JNP GROUP
CONSULTING ENGINEERS

TECHNICAL NOTE

Job name: KMCPRP-139-010-049 A629 Halifax Road

Job No: S12427

Note No: S12427-JNP-XX-XX-TN-G-1009 P01

Date: 18/12/2024

Prepared by: Louis Keane

Subject: Area D – Ainley Top – Rotary Drilling

1. Introduction

1.1 At the request of Kirklees Council, JNP Group has undertaken an intrusive investigation at Area D – Ainley Top. It was requested that two replacement boreholes were to be completed with gas and groundwater monitoring installations in the area of BH005, previously completed by Leeds City Council in Ground Investigation Report. Scheme Ref: 446367, Revision 1, dated December 2021.

1.2 The site is located at the roundabout junction on the A629 Halifax Road between the A629, the A643 and Blackley New Road, approximately 0.25km south-east of Junction 24 of the M62. The centre of the site is located at National Grid Reference: 411571, 419126. The site boundary includes the A629 to the east, a field, and then residential properties on Yew Tree Road to the south, fields to the west and the Ainley Top roundabout and Blackley New Road to the north.

1.3 Alterations are planned to the highway junction on the A629 Halifax Road between the A629 and Blackley New Road, as shown in the GA Plan (TF5/Area D/GA-1, dated 06/21). These include creating a link road between the A629 and Blackley New Road to connect the two without needing to navigate the roundabout. The resulting highway will be:

- To the west of the existing A629 in the southeast. This will require the construction of a retaining wall, slopes, and associated drainage including an attenuation tank; and
- To the south of Blackley New Road in the north of the site. This will require the road to be in a cutting at the western end of the site.

1.4 In preparing this technical note summary, JNP Group has reviewed the following reports:

- Leeds City Council Geotechnical Section. Ainley Top Highways Improvements, A629, Halifax Road, Huddersfield. Phase 1 Desk Study Report. Scheme Ref: 446367 Revision 1, November 2021.
- Leeds City Council Geotechnical Section. Ainley Top Highways Improvements, Huddersfield. Ground Investigation Report. Scheme Ref: 446367, Revision1, December 2021.
- Consultation Response from: KC Environmental Health. Responding Ref: WK/202122840. 27 October 2021.

1.5 This report should be read in conjunction with the following:

- S12427-JNP-XX-XX-TN-G-1003– Summary of Existing Ground Conditions and Ground

Investigation – Area D (Ainley Top), dated 25th June 2024.

2. Site works

2.1 The intrusive site work was undertaken by JNP Group on the 24 and 25 October 2024 and comprised one dynamic sampling borehole, and one rotary borehole to depths of 2.5 and 20.5m bgl, respectively. Three return gas and groundwater level monitoring visits were undertaken during a period from 12 September and 05 December 2024.

2.2 Photographs of the site are included within Appendix A.

2.3 All site work was completed under the instruction and supervision of JNP Group with the ground investigation procedures and sample descriptions given in the following publications:

- BS 5930 (2015).Code of Practice for Site Investigations;
- BS 10175 (2001+A1:2013+A2:2017). Investigation of potentially contaminated sites - code of practice;
- BS EN ISO 14688-1. "Soil - Identification and Description;
- BS EN ISO 14688-2. Soil - Classification principles and quantification of descriptive characteristics;
- BS EN ISO 14689. Rock - Identification and description;
- BS 18400-104:2018. Soil Quality – Sampling. Part 104: Strategies;
- BS 18400-202:2018. Soil Quality – Sampling. Part 202: Preliminary Investigations;
- BS 18400-203: 2018. Soil Quality – Sampling. Part 203: Investigation of potentially contaminated sites;
- BS 18400-205: 2018. Soil Quality – Sampling. Part 205: Guidance on the procedure for investigation of natural, near natural and cultivated sites;

2.4 The design and installation of groundwater quality monitoring points has been undertaken following the guidance given in the Environment Agency science report:

- SC020093. Guidance on the design and installation of groundwater quality monitoring points. 2006.

2.5 The locations of the exploratory holes are shown on JNP Group Drawing No. S12427-JNP-XX-XX-DR-G-7001 Area D – Ainley Top Exploratory Hole Location Plan, dated October 2024 in Appendix B. The exploratory hole records including strata and groundwater encountered, in-situ testing and samples taken are presented in Appendix C. The full details of the site work undertaken are summarised in the following sections.

Table 2.1 Exploratory Hole Location Rationale

Exploratory Hole Reference	Rationale
BH005R(D)	To install replacement monitoring well with a response zone of between 2.5 – 10.0 m begl.
BH005R(S)	To install replacement monitoring well with a response zone of between 1.0 - 2.5 m begl.

Dynamic Sampling Boreholes

2.6 One dynamic sampling borehole, designated BH005R(S) was formed on 25th October 2024, to a depth of 2.5 m below ground level (begl).

2.7 The dynamic sampling technique uses a lightweight tracked rig to advance a borehole by 1 m intervals using 1 m long steel sampler tubes, at diameters of 100 mm, reducing to 70 mm. The soils are then recovered from each sample tube as continuous core samples, which are logged on site. In situ Standard Penetration Tests (SPTs) were undertaken in accordance with BS 5930 (2015) at 1.0 m depth intervals in the boreholes in order to obtain in situ strength or relative density parameters for geotechnical design.

2.8 All exploratory boreholes commenced with hand excavated trial pits to depths of 1.20 m begl to mitigate risks of encountering existing underground utilities.

2.9 The borehole was completed with 50 mm gas monitoring standpipe installations, with flush fitting steel covers set in concrete at ground level. Response zones within the installations were installed between depths of 1.0 m begl to 2.5 m begl in order to target the underlying shallow strata.

Rotary Boreholes

2.10 One borehole (BH005R(D)) was formed by rotary drilling techniques, using water as a flushing medium to a maximum depth of 20.5 m begl during the period 24th and 25th October 2024. Dynamic Sampling drilling techniques were used to advance the borehole through the soils to a depth of 2.50 m begl; below which the hole was advanced by rotary coring techniques to a depth of 20.5 m begl.

2.11 A 50 mm diameter monitoring standpipe was installed to the base of the drillhole, with the response zone from 2.50 - 10.0 m begl. Inert filter gravel was placed as the response zone, with a bentonite seal placed from 2.50 m begl to ground level. A flush fitting steel cover was set in concrete at ground level.

