

# **2022 ANNUAL REVIEW OF MONITORING**

## **Withyhedge Landfill site EPR: MP3330WP**

*Report Number 2234r1v1d0223*

*Commissioned by*

Resources Management UK Ltd  
Withyhedge Landfill & MRF  
Rudbaxton  
Haverfordwest  
SA62 4DB

*Prepared by*

Geotechnology Ltd  
Ty Coed  
Cefn-yr-Allt  
Aberdulaish  
SA10 8HE



**FEBRUARY 2023**

---

## Table of Contents

---

|                                                        |           |
|--------------------------------------------------------|-----------|
| <b>1 INTRODUCTION</b>                                  | <b>1</b>  |
| 1.1 Background                                         | 1         |
| 1.2 Scope                                              | 1         |
| <b>2 SURFACE WATER</b>                                 | <b>2</b>  |
| 2.1 Quality                                            | 2         |
| 2.2 Flow                                               | 4         |
| <b>3 LEACHATE</b>                                      | <b>5</b>  |
| 3.1 Leachate Extraction                                | 5         |
| 3.2 Leachate Levels                                    | 5         |
| 3.3 Leachate Quality                                   | 5         |
| <b>4 GROUNDWATER</b>                                   | <b>6</b>  |
| 4.1 Groundwater Levels                                 | 6         |
| 4.2 Groundwater Quality                                | 6         |
| <b>5 LANDFILL GAS</b>                                  | <b>8</b>  |
| 5.1 Production                                         | 8         |
| 5.2 Chemistry                                          | 8         |
| 5.3 Trace Gas Inlet Monitoring                         | 8         |
| 5.4 Perimeter Monitoring                               | 10        |
| 5.5 Surface Emissions Monitoring                       | 12        |
| <b>6 TOPOGRAPHIC SURVEY, SETTLEMENT AND VOID SPACE</b> | <b>13</b> |
| 6.1 Topographic Survey                                 | 13        |
| 6.2 Void Capacity                                      | 13        |
| 6.3 Settlement                                         | 13        |

## List of Plates

---

|                                                                             |   |
|-----------------------------------------------------------------------------|---|
| Plate 2-1 Ammonia, Chloride and Suspended Solids in Rudbuxton Surface Water | 4 |
| Plate 2-2 Flow gauging at D1                                                | 4 |
| Plate 5-1 GUP Inlet Gas Monitoring                                          | 9 |

---

## List of Tables

---

|           |                                                                                        |    |
|-----------|----------------------------------------------------------------------------------------|----|
| Table 2-1 | Comparison of water quality (maximum concentrations) at D1 with Permit Emission Limits | 3  |
| Table 3-1 | Leachate extracted during 2022                                                         | 5  |
| Table 3-2 | Comparison of 2022 leachate with HRA input parameters                                  | 5  |
| Table 4-1 | Comparison of data from TP9, TP11, TP12, AIGH BH104, BH20 with Permit emission Limits  | 6  |
| Table 4-2 | Comparison of BH1, BH2, BH102 (now BH3), and AIGBH105 with Permit Emission Limits      | 7  |
| Table 4-3 | Comparison of BH1, with Permit Emission Limits                                         | 7  |
| Table 4-4 | Comparison of BH2 with Permit Emission Limits                                          | 7  |
| Table 4-5 | Comparison of BH102 (now BH3) with Permit Emission Limits                              | 7  |
| Table 4-6 | Comparison of BH105 with Permit Emission Limits                                        | 7  |
| Table 5-1 | Maximum concentrations of in-waste gas chemistry                                       | 8  |
| Table 5-2 | Quarterly and Annual Monitoring of Engine 1538 (new engine)                            | 8  |
| Table 5-3 | Annual Flare Stack Emission Monitoring                                                 | 8  |
| Table 5-4 | Trace gas content at compound                                                          | 10 |
| Table 5-5 | Monthly Perimeter Gas Data Evaluation                                                  | 10 |
| Table 5-6 | Carbon Dioxide Assessment Levels                                                       | 11 |
| Table 5-7 | Perimeter positions where methane >1%                                                  | 11 |
| Table 5-8 | Carbon Dioxide measurements >1.1 % in Q3 and Q4                                        | 12 |

---

## List of Figures

---

|           |                      |
|-----------|----------------------|
| Figure 1. | Monitoring Network   |
| Figure 2. | Groundwater Contours |
| Figure 3. | Current Topography   |

---

## List of Appendices

---

|             |                                           |
|-------------|-------------------------------------------|
| Appendix 1. | Engine and Flare Stack Monitoring Reports |
| Appendix 2. | Surface Emissions Assessment              |

---

# **1 INTRODUCTION**

## **1.1 Background**

Resources Management UK Limited (RML) operates the Withyhedge Landfill Site at Bowling Farm, Rudbaxton, approximately 5.5 km north of Haverfordwest in Pembrokeshire. The site is a non-hazardous landfill that covers approximately 53 ha. The site comprises two phases known as Phases 1 and 2. Phase 1 is classified as a non-hazardous landfill but has historically accepted a restricted number of hazardous wastes including asbestos. Phase 2 is a non-hazardous landfill. Both of the sites were operated by RML and were permitted as separate facilities until a variation was issued to consolidate the two sites into one.

At the start of 2022, the Dauson Environmental Group acquired RML. Since taking over operational control, significant improvements have been made with more planned. As part of the acquisition, all parties recognised that there were aspects of the site not in compliance with the Permit which is why NRW were provided with plans for a range of site improvements, several of which are ongoing, and a Permit Variation is soon to be submitted.

Of particular relevance to this annual review, RML commissioned the laboratory who has undertaken the environmental monitoring at the site for the past decade or so to summarise all data in a database. At the time of writing, this database is still going through QA/QC checks to ensure that future annual reviews can draw upon data that is understood and arranged in time series as this will facilitate better annual interpretation. Future annual reviews will provide a more detailed analysis of temporal and spatial variation.

## **1.2 Scope**

This report has been prepared independently by Geotechnology to assist RML satisfy the Permit which requires an annual review of monitoring. This report is the first produced by Geotechnology and follows on from previous annual reports that were understood to have been compiled internally by the previous site owners.

The report brings together monitoring results and data gathered by RML and third parties and compares the data to Permit thresholds, where relevant. A plan of the environment monitoring is provided in Figure 1.



---

## 2 SURFACE WATER

Surface water run-off from restored phases at the site is channelled into a sequence of lagoons. These lagoon systems discharge into Rudbaxton Water, which is the closest watercourse to the site. This flows east to west along the northern perimeter of Phase 1 and then Phase 2 before draining to the southwest where it enters the Western Cleddau River, approximately 2km southwest of the site.

As the site is located in a rural agricultural catchment underlain by pyritiferous shale and where there are potentially several diffuse sources of pollution in close proximity, there is a challenge to discern the cause of fluctuations in water quality. Environmental monitoring is currently focussed on key indicators of potential landfill leachate such as ammonia, chloride, BOD and COD alongside trace metals and organics such as nickel, cadmium, phenols and naphthalene.

However, several of these parameters may also be influenced by other processes and activities occurring within the catchment, some of which have developed and been permitted since the landfill was granted planning permission and an Environmental Permit. These include:

- Dairy farming and the application of slurry to the fields on the northern banks of Rudbaxton Water that drain into the same catchment. It is understood that the farm practice involves feeding and cutting silage several times a year.
- Discharge from sewerage treatment plant at Spittal, upstream of the site. According to Welsh Water there were 323 storm water overflow releases in 2021 with a combined duration of over 2700 hours.
- Natural passage of groundwater through the weathered horizon of the shale where pyrite is being oxidised along fractures releasing trace metals, sulphate, and resulting in groundwater with very acidic pH (<5). Such acidic groundwater can increase trace metal mobility and all parties have recognised that background groundwater is, in parts, naturally mineralised due to these processes.

Some of these processes may contribute the same pollutants to the catchment as the approved Phase I dilute and disperse landfill.

### 2.1 Quality

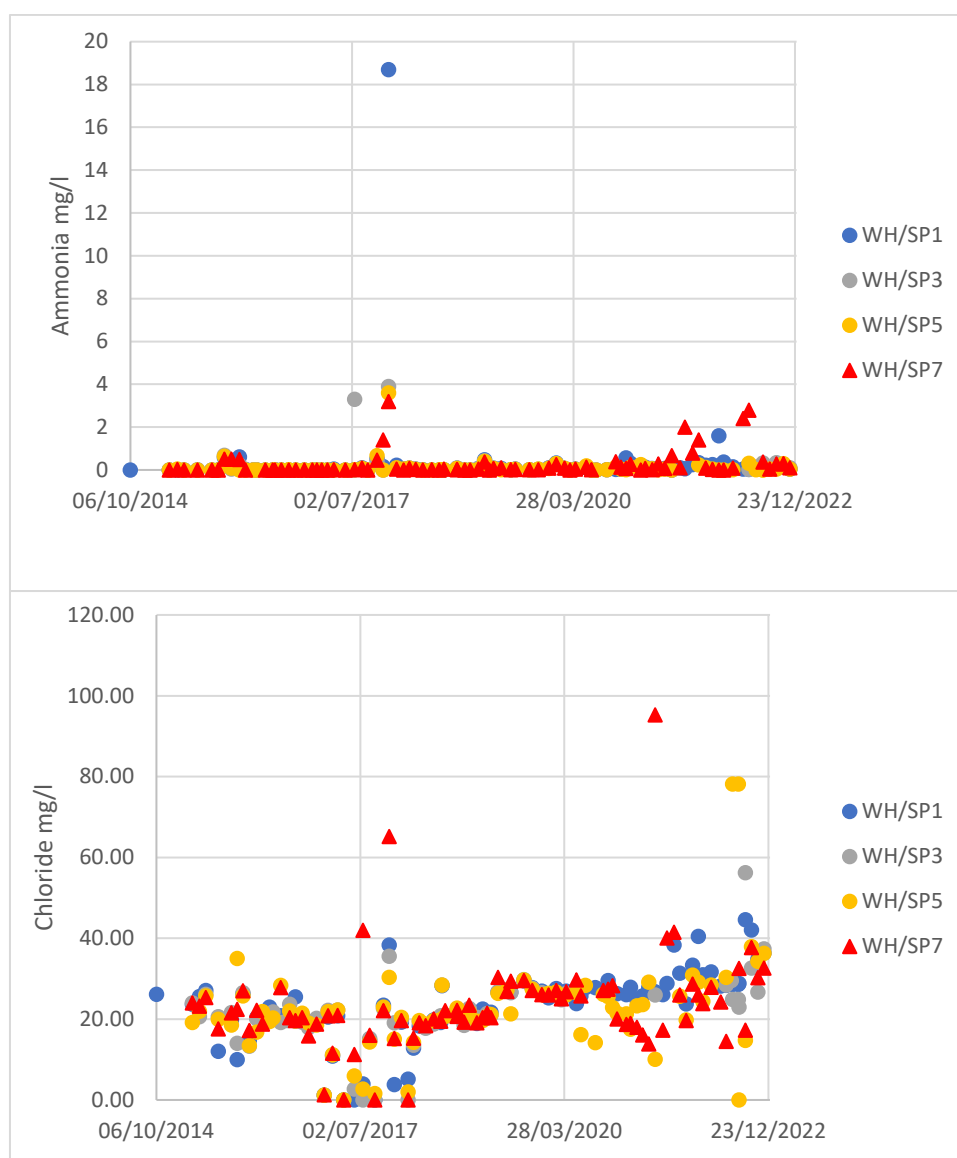
Surface water quality monitoring is undertaken at lagoon discharge point D1, north of Phase 1. Rudbaxton Water is also monitored monthly at points SP1, SP3, SP5, SP6 and SP7. These latter monitoring points do not have specified compliance limits.

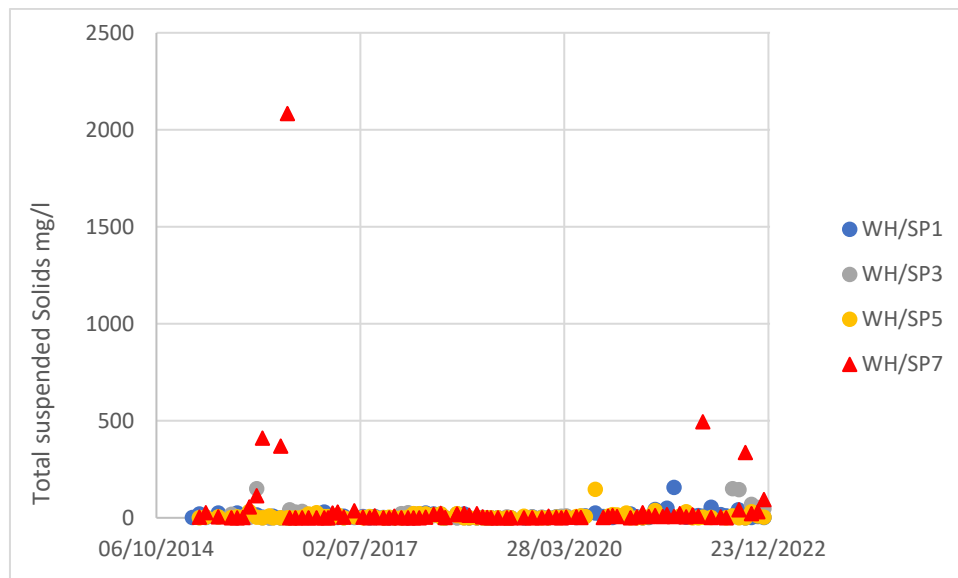
Table 2-1 provides a comparison of the maximum results observed at D1 during 2022 with the Permit emission limits. This reveals no exceedances.

Indicators of water quality in Rudbaxton water are summarised in Plate 2-1. This reveals that, at times, surface water upstream and downstream contains ammonia above analytical detection limit's and freshwater Environmental Quality Standards (EQS). Interestingly, the suspended solids observed at SP7 are higher than those encountered at D1.

**Table 2-1 Comparison of water quality (maximum concentrations) at D1 with Permit Emission Limits**

| Parameter                | Limit (incl unit) | Permit Emission Limits |           |      |           |
|--------------------------|-------------------|------------------------|-----------|------|-----------|
|                          |                   | Q1                     | Q2        | Q3   | Q4        |
| pH                       | 6 to 9 (pH units) |                        | 7.2 - 7.6 | 7.4  | 6.8 - 6.9 |
| Total Suspended solids   | 30 (mg/l)         | <1.5                   | 27.2      | 8    | 22.8      |
| Ammoniacal Nitrogen      | 0.5 (mg/l)        | 0.05                   | 0.22      | 0.06 | 0.32      |
| Biological Oxygen Demand | 17 (mg/l)         | 6                      | 2.7       | 0    | 1.6       |
| Chemical Oxygen Demand   | 150(mg/l)         | 21                     | 4         | 9    | 15        |
| Chloride                 | 250 (mg/l)        | 29.2                   | 32.8      | 40   | 29.9      |

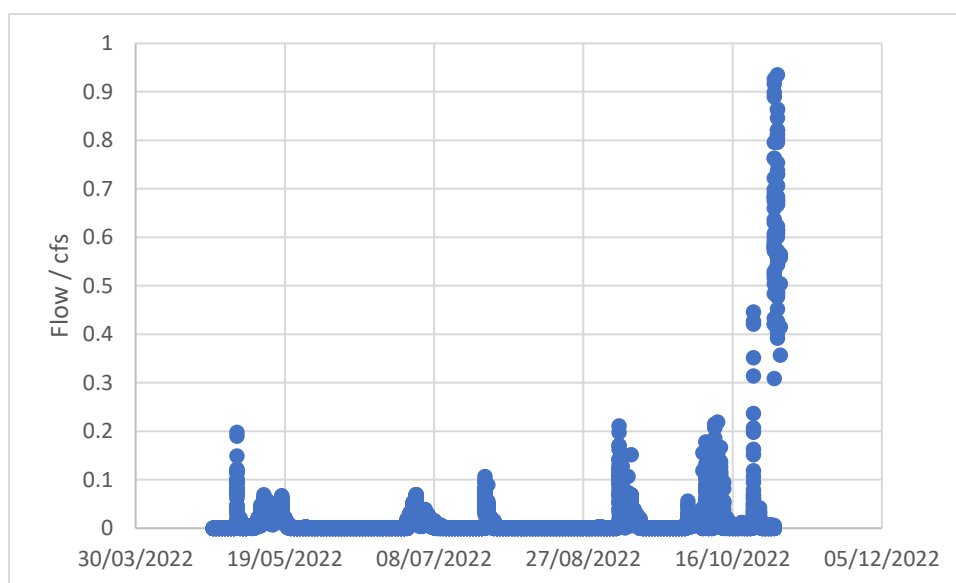




**Plate 2-1 Ammonia, Chloride and Suspended Solids in Rudbuxton Surface Water**

## 2.2 Flow

Flow reached 0.935 cubic ft /sec (0.02 m<sup>3</sup>/sec) during the winter period of 2022, as shown in Plate 2-2.



**Plate 2-2 Flow gauging at D1**

---

## 3 LEACHATE

### 3.1 Leachate Extraction

Leachate is pumped from leachate extraction wells via a series of pipelines that ultimately allow the leachate to be impounded in tanks before off-site disposal. The total tonnage of leachate extracted from the whole site in 2022 is summarised in Table 3-1. Also presented is the volume of leachate extracted from unlined Phase 1.

Table S4.1 of the permit requires the Operator to extract a minimum leachate volume of 1,278m<sup>3</sup> per annum (241m<sup>3</sup> per well) from wells LE1 to LE6. These wells are continuously pumped using float switches throughout the year in order to maintain < 1m leachate head. The wells are often found dry. As such, it is not always practicable to comply with the minimum extraction requirements, as indicated in Table 3-1.

**Table 3-1 Leachate extracted during 2022**

|    | Whole site              | Phase 1                        |
|----|-------------------------|--------------------------------|
|    | Leachate removed/tonnes | Leachate pumped/m <sup>3</sup> |
| Q1 | 7707.2                  | 33                             |
| Q2 | 2417.62                 | 112                            |
| Q3 | 248.02                  | 94                             |
| Q4 | 4147.36                 | 77                             |

### 3.2 Leachate Levels

All quarterly reported leachate levels were below 1m. Keeping leachate levels low is critical as it minimises risk to the environment. The raw data was reported in each of the quarterly reports.

### 3.3 Leachate Quality

Leachate quality is varied across the different phases of landfill due to different ages of waste. Selected key parameters are summarised in Table 3-2. This data will be more closely scrutinised and statistically assessed as part of the ongoing Permit Variation.

**Table 3-2 Comparison of 2022 leachate with HRA input parameters**

|                     |      | Q1     | Q2     | Q3     | Q4      |
|---------------------|------|--------|--------|--------|---------|
| Ammoniacal nitrogen | mg/l | 3740   | 3030   | 3110   | 2900    |
| Cadmium             | mg/l | 0.0339 | 0.0032 | 0.0031 | 0.0058  |
| Chloride            | mg/l | 4110   | 3180   | 4470   | 2900    |
| Mecoprop            | mg/l | 0.0418 | 0.041  | 0.0415 | <0.0001 |
| Nickel              | mg/l | 0.302  | 0.393  | 0.238  | 0.274   |
| Phenols             | mg/l |        | 142    | 0.49   | 59.8    |

---

## 4 GROUNDWATER

As shown in Figure 1, there is an extensive groundwater monitoring network with many boreholes spaced less than 50m apart around the landfill. Some of the downgradient monitoring positions are within ~10m of the landfill edge.

Some boreholes are considered to intersect fractures whilst others intersect the rock matrix through which little groundwater would be expected to quickly pass. Previous studies have shown, to the agreement of all parties, that background groundwater is naturally mineralised with acidic pH due to the passage of groundwater along fractures containing pyrite. As the pyrite naturally oxidises and weathers it would be expected to release protons, sulphate, iron and trace metals.

### 4.1 Groundwater Levels

A contour plan of groundwater levels is provided in Figure 2. Groundwater is typically <3m below ground-level in close proximity to the edge of the waste deposition area.

### 4.2 Groundwater Quality

Comparison of the groundwater quality against the Permit emission limits is provided in the following tables. Breaches of the emissions limits are highlighted grey.

It is evident that there are different emission limits for boreholes in close proximity along the northern and southern boundary of the landfill. Reference to Figure 2 indicates that some of these borehole positions (BH105 and BH20) are considered upgradient of the landfill.

To inform this and future reports, RML has commissioned the laboratory who has undertaken the environmental monitoring at the site for the past decade or so to summarise all data in a database. At the time of writing, this database is still going through QA/QC checks to ensure that future annual reviews can draw upon data that is understood and arranged in time series as this will facilitate better annual interpretation. During this process it has become apparent that the analysis of trace metals is not performed on filtered samples and that previously issued data has contained typographical errors.

The analysis of groundwater samples without filtration at 0.45 micron would offer a reasonable explanation for the trace metal (Cd, Ni) breaches highlighted grey in Tables 4-1 to 4-6. Apart from the trace metal breaches, there are no persistent breaches of the emission limits.

**Table 4-1 Comparison of data from TP9, TP11, TP12, AIGH BH104, BH20 with Permit emission Limits**

| Parameter           | Emission Limit                | Q1           | Q2           | Q3       | Q4       |
|---------------------|-------------------------------|--------------|--------------|----------|----------|
| Ammoniacal Nitrogen | 12 mg/l                       | 2.1          | 2.9          | 3.7      | 0.11     |
| Chloride            | 250 mg/l                      | 66.7         | 57.5         | 48.5     | 48.1     |
| Nickel              | 0.05 mg/l                     | 0.209 (BH20) | 0.144 (BH20) | 0.0253   | 0.0108   |
| Phenol              | 0.15 mg/l<br>(0.03) mg/l      | 0.14 (BH20)  | <0.0025      | <0.01    | <0.01    |
| Cadmium             | 0.0095 mg/l<br>(0.0001)mg/l   | 0.0023       | 0.0011       | 0.0022   | 0.0063   |
| Mecoprop            | 0.0001 mg/l<br>(0.00004) mg/l | <0.0001      | <0.0001      | <0.0001  | <0.0001  |
| Naphthalene         | 0.00001 mg/l                  | <0.00005     | <0.00005     | <0.00005 | <0.00005 |

**Table 4-2 Comparison of BH1, BH2, BH102 (now BH3), and AIGBH105 with Permit Emission Limits**

| Parameter | Emission Limit           | Q1*           | Q2            | Q3      | Q4      |
|-----------|--------------------------|---------------|---------------|---------|---------|
| Cadmium   | 0.002mg/l                | 0.011 (BH105) | 0.018 (BH105) | 0.00099 | 0.001   |
| Phenol    | 0.15 mg/l<br>(0.001mg/l) | 0.08 (BH105)  | <0.0025       | <0.0025 | <0.0025 |

Note: BH102 previously known as BH3. \*Data taken from RML database provided by Decus.  
Limits in brackets are superseded.

