

# Whinney Hill Landfill Site

## Improvement Condition 1

### Landfill Gas Compliance Limit Review

March 2021

#### Report Issue Form

##### Issue History

Issue	Description	Originated	Checked	Approved	Date
1	ISSUE	Daniel Reeves <i>Trainee Hydrogeologist</i>	Paula Bakes <i>EIR Manager – Energy North</i>  Roy Cooper <i>Landfill Site Manager</i>  Richard Phillips <i>Landfill Operations Manager</i>	Mike Brennan <i>Technical Manager - Landfill</i>	March 2021

##### Report Distribution

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## 1 Introduction

This report has been compiled to fulfil Improvement Condition 1 of the Environmental Permit Variation EPR/BL9500IJ/V006 ("the Permit") which states in Table S1.3:

*The Operator shall derive action levels for methane and carbon dioxide, and compliance limits for methane for boreholes around Enfield Quarry (as listed in Table S3.5). The Operator shall also develop and provide an action plan to explain how they plan to investigate and remediate any breach of an action level or compliance limit. The action levels, compliance limits and action plan shall be derived and written in accordance with the Industry Code of Practice (ICoP) on perimeter soil gas, and shall be submitted in writing to the Environment Agency for approval no later than 10 months after the onset of waste deposits within Area 6. Upon receipt of the Environment Agency's approval in writing, the compliance limits, action levels and action plans shall be incorporated in to the Gas Management Plan. The Monitoring Management Plan shall also be updated.*

Suez reports that tipping within Area six commenced on 6 January 2020. As such, a review of background perimeter gas levels has been conducted and provision of action levels given within this report.

A plan of the current Site layout and monitoring network is provided in Figure 1.

## 2 Derivation of Proposals

Improvement Condition 1 requested the calculation of methane action levels / compliance limits and carbon dioxide action levels in accordance with the current Industry Code of Practice (ICoP) methods. The period of time suggested is of two years prior to waste placement. However, as monitoring is undertaken on a quarterly schedule this period does not provide the required dataset of "24-30 background data points" (ICoP, 2011). Therefore, a reporting period of 1 January 2015 to 23 November 2020 has been used in order to satisfy the data point condition for the majority of the monitoring wells.

Although this extended timeframe has been utilised, little variation is observed in the gas concentrations across the period of time used to analyse background levels. These plots are provided in Appendix A. Therefore the use of a data set extended beyond the recommended time frame can be used.

In undertaking this task, SUEZ has reviewed the perimeter gas data at the Site for the period January 2015 to November 2020. Any carbon dioxide data associated with methane concentrations from the same monitoring event which are above 0.1%v/v have been excluded from the data set used for subsequent calculation of the  $T_{\max}$  concentration at the monitoring location.

To mitigate results obtained from boreholes with fewer than 24 data points provision is provided in Section 2.2 to periodically review the proposed limits, thereby expanding the dataset used for analysis.

Action Levels and Compliance limits have been determined using the Industry Guidance: Perimeter Soil Gas Emissions Criteria and Associated Management ([ICoP, 2011](#)). Calculation methodology is included within Appendix B and full dataset is presented in Appendix C.

## 2.1 Proposed Methane Action Levels and Compliance Limits

SUEZ propose the below action levels and compliance limits for methane for the perimeter boreholes based on the [\(ICoP, 2011\)](#) procedure. A compliance limit is proposed at 1.1%v/v, with an action level of 0.5 %v/v is proposed for all boreholes.

**Table 1. Proposed Methane Action Levels and Compliance Limit Summary**

Monitoring Point	Methane (%v/v)	
	Action Level	Compliance Limit
Boreholes listed in table 3.5 of the permit	0.5	1.1

## 2.2 Proposed Carbon Dioxide Action Levels

SUEZ undertook ICoP methodology [\(ICoP, 2011\)](#) to calculate carbon dioxide action levels for the review period June 2015 to September 2020. The results are provided in Table 2, full calculations have been included in Appendix D.

**Table 2. Proposed Carbon Dioxide Action Levels**

Monitoring Point	Carbon dioxide (%v/v)	
	Tmax	Action Level
EN/BH1	2.2	3.2
EN/BH10/1	2.8	3.8
EN/BH10/2	3.4	4.4
EN/BH10/3	4.1	5.1
EN/BH10/4	5.3	7.3
EN/BH11/1	5.5	7.5
EN/BH11/2	4.5	5.5
EN/BH11/3	4.2	5.2
EN/BH11/4	4.6	5.6
EN/BH12/1	4.7	5.7
EN/BH12/2	3.0	4.0
EN/BH12/3	3.7	4.7
EN/BH12/4	3.0	4.0
EN/BH13/1	2.2	3.2
EN/BH13/2	1.7	2.7
EN/BH13/3	1.8	2.8
EN/BH13/4	2.7	3.7
EN/BH14/1	4.0	5.0

Monitoring Point	Carbon dioxide (%v/v)	
	Tmax	Action Level
EN/BH14/2	0.2	1.2
EN/BH14/3	0.7	1.7
EN/BH14/4	0.5	1.5
EN/BH15/1	0.2	1.2
EN/BH15/2	0.3	1.3
EN/BH15/3	1.9	2.9
EN/BH15/4	3.1	4.1
EN/BH16/1	2.9	3.9
EN/BH16/2	2.7	3.7
EN/BH16/3	2.7	3.7
EN/BH16/4	2.5	3.5
EN/BH2/1	1.1	2.1
EN/BH2/2	1.1	2.1
EN/BH2/3	3.6	4.6
EN/BH2/4	2.0	3.0
EN/BH3/1	2.6	3.6
EN/BH3/2	6.7	8.7
EN/BH3/3	8.9	10.9
EN/BH3/4	3.6	4.6
EN/BH5	3.7	4.7
EN/BH6/1	2.6	3.6
EN/BH6/2	2.5	3.5
EN/BH6/3	4.8	5.8
EN/BH6/4	6.3	8.3
EN/BH7/1	6.3	8.3
EN/BH7/2	4.4	5.4
EN/BH7/3	4.0	5.0
EN/BH7/4	5.8	7.8
EN/BH8	3.2	4.2
EN/BH9/1	4.3	5.3
EN/BH9/2	2.7	3.7
EN/BH9/3	3.0	4.0
EN/BH9/4	4.3	5.3

SUEZ will continue to review the applicability of Action Levels at regular intervals and update the Environment Agency with periodically revised action levels. These revisions occur nominally at annual intervals where data collection is monthly or every two years where data collection is quarterly.

These reviews would be included, on an annual or biannual basis, within the Site Annual Report submitted to fulfil condition 4.2.2(a).

### 3 Requisite Surveillance

#### 3.1 Monitoring Regime

The current perimeter gas monitoring regime is detailed in the MMP ([SUEZ, 2020](#)), provided in Appendix E. SUEZ does not propose any changes in the frequency of the current monitoring regime.

**Table 3. Proposed Landfill Gas Monitoring Schedule**

Monitoring Points	Parameters	Frequency
EN/BH1, EN/BH2/1, EN/BH2/2, EN/BH2/3, EN/BH2/4, EN/BH3/1, EN/BH3/2, EN/BH3/3, EN/BH3/4, EN/BH5, EN/BH6/1, EN/BH6/2, EN/BH6/3, EN/BH6/4, EN/BH7/1, EN/BH7/2, EN/BH7/3, EN/BH7/4, EN/BH8, EN/BH9/1, EN/BH9/2, EN/BH9/3, EN/BH9/4, EN/BH10/1, EN/BH10/2, EN/BH10/3, EN/BH10/4, EN/BH11/1, EN/BH11/2, EN/BH11/3, EN/BH11/4, EN/BH12/1, EN/12/2, EN/12/3, EN/12/4, EN/BH13/1, EN/BH13/2, EN/BH13/3, EN/BH13/4, EN/BH14/1, EN/BH14/2, EN/BH14/3, EN/BH14/4, EN/BH15/1, EN/BH15/2, EN/BH15/3, EN/BH15/4, EN/BH16/1, EN/BH16/2, EN/BH16/3, EN/BH16/4	Methane, Carbon Dioxide, Oxygen, Atmospheric Pressure, Meteorological Data.	Quarterly

### 3.2 Contingency Actions –Action Limit Exceedance

Where methane or carbon dioxide action levels are exceeded, the following Contingency Actions will be completed:

**Table 4. Proposed Contingency Actions –Action Levels (carbon dioxide and methane)**

Table 4: Proposed Contingency Actions - Action Levels (Carbon dioxide and methane)			
Scenario	Contingency Action		Response Time
Initial Result Exceeds Control Level	Hazard Potential ≤Low	Inform the Site Manager. Record internally. <u>End of Actions.</u>	24 Hours
	Hazard Potential ≥Moderate	Inform Site Manager and Technical Support Manager to initiate measures to control migration. Record internally.	48 Hours
		Confirm calibration and QA procedures for equipment used	48 Hours
		Review actions and data trends during monthly compliance meeting	1 Month
In the event of persistent Action Level breaches or rising trends: Produce a Gas Action Plan and submit to the EA			To be agreed with the EA.

In all cases, contingency actions will cease once carbon dioxide or/and methane concentrations decrease in line with the ICOP action levels.

It is recognised that on occasion, recording of genuine “spikes” of methane and carbon dioxide concentrations in the subsurface environment may not be directly the result of landfill gas migration. In the event that an elevated methane or carbon dioxide concentration is detected, SUEZ will implement the contingency actions plans from tables 4 and 5 and on re-monitoring the concentrations this return to be within the normal range, then the matter will be considered to be closed without any further action.

### 3.3 Contingency Actions – Methane Compliance Limit Exceedance

When a methane compliance limit is exceeded, the following Contingency Actions are proposed:

**Table 5. Proposed Contingency Actions - Methane Compliance Limit Exceedance**

Scenario	Contingency Action		Response Time
Initial Result	Internally Record and inform Site Manager		Up to 24 Hours
	Hazard Potential (calculated as) Low <i>or less</i>	Inform the Environment Agency	24 Hours
		Record internally <u>End of Actions</u>	
	Hazard Potential (calculated as) <i>Moderate or greater</i>	Inform the Environment Agency	24 Hours
		Confirm calibration and QA procedures for equipment used.	48 Hours
		Inform Site Manager to initiate measures to control migration in accordance with the Gas Management Plan.	48 Hours
		Complete repeat monitoring visit	After control migration measures are in place (usually 48h)
Re-Sample (Compliant)	<u>End of Actions</u>		
Re-Sample (Non-Compliant)	Hazard Potential (calculated as) Low <i>or less</i>	Inform the Site Manager and record internally <u>End of Actions</u>	24 Hours post re-sample
	Hazard Potential (calculated as) <i>Moderate or greater</i>	Maintain monitoring frequency until data declines below the compliance limit.	1 Month
		Review gas infrastructure (if applicable) and notify the Environment Agency.	Up to 6 weeks
Produce a Gas Action Plan (if necessary) and submit to the Environment Agency.			To be agreed with the Environment Agency.

In all cases, contingency actions will cease once methane concentrations decrease below the compliance limit.



## 4 Summary

Waste tipping in Area 6 of the Site has triggered a requirement to comply with Improvement Condition 1 of the Permit.

SUEZ has presented calculations specifically for those monitoring locations associated with Area 6 for future action levels and compliance limits around the site boundary. Action levels have been calculated using the  $T_{\max}$  statistical approach set out in the 2011 ICOP for perimeter gas compliance management.

Associated updated compliance limits and action levels will be addressed through update of the site's Monitoring Management Plan and this will be submitted to the Environment Agency.

## 5 References

Environment Agency, 2011b. Techniques for the Interpretation of Landfill Monitoring Data Guidance Notes, Final Technical Report P1 – 471, Bristol.

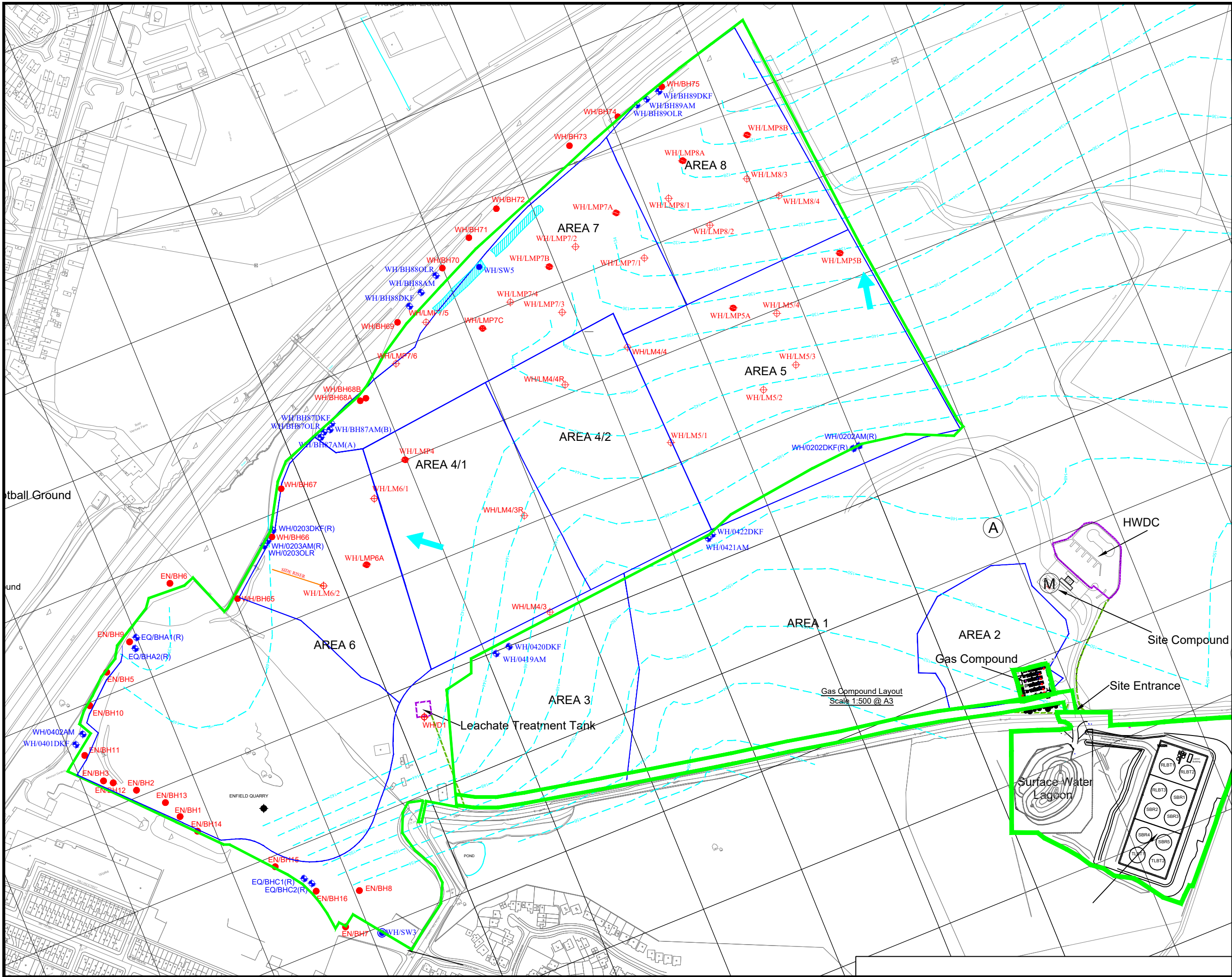
ICoP, 2011. Industry Code of Practice on perimeter soil gas emissions criteria and associated management.

SUEZ, 2020. Whinney Hill Landfill Site, Phase 2. Monitoring Management Plan. April 2020.

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## Figures


*Figure 1: Whinney Hill Landfill Monitoring plan*



Notes  
1. Reproduced from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationary Office, Crown Copyright, Licence Number 100004910.