Monitoring

2.12 Monitoring of the installed standpipes was undertaken after the completion of the site work. Three gas and groundwater level monitoring visits were undertaken during a period from 12 September and 05 December 2024.

3. Ground and Groundwater Conditions

Strata Encountered

3.1 The ground conditions encountered during the intrusive investigation were generally consistent with the published geological map and the findings of previous investigations by Leeds City Council

Geotechnical Section. Topsoil and made ground were found to be underlain by both granular and cohesive strata of the Pennine Lower Coal Measures Formation. This in turn was underlain by a very weak grey sandstone and mudstone, becoming weak, darker grey mudstone.

3.2 A summary of the stratigraphy encountered during the investigation is presented in the following table and described in the following sections, but for full details and descriptions, reference should be made to the exploratory hole records presented in Appendix C.

Table 3.2 Stratigraphy Encountered

Stratum	Depth to Top (m begl)	Depth to Base (m begl)	Thickness (m)
Topsoil and Made ground All exploratory holes	Ground level	1.60 – 1.70	1.60 – 1.70
Pennine Lower Coal Measures Formation All exploratory holes	1.60 – 1.70	Not proven	Not proven

Topsoil and Made Ground

3.3 Grass overlying firm, sandy, slightly gravelly clay topsoil was encountered in both exploratory holes to depths between 0.20 m begl and 0.25 m begl. The gravel consisted of fine to coarse, angular sandstone and concrete. Frequent rootlets were present throughout.

3.4 Made ground consisting of soft to firm, mottled grey, orange, brown, sandy, gravelly clay. The gravel fraction consists of fine to coarse, angular sandstone, concrete and rare fine coal.

3.5 The made ground was encountered to depths of 1.60 m begl in BH005R(D) and 1.70 m begl in BH005R(S).

Pennine Lower Coal Measures Formation

3.6 Strata of the Pennine Lower Coal Measures Formation were encountered directly beneath the made ground in both exploratory holes. Weathered mudstone recovered as light brownish grey sandy clay, becoming more cohesive to depths of 2.50 m begl. Light grey mudstone and sandstone was encountered between 3.00 m begl, extending to a depth of 4.60 m begl. This is underlain by weak, lightish grey heavily fractured mudstone to a final depth of 20.5 m begl.

Groundwater

3.7 Groundwater was encountered in BH005R(S) at a depth of 2.0 m begl during the investigation. Monitoring is ongoing and the groundwater levels will be confirmed in a later revision of this report following the completion of the monitoring period.

4. Gas Monitoring

4.1 Three rounds of gas monitoring have been undertaken by JNP Group between 12 September 2024 and 05 December 2024. The raw and collated results of the ground gas monitoring undertaken are presented in Appendix D.

4.2 Monitoring involved the measurement of the ground gas composition at each of the installations for methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) concentrations, together with atmospheric pressure, downhole pressure and flow rates, using a Gas Data GFM430 / Geotech GA5000 gas meter. After the measurement of gas concentrations, the depth to any groundwater within the standpipe was recorded.

4.3 One round of the monitoring visits was undertaken during a period of low and falling atmospheric pressure.

4.4 On two occasions, BH03 could not be located.

4.5 Methane concentrations above 1% were not recorded.

4.6 Carbon dioxide concentrations above 5% were not recorded.

4.7 Elevated flow rates above 70 l hr were not recorded; the highest flow rate of 38.9 l / hr was recorded in BH005R(S), on the 5 December 2024.

4.8 Given the small dataset (three visits) gas screening values have been calculated using maximum gas concentrations and worst-case flow rates.

Table 4.3 Calculated Gas Screening Values

Location	Maximum / Average CH_4 Concentration (% v/v)	Maximum / Average CO_2 Concentration (% v/v)	Maximum/ Average O_2 concentration (% v/v)	Maximum / Selected Flow Rate (l/hr)	GSV (l/hr)	Comments / Justification
BH005R(D)	0	1.20	20.5	0	0.0001	Low risk
BH005R(S)	0	1.40	20.9	38.9	0.545	Equivalent to CS2
BH03	0	1.70	17.3	0	0.0002	Low risk Potentially low oxygen levels should be considered for any below ground works

5. Conclusions

5.1 Topsoil and made ground were found to be underlain by both granular and cohesive strata of the Pennine Lower Coal Measures Formation. This in turn was underlain by a very weak grey sandstone and mudstone, becoming weak, darker grey mudstone.

5.2 Groundwater was encountered in BH005R(S) at a depth of 2.0 m bgl.

5.3 Response zones have been installed within the BH005R(D) and BH005R(S) at depths between 1.00 – 2.50 m begl and 2.50 – 10.00 m begl respectively. Monitoring of the boreholes are ongoing and groundwater levels and ground gas concentrations will be confirmed in a following revision of this report.

Document Issue Record

Technical Note No	Rev	Date	Prepared	Reviewed	Approved
TN-G-1009	-	November 2024	LK	JP	HI
	P01	December 2024	BR	SLL	JP

List of Appendices

Appendix A

Photo Document

Photograph 1: Rotary drilling rig set up on BH005R(D).

Photograph 2: Arisings from BH005R(D) between 2.50 – 16.00 m begl.