**Table 4-3 Comparison of BH1, with Permit Emission Limits**

| Parameter           | Limit                          | Q1       | Q2       | Q3       | Q4       |
|---------------------|--------------------------------|----------|----------|----------|----------|
| Naphthalene         | 0.00003 mg/l                   | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Nickel              | 0.02 mg/l                      | <0.0015  | 0.0069   | 0.0062   | <0.0015  |
| Ammoniacal Nitrogen | 1.328 mg/l<br>(0.8 mg/l)       | 0.75     | 0.1      | 0.07     | 0.36     |
| Chloride            | 117 mg/l<br>(55 mg/l)          | 47.7     | 85.6     | 46.4     | 15.9     |
| Mecoprop            | 0.00003 mg/l<br>(0.00002 mg/l) |          | 0        | 0        | 0        |

Note:  
Naphthalene detection limit above emission limit.  
Limits in brackets are superseded.

**Table 4-4 Comparison of BH2 with Permit Emission Limits**

| Parameter           | Limit        | Q1       | Q2       | Q3       | Q4       |
|---------------------|--------------|----------|----------|----------|----------|
| Naphthalene         | 0.00006 mg/l | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Nickel              | 0.02 mg/l    | <0.0015  | <0.0015  | 0.0048   | <0.0015  |
| Ammoniacal Nitrogen | 5.2 mg/l     | 0.17     | 0.05     | 0.9      | 0.67     |
| Chloride            | 180 mg/l     | 40.3     | 43.7     | 96.2     | 31.8     |
| Mecoprop            | 0.0001 mg/l  | <0.00005 | <0.00005 | <0.00005 | <0.00005 |

**Table 4-5 Comparison of BH102 (now BH3) with Permit Emission Limits**

| Parameter           | Limit        | Q1       | Q2      | Q3      | Q4      |
|---------------------|--------------|----------|---------|---------|---------|
| Naphthalene         | 0.00006 mg/l | <0.00005 | <0.0005 | <0.0005 | <0.0005 |
| Nickel              | 0.02 mg/l    | 0.006    | 0.0117  | 0.017   | 0.0114  |
| Ammoniacal Nitrogen | 55 mg/l      | 0.03     | 0.12    | 0.72    | 0.1     |
| Chloride            | 310 mg/l     | 179      | 178     | 220     | 225     |
| Mecoprop            | 0.0004 mg/l  | <0.00005 | <0.0001 | <0.0001 | <0.0001 |

**Table 4-6 Comparison of BH105 with Permit Emission Limits**

| Parameter           | Emission Limit                | Q1       | Q2       | Q3       | Q4       |
|---------------------|-------------------------------|----------|----------|----------|----------|
| Naphthalene         | 0.0001 mg/l                   | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Nickel              | 0.031 mg/l                    | 0.507    | 1.3      | 0.0164   | 0        |
| Ammoniacal Nitrogen | 0.5 mg/l                      | 2.7      | 0.89     | 0.21     | 0.36     |
| Chloride            | 50 mg/l                       | 19.5     | 21.3     | 39.3     | 24       |
| Mecoprop            | 0.0001 mg/l<br>(0.00002 mg/l) | <0.0001  | <0.0001  | <0.0001  | <0.0001  |

Note: Mecoprop analytical detection limit above emission limit

---

## 5 LANDFILL GAS

### 5.1 Production

The volume of gas treated during 2022 was 4.3 Mm<sup>3</sup>.

### 5.2 Chemistry

In-waste monitoring has revealed the maximum concentrations observed in 2022 summarised in Table 5-1.

**Table 5-1 Maximum concentrations of in-waste gas chemistry**

|                   | Q1   | Q2   | Q3   | Q4   |
|-------------------|------|------|------|------|
| Methane           | 68.8 | 78   | 69.4 | 72.4 |
| Carbon Dioxide    | 43.9 | 44.6 | 43.8 | 49.5 |
| Oxygen            | 22.8 | 21.6 | 21.6 | 21.9 |
| Carbon Monoxide   | 191  | 189  | 167  | 88   |
| Hydrogen sulphide | 2253 | 3782 | 2602 | 2709 |

Landfill gas is currently utilised by the gas engine generator plant. Landfill gas engine and flare emission monitoring is undertaken quarterly and annually in accordance with Table S4.2 of the site permit and as specified in permit variation EPR/GP3630HT/V005.

Compliance limits for Oxides of Nitrogen (NO<sub>x</sub>), Carbon Monoxide and Volatile Organic Compounds (VOCs) were met at engine exhaust 1538, as summarised in Table 5-2. The other engine, exhaust 1510, is a back-up engine.

**Table 5-2 Quarterly and Annual Monitoring of Engine 1538 (new engine)**

| Parameter          | Limit                  | Q1                     | Q2 (29/6/22) | Q3   | Q4  |
|--------------------|------------------------|------------------------|--------------|------|-----|
| Oxides of Nitrogen | 500 mg/m <sup>3</sup>  | Engine not operational | 372          | 443  | 494 |
| CO                 | 1400 mg/m <sup>3</sup> |                        | 984          | 1133 | 930 |
| Total VOC's        | 1000 mg/m <sup>3</sup> |                        | 908          |      |     |

The annual measurement at the flare revealed the monitoring parameters to be below emission limits, as summarised in Table 5-3 and reported in Appendix 1.

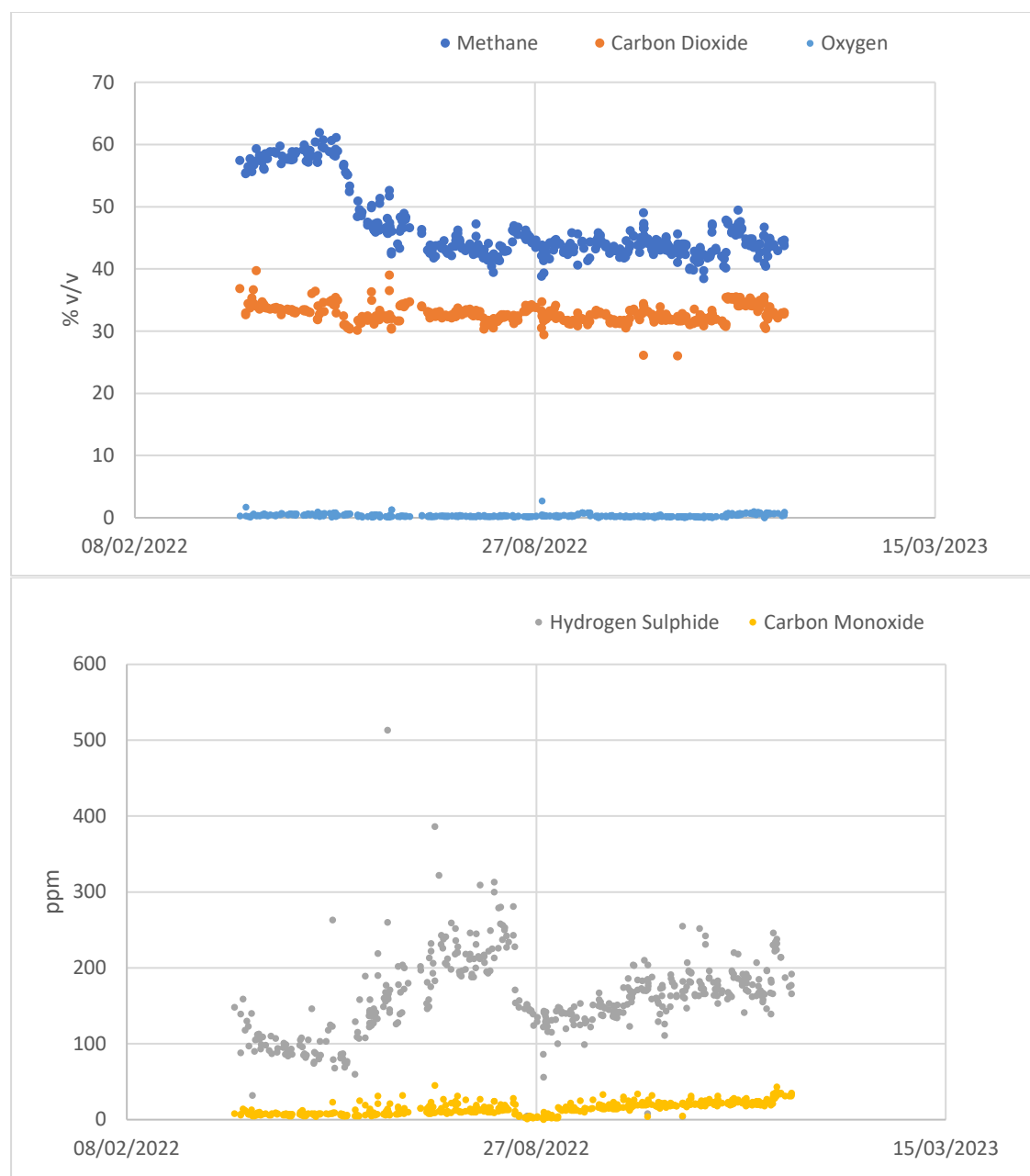
**Table 5-3 Annual Flare Stack Emission Monitoring**

| Parameter          | Limit                 | Q4   |
|--------------------|-----------------------|------|
| Oxides of Nitrogen | 150 mg/m <sup>3</sup> | 24.1 |
| CO                 | 50 mg/m <sup>3</sup>  | 2.6  |
| Total VOC's        | 10 mg/m <sup>3</sup>  | 4.1  |

### 5.3 Trace Gas Inlet Monitoring

Monitoring of the inlet to the GUP has been undertaken in 2022, as required by the Permit. This included annual laboratory analysis and more frequent bulk gas analysis using a portable monitor.

The gas analysis for Q2-Q4 is summarised in Plate 5-1. Reference to the gas compound inlet monitoring point was changed to WIVCOMPD on 18/08/22. Prior to this time, it was referenced WIVFANBM and Gas Inlet to Compound.



**Plate 5-1 GUP Inlet Gas Monitoring**

On 17 March 2022, trace gas analysis was undertaken on the fuel gas utilised by the gas engine generator plant. The compounds found to be above the analytical detection are summarised in Table 5-4 alongside the concentration of trace gas elements understood to have been previously monitored in the previous Landfill Gas Risk Assessment. The monitoring shows that very few compounds were detected above the analytical detection limit and that hydrogen sulphide continues to be the dominant trace gas, although the concentration detected in 2022 was lower than reported previously and below the concentration modelled.



**Table 5-4 Trace gas content at compound**

| Compound                | Concentration | Units             | LFGRA Input |
|-------------------------|---------------|-------------------|-------------|
| Vinyl Chloride          | 90            | µg/m <sup>3</sup> | 730000      |
| Chloroethane            | 61            | µg/m <sup>3</sup> | 5300        |
| Furan                   | 735           | µg/m <sup>3</sup> | 6200        |
| Dimethylsulphide        | 981           | µg/m <sup>3</sup> | 12000       |
| CS <sub>2</sub>         | 2615          | µg/m <sup>3</sup> | 170000      |
| Benzene                 | 531           | µg/m <sup>3</sup> | 73000       |
| Ethylbenzene            | 12            | µg/m <sup>3</sup> |             |
| m/p-Xylene              | 29            | µg/m <sup>3</sup> |             |
| o-Xylene                | 8             | µg/m <sup>3</sup> |             |
| Acetaldehyde (Ethanal)  | 67            | µg/m <sup>3</sup> |             |
| Formaldehyde (Methanal) | 67            | µg/m <sup>3</sup> | 250000      |
| Hydrogen sulphide       | < 151691      | µg/m <sup>3</sup> | 870000      |

## 5.4 Perimeter Monitoring

Perimeter monitoring is undertaken at selected groundwater monitoring wells. A comparison of the maximum concentrations detected during 2022 with emission limits is provided in Table 5-5. This indicates that there has been no breach of any emission limit.

**Table 5-5 Monthly Perimeter Gas Data Evaluation**

| Location                                             | Parameter      | Limit    | Maximum concentrations |     |     |     |
|------------------------------------------------------|----------------|----------|------------------------|-----|-----|-----|
|                                                      |                |          | Q1                     | Q2  | Q3  | Q4  |
| TP1,TP9,TP10,TP11, TP12                              | Carbon Dioxide | No limit | 0.3                    | 0.6 | 2.7 | 3.3 |
|                                                      | Methane        | 2.30%    | 0.1                    | 0.1 | 0   | 0.1 |
| BH104                                                | Carbon Dioxide | No limit | 0.2                    | 0.7 | 1   | 0.2 |
|                                                      | Methane        | 1% v/v.  | 0.1                    | 0.2 | 0   | 0.1 |
| AIGBH105, BH1 , BH2, BH3, BH6, BH9, BH15, BH18, BH20 | Carbon Dioxide | No limit | 0.6                    | 0.9 | 3.6 | 3.3 |
|                                                      | Methane        | 1% v/v.  | 0.1                    | 0.1 | 1.2 | 0.4 |

At each of the monitored wells, groundwater is typically <3m below datum level. With groundwater present at such levels, it is inevitable that both carbon dioxide and methane will be detected, potentially at very high concentrations and well beyond those observed in 2022. This does not necessarily mean that there is landfill gas migrating or a significant advective flux but simply localised processes within the well as gases can freely accumulate in the headspace. In this context, the data should be viewed with caution. In some cases, the slotted section of the monitoring could also be permanently below water level.

Geotechnology understands that Action levels for carbon dioxide have been derived historically and are contained within the Gas Management Plan. These are reproduced from a previous annual report in Table 5-6.

**Table 5-6 Carbon Dioxide Assessment Levels**

| Monitoring Point | Methane Compliance Limit (%v/v) | Carbon Dioxide Assessment Level (%v/v) |
|------------------|---------------------------------|----------------------------------------|
| BH102 (BH3)      | 1                               | 5.5                                    |
| BH104            | 1                               | 5.5                                    |
| BH105            | 1                               | 2.1                                    |
| BH1              | 1                               | 11                                     |
| BH2              | 1                               | 2.3                                    |
| BH4              | 1                               | 1.1                                    |
| BH5              | 1                               | 1.1                                    |
| BH6              | 1                               | 6                                      |
| BH9              | 1                               | 13.8                                   |
| BH15             | 1                               | 8.2                                    |
| BH18             | 1                               | 8.6                                    |
| BH20             | 1                               | 10.1                                   |
| TP1              | 1                               | 10                                     |
| TP9              | 1                               | 21.7                                   |
| TP10             | 1                               | 4.3                                    |
| TP11             | 1                               | 3.1                                    |
| TP12             | 1                               | 11.6                                   |
| GW1              | 1                               | 5                                      |
| BH24             | 1                               | 2.3                                    |
| BH25             | 1                               | 2.3                                    |
| BH26             | 1                               | 2.3                                    |
| BH27             | 1                               | 2.3                                    |
| BH28             | 1                               | 2.3                                    |

The positions where methane was found to be above 1% in 2022 are summarised in Table 5-7. It is evident that the spikes in methane concentration are short-lived and most likely due to processes within the well head as at all other times methane was less than 1% at these and all other positions.

**Table 5-7 Perimeter positions where methane >1%**

|    | Location | Carbon Dioxide | Methane | Oxygen | Atmospheric Pressure | Differential Pressure | Meteorological Data                 |
|----|----------|----------------|---------|--------|----------------------|-----------------------|-------------------------------------|
| Q3 | BH20     | 0              | 1.2     | 16.5   | 1011                 | -0.35                 | Sunny, 17 degrees<br>10km/h wind    |
| Q3 | BH24     | 0              | 4.3     | 18.6   | 1011                 | -0.25                 | Sunny, 17 degrees<br>10km/h wind    |
| Q3 | BH27     | 0              | 3.3     | 17.3   | 1011                 | -0.32                 | Sunny, 17 degrees<br>10km/h wind    |
| Q4 | BH17     | 0              | 1.3     | 18.4   | 993                  | -0.34                 | 13 degrees Overcast,<br>25km/h wind |

Similarly, there were few exceedances of the carbon dioxide limit, as summarised in Table 5-8. Again, these exceedances were not persistent and due to localised processes. There is no significant ground gas flux with all values at all other times <1.1%.

**Table 5-8 Carbon Dioxide measurements >1.1 % in Q3 and Q4**

|          | <b>Client Sample Reference</b> | <b>Carbon dioxide Action Level</b> | <b>Carbon Dioxide</b> | <b>Methane</b> | <b>Oxygen</b> | <b>Atmospheric Pressure</b> | <b>Differential Pressure</b> |
|----------|--------------------------------|------------------------------------|-----------------------|----------------|---------------|-----------------------------|------------------------------|
| Month 8  | BH4                            | 1.1                                | 1.1                   | 0              | 18.8          | 1021                        | -0.33                        |
| Month 9  |                                |                                    | 1.3                   | 0              | 19.2          | 1006                        | -0.35                        |
| Month 8  | BH19                           | Not specified                      | 2.5                   | 0              | 16.5          | 1021                        | -0.37                        |
| Month 9  |                                |                                    | 2.2                   | 0              | 19.8          | 1006                        | -0.35                        |
| Month 11 | BH25                           | 2.3                                | 2.7                   | 0.6            | 15.4          | 993                         | -0.34                        |
| Month 8  | BH27                           | 2.3                                | 2.4                   | 0              | 18.9          | 1021                        | -0.38                        |
| Month 9  |                                |                                    | 1.6                   | 0              | 17.1          | 1006                        | -0.34                        |
| Month 11 | TP9                            | 21.7                               | 3                     | 0.1            | 16            | 993                         | -0.29                        |

## 5.5 Surface Emissions Monitoring

Each year, the operator commissions an independent assessment of surface emissions, as required by the Permit. In 2022, the survey was undertaken on 12 and 13 January with the full report included in Appendix 2. Continuous data was collected using an FID by observation of the readings and by sound level. All readings were below 100 ppm and no distinct features, such as stressed vegetation, were discovered. The survey did not identify any significant faults in the gas management system.

Two slightly elevated readings were, however, detected:

1. 10ppm adjacent to the pipe which is connected to the gas extraction system at the southern end of Phase 1.
2. 3ppm at the north western edge of Phase 2 Cell 1/2N

Similar observations have previously been made in relation to other parts of the site.

The report recommends that a flux box survey should be undertaken on the recently capped cells.

Geotechnology understands that there is a move away from using FIDs for such surveys and suggests consideration could be given to undertaking a detailed walkover and methane inspection using a tuneable diode laser that is specific to methane. Such instruments can be hand-held and fitted with GPS so that the methane results can be plotted as a contour map across the landfill surface. This approach should be agreed with NRW.

---

## **6 TOPOGRAPHIC SURVEY, SETTLEMENT AND VOID SPACE**

### **6.1 Topographic Survey**

A topographic survey of the operational landfill cells was carried out 24 January 2023.

The survey was completed by Geotechnology using an unmanned aerial vehicle (UAV) with survey control established using dGPS land-based Hiper-SR survey equipment. The UAV data is then used together with ground control points to create a digital terrain model. This method of surveying is able to create a detailed topographic model, as shown in Figure 3.

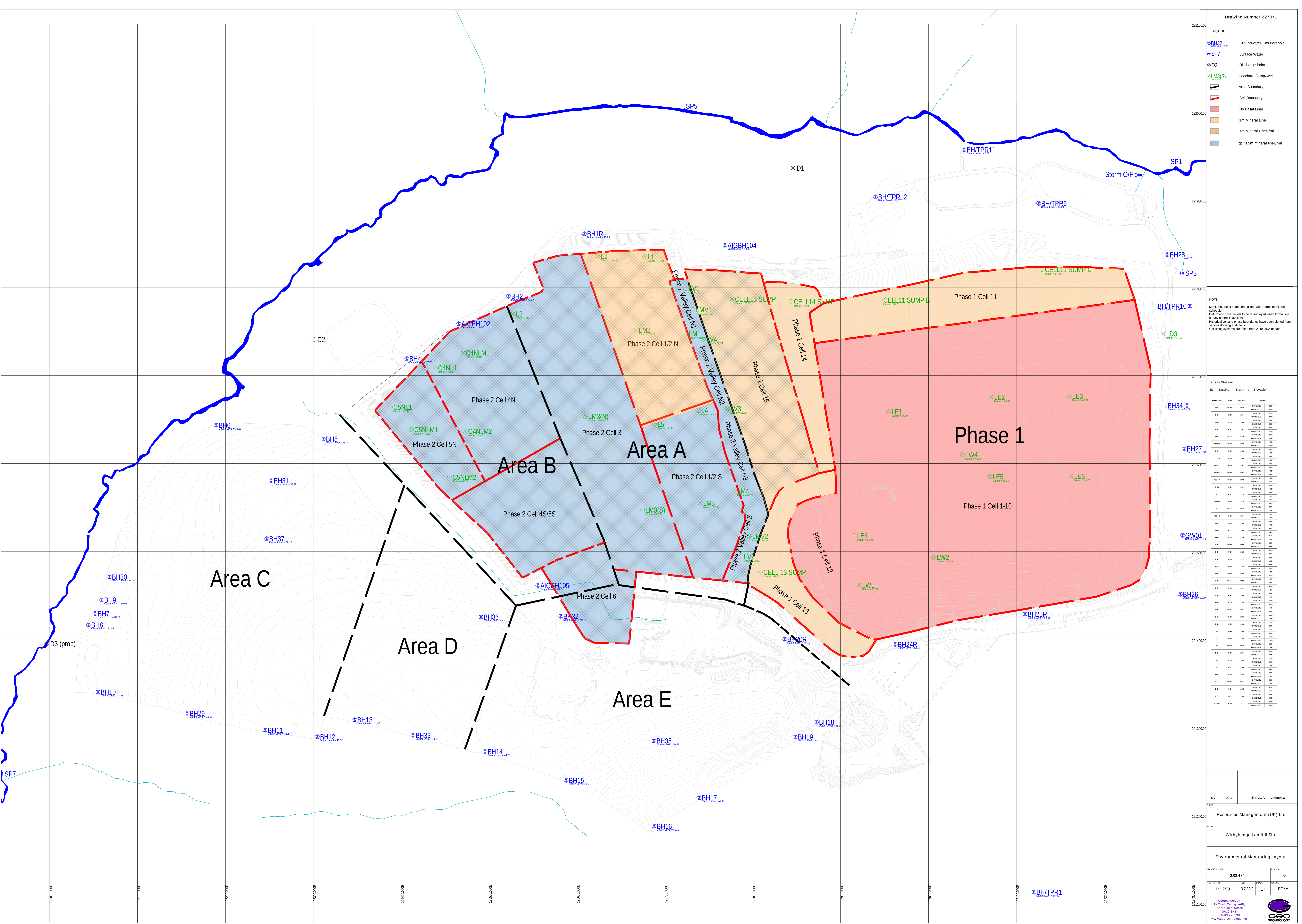
### **6.2 Void Capacity**

The remaining capacity in Cells 6 and 7 is 203,061m<sup>3</sup>.