- Permit Boundary
- Groundwater Monitoring Point
- Groundwater and Gas Monitoring Point (depth varies)
- Leachate and Gas Monitoring Point
- Gas Monitoring Point
- Leachate Monitoring Point
- Proposed Leachate Monitoring Point
- Leachate Extraction Point
- Proposed Leachate Extraction Point
- Surface Water Monitoring Point
- Proposed Surface Water Monitoring Point
- Meterological Monitoring Point
- Anemometer
- 48 Inferred Groundwater Contour (mAOD)
- Inferred Groundwater Flow Direction

Rev	subject	date
F	Cell 6A As built Mon Points Added	April 2020
E	Cell 8/2 As built Mon Points Added	Aug 2017
D	LM4/4R Added & Drawing Border Updated	April 2016
C	PPC Boundary Amended, Cell 8/1 As built Mon Points Added & Cell 7/3 Siderisers Added	April 2015
B	WH/LM4/3R Added	Dec 2013
A	Gas Compound Sampling Points Added	Jan 2013



Darwin Resource Recovery Park, Lower Eccleshill Road, Darwin, BB3 0RP  
Tel: (01254) 819700, Fax: (01254) 819749, Email: richard.bisset@sita.co.uk

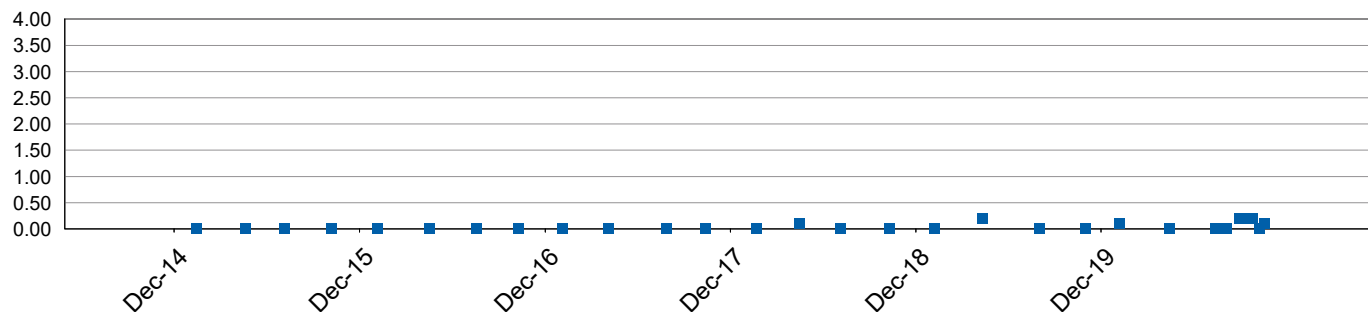
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Date	August 2017
Drawing Ref	WNH-P2-ESID-1112-07f
Drawn by	RB
Checked by	SW



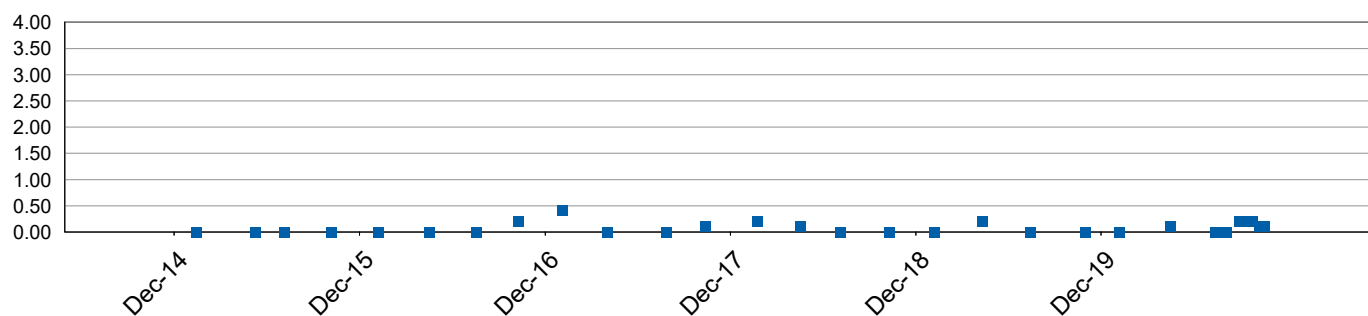
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## Appendices

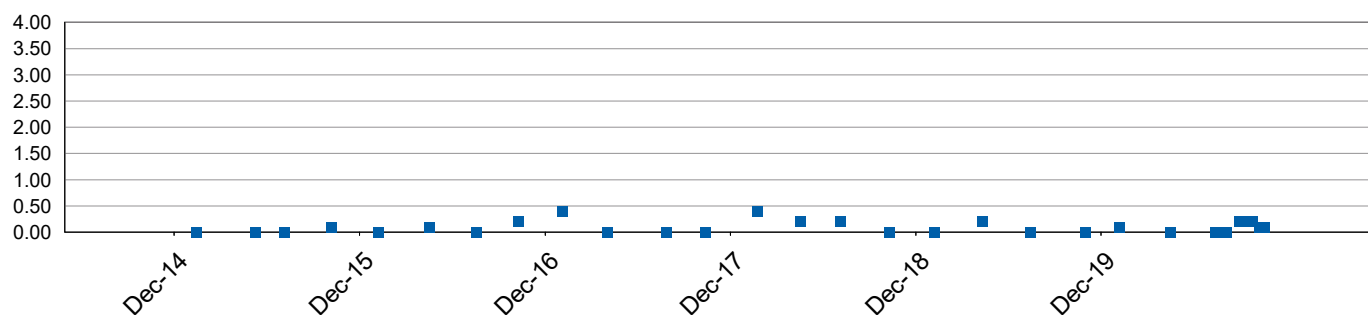
### *Appendix A Timeseries Plots of Methane and Carbon Dioxide for Enfield Quarry*

**EN/BH1**

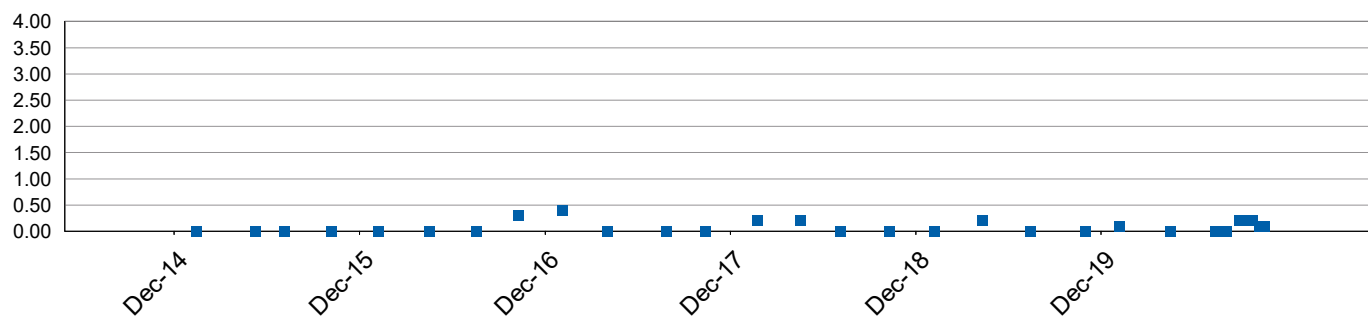
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EN/BH10/2



**EN/BH10/3**

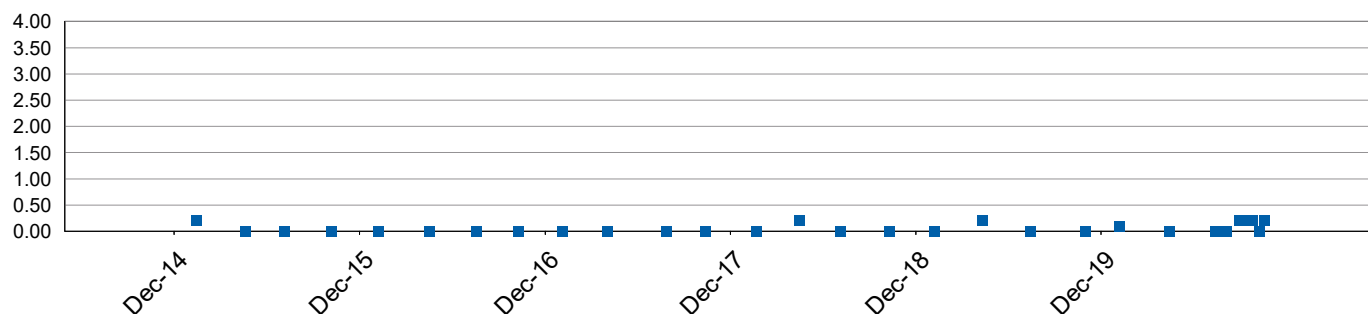


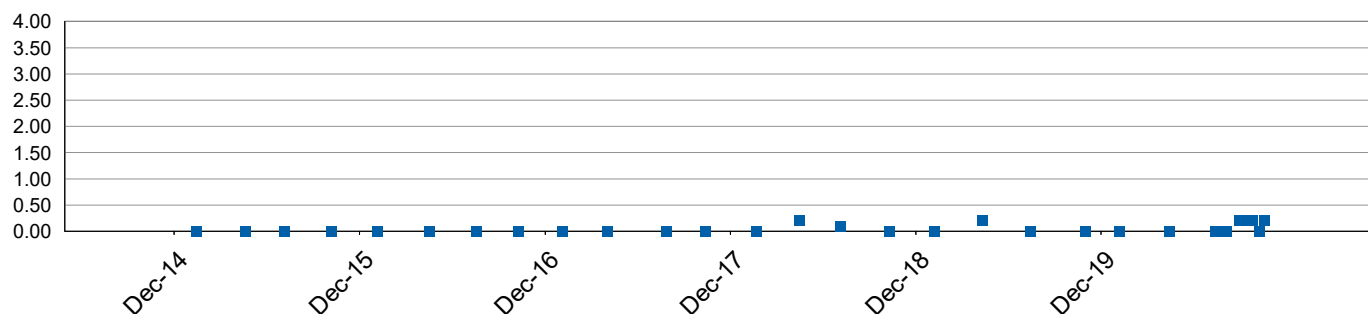
[illegible][illegible]

The chart displays the daily number of COVID-19 cases in the Netherlands from December 14, 2019, to December 19, 2019. The y-axis represents the number of cases, ranging from 0.00 to 4.00 in increments of 0.50. The x-axis shows dates from Dec-14 to Dec-19. The data points are represented by blue squares. Most days show 0 or 1 case, with a few days showing 2 cases.

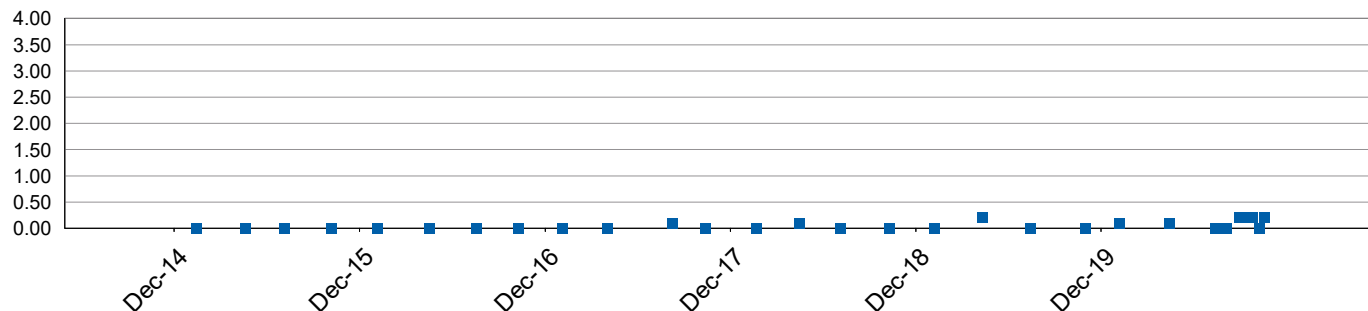
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Dec-17	0
Dec-18	0
Dec-19	0

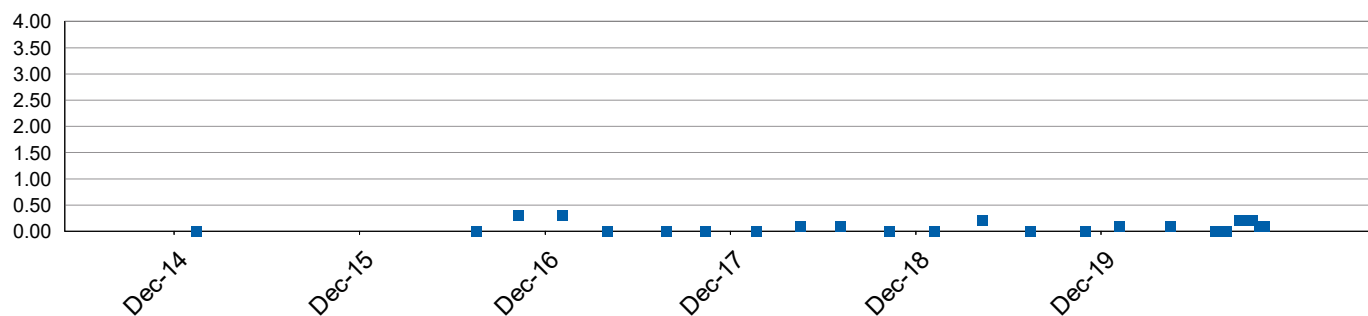
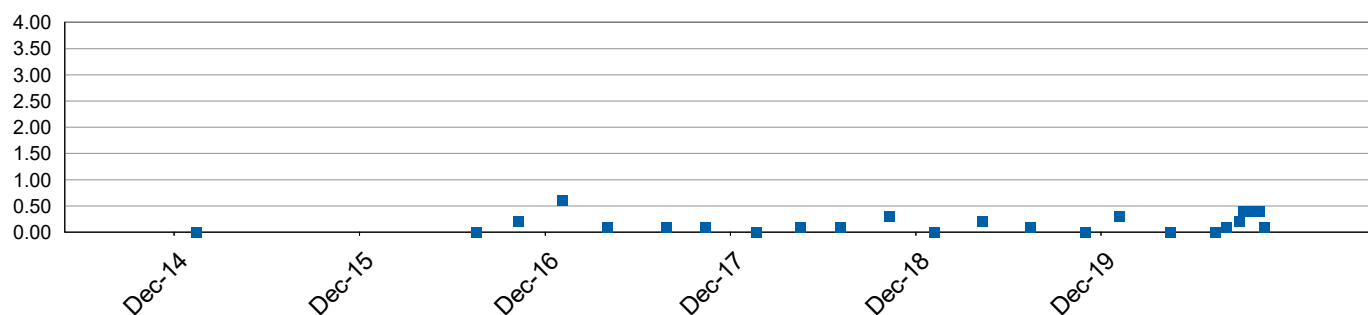
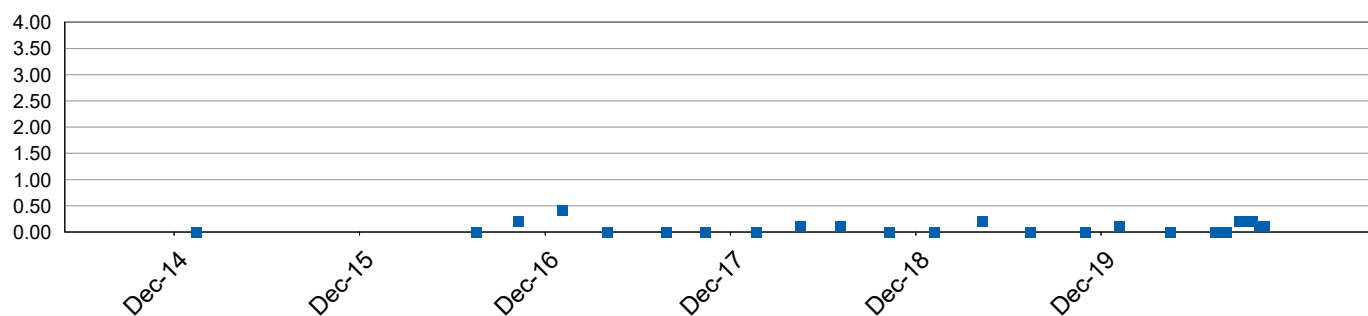
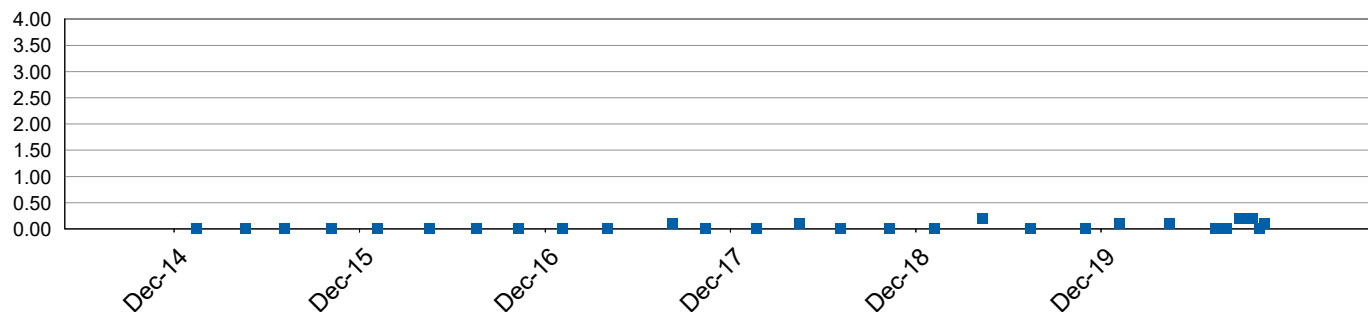
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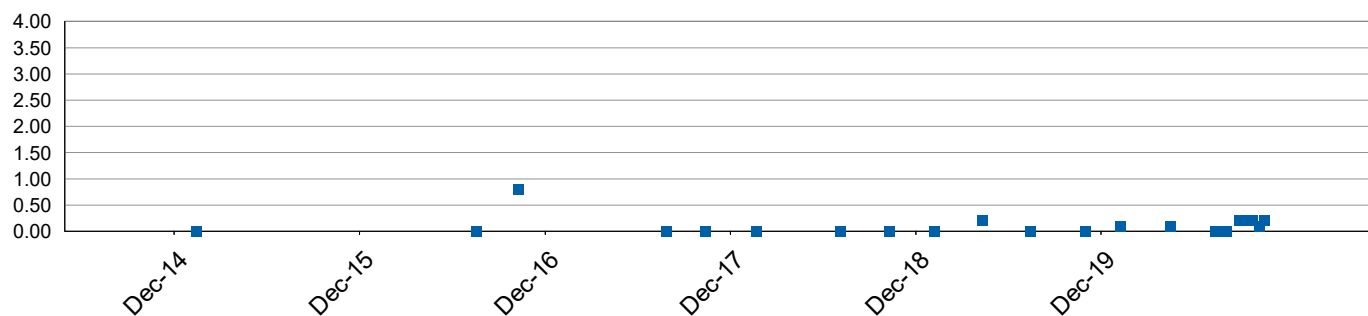
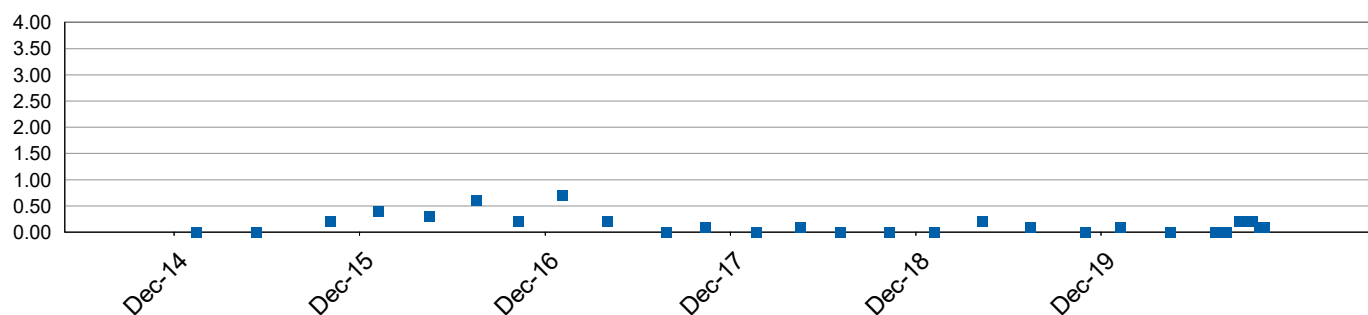
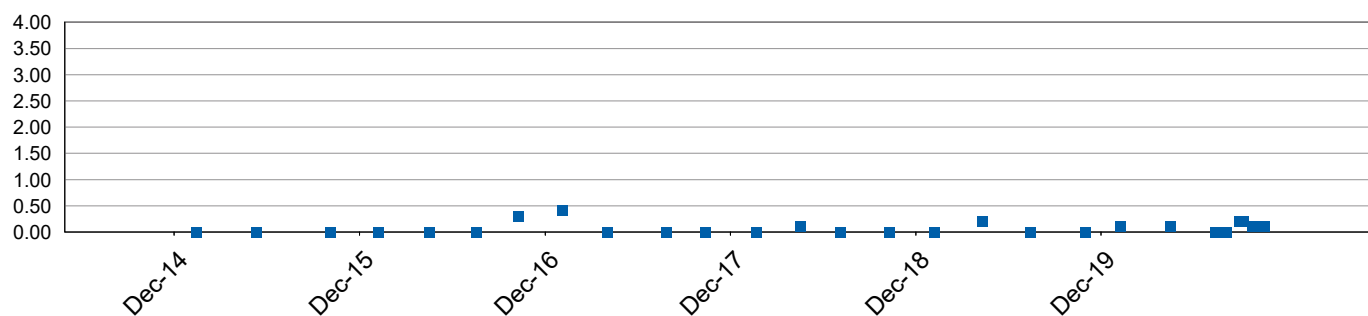
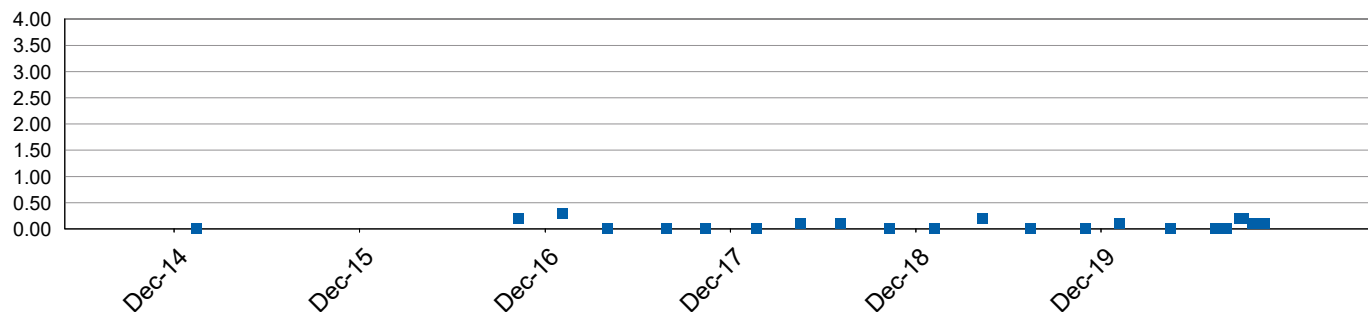