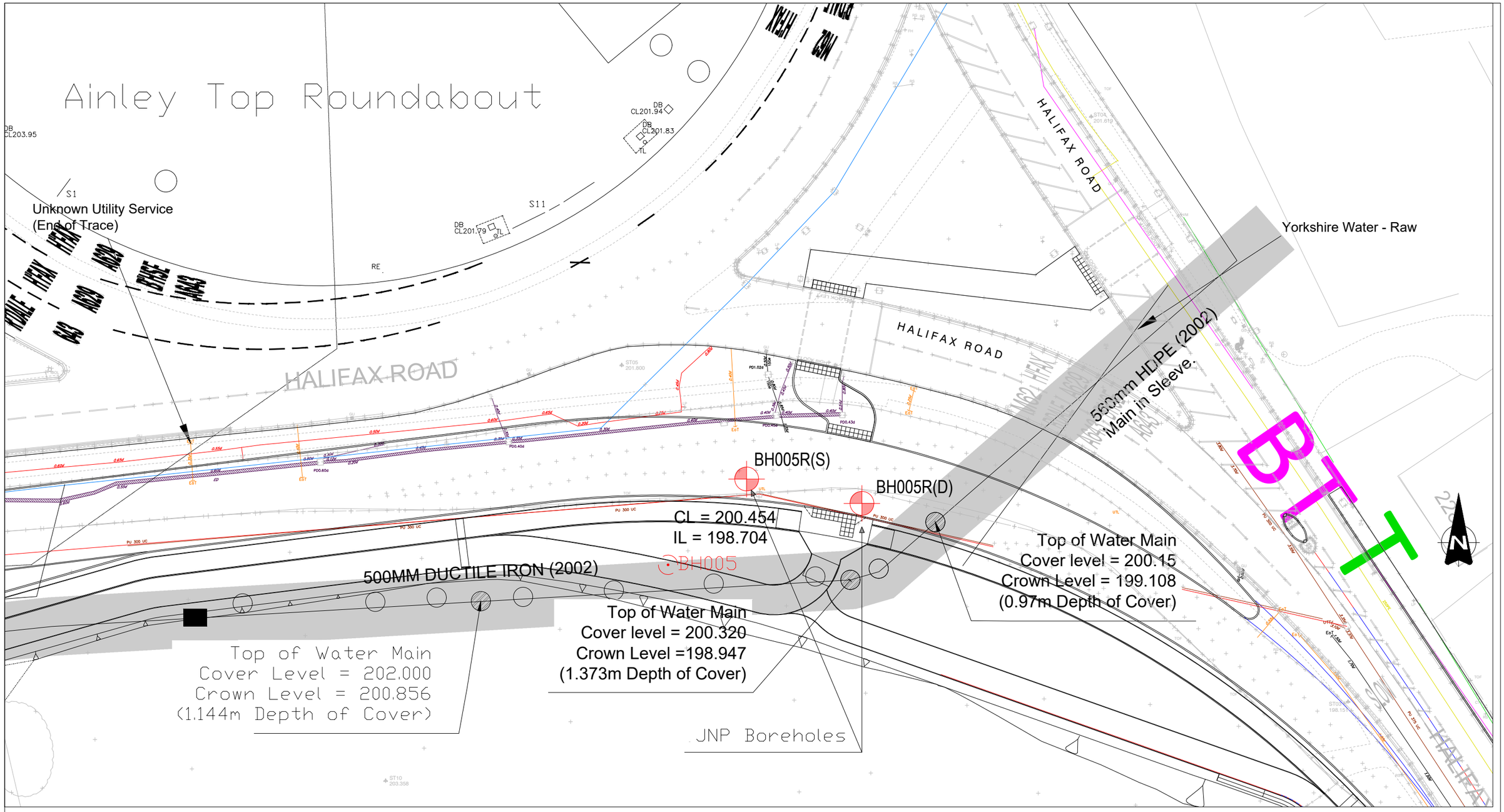
Photograph 3: Arisings from BH005R(D) between 16.00 – 20.50 m begl.

Photograph 4: Arisings from the hand pit of BH005R(S) to 1.20 m begl.

Photograph 5: Arisings from BH005R(S) between 1.00 – 2.50 m begl.

Appendix B

Exploratory Hole Location Plan



Kirklees COUNCIL

Rev.	Date	Description	Drn / Chk'd / App'd
	29/10/2024	First Issue	LK/JP/HI

Suitability:

S2 - Suitable for Information

Client:

Kirklees Council

Job:

KMCPRP-139-010-049 A629 Halifax Road

Title:

Area D - Ainley Top Exploratory Hole Location Plan

Classification:

FI_60_20

Scale @ A3:

As Shown

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● Amersham ● Brighouse ● Bristol ● Glasgow
● Hartlepool ● Sheffield ● Warwick

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Project - Originator - Volume/System - Level/Location - Type - Discipline - Number

S12427-JNP-XX-XX-DR-G-7001

Document/Drawing Number

Revision:

-

JNP Group Internal Project Number: X01234

Appendix C

Exploratory Hole Records

Borehole Log

Borehole No. **BH005R(S)**

Sheet 1 of 1

Project Name:	KMCPRP-139-010-049 A629 Halifax Road	Project No. S12427	Co-ords:	411601.00 - 419141.00	Hole Type WS
Location:	Huddersfield		Level:	200.81	Scale 1:25
Client:	Kirklees Council		Dates:	25/10/2024 - 25/10/2024	Logged By LK

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25	200.56		Grass overlying firm, dark brown, sandy, gravelly, CLAY. Gravel consists of fine to coarse, angular concrete and sandstone. TOPSOIL
		1.20		N=10 (1,1/2,2,3,3)				Soft, mottled orange, grey, sandy, gravelly CLAY. Gravel consists of fine to corase, angular sandstone and concrete with rare fine coal. MADE GROUND
					1.70	199.11		Weathered mudstone, recovered as light brownish grey, sandy CLAY. PENNINE LOWER COAL MEASURES FORMATION
		2.00		N=34 (12,13/10,8,7,9)				
					2.20	198.61		Weathered mudstone, recovered as slightly brownish grey, CLAY. PENNINE LOWER COAL MEASURES FORMATION
		2.50		N=50 (25 for 75mm/50 for 150mm)	2.50	198.31		End of borehole at 2.50 m

Remarks

Borehole drilled for replacement gas and groundwater monitoring well to be installed. Response zone installed between 1.0 - 2.5 m bgl.

Rotary Core Log

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Borehole No.
BH005R(D)
Sheet 1 of 3

Project Name:	KMCPRP-139-010-049 A629 Halifax Road	Project No. S12427	Co-ords:	411613.00 - 419141.00	Hole Type RC
Location:	Huddersfield		Level:	200.81	Scale 1:50
Client:	Kirklees Council		Dates:	24/10/2024 - 25/10/2024	Logged By LK

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							0.20	200.61		Grass overlying firm, sandy, slightly gravelly CLAY topsoil. Gravel is fine and angular sandstone. Frequent rootlets present. TOPSOIL
										Firm, mottled grey, orangey brown, rarely cobbly CLAY. Cobbles are sandstone and concrete. MADE GROUND
							1.60	199.21		Very soft, greyish orange, brown, sandy, silty CLAY. PENNINE LOWER COAL MEASURES FORMATION
							2.20	198.61		Dense, orangey brown, clayey, slightly gravelly SAND. Gravel is fine, weathered sandstone. PENNINE LOWER COAL MEASURES FORMATION
							2.50	198.31		
		2.50 - 4.00		53	33	7	3.00	197.81		Dense, orange, grey, GRAVEL. Gravel is fine to coarse, angular to sub-angular, weathered sandstone and mudstone. PENNINE LOWER COAL MEASURES FORMATION
							3.30	197.51		
							3.50	197.31		Very weak, grey mudstone with iron staining present. PENNINE LOWER COAL MEASURES FORMATION
		4.00 - 5.50		100	59	37	4.00	196.81		Loose, grey clayey GRAVEL. Gravel is weathered mudstone. PENNINE LOWER COAL MEASURES FORMATION
							4.60	196.21		Very weak, grey MUDSTONE. PENNINE LOWER COAL MEASURES FORMATION
		5.50 - 7.00		63	31	7				Thinly laminated, light and dark grey weak SANDSTONE. PENNINE LOWER COAL MEASURES FORMATION
		7.00 - 8.50		100	33	23				Weak, lightish grey, heavily fractured MUDSTONE. PENNINE LOWER COAL MEASURES FORMATION
		8.50 - 10.00		100	19	0				