### **6.3 Settlement**

Digital comparison of the two most recent surveys reveals negligible settlement when the tolerance of the technique is considered. To assess this aspect more accurately, settlement markers would need to be installed across the completed areas of landfill to allow repeat measurements.







Legend

Note

All coordinates and levels are to OS Grid and Datum.

Topographic survey undertaken on 19 January 2022 by photogrammetry using DJI Phantom 4 RTK Drone, ground control points installed with Topcon Hiper SR dGPS survey equipment.

Survey imagery and ground control processed in Pix4D Photogrammetry software to generate high resolution orthomosaic and digital surface model.



|                                                                                                                   |       |                    |
|-------------------------------------------------------------------------------------------------------------------|-------|--------------------|
|                                                                                                                   |       |                    |
| Rev                                                                                                               | Date  | Status/Ammendments |
| CLIENT                                                                                                            |       |                    |
| RML Ltd                                                                                                           |       |                    |
| PROJECT                                                                                                           |       |                    |
| Withyhedge Landfill Annual Review                                                                                 |       |                    |
| TITLE                                                                                                             |       |                    |
| Groundwater Contours & Vectors March 2022                                                                         |       |                    |
| DRAWING NUMBER                                                                                                    |       | REVISION           |
| Figure 2                                                                                                          |       | 0                  |
| SCALE AT A1                                                                                                       | DATE  | DRAWN              |
| 1:2000                                                                                                            | 02.23 | BR                 |
| CHECKED                                                                                                           |       |                    |
| Geotechnology<br>Ty Coed, Cefn-yr-Allt,<br>Aberdulais, Neath<br>SA10 8HE<br>01639 775293<br>www.geotechnology.net |       |                    |
|                                                                                                                   |       |                    |





|                                                                 |        |                                                             |                                                     |                             |               |             |                                                                                                  |
|-----------------------------------------------------------------|--------|-------------------------------------------------------------|-----------------------------------------------------|-----------------------------|---------------|-------------|--------------------------------------------------------------------------------------------------|
| <div><div>RML</div><div>RESOURCES MANAGEMENT UK LTD</div></div> | LEGEND | NOTES<br>Image acquired by drone survey on 24 January 2023. | PROJECT<br><br>Withyhedge Landfill<br>Annual Review | DRAWING NUMBER<br>2334/03   |               |             | <div></div> |
|                                                                 |        |                                                             |                                                     | SCALE AT A3<br>1:2000       | DATE<br>02.23 | DRAWN<br>BR |                                                                                                  |
|                                                                 |        |                                                             |                                                     | TITLE<br>Current Topography | NOTE          |             |                                                                                                  |



# **2022 ANNUAL REVIEW OF MONITORING**

**Withyhedge Landfill  
site  
EPR: MP3330WP**

**Appendix 1  
Engine and Flare Stack  
Monitoring Reports**  
*Report Number 2234r1v1d0223*





Element, Unit C6, Emery Court, The Embankment Business Park, Heaton Mersey, Stockport, SK4 3GL  
Your Element Contact: David Littlewood (07772 250 040)  
E: david.littlewood@element.com

**Stack Emissions Testing Report Commissioned by**  
Resource Management UK Ltd

**Installation Name & Address**  
Resource Management UK Ltd  
Withyhedge Landfill Site  
Rudbaxton  
Haverfordwest  
SA62 4DB

EPR Permit: GP3630HT/V003

**Stack Reference**  
Engine 1538

**Dates of the Monitoring Campaign**  
29th June 2022

**Job Reference Number**  
ERE-22253

| Report Written by                                                             |
|-------------------------------------------------------------------------------|
| Darren Price<br>Team Leader<br>MCERTS Level 2<br>MM 03 176<br>TE1 TE2 TE3 TE4 |

| Report Approved by                                                                       |
|------------------------------------------------------------------------------------------|
| David Littlewood<br>Operations Manager<br>MCERTS Level 2<br>MM 06 772<br>TE1 TE2 TE3 TE4 |

| Report Date    |
|----------------|
| 30th June 2022 |

| Version   |
|-----------|
| Version 1 |

| Signature of Report Approver                                                        |
|-------------------------------------------------------------------------------------|
|  |

## CONTENTS

TITLE PAGE

CONTENTS

EXECUTIVE SUMMARY

|                                 |   |
|---------------------------------|---|
| Monitoring Objectives           | 3 |
| Monitoring Results              | 4 |
| Monitoring Dates & Times        | 5 |
| Process Details                 | 6 |
| Monitoring & Analytical Methods | 7 |
| Summary of Sampling Deviations  | 7 |
| Sampling Location               | 8 |
| Plant Photos / Sample Points    | 9 |

APPENDIX 1 - Monitoring Personnel & List of Equipment

APPENDIX 2 - Raw Data, Sampling Equations & Charts

*Opinions and interpretations expressed herein are outside the scope of Element's ISO 17025 accreditation.*

*This test report shall not be reproduced, except in full, without the written approval of Element.*



## Executive Summary

(Page 1 of 7)

### MONITORING OBJECTIVES

Resource Management UK Ltd, Withyhedge Landfill Site

Engine 1538

29th June 2022

#### Overall Aim of the Monitoring Campaign

Element were commissioned by Resource Management UK Ltd to carry out stack emissions testing on the Engine 1538 at Withyhedge Landfill Site.

The aim of the monitoring campaign was to demonstrate compliance with a set of emission limit values (ELVs) as specified in the Site's Permit.

#### Special Requirements

There were no special requirements.

#### Target Parameters

Total VOCs (as Carbon), Oxides of Nitrogen (as NO<sub>2</sub>), Carbon Monoxide

## Executive Summary

(Page 2 of 7)

### MONITORING RESULTS

Resource Management UK Ltd, Withyhedge Landfill Site

Engine 1538

29th June 2022

where MU = Measurement Uncertainty associated with the Result

| Parameter                                | Concentration                  |          |           |       |
|------------------------------------------|--------------------------------|----------|-----------|-------|
|                                          | Units                          | Result   | MU<br>+/- | Limit |
| Total VOCs (as Carbon)                   | <sup>1</sup> mg/m <sup>3</sup> | 908      | 44        | 1000  |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | <sup>1</sup> mg/m <sup>3</sup> | 372      | 17        | 500   |
| Carbon Monoxide                          | <sup>1</sup> mg/m <sup>3</sup> | 984      | 45        | 1400  |
| Oxygen                                   | % v/v                          | Dry 6.46 | 0.27      |       |
| Water Vapour                             | % v/v                          | 12.5     | 2.3       |       |

<sup>1</sup> Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 5% oxygen.



## Executive Summary

(Page 3 of 7)

### MONITORING DATE(S) & TIMES

Resource Management UK Ltd, Withyhedge Landfill Site

Engine 1538

29th June 2022

| Parameter                                | Units                | Concentration |  | Sampling Date(s) | Sampling Times | Duration mins |
|------------------------------------------|----------------------|---------------|--|------------------|----------------|---------------|
| Total VOCs (as Carbon)                   | R1 mg/m <sup>3</sup> | 908           |  | 29/06/2022       | 10:30 - 11:30  | 60            |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | R1 mg/m <sup>3</sup> | 372           |  | 29/06/2022       | 10:30 - 11:30  | 60            |
| Carbon Monoxide                          | R1 mg/m <sup>3</sup> | 984           |  | 29/06/2022       | 10:30 - 11:30  | 60            |
| Oxygen                                   | R1 % v/v             | 6.5           |  | 29/06/2022       | 10:30 - 11:30  | 60            |
| Water Vapour                             | R1 % v/v             | 12.5          |  | 29/06/2022       | 10:30 - 11:30  | 60            |

All results are expressed at the respective reference conditions.

## Executive Summary

(Page 4 of 7)

### PROCESS DETAILS

Resource Management UK Ltd, Withyhedge Landfill Site

Engine 1538

29th June 2022

#### Standard Operating Conditions

| Parameter                            | Value                      |
|--------------------------------------|----------------------------|
| Process Status                       | Combustion                 |
| Capacity (of 100%) and Tonnes / Hour | Producing 1000kW (88% MCR) |
| Continuous or Batch Process          | Continuous                 |
| Feedstock (if applicable)            | N/A                        |
| Abatement System                     | None                       |
| Abatement System Running Status      | N/A                        |
| Fuel                                 | Landfill Gas               |
| Plume Appearance                     | No Visible Plume           |



## Executive Summary

(Page 5 of 7)

### MONITORING & ANALYTICAL METHODS

Resource Management UK Ltd, Withyhedge Landfill Site

Engine 1538

29th June 2022

| Parameter                                | Monitoring    |                     |                 |             | Analysis                                    |                      |                 |              | Overall Status | LOD (Average)          |
|------------------------------------------|---------------|---------------------|-----------------|-------------|---------------------------------------------|----------------------|-----------------|--------------|----------------|------------------------|
|                                          | Standard      | Technical Procedure | Sampling Status | Testing Lab | Analytical Procedure                        | Analytical Technique | Analysis Status | Analysis Lab |                |                        |
| Water Vapour                             | EN 14790      | CAT-TP-05           | MCERTS          | EET         | CAT-TP-05                                   | Gravimetric          | MCERTS          | EET          | MCERTS         | 0.10 % v/v             |
| Total VOCs (as Carbon)                   | EN 12619:2013 | CAT-TP-20           | MCERTS          | EET         | Flame Ionisation Detection by Signal 3010HM |                      |                 |              | MCERTS         | 0.32 mg/m <sup>3</sup> |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | EN 14792      | CAT-TP-21           | MCERTS          | EET         | Chemiluminescence by Horiba PG-250          |                      |                 |              | MCERTS         | 0.41 mg/m <sup>3</sup> |
| Carbon Monoxide                          | EN 15058      | CAT-TP-21           | MCERTS          | EET         | NDIR by Horiba PG-250                       |                      |                 |              | MCERTS         | 1.22 mg/m <sup>3</sup> |
| Oxygen                                   | EN 14789      | CAT-TP-21           | MCERTS          | EET         | Dry Zirconia Cell by Horiba PG-250          |                      |                 |              | MCERTS         | 0.1 %                  |

### ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

### SUMMARY OF SAMPLING DEVIATIONS

| Parameter | Run | Deviation                                                      |
|-----------|-----|----------------------------------------------------------------|
| All       | All | There are no deviations associated with the sampling employed. |

## SUITABILITY OF SAMPLING LOCATION

### Duct Characteristics

| Parameter           | Units          | Value    |
|---------------------|----------------|----------|
| Type                | -              | Circular |
| Depth               | m              | 0.40     |
| Width               | m              | -        |
| Area                | m <sup>2</sup> | 0.13     |
| Port Depth          | cm             | 5        |
| Orientation of Duct | -              | Vertical |
| Number of Ports     | -              | 1        |
| Sample Port Size    | -              | 1/2" BSP |

### Location of Sampling Platform

| General Platform Information   | Value     |
|--------------------------------|-----------|
| Permanent / Temporary Platform | On Ground |
| Inside / Outside               | Inside    |

### Platform Details

| EA Technical Guidance Note M1 / EN 15259 Platform Requirements                    | Value |
|-----------------------------------------------------------------------------------|-------|
| Sufficient working area to manipulate probe and operate the measuring instruments | Yes   |
| Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)                     | N/A   |
| Platform has vertical base boards (approx. 0.25m high)                            | N/A   |
| Platform has chains / self closing gates at top of ladders                        | N/A   |
| There are no obstructions present which hamper insertion of sampling equipment    | Yes   |
| Safe Access Available                                                             | Yes   |
| Easy Access Available                                                             | Yes   |

### Sampling Location / Platform Improvement Recommendations

The sampling location meets all the requirements specified in EA Guidance Note M1 and EN 15259, and therefore there are no improvement recommendations.

### EN 15259 Homogeneity Test Requirements

There is no requirement to perform a EN 15259 Homogeneity Test on this Stack.



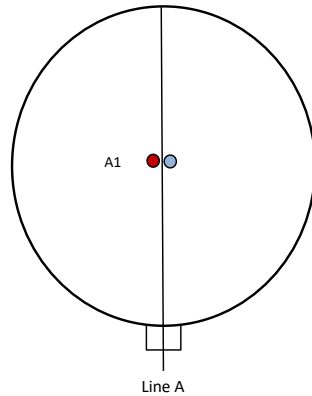
## Executive Summary

(Page 7 of 7)

### PLANT PHOTOS



### SAMPLE POINTS



where

- = isokinetic point sampled at
- = isokinetic point not sampled at
- = combustion gases sample point
- = non-isokinetic sample point

**APPENDIX CONTENTS**

APPENDIX 1 - Stack Emissions Monitoring Personnel, List of Equipment & Methods and Technical Procedures Used

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

### STACK EMISSIONS MONITORING PERSONNEL

| Position    | Name         | MCERTS Accreditation | MCERTS Number | Technical Endorsements |
|-------------|--------------|----------------------|---------------|------------------------|
| Team Leader | Darren Price | MCERTS Level 2       | MM 03 176     | TE1 TE2 TE3 TE4        |

### LIST OF EQUIPMENT

| Extractive Sampling      |                | Instrumental Analysers         |                | Miscellaneous Items              |                |
|--------------------------|----------------|--------------------------------|----------------|----------------------------------|----------------|
| Equipment Type           | Equipment I.D. | Equipment Type                 | Equipment I.D. | Equipment Type                   | Equipment I.D. |
| Control Box DGM (1)      | CAT 7.168      | Horiba PG-250                  | CAT 9.26       | Digital Manometer (1)            | -              |
| Control Box DGM (2)      | -              | Horiba PG-250 SRM              | -              | Digital Manometer (2)            | -              |
| Box Thermocouples (1)    | CAT 3.276      | Servomex 4900                  | -              | Digital Temperature Meter        | CAT TP#10      |
| Box Thermocouples (2)    | -              | Ankersmid AOX210               | -              | Stopwatch                        | CAT TP#10      |
| Umbilical (1)            | CAT 7.168      | ABB AO2020-URAS26              | -              | Barometer                        | CAT DB#28      |
| Umbilical (2)            | -              | Testo 350 XL                   | -              | Stack Thermocouple (1)           | -              |
| Oven Box (1)             | -              | Signal 2005M                   | -              | Stack Thermocouple (2)           | -              |
| Oven Box (2)             | -              | Gasmeter DX4000                | -              | Stack Thermocouple (3)           | -              |
| Heated Probe (1)         | -              | Gasmeter Sampling System       | -              | 1m Heated Line (1)               | -              |
| Heated Probe (2)         | -              | Signal 3010HM                  | CAT 8.43       | 1m Heated Line (2)               | -              |
| Heated Probe (3)         | -              | M&C PSS                        | -              | 1m Heated Line (3)               | -              |
| S-Pitot (1)              | -              | Mass Flow Controller (1)       | -              | 5m Heated Line (1)               | -              |
| S-Pitot (2)              | -              | Mass Flow Controller (2)       | -              | 15m Heated Line (1)              | -              |
| L-Pitot                  | -              | Mass View (1)                  | -              | 20m Heated Line (1)              | CAT HL#11      |
| Site Balance             | CAT BAL#02     | Mass View (2)                  | -              | 20m Heated Line (2)              | -              |
| 500g / 1Kg Check Weights | CAT BAL#02     | Squirrel 2020                  | CAT DL#04      | Dual Channel Heater Controller   | -              |
| Last Impinger Arm        | -              | Easylogger EN-EL-12 Bit        | -              | Single Channel Heater Controller | CAT HLC#11     |
| Callipers                | -              | Bioaerosols Temperature Logger | -              | Laboratory Balance               | -              |
| Tubes Kit Thermocouple   | -              | Electronic Refrigerator        | -              | Tape Measure                     | CAT 16.122     |

### METHODS & TECHNICAL PROCEDURES USED

| Parameter                                | Standard      | Technical Procedure |
|------------------------------------------|---------------|---------------------|
| Water Vapour                             | EN 14790      | CAT-TP-05           |
| Total VOCs (as Carbon)                   | EN 12619:2013 | CAT-TP-20           |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | EN 14792      | CAT-TP-21           |
| Carbon Monoxide                          | EN 15058      | CAT-TP-21           |
| Oxygen                                   | EN 14789      | CAT-TP-21           |



## WATER VAPOUR: RESULTS SUMMARY

Resource Management UK Ltd, Withyhedge Landfill Site  
Engine 1538

### Sample Runs

| Parameter     | Units  | Run 1 | Mean |
|---------------|--------|-------|------|
| Concentration | % v/v  | 12.5  | 12.5 |
| Uncertainty   | ±% v/v | 2.3   | 2.3  |

### General Sampling Information

| Parameter           | Value     |
|---------------------|-----------|
| Standard            | EN 14790  |
| Technical Procedure | CAT-TP-05 |

## WATER VAPOUR: SAMPLING DETAILS

### Sample Runs

| Parameter                  | Units              | Run 1         |
|----------------------------|--------------------|---------------|
| Sampling Times             | -                  | 10:30 - 11:30 |
| Sampling Dates             | -                  | 29/06/2022    |
| Sampling Device            | -                  | DGM           |
| Duration                   | mins               | 60            |
| DGM Start Volume           | m <sup>3</sup>     | 826.7090      |
| DGM End Volume             | m <sup>3</sup>     | 827.0200      |
| DGM Start Temperature      | °C                 | 19.0          |
| DGM End Temperature        | °C                 | 21.0          |
| Start ΔH                   | mmH <sub>2</sub> O | 6.0           |
| End ΔH                     | mmH <sub>2</sub> O | 6.0           |
| DGM Y <sub>d</sub>         | -                  | 0.9830        |
| Barometric Pressure        | kPa                | 101.0         |
| Volume Sampled (STP, Dry)  | m <sup>3</sup>     | 0.2841        |
| Volume Sampled (STP, Wet)  | m <sup>3</sup>     | 0.3246        |
| Sample Flow Rate           | l/min              | 5.10          |
| Liquid Trap Start Mass     | g                  | 2057.8        |
| Liquid Trap End Mass       | g                  | 2085.0        |
| Silica Trap Start Mass     | g                  | 891.6         |
| Silica Trap End Mass       | g                  | 896.9         |
| Total Mass Of Water Vapour | g                  | 32.5          |
| Calculated Water Vapour    | % v/v              | 12.48         |

Where: DGM stands for Dry Gas Meter

## WATER VAPOUR: QUALITY ASSURANCE

### Sample Runs

| Leak Test Results             | Units | Run 1 |  |
|-------------------------------|-------|-------|--|
| Mean Sampling Rate            | l/min | 5.1   |  |
| Pre-Sampling Leak Rate        | l/min | 0.09  |  |
| Post-Sampling Leak Rate       | l/min | 0.80  |  |
| Allowable Leak Rate           | l/min | 0.10  |  |
| Leak Test Acceptable          | -     | No    |  |
| Water Droplets                | Units | Run 1 |  |
| Are Water Droplets Present    | -     | No    |  |
| Measurement Uncertainty       | Units | Run 1 |  |
| Measurement Uncertainty (MU)  | %     | 18.5  |  |
| Allowable MU                  | %     | 20.0  |  |
| MU Acceptable                 | %     | Yes   |  |
| Silica Gel                    | Units | Run 1 |  |
| Less than 50% Faded           | %     | Yes   |  |
| Test Conditions               | Units | Run 1 |  |
| Ambient Temperature Recorded? | -     | No    |  |

### Method Deviations

| Nature of Deviation                                            | Run Number |
|----------------------------------------------------------------|------------|
| (x = deviation applies to the associated run)                  | 1          |
| There are no deviations associated with the sampling employed. | x          |

## WATER VAPOUR: MEASUREMENT UNCERTAINTY CALCULATIONS

| Measured Quantities       | Value  |        | Standard uncertainty |                |        |
|---------------------------|--------|--------|----------------------|----------------|--------|
|                           | Symbol | Run 1  | Symbol               | Units          | Run 1  |
| Sampled Volume (Actual)   | $V_m$  | 0.3110 | $uV_m$               | m <sup>3</sup> | 0.0062 |
| Sampled Gas Temperature   | $T_m$  | 293.0  | $uT_m$               | K              | 2.00   |
| Sampled Gas Pressure      | $p_m$  | 101.0  | $up_m$               | kPa            | 0.50   |
| Sampled Gas Humidity      | $H_m$  | 0.00   | $uH_m$               | % v/v          | 1.00   |
| Repeatability of Weighing | $R_w$  | 32.50  | $uR_w$               | g              | 0.06   |
| Reading of Balance        | $R_b$  | 32.50  | $uR_b$               | g              | 0.16   |
| Leak                      | L      | 15.70  |                      | %              | -      |

| Measured Quantities       | Uncertainty as a Percentage |       | Requirement of Standard |
|---------------------------|-----------------------------|-------|-------------------------|
|                           | Units                       | Run 1 |                         |
| Sampled Volume (Actual)   | %                           | 2.00  | ≤2%                     |
| Sampled Gas Temperature   | %                           | 0.68  | ≤1%                     |
| Sampled Gas Pressure      | %                           | 0.50  | ≤1%                     |
| Sampled Gas Humidity      | %                           | 1.00  | ≤1%                     |
| Repeatability of Weighing | %                           | 0.18  | No Requirement          |
| Reading of Balance        | %                           | 0.50  | No Requirement          |
| Leak                      | %                           | 15.70 | ≤2%                     |

| Measured Quantities       | Uncertainty in Measurement Units |                |        | Sensitivity Coefficient |  |
|---------------------------|----------------------------------|----------------|--------|-------------------------|--|
|                           | Symbol                           | Units          | Run 1  | Run 1                   |  |
| Sampled Volume (STP)      | $V_m$                            | m <sup>3</sup> | 0.2841 | 43.92                   |  |
| Repeatability of Weighing | $R_w$                            | g              | 32.50  | 0.38                    |  |
| Reading of Balance        | $R_b$                            | g              | 32.50  | 0.38                    |  |
| Leak                      | L                                | % v/v          | 1.13   | 1.00                    |  |

| Measured Quantities       | Uncertainty in Result |       |
|---------------------------|-----------------------|-------|
|                           | Units                 | Run 1 |
| Sampled Volume (STP)      | % v/v                 | 0.318 |
| Repeatability of Weighing | % v/v                 | 0.023 |
| Reading of Balance        | % v/v                 | 0.062 |
| Leak                      | % v/v                 | 1.131 |

| Parameter                                                               | Units | Run 1 |
|-------------------------------------------------------------------------|-------|-------|
| Combined uncertainty                                                    | % v/v | 1.18  |
| Expanded uncertainty (95% confidence)                                   | % v/v | 2.31  |
| Expanded uncertainty (95% confidence), estimated with Method Deviations | % v/v | 2.31  |
| Uncertainty if Water Droplets are present                               | % v/v | N/A   |
| Reported Uncertainty                                                    | % v/v | 2.31  |
| Expanded uncertainty (95% confidence)                                   | %     | 18.5  |
| Expanded uncertainty (95% confidence), estimated with Method Deviations | %     | 18.5  |
| Uncertainty if Water Droplets are present                               | %     | N/A   |
| Reported Uncertainty                                                    | %     | 18.5  |