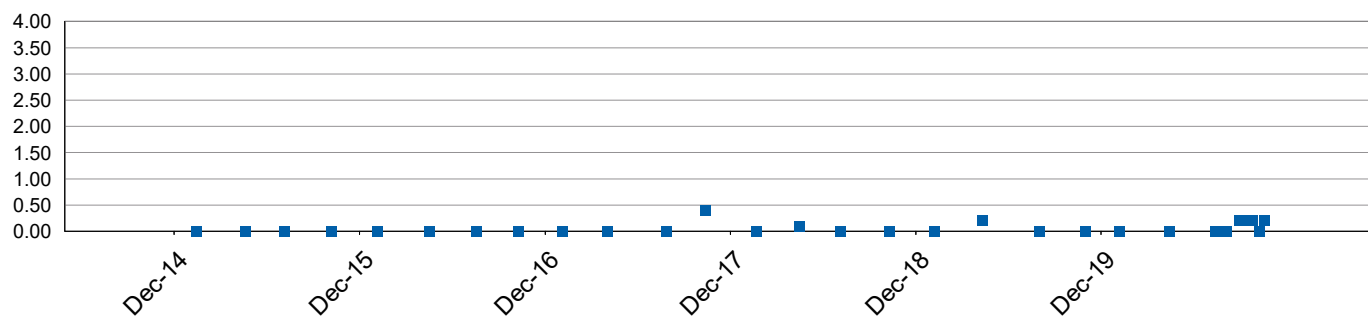


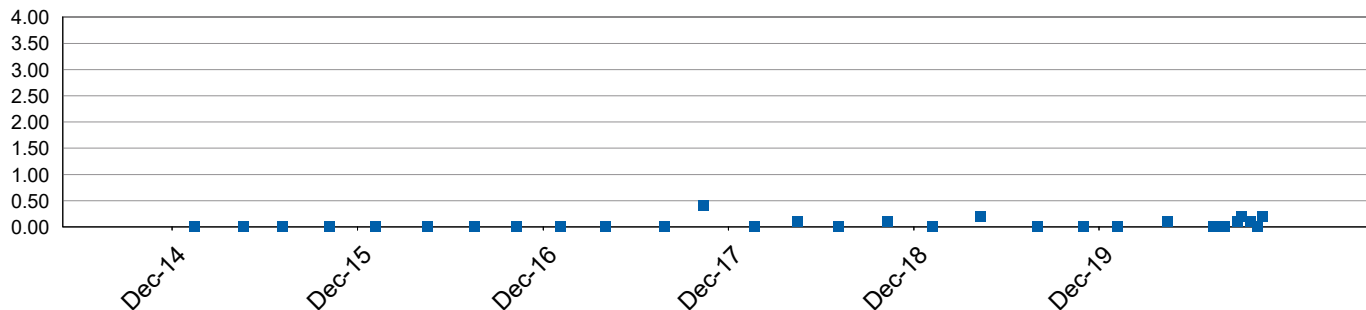
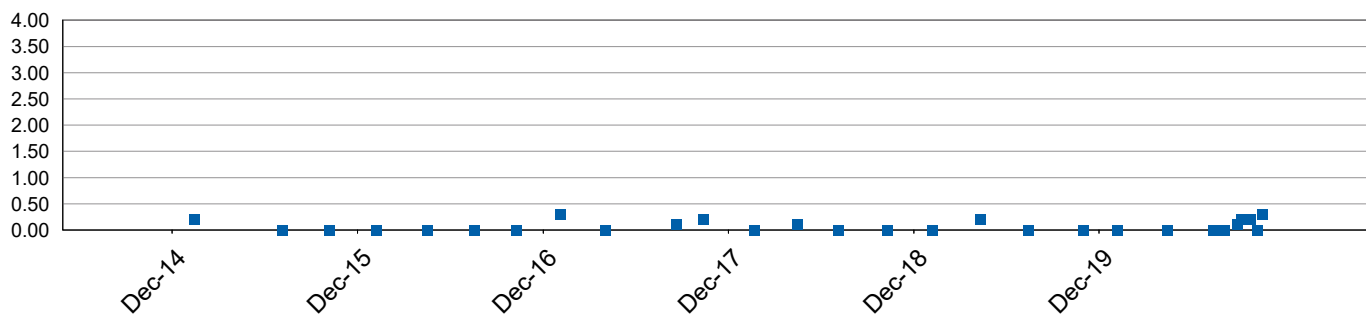
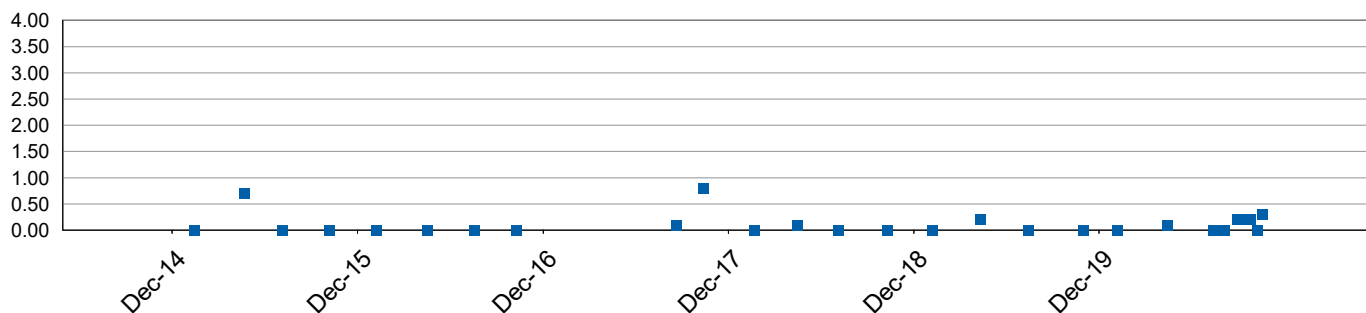
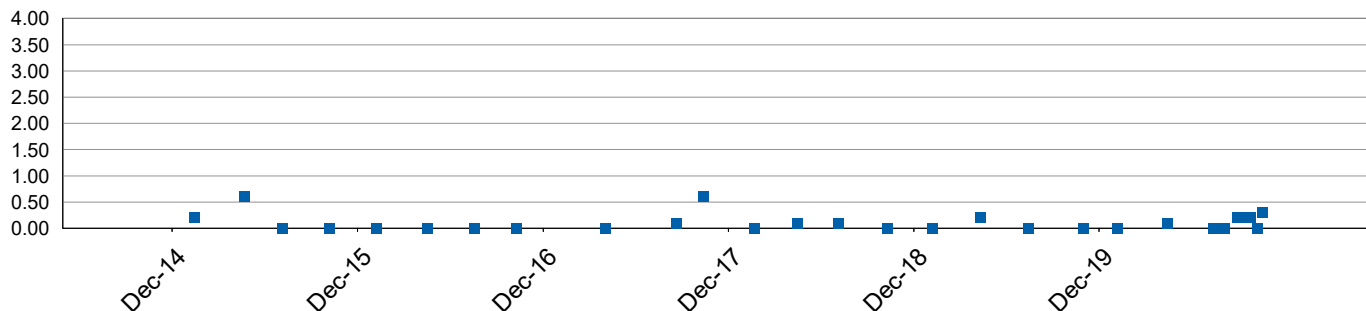




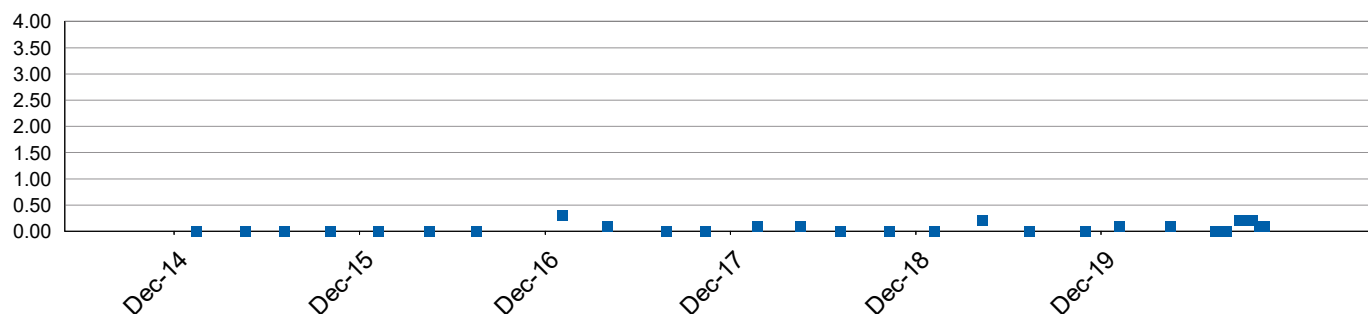


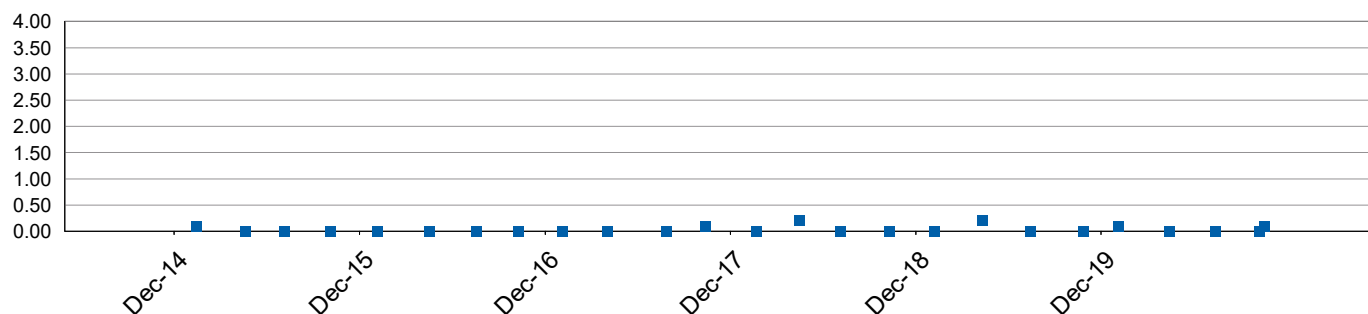




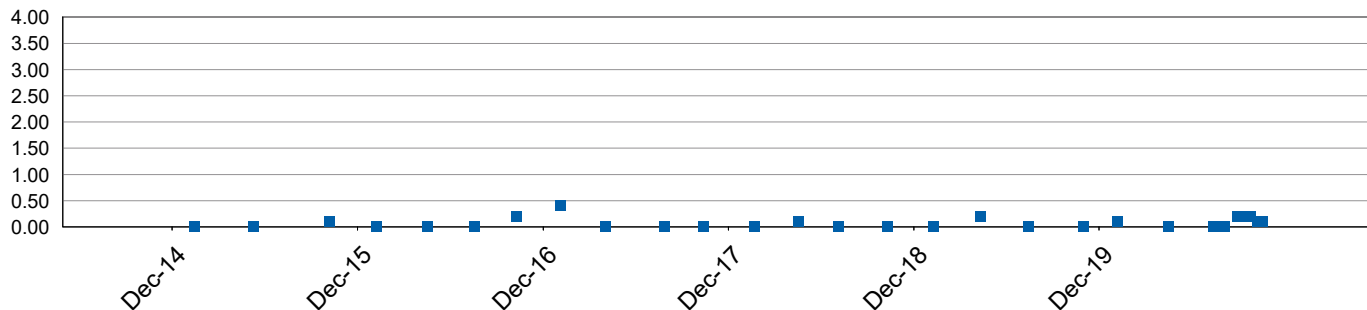
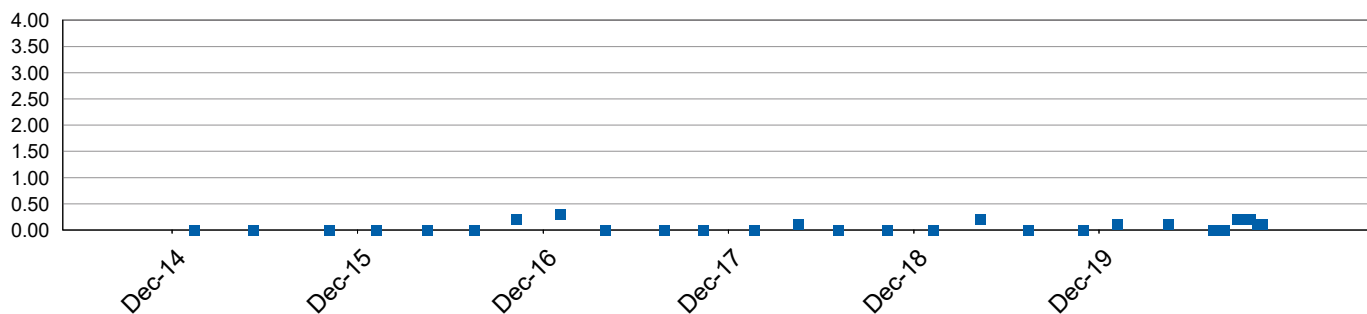
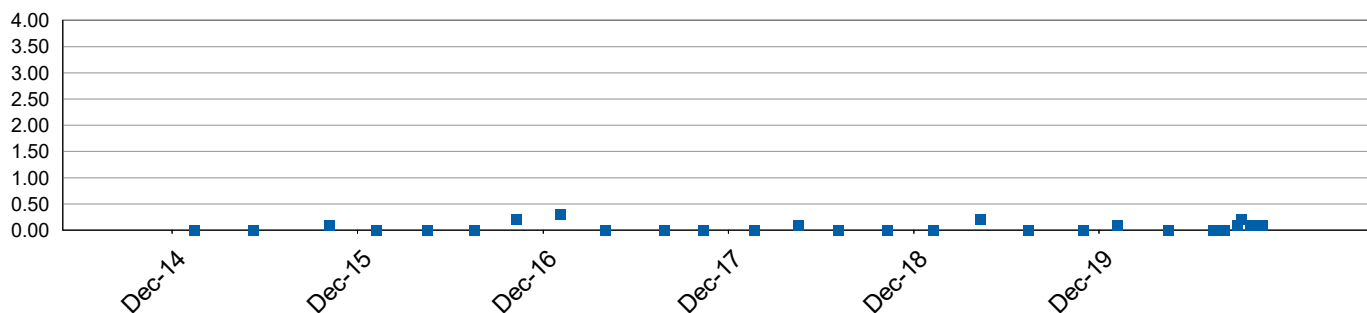
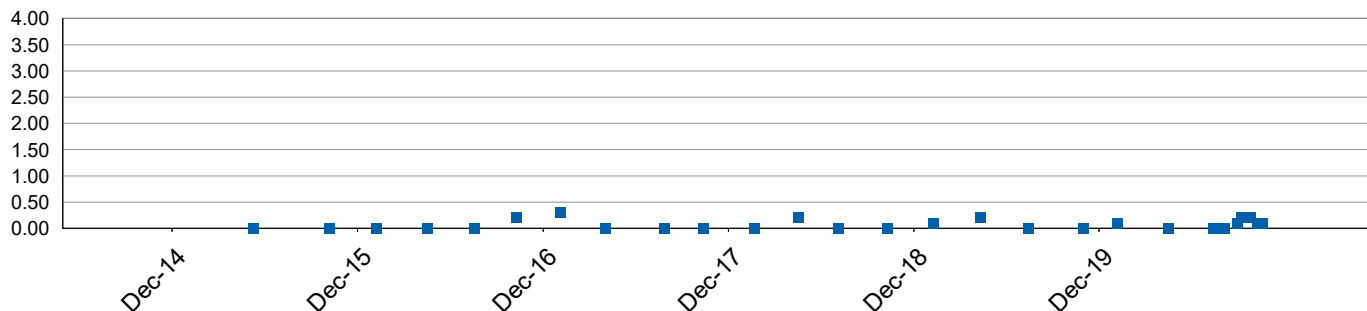
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**EN/BH2/4**

