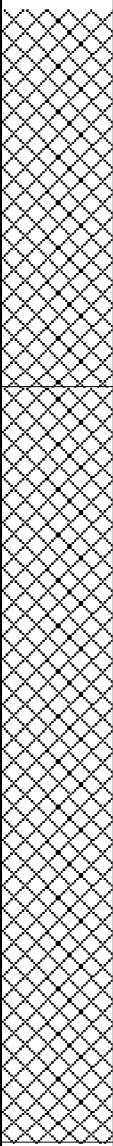
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

[illegible]

Comments:

Project No: C1296	Date: 27 Jan 2009	Easting: 270832.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195553.000
Client: St. Modwen	Method: CP	Datum: -
	Hole Diameter: 200mm	Screen Position: 0.80 - 7.50m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: mixture of compacted grey to black clay, gravels and cobbles (up to 10 cm) MADE GROUND: Mixture of black ash, brick fragments, gravel and brown clay. End of Borehole	2.50 7.50		

Comments:

Design and Construct Remediation

Date: 4 Feb 0009

Easting: 270401.000

Project No: C1296

Engineer: MS

Northing: 195595.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

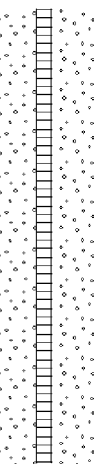
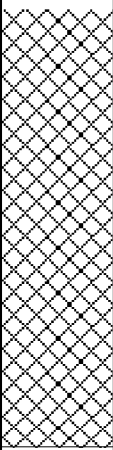
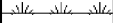
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

[illegible]

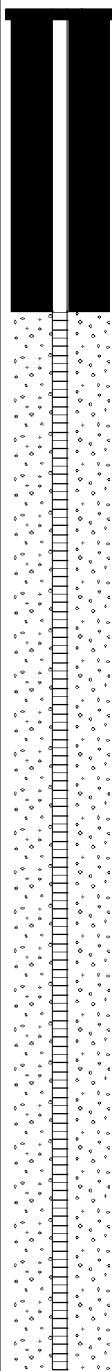
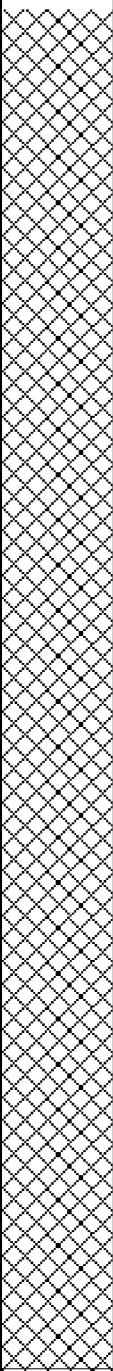
Comments:

Project No: C1296	Date: 4 Feb 0009	Easting: 270401.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195595.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste tip Fill.			
10								
11								
12								
					PEAT:	11.90		
					End of Borehole	12.00		
13								
14								
15								
16								
17								
18								

Comments:

Project No: C1296	Date: 30 Jan 2009	Easting: 270405.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195554.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste tip Fill.			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
Continued next sheet								

Comments:

Design and Construct Remediation

Date: 30 Jan 2009

Easting: 270405.000

Project No: C1296

Engineer: MS

Northing: 195554.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9.00m <								

Comments:

Design and Construct Remediation

Date: 4 Feb 0009

Easting: 270422.000

Project No: C1296

Engineer: MS

Northing: 195594.000

Site Location: BP Former Llandarcy

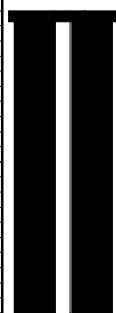
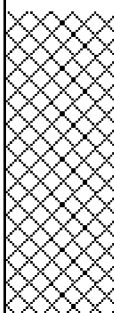
Method: ODEX

Datum: -

Client: St. Modwen

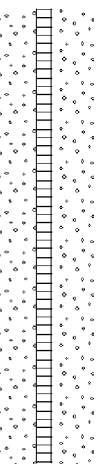
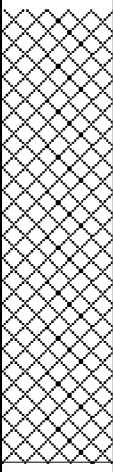
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					MADE GROUND: Waste tip Fill.			
1								
2								
3								
4								
5								
6								
7								
8								
9								
					Continued next sheet			

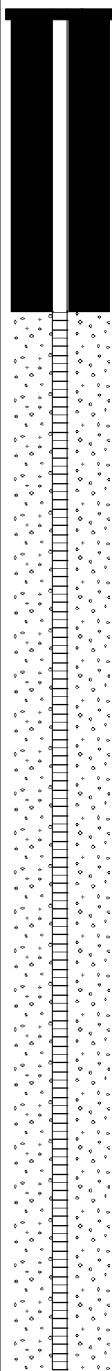
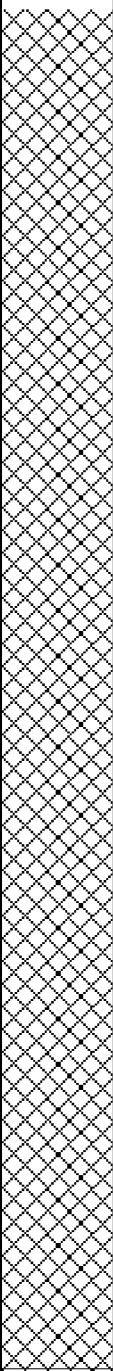
Comments:

Project No: C1296	Date: 4 Feb 0009	Easting: 270422.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195594.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste tip Fill.			
10								
11								
12								
13								
14								
15								
16								
17								
18								
					End of Borehole	12.00		

Comments:

Project No: C1296	Date: 6 Feb 2009	Easting: 270421.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195573.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste tip Fill.			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
Continued next sheet								

Comments:

Date: 6 Feb 2009

Easting: 270421.000

Project No: C1296

Engineer: MS

Northing: 195573.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

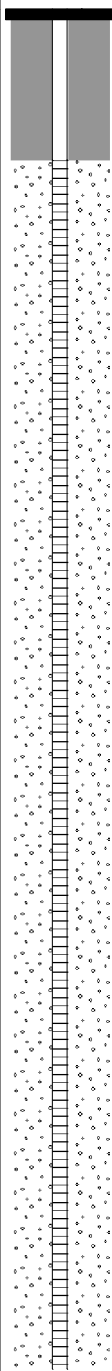
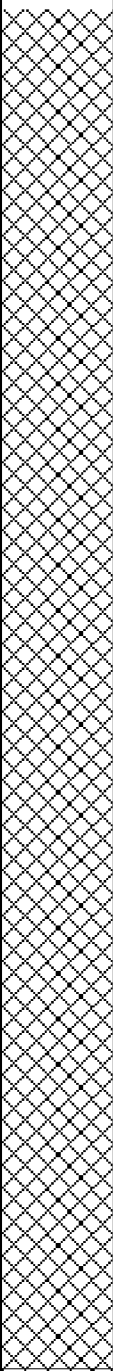
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

[illegible]

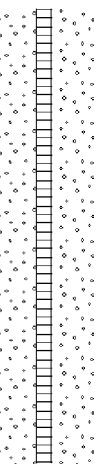
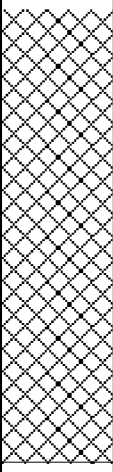
Comments:

Project No: C1296	Date: 4 Feb 0009	Easting: 270442.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195595.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste tip Fill.			
					Continued next sheet			

Comments:

Project No: C1296	Date: 4 Feb 0009	Easting: 270442.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195595.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste tip Fill.			
10								
11								
12								
13								
14								
15								
16								
17								
18								
					End of Borehole	12.00		

Comments:

Design and Construct Remediation

Date: 6 Feb 2009

Easting: 270441.000

Project No: C1296

Engineer: MS

Northing: 195573.000

Site Location: BP Former Llandarcy

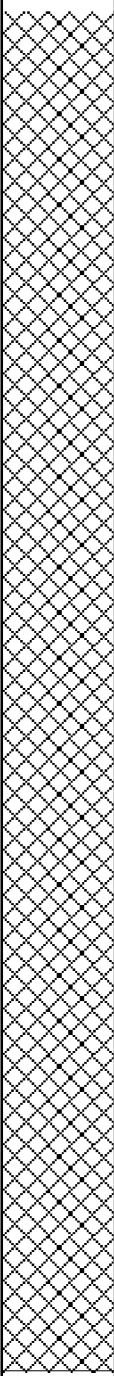
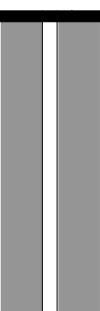
Method: ODEX

Datum: -

Client: St. Modwen

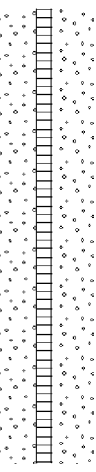
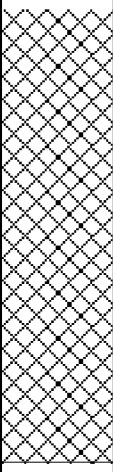
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE				
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)	
					MADE GROUND: Waste tip Fill.				
0									
1									
2									
3									
4									
5									
6									
7									
7.50m									
8									
9									
					Continued next sheet				

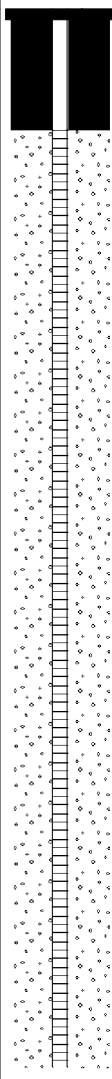
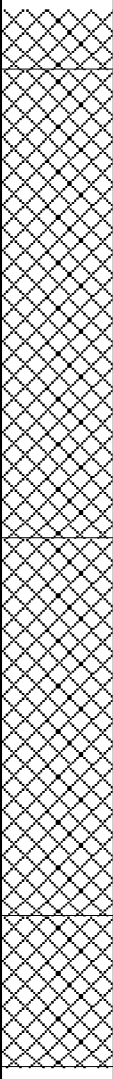
Comments:

Project No: C1296	Date: 6 Feb 2009	Easting: 270441.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195573.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste tip Fill.			
10								
11								
12								
13								
14								
15								
16								
17								
18								
					End of Borehole	12.00		

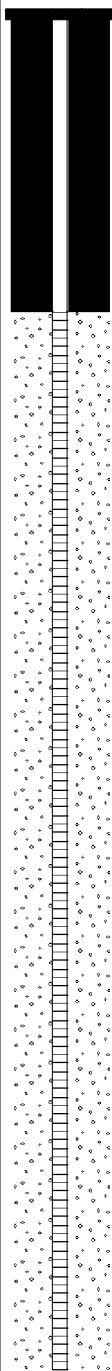
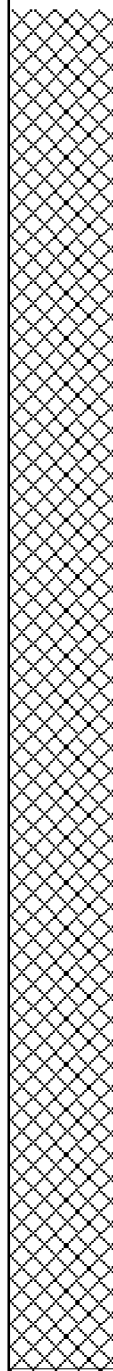
Comments:

Project No: C1296	Date: 2 Feb 2009	Easting: 270442.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195553.000
Client: St. Modwen	Method: CP	Datum: -
	Hole Diameter: 200mm	Screen Position: 0.80 - 7.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Black ashy clay with cobbles			
					MADE GROUND: Brown gravelly clay.	0.40		
					MADE GROUND: Black clay with bricks fragments and large timbers	3.50		
					MADE GROUND: Black clay with limestone cobbles.	6.00		
					End of Borehole	7.00		

Comments:

Project No: C1296	Date: 5 Feb 2009	Easting: 270461.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195595.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste tip Fill.			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
						Continued next sheet		

Comments:

Date: 5 Feb 2009

Easting: 270461.000

Project No: C1296

Engineer: MS

Northing: 195595.000

Site Location: BP Former Llandarcy

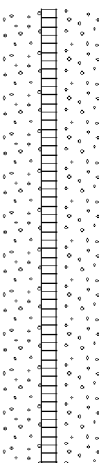
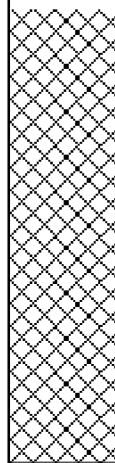
Method: ODEX

Datum: -

Client: St. Modwen

Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9 ▽ 10.50m					MADE GROUND: Waste tip Fill.			
11								
12					End of Borehole	12.00		
13								
14								
15								
16								
17								
18								

Comments:

