# Docksway Disposal Site

## Environmental Review for Area 1 - 2019

On behalf of **Newport City Council**

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# Document Control Sheet

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# 1 Introduction

## 1.1 Background

1.1.1 Docksway Disposal Site is located approximately 3km south of Newport city centre and is centred on National Grid Reference ST 305 853. The site is operated by Newport City Council, referred to hereafter as NCC. The location of the site is shown on **Figure 1**.

1.1.2 The site is approximately split into a northern part (Area 1) and a southern part (Area 2):

- Area 1 is an unlined ('dilute and disperse') landfill that was operated under Waste Management Licence (WML) number EAWML30058 and is now closed, and in the aftercare phase; and
- Area 2 is an engineered containment landfill that is active and operated under Pollution Prevention Control (PPC) Permit No. DP3733BK, Variation Number V004 (July 2016).

1.1.3 In accordance with the Closure Plan for Area 1, sampling of groundwater and leachate is undertaken annually, and the results are reviewed and reported to NRW on an annual basis. The requirement for environmental reviews of the sampling and other data is undertaken every four years to allow sufficient data to be collected for review of temporal trends to be undertaken. An environmental review report for Area 1 was last prepared and submitted to NRW in 2016.

## 1.2 Scope

1.2.1 This document reviews the data produced by various environmental monitoring programmes and management systems and provides an analysis of any trends in the data over the preceding four years, together with longer term trends. The data review and analysis are used to provide an appraisal of the potential environmental risks associated with Area 1 of the site. This document includes the following:

- Review and analysis of the Area 1 environmental monitoring results collated over the past 4 years;
- Comments on temporal trends observed in the longer-term monitoring data collected; and,
- A review of the potential risks to sensitive environmental receptors.

1.2.2 Guidance for readers of this report is given in **Section 11** of this report.

## 1.3 Aftercare Monitoring Plan

1.3.1 An environmental monitoring programme commenced at the Docksway Disposal site in September 2003, in accordance with the requirements of Condition 62 of the Area 1 WML. The environmental monitoring programme was modified once definitive closure was obtained for Area 1, and the environmental monitoring continued in accordance with the aftercare monitoring plan. The requirements of the aftercare monitoring plan are described below:

- Surface water quality samples obtained monthly.
- Groundwater and leachate levels recorded every 6 months
- Groundwater and leachate samples obtained on an annual basis; and,

- Gas monitoring carried out every 6 months;

## 1.4 Related Work

1.4.1 The environmental data commented on in this report has been forwarded to NRW previously in the form of interim environmental monitoring reports.

# 2 Surface Water Quality Monitoring

## 2.1 Current Monitoring Programme

2.1.1 A surface water monitoring programme commenced at Docksway Disposal site in September 2003, in accordance with the requirements of Condition 62 of the Area 1 WML and continues in accordance with the Closure Plan for Area 1 and the Environmental Permit for Area 2 (EPR/DP3733BK).

2.1.2 Since commencement of the monitoring, NCC has undertaken monthly surface water monitoring and has reported these results to NRW on a generally monthly basis. Details of the monitoring methodology and protocols for the site (including the frequency of testing and the range of chemical testing suites used) are presented in the Monitoring Plan for Area 1, (PBA, 2011)[1], and also the Monitoring Plan for Area 2: Landfill Extension, (PBA, 2005)[2].

2.1.3 Sampling locations SW_25 and SW_26 are the subject of individual discharge consents and will continue to be monitored in accordance with those consents, whilst all other locations will continue to be monitored in accordance with the Closure Plan and EP.

2.1.4 It is noted that sampling point C3_Asb was established at the start of 2017 and is specific to Cell 3a in Area 2. There is no commentary within this report regarding C3_Asb as this is provided in the separate Environmental Performance Report for Area 2.

2.1.5 A total of six monitoring locations have been used for assessing the surface water quality over the past 12 months for Area 1 as part of this report, the locations of which are shown on **Figure 2**, and details are tabulated below:

Table 2.1 - Details of the Surface Water Monitoring Locations

| Position Monitored | Location |
|---|---|
| SW_1A | Ebbw Upstream |
| SW_11 | North Pond |
| SW_23 | Discharge to Maes Glas Pill from Docks Drain Outfall (Disused Culvert) |
| SW_24 | Oxbow Lake Position 1 |
| SW_25 | Surface Water Management System Discharge Point. Subject to a discharge consent. |
| SW_26 | Area 2 Surface Water. Subject to a discharge consent. |

## 2.2 Surface Water Hydrochemistry

### Compliance Limits

2.2.1 Notwithstanding the surface water discharge consents, surface water compliance limits have not been set by NRW as part of the Waste Management Licence. Therefore, comments on the surface water hydrochemistry with respect to compliance limits are only presented in this report where applicable. The data and any temporal trends in the data are presented and commented upon for those positions without compliance limits.

2.2.2 Surface water sampling points SW_25 and SW_26, are subject to discharge consents (Consent Number AN0394301 and AN0401301 respectively) and have compliance limit values as set within the consents.

### SW_25

2.2.3 In the last 4 years, SW _25 has been sampled eleven times and was recorded dry on each of the other monthly monitoring visits.

2.2.4 The following provides commentary on the laboratory test results compared to the consented compliance limit values:

- On all the occasions that SW_25 was sampled in the last 4 years the concentration of Ammoniacal Nitrogen was significantly below the discharge consent limit of 30mg/l and adverse trends have not been identified in the longer-term data.
- The discharge consent limit of 40mg/l for Biological Oxygen Demand (BOD) was not exceeded at SW_25 in the last 4 years, and the longer-term data does not indicate any developing trends.
- The samples from SW_25 recorded pH values between 7.65 and 8.35 in the last four years which is within the required limits of between 6 and 9 set in the discharge consent.
- The concentration of Total Suspended Solids (TSS) was recorded below the discharge consent limit of 60mg/l during the last four years and adverse trends have not been identified in the longer term data.

2.2.5 There is currently no evidence to suggest that there are any detrimental temporal trends with regard to surface water quality at this location

### SW_26

2.2.6 Surface water monitoring point SW_26 was included in the monitoring programme for Area 1 at the start of 2013. In the last 4 years, SW_26 has been sampled eight times and was recorded as dry on each of the other monthly monitoring visits.

2.2.7 The following provides commentary on the laboratory test results compared to the consented limit values.

- There is no acceptable limit value for Ammoniacal Nitrogen in the discharge consent for SW_26. However, although the concentration recorded in January 2019, at 49.2 mg/l, is the highest it has been recorded since 2015, adverse trends have not been identified
- The results of the TSS testing undertaken on the samples obtained from SW_26 recorded concentrations below the discharge consent limit of 60mg/l.
- The pH values recorded at SW_26 were between 7.62 and 8.49 which is within the acceptable range of between 6 and 9, in accordance with the discharge consent.

2.2.8 There is currently no evidence to suggest that there are any detrimental temporal trends with regard to surface water quality at this location.

## Commentary on Other Surface Water Monitoring Locations

2.2.9 **Appendix 1-1** presents the results of Ammoniacal Nitrogen concentrations since 2003 at each of the surface water monitoring locations.

2.2.10 SW_1A was sampled on 43 occasions in the last 4 years. It can be seen that Ammoniacal Nitrogen concentrations in SW_1A have in all but four instances been recorded below the method detection limit (MDL) for the laboratory (0.2mg/l) in the last 4 years. This is consistent with the longer-term dataset.

2.2.11 SW_11 was sampled four times in the last 4 years as part of the annual screen. The recorded Ammoniacal Nitrogen concentration was typically 0.2mg/l, with the exception of a concentration of 0.7mg/l recorded in November 2018. These values are consistent with the longer term dataset.

2.2.12 At SW_23 the Ammoniacal Nitrogen concentrations have been relatively consistent, being recorded generally below 25mg/l in the last 5 years.

2.2.13 The remaining surface water monitoring location, SW_24, shows a generally consistent trend since commencement of monitoring, with concentrations predominantly below 1mg/l.

### Biochemical and Chemical Oxygen Demand

2.2.1 **Appendices 1-2** and **1-3** present Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) concentrations, since 2003, at each of the surface water monitoring locations.

2.2.2 All locations appear to be displaying a generally consistent trend in BOD concentrations with the majority of results recorded at concentrations below 10mg/l.

2.2.3 In general, COD concentrations appear to be relatively consistent at all monitoring locations during the last 4 years and in the longer term with results generally below 100mg/l.

### Chloride

2.2.1 **Appendix 1-4** presents the Chloride concentrations at each of the surface water monitoring locations since 2003. The data indicates that most surface water monitoring locations are showing a generally consistent trend of Chloride concentrations with concentrations at most locations predominantly below 100mg/l.

2.2.2 The exceptions to this are SW_23 where concentrations of Chloride have fluctuated significantly from month to month during the last 4 years (from about 55mg/l up to 8030mg/l), as they have done since monitoring commenced.

### pH

2.2.1 **Appendix 1-5** presents the results of pH monitoring of surface water since 2003 at each of the current surface water monitoring locations. The majority of the pH readings have generally been recorded between about pH 7.5 and pH 8.5, which is within the normal range for all of the monitoring locations in the last 5 years.

### Electrical Conductivity

2.2.2 **Appendix 1-6** presents Electrical Conductivity (EC) readings in each of the surface water monitoring locations since 2003. The data indicates a consistent trend of Electrical Conductivity, mostly below 5mS/cm at all monitoring locations. This is within the range of the overall dataset.

### Total Suspended Solids

2.2.3 **Appendix 1-7** presents the concentrations of Total Suspended Solids (TSS) at SW_25 since 2007 and SW_26 since 2013. The data does not currently indicate any developing trends for TSS.

### Dissolved Oxygen

2.2.4 **Appendix 1-8** presents the Dissolved Oxygen (DO) concentrations recorded at the surface water monitoring locations. The concentrations have generally been between about 5mg/l and 13mg/l, and this is consistent with the overall dataset with no indication of developing trends.

## 2.3 Review of Potential Risks and Further Monitoring

2.3.1 The environmental data obtained for the surface water locations does not indicate any significant adverse trends developing in surface water quality and does not indicate any significant decrease in surface water quality since the previous Environmental Review.

# 3 Groundwater Quality Monitoring

## 3.1 Monitoring Programme

3.1.1 A groundwater monitoring/sampling programme commenced at Docksway Disposal Site in September 2003 to monitor groundwater quality within the underlying River Terrace Gravel deposits present beneath the site.

3.1.2 Details of the groundwater quality monitoring methodology and protocols for Area 1 are presented in the Monitoring Plan for Area 1, (PBA, 2011), except that the frequency of monitoring has been amended to reflect the requirements of the aftercare monitoring plan, as described below.

3.1.3 Following definitive closure of Area 1 in October 2014, the groundwater monitoring programme was amended, in accordance with the aftercare monitoring plan. As a result, groundwater levels have been recorded every 6 months and groundwater samples have been obtained annually in Area 1, in accordance with the aftercare monitoring plan

3.1.4 The Monitoring Plan for Area 1 includes three compliance well monitoring points - GW03_02, GW03_05 and GW07_07. The locations of these boreholes used as part of the current monitoring and sampling programme are shown on **Figure 2**.

3.1.5 Interim groundwater quality reports have been provided to NRW in accordance with condition 61 of the Area 1 WML and the Closure Plan.

## 3.2 Monitoring Locations and Compliance Levels

3.2.1 The three current compliance wells for Area 1 have been monitored since February 2009. The locations of the compliance wells were selected to sample both hydraulically up-gradient and hydraulically down-gradient conditions with respect to the known groundwater flow direction.

Table 3.1 - Groundwater Monitoring Locations

| Monitoring Location | Easting | Northing |
|---|---|---|
| GW07_07 | 331113 | 185287 |
| GW03_02 | 330586 | 185694 |
| GW03_05 | 330932 | 185870 |

3.2.2 The Control Levels and Compliance Limits for all priority hazardous substances and non-hazardous pollutants are presented in Table 3.2 for the three current groundwater compliance wells. Where the proposed Control/Compliance is based on the laboratory Method Detection Limit (MDL), it should be noted that these will change if the MDL changes.

Table 3.1 - Control and Trigger Levels for Area 1 Groundwater

| | GW03_02 | | | GW03_05 | | | GW07_07 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Priority Contaminant (units)** | **Max** | **Control Level** | **Compliance Limit** | **Max** | **Control Level** | **Compliance Limit** | **Max** | **Control Level** | **Compliance Limit** |
| Extractable Petroleum Hydrocarbons (EPH) (µg/l) (1) | 114.0 | 125.4 | 142.5 | 129.0 | 141.9 | 161.3 | 390.0 | 429.0 | 487.5 |
| Arsenic (µg/l) (1) | 33.3 | 36.6 | 41.6 | 28.3 | 31.1 | 35.4 | 31.8 | 35.0 | 39.8 |
| Ammoniacal Nitrogen (mg/l) (1) | 82.8 | 91.1 | 103.5 | 117.0 | 128.7 | 146.3 | 105.0 | 115.5 | 131.3 |
| Benzene (µg/l)(1) | 1* (1.3) | 1* (1.3) | 1* (1.3) | 1* (1.3) | 1* (1.3) | 1* (1.3) | 1* (1.3) | 1* (1.3) | 1* (1.3) |
| Naphthalene (µg/l)(1) | 1* (4) | 1* (4) | 1* (4) | 1* (4) | 1* (4) | 1* (4) | 1* (4) | 1* (4) | 1* (4) |
| Nickel (µg/l) (1) | 3.7 | 4.1 | 4.6 | 15.0 | 16.5 | 18.8 | 28.0 | 30.8 | 35.0 |
| Potassium (mg/l) (1) | 74.0 | 81.4 | 92.5 | 119.0 | 130.9 | 148.8 | 180.0 | 198.0 | 225.0 |
| Xylene (µg/l) | 1* (1.7) | 1* (1.7) | 1* (1.7) | 1* (1.7) | 1* (1.7) | 1* (1.7) | 1* (1.7) | 1* (1.7) | 1* (1.7) |
| Phenols (mg/l) | 0.016* (0.015) | 0.016* (0.015) | 0.016* (0.015) | 0.016* (0.015) | 0.016* (0.015) | 0.016* (0.015) | 0.016* (0.015) | 0.016* (0.015) | 0.016* (0.015) |
| Mercury (µg/l) | 0.01* | 0.01* | 0.01* | 0.01* | 0.01* | 0.01* | 0.01* | 0.01* | 0.01* |

**Notes**
(1) Maximum measured concentration excluding anomalous results
(2) * denotes current laboratory method detection limit, numbers in brackets (*) denotes previous laboratory method detection limit
(3) Hazardous substances are highlighted in orange

## 3.3 Groundwater Quality

### Ammoniacal Nitrogen

3.3.1 **Appendices 2-1** to **2-3** present the results of Ammoniacal Nitrogen since 2003 for the three groundwater monitoring locations.