**Methane (% v/v)**
**EN/BH3/1**

**Methane (% v/v)**
**EN/BH3/2**

**Methane (% v/v)**
**EN/BH3/3**


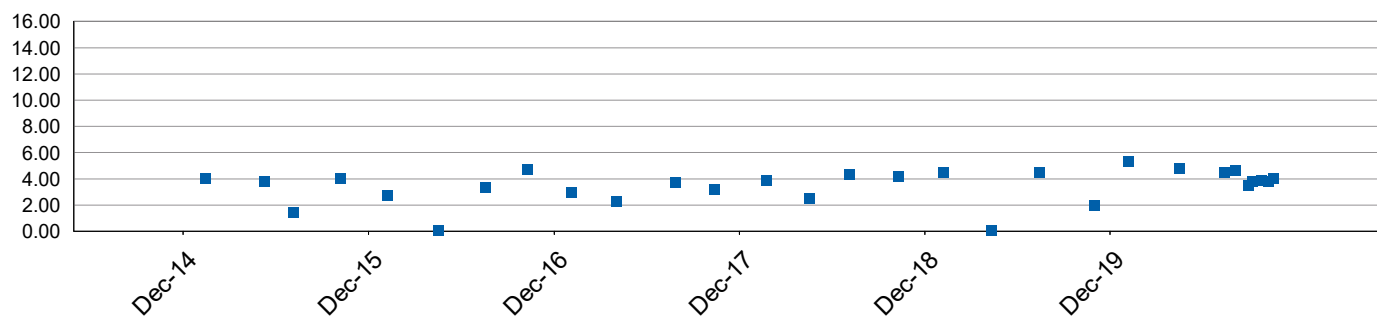
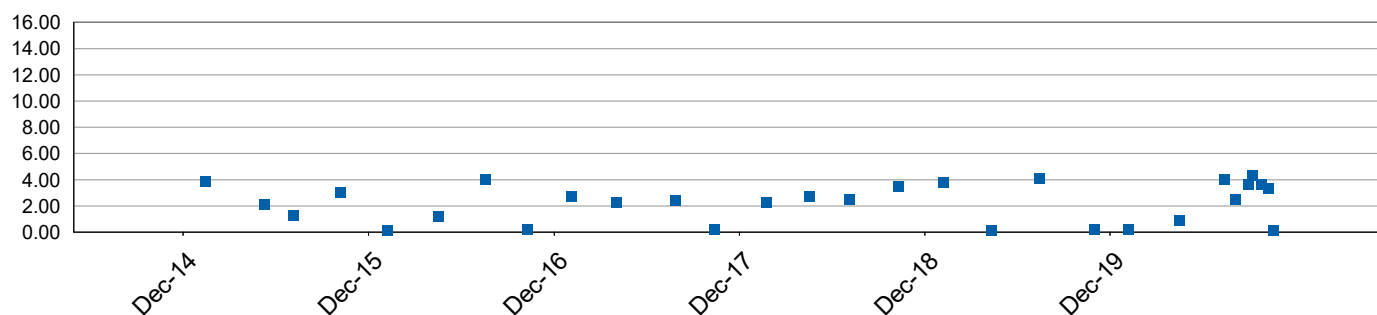
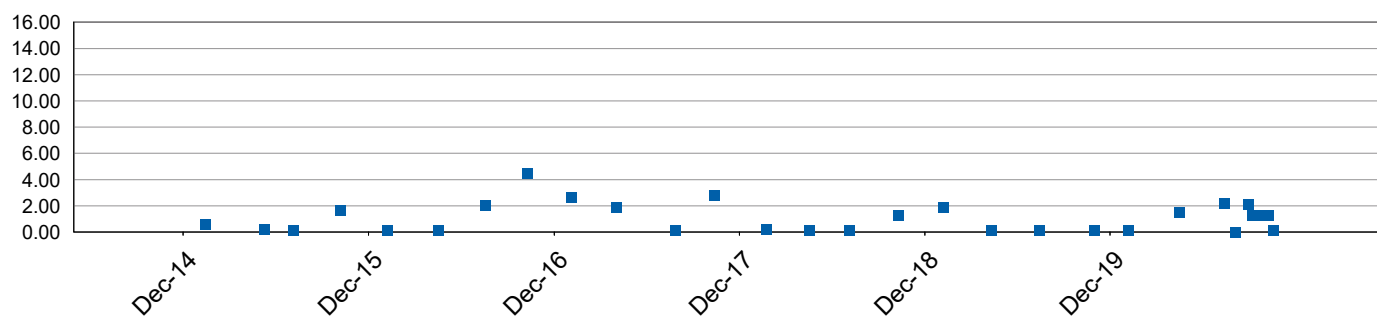
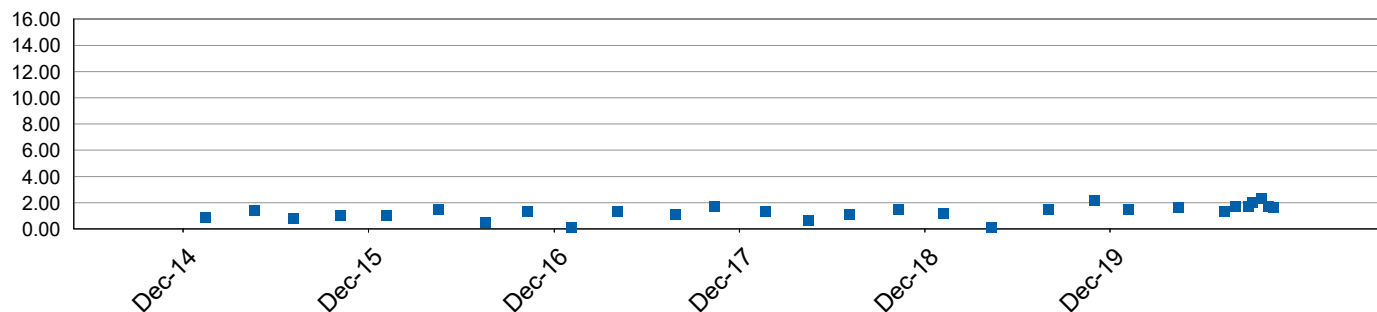


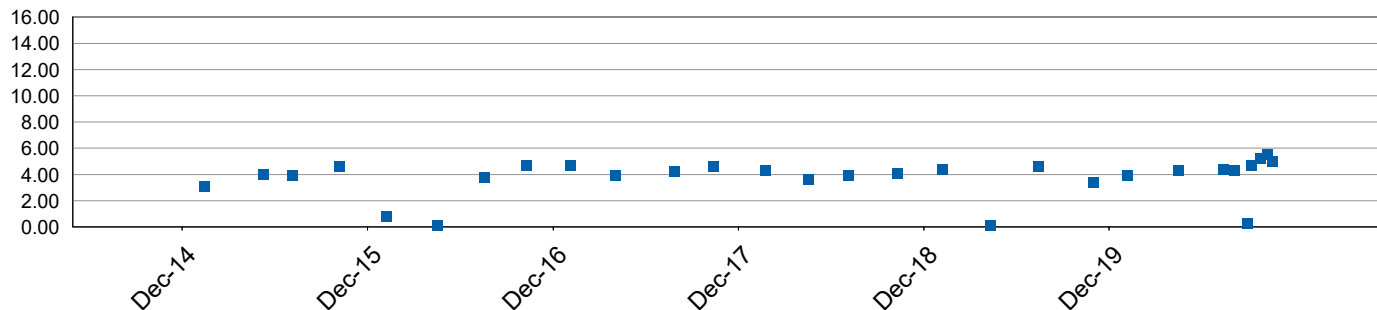


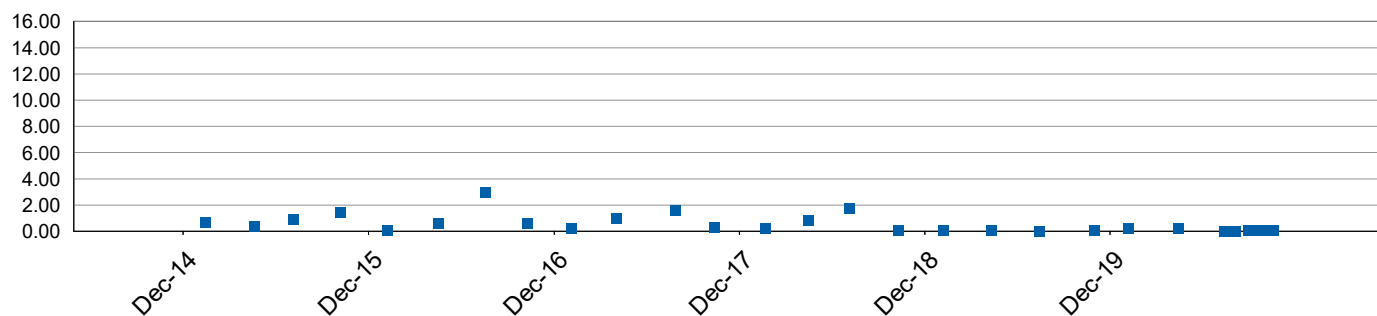


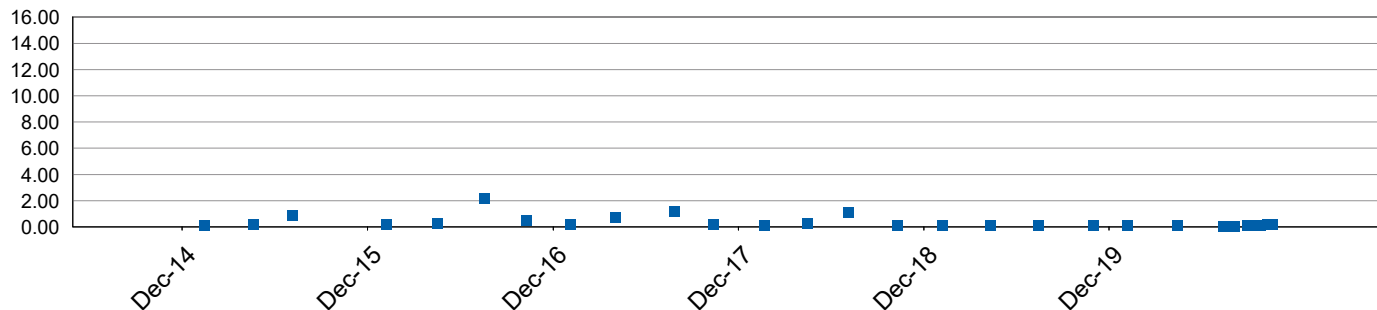
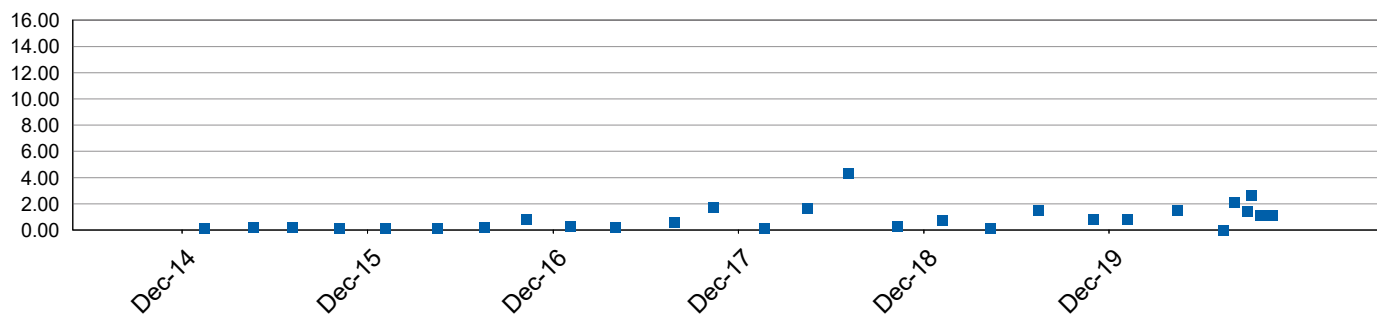
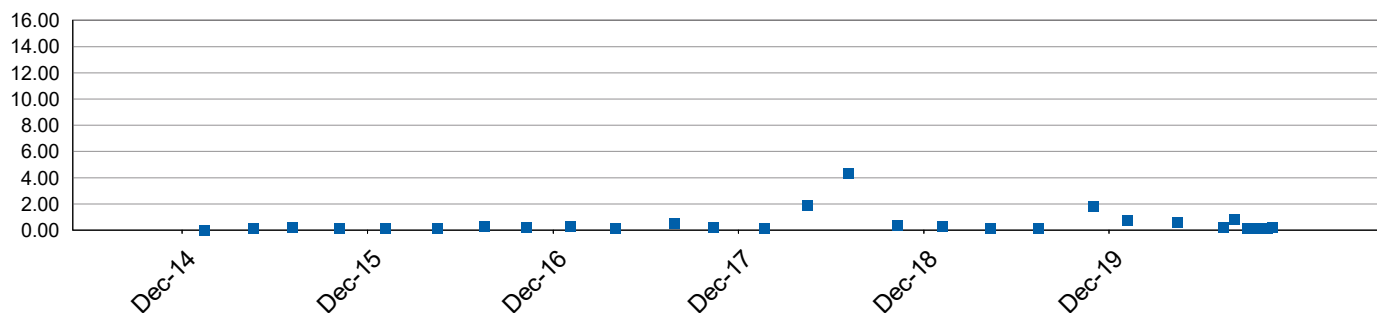
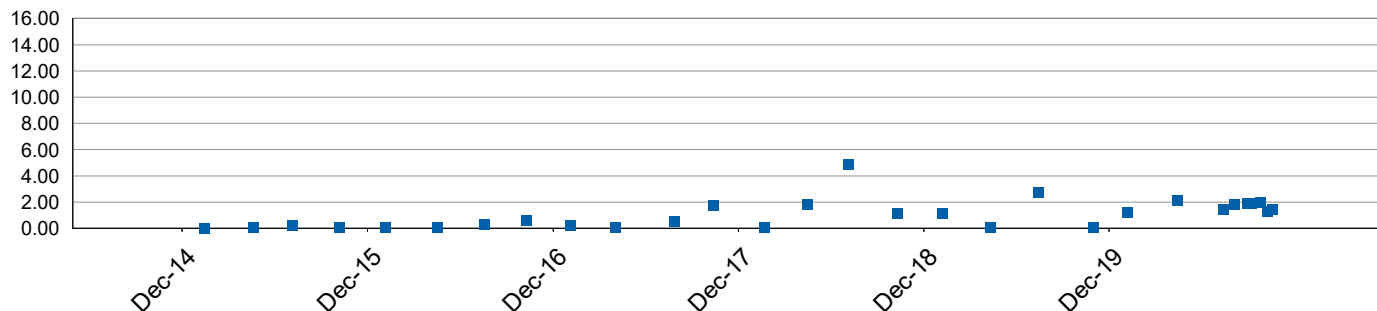


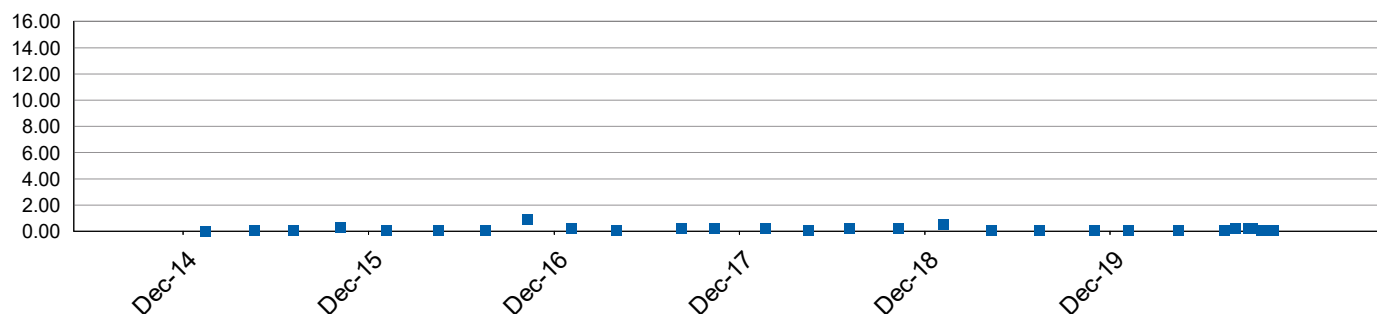
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**Methane (% v/v)**
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**Methane (% v/v)**
**EN/BH9/4**