Continued on next sheet

Remarks
Borehole drilled for replacement gas and groundwater monitoring well to be installed. Commenced with window sampling to a depth of 2.5 m bgl. Followed on with cored rotary drilling techniques. Response zone installed between 2.5 - 10.0 m bgl.

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Rotary Core Log

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Borehole No.
BH005R(D)
Sheet 2 of 3

Project Name: KMCPRP-139-010-049 A629 Halifax Road	Project No. S12427	Co-ords: 411613.00 - 419141.00	Hole Type RC
Location: Huddersfield		Level: 200.81	Scale 1:50
Client: Kirklees Council		Dates: 24/10/2024 - 25/10/2024	Logged By LK

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		10.00 - 11.50		100	40	9				
		11.50 - 13.00		100	27	8				
		13.00 - 14.50		100	49	8				
		14.50 - 16.00		100	55	19				
		16.00 - 17.50		100	29	15				
		17.50 - 19.00		100	8	0				
		19.00 - 20.50		100	27	0				

11 12 13 14 15 16 17 18 19 20

Continued on next sheet

Remarks
Borehole drilled for replacement gas and groundwater monitoring well to be installed. Commenced with window sampling to a depth of 2.5 m bgl. Followed on with cored rotary drilling techniques. Response zone installed between 2.5 - 10.0 m bgl.

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Rotary Core Log

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Borehole No.
BH005R(D)
Sheet 3 of 3

Project Name:	KMCPRP-139-010-049 A629 Halifax Road	Project No. S12427	Co-ords:	411613.00 - 419141.00	Hole Type RC
Location:	Huddersfield		Level:	200.81	Scale 1:50
Client:	Kirklees Council		Dates:	24/10/2024 - 25/10/2024	Logged By LK

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							20.50	180.31		End of borehole at 20.50 m

21
22
23
24
25
26
27
28
29
30

Remarks
Borehole drilled for replacement gas and groundwater monitoring well to be installed. Commenced with window sampling to a depth of 2.5 m bgl. Followed on with cored rotary drilling techniques. Response zone installed between 2.5 - 10.0 m bgl.

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Appendix D

Gas Monitoring

GAS MONITORING DATA

Site:	**KMCPRP-139-010-049 A629 Halifax Road, Huddersfield**			**Operator:**	**Louis Keane**
Project:	**S12427**	**Date:**	12/09/2024	**Weather:**	Clear

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Monitoring Location	Standpipe diameter (mm)	Response Zone (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (°C)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
BH005R(D)	55	2.50-10.00						15					
								30					
								60					
								90					Not installed at time of monitoring.
								120					
								180					
								240					
								300					
BH005R(S)	55	1.00-2.50						15					
								30					
								60					
								90					Not installed at time of monitoring.
								120					
								180					
								240					
								300					
BH03	55	5.00 - 16.00	7.43	1020	0.0	0.0	19	15	0.0	1.7	17.1	0.3	
								30	0.0	1.7	16.9	0.0	
								60	0.0	1.7	16.7	0.0	
								90	0.0	1.7	16.8	0.0	
								120	0.0	1.7	16.8	0.0	
								180	0.0	1.7	17.0	0.0	
								240	0.0	1.7	17.2	0.0	
								300	0.0	1.7	17.3	0	

GAS MONITORING DATA

Site:	**KMCPRP-139-010-049 A629 Halifax Road, Huddersfield**			**Operator:**	**BR**
Project:	**S12427**	**Date:**	01/11/2024	**Weather:**	Overcast

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Monitoring Location	Standpipe diameter (mm)	Response Zone (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (^oC)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
BH005R(D)	55	2.50-10.00	0.90	1026	0.0	0.0	12	15	0.0	1.2	17.8		Carbon monoxide was recorded at 84 parts per milllion, falling to 35 ppm after 5 minutes.
								30	0.0	0.7	19.0		
								60	0.0	0.6	19.5		
								90	0.0	0.4	19.9		
								120	0.0	0.3	20.1		
								180	0.0	0.3	20.3		
								240	0.0	0.2	20.4		
								300	0.0	0..2	20.4		
BH005R(S)	55	1.00-2.50	1.10	1026	0.0	0.0	12	15	0.0	0.7	20.2		Carbon monoxide was recorded at 16 parts per milllion, falling to 10 ppm after 5 minutes.
								30	0.0	0.8	20.2		
								60	0.0	0.8	20.1		
								90	0.0	0.8	20.1		
								120	0.0	0.8	20.1		
								180	0.0	0.8	20.0		
								240	0.0	0.8	20.0		
								300	0.0	0.8	20.0		
BH03	55	5.00 - 16.00						15					Not monitored.
								30					
								60					
								90					
								120					
								180					
								240					
								300					

GAS MONITORING DATA

Site:	**KMCPRP-139-010-049 A629 Halifax Road, Huddersfield**			**Operator:**	**Louis Keane**
Project:	**S12427**	**Date:**	05/12/2024	**Weather:**	Heavy Rain