**TOTAL VOCs (as CARBON): RESULTS SUMMARY**

Resource Management UK Ltd, Withyhedge Landfill Site  
Engine 1538

**Sample Runs**

| Parameter     | Units              | Run 1 | Mean |
|---------------|--------------------|-------|------|
| Concentration | mg/m <sup>3</sup>  | 908   | 908  |
| Uncertainty   | ±mg/m <sup>3</sup> | 43.6  | 43.6 |

**General Sampling Information**

| Parameter                        | Value                              |
|----------------------------------|------------------------------------|
| Standard                         | EN 12619:2013                      |
| Technical Procedure              | CAT-TP-20                          |
| Probe Material                   | Stainless Steel                    |
| Filtration Type / Size           | 0.1µm Glass Fibre                  |
| Heated Head Filter Used          | Yes                                |
| Heated Line Temperature          | 180                                |
| Span Gas Type                    | Propane In Synthetic Air (5 Grade) |
| Span Gas Reference Number        | 12.0443                            |
| Span Gas Expiry Date             | 13/04/2024                         |
| Span Gas Start Pressure (bar)    | 150                                |
| Gas Cylinder Concentration (ppm) | 618.5                              |
| Span Gas Set Point (ppm)         | 618.50                             |
| Span Gas Uncertainty (%)         | 2                                  |
| Zero Gas Type                    | Synthetic Air (5 Grade)            |
| Number of Sampling Lines Used    | 1/1                                |
| Number of Sampling Points Used   | 1/1                                |
| Sample Point I.D.'s              | A1                                 |

FORMAT: Number Used / Number Required

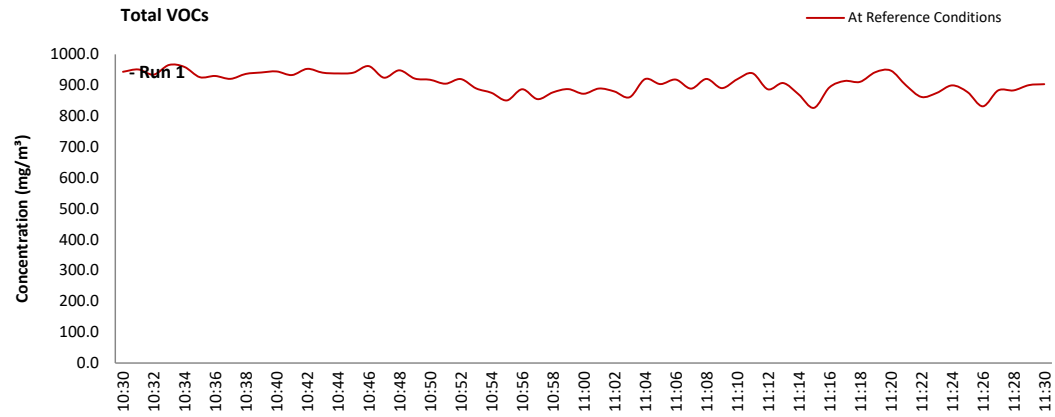
FORMAT: Number Used / Number Required

**Reference Conditions**

Reference Conditions are: 273K, 101.3kPa, dry gas, 5% oxygen.

TOTAL VOCs (as CARBON): DATA TREND

Graphical Trend of Data



**TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE**
**Sampling Details**

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:30 - 11:30 |
| Sampling Dates   | -     | 29/06/2022    |
| Instrument Range | ppm   | 1000          |
| Span Gas Value   | ppm   | 618.5         |

**Quality Assurance**

| Zero Drift                    |                                | Units | Run 1   |
|-------------------------------|--------------------------------|-------|---------|
| CAL 1                         | Zero Down Sampling Line (Pre)  | ppm   | 0.00    |
|                               | Zero Down Sampling Line (Post) | ppm   | 4.00    |
|                               | Zero Drift                     | ppm   | 4.00    |
|                               | Zero Drift                     | %     | 0.65    |
|                               | Drift Correction Applied       | 2-5%  | No      |
|                               | Allowable Zero Drift           | ± ppm | 30.93   |
|                               | Zero Drift Acceptable          | -     | Yes     |
| Span Drift                    |                                | Units | Run 1   |
| CAL 1                         | Span Down Sampling Line (Pre)  | ppm   | 612.00  |
|                               | Span Down Sampling Line (Post) | ppm   | 606.00  |
|                               | Span Drift                     | ppm   | -6.00   |
|                               | Span Drift                     | %     | -0.98   |
|                               | Drift Correction Applied       | 2-5%  | No      |
|                               | Allowable Span Drift           | ± ppm | 30.93   |
| Test Conditions               |                                | Units | Run 1   |
| Run Ambient Temperature Range |                                | °C    | 12 - 15 |

**Method Deviations**

| Nature of Deviation                                            | Run Number |
|----------------------------------------------------------------|------------|
| (x = deviation applies to the associated run)                  | 1          |
| There are no deviations associated with the sampling employed. | x          |



**TOTAL VOCs (as CARBON): MEASUREMENT UNCERTAINTY CALCULATIONS**

| Performance characteristics | RUN 1  |  | Units                        |
|-----------------------------|--------|--|------------------------------|
| Limit value                 | 1000.0 |  | mg/m <sup>3</sup> (REF)      |
| Allowable MU                | 15.0   |  | %                            |
| Measured concentration      | 825.16 |  | mg/m <sup>3</sup> (STP, dry) |
| Range Used                  | 1000.0 |  | ppm                          |
| Range Used [A]              | 1606.1 |  | mg/m <sup>3</sup>            |
| Cal gas conc.               | 618.5  |  | ppm                          |
| Conversion                  | 1.61   |  | ppm to mg/m <sup>3</sup>     |
| MCERTS Range [B]            | 15.0   |  | mg/m <sup>3</sup>            |
| Lower of [A] or [B]         | 15.0   |  | mg/m <sup>3</sup>            |
| Cal gas conc.               | 993.4  |  | mg/m <sup>3</sup>            |

| Performance characteristics        | RUN 1 |  | Units            |
|------------------------------------|-------|--|------------------|
| Response time                      | 15    |  | seconds          |
| Number of readings in measurement  | 60    |  | -                |
| Repeatability at zero              | 0.15  |  | % full scale     |
| Repeatability at span level        | 0.80  |  | % full scale     |
| Deviation from linearity           | 1.05  |  | % of value       |
| Zero drift                         | 0.65  |  | % full scale     |
| Span drift                         | -0.98 |  | % full scale     |
| Volume or pressure flow dependence | 2.00  |  | % of full scale  |
| Atmospheric pressure dependence    | 0.80  |  | % of value/kPa   |
| Ambient temperature dependence     | 1.00  |  | % full scale/10K |
| Combined interference              | 1.20  |  | % range          |
| Dependence on voltage              | 0.10  |  | % full scale/10V |
| Losses in the line (leak)          | 0.00  |  | % of value       |
| Uncertainty of calibration gas     | 2.00  |  | % of value       |

| Performance characteristic                        | RUN 1           |  | Units             |
|---------------------------------------------------|-----------------|--|-------------------|
| Standard deviation of repeatability at zero       | use rep at span |  | mg/m <sup>3</sup> |
| Standard deviation of repeatability at span level | 0.10            |  | mg/m <sup>3</sup> |
| Lack of fit                                       | 0.09            |  | mg/m <sup>3</sup> |
| Drift                                             | 0.00            |  | mg/m <sup>3</sup> |
| Volume or pressure flow dependence                | 0.00            |  | mg/m <sup>3</sup> |
| Atmospheric pressure dependence                   | 0.03            |  | mg/m <sup>3</sup> |
| Ambient temperature dependence                    | 0.14            |  | mg/m <sup>3</sup> |
| Combined interference (from MCERTS Certificate)   | 0.10            |  | mg/m <sup>3</sup> |
| Dependence on voltage                             | 0.01            |  | mg/m <sup>3</sup> |
| Losses in the line (leak)                         | 0.00            |  | mg/m <sup>3</sup> |
| Uncertainty of calibration gas                    | 9.53            |  | mg/m <sup>3</sup> |

| Measurement uncertainty                               | Result   | RUN 1  | Units                   |
|-------------------------------------------------------|----------|--------|-------------------------|
| Combined uncertainty                                  |          | 825.16 | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  | k = 1.96 | 9.53   | mg/m <sup>3</sup>       |
| Uncertainty corrected to std conds. (O <sub>2</sub> ) |          | 18.68  | mg/m <sup>3</sup>       |
|                                                       |          | 20.56  | mg/m <sup>3</sup> (REF) |

|                                                                        | RUN 1      | Units      |
|------------------------------------------------------------------------|------------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 2.26       | % of Value |
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 1.87       | % at ELV   |
| Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 15.0       | % at ELV   |
| <b>Result of Compliance with Uncertainty Requirement</b>               | <b>N/A</b> | -          |

|                                                                          | RUN 1            | Units      |
|--------------------------------------------------------------------------|------------------|------------|
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 4.80             | % of Value |
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 4.70             | % at ELV   |
| Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence | 15.6             | % at ELV   |
| <b>Result of Compliance with Uncertainty Requirement</b>                 | <b>COMPLIANT</b> | -          |

Requirement for SRM is that Uncertainty should be <15% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 15% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

## OXIDES OF NITROGEN (as NO<sub>2</sub>): RESULTS SUMMARY

Resource Management UK Ltd, Withyhedge Landfill Site  
Engine 1538

### Sample Runs

| Parameter     | Units              | Run 1 | Mean |
|---------------|--------------------|-------|------|
| Concentration | mg/m <sup>3</sup>  | 372   | 372  |
| Uncertainty   | ±mg/m <sup>3</sup> | 17.1  | 17.1 |

### General Sampling Information

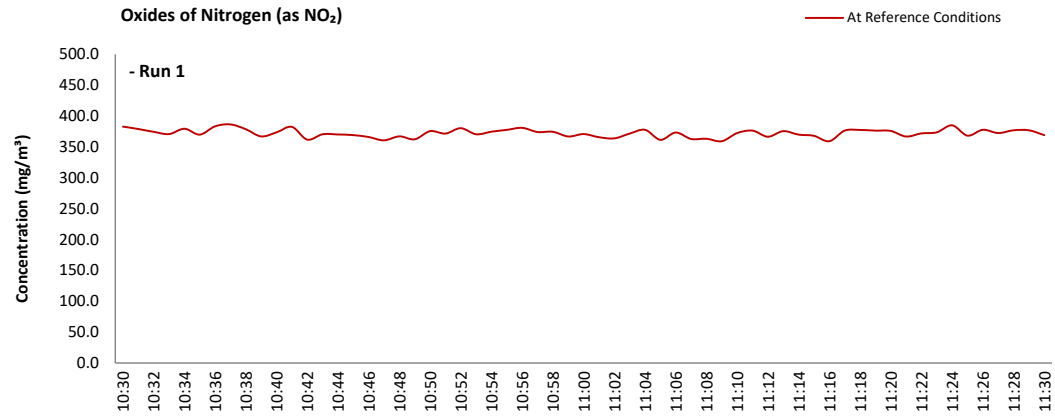
| Parameter                             | Value              |                                       |
|---------------------------------------|--------------------|---------------------------------------|
| Standard                              | EN 14792           |                                       |
| Technical Procedure                   | CAT-TP-21          |                                       |
| Probe Material                        | Stainless Steel    |                                       |
| Filtration Type / Size                | 0.1µm Glass Fibre  |                                       |
| Heated Head Filter Used               | Yes                |                                       |
| Heated Line Temperature               | 180°C              |                                       |
| Date & Result of Last Converter Check | 24/09/2021 - 97.4% |                                       |
| Span Gas Type                         | Nitrogen Monoxide  |                                       |
| Span Gas Reference Number             | 12.0441            |                                       |
| Span Gas Expiry Date                  | 13/04/2024         |                                       |
| Span Gas Start Pressure (bar)         | 120                |                                       |
| Gas Cylinder Concentration (ppm)      | 228.7              |                                       |
| Span Gas Uncertainty (%)              | 0.2                |                                       |
| Zero Gas Type                         | Nitrogen (5 Grade) |                                       |
| Number of Sampling Lines Used         | 1/1                | FORMAT: Number Used / Number Required |
| Number of Sampling Points Used        | 1/1                | FORMAT: Number Used / Number Required |
| Sample Point I.D.'s                   | A1                 |                                       |

### Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 5% oxygen.

# OXIDES OF NITROGEN (as NO<sub>2</sub>): DATA TREND

## Graphical Trend of Data





OXIDES OF NITROGEN (as NO<sub>2</sub>): SAMPLING DETAILS & QUALITY ASSURANCE

## Sampling Details

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:30 - 11:30 |
| Sampling Dates   | -     | 29/06/2022    |
| Instrument Range | ppm   | 500           |
| Span Gas Value   | ppm   | 228.7         |

## Quality Assurance

| Conditioning Unit Temperature | Units | Run 1 |
|-------------------------------|-------|-------|
| Average Temperature           | °C    | 4.0   |
| Allowable Temperature         | < °C  | 4.0   |
| Temperature Acceptable        | -     | Yes   |

| Zero Drift               | Units | Run 1 |
|--------------------------|-------|-------|
| Zero at Analyser (Pre)   | ppm   | 0.00  |
| Zero at Analyser (Post)  | ppm   | 3.50  |
| Zero Drift               | ppm   | 3.50  |
| Zero Drift               | %     | 1.53  |
| Drift Correction Applied | 2-5%  | No    |
| Allowable Zero Drift     | ± %   | 5.00  |
| Zero Drift Acceptable    | -     | Yes   |

| Span Drift               | Units | Run 1  |
|--------------------------|-------|--------|
| Span at Analyser (Pre)   | ppm   | 229.00 |
| Span at Analyser (Post)  | ppm   | 228.60 |
| Span Drift               | ppm   | -0.40  |
| Zero Adj. Span Drift     | %     | 1.71   |
| Drift Correction Applied | 2-5%  | No     |
| Allowable Span Drift     | ± %   | 5.00   |
| Span Drift Acceptable    | -     | Yes    |

| Test Conditions               | Units | Run 1   |
|-------------------------------|-------|---------|
| Run Ambient Temperature Range | °C    | 12 - 15 |

## Method Deviations

| Nature of Deviation                                            | Run Number |
|----------------------------------------------------------------|------------|
| (x = deviation applies to the associated run)                  | 1          |
| There are no deviations associated with the sampling employed. | x          |

# OXIDES OF NITROGEN (as NO<sub>2</sub>): MEASUREMENT UNCERTAINTY CALCULATIONS

| Performance characteristics | RUN 1  | Units                        |
|-----------------------------|--------|------------------------------|
| Limit value                 | 500.0  | mg/m <sup>3</sup> (REF)      |
| Allowable MU                | 10.0   | %                            |
| Measured concentration      | 338.27 | mg/m <sup>3</sup> (STP, dry) |
| Ratio NO / NO <sub>2</sub>  | 5      | %                            |
| Range Used                  | 500.0  | ppm                          |
| Range Used [A]              | 1026.1 | mg/m <sup>3</sup>            |
| Cal gas conc.               | 228.7  | ppm                          |
| Conversion                  | 2.05   | ppm to mg/m <sup>3</sup>     |
| MCERTS Range [B]            | 125.0  | mg/m <sup>3</sup>            |
| Lower of [A] or [B]         | 125.0  | mg/m <sup>3</sup>            |
| Cal gas conc.               | 469.4  | mg/m <sup>3</sup>            |

| Performance characteristics             | RUN 1 | Units            |
|-----------------------------------------|-------|------------------|
| Response time                           | 60    | seconds          |
| Number of readings in measurement       | 60    | -                |
| Repeatability at zero                   | 0.40  | % full scale     |
| Repeatability at span level             | 0.40  | % full scale     |
| Deviation from linearity                | 0.84  | % of value       |
| Zero drift                              | 1.53  | % full scale     |
| Span drift                              | -1.71 | % full scale     |
| Volume or pressure flow dependence      | 0.40  | % of full scale  |
| Atmospheric pressure dependence         | 0.30  | % of value/kPa   |
| Ambient temperature dependence          | 0.18  | % full scale/10K |
| Combined interference                   | 0.60  | % range          |
| Dependence on voltage                   | 0.40  | % full scale/10V |
| Converter efficiency                    | 97.4  | %                |
| Losses in the line (leak)               | 0.61  | % of value       |
| Uncertainty of calibration gas blending | 1.40  | % of value       |
| Uncertainty of calibration gas          | 0.20  | % of value       |

| Performance characteristic                        | RUN 1           | Units             |
|---------------------------------------------------|-----------------|-------------------|
| Standard deviation of repeatability at zero       | use rep at span | mg/m <sup>3</sup> |
| Standard deviation of repeatability at span level | 0.05            | mg/m <sup>3</sup> |
| Lack of fit                                       | 0.61            | mg/m <sup>3</sup> |
| Drift                                             | 0.00            | mg/m <sup>3</sup> |
| Volume or pressure flow dependence                | 0.00            | mg/m <sup>3</sup> |
| Atmospheric pressure dependence                   | 0.11            | mg/m <sup>3</sup> |
| Ambient temperature dependence                    | 0.03            | mg/m <sup>3</sup> |
| Combined interference (from MCERTS Certificate)   | 0.43            | mg/m <sup>3</sup> |
| Dependence on voltage                             | 0.05            | mg/m <sup>3</sup> |
| Converter efficiency                              | 0.25            | mg/m <sup>3</sup> |
| Losses in the line (leak)                         | 1.20            | mg/m <sup>3</sup> |
| Uncertainty of calibration gas blending           | 2.73            | mg/m <sup>3</sup> |
| Uncertainty of calibration gas                    | 0.39            | mg/m <sup>3</sup> |

| Measurement uncertainty                               | Result   | RUN 1  | Units                   |
|-------------------------------------------------------|----------|--------|-------------------------|
| Combined uncertainty                                  |          | 338.27 | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  | k = 1.96 | 3.14   | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  |          | 6.16   | mg/m <sup>3</sup>       |
| Uncertainty corrected to std conds. (O <sub>2</sub> ) |          | 6.78   | mg/m <sup>3</sup> (REF) |

|                                                                        | RUN 1      | Units      |
|------------------------------------------------------------------------|------------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 1.82       | % of Value |
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 1.23       | % at ELV   |
| Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 10.0       | % at ELV   |
| <b>Result of Compliance with Uncertainty Requirement</b>               | <b>N/A</b> | -          |

|                                                                          | RUN 1            | Units      |
|--------------------------------------------------------------------------|------------------|------------|
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 4.61             | % of Value |
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 4.44             | % at ELV   |
| Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence | 10.9             | % at ELV   |
| <b>Result of Compliance with Uncertainty Requirement</b>                 | <b>COMPLIANT</b> | -          |

Requirement for SRM is that Uncertainty should be <10% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 10% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

## CARBON MONOXIDE: RESULTS SUMMARY

Resource Management UK Ltd, Withyhedge Landfill Site  
Engine 1538

### Sample Runs

| Parameter     | Units              | Run 1 | Mean |
|---------------|--------------------|-------|------|
| Concentration | mg/m <sup>3</sup>  | 984   | 984  |
| Uncertainty   | ±mg/m <sup>3</sup> | 45.3  | 45.3 |

### General Sampling Information

| Parameter                        | Value              |
|----------------------------------|--------------------|
| Standard                         | EN 15058           |
| Technical Procedure              | CAT-TP-21          |
| Probe Material                   | Stainless Steel    |
| Filtration Type / Size           | 0.1µm Glass Fibre  |
| Heated Head Filter Used          | Yes                |
| Heated Line Temperature          | 180°C              |
| Span Gas Type                    | Carbon Monoxide    |
| Span Gas Reference Number        | 12.0441            |
| Span Gas Expiry Date             | 13/04/2024         |
| Span Gas Start Pressure (bar)    | 120                |
| Gas Cylinder Concentration (ppm) | 1210.3             |
| Span Gas Uncertainty (%)         | 0.2                |
| Zero Gas Type                    | Nitrogen (5 Grade) |
| Number of Sampling Lines Used    | 1/1                |
| Number of Sampling Points Used   | 1/1                |
| Sample Point I.D.'s              | A1                 |

FORMAT: Number Used / Number Required

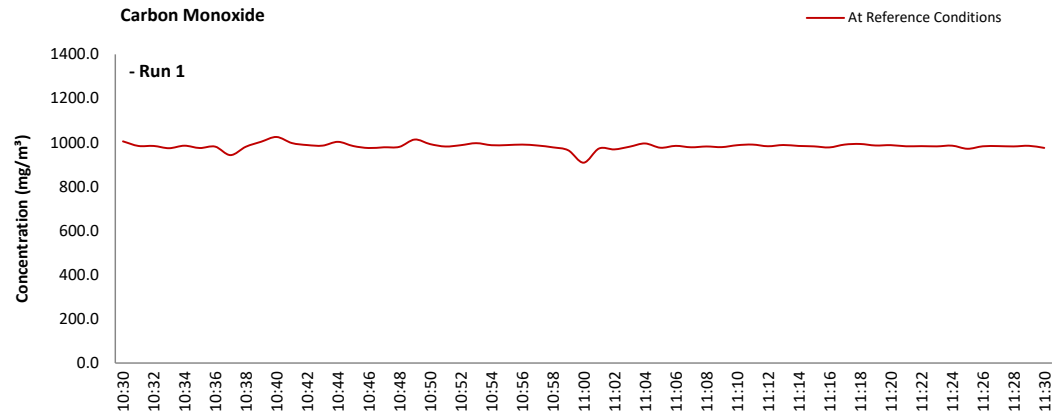
FORMAT: Number Used / Number Required

### Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 5% oxygen.