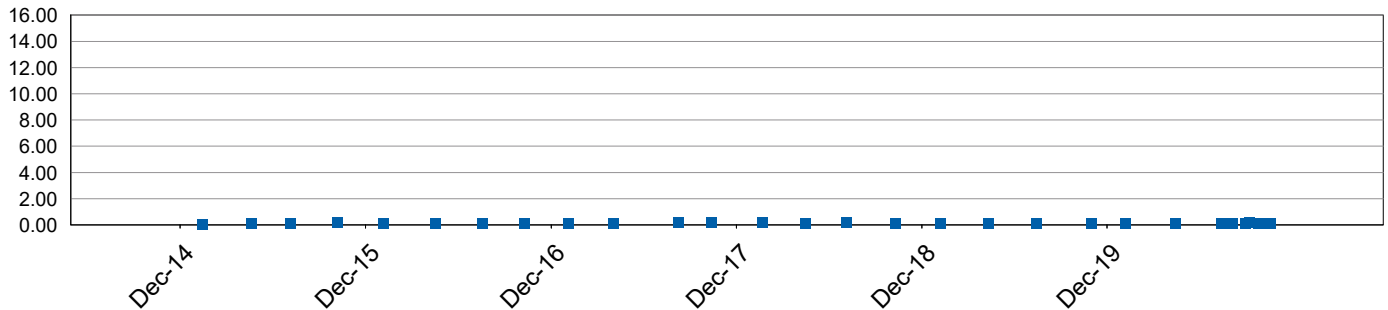
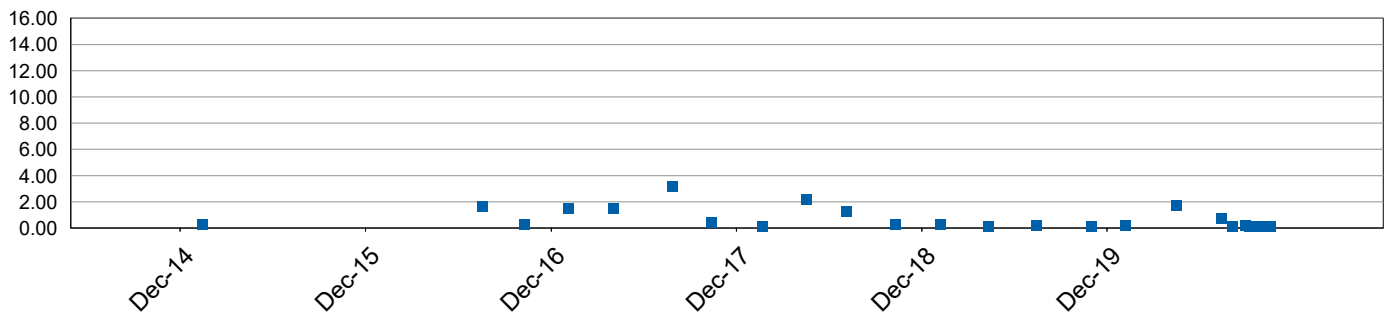
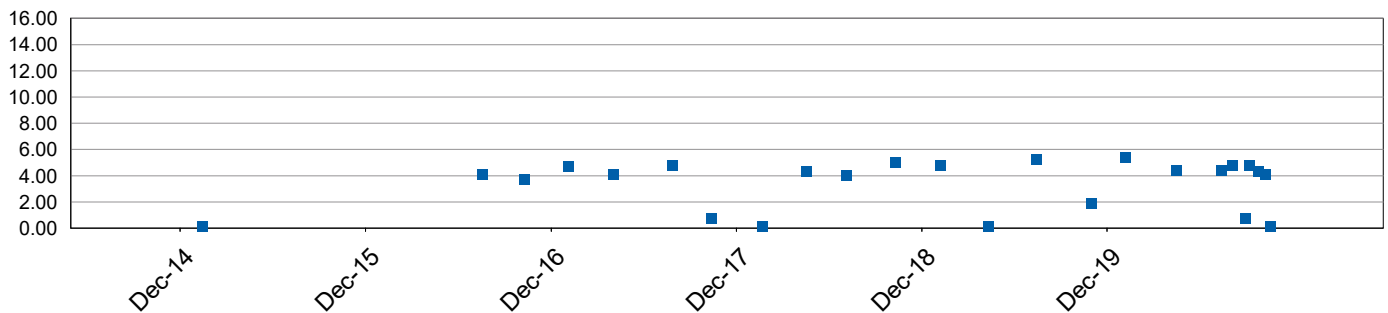
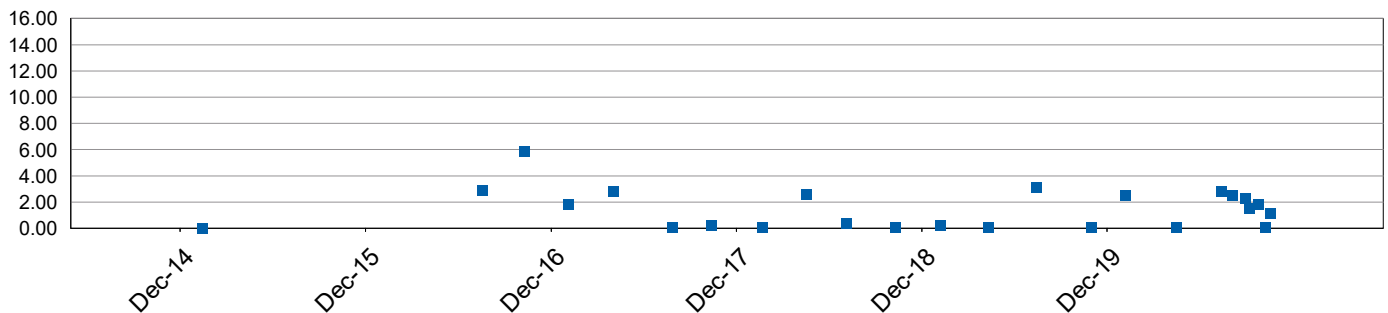


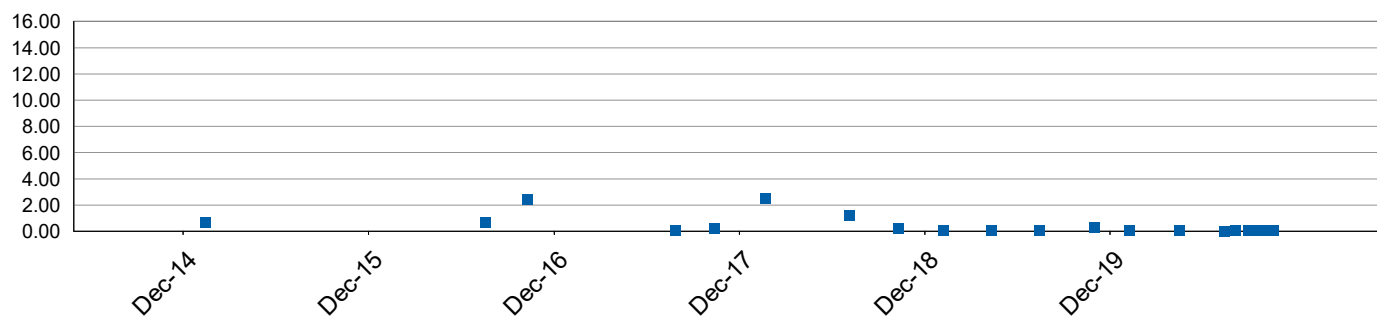
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**EN/BH10/4**




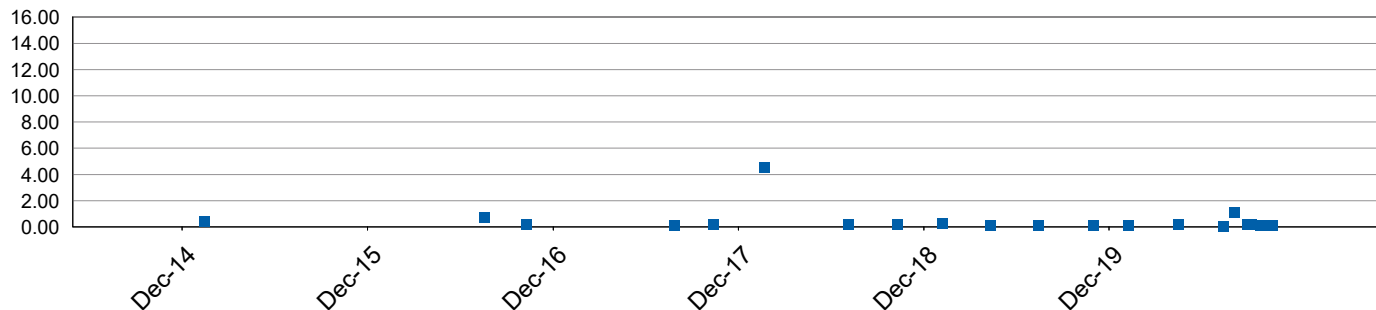
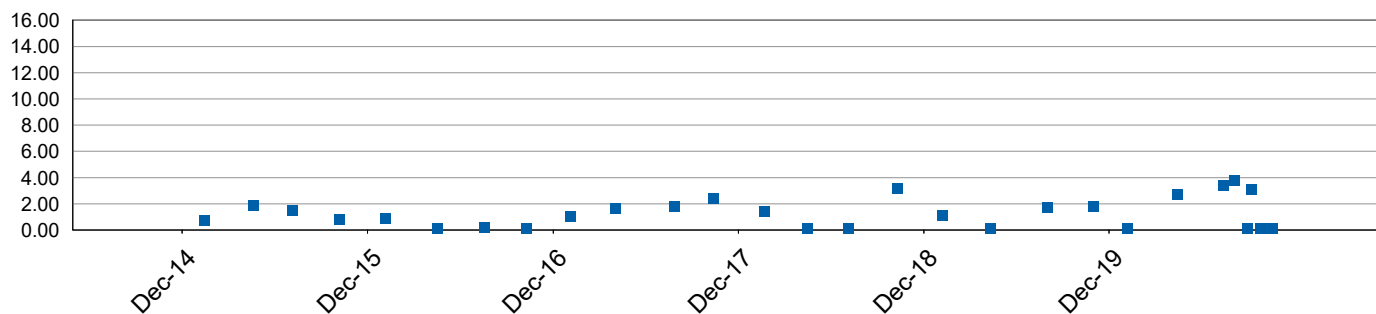
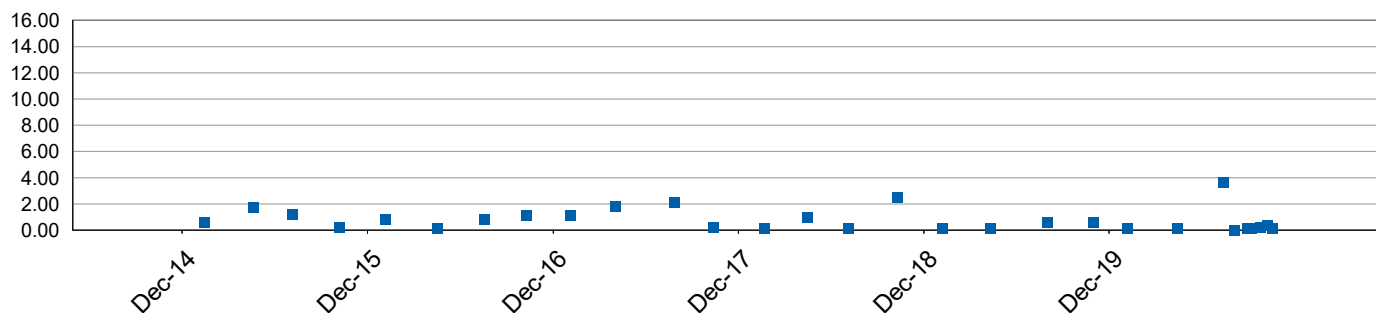
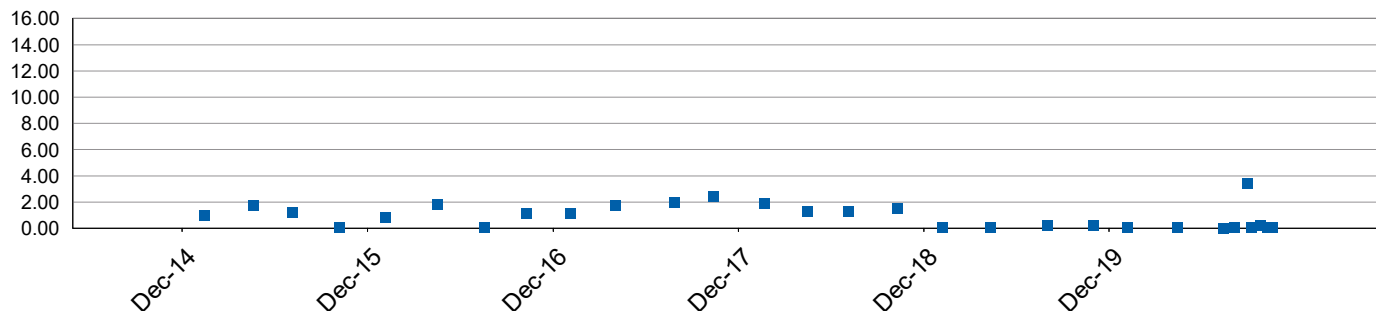
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**EN/BH12/4**

**Carbon Dioxide (% v/v)**
**EN/BH13/1**

**Carbon Dioxide (% v/v)**
**EN/BH13/2**

**Carbon Dioxide (% v/v)**
**EN/BH13/3**


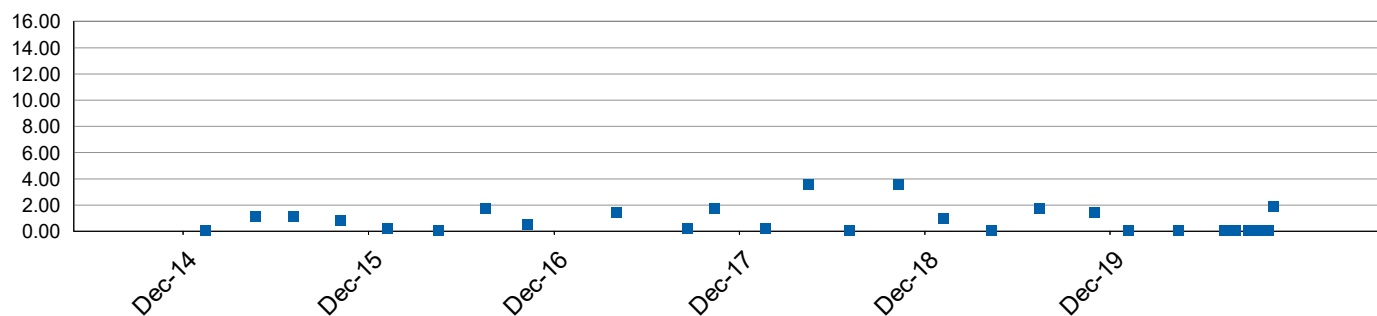


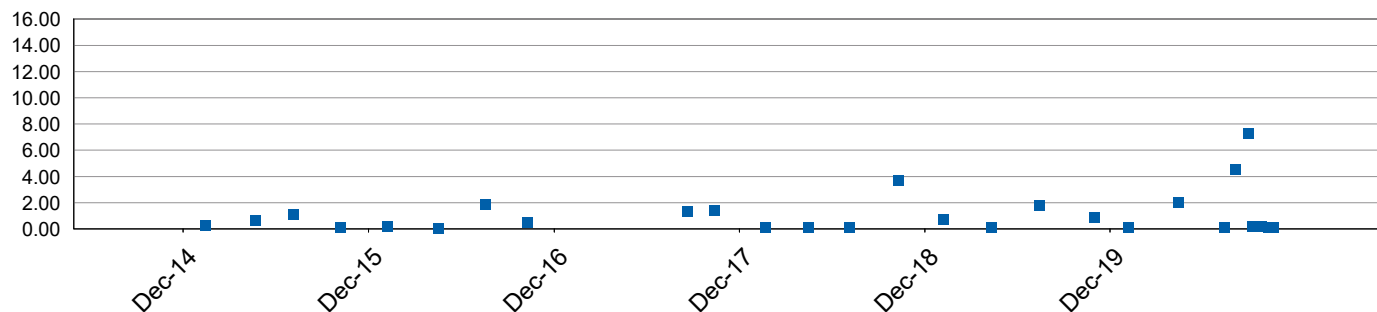
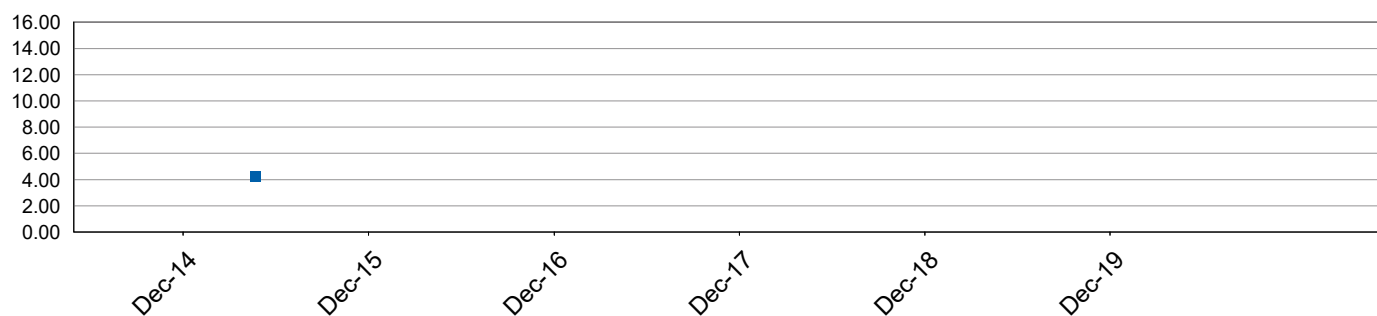
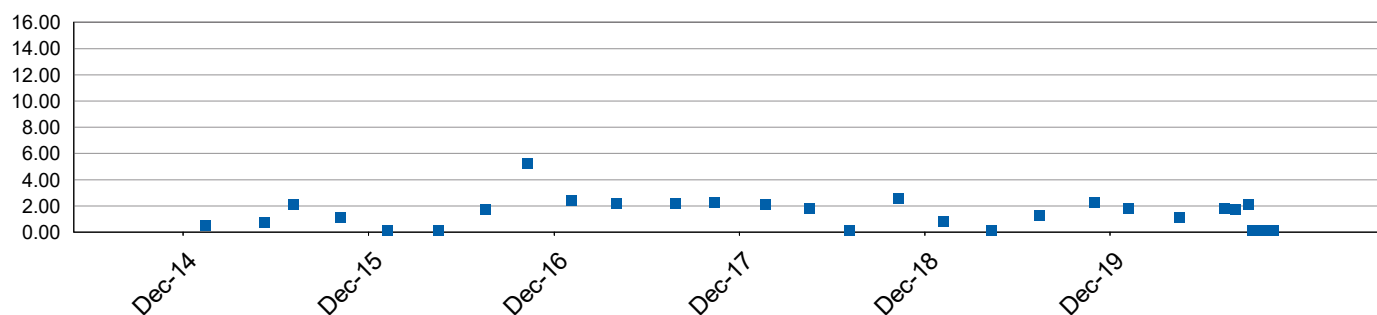
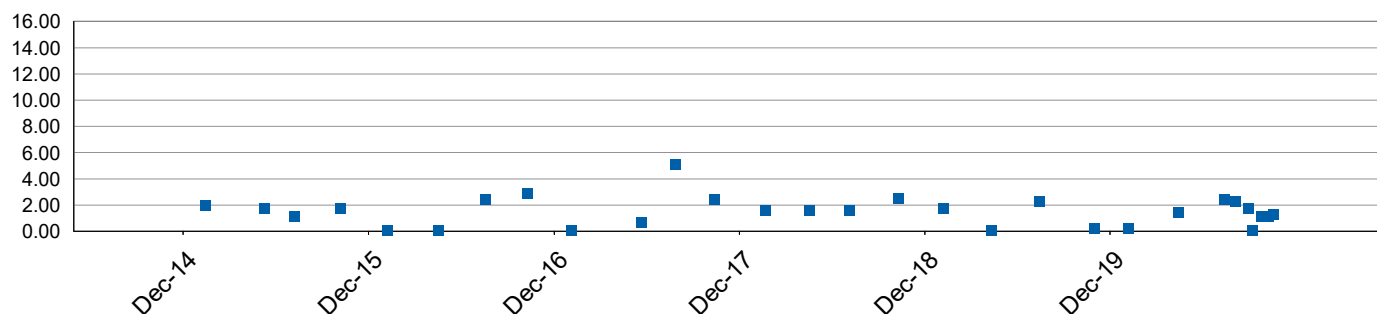
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**Carbon Dioxide (% v/v)**
**EN/BH15/1**