3.3.2 There were no recorded exceedances of the well-specific control levels and compliance limits for Ammoniacal Nitrogen in groundwater during the last 4 years.

3.3.3 All Ammoniacal Nitrogen results are within the overall range of previously measured datasets and there is no evidence of deterioration of the groundwater quality with reference to this parameter.

### Arsenic

3.3.4 **Appendices 2-4** to **2-6** present the results of Arsenic concentrations for the three groundwater monitoring locations.

3.3.5 There were no recorded exceedances of the well-specific control levels and compliance limits for Arsenic during the last 4 years, at any of the groundwater monitoring locations.

3.3.6 There are no apparent detrimental trends within any of the datasets for Arsenic, and all are within the overall range of the previously recorded results.

### Extractable Petroleum Hydrocarbons (EPH)

3.3.7 **Appendices 2-7** to **2-9** present the results of EPH concentrations since 2003 at the three groundwater monitoring locations.

3.3.8 There have not been any recorded exceedances of the well-specific control levels and compliance limits for EPH within GW03_07 and the data does not indicate any significant deterioration of groundwater quality with reference to this parameter.

3.3.9 However, GW03_02 and GW03_05 show intermittent exceedances of the compliance limits for EPH. GW03_02 recorded exceedances in 2017 and 2018 with concentrations of 838ug/l and 263ug/l respectively, however the concentration returned to below the compliance limit in 2019. GW03_05 recorded an exceedance in 2018 and 2019 with concentrations of 191ug/l and 163ug/l, respectively. However, at both locations the concentrations recorded are within the range of the longer-term dataset.

### Total Phenols

3.3.10 **Appendix 2-10** presents the concentrations of Total Phenols since 2003 at the groundwater monitoring locations. The concentration of Total Phenols in each of the monitoring wells in Area 1 have continued to be recorded below the MDL.

### O-Xylene

3.3.11 **Appendix 2-11** presents the concentrations of O-Xylene since 2003 at the three groundwater monitoring locations. None of the results have exceeded the laboratory MDL over the last twelve years.

3.3.12 It is noted that the laboratory MDL was lowered in September 2011 (from 1.7µg/l to 1.0µg/l) which gives a false impression that some of the results in 2011 exceeded the compliance level, as the compliance level tracks the MDL.

### Benzene, Mercury & Naphthalene

3.3.13 **Appendices 2-12** to **2-14** present the results of Benzene, Mercury & Naphthalene concentrations since commencement of monitoring.

3.3.14 The concentrations of Benzene, Mercury and Naphthalene recorded at the three compliance wells have remained below the MDL during the last 4 years.

### Nickel and Potassium

3.3.15 **Appendices 2-15** to **2-17** present the concentrations of Nickel for the three groundwater monitoring locations.

3.3.16 There have been no exceedances of the well-specific compliance limits for Nickel in GW03_05 or GW07_07 during the last ten years

3.3.17 A Nickel concentration of 5.4µg/l was recorded in GW03_02 in November 2018, and this is above the well-specific compliance limit of 4.6µg/l. Nickel concentrations in GW03_02 have occasionally exceeded the compliance limit since commencement of monitoring and therefore the result is within the general dataset range and is not considered representative of significant groundwater deterioration.

3.3.18 **Appendices 2-18** to **2-20** present the concentrations of Potassium over time at the three current Area 1 groundwater monitoring locations. The concentrations recorded in compliance wells GW03_05 and GW07_07 have not exceeded the well-specific compliance limits since the start of monitoring, and only a single exceedance of the well-specific compliance limit has ever been recorded in GW03_02 (March 2010).

### Chemical Oxygen Demand (COD) and Chloride

3.3.19 Appendix **2-21** presents the COD concentrations over time at the current Area 1 groundwater monitoring positions. The three data sets show generally steady trends (below 100mg/l) in the concentrations of COD since 2011. A slightly higher concentration of 258mg/l was recorded in GW03_02 in September 2017, with subsequent concentrations at this location recorded below 50mg/l.

3.3.20 Appendix **2-22** presents Chloride concentrations since 2003. The data indicates fluctuations in the concentrations of Chloride over the past four years at all the groundwater monitoring locations, although the results are within the ranges previously recorded since commencement of monitoring.

### Electrical Conductivity and pH value

3.3.21 **Appendix 2-23** presents Electrical Conductivity (EC) readings since 2003. The readings at all three compliance wells in the last four years are within the overall dataset range, and there are no distinct adverse trends.

3.3.22 **Appendix 2-24** presents pH values over time at the current Area 1 groundwater monitoring positions. The three data series indicate results typically between pH 7 and pH 8 since early 2015, which is within the range of the overall dataset, and there are no distinct adverse trends.

## 3.4 Review of Potential Risks and Future Monitoring

3.4.1 The environmental data for groundwater quality indicates that the groundwater chemistry within the River Terrace Gravel is generally stable and that there is therefore no indication of a significant decline in groundwater quality since the previous Environmental Review. Many of the data trends are steady or fluctuating within the existing dataset range.

3.4.2 Since the previous AEPR there have been exceedances within the Area 1 groundwater of the well-specific compliance limits for EPH (twice at GW03_02 and twice at GW03_05) and Nickel (once at GW03_02). All exceedances are within the range of those previously measured.

3.4.3 Monitoring and reporting of the groundwater at the three compliance wells in Area 1 will continue annually, in accordance with the Closure Plan.

# 4 Leachate Monitoring

## 4.1 Leachate Control Measures

4.1.1 Leachate is monitored and sampled in Area 1 in accordance with Condition 69.1 of the Waste Management Licence and the aftercare monitoring plan. Although the waste body in Area 1 is unlined, it is capped with an engineered cap incorporating drainage layers above and below the impermeable cap material. Where encountered via the undercap drainage system, leachate from Area 1 is pumped to a leachate collection tank where it is temporarily stored before being emptied by tanker. Volumes of leachate removed from Area 1 in the last four years are presented in Table 4.1.

Table 4.1 – Leachate Extraction Data from Area 1

| Period | Leachate Removed (kg) |
|---|---|
| January – December 2016 | 505,460 |
| January – December 2017 | 748,000 |
| January – December 2018 | 28,920 |
| January – December 2019 | 670,900 |

## 4.2 Leachate Levels

4.2.1 Leachate levels in Area 1 are monitored and reported to NRW on a bi-annual basis. **Appendix 3-1** provides a summary of the leachate level data collected to date in all of the leachate monitoring wells. Table 4.2 shows the monitoring locations where leachate level has been routinely monitored over this reporting period. The locations of the leachate monitoring wells are shown on **Figure 2**.

Table 4.2 – Leachate Monitoring Locations

| Monitoring Location | National Grid Reference | | Notes |
|---|---|---|---|
| LF03_03 | ST308853 | (330788E, 185277N) | Adopted in 2019 by the Operator as part of the gas control system. No longer able to be monitored. |
| LF03_01 | ST308855 | (330804E, 185537N) | - |
| LF11_01 | ST307857 | (330652E, 185723N) | - |
| LF11_02 | ST309858 | (330896E, 185787N) | - |
| LF11_03 | ST308854 | (330764E, 185391N) | - |
| LF11_04 | ST309852 | (330884E, 185219N) | - |
| LF11_05 | ST310853 | (330963E, 185341N) | - |
| LF11_07 | ST309856 | (330921E, 185551N) | - |

4.2.2 The highest leachate levels have been monitored in LF03_03 at around 22m Above Ordnance Datum (AOD).

4.2.3 Leachate levels in the monitoring wells have been relatively consistent within each well since commencement of monitoring. Within the last four years the levels of leachate have ranged between about 5.99mAOD (LF11_02) and 22.12mAOD (LF03_03).

4.2.4 The differences in leachate elevation in the monitoring wells across Area 1 suggest that there may be several separate discrete perched leachate bodies within different parts of the landfill.

Filling practices during the 1980s and 1990s would make this plausible since low permeability clay materials have been used within the waste to create discrete disposal zones and for daily cover purposes.

## 4.3 Leachate Chemistry

4.3.1 Samples of leachate were taken regularly from LF03_04 since the early 2000s and from LF11_02, LF11_04 and LF11_07 since their installation in 2012 on a generally quarterly basis until closure and then annually since closure. The testing suite has previously been agreed with NRW and details are provided in the Monitoring Plan for Area 1[1].

4.3.2 In June 2014, LF03_04 became blocked and LF11_05 was adopted as a replacement. The graphs referenced in the following section therefore include the historical data from LF03_04 but commentary on that data is not included in this report as it has been previously reviewed and commented on.

### Ammoniacal Nitrogen

4.3.3 **Appendix 3-2** presents the results of Ammoniacal Nitrogen concentrations in the leachate monitoring wells since commencement of monitoring.

4.3.4 The data shows that the respective concentrations within the monitoring wells are relatively consistent with no distinct trends apparent. Concentrations vary between about 400mg/l in LF11_02 and 2000mg/l in LF11_04

### Arsenic

4.3.5 **Appendix 3-3** presents the results of Arsenic concentrations in the leachate monitoring wells since commencement of monitoring.

4.3.6 The data indicates that the respective concentrations recorded in LF11_02 and LF11_04 are relatively consistent with no distinct trends and concentrations predominantly recorded below 20mg/l in the last four years.

4.3.7 At LF11_07, concentrations have fluctuated in the last four years between about 1mg/l and 55mg/l. The data from LF11_05 also indicates fluctuating concentrations between about 27mg/l and 80mg/l. At the current time there are no distinct trends apparent.

### Benzene, Mercury, and Naphthalene

4.3.8 **Appendix 3-4** presents the Benzene concentrations in the leachate monitoring wells since commencement of monitoring. The data indicates consistent trends within the dataset for each monitoring well with no apparent adverse trends, but the concentrations recorded vary between about 5ug/l and 12ug/l generally, with concentrations up to 20ug/l recorded in LF11_05.

4.3.9 **Appendix 3-5** presents the Mercury concentrations in the leachate monitoring wells since commencement of monitoring. Mercury concentrations within the leachate monitoring wells indicate stable trends with all results below the MDL at all locations.

4.3.10 **Appendix 3-6** presents the Naphthalene concentrations in the leachate monitoring wells since commencement of monitoring. Concentrations of Naphthalene are generally consistent within individual monitoring wells between monitoring events, with all results generally below 20µg/l. The exception to this is LF11_05 where concentrations have been recorded between 8ug/l and 156ug/l in the last 4 years.

### o-Xylene, Extractable Petroleum Hydrocarbons (EPH), and Total Phenols

4.3.11 **Appendix 3-7** presents the results of o-Xylene concentrations in the leachate monitoring wells. The results show that the o-Xylene concentrations recorded indicate a consistent trend, with concentrations predominantly recorded below 20ug/l in the last four years. The exception is LF11_05 where concentrations up to 34ug/l have been recorded in the last four years.

4.3.12 **Appendix 3-8** presents the results of EPH concentrations in leachate monitoring wells LF03_03, LF03_04, LF11_02, LF11_04 and LF11_07. The concentrations recorded in the period 2016 to 2019 are consistent with previous results and are all less than 15,000µg/l with the exception of a concentration of 134,000µg/l (134mg/l) recorded in LF11_07 in 2017 which subsequently reduced to 13,300µg/l in the sample obtained in 2018.

4.3.13 **Appendix 3-9** presents the results of EPH concentrations in LF11_05, which replaced leachate well LF03_04 when it became blocked in 2014. The concentration of EPH was recorded as 45,700mg/l in 2016, 1,160,000mg/l in 2017, reducing to 3,700mg/l in 2018 and 137mg/l in 2019. These concentrations are significantly higher than the EPH concentrations recorded in the other leachate monitoring wells. This has previously been reported and discussed in the annual monitoring reports.

4.3.14 **Appendix 3-10** presents the results of Total Phenol concentrations in the leachate monitoring wells in Area 1. The results recorded since 2014 are generally stable and typically less than 0.2mg/l with occasional concentrations (in LF11_05) recorded up to 0.6mg/l.

### Nickel and Potassium

4.3.15 **Appendices 3-11** and **3-12** present the concentrations of Nickel and Potassium in the four leachate monitoring wells.

4.3.16 The results indicate that Nickel concentrations are relatively consistent (below 50µg/l) in LF11_02. However, in the remaining monitoring wells the results have fluctuated between circa and 13µg/l and 570µg/l in the period 2016 to 2019.

4.3.17 The concentrations of Potassium recorded in the leachate are relatively consistent within each monitoring well since commencement of monitoring, with concentrations typically between about 200ug/l (LF11_02) and 1000µg/l (LF11_04). There are no distinct adverse trends.

## 4.4 Review of Potential Risks and Future Monitoring

4.4.1 The environmental data for leachate indicates that in general the leachate chemistry has been consistent in leachate wells LF11_02, LF11_04, and LF11_07 in the last four years.

4.4.2 Many of the dataset trends are consistent with previous monitoring rounds.

4.4.3 The leachate chemistry data for LF11_05 indicates greater fluctuations and often higher concentrations of parameters than the other monitoring wells.

4.4.4 Further to the significantly elevated concentrations of EPH recorded at LF11_05 in 2016 and 2017, the concentrations of EPH at this location have reduced significantly on each subsequent monitoring round, to 137mg/l in 2019. This concentration remains higher than the concentrations generally recorded in the other leachate monitoring wells.

4.4.5 The leachate levels in Area 1 have been consistent over the monitoring period of this report.

4.4.6 Leachate in Area 1 will continue to be pumped to the collection tank and periodically removed from site by tanker.

# 5 External Landfill Gas Monitoring

## 5.1 Gas Monitoring Locations

5.1.1 There are currently thirteen gas monitoring boreholes located around Area 1, drilled specifically to enable gas monitoring external to the Area 1 licenced area. Table 5.1 contains details of the coordinates of the current external gas monitoring points, with their respective positions shown on **Figure 2**.