## CARBON MONOXIDE: DATA TREND

### Graphical Trend of Data





APPENDIX 2

**CARBON MONOXIDE: SAMPLING DETAILS & QUALITY ASSURANCE**

**Sampling Details**

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:30 - 11:30 |
| Sampling Dates   | -     | 29/06/2022    |
| Instrument Range | ppm   | 2000          |
| Span Gas Value   | ppm   | 1210.3        |

**Quality Assurance**

| Conditioning Unit Temperature | Units | Run 1 |
|-------------------------------|-------|-------|
| Average Temperature           | °C    | 4.0   |
| Allowable Temperature         | < °C  | 4.0   |
| Temperature Acceptable        | -     | Yes   |

| Zero Drift               | Units | Run 1 |
|--------------------------|-------|-------|
| Zero at Analyser (Pre)   | ppm   | 0.00  |
| Zero at Analyser (Post)  | ppm   | 10.00 |
| Zero Drift               | ppm   | 10.00 |
| Zero Drift               | %     | 0.83  |
| Drift Correction Applied | 2-5%  | No    |
| Allowable Zero Drift     | ± %   | 5.00  |
| Zero Drift Acceptable    | -     | Yes   |

| Span Drift               | Units | Run 1   |
|--------------------------|-------|---------|
| Span at Analyser (Pre)   | ppm   | 1210.00 |
| Span at Analyser (Post)  | ppm   | 1194.00 |
| Span Drift               | ppm   | -16.00  |
| Zero Adj. Span Drift     | %     | 2.15    |
| Drift Correction Applied | 2-5%  | Yes     |
| Allowable Span Drift     | ± %   | 5.00    |
| Span Drift Acceptable    | -     | Yes     |

| Test Conditions               | Units | Run 1   |
|-------------------------------|-------|---------|
| Run Ambient Temperature Range | °C    | 12 - 15 |

**Method Deviations**

| Nature of Deviation                                            | Run Number |
|----------------------------------------------------------------|------------|
| (x = deviation applies to the associated run)                  | 1          |
| There are no deviations associated with the sampling employed. | x          |

## CARBON MONOXIDE: MEASUREMENT UNCERTAINTY CALCULATIONS

| Performance characteristics | RUN 1  |  | Units                        |
|-----------------------------|--------|--|------------------------------|
| Limit value                 | 1400.0 |  | mg/m <sup>3</sup> (REF)      |
| Allowable MU                | 6.0    |  | %                            |
| Measured concentration      | 893.91 |  | mg/m <sup>3</sup> (STP, dry) |
| Range Used                  | 2000.0 |  | ppm                          |
| Range Used [A]              | 2498.4 |  | mg/m <sup>3</sup>            |
| Cal gas conc.               | 1210.3 |  | ppm                          |
| Conversion                  | 1.25   |  | ppm to mg/m <sup>3</sup>     |
| MCERTS Range [B]            | 95.0   |  | mg/m <sup>3</sup>            |
| Lower of [A] or [B]         | 95.0   |  | mg/m <sup>3</sup>            |
| Cal gas conc.               | 1511.9 |  | mg/m <sup>3</sup>            |

| Performance characteristics             | RUN 1 |  | Units            |
|-----------------------------------------|-------|--|------------------|
| Response time                           | 60    |  | seconds          |
| Number of readings in measurement       | 60    |  | -                |
| Repeatability at zero                   | 0.40  |  | % full scale     |
| Repeatability at span level             | 0.40  |  | % full scale     |
| Deviation from linearity                | 0.62  |  | % of value       |
| Zero drift                              | 0.83  |  | % full scale     |
| Span drift                              | 0.00  |  | % full scale     |
| Volume or pressure flow dependence      | 0.40  |  | % of full scale  |
| Atmospheric pressure dependence         | 0.30  |  | % of value/kPa   |
| Ambient temperature dependence          | 0.05  |  | % full scale/10K |
| Combined interference                   | 0.73  |  | % range          |
| Dependence on voltage                   | 0.40  |  | % full scale/10V |
| Losses in the line (leak)               | 0.74  |  | % of value       |
| Uncertainty of calibration gas blending | 1.40  |  | % of value       |
| Uncertainty of calibration gas          | 0.20  |  | % of value       |

| Performance characteristic                        | RUN 1           |  | Units             |
|---------------------------------------------------|-----------------|--|-------------------|
| Standard deviation of repeatability at zero       | use rep at span |  | mg/m <sup>3</sup> |
| Standard deviation of repeatability at span level | 0.05            |  | mg/m <sup>3</sup> |
| Lack of fit                                       | 0.34            |  | mg/m <sup>3</sup> |
| Drift                                             | 0.00            |  | mg/m <sup>3</sup> |
| Volume or pressure flow dependence                | 0.00            |  | mg/m <sup>3</sup> |
| Atmospheric pressure dependence                   | 0.08            |  | mg/m <sup>3</sup> |
| Ambient temperature dependence                    | 0.01            |  | mg/m <sup>3</sup> |
| Combined interference (from MCERTS Certificate)   | 0.40            |  | mg/m <sup>3</sup> |
| Dependence on voltage                             | 0.05            |  | mg/m <sup>3</sup> |
| Losses in the line (leak)                         | 3.84            |  | mg/m <sup>3</sup> |
| Uncertainty of calibration gas blending           | 7.23            |  | mg/m <sup>3</sup> |
| Uncertainty of calibration gas                    | 1.03            |  | mg/m <sup>3</sup> |

| Measurement uncertainty                               | Result   | RUN 1  | Units                   |
|-------------------------------------------------------|----------|--------|-------------------------|
| Combined uncertainty                                  |          | 893.91 | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  | k = 1.96 | 8.27   | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  |          | 16.22  | mg/m <sup>3</sup>       |
| Uncertainty corrected to std conds. (O <sub>2</sub> ) |          | 17.85  | mg/m <sup>3</sup> (REF) |

|                                                                        | RUN 1      | Units      |
|------------------------------------------------------------------------|------------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 1.81       | % of Value |
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 1.16       | % at ELV   |
| Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 6.0        | % at ELV   |
| <b>Result of Compliance with Uncertainty Requirement</b>               | <b>N/A</b> | -          |

|                                                                          | RUN 1            | Units      |
|--------------------------------------------------------------------------|------------------|------------|
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 4.60             | % of Value |
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 4.42             | % at ELV   |
| Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence | 7.3              | % at ELV   |
| <b>Result of Compliance with Uncertainty Requirement</b>                 | <b>COMPLIANT</b> | -          |

Requirement for SRM is that Uncertainty should be <6% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 6% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

## OXYGEN: RESULTS SUMMARY

Resource Management UK Ltd, Withyhedge Landfill Site  
Engine 1538

### Sample Runs

| Parameter     | Units  | Run 1 | Mean |
|---------------|--------|-------|------|
| Concentration | % v/v  | 6.5   | 6.5  |
| Uncertainty   | ±% v/v | 0.27  | 0.27 |

### General Sampling Information

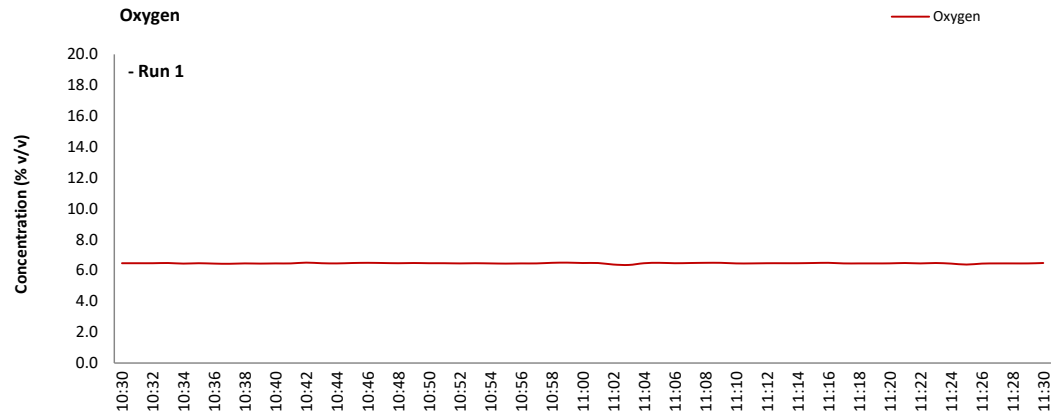
| Parameter                          | Value                   |
|------------------------------------|-------------------------|
| Standard                           | EN 14789                |
| Technical Procedure                | CAT-TP-21               |
| Probe Material                     | Stainless Steel         |
| Filtration Type / Size             | 0.1µm Glass Fibre       |
| Heated Head Filter Used            | Yes                     |
| Heated Line Temperature            | 180°C                   |
| Span Gas Type                      | Synthetic Air (5 Grade) |
| Span Gas Reference Number          | 12.0443                 |
| Span Gas Expiry Date               | 13/04/2024              |
| Span Gas Start Pressure (bar)      | 150                     |
| Gas Cylinder Concentration (% v/v) | 8.2                     |
| Span Gas Uncertainty (%)           | 2                       |
| Zero Gas Type                      | Nitrogen (5 Grade)      |
| Number of Sampling Lines Used      | 1/1                     |
| Number of Sampling Points Used     | 1/1                     |
| Sample Point I.D.'s                | A1                      |

FORMAT: Number Used / Number Required

FORMAT: Number Used / Number Required

## OXYGEN: DATA TREND

### Graphical Trend of Data





## OXYGEN: SAMPLING DETAILS & QUALITY ASSURANCE

### Sampling Details

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:30 - 11:30 |
| Sampling Dates   | -     | 29/06/2022    |
| Instrument Range | % v/v | 25.0          |
| Span Gas Value   | % v/v | 8.2           |

### Quality Assurance

| Conditioning Unit Temperature | Units | Run 1 |
|-------------------------------|-------|-------|
| Average Temperature           | °C    | 4.0   |
| Allowable Temperature         | < °C  | 4.0   |
| Temperature Acceptable        | -     | Yes   |

| Zero Drift               | Units | Run 1 |
|--------------------------|-------|-------|
| Zero at Analyser (Pre)   | % v/v | 0.00  |
| Zero at Analyser (Post)  | % v/v | 0.04  |
| Zero Drift               | % v/v | 0.04  |
| Zero Drift               | %     | 0.49  |
| Drift Correction Applied | 2-5%  | No    |
| Allowable Zero Drift     | ± %   | 5.00  |
| Zero Drift Acceptable    | -     | Yes   |

| Span Drift               | Units | Run 1 |
|--------------------------|-------|-------|
| Span at Analyser (Pre)   | % v/v | 8.20  |
| Span at Analyser (Post)  | % v/v | 8.35  |
| Span Drift               | % v/v | 0.15  |
| Zero Adj. Span Drift     | %     | 1.34  |
| Drift Correction Applied | 2-5%  | No    |
| Allowable Span Drift     | ± %   | 5.00  |
| Span Drift Acceptable    | -     | Yes   |

| Test Conditions               | Units | Run 1   |
|-------------------------------|-------|---------|
| Run Ambient Temperature Range | °C    | 12 - 15 |

### Method Deviations

| Nature of Deviation                                            | Run Number |
|----------------------------------------------------------------|------------|
| (x = deviation applies to the associated run)                  | 1          |
| There are no deviations associated with the sampling employed. | x          |

## OXYGEN: MEASUREMENT UNCERTAINTY CALCULATIONS

| Performance characteristics | RUN 1 | Units |
|-----------------------------|-------|-------|
| Limit value                 | N/A   | %vol  |
| Allowable MU                | 6.0   | %     |
| Measured concentration      | 6.46  | %vol  |
| Range Used                  | 25.0  | %vol  |
| Cal gas conc.               | 8.2   | %vol  |

| Performance characteristics        | RUN 1 | Units            |
|------------------------------------|-------|------------------|
| Response time                      | 60    | seconds          |
| Number of readings in measurement  | 60    | -                |
| Repeatability at zero              | 0.04  | % full scale     |
| Repeatability at span level        | 0.04  | % full scale     |
| Deviation from linearity           | 0.10  | % of value       |
| Zero drift                         | 0.49  | % full scale     |
| Span drift                         | 1.34  | % full scale     |
| Volume or pressure flow dependence | 0.20  | % of full scale  |
| Atmospheric pressure dependence    | 0.30  | % of value/kPa   |
| Ambient temperature dependence     | -0.07 | % full scale/10K |
| Combined interference              | 0.56  | % range          |
| Dependence on voltage              | 0.02  | % full scale/10V |
| Losses in the line (leak)          | 0.00  | % of value       |
| Uncertainty of calibration gas     | 2.00  | % of value       |

| Performance characteristic                        | RUN 1           | Units |
|---------------------------------------------------|-----------------|-------|
| Standard deviation of repeatability at zero       | use rep at span | %vol  |
| Standard deviation of repeatability at span level | 0.01            | %vol  |
| Lack of fit                                       | 0.01            | %vol  |
| Drift                                             | 0.00            | %vol  |
| Volume or pressure flow dependence                | 0.00            | %vol  |
| Atmospheric pressure dependence                   | 0.02            | %vol  |
| Ambient temperature dependence                    | -0.01           | %vol  |
| Combined interference (from MCERTS Certificate)   | 0.08            | %vol  |
| Dependence on voltage                             | 0.00            | %vol  |
| Losses in the line (leak)                         | 0.00            | %vol  |
| Uncertainty of calibration gas                    | 0.07            | %vol  |

| Measurement uncertainty | Result   | RUN 1 | Units |
|-------------------------|----------|-------|-------|
| Combined uncertainty    |          | 6.46  | %vol  |
| Expanded uncertainty    |          | 0.14  | %vol  |
| Expanded uncertainty    | k = 1.96 | 0.27  | %vol  |

|                                                               | RUN 1     | Units      |
|---------------------------------------------------------------|-----------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 4.23      | % of Value |
| Result of Compliance with Uncertainty Requirement             | COMPLIANT | -          |

Requirement for SRM is that Uncertainty should be 0.3% vol absolute or 6% relative whichever is the lower, on a dry gas basis. Source, EN 14789.

| Version Number | Record of changes made within this version of the document |
|----------------|------------------------------------------------------------|
| V1             | The original document issued to the client                 |



Element, Unit C6, Emery Court, The Embankment Business Park, Heaton Mersey, Stockport, SK4 3GL  
Your Element Contact: David Littlewood (07772 250 040)  
E: david.littlewood@element.com

**Stack Emissions Testing Report Commissioned by**  
Resource Management Group UK Ltd

**Installation Name & Address**  
Resource Management Group UK Ltd  
Withyhedge Landfill Site  
Rudbaxton  
Haverfordwest  
SA62 4DB

EPR Permit: GP3630HT/V003

**Stack Reference**  
Flare Stack

**Dates of the Monitoring Campaign**  
18th October 2022

**Job Reference Number**  
ERE-22405

| Report Written by                                                             |
|-------------------------------------------------------------------------------|
| Darren Price<br>Team Leader<br>MCERTS Level 2<br>MM 03 176<br>TE1 TE2 TE3 TE4 |

| Report Approved by                                                                       |
|------------------------------------------------------------------------------------------|
| David Littlewood<br>Operations Manager<br>MCERTS Level 2<br>MM 06 772<br>TE1 TE2 TE3 TE4 |

| Report Date        |
|--------------------|
| 14th November 2022 |

| Version   |
|-----------|
| Version 1 |

| Signature of Report Approver                                                         |
|--------------------------------------------------------------------------------------|
|  |



CONTENTS

TITLE PAGE

CONTENTS

EXECUTIVE SUMMARY

|                                 |   |
|---------------------------------|---|
| Monitoring Objectives           | 3 |
| Monitoring Results              | 4 |
| Monitoring Dates & Times        | 5 |
| Process Details                 | 6 |
| Monitoring & Analytical Methods | 7 |
| Summary of Sampling Deviations  | 7 |
| Sampling Location               | 8 |
| Plant Photos / Sample Points    | 9 |

APPENDIX 1 - Monitoring Personnel & List of Equipment

APPENDIX 2 - Raw Data, Sampling Equations & Charts

*Opinions and interpretations expressed herein are outside the scope of Element's ISO 17025 accreditation.*

*This test report shall not be reproduced, except in full, without the written approval of Element.*

## Executive Summary

(Page 1 of 7)

### MONITORING OBJECTIVES

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack  
18th October 2022

#### Overall Aim of the Monitoring Campaign

Element were commissioned by Resource Management Group UK Ltd to carry out stack emissions testing on the Flare Stack at Withyhedge Landfill Site.

The aim of the monitoring campaign was to demonstrate compliance with a set of emission limit values (ELVs) as specified in the Site's Permit.

#### Special Requirements

There were no special requirements.

#### Target Parameters

Total VOCs (as Carbon), Oxides of Nitrogen (as NO<sub>2</sub>), Carbon Monoxide

Executive Summary  
(Page 2 of 7)

MONITORING RESULTS

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack  
18th October 2022

where MU = Measurement Uncertainty associated with the Result

| Concentration                            |                                |                  |           |       |
|------------------------------------------|--------------------------------|------------------|-----------|-------|
| Parameter                                | Units                          | Result           | MU<br>+/- | Limit |
| Total VOCs (as Carbon)                   | <sup>1</sup> mg/m <sup>3</sup> | 4.1              | 0.8       | 10    |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | <sup>1</sup> mg/m <sup>3</sup> | 24.1             | 4.1       | 150   |
| Carbon Monoxide                          | <sup>1</sup> mg/m <sup>3</sup> | 2.6              | 1.1       | 50    |
| Oxygen                                   | % v/v                          | <b>Dry</b> 10.95 | 0.26      |       |
| Water Vapour                             | % v/v                          | 11.4             | 3.0       |       |

<sup>1</sup> Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 3% oxygen.

Executive Summary  
(Page 3 of 7)

MONITORING DATE(S) & TIMES

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack  
18th October 2022

| Parameter                                | Units | Concentration |      | Sampling Date(s) | Sampling Times | Duration mins |
|------------------------------------------|-------|---------------|------|------------------|----------------|---------------|
| Total VOCs (as Carbon)                   | R1    | mg/m³         | 4.1  | 18/10/2022       | 10:10 - 11:10  | 60            |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | R1    | mg/m³         | 24.1 | 18/10/2022       | 10:10 - 11:10  | 60            |
| Carbon Monoxide                          | R1    | mg/m³         | 2.6  | 18/10/2022       | 10:10 - 11:10  | 60            |
| Oxygen                                   | R1    | % v/v         | 11.0 | 18/10/2022       | 10:10 - 11:10  | 60            |
| Water Vapour                             | R1    | % v/v         | 11.4 | 18/10/2022       | 10:10 - 11:10  | 60            |

All results are expressed at the respective reference conditions.



Executive Summary

(Page 4 of 7)

PROCESS DETAILS

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack  
18th October 2022

Standard Operating Conditions

| Parameter                            | Value               |
|--------------------------------------|---------------------|
| Process Status                       | Operating           |
| Capacity (of 100%) and Tonnes / Hour | Rated at 2000 m3/hr |
| Continuous or Batch Process          | Continuous          |
| Feedstock (if applicable)            | N/A                 |
| Abatement System                     | None                |
| Abatement System Running Status      | N/A                 |
| Fuel                                 | Landfill Gas        |
| Plume Appearance                     | No Visible Plume    |

## Executive Summary

(Page 5 of 7)

### MONITORING & ANALYTICAL METHODS

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack  
18th October 2022

| Parameter                                | Monitoring    |                     |                 |             | Analysis                                    |                      |                 |              | Overall Status | LOD (Average)          |
|------------------------------------------|---------------|---------------------|-----------------|-------------|---------------------------------------------|----------------------|-----------------|--------------|----------------|------------------------|
|                                          | Standard      | Technical Procedure | Sampling Status | Testing Lab | Analytical Procedure                        | Analytical Technique | Analysis Status | Analysis Lab |                |                        |
| Total VOCs (as Carbon)                   | EN 12619:2013 | CAT-TP-20           | MCERTS          | EET         | Flame Ionisation Detection by Signal 3010HM |                      |                 |              | MCERTS         | 0.32 mg/m <sup>3</sup> |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | EN 14792      | CAT-TP-39           | MCERTS          | EET         | Chemiluminescence by Horiba PG-350E         |                      |                 |              | MCERTS         | 0.41 mg/m <sup>3</sup> |
| Carbon Monoxide                          | EN 15058      | CAT-TP-39           | MCERTS          | EET         | NDIR by Horiba PG-350E                      |                      |                 |              | MCERTS         | 0.25 mg/m <sup>3</sup> |
| Oxygen                                   | EN 14789      | CAT-TP-39           | MCERTS          | EET         | Dry Paramagnetic Cell by Horiba PG-350E     |                      |                 |              | MCERTS         | 0.1 %                  |

### ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

### SUMMARY OF SAMPLING DEVIATIONS

| Parameter | Run | Deviation                                                      |
|-----------|-----|----------------------------------------------------------------|
| All       | All | There are no deviations associated with the sampling employed. |

## Executive Summary

(Page 6 of 7)

### SUITABILITY OF SAMPLING LOCATION

#### Duct Characteristics

| Parameter           | Units          | Value    |
|---------------------|----------------|----------|
| Type                | -              | Circular |
| Depth               | m              | 1.50     |
| Width               | m              | -        |
| Area                | m <sup>2</sup> | 1.77     |
| Port Depth          | cm             | N/A      |
| Orientation of Duct | -              | Vertical |
| Number of Ports     | -              | N/A      |
| Sample Port Size    | -              | N/A      |

#### Location of Sampling Platform

| General Platform Information   | Value     |
|--------------------------------|-----------|
| Permanent / Temporary Platform | On Ground |
| Inside / Outside               | Outside   |

#### Platform Details

| EA Technical Guidance Note M1 / EN 15259 Platform Requirements                    | Value |
|-----------------------------------------------------------------------------------|-------|
| Sufficient working area to manipulate probe and operate the measuring instruments | Yes   |
| Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)                     | N/A   |
| Platform has vertical base boards (approx. 0.25m high)                            | N/A   |
| Platform has chains / self closing gates at top of ladders                        | N/A   |
| There are no obstructions present which hamper insertion of sampling equipment    | Yes   |
| Safe Access Available                                                             | Yes   |
| Easy Access Available                                                             | Yes   |

#### Sampling Location / Platform Improvement Recommendations

The sampling location is acceptable for flare monitoring, and therefore there are no improvement recommendations.