**Carbon Dioxide (% v/v)**
**EN/BH15/2**

**Carbon Dioxide (% v/v)**
**EN/BH15/3**






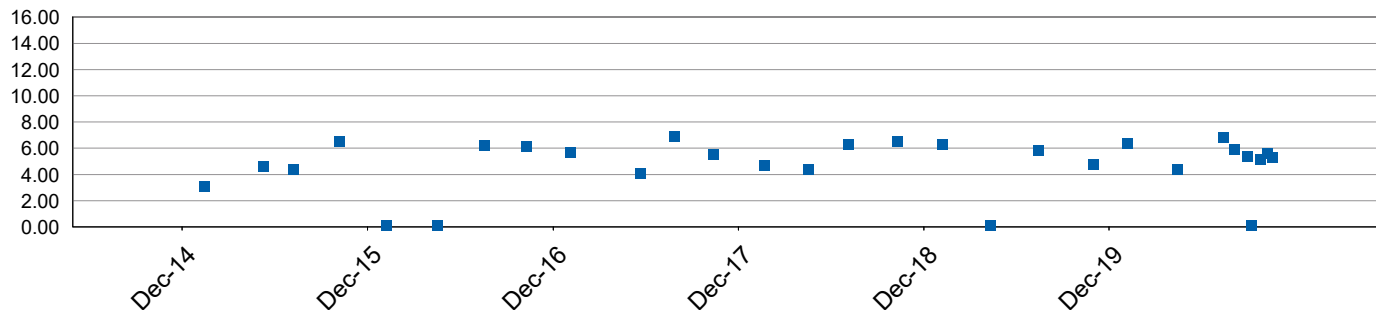
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**Carbon Dioxide (% v/v)**
**EN/BH2/3**




**Carbon Dioxide (% v/v)**
**EN/BH3/4**

**Carbon Dioxide (% v/v)**
**EN/BH3/5**

**Carbon Dioxide (% v/v)**
**EN/BH5**

**Carbon Dioxide (% v/v)**
**EN/BH6/1**


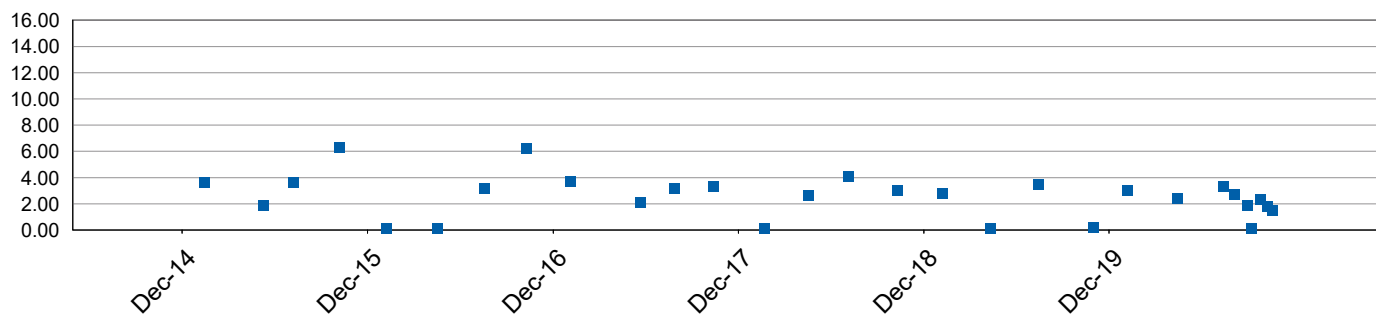
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EN/BH6/2



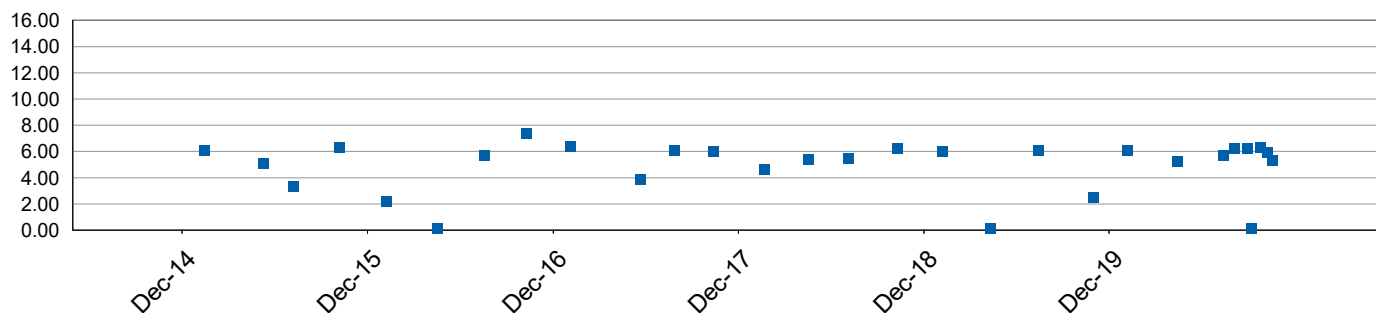
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EN/BH6/3



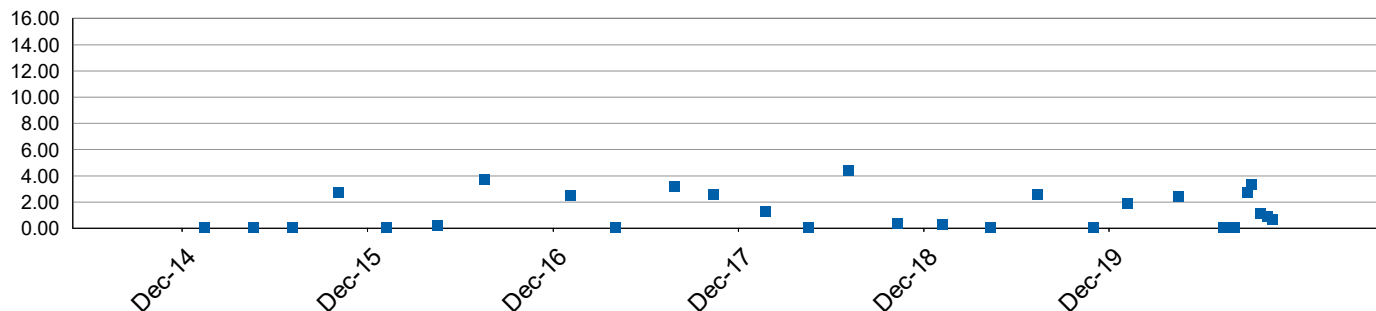
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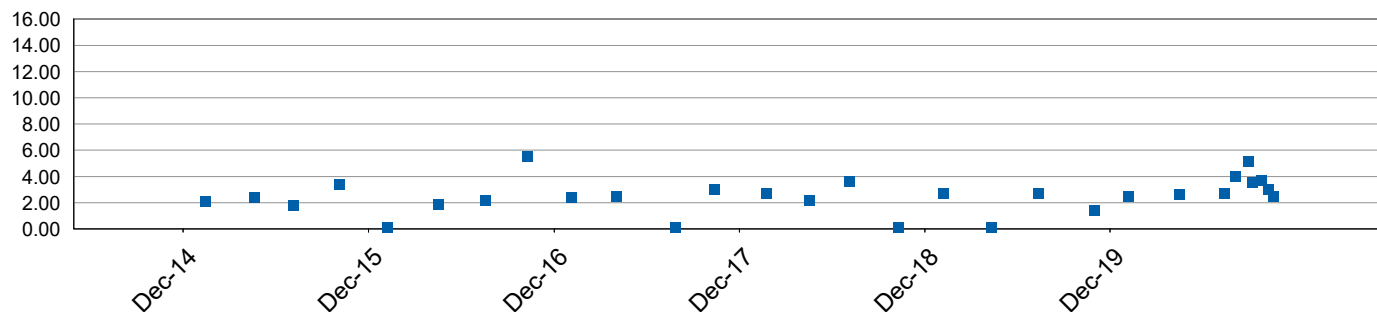
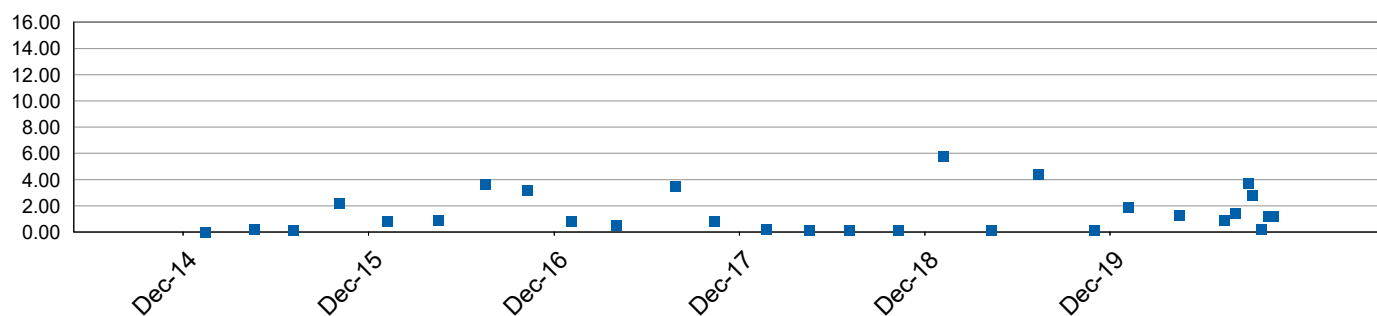
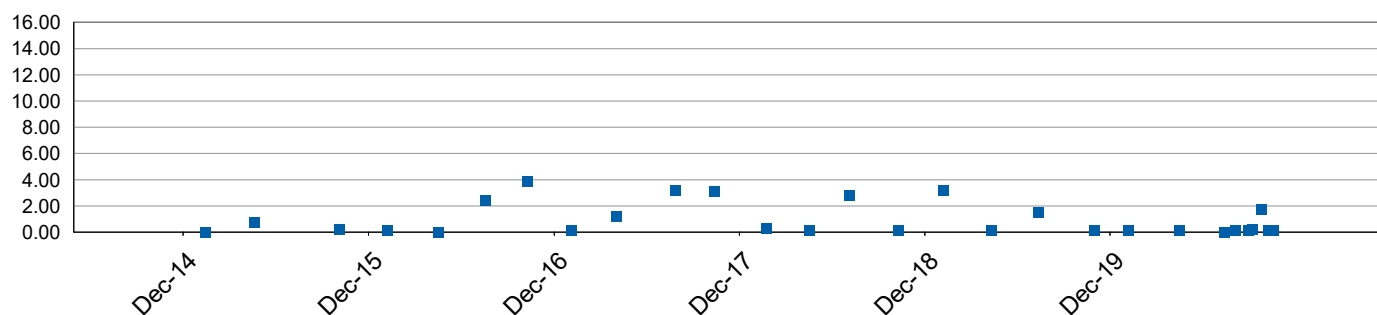
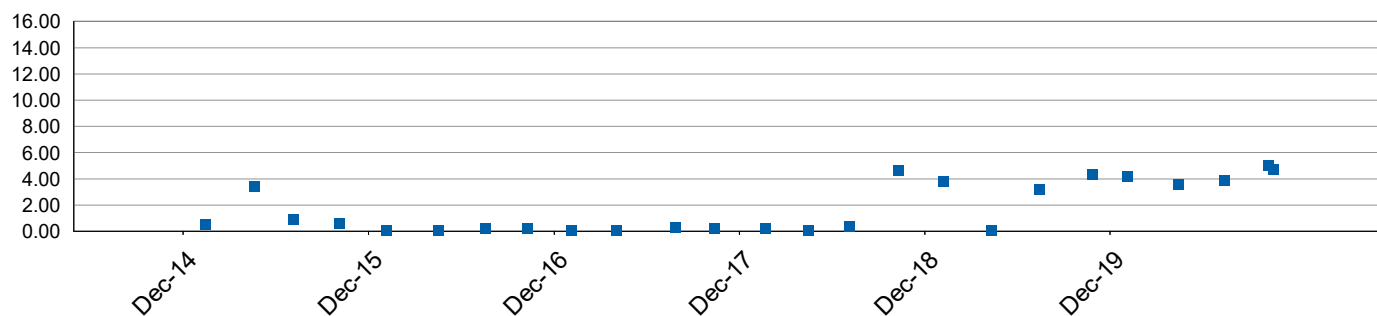
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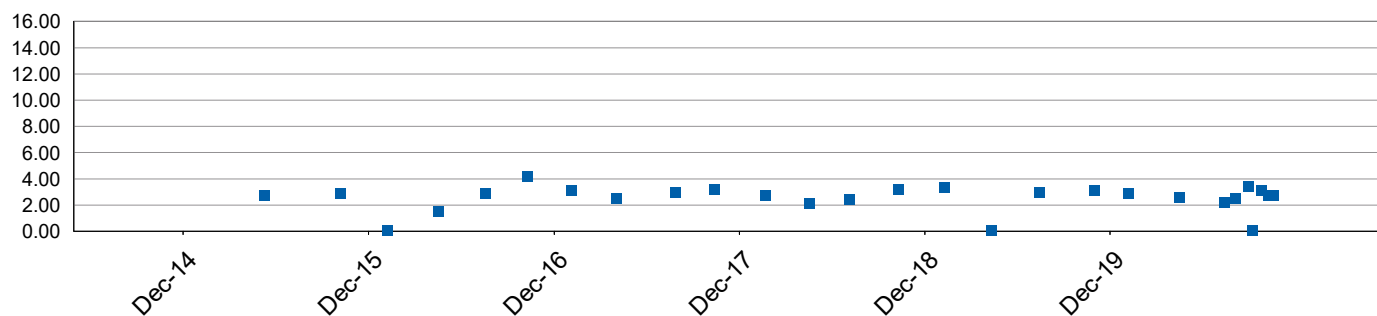


### Carbon Dioxide (% v/v)

EN/BH7/1



**Carbon Dioxide (% v/v)**
**EN/BH7/2**

**Carbon Dioxide (% v/v)**
**EN/BH7/3**

**Carbon Dioxide (% v/v)**
**EN/BH7/4**

**Carbon Dioxide (% v/v)**
**EN/BH8**




## **Appendix B ICoP 2011 methodology**

### **Introduction**

As agreed within Improvement Condition 3, the ICoP method has been applied to the dataset using statistical techniques to establish background methane and carbon dioxide concentrations for individual gas monitoring locations ([ICoP, 2011](#)).

A key element of the ICoP recommends that, for carbon dioxide, action levels are implemented, in place of compliance limits.

These action levels are to be set at a level at which the operator should take action and form an early warning and/or may instigate additional monitoring or emergency procedures. An exceedance may mean an interruption to the gas management system, but the Environment Agency does not need to be informed.

The Environment Agency can still regulate carbon dioxide through the Monitoring Management Plan if, for example, Contingency Actions were not implemented following carbon dioxide concentrations exceeding an action level.

### **Background Concentrations and Action Levels**

Before action levels can be determined, the background or baseline gas concentrations must first be understood, which in the context of this methodology are defined as the data measurements within the monitoring network prior to a gas migration event.

In order to adopt a conservative approach, the dataset is first subject to the identification and removal of any outliers as outlined in Agency R&D Document P1-471 ([Environment Agency, 2011b](#)).

The P1-471 outlier test (also referred to as the 'T<sub>max</sub> methodology') is a screening tool with the general aim of eliminating any confounding factors (outliers, potential migration events) which otherwise may adversely influence any conclusions in order to estimate baseline statistics.

The method 'standardises' and ranks all data points (on the basis of:  $n$  -mean / standard deviation) and compares the highest numerical value of this standardised dataset (termed 'T<sub>max</sub>') to a Critical Value ('T<sub>critical</sub>') at  $P = 1\%$  (probability).

When applied to gas concentrations in line with ICoP, the highest numerical value of this standardised dataset is termed 'T<sub>max</sub>' and the methodology can be used to determine whether the T<sub>max</sub> value is an 'outlier' of a normally distributed (or stable) dataset and can therefore be discounted, or is part of a 'normal' (stable) dataset ([ICoP, 2011](#)).

Unstable environments occur when the range in concentration values (between the maximum value and the 95<sup>th</sup> percentile value) is  $> 8\%$ .

$T_{\max}$  background concentrations and action levels have been calculated based on statistical assessment of the dataset over time. Table 1 and Table 2 outline the process for stable and unstable sub-surface environments.