Design and Construct Remediation

Date: 6 Feb 2009

Easting: 270463.000

Project No: C1296

Engineer: MS

Northing: 195572.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

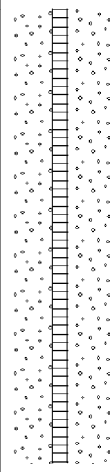
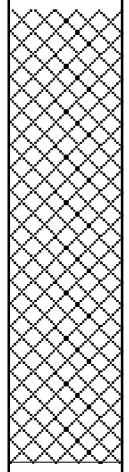
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
		N Value	Sample Type	Sample Ref	Description of Strata	Depth (m bgl)	Legend	Level (m AOD)
Water Strike	Well Data							
0					MADE GROUND: Waste tip Fill.			
1								
2								
3								
4								
5								
6								
7								
8								
9								
					Continued next sheet			

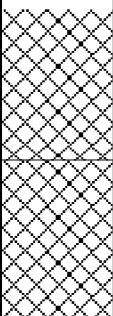
Comments:

Project No: C1296	Date: 6 Feb 2009	Easting: 270463.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195572.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste tip Fill.	12.00		
10					Green oil			
11								
12					End of Borehole			
13								
14								
15								
16								
17								
18								

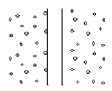
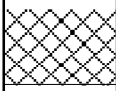
Comments:

Project No: C1296	Date: 5 Feb 2009	Easting: 270466.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195557.000
Client: St. Modwen	Method: CP	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 0.51m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					MADE GROUND: Black clay with cobbles and bricks and plastic fragments			
					MADE GROUND: Light brown clay	1.00		
2					MADE GROUND: Brown to black clay	2.50		
3								
4								
5								
6								
7								
8					MADE GROUND: Black clay with cobbles. Gas bubbling	8.00		
9					Continued next sheet			

Comments:

Project No: C1296	Date: 5 Feb 2009	Easting: 270466.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195557.000
Client: St. Modwen	Method: CP	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 0.51m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Black clay with cobbles. Gas bubbling	9.50		
					End of Borehole			
10								
11								
12								
13								
14								
15								
16								
17								
18								

Comments:

Design and Construct Remediation

Date: 5 Feb 2009

Easting: 270489.000

Project No: C1296

Engineer: MS

Northing: 195598.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

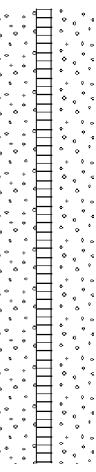
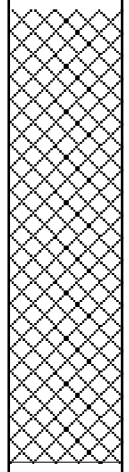
Hole Diameter: 200mm

Screen Position: 2.00 - 12.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	Description of Strata	Depth (m bgl)	Legend	Level (m AOD)
0								
1								
2								
3								
4								
4.50m								
5								
6								
7								
8								
9								
Continued next sheet								

Comments:

Project No: C1296	Date: 5 Feb 2009	Easting: 270489.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195598.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 2.00 - 12.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste tip Fill.			
10								
11								
12								
13								
14								
15								
16								
17								
18								
					End of Borehole	12.00		

Comments:

Date: 9 Feb 2009

Easting: 270490.000

Project No: C1296

Engineer: MS

Northing: 195533.000

Site Location: BP Former Llandarcy

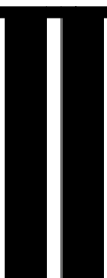
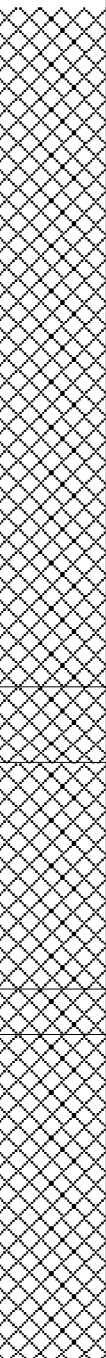
Method: CP

Datum: -

Client: St. Modwen

Hole Diameter: 200mm

Screen Position: 1.80 - 10.00m

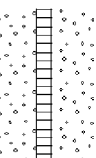
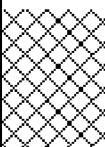
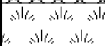
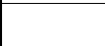
WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					MADE GROUND: Compacted mixture of black clay and bricks fragments.			
1								
2								
3								
4								
5								
6								
7								
8								
9								

5.00m

Continued next sheet

Comments:

Project No: C1296	Date: 9 Feb 2009	Easting: 270490.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195533.000
Client: St. Modwen	Method: CP	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.80 - 10.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Black coal ash. Strong hydrocarbons odour.			
10					PEAT	10.00		
					End of Borehole	10.30		
11								
12								
13								
14								
15								
16								
17								
18								

Comments:

Date: 10 Feb 2009

Easting: 270515.000

Project No: C1296

Engineer: MS

Northing: 195534.000

Site Location: BP Former Llandarcy

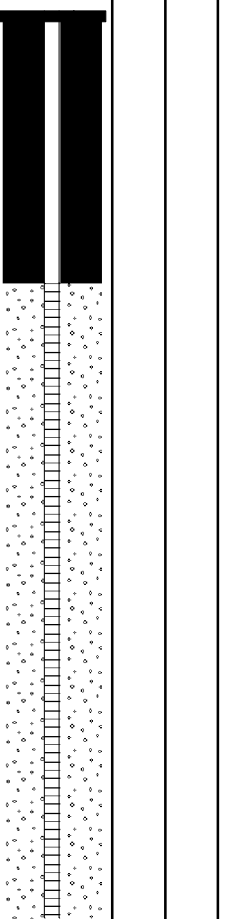
Method: CP

Datum: -

Client: St. Modwen

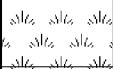
Hole Diameter: 200mm

Screen Position: 1.80 - 6.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					MADE GROUND: Black clay with bricks fragments and peat/clay mixture.			
1								
2								
3								
4.00m								
5								
6						End of Borehole		6.00
7								
8								
9								

Comments:

Project No: C1296	Date: 23 Jul 2009	Easting: 270372.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195500.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					MADE GROUND: Waste Tip Fill.			
1								
2								
3								
4								
5								
6								
7								
8								
9								
					Continued next sheet	8.60		

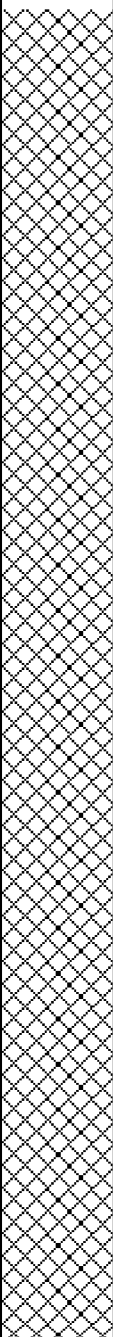
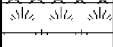
Comments:

Project No: C1296	Date: 23 Jul 2009	Easting: 270372.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195500.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					PEAT: End of Borehole	9.00		
10								
11								
12								
13								
14								
15								
16								
17								
18								

Comments:

Project No: C1296	Date: 23 Jul 2009	Easting: 270394.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195502.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste Tip fill.			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9						8.80		
Continued next sheet								

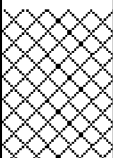
Comments:

Project No: C1296	Date: 23 Jul 2009	Easting: 270394.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195502.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					PEAT: End of Borehole	9.00		
10								
11								
12								
13								
14								
15								
16								
17								
18								

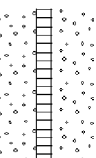
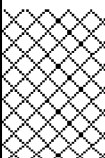
Comments:

Project No: C1296	Date: 22 Jul 2009	Easting: 270393.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195523.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste Tip fill.			
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
Continued next sheet								

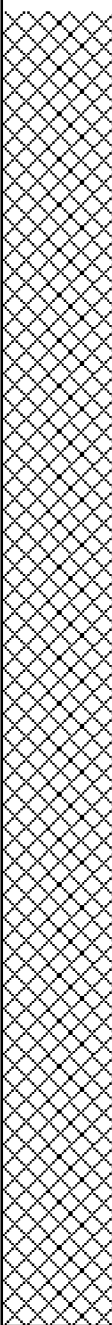
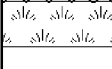
Comments:

Project No: C1296	Date: 22 Jul 2009	Easting: 270393.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195523.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste Tip fill.			
10					End of Borehole	10.00		
11								
12								
13								
14								
15								
16								
17								
18								

Comments:

Project No: C1296	Date: 22 Jul 2009	Easting: 270415.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195525.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE				
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)	
0					MADE GROUND: Waste Tip fill.				
1									
2									
3									
4									
5									
6									
7									
8									
9									
Continued next sheet						8.70			

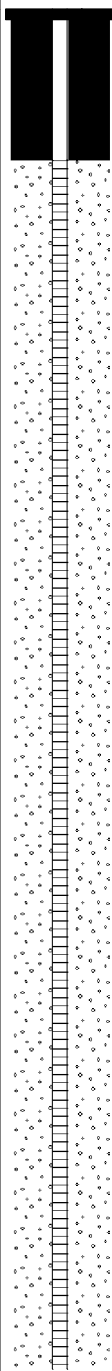
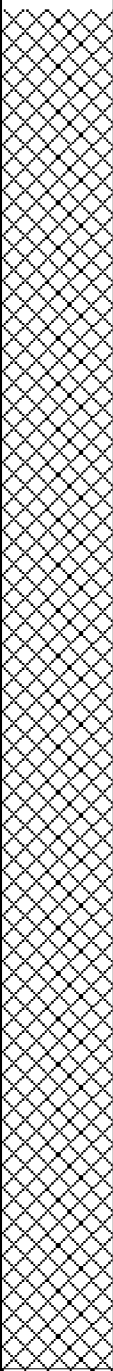
Comments:

Project No: C1296	Date: 22 Jul 2009	Easting: 270415.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195525.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					PEAT: End of Borehole	9.00		
10								
11								
12								
13								
14								
15								
16								
17								
18								

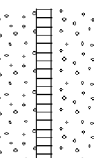
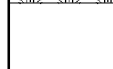
Comments:

Project No: C1296	Date: 24 Jul 2009	Easting: 270410.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195585.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste Tip fill.			
					Continued next sheet			

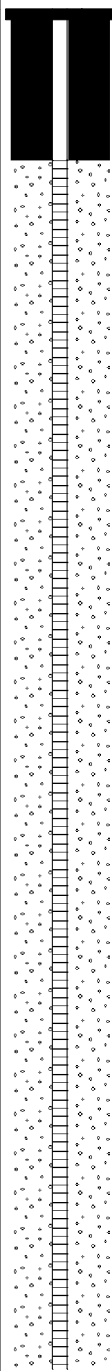
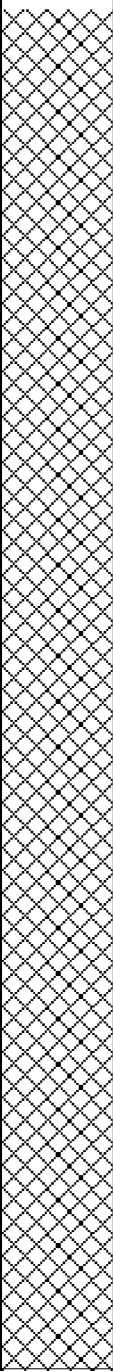
Comments:

Project No: C1296	Date: 24 Jul 2009	Easting: 270410.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195585.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste Tip fill.			
					PEAT:	9.60		
					End of Borehole	10.00		
10								
11								
12								
13								
14								
15								
16								
17								
18								

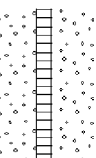
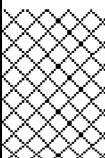
Comments:

Project No: C1296	Date: 28 Jul 2009	Easting: 270512.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195605.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					MADE GROUND: Waste Tip fill.			
					Continued next sheet			

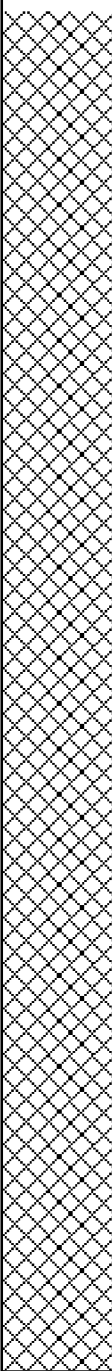
Comments:

Project No: C1296	Date: 28 Jul 2009	Easting: 270512.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195605.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE		
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
9					MADE GROUND: Waste Tip fill.			
10					End of Borehole	10.00		
11								
12								
13								
14								
15								
16								
17								
18								

Comments:

Project No: C1296	Date: 28 Jul 2009	Easting: 270513.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195582.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 10.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE				
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)	
0					MADE GROUND: Waste Tip fill.				
1									
2									
3									
4									
5									
6									
7									
8									
9									
Continued next sheet									

Comments:

Design and Construct Remediation

Date: 27 Jul 2009

Easting: 270533.000

Project No: C1296

Engineer: MS

Northing: 195551.000

Site Location: BP Former Llandarcy

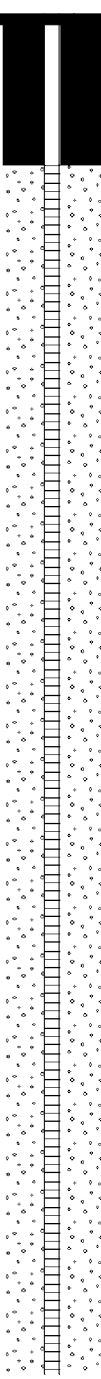
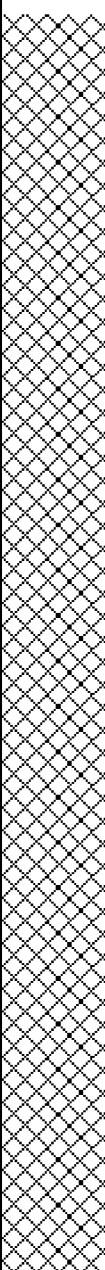
Method: ODEX

Datum: -

Client: St. Modwen

Hole Diameter: 200mm

Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					MADE GROUND: Waste Tip fill.			
1								
2								
3								
4								
5								
6								
7								
8								
9					PEAT:	8.40		
	End of Borehole							

Comments:

Design and Construct Remediation

Date: 29 Jul 2009

Easting: 270483.000

Project No: C1296

Engineer: MS

Northing: 195513.000

Site Location: BP Former Llandarcy

Method: ODEX

Datum: -

Client: St. Modwen

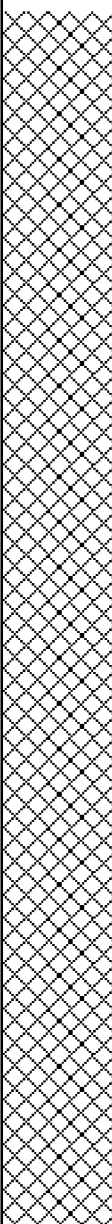
Hole Diameter: 200mm

Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					MADE GROUND: Waste Tip fill.			
1								
2								
3								
4								
5								
6								
7								
8								
9								
					PEAT:	8.40		
					End of Borehole			

Comments:

Project No: C1296	Date: 29 Jul 2009	Easting: 270505.000
Site Location: BP Former Llandarcy	Engineer: MS	Northing: 195510.000
Client: St. Modwen	Method: ODEX	Datum: -
	Hole Diameter: 200mm	Screen Position: 1.00 - 9.00m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE				
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)	
0					MADE GROUND: Waste Tip fill.				
1									
2									
3									
4									
5									
6									
7									
8									
9									
					PEAT:	8.10			
					End of Borehole				

Comments:

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: CARW008		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 17/01/01		DRILLING METHODS : Percussive	
							DRILLER : Geotechnical		BOREHOLE DIAMETER : ~100mm	
							LOGGED BY : URS		SCREEN TYPE & DIAM: UPVC 50mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
					0.0		DESCRIPTION	COMMENTS	0.0	
					0.5		Loose, black, sandy, fine GRAVEL comprising Ash. MADE GROUND	Dry, NVO		
			*47.6		0.5		Sticky, black sandy GRAVEL, some grease. (MADE GROUND)	Sticky product. Mod odour	0.5	
			*37.4		1.0		As above but fine-medium GRAVEL. (MADE GROUND)	Damp from 0.85m, wet from 1.0m. Mod odour	1.0	
					1.5				1.5	
			*237		2.0				2.0	
					2.5		Soft, brown, silty CLAY	Dry, NVC, slight odour	2.5	
			*3.5		3.0		Soft, very light brown CLAY. Drilled to 3.0m, collapsed to 2.0m	Dry-moist. NVO	3.0	
					3.5		End of Borehole		3.5	
					4.0				4.0	
						4.5			4.5	
						5.0			5.0	

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery URS App'd: _____ Date: 05/09/2002 Drawn : SS Ref: _____ Scale: As scale Job No: 39991-016 Drg. Size: A4 BOREHOLE LOG	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: CARW009		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 09/01/01 - 10/01/01		DRILLING METHODS :	
							DRILLER : Geotechnical		BOREHOLE DIAMETER :	
							LOGGED BY : SC		SCREEN TYPE & DIAM:	
							CHECKED BY :		SCREEN SLOT SIZE:	
							DESCRIPTION	COMMENTS		
						0.0	Soft-loose, black, fine-coarse GRAVEL with patches of sandy silt. Grades into gravelly, silty SAND from 0.6m. Lump of sticky grease at 0.65m MADE GROUND	Wet, slight odour	0.0	
						0.5			0.5	
						*4.2				
						*3.4				
						*3.5		Soft, med brown, slightly clayey, slightly sandy SILT with occasional gravels and cobbles. (MADE GROUND)	Wet. Manure-like odour	1.0
						1.0		Med-soft grey/black clayey SILT.	Damp. Manure odour, some staining	1.0
						*14.5		Very soft, brown/grey/black, slightly gravelly, clayey, sandy SILT.	Very damp, slight odour, some staining. Odour decreases with depth	1.5
						1.5		More clayey at 2.0m, but remains soft.		1.5
						*2.2		Becomes sandier and firmer (compressed) from 2.3m		2.0
						2.0				2.0
2.5				2.5						
*1.5				2.5						
3.0		Firm, grey (with some orange streaks), clayey, very sandy SILT. Becoming more clayey from 3.2m	Moist. NVO. Some chicken wire	3.0						
*1.3				3.0						
3.5		Loose, med brown, gravelly SAND. Very gravelly from 3.5m		3.5						
*0.5				3.5						
4.0				4.0						
4.0		Med-dense, med brown, gravelly, very sandy SILT		4.0						
4.5		End of Borehole		4.5						
5.0				5.0						

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery	
		URS App'd: _____ Date: 05/09/2002 Drawn: SS Ref: _____ Scale: As scale Job No: 39991-016 Drg. Size: A4 BOREHOLE LOG	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: CARW034		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 20/06/01		DRILLING METHODS : Percussive	
							DRILLER : Geotechnical		BOREHOLE DIAMETER : ~100mm	
							LOGGED BY : NL		SCREEN TYPE & DIAM: UPVC 50mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
					0.0		DESCRIPTION		COMMENTS	0.0
					0.5		Soft, brown, silty PEAT		Strong odour	0.5
					1.0	SAMPLE LOST DUE TO HIGH WATER CONTENT		1.0		
					1.5		Mottled orange/grey sandy SILT with some clay and occasional gravel.		Sheen and odour. Some free phase product. Heavy staining throughout.	1.5
					2.0	Gravel concentration increasing with depth, resulting in harder drilling.		2.0		
				2.5		End of Borehole			2.5	
					3.0					3.0
					3.5					3.5
					4.0					4.0
					4.5					4.5
					5.0					5.0
					5.5					5.5
					6.0					6.0

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery 	
		App'd:	Date: 04/09/2002
		Drawn : SS	Ref:
		Scale: As scale	Job No: 39991-016
		Drg. Size: A4	BOREHOLE LOG

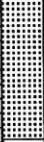
BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW034D1/D2		PAGE 1 of 2	
								START DATE: 21/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
								FINISH DATE: 21/4/99		BOREHOLE DIAMETER: 165 mm	
								DRILLER: R1		SCREEN TYPE & DIAMETER: 50/19 mm ID UPVC	
								LOGGED BY: MC APPR'D BY:		SCREEN SLOT SIZE: 0.5/1 mm	
D2	D1							DESCRIPTION	COMMENTS		
						0		Grey-dark grey sandy gravelly CLAY with sandstone and brick fragments (MADE GROUND)	Strong hydrocarbon odour Moist	0	
						1.0				1.0	
						2.0				2.0	
						3.0		Dark brown-black peaty, gravelly CLAY with wood fragments (MADE GROUND)	Strong hydrocarbon odour	3.0	
								Grey clayey GRAVEL	Damp - wet No odour		
						4.0				4.0	
								Dense brown gravelly, silty CLAY (BOULDER CLAY)	Dry No hydrocarbon odour		
						5.0				5.0	
						6.0				6.0	
								Dense brown clayey GRAVEL	Productive at 8.2 m but cased out at 9.6 m		
						7.0				7.0	
						8.0				8.0	
						9.0				9.0	
						10			Moist	10	

LOCATION / NOTES: 1. All measurements in m below ground level		LEGEND Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	BOREHOLE LOG Job Title SOIL & GROUNDWATER INVESTIGATION Location LLANDARCY REFINERY Client BP LLANDARCY LTD App'd DRAFT Ref. CR/MC/BRS Date MAY 99 Job No. 39991-004-401	 DAMES & MOORE GROUP
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW034D1/D2		PAGE 2 of 2	
	NUMBER	TYPE					START DATE: 21/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 21/4/99		BOREHOLE DIAMETER: 165 mm	
							DRILLER: R1		SCREEN TYPE & DIAMETER: 50/19 mm ID UPVC	
							LOGGED BY: MC APPR'D BY:		SCREEN SLOT SIZE: 0.5/1 mm	
						DESCRIPTION		COMMENTS		
						10 Gravelly CLAY (BOULDER CLAY)		Moist		
						11 Dense coarse grey silty, sandy GRAVEL becoming more clayey at 11 m		No water in hole		
						12 ROCKHEAD - Dark grey MUDSTONE with occasional silty and sandy layers.				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				
LOCATION / NOTES: 1. All measurements in m below ground level						LEGEND ☒ Disturbed Sample ■ Undisturbed Sample * Headspace Analysis † Down Borehole Analysis ▼ Groundwater Table ▼ Perched Water Table		BOREHOLE LOG Job Title SOIL & GROUNDWATER INVESTIGATION Location LLANDARCY REFINERY Client BP LLANDARCY LTD App'd DRAFT Ref. CR/MC/BRs Date MAY 99 Job No. 39991-004-401		
								DAMES & MOORE GROUP		

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW035D2		PAGE 1 of 2	
	NUMBER	TYPE					START DATE: 21/4/99		DRILLING METHOD: ROTARY AIR FLUSH	
							FINISH DATE: 21/4/99		BOREHOLE DIAMETER: 165 mm	
							DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC	
				LOGGED BY: MC APPRD BY:		SCREEN SLOT SIZE: 0.5 mm				
							DESCRIPTION	COMMENTS		
						0	ASH with gravel and brick fragments (MADE GROUND)			0
						1.0	Silty and sandy GRAVEL with some black ash (MADE GROUND)	Strong "farry" hydrocarbon odour Wet		1.0
						2.0	Grey plastic CLAY with silt and sand	Moist Moderate hydrocarbon odour		2.0
						3.0				3.0
						4.0	Very soft grey-brown very sandy CLAY becoming gravelly and brown-grey	Easy drilling Faint hydrocarbon odour		4.0
						5.0		Wet at 5.0m After pipe connection; faint hydrocarbon odour		5.0
						6.0		Cased out at 6.0m		6.0
						7.0	Soft grey silty, sandy and gravelly CLAY	Dry Very easy drilling - "powdery" returns		7.0
						8.0	gravel content increasing at 7.7m becoming firmer and more stiff at 8.7m	Wet at 7.7m Dry at 8.7m		8.0
						9.0	Dense grey coarse mudstone GRAVEL	Wet		9.0
							ROCKHEAD - Dark grey MUDSTONE (BEDROCK)	Productive		
						10	Hard grey crystalline SANDSTONE (BEDROCK)			10

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)		Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table		Job Title SOIL & GROUNDWATER INVESTIGATION Location LLANDARCY REFINERY Client BP LLANDARCY LTD	
2. Bedrock addition to 2 existing shallow				Appd Ref. CR/MC/BRS Date MAY 99 Job No. 39991-004-401	
				DAMES & MOORE	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW035D2		PAGE 2 of 2		
	NUMBER	TYPE					START DATE: 21/4/99		DRILLING METHOD: ROTARY AIR FLUSH		
							FINISH DATE: 21/4/99		BOREHOLE DIAMETER: 165 mm		
							DRILLER: R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC		
							LOGGED BY: MC APPD BY:		SCREEN SLOT SIZE: 0.5 mm		
							DESCRIPTION		COMMENTS		
					10		Hard grey SANDSTONE (BEDROCK)			10	
					11					11	
					12					12	
					13					13	
					14					14	
					15					15	
					16					16	
					17					17	
					18					18	
					19					19	
					20					20	
LOCATION / NOTES:						LEGEND			BOREHOLE LOG		
1. All measurements in m below ground level (mbgl)						 Disturbed Sample			Job Title SOIL & GROUNDWATER INVESTIGATION		
2. Bedrock addition to 2 existing shallow						 Undisturbed Sample			Location LLANDARCY REFINERY		
						 Headspace Analysis			Client BP LLANDARCY LTD		
						 Down Borehole Analysis			Appd DRAFT		
						 Groundwater Table			Ref. CR/MC/BRS		
						 Perched Water Table			Date MAY 99		
									Job No. 39991-004-401		
									 DAMES & MOORE		