#### EN 15259 Homogeneity Test Requirements

There is no requirement to perform a EN 15259 Homogeneity Test on this Stack.

Executive Summary

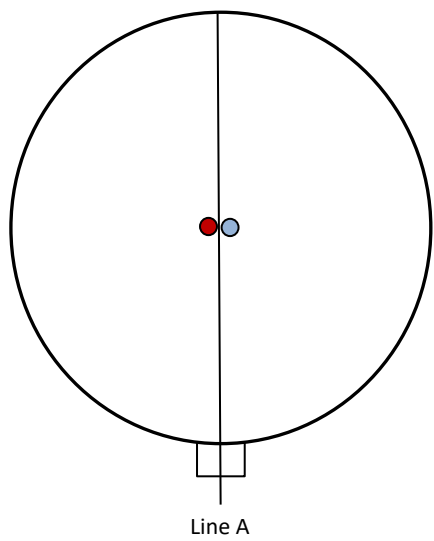
(Page 7 of 7)

PLANT PHOTOS

Photo 1



SAMPLE POINTS



- where
- = isokinetic point sampled at
  - = isokinetic point not sampled at
  - = combustion gases sample point
  - = non-isokinetic sample point

APPENDICES

APPENDIX CONTENTS

APPENDIX 1 - Stack Emissions Monitoring Personnel, List of Equipment & Methods and Technical Procedures Used

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts



# APPENDIX 1

## STACK EMISSIONS MONITORING PERSONNEL

| Position    | Name             | MCERTS Accreditation | MCERTS Number | Technical Endorsements |
|-------------|------------------|----------------------|---------------|------------------------|
| Team Leader | Darren Price     | MCERTS Level 2       | MM 03 176     | TE1 TE2 TE3 TE4        |
| Trainee     | Joshua Cuningham | MCERTS Trainee       | MM 22 1702    | None                   |

## LIST OF EQUIPMENT

| Extractive Sampling      |                | Instrumental Analysers         |                | Miscellaneous Items              |                |
|--------------------------|----------------|--------------------------------|----------------|----------------------------------|----------------|
| Equipment Type           | Equipment I.D. | Equipment Type                 | Equipment I.D. | Equipment Type                   | Equipment I.D. |
| Control Box DGM (1)      | CAT 7.126      | Horiba PG-250                  | CAT 39.21      | Digital Manometer (1)            | -              |
| Control Box DGM (2)      | -              | Horiba PG-250 SRM              | -              | Digital Manometer (2)            | -              |
| Box Thermocouples (1)    | CAT 3.276      | Servomex 4900                  | -              | Digital Temperature Meter        | CAT TP#10      |
| Box Thermocouples (2)    | -              | Ankersmid AOX210               | -              | Stopwatch                        | CAT TP#10      |
| Umbilical (1)            | CAT 7.126      | ABB AO2020-URAS26              | -              | Barometer                        | CAT DB#28      |
| Umbilical (2)            | -              | Testo 350 XL                   | -              | Stack Thermocouple (1)           | -              |
| Oven Box (1)             | -              | Signal 200SM                   | -              | Stack Thermocouple (2)           | -              |
| Oven Box (2)             | -              | Gasmet DX4000                  | -              | Stack Thermocouple (3)           | -              |
| Heated Probe (1)         | -              | Gasmet Sampling System         | -              | 1m Heated Line (1)               | -              |
| Heated Probe (2)         | -              | Signal 3010HM                  | CAT 8.51       | 1m Heated Line (2)               | -              |
| Heated Probe (3)         | -              | M&C PSS                        | -              | 1m Heated Line (3)               | -              |
| S-Pitot (1)              | -              | Mass Flow Controller (1)       | -              | 5m Heated Line (1)               | -              |
| S-Pitot (2)              | -              | Mass Flow Controller (2)       | -              | 15m Heated Line (1)              | -              |
| L-Pitot                  | -              | Mass View (1)                  | -              | 20m Heated Line (1)              | CAT HL#11      |
| Site Balance             | CAT BAL#02     | Mass View (2)                  | -              | 20m Heated Line (2)              | -              |
| 500g / 1Kg Check Weights | CAT BAL#02     | Squirrel 2020                  | CAT DL#04      | Dual Channel Heater Controller   | -              |
| Last Impinger Arm        | -              | Easylogger EN-EL-12 Bit        | -              | Single Channel Heater Controller | CAT HLC#11     |
| Callipers                | -              | Bioaerosols Temperature Logger | -              | Laboratory Balance               | -              |
| Tubes Kit Thermocouple   | -              | Electronic Refrigerator        | -              | Tape Measure                     | CAT 16.122     |

## METHODS & TECHNICAL PROCEDURES USED

| Parameter                                | Standard      | Technical Procedure |
|------------------------------------------|---------------|---------------------|
| Total VOCs (as Carbon)                   | EN 12619:2013 | CAT-TP-20           |
| Oxides of Nitrogen (as NO <sub>2</sub> ) | EN 14792      | CAT-TP-39           |
| Carbon Monoxide                          | EN 15058      | CAT-TP-39           |
| Oxygen                                   | EN 14789      | CAT-TP-39           |

WATER VAPOUR: RESULTS SUMMARY

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack

Sample Runs

| Parameter     | Units  | Run 1 |  | Mean |
|---------------|--------|-------|--|------|
| Concentration | % v/v  | 11.4  |  | 11.4 |
| Uncertainty   | ±% v/v | 3.0   |  | 3.0  |

General Sampling Information

| Parameter           | Value     |
|---------------------|-----------|
| Standard            | EN 14790  |
| Technical Procedure | CAT-TP-05 |

WATER VAPOUR: SAMPLING DETAILS

Sample Runs

| Parameter                  | Units              | Run 1         |  |
|----------------------------|--------------------|---------------|--|
| Sampling Times             | -                  | 10:10 - 11:10 |  |
| Sampling Dates             | -                  | 18/10/2022    |  |
| Sampling Device            | -                  | DGM           |  |
| Duration                   | mins               | 60            |  |
| DGM Start Volume           | m <sup>3</sup>     | 857.4514      |  |
| DGM End Volume             | m <sup>3</sup>     | 857.9080      |  |
| DGM Start Temperature      | °C                 | 10.0          |  |
| DGM End Temperature        | °C                 | 13.0          |  |
| Start ΔH                   | mmH <sub>2</sub> O | 5.0           |  |
| End ΔH                     | mmH <sub>2</sub> O | 5.0           |  |
| DGM Y <sub>d</sub>         | -                  | 0.9830        |  |
| Barometric Pressure        | kPa                | 102.8         |  |
| Volume Sampled (STP, Dry)  | m <sup>3</sup>     | 0.4371        |  |
| Volume Sampled (STP, Wet)  | m <sup>3</sup>     | 0.4934        |  |
| Sample Flow Rate           | l/min              | 7.48          |  |
| Liquid Trap Start Mass     | g                  | 1986.0        |  |
| Liquid Trap End Mass       | g                  | 2021.7        |  |
| Silica Trap Start Mass     | g                  | 942.6         |  |
| Silica Trap End Mass       | g                  | 952.1         |  |
| Total Mass Of Water Vapour | g                  | 45.2          |  |
| Calculated Water Vapour    | % v/v              | 11.41         |  |

Where: DGM stands for Dry Gas Meter

WATER VAPOUR: QUALITY ASSURANCE

Sample Runs

| Leak Test Results             | Units | Run 1 |  |
|-------------------------------|-------|-------|--|
| Mean Sampling Rate            | l/min | 7.5   |  |
| Pre-Sampling Leak Rate        | l/min | 0.08  |  |
| Post-Sampling Leak Rate       | l/min | 0.08  |  |
| Allowable Leak Rate           | l/min | 0.15  |  |
| Leak Test Acceptable          | -     | Yes   |  |
| Water Droplets                | Units | Run 1 |  |
| Are Water Droplets Present    | -     | No    |  |
| Measurement Uncertainty       | Units | Run 1 |  |
| Measurement Uncertainty (MU)  | %     | 26.5  |  |
| Allowable MU                  | %     | 20.0  |  |
| MU Acceptable                 | %     | No    |  |
| Silica Gel                    | Units | Run 1 |  |
| Less than 50% Faded           | %     | Yes   |  |
| Test Conditions               | Units | Run 1 |  |
| Ambient Temperature Recorded? | -     | No    |  |

Method Deviations

| Nature of Deviation                                            | Run Number |  |
|----------------------------------------------------------------|------------|--|
| (x = deviation applies to the associated run)                  | 1          |  |
| There are no deviations associated with the sampling employed. | x          |  |

# WATER VAPOUR: MEASUREMENT UNCERTAINTY CALCULATIONS

| Measured Quantities       | Value  |        | Standard uncertainty |                |        |
|---------------------------|--------|--------|----------------------|----------------|--------|
|                           | Symbol | Run 1  | Symbol               | Units          | Run 1  |
| Sampled Volume (Actual)   | $V_m$  | 0.4566 | $uV_m$               | m <sup>3</sup> | 0.0091 |
| Sampled Gas Temperature   | $T_m$  | 284.5  | $uT_m$               | K              | 2.00   |
| Sampled Gas Pressure      | $p_m$  | 102.8  | $up_m$               | kPa            | 0.50   |
| Sampled Gas Humidity      | $H_m$  | 0.00   | $uH_m$               | % v/v          | 1.00   |
| Repeatability of Weighing | $R_w$  | 45.20  | $uR_w$               | g              | 6.00   |
| Reading of Balance        | $R_b$  | 45.20  | $uR_b$               | g              | 0.23   |
| Leak                      | L      | 1.07   |                      | %              | -      |

| Uncertainty as a Percentage |       |       |                         |
|-----------------------------|-------|-------|-------------------------|
| Measured Quantities         | Units | Run 1 | Requirement of Standard |
| Sampled Volume (Actual)     | %     | 2.00  | ≤2%                     |
| Sampled Gas Temperature     | %     | 0.70  | ≤1%                     |
| Sampled Gas Pressure        | %     | 0.49  | ≤1%                     |
| Sampled Gas Humidity        | %     | 1.00  | ≤1%                     |
| Repeatability of Weighing   | %     | 13.27 | No Requirement          |
| Reading of Balance          | %     | 0.50  | No Requirement          |
| Leak                        | %     | 1.07  | ≤2%                     |

| Uncertainty in Measurement Units |        |                |        | Sensitivity Coefficient |  |
|----------------------------------|--------|----------------|--------|-------------------------|--|
| Measured Quantities              | Symbol | Units          | Run 1  | Run 1                   |  |
| Sampled Volume (STP)             | $V_m$  | m <sup>3</sup> | 0.4371 | 26.11                   |  |
| Repeatability of Weighing        | $R_w$  | g              | 45.20  | 0.25                    |  |
| Reading of Balance               | $R_b$  | g              | 45.20  | 0.25                    |  |
| Leak                             | L      | % v/v          | 0.07   | 1.00                    |  |

| Uncertainty in Result     |       |       |
|---------------------------|-------|-------|
| Measured Quantities       | Units | Run 1 |
| Sampled Volume (STP)      | % v/v | 0.282 |
| Repeatability of Weighing | % v/v | 1.515 |
| Reading of Balance        | % v/v | 0.057 |
| Leak                      | % v/v | 0.070 |

| Parameter                                                               | Units | Run 1 |
|-------------------------------------------------------------------------|-------|-------|
| Combined uncertainty                                                    | % v/v | 1.54  |
| Expanded uncertainty (95% confidence)                                   | % v/v | 3.03  |
| Expanded uncertainty (95% confidence), estimated with Method Deviations | % v/v | 3.03  |
| Uncertainty if Water Droplets are present                               | % v/v | N/A   |
| Reported Uncertainty                                                    | % v/v | 3.03  |
| Expanded uncertainty (95% confidence)                                   | %     | 26.5  |
| Expanded uncertainty (95% confidence), estimated with Method Deviations | %     | 26.5  |
| Uncertainty if Water Droplets are present                               | %     | N/A   |
| Reported Uncertainty                                                    | %     | 26.5  |

TOTAL VOCs (as CARBON): RESULTS SUMMARY

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack

Sample Runs

| Parameter     | Units              | Run 1 |  | Mean |
|---------------|--------------------|-------|--|------|
| Concentration | mg/m <sup>3</sup>  | 4.1   |  | 4.1  |
| Uncertainty   | ±mg/m <sup>3</sup> | 0.83  |  | 0.83 |

General Sampling Information

| Parameter                        | Value                              |                                       |
|----------------------------------|------------------------------------|---------------------------------------|
| Standard                         | EN 12619:2013                      |                                       |
| Technical Procedure              | CAT-TP-20                          |                                       |
| Probe Material                   | Stainless Steel                    |                                       |
| Filtration Type / Size           | 0.1µm Glass Fibre                  |                                       |
| Heated Head Filter Used          | Yes                                |                                       |
| Heated Line Temperature          | 180°C                              |                                       |
| Span Gas Type                    | Propane In Synthetic Air (5 Grade) |                                       |
| Span Gas Reference Number        | 12.0470                            |                                       |
| Span Gas Expiry Date             | 21/09/2024                         |                                       |
| Span Gas Start Pressure (bar)    | 220                                |                                       |
| Gas Cylinder Concentration (ppm) | 8.5                                |                                       |
| Span Gas Set Point (ppm)         | 8.50                               |                                       |
| Span Gas Uncertainty (%)         | 2                                  |                                       |
| Zero Gas Type                    | Synthetic Air (5 Grade)            |                                       |
| Number of Sampling Lines Used    | 1/1                                | FORMAT: Number Used / Number Required |
| Number of Sampling Points Used   | 1/1                                | FORMAT: Number Used / Number Required |
| Sample Point I.D.'s              | A1                                 |                                       |

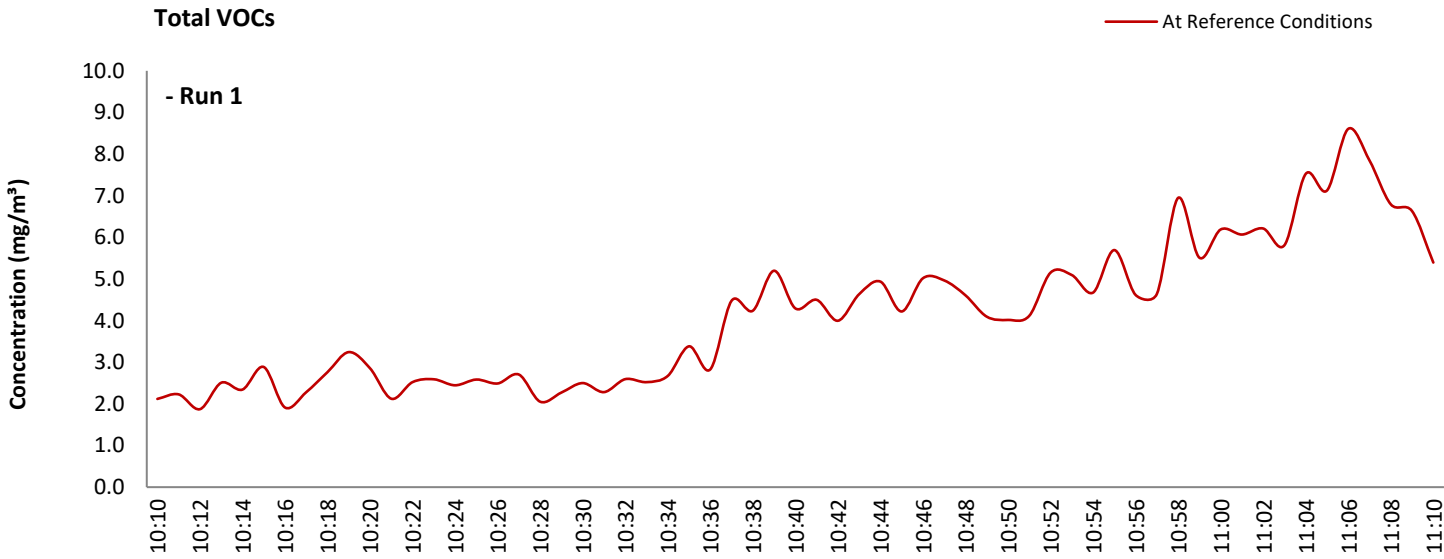
Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 3% oxygen.



TOTAL VOCs (as CARBON): DATA TREND

Graphical Trend of Data



**TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE**

**Sampling Details**

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:10 - 11:10 |
| Sampling Dates   | -     | 18/10/2022    |
| Instrument Range | ppm   | 100           |
| Span Gas Value   | ppm   | 8.5           |

**Quality Assurance**

| Zero Drift                    |                                | Units | Run 1   |
|-------------------------------|--------------------------------|-------|---------|
| CAL 1                         | Zero Down Sampling Line (Pre)  | ppm   | 0.00    |
|                               | Zero Down Sampling Line (Post) | ppm   | 0.20    |
|                               | Zero Drift                     | ppm   | 0.20    |
|                               | Zero Drift                     | %     | 2.38    |
|                               | Drift Correction Applied       | 2-5%  | Yes     |
|                               | Allowable Zero Drift           | ± ppm | 0.43    |
|                               | Zero Drift Acceptable          | -     | Yes     |
| Span Drift                    |                                | Units | Run 1   |
| CAL 1                         | Span Down Sampling Line (Pre)  | ppm   | 8.40    |
|                               | Span Down Sampling Line (Post) | ppm   | 8.10    |
|                               | Span Drift                     | ppm   | -0.30   |
|                               | Span Drift                     | %     | -3.57   |
|                               | Drift Correction Applied       | 2-5%  | Yes     |
|                               | Allowable Span Drift           | ± ppm | 0.43    |
|                               | Span Drift Acceptable          | -     | Yes     |
| Test Conditions               |                                | Units | Run 1   |
| Run Ambient Temperature Range |                                | °C    | 10 - 13 |

**Method Deviations**

| Nature of Deviation                                            | Run Number |  |
|----------------------------------------------------------------|------------|--|
| (x = deviation applies to the associated run)                  | 1          |  |
| There are no deviations associated with the sampling employed. | x          |  |

## TOTAL VOCs (as CARBON): MEASUREMENT UNCERTAINTY CALCULATIONS

| Performance characteristics | RUN 1 | Units                        |
|-----------------------------|-------|------------------------------|
| Limit value                 | 10.0  | mg/m <sup>3</sup> (REF)      |
| Allowable MU                | 15.0  | %                            |
| Measured concentration      | 2.30  | mg/m <sup>3</sup> (STP, dry) |
| Range Used                  | 100.0 | ppm                          |
| Range Used [A]              | 160.6 | mg/m <sup>3</sup>            |
| Cal gas conc.               | 8.5   | ppm                          |
| Conversion                  | 1.61  | ppm to mg/m <sup>3</sup>     |
| MCERTS Range [B]            | 15.0  | mg/m <sup>3</sup>            |
| Lower of [A] or [B]         | 15.0  | mg/m <sup>3</sup>            |
| Cal gas conc.               | 13.7  | mg/m <sup>3</sup>            |

| Performance characteristics        | RUN 1 | Units            |
|------------------------------------|-------|------------------|
| Response time                      | 15    | seconds          |
| Number of readings in measurement  | 60    | -                |
| Repeatability at zero              | 0.15  | % full scale     |
| Repeatability at span level        | 0.80  | % full scale     |
| Deviation from linearity           | 0.19  | % of value       |
| Zero drift                         | 0.00  | % full scale     |
| Span drift                         | 0.00  | % full scale     |
| Volume or pressure flow dependence | 2.00  | % of full scale  |
| Atmospheric pressure dependence    | 0.80  | % of value/kPa   |
| Ambient temperature dependence     | 1.00  | % full scale/10K |
| Combined interference              | 1.20  | % range          |
| Dependence on voltage              | 0.10  | % full scale/10V |
| Losses in the line (leak)          | 1.18  | % of value       |
| Uncertainty of calibration gas     | 2.00  | % of value       |

| Performance characteristic                        | RUN 1           | Units             |
|---------------------------------------------------|-----------------|-------------------|
| Standard deviation of repeatability at zero       | use rep at span | mg/m <sup>3</sup> |
| Standard deviation of repeatability at span level | 0.10            | mg/m <sup>3</sup> |
| Lack of fit                                       | 0.02            | mg/m <sup>3</sup> |
| Drift                                             | 0.00            | mg/m <sup>3</sup> |
| Volume or pressure flow dependence                | 0.00            | mg/m <sup>3</sup> |
| Atmospheric pressure dependence                   | 0.03            | mg/m <sup>3</sup> |
| Ambient temperature dependence                    | 0.14            | mg/m <sup>3</sup> |
| Combined interference (from MCERTS Certificate)   | 0.10            | mg/m <sup>3</sup> |
| Dependence on voltage                             | 0.01            | mg/m <sup>3</sup> |
| Losses in the line (leak)                         | 0.02            | mg/m <sup>3</sup> |
| Uncertainty of calibration gas                    | 0.03            | mg/m <sup>3</sup> |

| Measurement uncertainty                               | Result | RUN 1 | Units                   |
|-------------------------------------------------------|--------|-------|-------------------------|
| Combined uncertainty                                  |        | 2.30  | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  | k =    | 0.24  | mg/m <sup>3</sup>       |
| Uncertainty corrected to std conds. (O <sub>2</sub> ) | 1.96   | 0.46  | mg/m <sup>3</sup>       |
|                                                       |        | 0.83  | mg/m <sup>3</sup> (REF) |

|                                                                        | RUN 1 | Units      |
|------------------------------------------------------------------------|-------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 20.09 | % of Value |
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 4.62  | % at ELV   |
| Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 15.0  | % at ELV   |
| Result of Compliance with Uncertainty Requirement                      | N/A   | -          |

|                                                                          | RUN 1     | Units      |
|--------------------------------------------------------------------------|-----------|------------|
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 20.23     | % of Value |
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 8.61      | % at ELV   |
| Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence | 15.2      | % at ELV   |
| Result of Compliance with Uncertainty Requirement                        | COMPLIANT | -          |