**Table 6. Stable Dataset –  $T_{\max}$  and Action Level Methodology**

Determinand	$T_{\max}$ (Background) Concentration	Action Level
Methane	-	$T_{\max}$ (Background) + 0.5%
Carbon Dioxide	5% or less	$T_{\max}$ (Background) + 1.0%
	>5% to 10%	$T_{\max}$ (Background) + 2.0%
	>10% to 20%	$T_{\max}$ (Background) + 3.0%
	>20% to 25%	$T_{\max}$ (Background) + 4.0%
	Greater than 25%	None

**Table 7. Unstable Dataset - Action Level Methodology**

Determinand	$T_{\max}$ (Background) Concentration	Action Level
Methane	Any	$T_{\max}$ (Background)
Carbon Dioxide	Any	$T_{\max}$ (Background)

Action levels will identify changes in soil gas conditions that may be reflective of either:

1. Changes within the normal range of background conditions; and/or
2. Possible emissions of gas from the site.

The ICoP states that action levels are not required to be formally listed in the permit as there is no requirement for SUEZ to report action level exceedances to the Agency ([ICoP, 2011](#)).

As required under the Environmental Permitting (England and Wales) Regulations 2016 ([EPR, 2016](#)), the Site Contingency Action Plan states the Site will follow operating procedures and if an action level is exceeded a record will be kept including the exceedance and the action that was taken. Subsequently, if a methane compliance limit is breached, the Agency will have an audit trail on which to base their decision if to CCS score the incident, or not.

If the cause of the elevated methane and / or carbon dioxide is determined and rectified leading to a decrease in concentration, or the concentration declines of its own accord, then contingency actions will cease.



## Compliance Limits - Methane

The existing limits for methane, set in-line with Agency guidance document LFTGN 03 ([Environment Agency, 2004a](#)) may continue to be used if they are considered to remain appropriate. Where they are inappropriate, methane compliance limits should be set to:

**Table 8. Methane Compliance Limit Methodology**

$T_{\max}$ (Background) Concentration	Methane Compliance Limit
10% or less	$T_{\max}$ (Background) + 1.0%
Greater than 10%	None

## Compliance Limits - Carbon Dioxide

The ICoP methodology proposes that carbon dioxide is not used for regulating the sub-surface strata outside the landfill.

In-line with an approach accepted by the Agency at other Sites nationally, no compliance limits are assigned to Low or Medium Risk Boreholes.

Compliance limits would be assigned for carbon dioxide in High Risk monitoring points, based on an adaptation of the methodology for setting methane compliance limits ([ICoP, 2011](#)):

**Table 9. Carbon Dioxide Compliance Limit Methodology**

$T_{\max}$ (Background) Concentration	Carbon Dioxide Compliance Limit
5% or less	Action Level + 0.5%
>5% to 20%	Action Level + 1.0%



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***Appendix C Perimeter Gas Monitoring Data (%v/v) (January 2015 to November 2020).***

[Section Blank – Provided as Separate Workbook]



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***Appendix D Carbon Dioxide action levels calculations***

[Section Blank – Provided as Separate Workbook]



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***Appendix E SUEZ 2020 MMP***

**WHINNEY HILL LANDFILL SITE****PHASE 2****MONITORING MANAGEMENT PLAN**

April 2020

<b>Site</b>	Whinney Hill Landfill – Phase 2
<b>Document Title</b>	WNHP2/07 - Monitoring Management Plan
<b>Location of controlled copy</b>	1) SHEQ Manager / Advisor 2) Site 3) Environment Department

Date	Description and Summary of Changes
<b>November 2005</b>	Original Document. Changes Not Applicable
<b>August 2008</b>	Amend borehole references and requirements to correspond with permit variation WP3439LR issued 23 August 2007.
<b>November 2012</b>	Updated format and references to SITA Policies and Procedures. Incorporated various changes that had been agreed outside of revising the MMP previously. Revised in preparation for permit variation application.
<b>February 2013</b>	Updated leachate level compliance limits
<b>April 2013</b>	Updated permit references, updated leachate level compliance limits and the addition of leachate assessment levels.
<b>June 2013</b>	Updated to reflect issue of permit variation.
<b>Dec 2013</b>	Updated to reflect replacement of WH/LM4/3 with WH/LM4/3R
<b>July 2015</b>	Updated to reflect issue of permit variation, mainly: Reduction of Gas, Leachate Analysis and Groundwater monitoring to Quarterly. Trigger Level changes for Leachates. Also revised to match new template.
<b>April 2016</b>	Amendment to include leachate well re-drill WH/LM4/4R. Change to Suez format.
<b>October 2016</b>	Removal of perimeter gas monitoring points EN/BH3/5 and EN/BH13/5
<b>August 2017</b>	Inclusion of leachate compliance limits and monitoring requirements for Cell 8/2 (LMP8B, LM8/3 and LM8/4) following EA agreement. Monitoring plan updated, including new location of SW5.
<b>April 2020</b>	Updated with new cell Monitoring Points LMP6A, LM6/1 and LM6/2. Updated MMP format and quarterly report requirements in line with S4.1 of the permit. Updated contingency actions with new role titles.

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## **CONTENTS**

1. Introduction
2. Monitoring Regime
3. Compliance / Assessment Limits & Action Levels
4. Contingency Action Plans

## **FIGURES**

Figure 1. Monitoring Location Plan

## 1.0 INTRODUCTION

- 1.1 This Monitoring Management Plan (MMP) for Whinney Hill, Phase 2 Landfill (the Site) has been produced in line with the Permit, local agreements and approved documents.
- 1.2 The Environmental Monitoring regime is detailed in Section 2. Compliance Limits, Assessment Limits and Action Levels are detailed in Section 3. Contingency Actions to be implemented if a compliance limit, assessment level or action level is breached are detailed in Section 4. Locations of monitoring points are shown in Figure 1.
- 1.3 An inspection to determine that all monitoring infrastructure is in a fit for purpose condition is conducted during every scheduled monitoring site visit. The results are recorded within Suez's internal electronic systems and where necessary, remediation plans are implemented.
- 1.4 SUEZ has internal procedures for the monitoring and sampling of landfill gases, surface waters, groundwater and leachate. These protocols will be adhered to in monitoring at the site:
  - i. Procedure to measure methane, carbon dioxide and oxygen in and around landfill sites SUEZ-G01
  - ii. Procedure to measure groundwater and leachate levels SUEZ-L01
  - iii. Procedure to sample raw waters and leachate SUEZ-S01Copies are available upon request.
- 1.5 Suez are certified to ISO 14001 and ISO 9001 and OHSAS 18001 standards.
- 1.6 A suitable UKAS accredited laboratory will carry out all aqueous sample analysis. Approved suppliers will be used for any other analysis requirements.
- 1.7 All monitoring data and sampling results are stored electronically on a Suez monitoring database, which is backed up daily and stored for a minimum period of 6 years.
- 1.8 Quarterly monitoring data submissions will be made through the Agency's sharefile link system as per the table below. Quarterly submissions will include data for groundwater level and quality, leachate level, surface water quality and flow, leachate discharge flow, perimeter gas and in-waste gas in accordance with Table S4.1 of the Permit.
- 1.9 An annual monitoring report will be submitted to the Environment Agency on an annual basis by 31 March each year, covering a reporting period of 1 January to 31 December and will include all environmental monitoring data collected during the reporting period.
- 1.10 Reporting and monitoring periods:



Description of Task	Monitoring Period	Reporting Period	Report Deadline	Submission
Annual Interpretive Report (4.2.2a) and Monitoring Requirements.	1 Jan to 31 Dec	1 Jan to 31 Dec	31 March	
Quarterly Monitoring and Reporting	1 Jan to 31 March	1 Jan to 31 March	28 April	
	1 April to 30 June	1 April to 30 June	28 July	
	1 July to 30 Sept	1 July to 30 Sept	28 October	
	1 Oct to 31 Dec	1 Oct to 31 Dec	28 January	

Note: Monitoring periods, reporting periods and report submission deadline dates may be altered upon receipt of written agreement from the Environment Agency.

Note: Multiyear analytical monitoring requirements will be scheduled and reported as required by the MMP.

## 2.0 MONITORING REGIME

Surface Water		
Monitoring Points	Frequency	Determinands
WH/SW1, WH/SW2, WH/SW3, WHSW3A, WH/SW4, WH/SW5	Continuous	Flow
<i>SW3A to be monitored until SW3 constructed.</i>	Monthly	pH, electrical conductivity, ammoniacal nitrogen, chloride, Suspended Solids, Visual Oil and Grease, temperature.
WH/SW1, WH/SW2, WH/SW3, WHSW3A, WH/SW4, WH/SW5  <i>SW3A to be monitored until SW3 constructed.</i>	Annually	As monthly plus :  Sulphate, alkalinity, TON, TOC, Sodium, potassium, calcium, magnesium, iron, manganese, cadmium, chromium, copper, nickel, lead, zinc, mecoprop, phenol.

Groundwater		
Monitoring Points	Frequency	Determinands
Up gradient boreholes: EQ/BHC1(R), EQ/BHC2(R), WH/0419AM, WH/420DKF, WH/0421AM, WH/0422DKF, WH/0202AMR, WH/0202DKF(R)	Quarterly	Groundwater level, pH, electrical conductivity, ammoniacal nitrogen, chloride, Nickel, Cadmium, Mecoprop, Toluene, temperature.
	Annually	As quarterly plus: Calcium, Magnesium, Sodium, Potassium, Alkalinity, Sulphate, Iron, Manganese, Chromium, Copper, Lead, Zinc, Phenol. Base of monitoring point
Down Gradient boreholes: WH/0401DKF1, WH/0402AM1, WH/0203AM(R), WH/0203DKF(R), WH/0203OLR, WH/BH87DKF, WH/BH87AM(A), WH/BH87AM(B), WH/BH87OLR, WH/BH88DKF, WH/BH88AM, WH/BH88OLR, WH/BH89DKF, WH/BH89AM, WH/BH89OLR, EQ/BHA1(R)1, EQ/BHA2(R)1,	Every 2 years	As quarterly and annual plus volatile organic compounds, semi volatile organic compounds, organotin compounds, organochlorine and organophosphorus pesticides, acid herbicides, mecoprop and speciated TPH. Other substances as agreed with the Suez risk team.

Gas External		
Monitoring Points	Frequency	Determinands
EN/BH1, EN/BH2/1, EN/BH2/2, EN/BH2/3, EN/BH2/4, EN/BH3/1, EN/BH3/2, EN/BH3/3, EN/BH3/4, EN/BH5, EN/BH6/1, EN/BH6/2, EN/BH6/3, EN/BH6/4, EN/BH7/1, EN/BH7/2, EN/BH7/3, EN/BH7/4, EN/BH8, EN/BH9/1, EN/BH9/2, EN/BH9/3, EN/BH9/4, EN/BH10/1, EN/BH10/2, EN/BH10/3, EN/BH10/4, EN/BH11/1, EN/BH11/2, EN/BH11/3, EN/BH11/4, EN/BH12/1, EN/BH12/2, EN/BH12/3, EN/BH12/4, EN/BH13/1, EN/BH13/2, EN/BH13/3, EN/BH13/4, EN/BH14/1, EN/BH14/2, EN/BH14/3, EN/BH14/4, EN/BH15/1, EN/BH15/2, EN/BH15/3, EN/BH15/4, EN/BH16/1, EN/BH16/2, EN/BH16/3, EN/BH16/4, WH/BH65, WH/BH66, WH/BH67, WH/BH68A, WH/BH68B, WH/BH69, WH/BH70, WH/BH71, WH/BH72, WH/BH73, WH/BH74, WH/BH75	Quarterly	Methane, carbon dioxide, oxygen, atmospheric pressure, meteorological data.  Record whether the ground is:  Waterlogged / Frozen / Snow covered

Gas Internal		
Monitoring Points	Frequency	Determinands
Gas collection system at control valve and/or manifolds on gas system	Monthly	Methane, carbon dioxide, oxygen, carbon monoxide, atmospheric pressure, gas flow rate or suction, % Balance Gas (calculated as the difference between the sum of measured gases and 100%). Record whether the ground is: Waterlogged / Frozen / Snow covered
	6 Monthly	Hydrogen Sulphide
Input to Gas Utilisation Compound	Annually	Trace gas analysis in accordance with LFTGN04 (v3 2010) or as otherwise agreed with EA.
Input to Gas Utilisation Compound	Weekly	Methane, carbon dioxide, oxygen, gas flow rate, Suction, % Balance Gas (calculated as the difference between the sum of measured gases and 100%)
Engine A1, A2, A3, A4, A5 & A6	Annually	Oxides of Nitrogen, CO, Total VOC's
	Quarterly	NOx and CO
Flare (A7)	Annually	Oxides of Nitrogen, CO Total VOC's. Temperature (in accordance with LFTGN05 (v2 2010) or as otherwise agreed with EA).

Annual flare monitoring only required if the flare operates for more than 10% of a year (876 hours).

Surface Emissions – FID Walkover	
Monitoring Points	Frequency
Permanently and Temporarily capped zone and Uncapped areas	Annually
Permanently capped zone and Temporarily capped zone	In accordance with LFTGN07*

\*: LFTGN07 states monitoring of emissions through a landfill cap has two stages:

1. Initially a walkover survey using an FID demonstrates whether there are inadequacies in the gas containment and collection system. Only when these deficiencies have been located and remedied such that the concentration of gas above the surface is low is it appropriate to begin a quantitative survey of surface flux.
2. Subsequently, the flux of methane emitted through the intact cap is measured at a number of representative points using an array of flux boxes. From these individual measurements, we can calculate the average flux from capped zones. This identified where the gas flux exceeds an emission standard set by the Environment Agency.

Progression to Stage (2) will not occur until Stage (1) demonstrates results are less than the assessment limits in Section 3. Where the assessment limits in Section 3 are exceeded, the Landfill Gas Surface Emissions Contingency Action (Section 4) will be implemented.

Where the flux box survey shows results below the compliance limits detailed in Section 3 and there have been no significant physical changes in the gas management during the year, a detailed annual FID walkover survey (Stage i) can be used to demonstrate that the surface emissions are compliant, by comparing results to the assessment limits detailed in Section 3.

If the surveys show no change in the pattern of methane emissions, the values for the flux and total methane emissions measured in the initial survey may be reported and a fresh flux box survey is not necessary.

Leachate		
Monitoring Points	Frequency	Determinands
WH/LM4/3R, WH/LM4/4R, WH/LM5/1, WH/LM5/2, WH/LM5/3, WH/LM5/4, WH/LM6/1, WH/LM6/2, WH/LM7/1, WH/LM7/2, WH/LM7/3, WH/LM7/4, WH/LM7/5, WH/LM7/6, WH/LM8/1, WH/LM8/2, WH/LM8/3, WH/LM8/4.  <i>Not constructed, to be monitored            when constructed: WH/LM6/3,            WH/LM6/4</i>	Monthly or  Quarterly (if cell is permanently capped)	Depth to leachate
WH/LM4/3R, WH/LM4/4R, WH/LM5/1, WH/LM5/2, WH/LM5/3, WH/LM5/4, WH/LM6/1, WH/LM6/2, WH/LM7/1, WH/LM7/2, WH/LM7/3, WH/LM7/4, WH/LM7/5, WH/LM7/6, WH/LM8/1, WH/LM8/2, WH/LM8/3, WH/LM8/4, WH/LMP4, WH/LMP5A, WH/LMP5B, WH/LMP6A, WH/LMP7A, WH/LMP7B, WH/LMP7C, WH/LMP8A, WH/LMP8B  <i>Not constructed, to be monitored            when constructed: WH/LM6/3,            WH/LM6/4, WH/LMP6B</i>	Annually	Base elevation of monitoring point
WH/LMP4, WH/LMP5A, WH/LMP5B, WH/LMP6A, WH/LMP7A, WH/LMP7B, WH/LMP7C, WH/LMP8A, WH/LMP8B  <i>Not constructed, to be monitored            when constructed: WH/LMP6B</i>	Quarterly	pH, electrical conductivity, ammoniacal nitrogen, chloride, BOD, COD, Calcium, Magnesium, Sodium, Potassium, Iron, Manganese, Chromium, Copper, Nickel, Lead, Zinc, Cadmium, Arsenic, Total Sulphates, Alkalinity, Temperature.
	Annually or  Every 4 years (if cell is permanently capped)	As quarterly plus: Mercury, Phenol, volatile organic compounds, semi volatile organic compounds, organotin compounds, organochlorine and organophosphorus pesticides, acid herbicides, mecoprop and speciated TPH. Other substances as agreed with the Suez risk team.

Note: WH/LMP7A, WH/LMP7B, WH/LM7/1, WH/LM7/2, WH/LM7/3, WH/LM7/4 and WH/LM4/4R were previously called WH/7.1LEC, WH/7.2LEC, WH/7.1LMP1, WH/7.1LMP2, WH/7.2LMP1, WH/7.2LMP2 and WH/LM4/4 respectively.

Discharge Consent		
Monitoring Points	Frequency	Determinands
WH/D1	Daily	Daily maximum flow Daily maximum volume
	Monthly	Ammoniacal nitrogen, antimony, arsenic, beryllium, BOD, cadmium, chloride, chromium, COD, copper, cyanide, formaldehyde, lead, mercury, nickel, NVM (Petroleum Spirit Extractable), pH, selenium, settleable solids, silver, sulphate, sulphides, sulphur, temperature, tin, total suspended solids, vanadium, zinc and ammonia, separable grease and oil, dissolved methane, Calcium Carbide, Carbon Disulphide, organo-halogens

WH/D1 analysis requirements are included as the monitoring is required to demonstrate compliance with the trade effluent consent issued by United Utilities.