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW091		PAGE 1 of 1	
	NUMBER	TYPE					START DATE: 5/3/99		DRILLING METHOD: Hydraulic Percussive	
							FINISH DATE: 5/3/99		BOREHOLE DIAMETER: 100 mm	
			DRILLER: GEOTECHNICAL		SCREEN TYPE & DIAMETER: 50 mm UPVC					
			LOGGED BY: SG APPR'D BY:		SCREEN SLOT SIZE: 1 mm					
						DESCRIPTION	COMMENTS			
						0	Soft, brown sandy SILT with some clay.	Slight hydrocarbon odour.	0	
						1.0	Soft to very soft, orange-brown sandy SILT with occasional gravel.		1.0	
						2.0	Soft, grey slightly gravelly sandy SILT with frequent cobbles.	Strong hydrocarbon odour.	2.0	
						2.0	Gravel at 1.9m	Heavy black staining at 1.9m	2.0	
						3.0			3.0	
						3.0		Very strong hydrocarbon odour.	3.0	
						4.0	Gravel at 3.5m		4.0	
						4.0			4.0	
						5.0			5.0	
						6.0			6.0	
						7.0			7.0	
						8.0			8.0	
						9.0			9.0	
						10			10	

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)	Disturbed Sample	Job Title	SOIL & GROUNDWATER INVESTIGATION
2. DUP GG = MSMW091-1.5m.	Undisturbed Sample	Location	LLANDARCY REFINERY
	* Headspace Analysis	Client	BP LLANDARCY LTD
	† Down Borehole Analysis	App'd	DRAFT
	Groundwater Table	Ref.	CR/MC/BRS
	Perched Water Table	Date	MAY 99
		Job No.	39991-004-401
		DAMES & MOORE	

BOREHOLE CONSTRUCTION		SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW156D, S1, S2		PAGE 1 of 2	
		NUMBER	TYPE					START DATE: 9/4/99	DRILLING METHOD: Cable Percussion/Rotary		
								FINISH DATE: 9/4/99		BOREHOLE DIAMETER: 200/165 mm	
								DRILLER: CP2/R1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC	
								LOGGED BY: JC/DB APPR'D BY:		SCREEN SLOT SIZE: 0.5 mm	
D S2 S1						0		DESCRIPTION		COMMENTS	
						0		Loose mottled brown and grey sandy clayey SILT with frequent medium to coarse slag gravel, sandstone and brick fragments (MADE GROUND)	Dry	0	
						1.0		Slight hydrocarbon odour	1.0		
						2.0		Soft dark brown and yellow PEAT	Very strong hydrocarbon odour and staining from 1.6-3.0m	2.0	
						3.0			Damp	3.0	
						4.0			No odour in peat from 3.0m	4.0	
						5.0				5.0	
						6.0			becoming lighter in colour and red-brown at 5.5m	6.0	
						7.0			Soft grey-brown CLAY	No hydrocarbon odour	7.0
						8.0				Dry beneath bentonite seal	8.0
						9.0				No odour	9.0
						9.0		clay becoming gravelly at 9.0m		9.0	
						10.0		Loose grey-brown gravel	No odour	10.0	
									Water strike at 10m - productive	10	

LOCATION / NOTES:

- All measurements in m below ground level (mbgl)
- Cable Percussion to 7.5 m, Rotary with ODEX from 7.5m to 14.0 m
- Temporary 200 mm casing installed to 7.5 m during Rotary drilling and well installation

LEGEND

- Disturbed Sample
- Undisturbed Sample
- Headspace Analysis
- Down Borehole Analysis
- Groundwater Table
- Perched Water Table

BOREHOLE LOG

Job Title **SOIL & GROUNDWATER INVESTIGATION**

Location **LLANDARCY REFINERY**

Client **BP LLANDARCY LTD**

App'd **DRAFT**

Ref. **CR/MC/BR5**

Date **MAY 99**

Job No. **39991-004-401**

DAMES & MOORE

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW156D, S1, S2		PAGE 2 of 2	
	NUMBER	TYPE					START DATE: 9/4/99		DRILLING METHOD: Cable Percussion/Rotary	
							FINISH DATE: 9/4/99		BOREHOLE DIAMETER: 200 mm	
							DRILLER: RD1		SCREEN TYPE & DIAMETER: 50 mm ID UPVC	
							LOGGED BY: JC/DB APPR'D BY:		SCREEN SLOT SIZE: 1 mm	
						DESCRIPTION		COMMENTS		
						10 Loose grey-brown gravel				
						11				
						12 gravel becoming more dense		No odour		
						13				
						14 ROCKHEAD - Soft grey MUDSTONE (BEDROCK)		No odour		
						15 Borehole terminated at 14.0 mbgl				
						16				
						17				
						18				
						19				
						20				

LOCATION / NOTES:		LEGEND		BOREHOLE LOG	
1. All measurements in m below ground level (mbgl)		☒ Disturbed Sample		Job Title SOIL & GROUNDWATER INVESTIGATION	
2. Cable Percussion to 7.5 m, Rotary with		☐ Undisturbed Sample		Location LLANDARCY REFINERY	
		* Headspace Analysis		Client BP LLANDARCY LTD	
		† Down Borehole Analysis		App'd DRAFT	
		Groundwater Table		Ref. CR/MC/BRS	
		Perched Water Table		Date MAY 99	
				Job No. 39991-004-401	
				DAMES & MOORE	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW226		PAGE 1 of 1	
	NUMBER	TYPE					DRILLING DATES: 11/04/01		DRILLING METHODS : Air Rotary	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 150mm	
							LOGGED BY : PEW		SCREEN TYPE & DIAM: HDPE 50mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
							DESCRIPTION	COMMENTS		
					0.0		Brown, sandy, silty, angular fine-coarse GRAVEL. MADE GROUND		0.0	
					0.5					
					1.0				1.0	
					1.5				1.5	
					2.0		Black, fine-medium ash and GRAVEL with sand, and minor silt.	H/C staining	2.0	
					2.5					2.5
					3.0					3.0
					3.5					3.5
					4.0					4.0
					4.5					4.5
					5.0					5.0
					5.5					5.5
					6.0					6.0
					6.5					6.5
					7.0					7.0
					7.5					7.5
					8.0					8.0
					8.5					8.5
					9.0					9.0
					9.5				9.5	
					10.0				10.0	
					10.5		10.5			

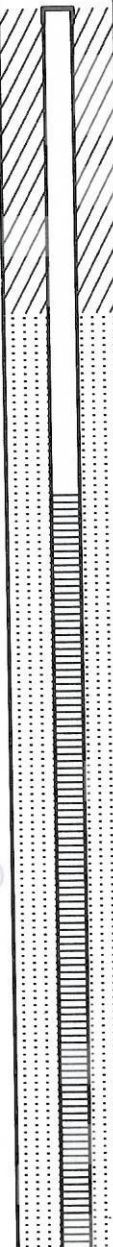
LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery  App'd: _____ Date: 04/09/2002 Drawn : SS Ref: _____ Scale: As scale Job No: 39991-016 Drg. Size: A4 BOREHOLE LOG	

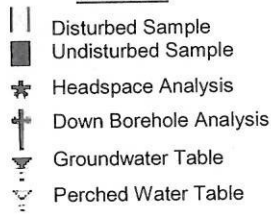
BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW227		PAGE 1 of 2	
	NUMBER	TYPE					DRILLING DATES: 10/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PEW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
							DESCRIPTION	COMMENTS		
							Black, organic silty, clayey GRAVEL of ash and clinker. MADE GROUND.	H/C staining	0.0	
						Black, sandy, silty, fine-medium, angular GRAVEL with clinker. MADE GROUND.	0.5			
						Poor returns	1.0			
							As above with small amounts of plant material.		1.5	
							As above without plant material and without silt.		2.0	
									2.5	
									3.0	
									3.5	
									4.0	
									4.5	
									5.0	
									5.5	
									6.0	
									6.5	
								H/C contamination	7.0	
									7.5	
									8.0	
									8.5	
							As above with decreasing clinker/ash fraction		9.0	
									9.5	
									10.0	

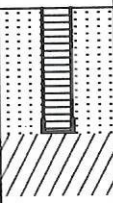
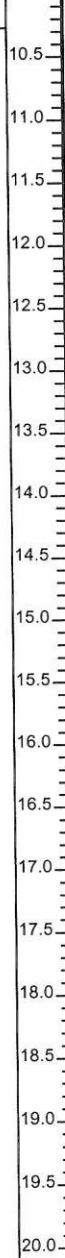
LOCATION / NOTES:	LEGEND	BOREHOLE LOG									
NVO = No visual or olfactory evidence	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery <table border="1" style="width: 100%;"> <tr> <td>App'd:</td> <td>Date: 04/09/2002</td> </tr> <tr> <td>Drawn : SS</td> <td>Ref:</td> </tr> <tr> <td>Scale: As scale</td> <td>Job No: 39991-016</td> </tr> <tr> <td>Drg. Size: A4</td> <td>BOREHOLE LOG</td> </tr> </table>		App'd:	Date: 04/09/2002	Drawn : SS	Ref:	Scale: As scale	Job No: 39991-016	Drg. Size: A4	BOREHOLE LOG
App'd:	Date: 04/09/2002										
Drawn : SS	Ref:										
Scale: As scale	Job No: 39991-016										
Drg. Size: A4	BOREHOLE LOG										

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW227		PAGE 2 of 2	
	NUMBER	TYPE					DRILLING DATES: 10/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PEW		SCREEN TYPE & DIAM: HDPE 100mm	
		CHECKED BY :		SCREEN SLOT SIZE: 1mm						
						As above with increasing silt/clay from 10.0m.		COMMENTS Major water/HC returns	10.5	
						MADE GROUND fill materials containing sub-rounded, medium-coarse GRAVELS.			11.0	
						Fine-coarse GRAVEL of ash, clinker and brick. MADE GROUND			11.5	
						End of Borehole			12.0	
									12.5	
									13.0	
									13.5	
									14.0	
									14.5	
									15.0	
									15.5	
									16.0	
									16.5	
									17.0	
									17.5	
									18.0	
									18.5	
									19.0	
									19.5	
									20.0	

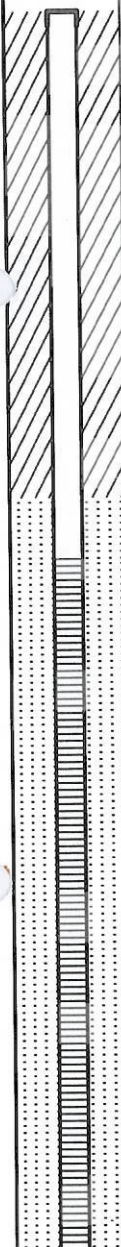
LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery	
			App'd: _____ Date: 04/09/2002 Drawn : SS Ref: _____ Scale: As scale Job No: 39991-016 Drg. Size: A4 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW231		PAGE 1 of 2	
	NUMBER	TYPE					DRILLING DATES: 03/04/01 - 05/04/01		DRILLING METHODS: Rotary Air Flush	
							DRILLER: Tectonics		BOREHOLE DIAMETER: 250mm	
							LOGGED BY: PW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY:		SCREEN SLOT SIZE: 1mm	
DESCRIPTION							COMMENTS			
							Dark brown sandy/clayey fine-coarse GRAVEL. MADE GROUND Intermittent hard bands of concrete/rubble.	Oil/Free Product from 4.0m Wet/Oily	0.0	
									0.5	
									1.0	
									1.5	
Fine-medium GRAVEL with silt and clay. MADE GROUND.							Wet/Oily	2.0		
Medium, subangular GRAVEL fill with peat/fibrous plant remains. MADE GROUND								2.5		
Decreasing fibrous material from 8.0m Increasing amounts of ash and clinker.								3.0		
Saturated with H/C								3.5		
Very poor returns							4.0			
							4.5			
							5.0			
							5.5			
							6.0			
							6.5			
							7.0			
							7.5			
							8.0			
							8.5			
							9.0			
							9.5			
							10.0			

LOCATION / NOTES: NVO = No visual or olfactory evidence	LEGEND 	BOREHOLE LOG Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery	
			App'd: _____ Date: 04/09/2002 Drawn: SS Ref: _____ Scale: As scale Job No: 39991-016 Drg. Size: A4 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW231		PAGE 2 of 2	
	NUMBER	TYPE					DRILLING DATES: 03/04/01 - 05/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
						Small amounts of fibrous material, abundant ash and clinker. MADE GROUND		COMMENTS		
						Gravelly CLAY. Borehole terminated and backfilled to 11m				
						End of Borehole				

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery 	
		App'd:	Date: 04/09/2002
		Drawn : SS	Ref:
		Scale: As scale	Job No: 39991-016
		Drg. Size: A4	BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW232		PAGE 1 of 2	
	NUMBER	TYPE					DRILLING DATES: 05/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
DESCRIPTION							COMMENTS			
						Grey/brown silty/sandy GRAVEL fill with brick and wood ash fragments. MADE GROUND. Increasing clay below 1.0m Very poor returns from 1.5m Without Ash or Brick from 2.0m	H/C staining 0.5-1.0m. PID 0.0	0.0		
							W/out H/C	0.5		
							W/out H/C stains	1.0		
								1.5		
As above with plastic liner/geotextile from 3.5m Becoming brown. MADE GROUND								2.0		
Light brown, subangular GRAVEL. Possibly reworked natural material.MADE GROUND						Small water return when flushed. No H/C stain		2.5		
						H/C sheen from 6.0m		3.0		
								3.5		
								4.0		
								4.5		
								5.0		
								5.5		
								6.0		
								6.5		
								7.0		
								7.5		
								8.0		
								8.5		
								9.0		
								9.5		
								10.0		