Table 5.1 – Area 1 Landfill Gas Monitoring Boreholes (external)

| Gas Monitoring Borehole | National Grid Reference | |
|---|---|---|
| NCC1 | ST303858 | (330336E,185808N) |
| NCC2 | ST310857 | (331011E,185740N) |
| NCC3 | ST310857 | (331020E,185717N) |
| NCC5 | ST311855 | (331094E,185486N) |
| NCC6 | ST311856 | (331054E,185612N) |
| GP03_01 | ST306857 | (330586E,185697N) |
| GP03_02 | ST308858 | (330783E,185814N) |
| GP03_3A | ST309859 | (330945E,185862N) |
| GP03_13 | ST308858 | (330775E,185810N) |
| GP09_09 | ST307853 | (330683E,185349N) |
| GP07_05A | ST311853 | (331116E,185290N) |
| GP12_26 | ST311853 | (331112E,185332N) |
| GP12_27 | ST308851 | (330827E,185146N) |

## 5.2 Monitoring Requirements and Trigger Levels

5.2.1 In accordance with Condition 60 of the WML Landfill gas monitoring was undertaken on a monthly basis until formal closure of the site in October 2014 when the site moved into the aftercare phase and the frequency of monitoring was reduced to bi-annually in accordance with the closure plan.

5.2.2 Trigger Levels for landfill gas monitoring are presented in Table 60C of the WML, being >1% for methane, >1.5% for carbon dioxide and <18% for oxygen. Table 60D of the WML stipulates that monitoring results should be reviewed against Trigger Levels.

## 5.3 External Landfill Gas Monitoring

### Methane

5.3.1 **Appendix 4-1** presents the results of methane concentrations since the commencement of the landfill gas monitoring programme in 2003 and includes the thirteen current monitoring locations. Methane has been recorded in excess of the Trigger Level (1%) at the majority of monitoring locations throughout the monitoring programme. During the last four years methane has been recorded between <1%v/v and 73.1%v/v which is consistent with previous years.

### Carbon Dioxide

5.3.2 **Appendix 4-2** presents the results of carbon dioxide concentrations since the commencement of the landfill gas monitoring programme in 2003, including the current thirteen monitoring locations. Carbon dioxide has generally been recorded in excess of the Trigger Level (1.5%) at the majority of monitoring locations throughout the monitoring programme. During the last four years carbon dioxide has been recorded between 0.2% and 24.6%, which is consistent with previous years.

### Oxygen

5.3.3 **Appendix 4-3** presents the results of oxygen concentrations since the commencement of the landfill gas monitoring programme in 2003, including the current thirteen monitoring locations. Oxygen content is typically recorded below the Trigger Level of 18% (i.e. it is depleted) at the majority of monitoring locations throughout the monitoring programme. During the last four years Oxygen has been recorded between 0.3% and 21.0%, which is consistent with previous years.

## 5.4 Review of Potential Risks and Future Monitoring

5.4.1 The results of gas monitoring undertaken during the last four years reveal that there are no new adverse trends in the environmental monitoring data and therefore it is not considered that there is a significant increase in potential landfill gas risk since the previous Environmental Review.

5.4.2 We have described previously that the wells external to the Area 1 licenced area are considered as being inappropriate for ‘external’ gas monitoring. This is because deposition of waste has historically taken place over a wide area outside the limits of the current licenced boundary, with biodegradable refuse present in the soil into which the majority of these gas monitoring positions have been installed. As such, the origin of the gas measured at these locations is questionable and may be representing ongoing degradation within the local soil conditions, as opposed to representing gas which has migrated from the licenced area of the landfill.

5.4.3 Definitive closure for Area 1 at Docksway Disposal Site was obtained in October 2014. Monitoring of landfill gas in Area 1 will continue in accordance with the closure plan.

# 6 Landfill Gas Generation and Usage

## 6.1 Landfill Gas Utilisation Plant

6.1.1 Docksway Disposal Site has a Landfill Gas Utilisation Plant servicing both Area 1 and Area 2 landfill areas. It currently comprises one 1MW Jenbacher (320) engine together with one 1250m$^3$/hr flare. Information from Infinis Energy indicates that the plant capacity was reduced in January 2014, with a 330kW Jenbacher (208) engine removed as a result of a reduction in gas availability at the site.

6.1.2 Infinis Energy are currently responsible for the general running and minor routine maintenance of the gas plant and has provided information to assist in the compilation of this section of the report. The Infinis annual report is presented as **Appendix 5**. The annual reports for the prior years have been submitted previously to NRW as part of the annual environmental performance reports for Area 2, and also separately, directly by Infinis.

6.1.3 Monitoring of the plant performance and volumes of gas extracted from the gas utilisation plant has been undertaken on a regular basis since 2005 by Novera/Infinis.

## 6.2 Landfill Gas Extraction

6.2.1 The total production of energy from the Landfill Gas Utilisation Plant in each of the last four years is given in Table 5.1 below.

Table 6.1 - Landfill Gas Utilisation Statistics

| Year | Total production of energy | Energy Exported (MWh) | Site Efficiency (%) | Engine Operation (Hours) | Engine Downtime (Hours) | Flare Operation (Hours) |
|---|---|---|---|---|---|---|
| 2016 | 5669 | 7306 | 29.7 | 8088 | 672 | 5941 |
| 2017 | 7443 | 7716 | 33.5 | 8072 | 688 | 667 |
| 2018 | 5938 | 5669 | 33.0 | 7987 | 773 | 778 |
| 2019 | 5126 | 4864 | 30.9 | 7798 | 962 | 1107 |

6.2.2 As can be seen from Table 5.1 the total production of energy, amount of energy exported and the site efficiency have reduced each year since 2017. Since 2016 the engine has operated for fewer hours each year, with engine downtime also increasing. However, flare operation has increased since 2017. A review of the volumes of gas processed shows a significant decrease in the volume combusted by engine in 2019 vs. 2018 (2.9 million m$^3$ vs. 3.5 million m$^3$) and a corresponding increase in volume combusted by flare in 2019 vs. 2018 (484,000m$^3$ vs. 342,000m$^3$).

6.2.3 Infinis have indicated that the flare is operated during periods when the engine is down for maintenance or during a period of surplus landfill gas production.

6.2.4 Environmental Performance Indicators provided by Infinis are summarised in Table 5.2 below.

Table 6.2 - Environmental Performance Indicators (provided by Infinis)

| Year | Total oxides of Nitrogen emission as $NO_2$ (kg/MWh) | Total Carbon Monoxide Emissions (kg/MWh) | Total Engine Downtime (%) |
|---|---|---|---|
| 2016 | 2.0 | 4.4 | 7.7 |
| 2017 | 1.2 | 4.1 | 8.8 |
| 2018 | 2.1 | 4.6 | 8.8 |
| 2019 | 7.8 | 15.7 | 11.0 |

6.2.5 As can be seen from Table 5.2, the environmental indicator parameters were relatively similar between 2016 and 2018, however the 2019 data indicates an increase in all parameters. Emissions data critically depends on a number of factors including run hours of engines and the availability of landfill gas to them, and whilst they are presented as EPI they should be treated with caution.

## 6.3 Monitoring of Extracted Gas

6.3.1 The PPC Permit (LP3135SB) for the gas installation at the site requires that 'emissions to air from the engine stacks, fugitive emissions, and odour are monitored and reported annually'. This data is collated and presented directly to NRW by Infinis Energy.

6.3.2 Flare monitoring is only required if the flare is in operation greater than 10% of the time. Infinis have indicated that emissions testing of the flare was not carried out in 2017, 2018 or 2019 as the flare hours did not exceed the 10% trigger level (in the preceding 12-month period).

6.3.3 Monitoring and reporting will continue by Infinis in accordance with the PPC Permit and the WML.

# 7 Annual Production / Treatment and Performance Parameters

## 7.1 Annual Production/Treatment

Table 7.1 – Annual production/treatment reported by NCC and Infinis (Landfill gas)

| **Leachate:** | **Tonnes/year** | | | |
|---|---|---|---|---|
| | 2016 | 2017 | 2018 | 2019 |
| Disposed of off-site (Area 1) | 506 | 748 | 29 | 671 |
| Disposed of to any onsite effluent treatment plant | None | None | None | None |
| Re-circulated into the waste mass | None | None | None | None |
| **Surface water and/or groundwater:** | **Cubic metres/year** | | | |
| | 2016 | 2017 | 2018 | 2019 |
| Disposed of off site | n/a | n/a | n/a | n/a |
| Disposed of to any onsite effluent treatment plant | None | None | None | None |
| **Landfill Gas: (Whole site)** | **Normalised cubic metres/year** | | | |
| | 2016 | 2017 | 2018 | 2019 |
| Combustion in flares | 809,640 | 327,098 | 342,557 | 484,812 |
| Combustion in gas engines | 3,763,344 | 3,959,712 | 3,516,712 | 2,953,545 |
| Other methods of gas utilisation | None | None | None | None |

## 7.2 Performance Parameters

Table 7.2 – Performance parameters reported by NCC (Whole site)

| Parameter | Year | Annual Total | Unit |
|---|---|---|---|
| Potable Water Use (Annual) | 2016 | 3,158 | Cubic metres |
| | 2017 | 3,136 | |
| | 2018 | 1,558 | |
| | 2019 | 1,637 | |
| Energy Used (including for leachate treatment, excluding electricity generated) (Annual) | 2016 | 163,591 | kWh of electricity |
| | 2017 | 182,323 | |
| | 2018 | 195,120 | |
| | 2019 | 178,666 | |
| Non-Potable Water Use (Annual) | 2016 | 0 | Cubic metres |
| | 2017 | 0 | |
| | 2018 | 0 | |
| | 2019 | 0 | |

## 7.3 Topographic Surveys

A review of the annual topographical surveys across Area 1 during the reporting period 2016 to 2019 indicates that generally the waste mass appears to be gradually settling as anticipated. However, there are irregularities between the surveys that indicate localised areas where the ground levels appear to have increased. Newport City Council have confirmed that the reasons for these apparent ground level increases are due to inconsistencies and errors in the surveys, and they are committed to improving the survey coverage and control for future surveys.

# 8 Conclusions

## 8.1 Assessment of Environmental Performance Trends

8.1.1 This document reviews the environmental data from the four-year period 2016 to 2019, compares it to the long-term data and provides an indication of data trends both over the last four years and since the various monitoring programmes commenced.

8.1.2 Surface water monitoring indicates generally relatively stable trends since the previous Environmental Performance Review, with no evidence of significant adverse trends developing. SW25 and SW26 are subject to discharge consents and across the last four years have not exceeded the discharge consent limits. On the basis of the data available, it is considered that there has been no significant deterioration of the surface water quality in the last four years.

8.1.3 The environmental data for groundwater quality indicates that there have been a limited number of exceedances of the well-specific compliance as described in Section 3. All exceedances are within the range of concentrations previously recorded. The groundwater chemistry within the River Terrace Gravel appears generally stable and the data indicates that there is therefore no significant decline in groundwater quality since the previous Environmental Review.

8.1.4 Leachate levels across Area 1 appear to be indicating the presence of discrete perched leachate bodies within different parts of the landfill, and recorded levels are relatively consistent with no distinct trends.

8.1.5 The leachate chemistry data indicates generally stable or indistinct trends in the leachate wells across Area 1, although concentrations of some parameters in LF11_05 are notably higher and/or indicate greater fluctuations than the other monitoring wells. The previously elevated concentrations of EPH recorded in LF11_05 in 2016 appear to have significantly reduced although they remain higher than the concentrations recorded in the other leachate monitoring wells.

8.1.6 The external landfill gas monitoring data indicates that the concentrations of Methane and Carbon Dioxide have consistently exceeded the relevant Trigger Levels since 2003 whilst concentrations of Oxygen have consistently been recorded below the required Trigger Level over the same period. These are consistent data trends.

## 8.2 Future Monitoring Requirements

8.2.1 The application for ‘definitive closure’ of Area 1 at Docksway Disposal Site, and the associated Closure Plan was accepted by NRW in October 2014.

8.2.2 The Docksway Disposal Site Area 1 monitoring programmes will continue (as approved by NRW) in accordance with the aftercare monitoring plan.

# 9 References

[1] PBA (2011) Docksway Disposal Site, Newport. 2011 Monitoring Plan for Area 1. Peter Brett Associates, August 2011.

# 10 Essential Guidance for Report Readers

This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints they are described in the report text.

1. The opinions and recommendations expressed in this report are based on statute, guidance, and appropriate practice current at the date of its preparation. Stantec UK does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and we will be pleased to advise if any report requires revision due to changing circumstances, especially those over one year old. Following delivery of any report Stantec has no obligation to advise the Client or any other party of such changes or their repercussions.

2. Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third party data used.

3. The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in any analysis and reporting.

4. It should be noted that groundwater levels, groundwater chemistry, surface water levels, surface water chemistry, soil gas concentrations and soil gas flow rates can vary due to seasonal, climatic, tidal and manmade effects.

5. This report has been written for the sole use of the Client stated at the front of the report. This report shall not be relied upon or transferred to any other party without the express written authorisation of Stantec. Any such party relies upon the report at its own risk.

6. The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not taken into account the perceptions of, for example, banks, insurers, other funders, lay people, etc., unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.

7. Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as Natural Resources Wales, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

# Figures


Site Grid Ref: ST 309 852

DOCKSWAY DISPOSAL SITE
NEWPORT

SITE LOCATION PLAN

Client
NEWPORT CITY COUNCIL

| Date of 1st Issue | Drawn by |
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| 20.01.2020 | davco |
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# DOCKSWAY DISPOSAL SITE, NEWPORT

## MONITORING POINT LOCATION PLAN FEBRUARY 2019

GW03_29
NCC1
GC99_09
LF11_01
NEW SITE OFFICES AND METEOROLOGICAL STATION
GP03_01
GW03_02
SW01A
200m Upstream
GW03_01
SW11
GW03_03
GC99_10
GW03_05
GP03_03a
GP03_02
GP03_13
GW07_04
LF11_02
SW07
SW23
NCC2
NCC3
NCC5
GP03_11
NCC6
GP03_04a
GW03_06a
LF11_07
LF03_01
LF03_04
LF03_03
LF11_03
GW09_15A
GP09_09
LF11_05
LF11_06
GP12_26
GP07_05
GW07_07
LF11_04
GP06_25
SW24
GP03_06
GW07_40
GW12_30
SW 25
GP12_27
GP06_08A
GW06_14A
GW06_39
GP05_14
GW09_31
C3_Asb
GP05_15
GP12_23
GW03_09
GP05_16
GW09_32
GP05_22
GW12_38
C1D
C1A
C1E
C2C
GP05_21
GW06_13
LF08_07
C1B
GP05_17
C2B
GW12_33
GP05_20
SW 26
GW06_37
GW06_36
GW09_35
C2A
GP18_18A
GP18_18B
GP18_18C
GP09_18
GW06_34
SW02
GW03_26
GW03_27

AREA 1
AREA 2
CELL 1
CELL 2
CELL 3A
CELL 3B
CELL 4A
CELL 4B
CELL 5

River Ebbw
Ebbw River (Afon Ebwy)

186000
185800
185600
185400
185200
185000
184800
184600
330400
330600
330800
331000
331200
331400

KEY
- LEACHATE WELLS
- GAS MONITORING BOREHOLE
- GRAVEL GROUNDWATER MONITORING BOREHOLE
- DISUSED MONITORING WELL
- LOST, BURIED OR DAMAGED WELLS
- SURFACE WATER MONITORING POINT
- RIVER EBBW/WATER BODIES
- CUT OFF WALL
- AREA 2 CELL BOUNDARIES

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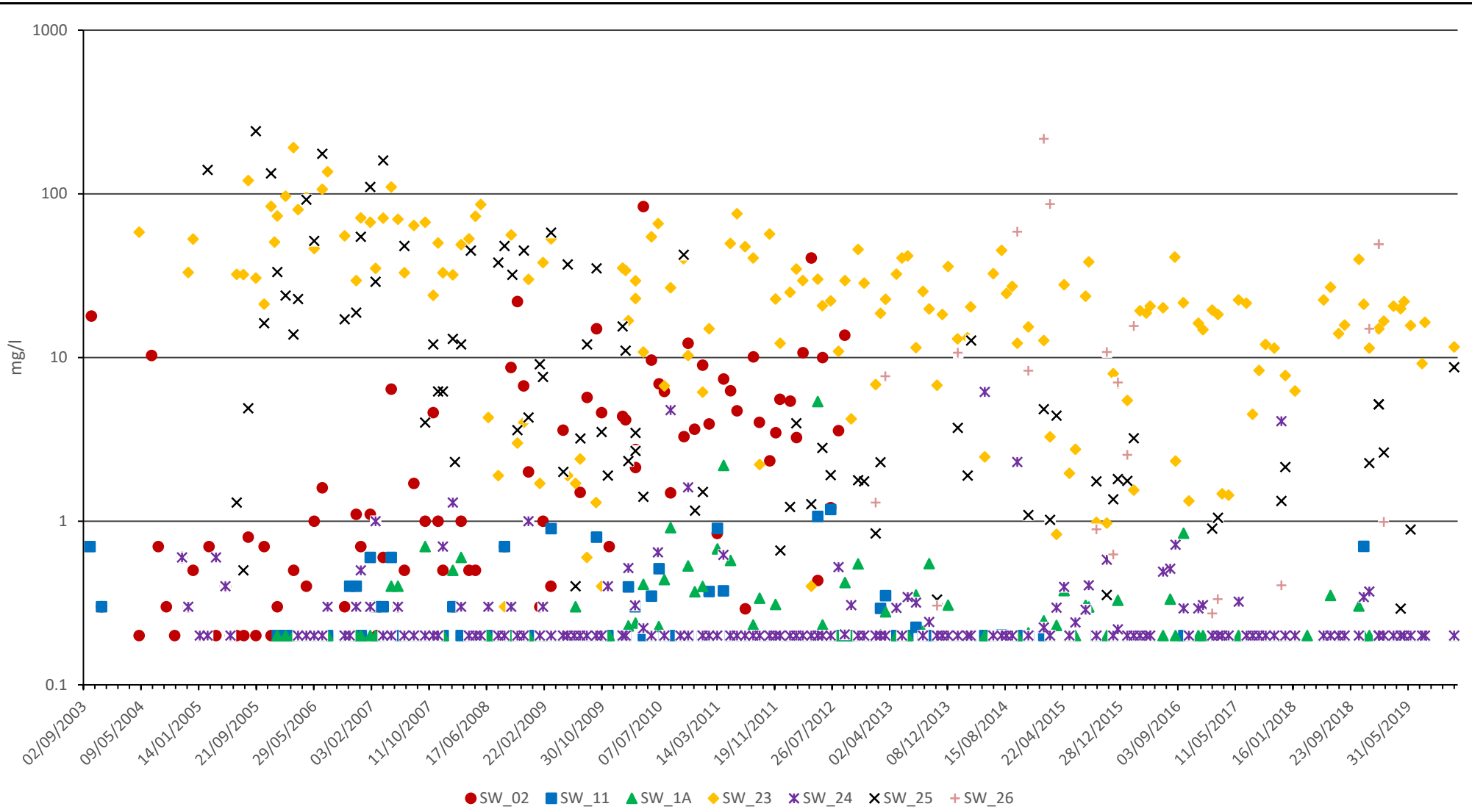
user name: cotton, david

File Location: j:\14739\075-interim reporting\exploratory hole location plan\updated feb 2019\figure 2 - exploratory hole location plan - feb 2019.dwg

# Appendix 1 Surface Water Graphs

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**Docksway Disposal Site**

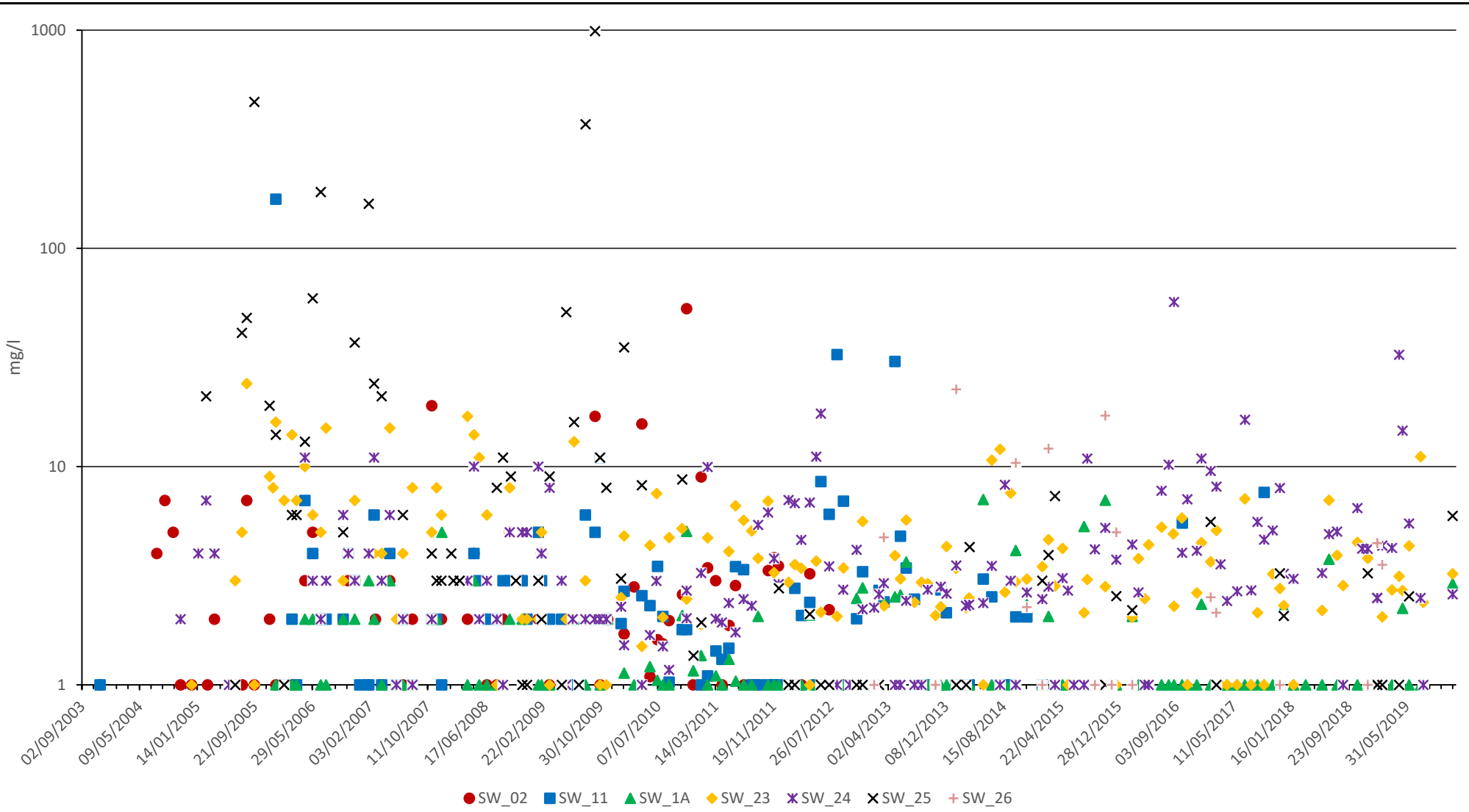
**Ammonical Nitrogen in Surface Water**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-1**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 1 - Surface Water\[1-1 Ammonixal Nitrogen SW.xlsm]Summary

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**Docksway Disposal Site**

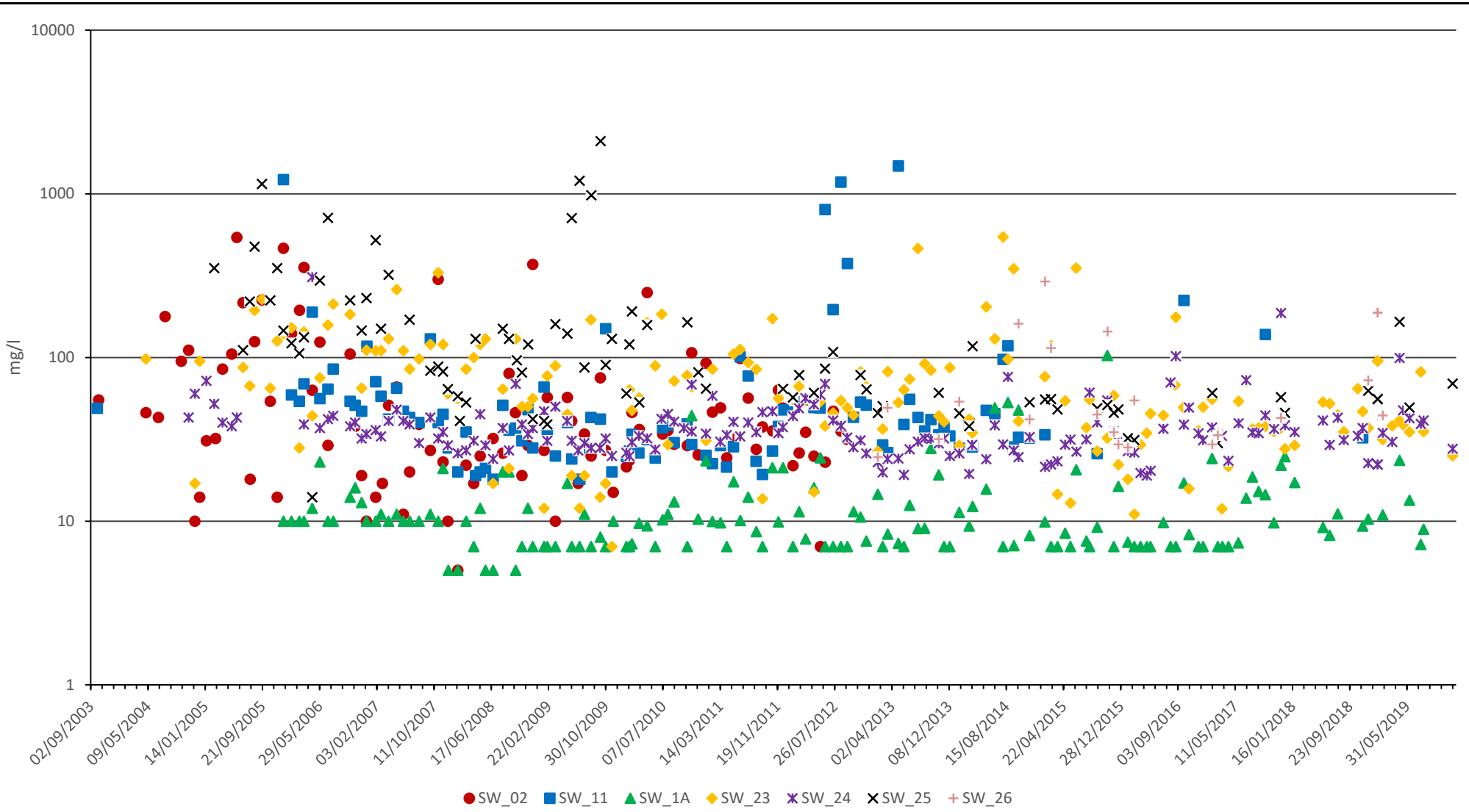
**Biochemical Oxygen Demand in Surface Water**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-2**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 1 - Surface Water\[1-2 BOD SW.xlsm]Summary