### 3.0 COMPLIANCE / ASSESSMENT LIMITS

Landfill Gas Compliance Limits		
Monitoring Point	Methane %v/v	Carbon Dioxide %v/v
WH/BH65	1.0	6.3
WH/BH66	1.0	4.1
WH/BH67	1.0	7.9
WH/BH68A	1.0	1.5
WH/BH68B	1.0	1.5
WH/BH69	1.0	4.7
WH/BH70	1.0	3.6
WH/BH71	1.0	5.0
WH/BH72	1.0	5.5
WH/BH73	1.0	5.3
WH/BH74	1.0	3.1
WH/BH75	1.0	12.0
EN/BH1, EN/BH2/1, EN/BH2/2, EN/BH2/3, EN/BH2/4, EN/BH3/1, EN/BH3/2, EN/BH3/3, EN/BH3/4, EN/BH5, EN/BH6/1, EN/BH6/2, EN/BH6/3, EN/BH6/4, EN/BH7/1, EN/BH7/2, EN/BH7/3, EN/BH7/4, EN/BH8, EN/BH9/1, EN/BH9/2, EN/BH9/3, EN/BH9/4, EN/BH10/1, EN/BH10/2, EN/BH10/3, EN/BH10/4, EN/BH11/1, EN/BH11/2, EN/BH11/3, EN/BH11/4, ENBH12/1, ENBH12/2, ENBH12/3, ENBH12/4, ENBH13/1, ENBH13/2, ENBH13/3, ENBH13/4, ENBH14/1, ENBH14/2, ENBH14/3, ENBH14/4, ENBH15/1, ENBH15/2, ENBH15/3, ENBH15/4, ENBH16/1, ENBH16/2, ENBH16/3, ENBH16/4	n/a	n/a

Landfill Gas Collection System Assessment Limits	
Monitoring Point	Assessment Limit
Gas collection system at well control valve and/or manifold on gas system	Where the oxygen level exceeds 5% or the % balance gas is greater than 20% an assessment of air ingress into the system shall be undertaken.
	Where the concentration of carbon monoxide exceeds 100ppm.
	Concentrations of hydrogen sulphide shall be assessed in accordance with the gas and odour management plans
Input to LFG Utilisation Compound	Where the oxygen level exceeds 5% or the % balance gas is greater than 20% an assessment of air ingress into the system shall be undertaken.
	The concentration of trace gas components shall be assessed against the assumptions made in the Landfill Gas Risk Assessment and Dispersion Modelling.

Gas Emissions- Flare Compliance Limits		
Determinand	Frequency	Emission Limit mg/m <sup>3</sup>
NOx	Annually	150
CO		50
Total VOCs		10

Note: For flare commissioned post Dec 2003

Gas Emissions- Engine Compliance Limits		
Determinand	Frequency	Emission Limit mg/m <sup>3</sup>
NOx	Annually	500
CO		1400
Total VOCs		1000

Note: Lower engine emission standard applied to all engines following updated Atmospheric Dispersion Modelling (Golder Associates, October 2012).

Surface Emission Assessment Limits	
Zone	Assessment Limit (ppmv)
Immediately above the surface on main zones of the cap and temporary cap	100
Close to any discrete feature such as a leachate well or well head or above uncapped area	1000

Note: Assessment limits assigned in-line with those recommended within Environment Agency guidance LFTGN07 V2 (2010)



Flux Emission Assessment Limits	
Zone	Assessment Limit (mg/m <sup>2</sup> /sec)
Permanently capped zone	0.001
Temporarily capped zone	0.1

Note: Assessment limits assigned in-line with those recommended within Environment Agency guidance LFTGN07 V2 (2010)

Leachate Compliance and Assessment Limits		
Monitoring Point	Assessment Limit (m Head)*	Compliance Limit (m Head)
WH/LMP4	1.50	None
WH/LM4/3R	1.50	3.00
WH/LM4/4R	1.50	3.00
WH/LMP5A	1.50	None
WH/LM5/1	1.50	3.00
WH/LM5/2	1.50	3.00
WH/LMP5B	1.50	None
WH/LM5/3	1.50	3.00
WH/LM5/4	1.50	3.00
WH/LMP7A	1.50	None
WH/LM7/1	1.50	3.00
WH/LM7/2	1.50	3.00
WH/LMP7B	1.50	None
WH/LM7/3	1.50	3.00
WH/LM7/4	1.50	3.00
WH/LMP7C	1.00	None
WH/LM7/5	1.00	1.50
WH/LM7/6	1.00	1.50
WH/LMP8A	1.50	None
WH/LM8/1	1.50	3.00
WH/LM8/2	1.50	3.00
WH/LM8/3	1.50	2.50
WH/LM8/4	1.50	2.00
WH/LM6/1	1.50	3.00
WH/LM6/2	1.50	3.00
WH/LM6/3	Not Constructed - TBC	Not Constructed - TBC
WH/LM6/4	Not Constructed - TBC	Not Constructed - TBC

\* Note: Assessment limit as detailed within the Leachate Management Plan

Discharge to Sewer Compliance Limit		
Monitoring Point	Parameter	Limit
WH/D1	Volume	1000 m <sup>3</sup> /day

Groundwater Compliance Limits		
Monitoring Point	Parameter	Limit
WH/SW3a	pH	>5 <9
	Ammoniacal nitrogen (mg/l)	1.0
	Suspended Solids (mg/l)	30
	Flow (l/sec)	10
WH/SW3*	Ammoniacal nitrogen (mg/l)	0.5
	Chloride (mg/l)	250
	Suspended Solids (mg/l)	30
	Mecoprop (µg/l)	18
	Cadmium (mg/l)	0.001
	Nickel (mg/l)	0.02
	Flow (l/sec)	10
WH/SW4	Ammoniacal nitrogen (mg/l)	1.0
	Chloride (mg/l)	250
	Suspended Solids (mg/l)	59.4
	Mecoprop (µg/l)	18
	Cadmium (mg/l)	0.001
	Nickel (mg/l)	0.02
	Flow (l/sec)	10
WH/SW5	Ammoniacal nitrogen (mg/l)	1.0
	Chloride (mg/l)	250
	Suspended Solids (mg/l)	30
	Flow (l/sec)	30

\* Note: To be installed following agreement of Surface Water Management Plan

Groundwater Compliance Limits						
Monitoring Point	Ammoniacal Nitrogen (mg/l)	Chloride (mg/l)	Cadmium (mg/l)	Mecoprop (µg/l)	Nickel (mg/l)	Toluene (µg/l)
WH/BH87OLR, WH/BH88OLR, WH/BH89OLR and WH/BH0203OLR	0.39	250	0.001	0.10	0.02	4.0
WH/BH87AM(A), WH/BH87AM(B), WH/BH88AM, WH/BH89AM, WH/0203AMR and WH/0402AM	1.62	316.75	0.001	1.67	0.02	4.0
WH/BH87DKF, WH/BH88DKF, WH/BH89DKF, WH/0203DKFR and WH/0401DKF	3.57	250	0.001	2.18	0.02	4.0

## 4.0 CONTINGENCY ACTIONS

Landfill Gas Flare / Engine		
Contingency Action	Response Time	Responsibility
Notify the EA and site manager via the notification form as required by condition 4.3.2 of the Permit	24 hours	Site Manager / EIR Manager / EIR Advisor
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Site Manager / EIR Manager / EIR Advisor
Verify results with the gas analyst	7 days	Site Manager / EIR Manager / EIR Advisor
Re-test	1 month	Site Manager / EIR Manager / EIR Advisor
Action plan to be agreed following retest, action plan to include: determine risk. If risks unacceptable remedial actions to be implemented	3 months or as agreed with the EA	Site Manager / EIR Manager / EIR Advisor

Perimeter Gas		
Contingency Action	Response Time	Responsibility
Inform EA via the notification form as required by condition 4.3.2 of the Permit	24 hours	Aftercare Technician / Aftercare Operative
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative
Re-monitor the borehole	1 month	Aftercare Technician / Aftercare Operative
Adjust gas extraction system (if necessary)	14 days	Site Manager
Review risk to receptor	1 month	SUEZ Risk Team
Review whether additional contingency actions are required	1 month	Site Manager / EIR Manager / EIR Advisor / SUEZ Risk Team

Landfill Gas Collection System		
Contingency Action	Response Time	Responsibility
Where the oxygen level exceeds 5% or where the addition of carbon dioxide and methane percentages is less than 80%	An assessment of air ingress into the system shall be undertaken	Site Manager
Where the concentration of carbon monoxide exceeds 100ppm.	Further investigation shall be undertaken	Site Manager

Landfill Gas Surface Emissions - Walkover		
Contingency Action	Response Time	Responsibility
Inform Site Manager	24 hours	Aftercare Technician / Aftercare Operative
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative
Agree and implement remedial actions	1 month	Aftercare Technician / Aftercare Operative
Re-monitor the area of exceedance and adjacent installations to confirm remedial actions were successful	2 months	Aftercare Technician / Aftercare Operative
Report results to the EA	Contained within annual report for period monitored	Aftercare Technician / Aftercare Operative

Landfill Gas Surface Emissions – Flux Box		
Contingency Action	Response Time	Responsibility
Inform Site Manager & notify the EA via Schedule 5 Notification	24 hours	Aftercare Technician / Aftercare Operative / EIR Manager / EIR Advisor
Raise a CAR on Compas to ensure appropriate remedial actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative / EIR Manager / EIR Advisor
Agree and implement remedial actions	1 month	Site Manager / EIR Manager / EIR Advisor
Re-monitor the area using an appropriate survey	3 months	Aftercare Technician / Aftercare Operative
Undertaken a further flux box survey one year from the data of the initial survey	12 months	Site Manager / Aftercare Technician / Aftercare Operative

Leachate Level – Assessment Level		
Contingency Action	Response Time	Responsibility
Inform Site Manager / SHEQ Advisor	24 hours	Aftercare Technician / Aftercare Operative
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Assistant Site Manager / Site Manager
Site Manager to initiate remedial measures to reduce leachate level, including checking efficiency of leachate extraction system.	1 week	Site Manager
Monitor level and review trends	1 month	Site Manager
Develop action plan as necessary	1 month	Site Manager

Note: Assessment levels are used to manage leachate levels at the Site, to prevent a compliance limit breach. Therefore, the management system will be considered effective even if assessment levels are breached, providing compliance is maintained. The Agency are not required to be informed of an assessment level breach.

<b>Leachate Level – Compliance Limit</b>		
<b>Contingency Action</b>	<b>Response Time</b>	<b>Responsibility</b>
Notify Site Manager / SHEQ Advisor	24 hours	Aftercare Technician / Aftercare Operative
Notify the EA via the notification form as required by condition 4.3.2 of the Permit	24 hours	Aftercare Technician / Aftercare Operative
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative
Site Manager to initiate remedial measures to reduce leachate level, including checking efficiency of leachate extraction system and increased monitoring of levels.	1 week	Site Manager
Agree action plan as necessary	1 month or as agreed with the EA	Site Manager and EIR Manager / EIR Advisor

<b>Leachate – Discharge</b>		
<b>Contingency Action</b>	<b>Response Time</b>	<b>Responsibility</b>
Notify the EA and Site Manager via the notification form as required by condition 4.3.2 of the Permit	24 hours	Aftercare Technician / Aftercare Operative
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative
Review trends	1 month (monitoring) /3 months (trends)	Site Manager / EIR Manager / EIR Advisor
Agree action plan as necessary	3 months or as agreed with the EA	Site Manager / EIR Manager / EIR Advisor

Surface Water		
Contingency Action	Response Time	Responsibility
<b>In the case of a breach where there is an obvious pollution incident</b>		
Establish the source and instigate preventative/ corrective actions. If pollution incident inform EA immediately via the notification form as required by condition 4.3.2 of the Permit	24 hours	Aftercare Technician / Aftercare Operative / Site Manager / EIR Manager / EIR Advisor
Cease all discharge of suspected contaminated surface water to controlled water	Immediate and within 24 hours	Site Manager
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative / Site Manager
Action plan to be agreed following review, action plan to include: determine risk. If risk are unacceptable remedial actions to be implemented	1 month	Site Manager / EIR Manager / EIR Advisor / SUEZ Risk Team
Contingency Action	Response Time	Responsibility
<b>In the case of a breach where a pollution incident is not obvious</b>		
Notify the EA and Site Manager via the notification form as required by condition 4.3.2 of the Permit	24 hours	Aftercare Technician / Aftercare Operative / Site Manager / Advisor
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative
Verify results with the lab	7 days	Aftercare Technician / Aftercare Operative
Re-sample	1 week	Aftercare Technician / Aftercare Operative
Review trends and establish source	1 months	Site Manager / EIR Manager / EIR Advisor
Action Plan to be agreed following review, action plan to include: determine risk. If risk are unacceptable remedial actions to be implemented	3 months	Site Manager / EIR Manager / EIR Advisor / SUEZ Risk Team

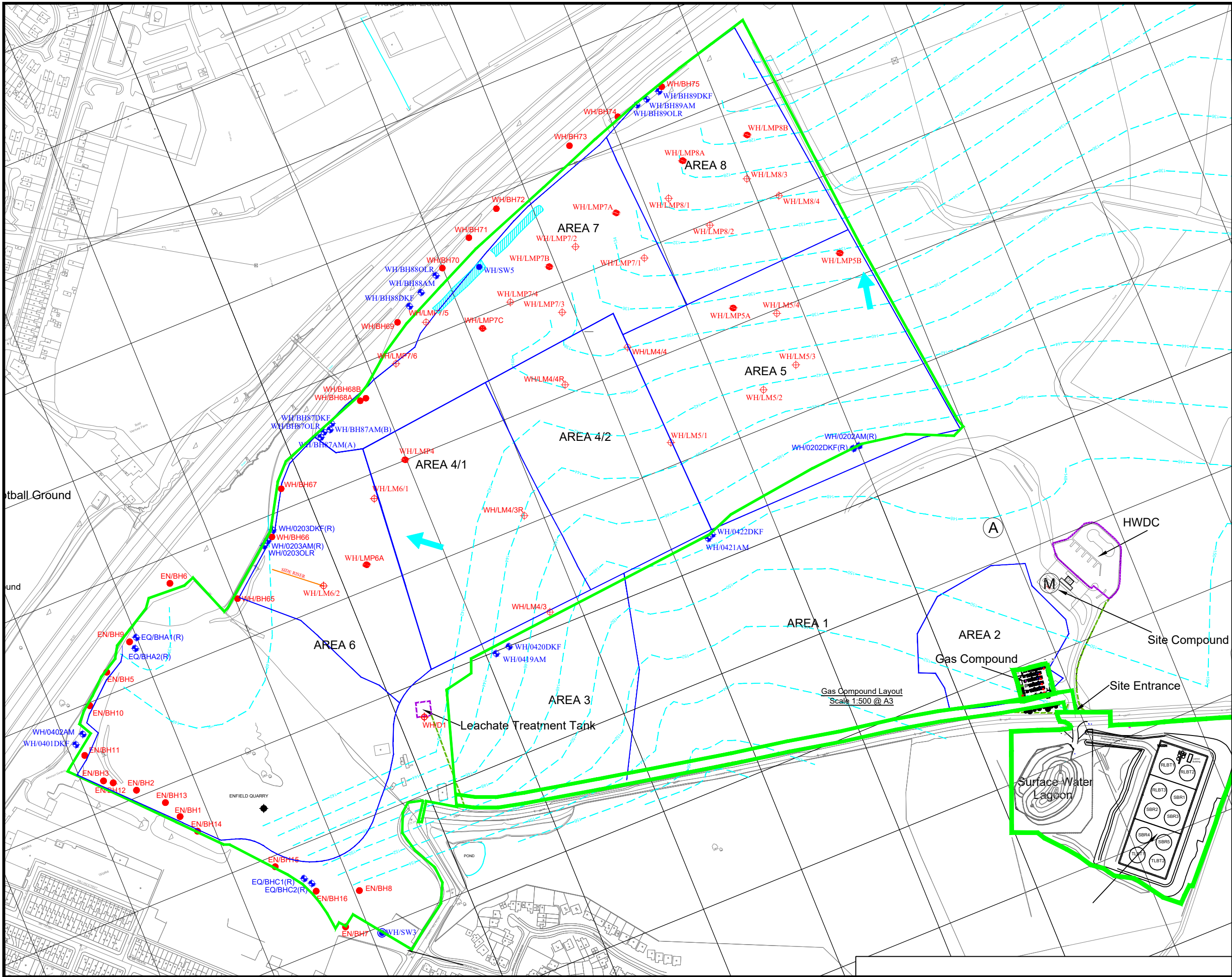


Groundwater Contingency Actions		
Contingency Action	Response Time	Responsibility
Notify the EA and site manager via the notification form as required by condition 4.3.2 of the Permit	24 hours	Aftercare Technician / Aftercare Operative
In the case of an obvious pollution incident establish the source investigate preventative/corrective actions	Immediate	Site Manager
Raise a CAR on Compas to ensure appropriate contingency actions are undertaken.	48 hours	Aftercare Technician / Aftercare Operative
Verify results with the lab	7 days	Aftercare Technician / Aftercare Operative
Re-test	1 month	Aftercare Technician / Aftercare Operative
Review Leachate levels and groundwater quality trends	3 months	Site Manager / EIR Manager / EIR Advisor
Action plan to be agreed following review, action plan to include: determine risk. If risks unacceptable remedial actions to be implemented	3 months or as agreed with the EA	Site Manager / EIR Manager / EIR Advisor / SUEZ Risk Team



## **Figure 1**

### **Monitoring Location Plan**



Notes

1. Reproduced from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationary Office, Crown Copyright, Licence Number 100004910.

Permit Boundary

Groundwater Monitoring Point

Groundwater and Gas Monitoring Point (depth varies)

Leachate and Gas Monitoring Point

Gas Monitoring Point

Leachate Monitoring Point

Proposed Leachate Monitoring Point

Leachate Extraction Point

Proposed Leachate Extraction Point

Surface Water Monitoring Point

Proposed Surface Water Monitoring Point

Meterological Monitoring Point

Anemometer

48 Inferred Groundwater Contour (mAOD)

Inferred Groundwater Flow Direction

Rev	subject	date
F	Cell 6A As built Mon Points Added	April 2020
E	Cell 8/2 As built Mon Points Added	Aug 2017
D	LM4/4R Added & Drawing Border Updated	April 2016
C	PPC Boundary Amended, Cell 8/1 As built Mon Points Added & Cell 7/3 Siderisers Added	April 2015
B	WH/LM4/3R Added	Dec 2013
A	Gas Compound Sampling Points Added	Jan 2013

**suez**

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Site	Whinney Hill Landfill Site
Title	Environmental Monitoring Locations
Scale	Not To Scale on A3
Date	August 2017
Drawing Ref	WNH-P2-ESID-1112-07f
Drawn by	RB
Checked by	SW