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	 Disturbed Sample  Undisturbed Sample  Headspace Analysis  Down Borehole Analysis  Groundwater Table  Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery	
			App'd: _____ Date: 04/09/2002 Drawn: SS Ref: _____ Scale: As scale Job No: 39991-016 Drg. Size: A4 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW232		PAGE 2 of 2	
	NUMBER	TYPE					DRILLING DATES: 05/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
						GRAVEL, less clayey than above. MADE GROUND MADE GROUND. Fine to coarse grained, gravel-sized clinker and brick fill. End of Borehole		COMMENTS Very high H/C content		10.5
										11.0
										11.5
										12.0
										12.5
										13.0
										13.5
										14.0
										14.5
										15.0
										15.5
										16.0
										16.5
										17.0
										17.5
18.0										
18.5										
19.0										
19.5										
20.0										

LOCATION / NOTES: NVO = No visual or olfactory evidence		LEGEND Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table		BOREHOLE LOG Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery 				App'd: _____ Date: 04/09/2002 Drawn: SS _____ Ref: _____ Scale: As scale _____ Job No: 39991-016 Drg. Size: A4 _____ BOREHOLE LOG	
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BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW238		PAGE 1 of 3	
	NUMBER	TYPE					DRILLING DATES: 05/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
						DESCRIPTION	COMMENTS			
						0.0 Light-dark brown, silty/clayey/sandy med-coarse GRAVEL fill with brick fragments, wood, plastic liner and clinker. MADE GROUND		0.0		
						0.5 Dark grey, gravelly/sandy CLAY with brick fragments and pipe lagging. MADE GROUND		0.5		
						1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0		1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0		
						As above plus abundant lagging foam between 4.0 and 5.0m. MADE GROUND	Saturated with dark, black H/C Abundant free product from 4.5m			

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	Disturbed Sample ■ Undisturbed Sample * Headspace Analysis + Down Borehole Analysis ~ Groundwater Table ~ Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery	
			App'd: _____ Date: 04/09/2002 Drawn : SS Ref: _____ Scale: As scale Job No: 39991-016 Drg. Size: A4 BOREHOLE LOG

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW238		PAGE 2 of 3	
	NUMBER	TYPE					DRILLING DATES: 05/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
									COMMENTS	
					5.5					5.5
					6.0					6.0
					6.5					6.5
					7.0					7.0
					7.5					7.5
					8.0					8.0
					8.5					8.5
					9.0					9.0
					9.5					9.5
					10.0					10.0

LOCATION / NOTES:	LEGEND	BOREHOLE LOG	
NVO = No visual or olfactory evidence	Disturbed Sample Undisturbed Sample Headspace Analysis Down Borehole Analysis Groundwater Table Perched Water Table	Job Title: Containment Area Investigation Location: Llandarcy Refinery Client: BP Llandarcy Refinery URS App'd: _____ Date: 04/09/2002 Drawn : SS _____ Ref: _____ Scale: As scale _____ Job No: 39991-016 Drg. Size: A4 _____ BOREHOLE LOG	

BOREHOLE CONSTRUCTION	SAMPLE		SOIL VAPOUR (ppm)	GROUNDWATER	DEPTH (m)	GEOLOGY	BOREHOLE NUMBER: MSMW238		PAGE 3 of 3	
	NUMBER	TYPE					DRILLING DATES: 05/04/01		DRILLING METHODS : Rotary Air Flush	
							DRILLER : Tectonics		BOREHOLE DIAMETER : 250mm	
							LOGGED BY : PW		SCREEN TYPE & DIAM: HDPE 100mm	
							CHECKED BY :		SCREEN SLOT SIZE: 1mm	
							COMMENTS			
End of Borehole										

LOCATION / NOTES:

NVO = No visual or olfactory evidence

LEGEND

- Disturbed Sample
- Undisturbed Sample
- Headspace Analysis
- Down Borehole Analysis
- Groundwater Table
- Perched Water Table

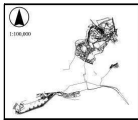
BOREHOLE LOG

Job Title: Containment Area Investigation
Location: Llandarcy Refinery
Client: BP Llandarcy Refinery

	App'd:	Date: 04/09/2002
	Drawn : SS	Ref:
	Scale: As scale	Job No: 39991-016
	Drg. Size: A4	BOREHOLE LOG



Appendix C URS groundwater drawings



LEGEND

- Shallow Wells (Typical Shallow/Hand-dug sequences)
- Deep Wells (Typical Borehole Units)
- Interpolated Groundwater Contours
 - on Contour Interval
 - on Contour Interval
 - on Contour Interval
 - on Contour Interval
- Contours based on groundwater elevation C data collected in September 2003

REVISE	DATE	CHK	APPD
1 - INITIAL DRAFT	MAY 04	SG	

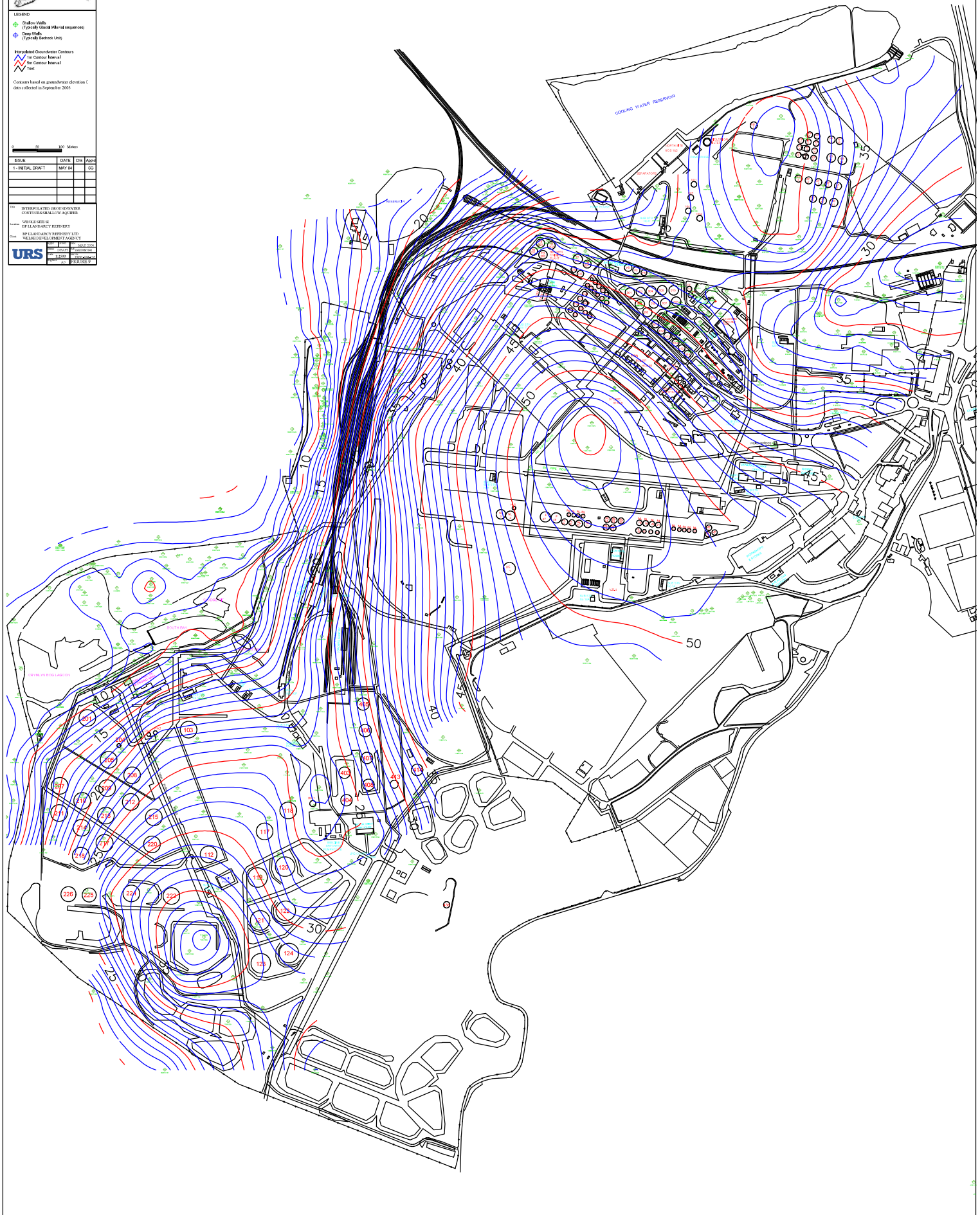
INTERPOLATED GROUNDWATER CONTOUR MAP FOR THE SITE

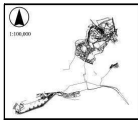
WELL SITE IS

OF LANDSCAPE RECOVERY LTD

WELL SITE IS

URS





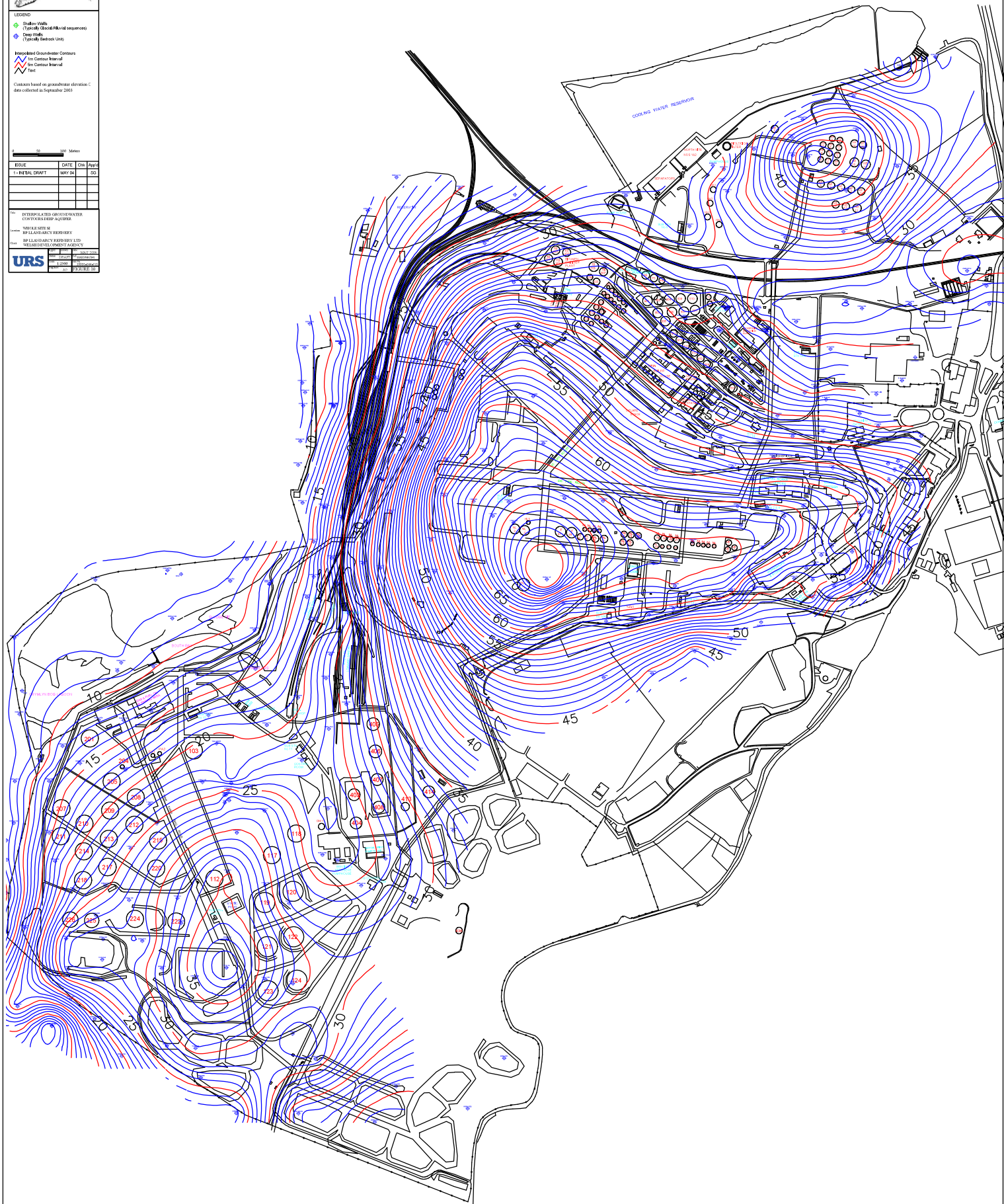
LEGEND

- Station Marks
(Circular) (Circular) (Circular) (Circular)
- Deep Wells
(Circular) (Circular) (Circular)
- Interpolated Groundwater Contours
- 1m Contour Interval
- 5m Contour Interval
- 10m Contour Interval
- 20m Contour Interval
- Contours based on groundwater elevation C
data collected in September 2003