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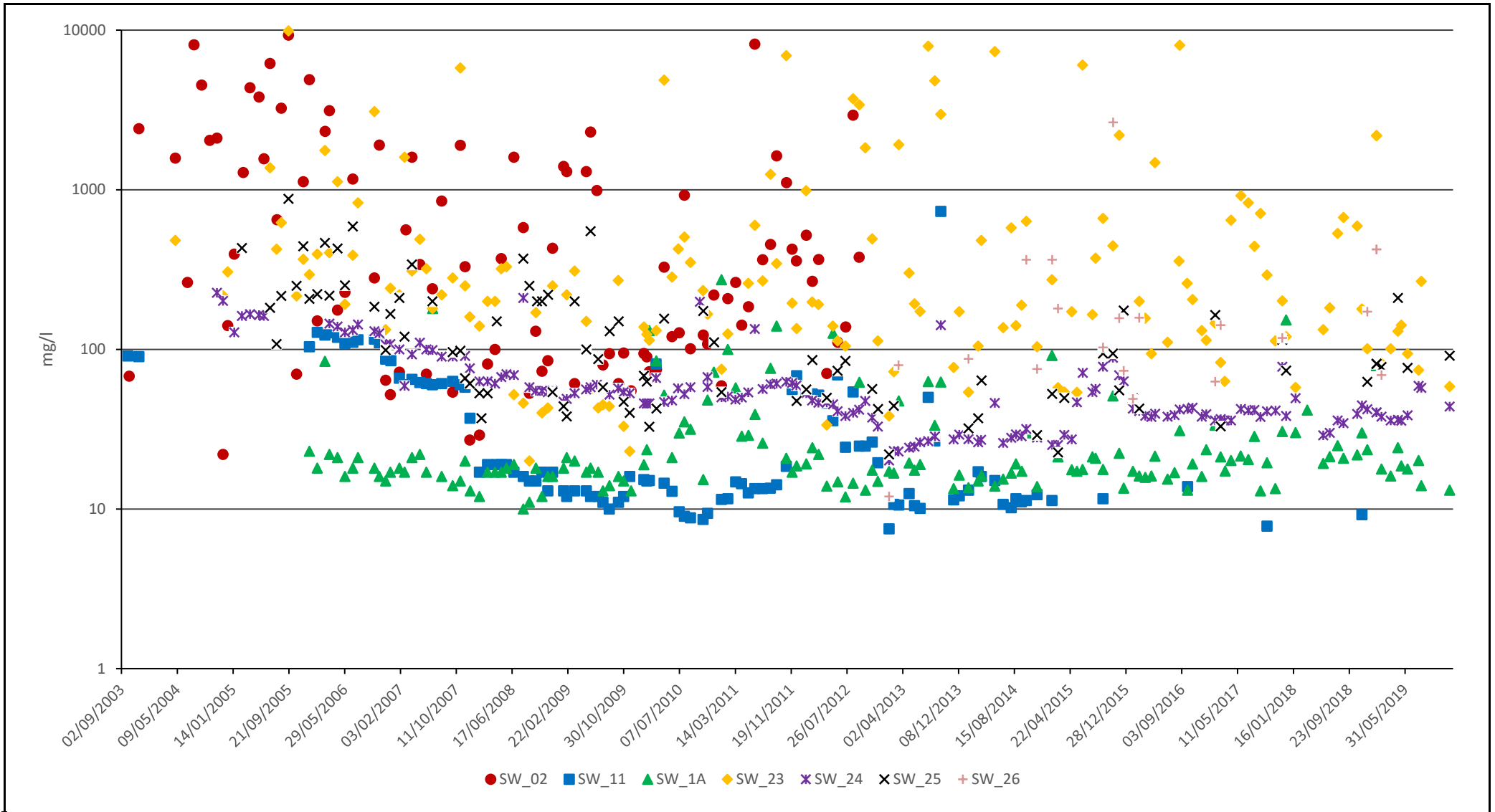
**Chemical Oxygen Demand in Surface Water**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-3**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 1 - Surface Water\[1-3 COD SW.xlsm]Summary

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**Chloride in Surface Water**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-4**

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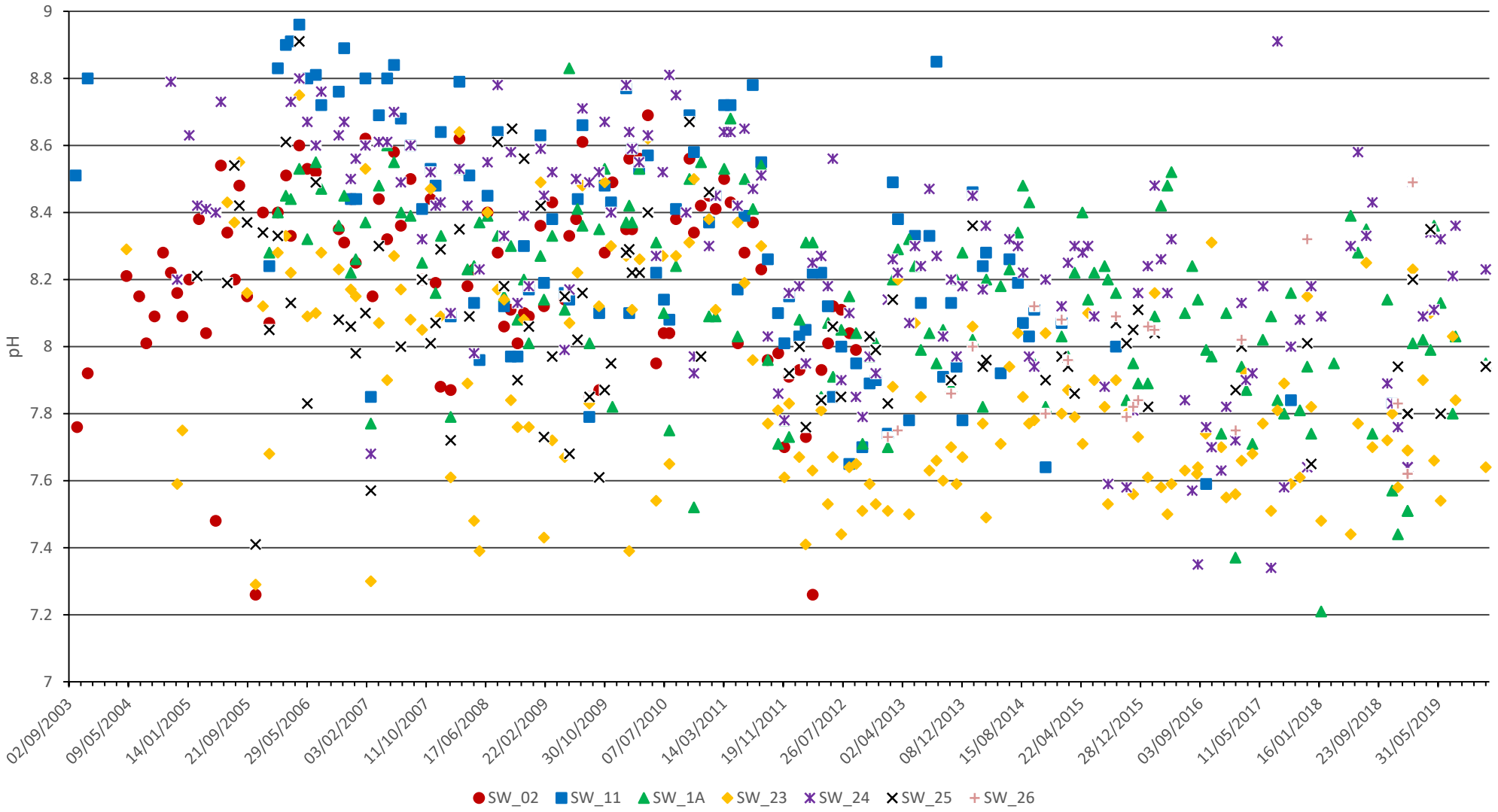


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**pH in Surface Water**

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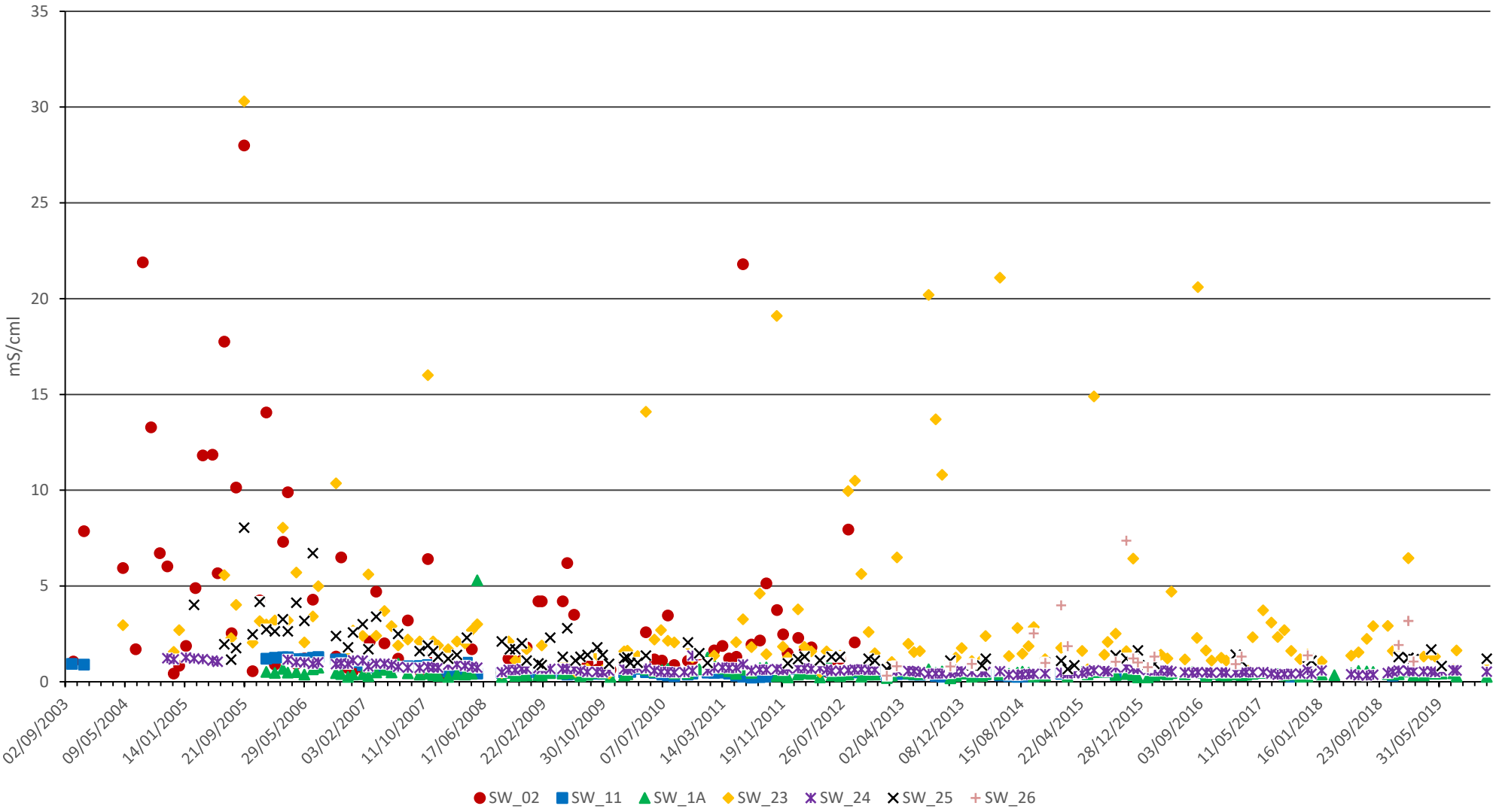
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-5**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 1 - Surface Water\[1-5 pH SW.xlsm]Summary

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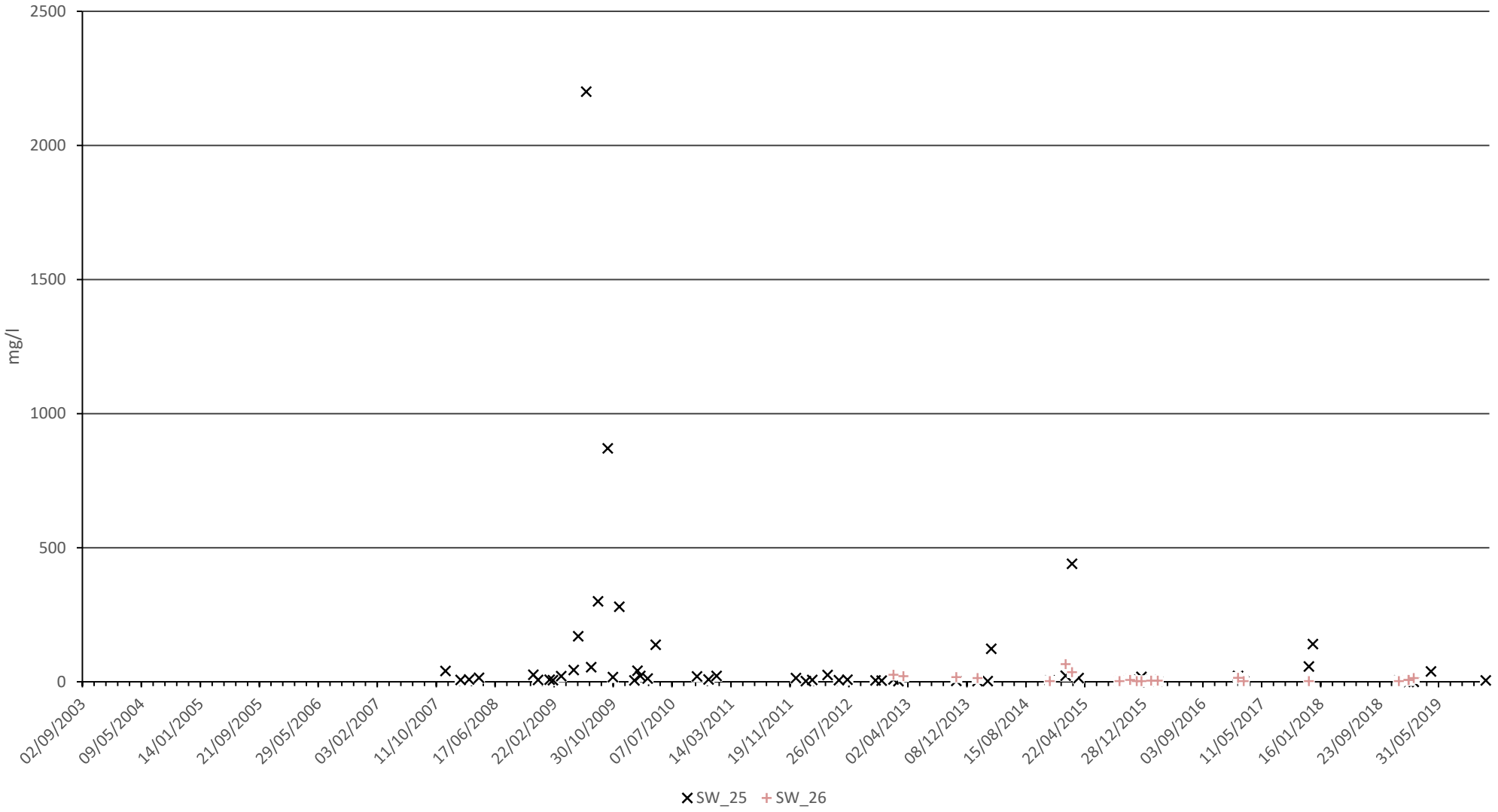
**Electrical Conductivity in Surface Water**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-6**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 1 - Surface Water\[1-6 EC SW.xlsm]Summary