Requirement for SRM is that Uncertainty should be <15% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 15% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

## APPENDIX 2

### OXIDES OF NITROGEN (as NO<sub>2</sub>): RESULTS SUMMARY

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack

#### Sample Runs

| Parameter     | Units              | Run 1 |  | Mean |
|---------------|--------------------|-------|--|------|
| Concentration | mg/m <sup>3</sup>  | 24.1  |  | 24.1 |
| Uncertainty   | ±mg/m <sup>3</sup> | 4.1   |  | 4.1  |

#### General Sampling Information

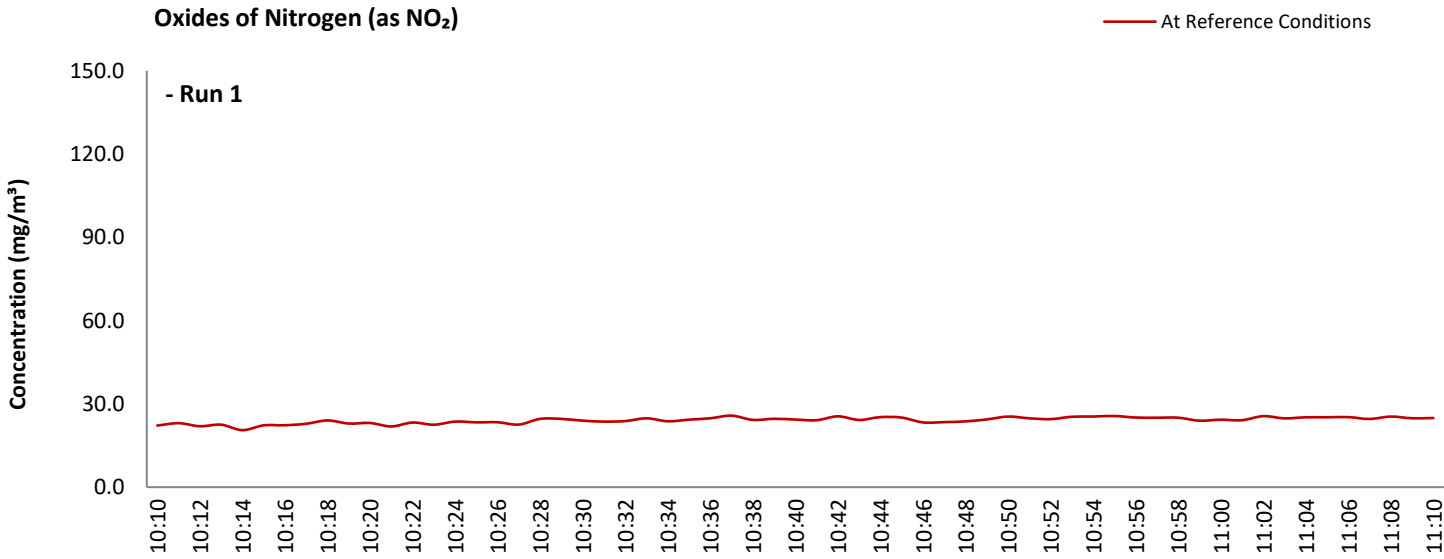
| Parameter                             | Value              |                                       |
|---------------------------------------|--------------------|---------------------------------------|
| Standard                              | EN 14792           |                                       |
| Technical Procedure                   | CAT-TP-39          |                                       |
| Probe Material                        | Stainless Steel    |                                       |
| Filtration Type / Size                | 0.1µm Glass Fibre  |                                       |
| Heated Head Filter Used               | Yes                |                                       |
| Heated Line Temperature               | 180°C              |                                       |
| Date & Result of Last Converter Check | 18/11/2021 - 96.7% |                                       |
| Span Gas Type                         | Nitrogen Monoxide  |                                       |
| Span Gas Reference Number             | 12.0433            |                                       |
| Span Gas Expiry Date                  | 12/04/2024         |                                       |
| Span Gas Start Pressure (bar)         | 100                |                                       |
| Gas Cylinder Concentration (ppm)      | 81.8               |                                       |
| Span Gas Uncertainty (%)              | 2                  |                                       |
| Zero Gas Type                         | Nitrogen (5 Grade) |                                       |
| Number of Sampling Lines Used         | 1/1                | FORMAT: Number Used / Number Required |
| Number of Sampling Points Used        | 1/1                | FORMAT: Number Used / Number Required |
| Sample Point I.D.'s                   | A1                 |                                       |

#### Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 3% oxygen.

OXIDES OF NITROGEN (as NO<sub>2</sub>): DATA TREND

Graphical Trend of Data





# APPENDIX 2

## OXIDES OF NITROGEN (as NO<sub>2</sub>): SAMPLING DETAILS & QUALITY ASSURANCE

### Sampling Details

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:10 - 11:10 |
| Sampling Dates   | -     | 18/10/2022    |
| Instrument Range | ppm   | 100           |
| Span Gas Value   | ppm   | 81.8          |

### Quality Assurance

| Conditioning Unit Temperature | Units | Run 1 |
|-------------------------------|-------|-------|
| Average Temperature           | °C    | 2.5   |
| Allowable Temperature         | < °C  | 4.0   |
| Temperature Acceptable        | -     | Yes   |

| Zero Drift |                          | Units | Run 1 |
|------------|--------------------------|-------|-------|
| CAL 1      | Zero at Analyser (Pre)   | ppm   | 0.00  |
|            | Zero at Analyser (Post)  | ppm   | -0.10 |
|            | Zero Drift               | ppm   | -0.10 |
|            | Zero Drift               | %     | 0.12  |
|            | Drift Correction Applied | 2-5%  | No    |
|            | Allowable Zero Drift     | ± %   | 5.00  |
|            | Zero Drift Acceptable    | -     | Yes   |

| Span Drift |                          | Units | Run 1 |
|------------|--------------------------|-------|-------|
| CAL 1      | Span at Analyser (Pre)   | ppm   | 81.80 |
|            | Span at Analyser (Post)  | ppm   | 82.90 |
|            | Span Drift               | ppm   | 1.10  |
|            | Zero Adj. Span Drift     | %     | 1.47  |
|            | Drift Correction Applied | 2-5%  | No    |
|            | Allowable Span Drift     | ± %   | 5.00  |
|            | Span Drift Acceptable    | -     | Yes   |

| Test Conditions               | Units | Run 1   |
|-------------------------------|-------|---------|
| Run Ambient Temperature Range | °C    | 10 - 13 |

### Method Deviations

| Nature of Deviation                                            | Run Number |  |
|----------------------------------------------------------------|------------|--|
| (x = deviation applies to the associated run)                  | 1          |  |
| There are no deviations associated with the sampling employed. | x          |  |

## OXIDES OF NITROGEN (as NO<sub>2</sub>): MEASUREMENT UNCERTAINTY CALCULATIONS

| Performance characteristics | RUN 1 | Units                        |
|-----------------------------|-------|------------------------------|
| Limit value                 | 150.0 | mg/m <sup>3</sup> (REF)      |
| Allowable MU                | 10.0  | %                            |
| Measured concentration      | 13.44 | mg/m <sup>3</sup> (STP, dry) |
| Ratio NO / NO <sub>2</sub>  | 5     | %                            |
| Range Used                  | 100.0 | ppm                          |
| Range Used [A]              | 205.2 | mg/m <sup>3</sup>            |
| Cal gas conc.               | 81.8  | ppm                          |
| Conversion                  | 2.05  | ppm to mg/m <sup>3</sup>     |
| MCERTS Range [B]            | 205.0 | mg/m <sup>3</sup>            |
| Lower of [A] or [B]         | 205.0 | mg/m <sup>3</sup>            |
| Cal gas conc.               | 167.9 | mg/m <sup>3</sup>            |

| Performance characteristics             | RUN 1 | Units            |
|-----------------------------------------|-------|------------------|
| Response time                           | 31    | seconds          |
| Number of readings in measurement       | 60    | -                |
| Repeatability at zero                   | 0.00  | % full scale     |
| Repeatability at span level             | 0.10  | % full scale     |
| Deviation from linearity                | 0.36  | % of value       |
| Zero drift                              | -0.12 | % full scale     |
| Span drift                              | 1.47  | % full scale     |
| Volume or pressure flow dependence      | 0.10  | % of full scale  |
| Atmospheric pressure dependence         | 0.10  | % of value/kPa   |
| Ambient temperature dependence          | 0.04  | % full scale/10K |
| Combined interference                   | 0.63  | % range          |
| Dependence on voltage                   | -0.23 | % full scale/10V |
| Converter efficiency                    | 96.7  | %                |
| Losses in the line (leak)               | 0.49  | % of value       |
| Uncertainty of calibration gas blending | 1.40  | % of value       |
| Uncertainty of calibration gas          | 2.00  | % of value       |

| Performance characteristic                        | RUN 1           | Units             |
|---------------------------------------------------|-----------------|-------------------|
| Standard deviation of repeatability at zero       | use rep at span | mg/m <sup>3</sup> |
| Standard deviation of repeatability at span level | 0.01            | mg/m <sup>3</sup> |
| Lack of fit                                       | 0.43            | mg/m <sup>3</sup> |
| Drift                                             | 0.00            | mg/m <sup>3</sup> |
| Volume or pressure flow dependence                | 0.00            | mg/m <sup>3</sup> |
| Atmospheric pressure dependence                   | 0.06            | mg/m <sup>3</sup> |
| Ambient temperature dependence                    | 0.01            | mg/m <sup>3</sup> |
| Combined interference (from MCERTS Certificate)   | 0.75            | mg/m <sup>3</sup> |
| Dependence on voltage                             | -0.03           | mg/m <sup>3</sup> |
| Converter efficiency                              | 0.01            | mg/m <sup>3</sup> |
| Losses in the line (leak)                         | 0.04            | mg/m <sup>3</sup> |
| Uncertainty of calibration gas blending           | 0.11            | mg/m <sup>3</sup> |
| Uncertainty of calibration gas                    | 0.16            | mg/m <sup>3</sup> |

| Measurement uncertainty                               | Result   | RUN 1 | Units                   |
|-------------------------------------------------------|----------|-------|-------------------------|
| Combined uncertainty                                  |          | 13.44 | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  |          | 1.16  | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  | k = 1.96 | 2.27  | mg/m <sup>3</sup>       |
| Uncertainty corrected to std conds. (O <sub>2</sub> ) |          | 4.06  | mg/m <sup>3</sup> (REF) |

|                                                                        | RUN 1 | Units      |
|------------------------------------------------------------------------|-------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 16.85 | % of Value |
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 1.51  | % at ELV   |
| Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 10.0  | % at ELV   |
| Result of Compliance with Uncertainty Requirement                      | N/A   | -          |

|                                                                          | RUN 1     | Units      |
|--------------------------------------------------------------------------|-----------|------------|
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 17.01     | % of Value |
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 3.58      | % at ELV   |
| Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence | 10.3      | % at ELV   |
| Result of Compliance with Uncertainty Requirement                        | COMPLIANT | -          |

Requirement for SRM is that Uncertainty should be <10% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 10% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

CARBON MONOXIDE: RESULTS SUMMARY

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack

Sample Runs

| Parameter     | Units              | Run 1 |  | Mean |
|---------------|--------------------|-------|--|------|
| Concentration | mg/m <sup>3</sup>  | 2.6   |  | 2.6  |
| Uncertainty   | ±mg/m <sup>3</sup> | 1.1   |  | 1.1  |

General Sampling Information

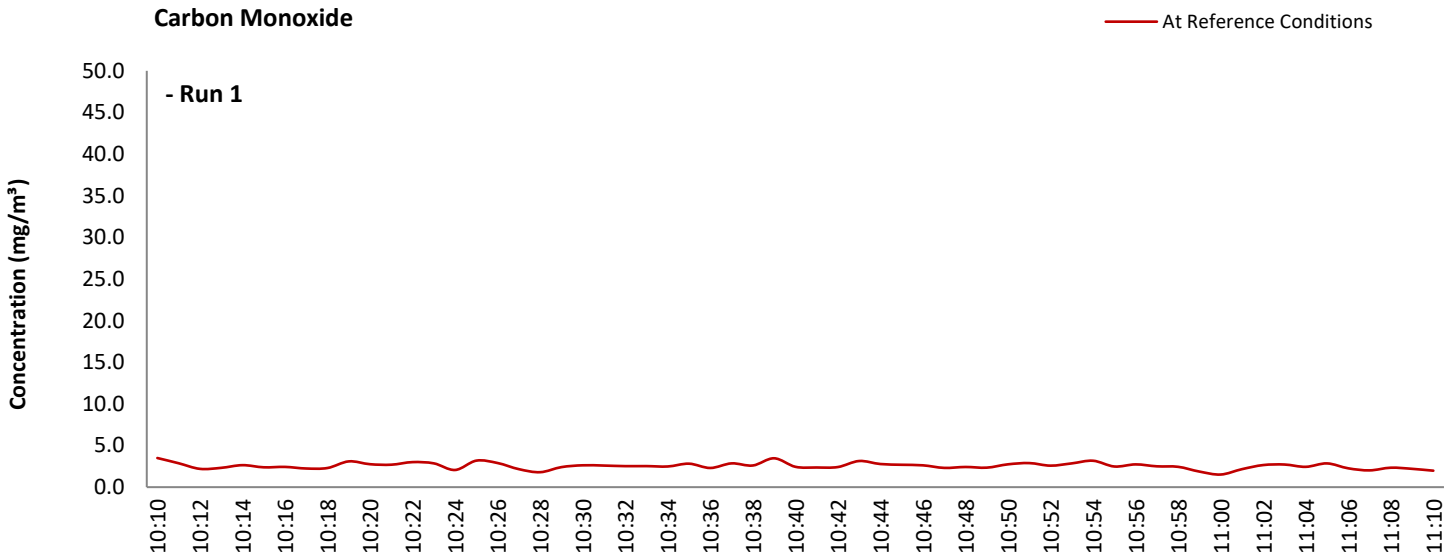
| Parameter                        | Value              |                                       |
|----------------------------------|--------------------|---------------------------------------|
| Standard                         | EN 15058           |                                       |
| Technical Procedure              | CAT-TP-39          |                                       |
| Probe Material                   | Stainless Steel    |                                       |
| Filtration Type / Size           | 0.1µm Glass Fibre  |                                       |
| Heated Head Filter Used          | Yes                |                                       |
| Heated Line Temperature          | 180°C              |                                       |
| Span Gas Type                    | Carbon Monoxide    |                                       |
| Span Gas Reference Number        | 12.0433            |                                       |
| Span Gas Expiry Date             | 12/04/2024         |                                       |
| Span Gas Start Pressure (bar)    | 100                |                                       |
| Gas Cylinder Concentration (ppm) | 149.1              |                                       |
| Span Gas Uncertainty (%)         | 2                  |                                       |
| Zero Gas Type                    | Nitrogen (5 Grade) |                                       |
| Number of Sampling Lines Used    | 1/1                | FORMAT: Number Used / Number Required |
| Number of Sampling Points Used   | 1/1                | FORMAT: Number Used / Number Required |
| Sample Point I.D.'s              | A1                 |                                       |

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 3% oxygen.

CARBON MONOXIDE: DATA TREND

Graphical Trend of Data



APPENDIX 2

CARBON MONOXIDE: SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:10 - 11:10 |
| Sampling Dates   | -     | 18/10/2022    |
| Instrument Range | ppm   | 200           |
| Span Gas Value   | ppm   | 149.1         |

Quality Assurance

| Conditioning Unit Temperature | Units | Run 1 |
|-------------------------------|-------|-------|
| Average Temperature           | °C    | 2.5   |
| Allowable Temperature         | < °C  | 4.0   |
| Temperature Acceptable        | -     | Yes   |

| Zero Drift               | Units | Run 1 |
|--------------------------|-------|-------|
| Zero at Analyser (Pre)   | ppm   | 0.00  |
| Zero at Analyser (Post)  | ppm   | -1.00 |
| Zero Drift               | ppm   | -1.00 |
| Zero Drift               | %     | 0.67  |
| Drift Correction Applied | 2-5%  | No    |
| Allowable Zero Drift     | ± %   | 5.00  |
| Zero Drift Acceptable    | -     | Yes   |

| Span Drift               | Units | Run 1  |
|--------------------------|-------|--------|
| Span at Analyser (Pre)   | ppm   | 149.10 |
| Span at Analyser (Post)  | ppm   | 146.10 |
| Span Drift               | ppm   | -3.00  |
| Zero Adj. Span Drift     | %     | 1.34   |
| Drift Correction Applied | 2-5%  | No     |
| Allowable Span Drift     | ± %   | 5.00   |
| Span Drift Acceptable    | -     | Yes    |

| Test Conditions               | Units | Run 1   |
|-------------------------------|-------|---------|
| Run Ambient Temperature Range | °C    | 10 - 13 |

Method Deviations

| Nature of Deviation                                            | Run Number |
|----------------------------------------------------------------|------------|
| (x = deviation applies to the associated run)                  | 1          |
| There are no deviations associated with the sampling employed. | x          |



# CARBON MONOXIDE: MEASUREMENT UNCERTAINTY CALCULATIONS

| Performance characteristics | RUN 1 | Units                        |
|-----------------------------|-------|------------------------------|
| Limit value                 | 50.0  | mg/m <sup>3</sup> (REF)      |
| Allowable MU                | 6.0   | %                            |
| Measured concentration      | 1.42  | mg/m <sup>3</sup> (STP, dry) |
| Range Used                  | 200.0 | ppm                          |
| Range Used [A]              | 249.8 | mg/m <sup>3</sup>            |
| Cal gas conc.               | 149.1 | ppm                          |
| Conversion                  | 1.25  | ppm to mg/m <sup>3</sup>     |
| MCERTS Range [B]            | 75.0  | mg/m <sup>3</sup>            |
| Lower of [A] or [B]         | 75.0  | mg/m <sup>3</sup>            |
| Cal gas conc.               | 186.3 | mg/m <sup>3</sup>            |

| Performance characteristics             | RUN 1 | Units            |
|-----------------------------------------|-------|------------------|
| Response time                           | 28    | seconds          |
| Number of readings in measurement       | 60    | -                |
| Repeatability at zero                   | 0.10  | % full scale     |
| Repeatability at span level             | 0.20  | % full scale     |
| Deviation from linearity                | 0.24  | % of value       |
| Zero drift                              | -0.67 | % full scale     |
| Span drift                              | -1.34 | % full scale     |
| Volume or pressure flow dependence      | 0.10  | % of full scale  |
| Atmospheric pressure dependence         | 0.22  | % of value/kPa   |
| Ambient temperature dependence          | -0.20 | % full scale/10K |
| Combined interference                   | -0.48 | % range          |
| Dependence on voltage                   | -0.35 | % full scale/10V |
| Losses in the line (leak)               | 0.00  | % of value       |
| Uncertainty of calibration gas blending | 1.40  | % of value       |
| Uncertainty of calibration gas          | 2.00  | % of value       |

| Performance characteristic                        | RUN 1           | Units             |
|---------------------------------------------------|-----------------|-------------------|
| Standard deviation of repeatability at zero       | use rep at span | mg/m <sup>3</sup> |
| Standard deviation of repeatability at span level | 0.03            | mg/m <sup>3</sup> |
| Lack of fit                                       | 0.10            | mg/m <sup>3</sup> |
| Drift                                             | 0.00            | mg/m <sup>3</sup> |
| Volume or pressure flow dependence                | 0.00            | mg/m <sup>3</sup> |
| Atmospheric pressure dependence                   | 0.05            | mg/m <sup>3</sup> |
| Ambient temperature dependence                    | -0.03           | mg/m <sup>3</sup> |
| Combined interference (from MCERTS Certificate)   | -0.21           | mg/m <sup>3</sup> |
| Dependence on voltage                             | -0.04           | mg/m <sup>3</sup> |
| Losses in the line (leak)                         | 0.00            | mg/m <sup>3</sup> |
| Uncertainty of calibration gas blending           | 0.01            | mg/m <sup>3</sup> |
| Uncertainty of calibration gas                    | 0.02            | mg/m <sup>3</sup> |

| Measurement uncertainty                               | Result | RUN 1 | Units                   |
|-------------------------------------------------------|--------|-------|-------------------------|
| Combined uncertainty                                  |        | 1.42  | mg/m <sup>3</sup>       |
| Expanded uncertainty                                  | k =    | 0.32  | mg/m <sup>3</sup>       |
| Uncertainty corrected to std conds. (O <sub>2</sub> ) | 1.96   | 0.63  | mg/m <sup>3</sup>       |
|                                                       |        | 1.13  | mg/m <sup>3</sup> (REF) |

|                                                                        | RUN 1 | Units      |
|------------------------------------------------------------------------|-------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 44.18 | % of Value |
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence          | 1.26  | % at ELV   |
| Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 6.0   | % at ELV   |
| Result of Compliance with Uncertainty Requirement                      | N/A   | -          |

|                                                                          | RUN 1     | Units      |
|--------------------------------------------------------------------------|-----------|------------|
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 44.24     | % of Value |
| Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence          | 3.25      | % at ELV   |
| Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence | 6.4       | % at ELV   |
| Result of Compliance with Uncertainty Requirement                        | COMPLIANT | -          |

Requirement for SRM is that Uncertainty should be <6% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 6% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