REVISE	DATE	CHK	APPD
1 - INITIAL DRAFT	MAY 04	SG	

INTERPOLATED GROUNDWATER
CONTOUR MAP
SITING OF
WATER TREATMENT PLANT
SITING OF
WATER TREATMENT PLANT
SITING OF
WATER TREATMENT PLANT

URS





Appendix D Groundwater and Surface Water Laboratory Results

Coed Darcy 2022: January-June Surface Water Data

Customer Sample ID		CARW008	CARW008	CARW008	CARW008	CARW008	CARW008	CARW008	CARW009	CARW009	CARW009	CARW009	CARW009	CARW009	CARW034	CARW034	CARW034	CARW034	CARW034	CARW034	CBH20	CBH20	CBH20	CBH20	CBH20		
Depth		0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00			
Sample Type		JUND_WATER	JUND_WATER	JUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER			
Sampled Date		26/01/2022	09/03/2022	06/04/2022	04/05/2022	31/05/2022	28/06/2022	26/01/2022	09/03/2022	06/04/2022	04/05/2022	28/06/2022	26/01/2022	09/03/2022	31/03/2022	05/06/2022	31/05/2022	28/06/2022	09/03/2022	31/03/2022	05/06/2022	31/05/2022	28/06/2022				
Sample Received Date		28/01/2022	24/03/2022	08/04/2022	06/05/2022	02/06/2022	30/06/2022	28/01/2022	24/03/2022	08/04/2022	06/05/2022	30/06/2022	28/01/2022	24/03/2022	02/04/2022	07/05/2022	02/06/2022	30/06/2022	24/03/2022	02/04/2022	07/05/2022	02/06/2022	30/06/2022				
Final Instruction Date		28/01/2022	24/03/2022	08/04/2022	06/05/2022	02/06/2022	29/06/2022	28/01/2022	24/03/2022	08/04/2022	06/05/2022	29/06/2022	28/01/2022	24/03/2022	02/04/2022	07/05/2022	02/06/2022	29/06/2022	24/03/2022	02/04/2022	07/05/2022	02/06/2022	29/06/2022				
Report Completed Date		08/02/2022	12/04/2022	21/04/2022	13/05/2022	13/06/2022	10/07/2022	08/02/2022	12/04/2022	21/04/2022	13/05/2022	10/07/2022	08/02/2022	12/04/2022	13/04/2022	19/05/2022	13/06/2022	10/07/2022	12/04/2022	13/04/2022	19/05/2022	13/06/2022	10/07/2022				
SDG		220128-62	220324-96	220408-139	220506-162	220602-51	220630-46	220128-62	220324-96	220408-139	220506-162	220630-46	220128-62	220324-96	220402-53	220507-69	220602-51	220630-46	220324-96	220402-53	220507-69	220602-51	220630-46				
Sample Temperature		4.8	8.4	7.9	12.2	15.0	7.5	4.8	8.4	7.9	12.2	7.5	4.8	8.4	7.3	7.6	15.0	7.5	8.4	7.3	7.6	15.0	7.5				
Analysis	Test	Method	Units	LOD																							
Carbon																											
	Carbon, Organic (diss.flit)	TM090	mg/l	<3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Inorganics																											
	Ammoniacal Nitrogen as N	TM099	mg/l	<0.2	0.466	0.407	0.25	0.247	0.255	0.311	1.19	1.07	1.18	1.08	0.962	<0.2	<0.2	0.436	1.41	1.54	2.26	1.32	2.66	3.13	3.61	4.36	
	Ammoniacal Nitrogen as N (< removed)				0.466	0.407	0.25	0.247	0.255	0.311	1.19	1.07	1.18	1.08	0.962	0.2	0.2	0.436	1.41	1.54	2.26	1.32	2.66	3.13	3.61	4.36	
	pH	TM256	pH Units	<1.00	-	-	-	7.52	7.12	7.04	-	-	-	7.65	7.65	-	-	-	6.86	6.8	6.75	-	-	7.06	7.14	7.53	
	Chloride	TM184	mg/l	<2	26.1	30.4	31.8	30.4	29.2	33.2	32.5	31	37.9	37	37.9	11.7	20.3	18.8	17.8	15.5	14.9	47.6	110	147	170	180	
Filtered (Dissolved) Me																											
	Mercury (diss.flit)	TM183	µg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.01	<0.01	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
	Arsenic (diss.flit)	TM152	µg/l	<0.5	0.954	0.954	0.63	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.576	1.06	7	11.5	7.57	15	21.4	24.1	2.96	4	4.29	4.42	4.73	
	Boron (diss.flit)	TM152	µg/l	<10	51	45.9	55.7	58.6	66.4	71.9	55.7	56.7	61.1	55.2	71	<10	<10	16.7	17.9	27.3	26	95.1	513	575	735	726	
	Cadmium (diss.flit)	TM152	µg/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		
	Chromium (diss.flit)	TM152	µg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5.24	2.43	<1	<1	<1	<1	<1	<1	<1	<1	<1		
	Copper (diss.flit)	TM152	µg/l	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.684	0.928	<0.3	0.577	0.603	0.615	0.326	<0.3	1.02	0.439	0.51		
	Lead (diss.flit)	TM152	µg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.213	0.379	0.332	0.29	0.571	<0.2	<0.2	<0.2	0.337	<0.2	0.356		
	Nickel (diss.flit)	TM152	µg/l	<0.4	0.956	0.948	0.953	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	1.09	1.95	1.83	2.05	2.39	2.93	0.729	0.802	0.858	0.821	1.03		
	Selenium (diss.flit)	TM152	µg/l	<1.0	<1	<1	<1	<1	1.12	1.41	1.2	1.16	1.71	2.03	2.91	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
	Vanadium (diss.flit)	TM152	µg/l	<1.0	<1	<1	<1	<1	<1	<1	1.08	<1	1.07	<1	1.07	<1	<1	<1	<1	<1	<1	1.19	2.17	1.7	1.92	2.49	
	Zinc (diss.flit)	TM152	µg/l	<1.0	1.19	<1	1.17	2.05	<1	2.73	1.27	2.9	<1	2.69	5.63	3.2	2.95	5.05	11.6	5.39	16.4	2.82	2.45	8.12	5.94	2.1	
	Calcium (Dis.Filt)	TM152	mg/l	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Unfiltered (Total) Metal																											
	Mercury (tot.unfilt)	TM183	µg/l	<0.02	<0.02	<0.02	<0.02	<0.02	0.264	<0.02	<0.2	0.0671	<2	<0.02	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.2	<0.02	<0.02	<0.2	<0.02		
	Arsenic (tot.unfilt)	TM152	µg/l	<2	2.28	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	16.2	18.9	15.5	37.9	34.8	26.3	3.84	4.82	5.43	5.39	6.02	
	Boron (tot.unfilt)	TM152	µg/l	<20	52.8	65.9	65.4	77	68.2	80.5	61.3	73	79.6	64.9	69.2	<20	27	<20	<20	<20	31.8	129	460	601	747	878	
	Cadmium (tot.unfilt)	TM152	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.554	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
	Chromium (tot.unfilt)	TM152	µg/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	6.91	6.86	<3	<3	3.39	<3	<3	<3	<3	<3	<3		
	Copper (tot.unfilt)	TM152	µg/l	<1	1.61	1.13	1.55	<1	1.04	<1	<1	<1	<1	<1	1.28	3.83	3.27	4.23	31.2	11.1	2.97	3.05	2.51	13.6	31	4.84	
	Lead (tot.unfilt)	TM152	µg/l	<1	1.56	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.43	2.09	<1	2.72	22.6	6.34	1.53	2.32	<1	4.3	5.24	2.73
	Nickel (tot.unfilt)	TM152	µg/l	<1	9.46	8.25	5.48	2.67	12	6.66	1.04	1.02	2.16	<1	2.36	2.41	2.38	2.33	16.7	5.21	3.61	1.17	<1	2.02	1.65	1.57	
	Selenium (tot.unfilt)	TM152	µg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
	Vanadium (tot.unfilt)	TM152	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5.97	<5	<5	<5	<5	<5	<5	<5		
	Zinc (tot.unfilt)	TM152	µg/l	<5	12.6	20.2	<5	12	10.3	6.73	10.4	39	5.67	<5	18.4	6.8	7.9	12.6	159	47.5	17.5	13	<5	30.6	48.3	17.3	
	Calcium (Tot. Unfilt.)	TM152	mg/l	<0.057	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Hardness, Total as CaCO3 unfiltered	TM152	mg/l	<0.35	343	298	424	512	530	583	365	375	358	410	454	341	355	385	402	388	316	253	324	331	342	373	
TPH Criteria Working G																											
	GRO Surrogate % recovery**	TM245	%		90	80	99	99	105	81	85	88	98	99	80	103	89	99	107	104	70	92	92	105	115	88	
	GRO >C5-C12	TM245	µg/l	<50	<50	56	197	100	201	75	378	342	478	643	640	<50	<50	148	142	170	213	170	134	<50	87	<50	
	Aliphatics >C5-C6	TM245	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
	Aliphatics >C6-C8	TM245	µg/l	<10	<10	10	24	14	25	11	25	21	34	32	40	<10	<10	14	14	27	20	23	21	<10	21	<10	
	Aliphatics >C8-C10	TM245	µg/l	<10	<10	10	40	17	39	13	44	39	60	68	93	<10	<10	25	26	28	31	24	28	<10	16	<10	
	Aliphatics >C10-C12	TM245	µg/l	<10	<10	14	61	31	62	23	163	148	201	294	263	<10	<10	55	50	54	84	60	38	<10	20	<10	
	Aliphatics >C12-C16 (aq)	TM174	µg/l	<10	263	<10	<10	<10	137	52	44	152	241	294	258	381	1850	852	1430	943	1650	194	295	18	43	<10	
	Aliphatics >C16-C21 (aq)	TM174	µg/l	<10	755	<10	<10	34	447	211	267	816	261	2920	717	859	4050	1760	2920	1830	3310	250	399	21	88	47	
	Aliphatics >C21-C35 (aq)	TM174	µg/l	<10	932	<10	<10	65	434	182	205	291	779	81	587	1250	6020	24									