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**Docksway Disposal Site**

**Total Suspended Solids in Surface Water**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-7**

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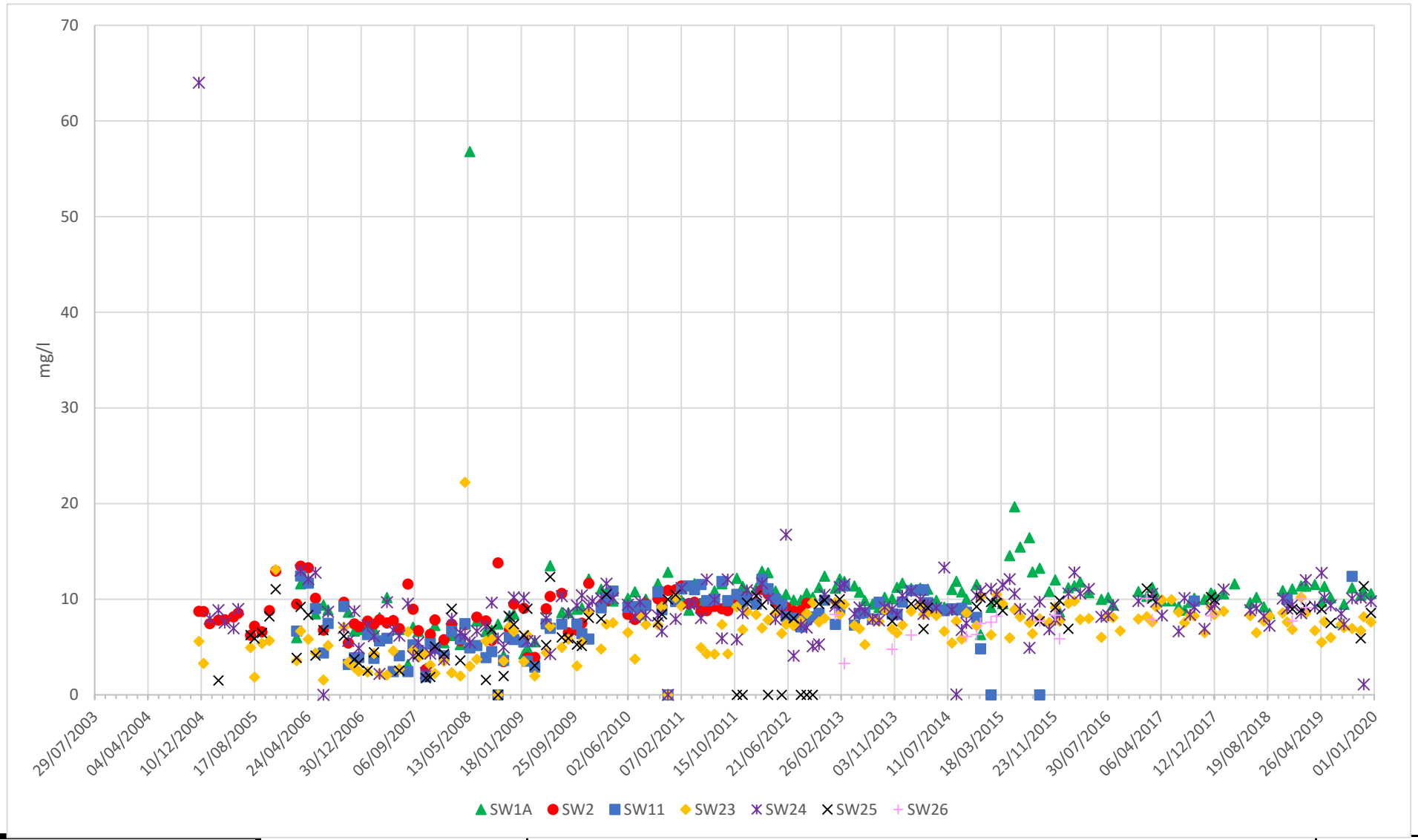


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**Docksway Disposal Site**

**Dissolved Oxygen in Surface Water**

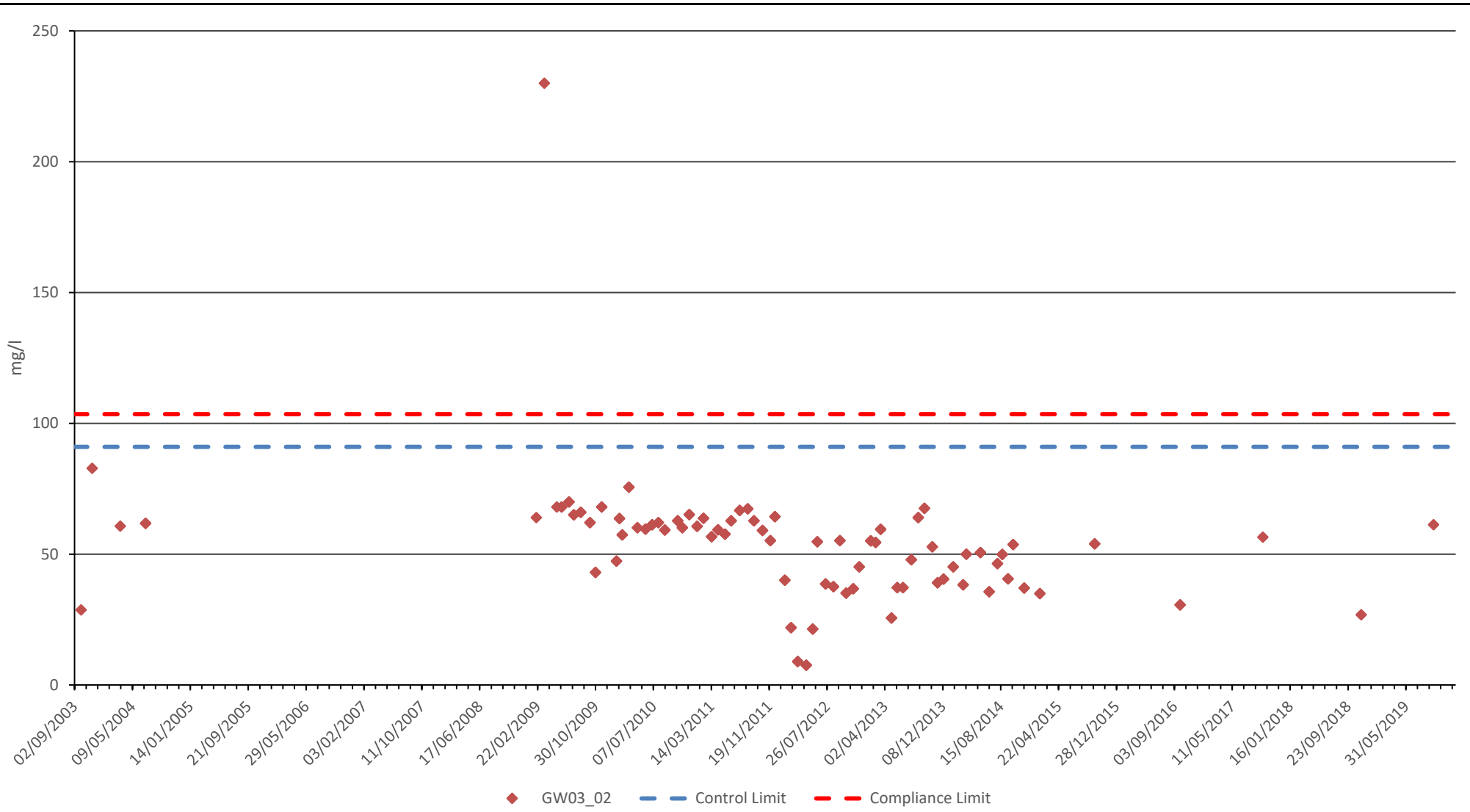
| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**1-8**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 1 - Surface Water\[1-8 DO Graph SW.xlsm]Summary

# Appendix 2 Groundwater Graphs

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**Newport City Council**

**Docksway Disposal Site**

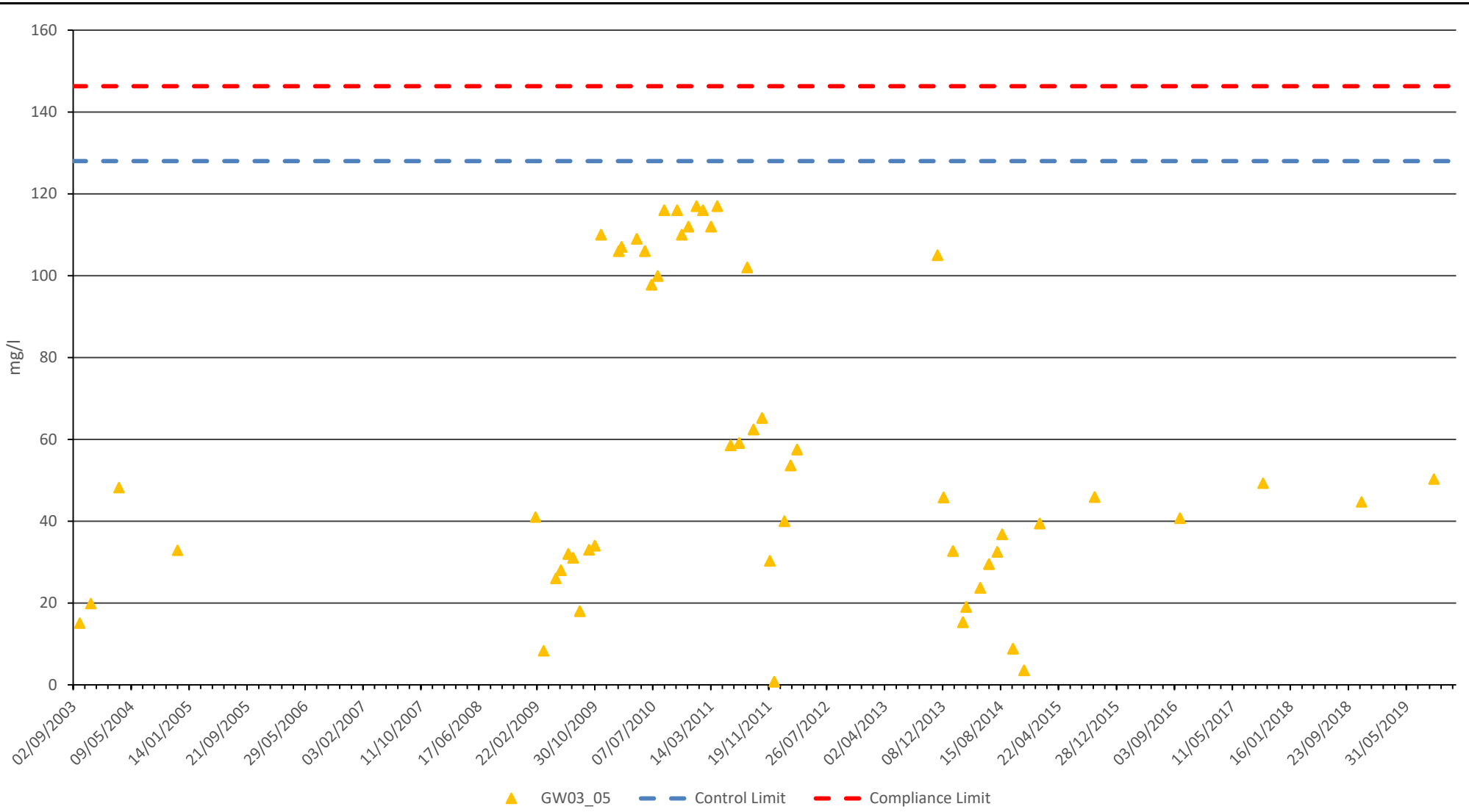
**Ammoniacal Nitrogen in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-1**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-1 Ammoniacal nitrogen.xlsm]Summary

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**Newport City Council**

**Docksway Disposal Site**

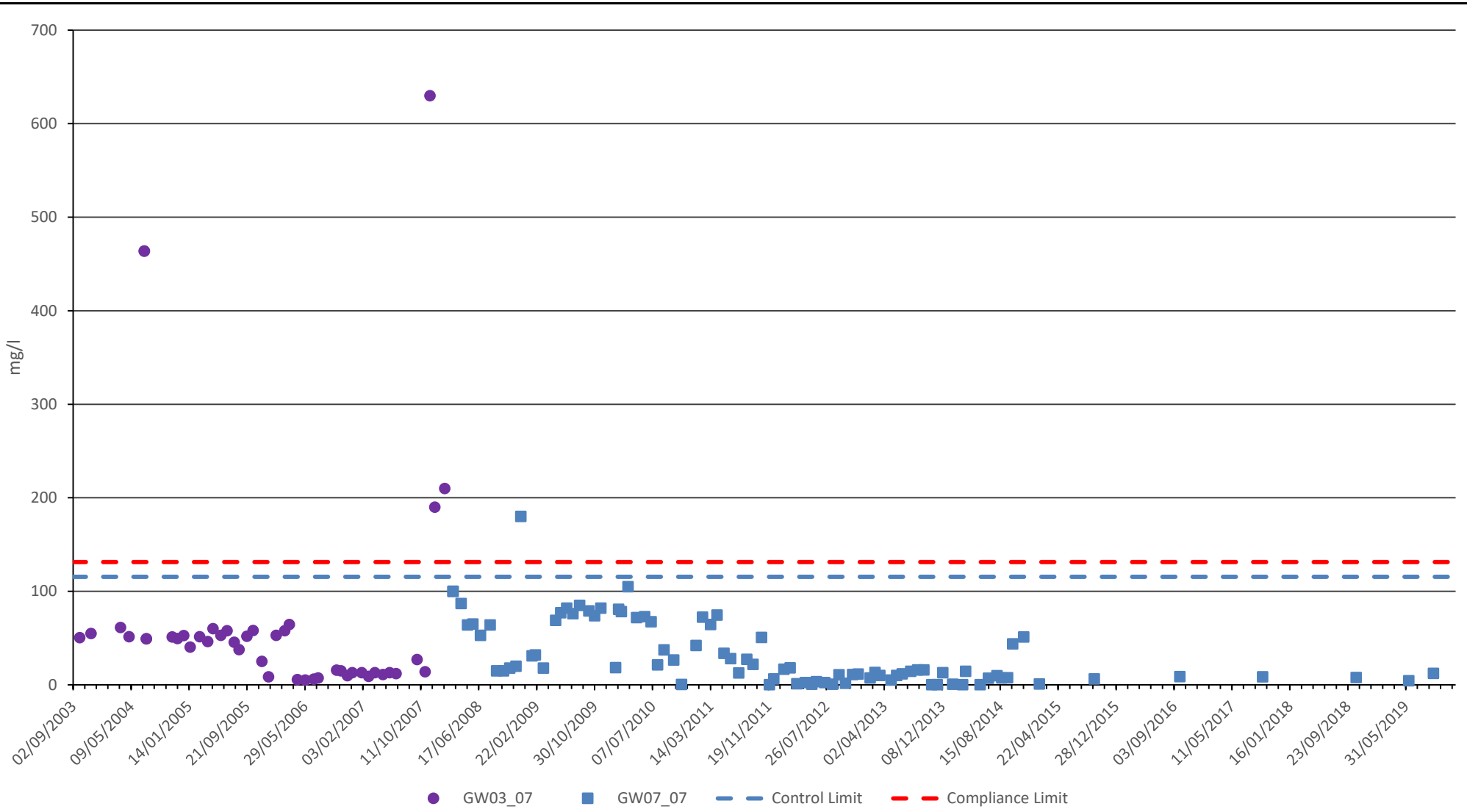
**Ammoniacal Nitrogen in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-2**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-2 Ammoniacal nitrogen.xlsm]Summary