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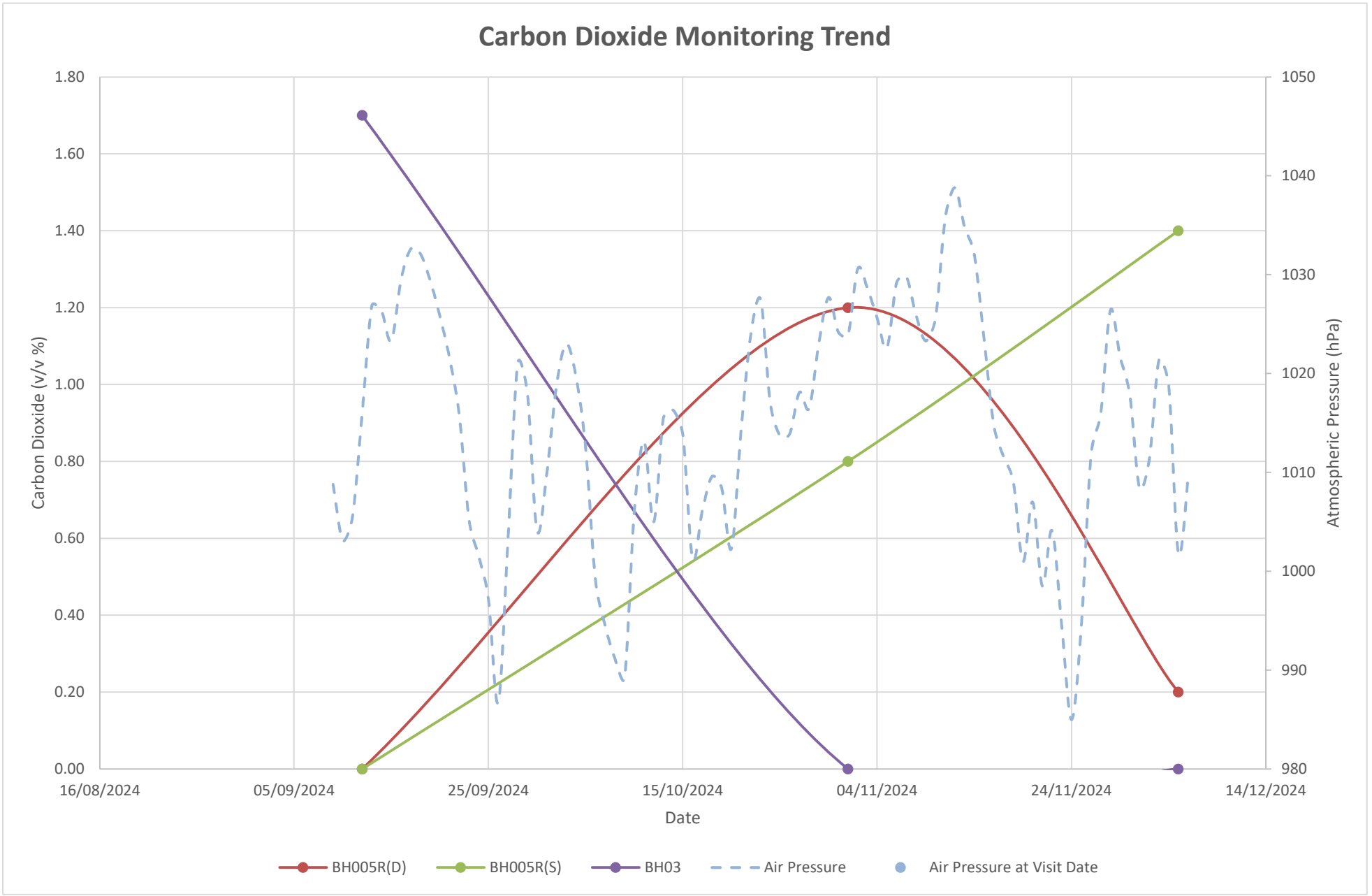
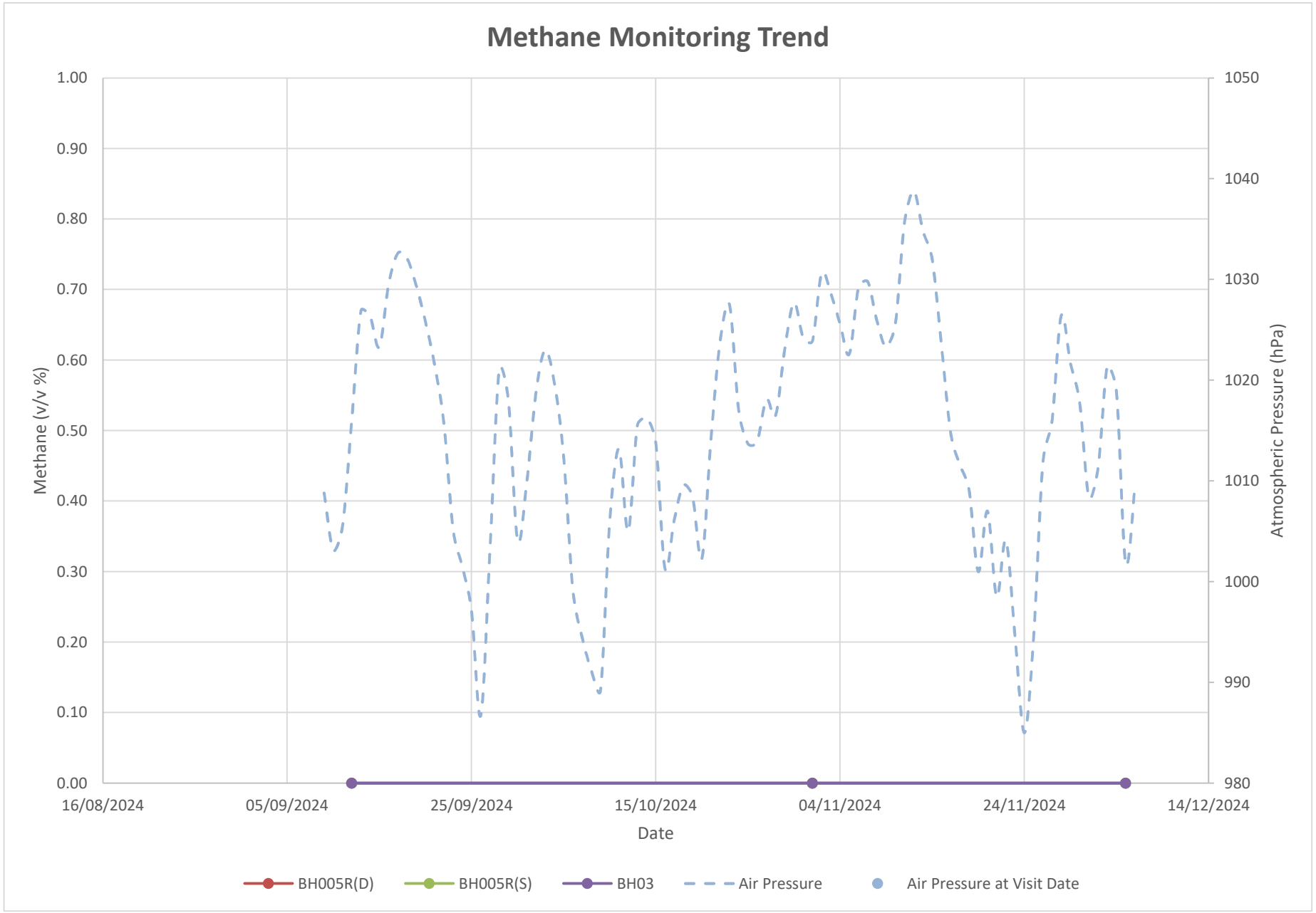
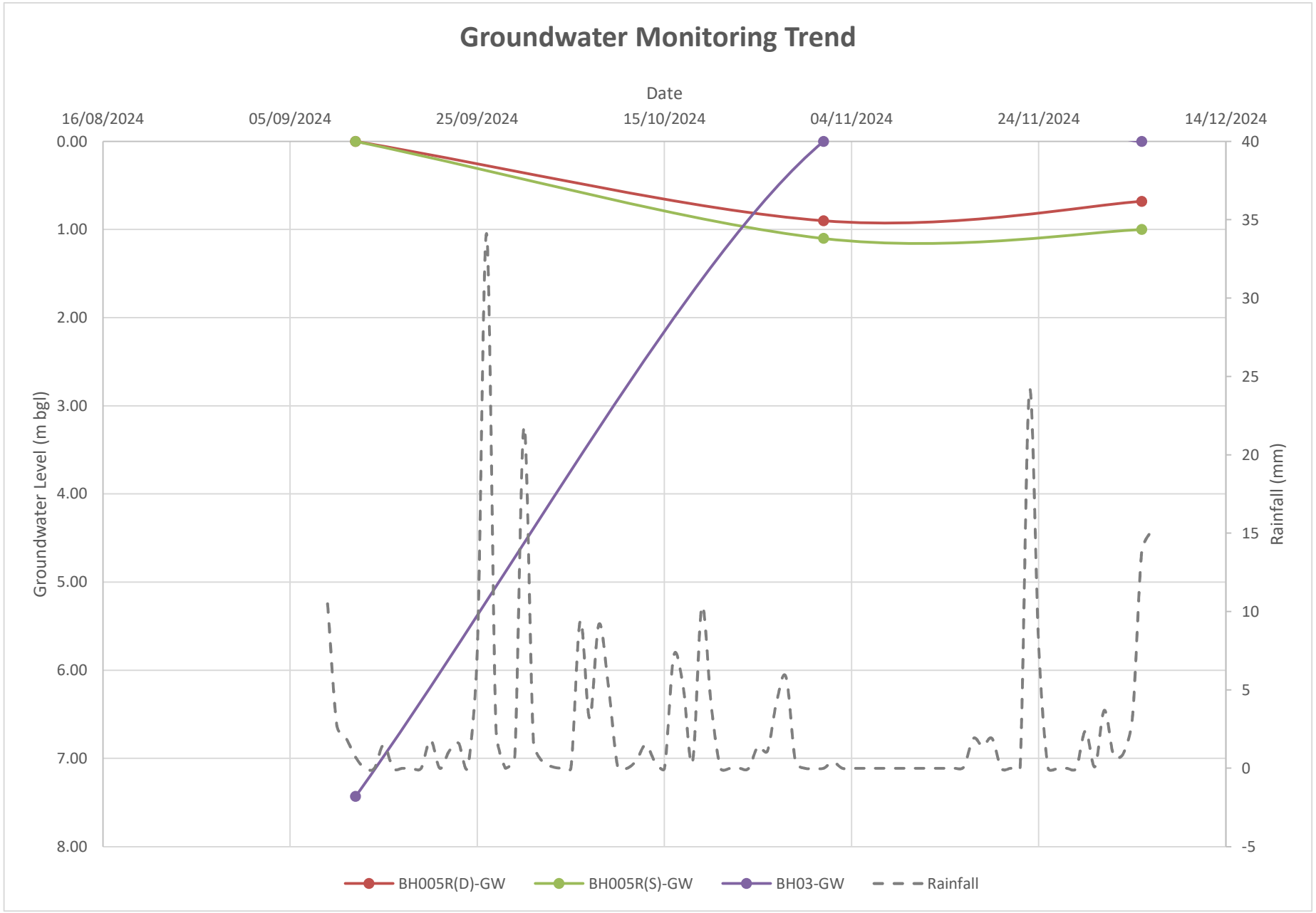
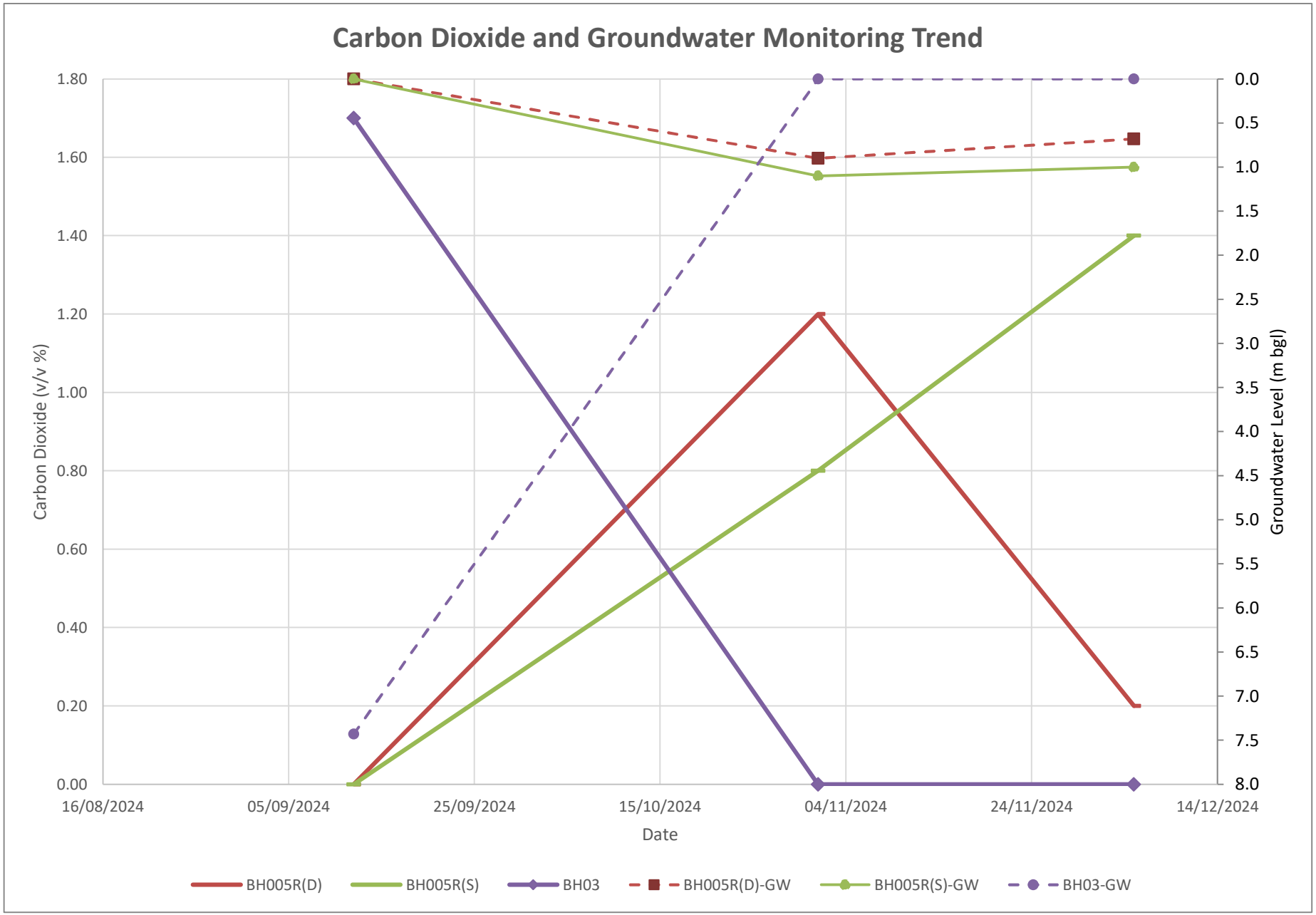
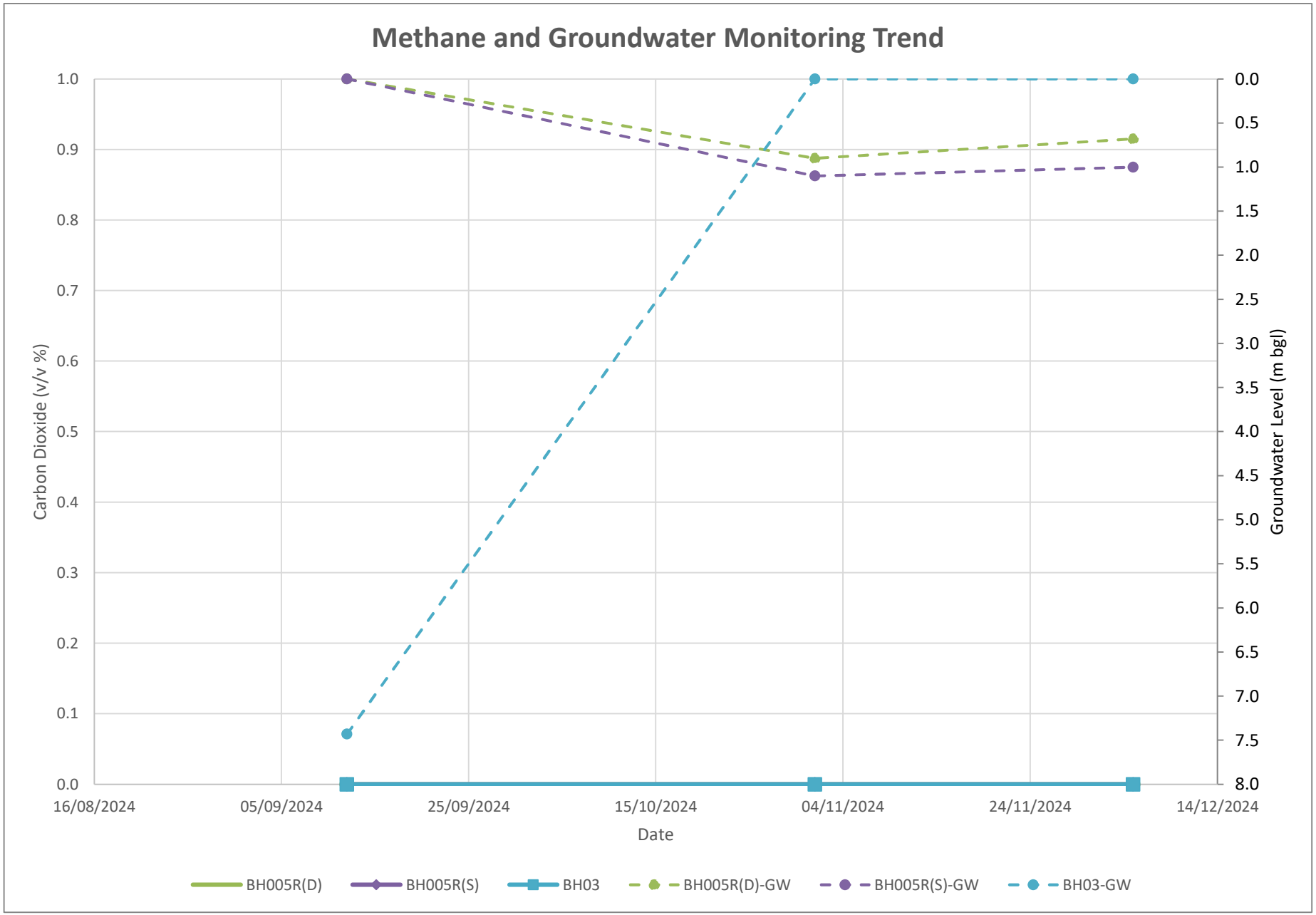
Monitoring Location	Standpipe diameter (mm)	Response Zone (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (^{o}C)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
BH005R(D)	55	2.50-10.00	0.68	998	0.0	0.0	10	15	0.0	0.2	20.3		
								30	0.0	0.1	20.4		
								60	0.0	0.0	20.5		
								90	0.0	0.0	20.5		
								120	0.0	0.0	20.5		
								180	0.0	0.0	20.5		
								240	0.0	0.0	20.5		
								300	0.0	0.0	20.5		
BH005R(S)	55	1.00-2.50	1.00	998	38.9	4.6	10	15	0.0	0.8	20.9		
								30	0.0	0.7	20.0		
								60	0.0	0.9	19.8		
								30	0.0	1.1	19.7		
								120	0.0	1.2	19.6		
								180	0.0	1.3	19.5		
								240	0.0	1.3	19.4		
								300	0.0	1.4	19.3		
BH03	55	5.00 - 16.00		998				15					Not monitored.
								30					
								60					
								90					
								120					
								180					
								240					
								300					