APPENDIX 2

OXYGEN: RESULTS SUMMARY

Resource Management Group UK Ltd, Withyhedge Landfill Site  
Flare Stack

Sample Runs

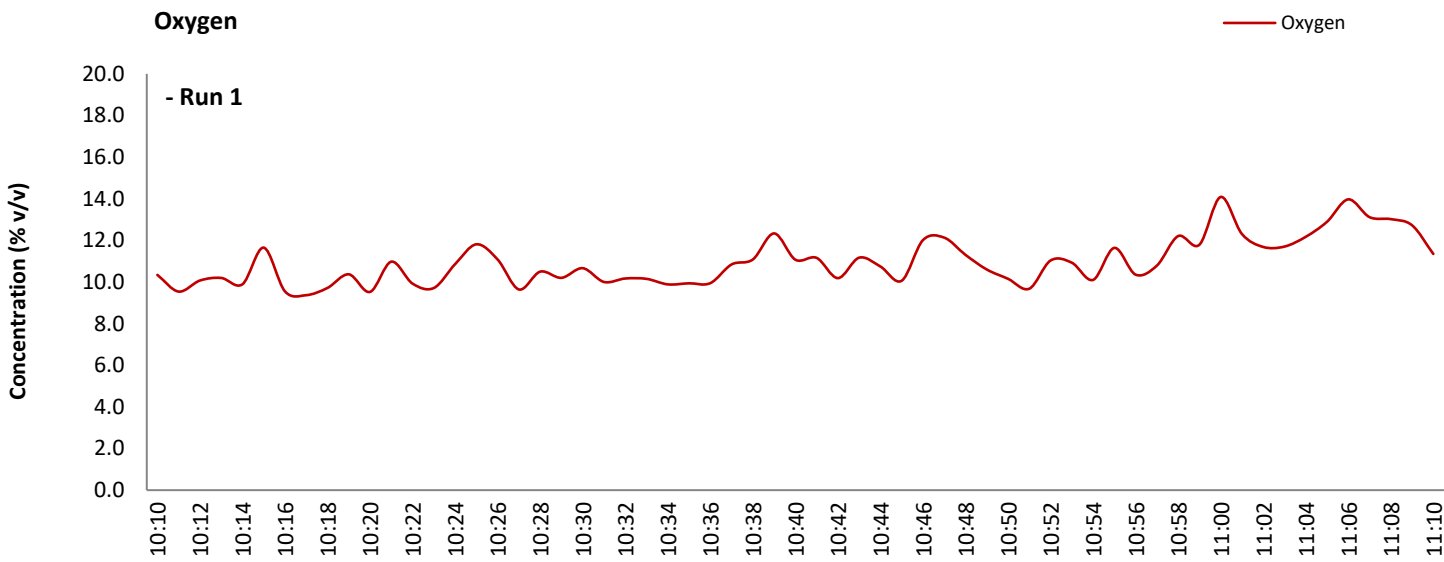
| Parameter     | Units  | Run 1 |  | Mean |
|---------------|--------|-------|--|------|
| Concentration | % v/v  | 11.0  |  | 11.0 |
| Uncertainty   | ±% v/v | 0.26  |  | 0.26 |

General Sampling Information

| Parameter                          | Value                   |                                       |
|------------------------------------|-------------------------|---------------------------------------|
| Standard                           | EN 14789                |                                       |
| Technical Procedure                | CAT-TP-39               |                                       |
| Probe Material                     | Stainless Steel         |                                       |
| Filtration Type / Size             | 0.1µm Glass Fibre       |                                       |
| Heated Head Filter Used            | Yes                     |                                       |
| Heated Line Temperature            | 180°C                   |                                       |
| Span Gas Type                      | Synthetic Air (5 Grade) |                                       |
| Span Gas Reference Number          | 12.047                  |                                       |
| Span Gas Expiry Date               | 21/09/2024              |                                       |
| Span Gas Start Pressure (bar)      | 220                     |                                       |
| Gas Cylinder Concentration (% v/v) | 7.8                     |                                       |
| Span Gas Uncertainty (%)           | 2                       |                                       |
| Zero Gas Type                      | Nitrogen (5 Grade)      |                                       |
| Number of Sampling Lines Used      | 1/1                     | FORMAT: Number Used / Number Required |
| Number of Sampling Points Used     | 1/1                     | FORMAT: Number Used / Number Required |
| Sample Point I.D.'s                | A1                      |                                       |

OXYGEN: DATA TREND

Graphical Trend of Data



APPENDIX 2

OXYGEN: SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

| Parameter        | Units | Run 1         |
|------------------|-------|---------------|
| Sampling Times   | -     | 10:10 - 11:10 |
| Sampling Dates   | -     | 18/10/2022    |
| Instrument Range | % v/v | 25.0          |
| Span Gas Value   | % v/v | 7.8           |

Quality Assurance

| Conditioning Unit Temperature | Units | Run 1 |
|-------------------------------|-------|-------|
| Average Temperature           | °C    | 2.5   |
| Allowable Temperature         | < °C  | 4.0   |
| Temperature Acceptable        | -     | Yes   |

| Zero Drift | Units                    | Run 1      |
|------------|--------------------------|------------|
| CAL 1      | Zero at Analyser (Pre)   | % v/v 0.00 |
|            | Zero at Analyser (Post)  | % v/v 0.18 |
|            | Zero Drift               | % v/v 0.18 |
|            | Zero Drift               | % 2.36     |
|            | Drift Correction Applied | 2-5% Yes   |
|            | Allowable Zero Drift     | ± % 5.00   |
|            | Zero Drift Acceptable    | - Yes      |

| Span Drift | Units                    | Run 1      |
|------------|--------------------------|------------|
| CAL 1      | Span at Analyser (Pre)   | % v/v 7.63 |
|            | Span at Analyser (Post)  | % v/v 7.92 |
|            | Span Drift               | % v/v 0.29 |
|            | Zero Adj. Span Drift     | % 1.41     |
|            | Drift Correction Applied | 2-5% No    |
|            | Allowable Span Drift     | ± % 5.00   |
|            | Span Drift Acceptable    | - Yes      |

| Test Conditions               | Units | Run 1   |
|-------------------------------|-------|---------|
| Run Ambient Temperature Range | °C    | 10 - 13 |

Method Deviations

| Nature of Deviation                                            | Run Number |  |
|----------------------------------------------------------------|------------|--|
| (x = deviation applies to the associated run)                  | 1          |  |
| There are no deviations associated with the sampling employed. | x          |  |

# OXYGEN: MEASUREMENT UNCERTAINTY CALCULATIONS

| Performance characteristics | RUN 1 | Units |
|-----------------------------|-------|-------|
| Limit value                 | N/A   | %vol  |
| Allowable MU                | 6.0   | %     |
| Measured concentration      | 10.95 | %vol  |
| Range Used                  | 25.0  | %vol  |
| Cal gas conc.               | 7.8   | %vol  |

| Performance characteristics        | RUN 1 | Units            |
|------------------------------------|-------|------------------|
| Response time                      | 41    | seconds          |
| Number of readings in measurement  | 60    | -                |
| Repeatability at zero              | 0.02  | % full scale     |
| Repeatability at span level        | 0.02  | % full scale     |
| Deviation from linearity           | 0.02  | % of value       |
| Zero drift                         | 0.00  | % full scale     |
| Span drift                         | 1.41  | % full scale     |
| Volume or pressure flow dependence | 0.10  | % of full scale  |
| Atmospheric pressure dependence    | 0.19  | % of value/kPa   |
| Ambient temperature dependence     | -0.21 | % full scale/10K |
| Combined interference              | 0.00  | % range          |
| Dependence on voltage              | 0.02  | % full scale/10V |
| Losses in the line (leak)          | 0.00  | % of value       |
| Uncertainty of calibration gas     | 2.00  | % of value       |

| Performance characteristic                        | RUN 1           | Units |
|---------------------------------------------------|-----------------|-------|
| Standard deviation of repeatability at zero       | use rep at span | %vol  |
| Standard deviation of repeatability at span level | 0.00            | %vol  |
| Lack of fit                                       | 0.00            | %vol  |
| Drift                                             | 0.00            | %vol  |
| Volume or pressure flow dependence                | 0.00            | %vol  |
| Atmospheric pressure dependence                   | 0.01            | %vol  |
| Ambient temperature dependence                    | -0.03           | %vol  |
| Combined interference (from MCERTS Certificate)   | 0.00            | %vol  |
| Dependence on voltage                             | 0.00            | %vol  |
| Losses in the line (leak)                         | 0.00            | %vol  |
| Uncertainty of calibration gas                    | 0.13            | %vol  |

| Measurement uncertainty | Result   | RUN 1 | Units |
|-------------------------|----------|-------|-------|
| Combined uncertainty    |          | 10.95 | %vol  |
| Expanded uncertainty    |          | 0.13  | %vol  |
|                         | k = 1.96 | 0.26  | %vol  |

|                                                               | RUN 1     | Units      |
|---------------------------------------------------------------|-----------|------------|
| Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence | 2.34      | % of Value |
| Result of Compliance with Uncertainty Requirement             | COMPLIANT | -          |

Requirement for SRM is that Uncertainty should be 0.3% vol absolute or 6% relative whichever is the lower, on a dry gas basis. Source, EN 14789.



| Version Number | Record of changes made within this version of the document |
|----------------|------------------------------------------------------------|
| V1             | The original document issued to the client                 |

# **2022 ANNUAL REVIEW OF MONITORING**

**Withyhedge Landfill  
site  
EPR: MP3330WP**

## **Appendix 2 Surface Emissions Assessment**

*Report Number 2234r1v1d0223*

**WITHYHEDGE LANDFILL**

**FLAME IONISATION GAS DETECTION SURVEY**

**JANUARY 2023**

**Prepared for:**

**Resources Management UK Ltd  
Withyhedge Landfill and MSF  
Rudbaxton  
SA62 4DB**

ExCAL House, Capel Hendre Industrial Estate, Ammanford,  
Carmarthenshire. SA18 3SJ  
Tel: 01269 844558  
Fax: 01269 841867



## DOCUMENT CONTROL SHEET

|          |                                       |
|----------|---------------------------------------|
| PROJECT: | WITHYHEDGE LANDFILL & MRF             |
| TITLE:   | FLAME IONISATION GAS DETECTION SURVEY |

|              |                |
|--------------|----------------|
| PROJECT REF: | 46-01-14-23    |
| REPORT No.:  | 46-01-14-23.R1 |

## PREPARED BY:

S Whitehouse:



## APPROVED BY:

A Whitehouse:



| Version  | Date         | Amendments |
|----------|--------------|------------|
| Original | January 2023 |            |
|          |              |            |
|          |              |            |
|          |              |            |
|          |              |            |

This report, and information or advice which it contains, is provided by Decus solely for internal use and reliance by its Client in performance of Decus's duties and liabilities under its contract with the Client. Any advice, opinions, or recommendations within this report should be read and relied upon only in the context of the report as a whole. The advice and opinions in this report are based upon the information made available to Decus at the date of this report and on current UK standards, codes, technology and construction practices as at the date of this report. Following final delivery of this report to the Client, Decus will have no further obligation or duty to advise the Client on any matters, including development affecting the information or advice provided in this report. This report has been prepared by Decus in their professional capacity as Environmental Consultants. The contents of this report do not, in any way, purport to include any manner of legal advice or opinion. This report is prepared in accordance with the terms and conditions of Decus's contract with the Client. Regard should be had to those terms and conditions when considering and/or placing any reliance on this report. Should the Client wish to release this report to a Third Party for the party's reliance, Decus may, at its discretion, agree to such release provided that:

- Decus's written agreement is obtained prior to such release and,
- By release of the report to the Third Party, that Third Party does not acquire any rights, contractual or otherwise, whatsoever against Decus and Decus, accordingly, assume no duties, liabilities or obligations to that Third Party, and
- Decus accepts no responsibility for any loss or damage incurred by the Client or for any conflict of Decus's interests arising out of the Clients' release of this report to the Third Party.

**WITHYHEDGE LANDFILL & MSF  
FLAME IONISATION GAS DETECTION SURVEY**

| <b>Contents</b>                                 | <b>Page</b> |
|-------------------------------------------------|-------------|
| <hr/>                                           |             |
| <b>1.0 INTRODUCTION .....</b>                   | <b>1</b>    |
| <b>2.0 MONITORING.....</b>                      | <b>2</b>    |
| <b>2.1 Equipment.....</b>                       | <b>2</b>    |
| <b>2.2 Site Conditions .....</b>                | <b>2</b>    |
| <b>2.3 Method.....</b>                          | <b>2</b>    |
| <b>3.0 SURVEY RESULTS .....</b>                 | <b>4</b>    |
| <b>4.0 CONCLUSIONS AND RECOMMENDATIONS.....</b> | <b>5</b>    |
| <br><b>APPENDIX A Calibration Certificate</b>   |             |

## 1.0 INTRODUCTION

Resources Management UK Limited operates a Landfill at Withyhedge near Haverfordwest.

The site address is: -

Withyhedge Material Recycling Facility  
Rudbaxton  
Haverfordwest  
Pembrokeshire  
SA62 4DB.

The operator holds an environmental permit for the site with reference EPR/MP3330WP.

Decus Research Limited has been commissioned by Resources Management UK Limited to undertake a walkover survey of the landfill cap to identify whether or not there are any methane leaks.

Landfill operators are required to monitor methane emissions through the restored cap of the landfill to demonstrate compliance with the Landfill Directive and to establish whether or not any faults are present in the gas management system at the site.

The work was undertaken with reference to Environmental Agency Guidance Notes LFTGNO7 v2 (2010).



## 2.0 MONITORING

The permanent cap has been surveyed periodically previously and is inspected monthly as part of the routine monitoring programme.

The cap is sown with grass and managed with a flock of sheep that are rotated to maintain a short sward.

The survey was undertaken on all areas of the site that have a permanent cap as shown on figure 1.

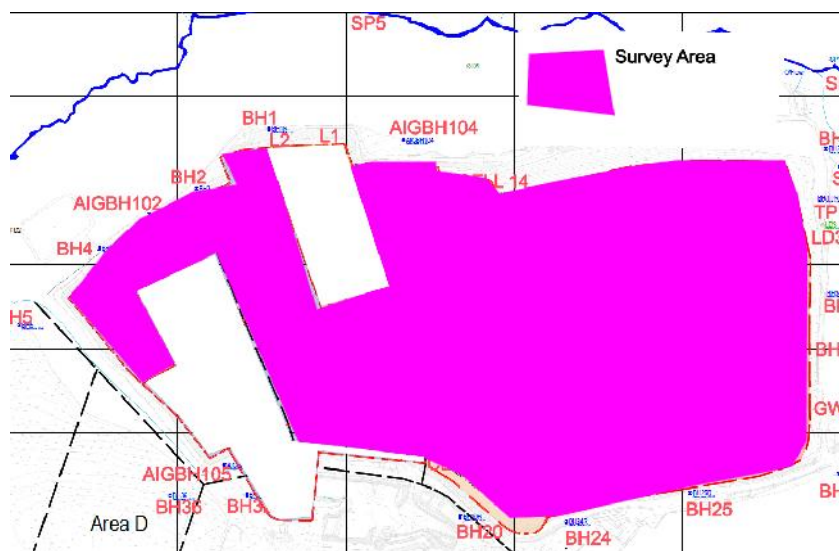


Figure 1

### 2.1 Equipment

A Gastec Mk4 Flame Ionisation Detector (FID) was utilised to detect methane emissions with a sensitivity of 1ppm.

A calibration certificate for the equipment is contained in Appendix A.

### 2.2 Site Conditions

The walkover survey was carried out on the 12<sup>th</sup> and 13<sup>th</sup> January 2023.

The following general weather conditions were noted: -

| Survey Ref   | Atmospheric Pressure (mb) | Precipitation | Wind Speed (m/s) | Wind Direction |
|--------------|---------------------------|---------------|------------------|----------------|
| Survey Day 1 | 955                       | Occasional    | Up to 10         | From west      |
| Survey Day 2 | 955                       | Occasional    | Up to 10         | From west      |

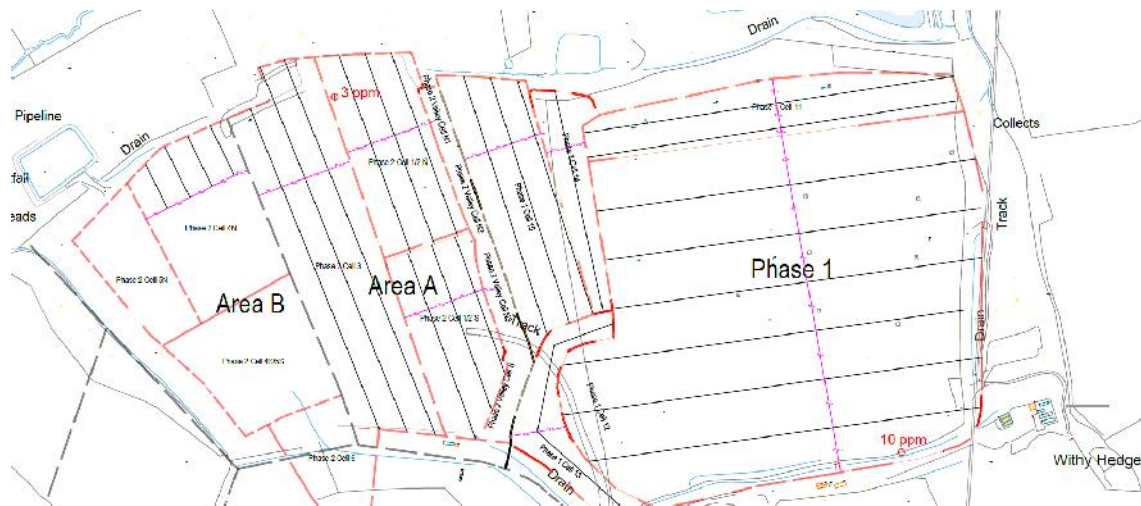
Breezy conditions were encountered during both surveying days and there was intermittent rain.

### 2.3 Method

Environmental Agency guidelines suggest that surface emission surveys should be carried out along regular lines or transects, typically 50m for permanent capped landfills and 25m apart for temporary capped areas.

To ensure a conservative approach the survey spacing was undertaken at 50m spacing across Phase 1 and 25m spacing elsewhere. In addition, the edge of each cell was surveyed as well as all features that penetrated the cap.

The survey route is shown on Figure 2.



**Figure 2 Survey Route**

Particular attention was given to the edge of the caps as this is a potential line of weakness in the containment of methane, possibly creating an emission feature.

The sample probe was held as close to the surface as possible (<5cm) in order to take in air containing any localised emissions of gas.

Where elevated concentrations of methane were detected, the air was also sampled well above the ground (roughly head height) to ensure that the emission was from the cap and not drifting over from an uncapped cell.

It can be assumed that if a large difference in methane concentration is found between the airborne reading and near-ground reading, then the main contribution is from the ground close by. Where readings are comparable, the primary source is likely to be upwind.

### 3.0 SURVEY RESULTS

Continuous data was collected by observation of the readings and by sound level.

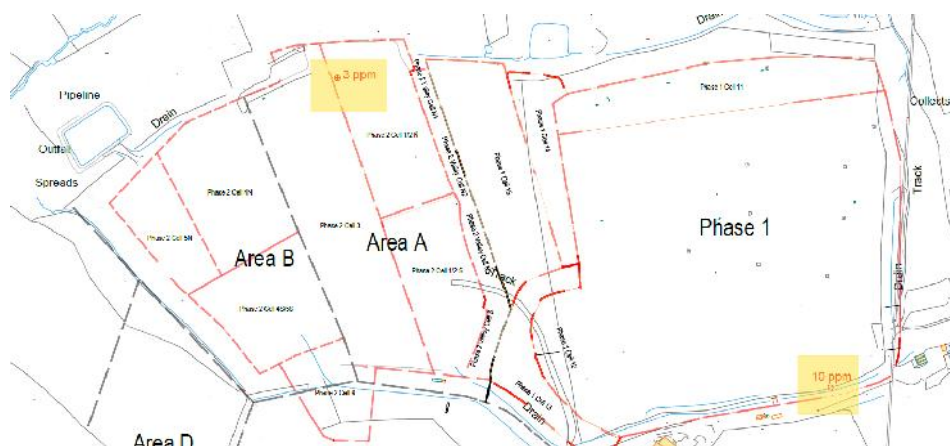
All readings were below 100 ppm.

No distinct features such as stressed vegetation were discovered and the survey did not identify any significant faults in the gas management system.

Two slightly elevated readings were detected as follows: -

1. 10ppm adjacent to the pipe which is connected to the gas extraction system at the southern end of Phase 1.
2. 3ppm at the north western edge of Phase 2 Cell 1/2N

The locations of the elevated concentrations are shown on Figure 3.



**Figure 3 Location of Elevated Concentrations**

#### **4.0 CONCLUSIONS AND RECOMMENDATIONS**

No significant defects were identified.

Whilst no significant evidence of gas emission was recorded, conditions can alter due to degradation of the contents of the cell. Consequently, it is recommended that the area is monitored by the operator for surface gas emission in accordance with the Environmental Permit on a regular basis.

A flux box survey should be undertaken on the recently capped cells.

**APPENDIX A**  
**Calibration Certificate**



British Gas approved test house ~  
Repair and maintenance of electronic equipment

## Gas & Environmental Services Ltd

Units 1 & 3, Little Ridge Industrial Estate  
Welwyn Garden City  
Herts, AL7 2BH

Telephone: 01707 373751 Fax: 01707 373752  
E-mail: [info@gesuk.com](mailto:info@gesuk.com) Website: [www.gesuk.com](http://www.gesuk.com)

### Certificate of Test and Calibration

**Calibration Date** 1<sup>st</sup> September 2022  
**Instrument Details** Gastec MK 4  
**Serial Number** 8253  
**Customer** Gas & Environmental Services (Hire unit)

The above instrument has been serviced in accordance with the manufacturers and British Gas recommended procedures for recalibration and checking of Gastec gas detectors.

The instrument was calibrated using gas standards that are traceable to national standards.

The instrument meets the requirements of British Gas standards, provided it is used and maintained in accordance with the manufacturers instructions

Recalibration is recommended to be carried out at six months from the date on this certificate.

| Methane Gas Standard | Range | Readings | Cylinder number |
|----------------------|-------|----------|-----------------|
| 80 ppm               | One   | 80ppm    | P28627/2288     |
| 500 ppm              | One   | 525ppm   | AGA184231       |
| 800 ppm              | One   | 840ppm   | CTCO7135426     |
| 80 ppm               | Two   | 80ppm    | P28627/2288     |
| 500 ppm              | Two   | 500ppm   | AGA184231       |
| 800 ppm              | Two   | 840ppm   | CTCO7135426     |
| 8000 ppm             | Two   | 8400ppm  | APL12/073701    |

Matthew Herrick  
Gas & Environmental Services Ltd







**GEO**  
**TECHNOLOGY**

Geotechnical &  
Environmental Services

Ty Coed  
Cefn-yr-Allt  
Aberdulais  
Neath SA10 8HE

**T** 01639 775293  
**F** 01639 779173

[enquiries@geotechnology.net](mailto:enquiries@geotechnology.net)  
[www.geotechnology.net](http://www.geotechnology.net)