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**Newport City Council**

**Docksway Disposal Site**

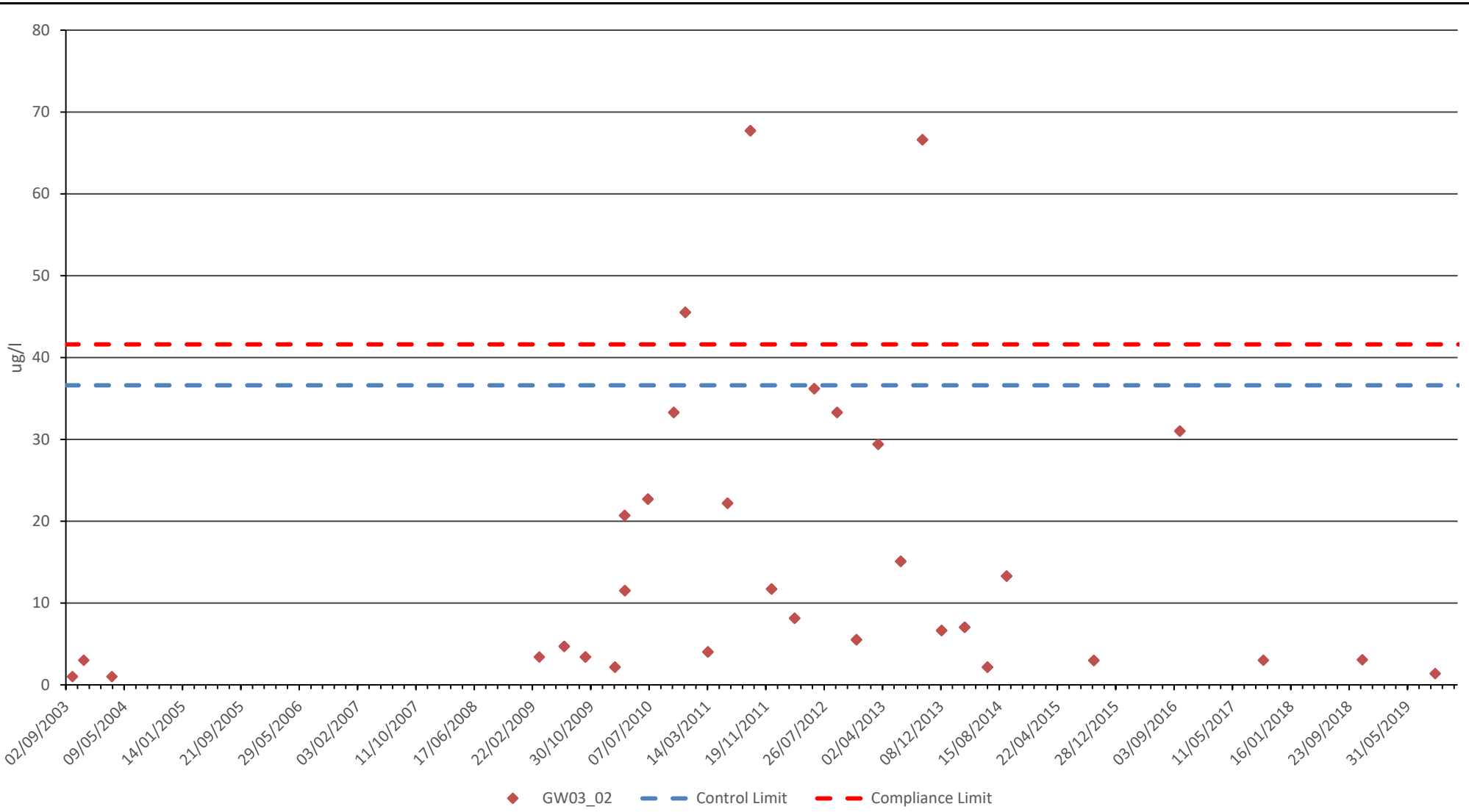
**Ammoniacal Nitrogen in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-3**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-3 Ammoniacal nitrogen.xlsm]Summary

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**Docksway Disposal Site**

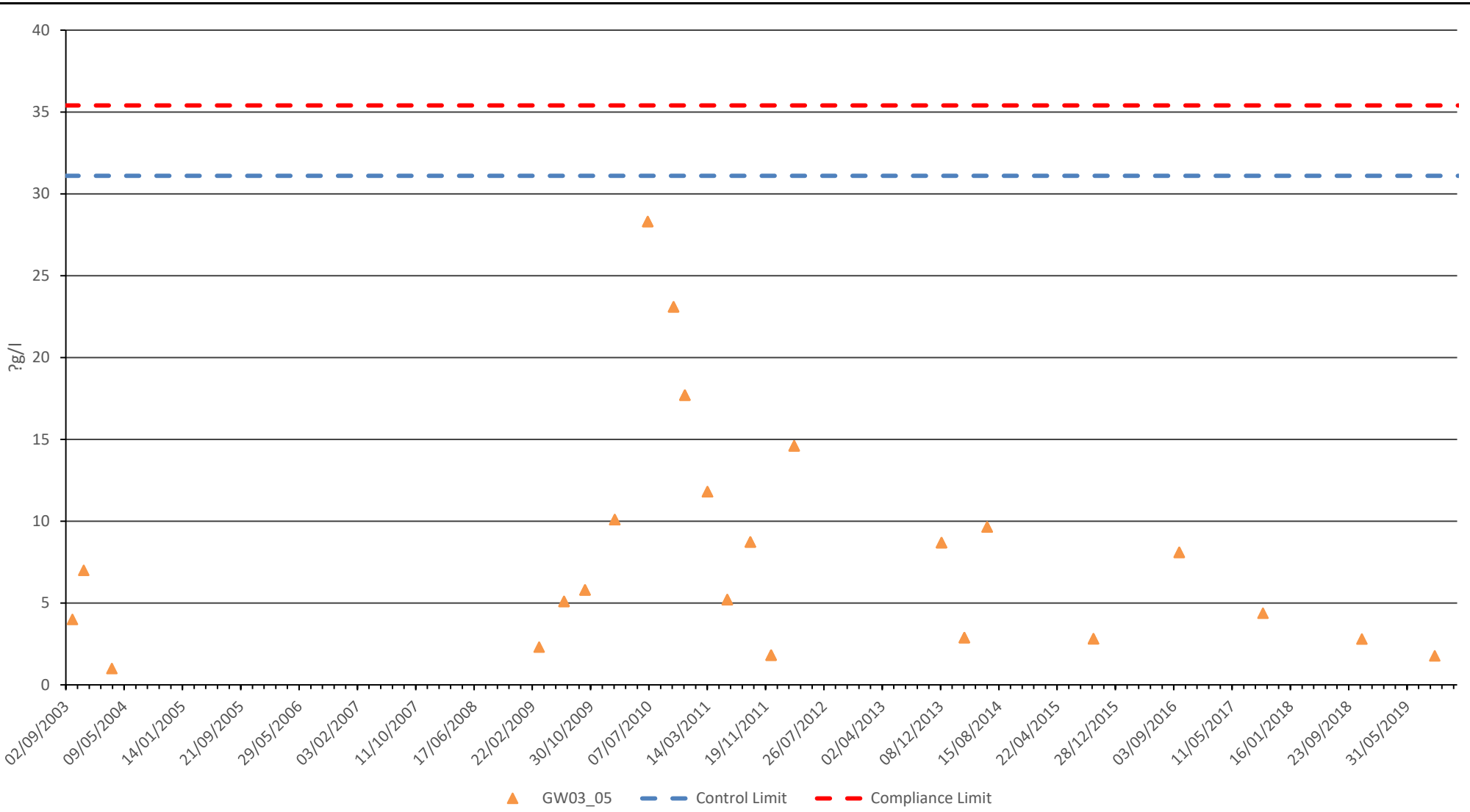
**Arsenic in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-4**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-4 Arsenic.xlsm]Summary

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**Docksway Disposal Site**

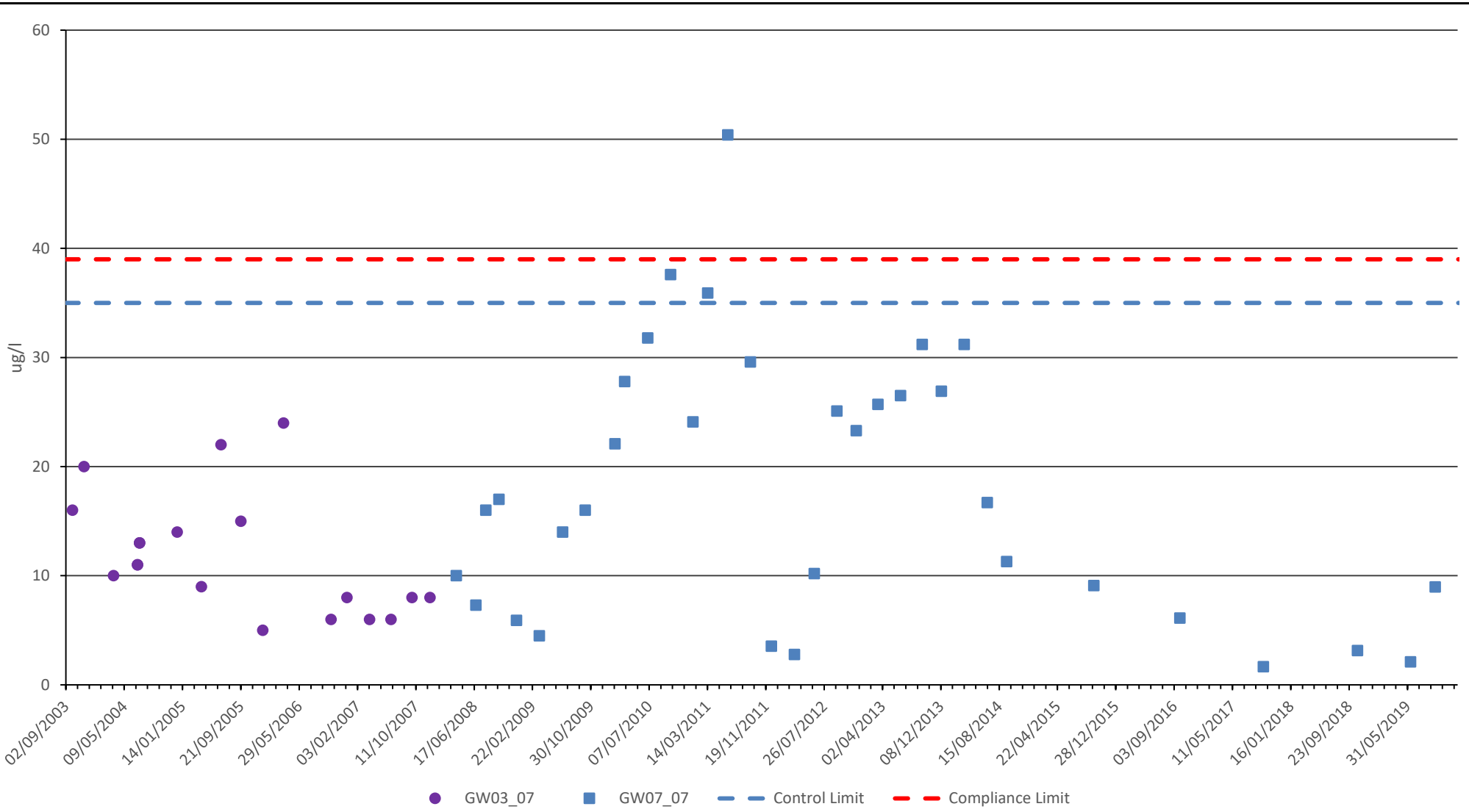
**Arsenic in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NH |
| Checked | VKR |