CBH23	CBH23	CBH23	CBH23	CBH23	CBH23	CBH23	CBH23	CBH29	CBH29	CBH43	CBH43	CBH43	CBH46	CBH46	CBH46	CBH46	CBH46	CBH46	CBH52	CBH52	CBH57	CBH57	CBH57	CBH57	CBH57	CBH57	CBH64	CBH64	
0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00		
GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	GROUND_WATER	
26/01/2022	09/03/2022	31/03/2022	05/06/2022	31/05/2022	28/06/2022	06/05/2022	31/05/2022	28/06/2022	06/05/2022	31/05/2022	28/06/2022	06/05/2022	31/03/2022	05/06/2022	31/05/2022	26/01/2022	09/03/2022	26/01/2022	09/03/2022	31/03/2022	05/06/2022	31/05/2022	28/06/2022	26/01/2022	31/03/2022	28/01/2022	31/03/2022		
28/01/2022	24/03/2022	02/04/2022	07/05/2022	30/06/2022	30/06/2022	12/05/2022	02/06/2022	12/05/2022	02/06/2022	12/05/2022	02/06/2022	30/06/2022	28/01/2022	07/05/2022	02/06/2022	28/01/2022	24/03/2022	28/01/2022	24/03/2022	02/04/2022	07/05/2022	02/06/2022	30/06/2022	28/01/2022	02/04/2022	28/01/2022	02/04/2022		
28/01/2022	24/03/2022	02/04/2022	07/05/2022	02/06/2022	29/06/2022	10/05/2022	02/06/2022	29/06/2022	10/05/2022	02/06/2022	29/06/2022	10/05/2022	02/04/2022	07/05/2022	02/06/2022	28/01/2022	24/03/2022	28/01/2022	24/03/2022	02/04/2022	07/05/2022	02/06/2022	29/06/2022	28/01/2022	02/04/2022	28/01/2022	02/04/2022		
08/02/2022	12/04/2022	13/04/2022	19/05/2022	13/06/2022	10/07/2022	19/05/2022	13/06/2022	10/07/2022	19/05/2022	13/06/2022	10/07/2022	19/05/2022	13/04/2022	19/05/2022	13/06/2022	08/02/2022	12/04/2022	08/02/2022	12/04/2022	13/04/2022	19/05/2022	13/06/2022	10/07/2022	08/02/2022	13/04/2022	19/05/2022	13/04/2022		
220128-62	220324-96	220402-53	220507-69	220602-51	220630-46	220512-89	220602-51	220630-46	220512-89	220602-51	220630-46	220512-89	220602-51	220630-46	220128-62	220324-96	220402-53	220507-69	220602-51	220128-62	220324-96	220128-62	220324-96	220402-53	220507-69	220602-51	220630-46	220128-62	220402-53
4.8	8.4	7.3	7.6	15.0	7.5	10.5	15.0	7.5	10.5	15.0	7.5	10.5	15.0	7.5	4.8	8.4	7.3	7.6	15.0	4.8	8.4	4.8	8.4	7.3	7.6	15.0	7.5	4.8	7.3
								47.4				67.9																	
1.35	0.743	3.01	6.47	4.99	6.19	1.89	7.71	9.84	0.367	0.534	2.31	10.2	10.5	12.7	13.5	14.2	0.341	<0.2	<0.2	<0.2	1.46	2.46	2.31	3.7	4.95	5.87			
1.35	0.743	3.01	6.47	4.99	6.19	1.89	7.71	9.84	0.367	0.534	2.31	10.2	10.5	12.7	13.5	14.2	0.341	0.2	0.2	0.2	1.46	2.46	2.31	3.7	4.95	5.87			
-	-	-	6.9	6.88	6.97	7.07	6.89	7.09	7.64	7.43	7.68	-	-	-	7.52	7.63	-	-	-	-	-	6.85	6.98	7.05	-	-	-	-	
22.3	46.6	31.3	27.7	26.4	26.9	22.8	25.3	25.2	32.2	33.2	33.1	92.7	107	100	134	111	20.2	25.8	27	23.3	23	24.6	21.9	24.5	35.7	38.4			
<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.124	<0.01	<0.1	<0.1	0.174	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
6.41	3.85	6.49	6.64	9.53	18.2	38.4	17.3	18	52.7	21.1	5.33	10.3	6.07	7.08	5.32	7.22	1.84	3.13	0.898	1.29	8.9	7.89	6.17	2.97	13.6	7.6			
44.3	41.8	57.7	52.2	57.5	59.2	58.1	104	75.2	59.2	194	488	402	541	162	515	176	616	49	48.2	17.2	<10	16.3	16.8	21	128	142			
<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.351	0.664	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.164	<0.08	0.0888	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		
<1	<1	<1	<1	<1	<1	<1	<1	<1	4.02	1.14	1.57	1.7	4.8	2	2.54	2.72	2.48	3.02	<1	<1	<1	<1	1.34	<1	<1	<1	<1		
0.658	1.42	<0.3	<0.3	<0.3	2.06	<0.3	3.66	2.19	1.21	0.599	0.491	0.312	0.607	0.519	1.02	0.33	1.81	9.57	<0.3	8.61	<0.3	0.503	<0.3	0.553	<1				
0.276	<0.2	<0.2	0.25	<0.2	3.54	<0.2	0.312	0.472	0.805	0.341	0.208	<0.2	0.354	0.747	0.642	<0.2	<0.2	1.54	<0.2	0.557	<0.2	0.21	0.363	<0.2	0.247	<0.2			
1.67	2.57	0.858	0.608	0.568	1.2	0.732	17.8	19.2	11.8	8.03	4.07	8.61	10.8	11.4	8.84	4.21	9.78	11.8	1.08	<0.4	0.684	0.507	3.3	4.14					
<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.18	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
<1	<1	<1	<1	<1	<1	2.01	<1	<1	2.87	3.25	5.05	22	29.3	23.1	26.8	1.08	7.48	<1	<1	1.95	<1	<1	<1	<1	<1	<1	<1		
8.35	18.1	2.11	8.84	6.88	17.5	6.31	80	126	12	6.19	2.27	1.8	3.36	5.45	2.7	3.25	9.33	49.2	1.81	17	8.04	4.9	5.09	4.17	4.88	12.7			
-	-	-	-	-	-	-	-	168	-	-	349	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
<0.02	0.179	0.34	<0.2	0.325	1.33	<0.2	0.299	0.0886	<0.02	0.305	0.0377	<0.2	0.161	<0.02	<0.2	0.267	<0.02	<0.2	<0.02	<0.02	0.0328	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
10.8	12.8	27.7	29.1	37.8	289	500	107	28.7	68.2	35.6	150	10.7	9.61	68.2	11.3	6.92	8.88	4.63	3.07	13.7	9.31	8.04	10.6	33.2	31.4				
44.2	60.7	71.1	74	68	283	87.7	80.3	97.8	193	171	236	534	407	573	577	615	56.5	66.2	<20	20.6	24.4	<20	<20	30.7	130	151			
<0.5	0.652	1.32	1.6	1.82	16.6	2.98	1.13	0.786	<0.5	0.582	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
<3	6.62	15.2	14.3	18.3	155	16.4	3.48	6.51	<3	6.29	<3	12.5	5.66	6.55	3.68	<3	<3	<3	<3	3.25	<3	5.65	<3	<3	<3	<3	<3		
6.65	84.8	179	152	208	2070	117	33.8	6.26	35.4	139	21.4	31.2	43.4	6.94	5.46	7.41	51.6	26.4	<1	13.8	31.3	6.6	<1	1.66	13.9	2.71			
7.45	90.3	229	254	279	2500	95	20.7	9.12	25.1	77	13.5	23.2	40.6	10	10	4.46	31.1	11.1	<1	2.58	17.8	1.16	3.21	27.8	8.33				
2.55	13.5	24.5	26	28.2	265	37.2	17.7	11	13.3	12.4	5.84	18	21.7	11.2	13.9	9.78	4.06	3.29	10.3	3.22	5.28	1.38	1.13	1.45	5.4	5.27			
<1	<1	1.34	1.39	1.59	13.1	1.43	1.2	<1	<1	1.19	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1		
<5	12.5	27.9	33.2	33.1	328	45.6	8.28	<5	6.11	10.7	6.05	54.9	59.8	34.2	39.7	25.3	6.57	<5	<5	<5	7.06	<5	<5	<5	<5	<5	<5		
25.4	160	388	612	479	4540	344	152	133	59.8	134	32.6	74.5	126	29.6	27.1	22.2	100	59.2	<5	29.7	89.3	23.3	6.81	11.5	60.8	26			
-	-	-	-	-	-	-	-	165	-	-	366	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
300	328	384	436	434	638	499	511	519	1190	1030	1090	733	617	612	623	604	431	413	290	156	206	233	224	228	765	917			
88	79	93	106	100	73	76	97	90	83	116	83	100	94	96	101	102	95	85	99	93	96	96	101	88	84	95			
<50	<50	94	192	<50	564	<50	70	<50	<50	<50	<50	1460	832	2050	570	411	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		
<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	84	40	98	<10	46	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
<10	<10	15	21	<10	56	<10	11	<10	<10	<10	<10	165	85	172	56	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
<10	<10	21	35	<10	99	<10	14	<10	<10	<10	<10	97	103	151	<10	70	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
<10	<10	26	66	<10	199	<10	19	<10	<10	<10	<10	267	321	333	158	136	13	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
<10	245	2770	1390	1160	13000	664	273	<10	<10	<10	<10	4070	1690	371	463	259</													

[illegible]

MAX	UK DWS	EQS Freshwater (AA)	EQS Freshwater (MAC)	Calculated 90 percentile	EQS 90 percentile	Permit Emission Limit	MBAT PNEC	No. of EQS Freshwater (AA) Exceedances	No. of EQS Freshwater (MAC) Exceedances	No. of UKDWS Exceedances	No. of Environmental Permit Exceedances	EQS	No. of PNEC exceedances
14.2				6.33	0.3			55				50 %ile exceeds	
7.95													
180	250		300						0	0			
0.174	1		0.07						2	0			
52.7	10	50						1		15			
735	1000									0			
0.684	5	0.08	0.45					4	1	0			
5.78	50									0			
9.57	2000	1					48.59	11		0			0
3.54	10	1.2	14					3	0	0			
19.2	20	4	34				30.47	15	0	0			0
2.91	10							5		0			
29.3		20						5					
126		10.9					73.55	11					2
349													
1.33													
500													
878													
16.6													
155		4.7						21					
2070													
2500													
265													
13.1													
328													
4540													
366													
1190													
116													
2050													
98													
172													
151													
333													
13000													
20600													
47700													
81300													
952													
0													
113													
222													
1840													
7190													
39500													
48500													
130000						5000					15		
14.4		2	130					0	0				
41.6													
2.6													
22.8		0.0063	0.12					47	28				
12.1		0.1	0.1					14	14				
40.6													
39													
17.8													
29.3													
10													
26.1	0.1		0.017						25	25			
7.86	0.1		0.017						21	14			
17.1	0.01	0.00017	0.27					20	11	19			
0.57													
23.5	0.1		0.0082						20	16			
14.5	0.1									8			
199													
9.26													
855	1	10	50					3	3	6			
5.05		74						0					
4.01													
5.4													
3.1													
8.33													
855													
68300													

[illegible]

[illegible]

Coed Darcy 2022: January-June Surface Water Data

Customer Sample ID					SW1	SW1	SW1	SW1	SW1	SW1	SW2	SW2	SW2	SW2	SW2	SW2	SW3	SW3	SW3	SW3	SW3	SW3	SW4	SW4	SW4	SW4				
Depth					0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00	0.00-0.00				
Sample Type					FACE_WATER	FACE_WATER	FACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER	SURFACE_WATER				
Sampled Date					26/01/2022	01/03/2022	06/04/2022	04/05/2022	31/05/2022	28/06/2022	26/01/2022	01/03/2022	06/04/2022	04/05/2022	31/05/2022	28/06/2022	26/01/2022	01/03/2022	06/04/2022	04/05/2022	31/05/2022	28/06/2022	26/01/2022	01/03/2022	06/04/2022	04/05/2022				
Sample Received Date					27/01/2022	03/03/2022	08/04/2022	06/05/2022	02/06/2022	30/06/2022	27/01/2022	03/03/2022	08/04/2022	06/05/2022	02/06/2022	30/06/2022	27/01/2022	03/03/2022	08/04/2022	06/05/2022	02/06/2022	30/06/2022	27/01/2022	03/03/2022	08/04/2022	06/05/2022				
Final Instruction Date					27/01/2022	03/03/2022	08/04/2022	06/05/2022	02/06/2022	29/06/2022	27/01/2022	03/03/2022	08/04/2022	06/05/2022	02/06/2022	29/06/2022	27/01/2022	03/03/2022	08/04/2022	06/05/2022	02/06/2022	29/06/2022	27/01/2022	03/03/2022	08/04/2022	06/05/2022				
Report Completed Date					07/02/2022	11/03/2022	21/04/2022	13/05/2022	12/06/2022	10/07/2022	07/02/2022	11/03/2022	21/04/2022	13/05/2022	13/06/2022	10/07/2022	07/02/2022	11/03/2022	21/04/2022	13/05/2022	13/06/2022	10/07/2022	07/02/2022	11/03/2022	21/04/2022	13/05/2022				
SDG					220127-148	220303-48	220408-140	220506-162	220602-51	220630-46	220127-148	220303-48	220408-140	220506-162	220602-51	220630-46	220127-148	220303-48	220408-140	220506-162	220602-51	220630-46	220127-148	220303-48	220408-140	220506-162				
Sample Temperature					5.3	8.4	7.9	12.2	15.0	7.5	5.3	8.4	7.9	12.2	15.0	7.5	5.3	8.4	7.9	12.2	15.0	7.5	5.3	8.4	7.9	12.2				
Analysis	Test	Method	Units	LOD																										
Carbon																														
	Carbon, Organic (diss.filt)	TM090	mg/l	<3	-	-	-	-	-	-	33.3	12.8	32.3	25.4	25.7	29.3	-	-	-	-	-	-	-	-	-	-				
Inorganics																														
	Ammoniacal Nitrogen as N	TM099	mg/l	<0.2	3.62	0.708	1.79	0.775	0.875	1.24	<0.2	0.533	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.736	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				
	Ammoniacal Nitrogen as N (< removed)		mg/l		3.62	0.708	1.79	0.775	0.875	1.24	0.2	0.533	0.2	0.2	0.2	0.2	0.2	0.2	0.736	0.2	0.2	0.2	0.2	0.2	0.2	0.2				
	pH	TM256	pH Units	<1.00	-	-	-	7.59	7.06	7.34	-	-	-	7.74	7.28	7.48	7.48	0.2	0.2	-	8.08	7.53	7.64	-	-	-	8.29			
	Chloride	TM184	mg/l	<2	25.8	21.7	25.6	24.3	15.8	18.4	20.2	22.9	24.4	23.1	16.2	15.3	18.3	25	22.9	23.2	20.7	19.1	17.7	19.8	21.3	22				
Filtered (Dissolved) Me																														
	Mercury (diss.filt)	TM183	µg/l	<0.01	<0.01	<0.01	<0.01	<0.1	0.16	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
	Arsenic (diss.filt)	TM152	µg/l	<0.5	0.788	<0.5	0.546	0.752	0.85	1.47	<0.5	<0.5	<0.5	0.697	0.531	0.612	0.613	-	0.88	0.871	1.01	1.13	0.765	0.851	1.17	1.26				
	Boron (diss.filt)	TM152	µg/l	<10	155	56.1	180	176	192	189	37.1	45	66.8	80.7	82.6	105	32.4	-	59.5	47.4	56.9	69.3	52.7	46.7	59.3	51.9				
	Cadmium (diss.filt)	TM152	µg/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08				
	Chromium (diss.filt)	TM152	µg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1				
	Copper (diss.filt)	TM152	µg/l	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	1.51	-	0.943	<0.3	<0.3	1.83	1.23	1.71	0.83	1.08				
	Lead (diss.filt)	TM152	µg/l	<0.2	<0.2	<0.2	<0.2	0.229	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	0.26	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				
	Nickel (diss.filt)	TM152	µg/l	<0.4	<0.4	<0.4	<0.4	0.514	0.553	0.553	<0.4	<0.4	<0.4	0.539	<0.4	0.489	0.594	-	0.749	0.708	0.511	0.774	1.25	1.24	1.01	1.03				
	Selenium (diss.filt)	TM152	µg/l	<1.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1				
	Vanadium (diss.filt)	TM152	µg/l	<1.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1				
	Zinc (diss.filt)	TM152	µg/l	<1.0	7.87	10.9	4.65	5.27	2.5	11.1	7.54	7.73	3.3	1.84	3.33	9.84	4.85	-	8.42	4.48	2.51	10.5	2.72	2.9	1.98	20.2				
		Calcium (Dis.Filt)	TM152	mg/l	<0.2	-	-	-	-	-	-	66.9	42.1	71.1	82.6	76.9	74	-	-	-	-	-	-	-	-	-	-			
	Unfiltered (Total) Metal																													
		Mercury (tot.unfilt)	TM183	µg/l	<0.02	<0.2	<0.02	0.0213	<0.2	0.277	<0.2	<0.02	<0.02	0.0233	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			
Arsenic (tot.unfilt)		TM152	µg/l	<2	2.03	<2	3.54	3.14	9.22	16.4	<2	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	<2	<2				
Boron (tot.unfilt)		TM152	µg/l	<20	173	50.8	190	191	180	214	43.9	37.6	79.2	56	87.3	109	42.2	-	52.2	50.2	70.4	72.9	76.3	46.7	55.5	54.2				
Cadmium (tot.unfilt)		TM152	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	0.589	0.675	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				
Chromium (tot.unfilt)		TM152	µg/l	<3	<3	<3	3.26	<3	6.88	9.76	<3	<3	<3	<3	<3	<3	<3	-	<3	<3	<3	<3	<3	<3	<3	<3				
Copper (tot.unfilt)		TM152	µg/l	<1	2.86	1.39	5.96	2.92	13.2	20.2	1.27	1.68	<1	<1	<1	1.89	2.74	-	1.19	<1	<1	<1	2.99	5.02	1.9	<1				
Lead (tot.unfilt)		TM152	µg/l	<1	5.73	3.13	19.8	11.5	41.1	50.6	<1	<1	<1	<1	<1	3.51	<1	-	1.01	<1	1.93	<1	<1	6.51	1.19	1.34				
Nickel (tot.unfilt)		TM152	µg/l	<1	1.19	<1	3.01	2.33	4.65	8.51	<1	<1	1.68	<1	<1	1.13	1.37	-	<1	<1	1.32	1.14	1.82	2.97	<1	1.59				
Selenium (tot.unfilt)		TM152	µg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1				
Vanadium (tot.unfilt)		TM152	µg/l	<5	<5	<5	<5	<5	9.22	20.3	<5	<5																		