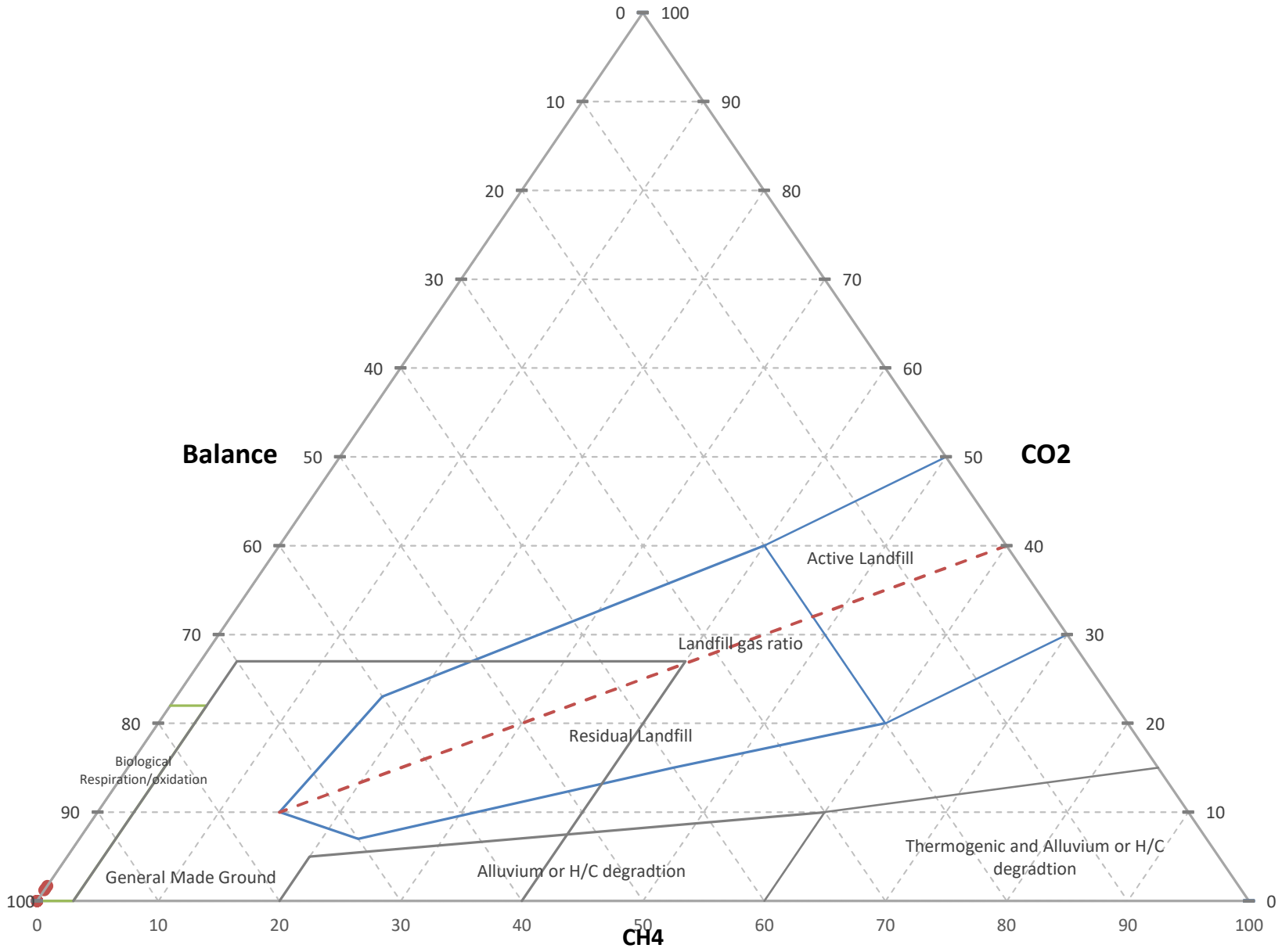

Carbon Dioxide Monitoring Trend
Carbon Dioxide (v/v %)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Atmospheric Pressure (hPa)
1050
1040
1030
1020
1010
1000
990
980
16/08/2024
05/09/2024
25/09/2024
15/10/2024
04/11/2024
24/11/2024
14/12/2024
Date
BH005R(D)
BH005R(S)
BH03
Air Pressure
Air Pressure at Visit Date


Methane Monitoring Trend
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Methane (v/v %)
1050
1040
1030
1020
1010
1000
990
980
Atmospheric Pressure (hPa)
16/08/2024
05/09/2024
25/09/2024
15/10/2024
04/11/2024
24/11/2024
14/12/2024
Date
BH005R(D)
BH005R(S)
BH03
Air Pressure
Air Pressure at Visit Date


Groundwater Monitoring Trend
Date
16/08/2024
05/09/2024
25/09/2024
15/10/2024
04/11/2024
24/11/2024
14/12/2024
Groundwater Level (m bgl)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Rainfall (mm)
40
35
30
25
20
15
10
5
0
-5
BH005R(D)-GW
BH005R(S)-GW
BH03-GW
Rainfall


Carbon Dioxide and Groundwater Monitoring Trend
Carbon Dioxide (v/v %)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Groundwater Level (m bgl)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
16/08/2024
05/09/2024
25/09/2024
15/10/2024
04/11/2024
24/11/2024
14/12/2024
Date
BH005R(D)
BH005R(S)
BH03
BH005R(D)-GW
BH005R(S)-GW
BH03-GW


Methane and Groundwater Monitoring Trend
Carbon Dioxide (v/v %)
Groundwater Level (m bgl)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
16/08/2024
05/09/2024
25/09/2024
15/10/2024
04/11/2024
24/11/2024
14/12/2024
Date
BH005R(D)
BH005R(S)
BH03
BH005R(D)-GW
BH005R(S)-GW
BH03-GW


Balance
CO2
CH4
Active Landfill
Landfill gas ratio
Residual Landfill
Biological
Respiration/oxidation
General Made Ground
Alluvium or H/C degradtion
Thermogenic and Alluvium or H/C
degradtion