[illegible]

INPUT DATA										RESULTS (Copper)					RESULTS (Zinc)					RESULTS (Mn)			RESULTS (Ni)				
ID	Location	Waterbody	Date	Measured Cu Concentration (dissolved) (µg l ⁻¹)	Measured Zn Concentration (dissolved) (µg l ⁻¹)	Measured Mn Concentration (dissolved) (µg l ⁻¹)	Measured Ni Concentration (dissolved) (µg l ⁻¹)	pH	DOC	Ca	Site-specific PNEC Dissolved Copper (µg l ⁻¹)	BioEff	Bioavailable Copper Concentration (µg l ⁻¹)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Zinc (µg l ⁻¹)	BioEff	Bioavailable Zinc Concentration (µg l ⁻¹)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Manganese (µg l ⁻¹)	BioEff	Bioavailable Manganese Concentration (µg l ⁻¹)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Nickel (µg l ⁻¹)	BioEff	Bioavailable Nickel Concentration (µg l ⁻¹)	Risk Characterisation Ratio	
1 SWQ		Crynmyln Bog	44587	0.3	7.54		0.4	7.6	33.3	66.9	51.32	0.02	0.01	0.01	77.80	0.14	1.06	0.10	265.90	0.46			31.09	0.13	0.05	0.01	
2 SWQ		Crynmyln Bog	44621	0.3	7.73		0.4	7.6	12.8	42.1	51.03	0.02	0.01	0.01	53.63	0.20	1.57	0.14	265.90	0.46			20.43	0.20	0.08	0.02	
3 SWQ		Crynmyln Bog	44657	0.3	3.3		0.4	7.6	32.3	71.1	51.13	0.02	0.01	0.01	77.39	0.14	0.46	0.04	476.25	0.28			32.11	0.12	0.05	0.01	
4 SWQ		Crynmyln Bog	44685	0.3	1.84		0.530	7.74	25.4	82.6	50.65	0.03	0.01	0.01	80.95	0.13	0.25	0.03	363.15	0.34			23.82	0.12	0.07	0.02	
5 SWQ		Crynmyln Bog	44712	0.3	3.33		0.4	7.28	25.7	76.9	60.61	0.02	0.00	0.00	66.47	0.16	0.55	0.05	884.87	0.14			37.56	0.11	0.04	0.02	
6 SWQ		Crynmyln Bog	44740	0.3	9.84		0.489	7.48	29.3	74	57.18	0.02	0.01	0.01	73.24	0.15	1.46	0.13	600.80	0.20			34.50	0.12	0.06	0.01	
7 SWQ		Crynmyln Bog	44775	0.5	4.8		0.5	7.5	89	85	56.59	0.02	0.01	0.01	72.90	0.15	0.69	0.06	577.98	0.21			37.26	0.11	0.05	0.01	
8 SWQ		Crynmyln Bog	44845	0.5	4.3		0.5	7.9	22	50	31.79	0.03	0.02	0.02	89.14	0.12	0.53	0.05	144.53	0.85			23.59	0.17	0.08	0.02	
9 SWQ		Crynmyln Bog	44881	0.5	3.7		0.5	7.6	15	47	52.74	0.02	0.01	0.01	61.23	0.13	0.66	0.06	265.90	0.46			22.99	0.17	0.09	0.02	
10 SWQ		Crynmyln Bog	44902	0.5	5.1		0.5	7.8	22	85	33.78	0.03	0.01	0.01	62.73	0.15	0.67	0.06	323.36	0.38			32.35	0.12	0.06	0.02	



Appendix E Landfill Gas Monitoring Data

2022 Gas Data

Stable CH4 outside Tip

	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Min	Max	Average
MSMW155D	0	0.1	0.1	0	0	0	0	0.5	0.5	0.2	0.1	0.1	0	0.5	0.13
MSMW155S	0.5	0.9	0.1	0	0	0	0.1	0.5	0.6	0.2	0.2	0.2	0	0.9	0.28
MSMW91	0	0	0.2	0	0	0	0	0.3	0.5	0.7	0.1	0.2	0	0.7	0.17
Atmospheric Pressure (bar)	1034	1004	1009	1018	1020	1010	1021	1016	1005	1007	1002	1011	1002	1034	1013

Stable CH4 within Tip

	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Min	Max	Average
CARW008	0	0	0.1	0	0	0.4	0.2	0.8	0.5	0.7	0.1	0.2	0	0.8	0.25
CARW009	0.1	0.9	0.1	0.3	0	0.6	0.4	0.6	0.7	1.2	0.1	0.3	0	1.2	0.44
CBH51	0	12.8	0.2	0.1	0.8	0.9	0.1	0.6	6.6	7.2	2.7	3.3	0	12.8	2.94
CBH52	3.2	0.1	0	0.1	1.5	0.5	4.5	0.5	5.9	6.3	8.9	9.3	0	9.3	3.40
CBH20	52.7	0.1	22.3	38.1	17.8	6.4	33.4	17.6	28.5	25.6	24.3	23.6	0.1	52.7	24.20
MSMW231	10.6	7.9	4.1	1	5.8	6.1	1.2	9.9	12.7	11.8	5.9	5.4	1	12.7	6.87
CBH57	6.4	0.8	0.1	4.9	0	0.5	7.6	0.6	7.6	6.2	10.8	11.7	0	11.7	4.77
CBH32	1.3	0.6	3.2	0.3	0	0.6	0.2	0.5	6.2	5.7	5.1	6.4	0	6.4	2.51
CBH23	0.1	0.1	1.7	0.1	0	0.5	0.4	0.5	11.3	11.2	0.2	0.3	0	11.3	2.20
CBH49	0.5	0.9	0.1	0.1	0.3	0.6	0.2	0.7	0.4	0.5	1.6	1.9	0.1	1.9	0.65
Atmospheric Pressure (bar)	1034	1004	1008	1021	1019	1010	1021	1014	1005	1006	1004	1012	1004	1034	1013

Stable CO2 outside Tip

	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Min	Max
MSMW155D	0.1	0.2	0.1	0	0	0.1	0.1	0.1	0.2	0.1	1.2	1.3	0	1.3
MSMW155S	0.6	0.3	0.1	0	0.4	0.1	1	0.1	0.1	0.1	0.2	0.1	0	1
MSMW91	0.6	5.4	3.7	6.2	4.9	0.4	8.38	0.9	2.4	1.8	3.8	3.3	0.4	8.38
Atmospheric Pressure (bar)	1034	1004	1009	1018	1020	1010	1021	1016	1005	1007	1002	1011	1002	1034

Stable CO2 within Tip

	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Min	Max
CARW008	0.4	2.1	0.1	0	0	0.1	0.4	0.2	0.4	1.2	1.4	1.5	0	2.1
CARW009	0.1	2.2	1.5	1	0	0.1	0.3	0.2	0.2	0.3	0.1	0.1	0	2.2
CBH51	0.1	6.2	0.6	0.1	0.4	0.7	0.1	0.2	6.4	5.6	2.6	1.9	0.1	6.4
CBH52	0.9	0.4	0.3	0.4	1.3	1	2.6	1.3	3.6	3.2	2.5	2.3	0.3	3.6
CBH20	7.9	0.1	7.2	4.3	6.9	2.4	5.3	8.5	9.3	8.5	7.6	8.2	0.1	9.3
MSMW231	4.9	3.7	2.4	1.1	3.8	4.6	0.3	6	6.7	6.8	3.8	5.1	0.3	6.8
CBH57	5.4	1.1	0.7	3.9	0	0.1	6.3	0.1	7	5.4	7.2	7.6	0	7.6
CBH32	4.1	1.3	8.3	2.3	0	0.1	0.2	0.1	1.4	1.1	9.6	10.1	0	10.1
CBH23	2.4	0.7	2.8	0.3	0	0	0.3	0.1	7.6	8.2	2.9	3.1	0	8.2
CBH49	0.2	0.2	0.1	0.1	0.1	0.4	0.1	0.4	0.1	0.2	0.1	0.1	0.1	0.4
Atmospheric Pressure (bar)	1034	1004	1008	1021	1019	1010	1021	1014	1005	1006	1004	1012	1004	1034

Stable O2 Outside Tip

	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Min	Max
MSMW155D	21.8	22	22.2	20.8	20.5	23.4	0.6	20.6	21.2	18.9	19.7	18.1	0.6	23.4
MSMW155S	20.3	21.1	22.1	20.8	20.1	21.2	0.6	20.6	21.4	20.3	20.4	19.5	0.6	22.1
MSMW91	20.7	8	14.6	6.7	13.1	20.5	0.8	19.6	18.1	16.4	9.6	8.2	0.8	20.7
Atmospheric Pressure (bar)	1034	1004	1009	1018	1020	1010	1021	1016	1005	1007	1002	1011	1002	1034

Stable O2 Within Tip

	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Min	Max
CARW008	21.4	19.9	22.2	21.4	20	22.1	20.4	20.4	21.3	19.8	20.9	19.3	19.3	22.2
CARW009	21.8	20.1	20.6	20.8	20	21.3	21.2	20.5	21.6	22.3	18.9	16.2	16.2	22.3
CBH51	20.6	9.6	19.7	20.1	19.3	19.2	20.1	20.5	8.8	9.1	16.8	14.6	8.8	20.6
CBH52	19.2	20.3	20.6	20.1	18.1	18.4	16.9	18.8	14.2	11.4	15.6	18.1	11.4	20.6
CBH20	0.1	20.6	0.9	1.2	0.2	13.4	10.2	0.7	0.2	0.1	0.1	0.5	0.1	20.6
MSMW231	14	15.8	18.3	19.7	14.4	13.8	20.9	10.7	10.7	10.2	15.5	16.1	10.2	20.9
CBH57	9.9	18.3	20.3	5.8	21.1	20.6	19.1	20.7	5.6	5.5	0.1	0.3	0.1	21.1
CBH32	15.5	20.1	7.4	19.6	22.1	21.1	20.5	21	0.1	0.1	4.2	3.2	0.1	22.1
CBH23	17.8	18.1	13.6	20.4	21	21.2	21.8	21	2.1	3.4	9.8	13.8	2.1	21.8
CBH49	21.8	21	20.7	20.6	20.2	19.4	20.1	22.1	21.8	15.3	12.3	13.6	12.3	22.1
Atmospheric Pressure (bar)	1034	1004	1008	1021	1019	1010	1021	1014	1005	1006	1004	1012	1004	1034