**Appendix**

**2-5**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-5 Arsenic GW0305.xlsm]Summary

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**Docksway Disposal Site**

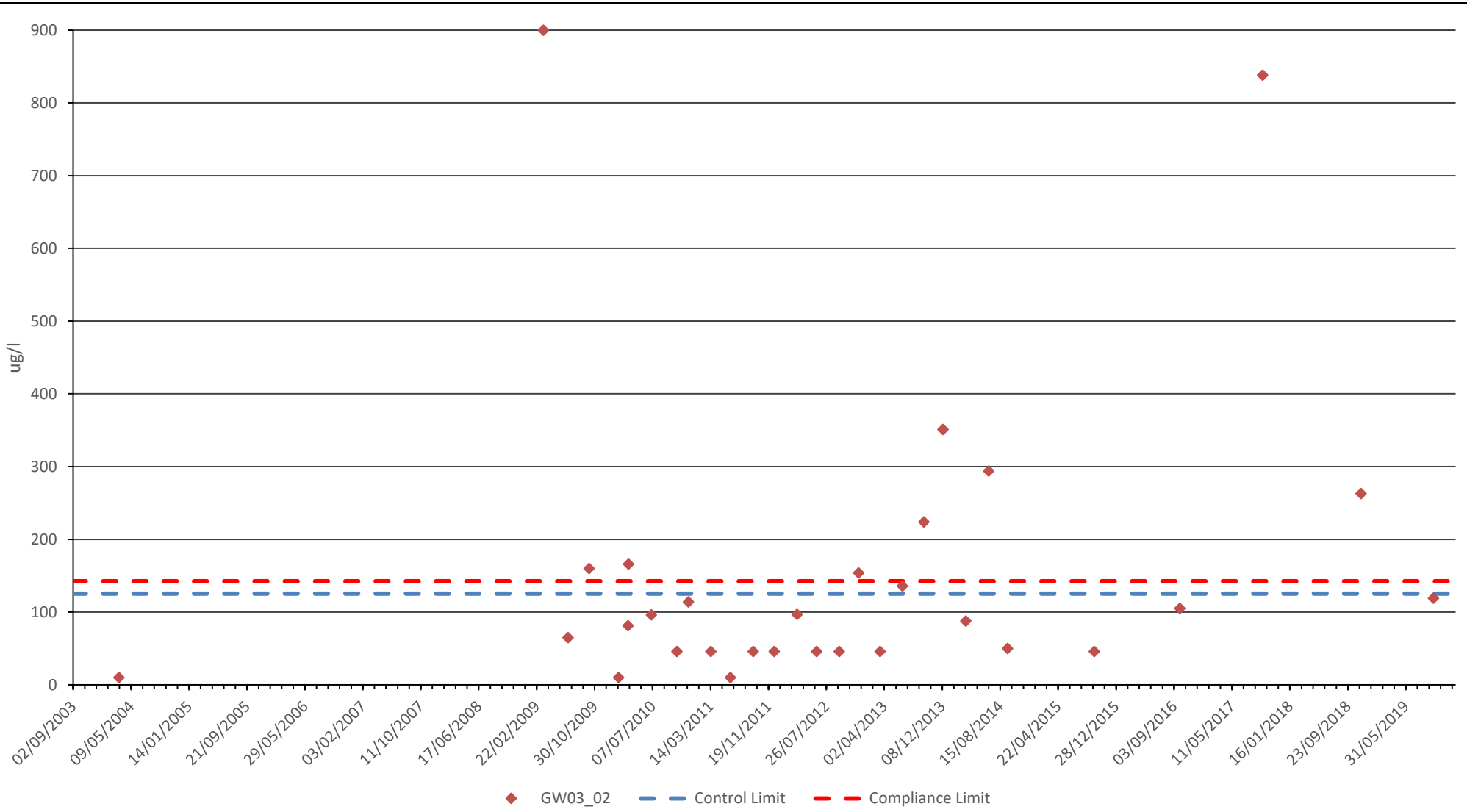
**Arsenic in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-6**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-6 Arsenic GW03_03 GW03_07.xlsm]Summary

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**Docksway Disposal Site**

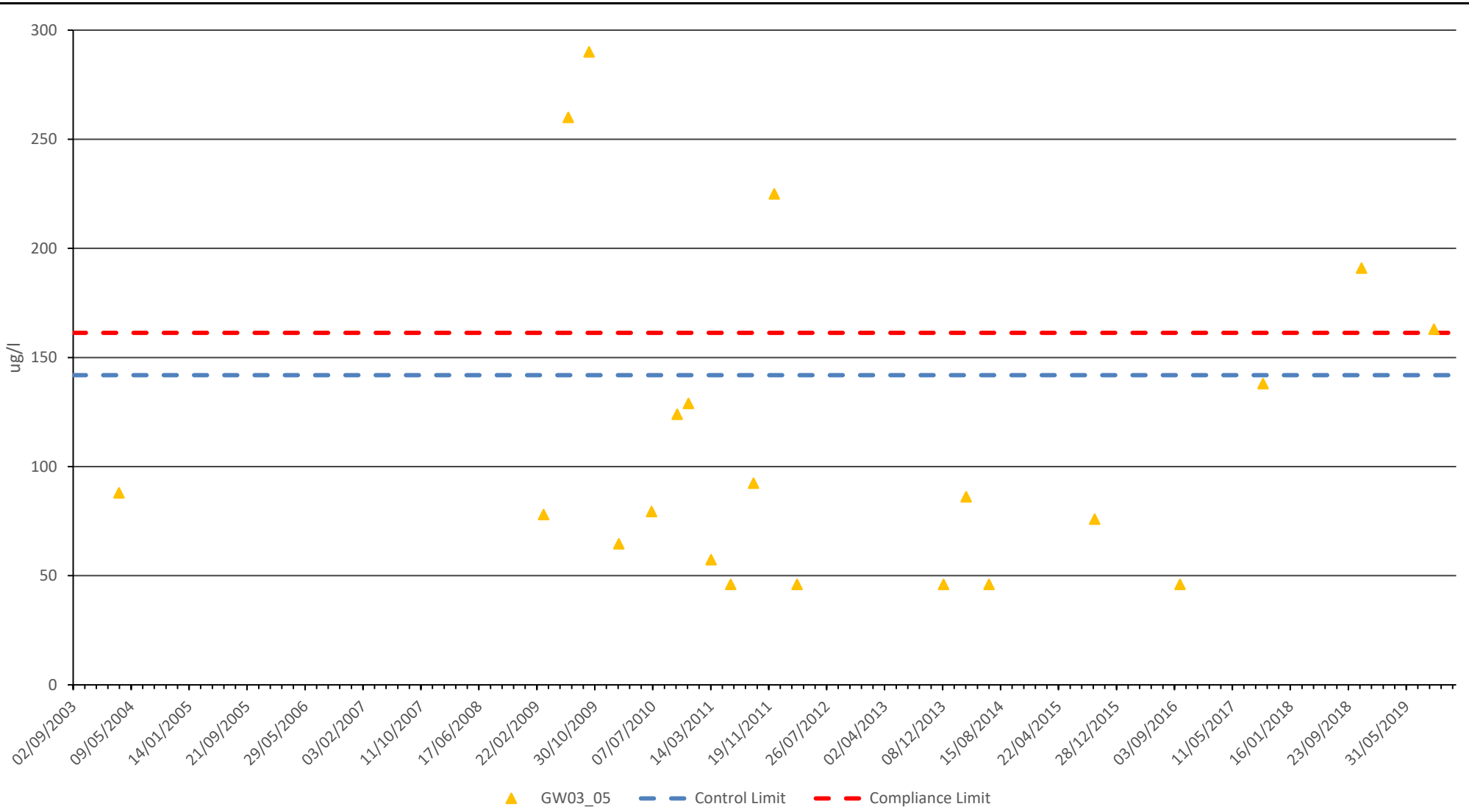
**EPH in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-7**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-7 EPH.xlsm]Summary

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**Docksway Disposal Site**

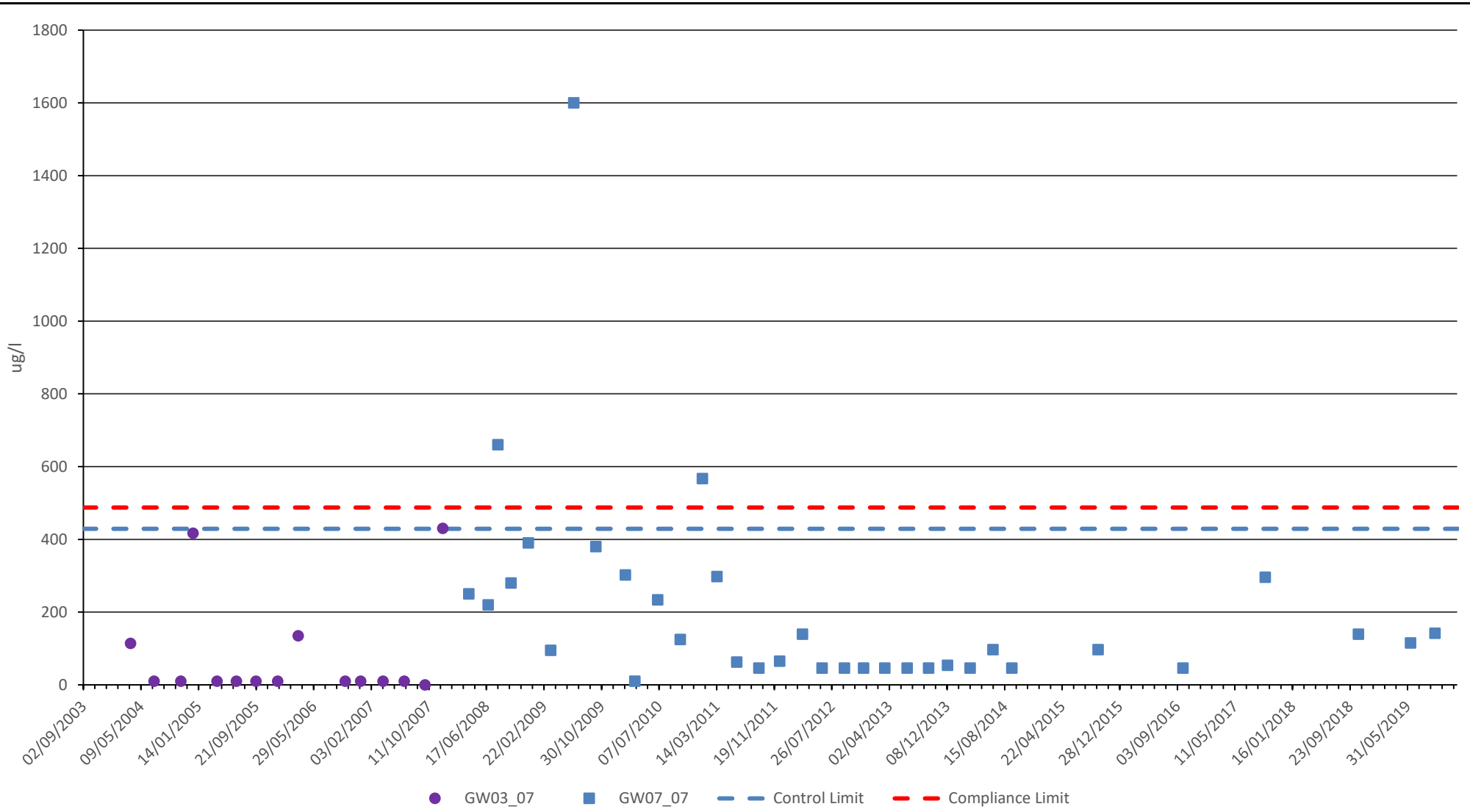
**EPH in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-8**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-8 EPH.xlsm]Summary

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**Docksway Disposal Site**

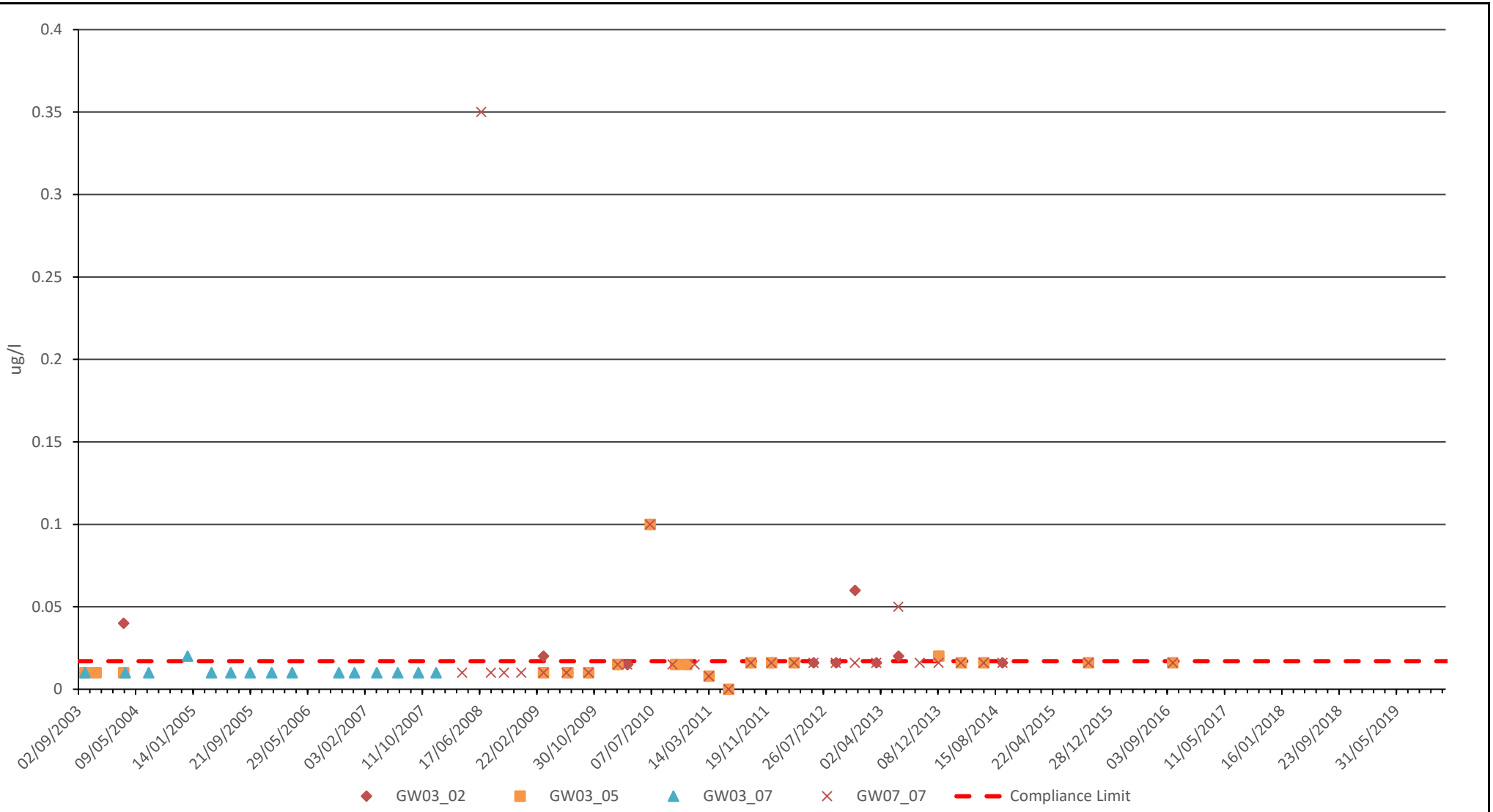
**EPH in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-9**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-9 EPH.xlsm]Summary

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**Docksway Disposal Site**

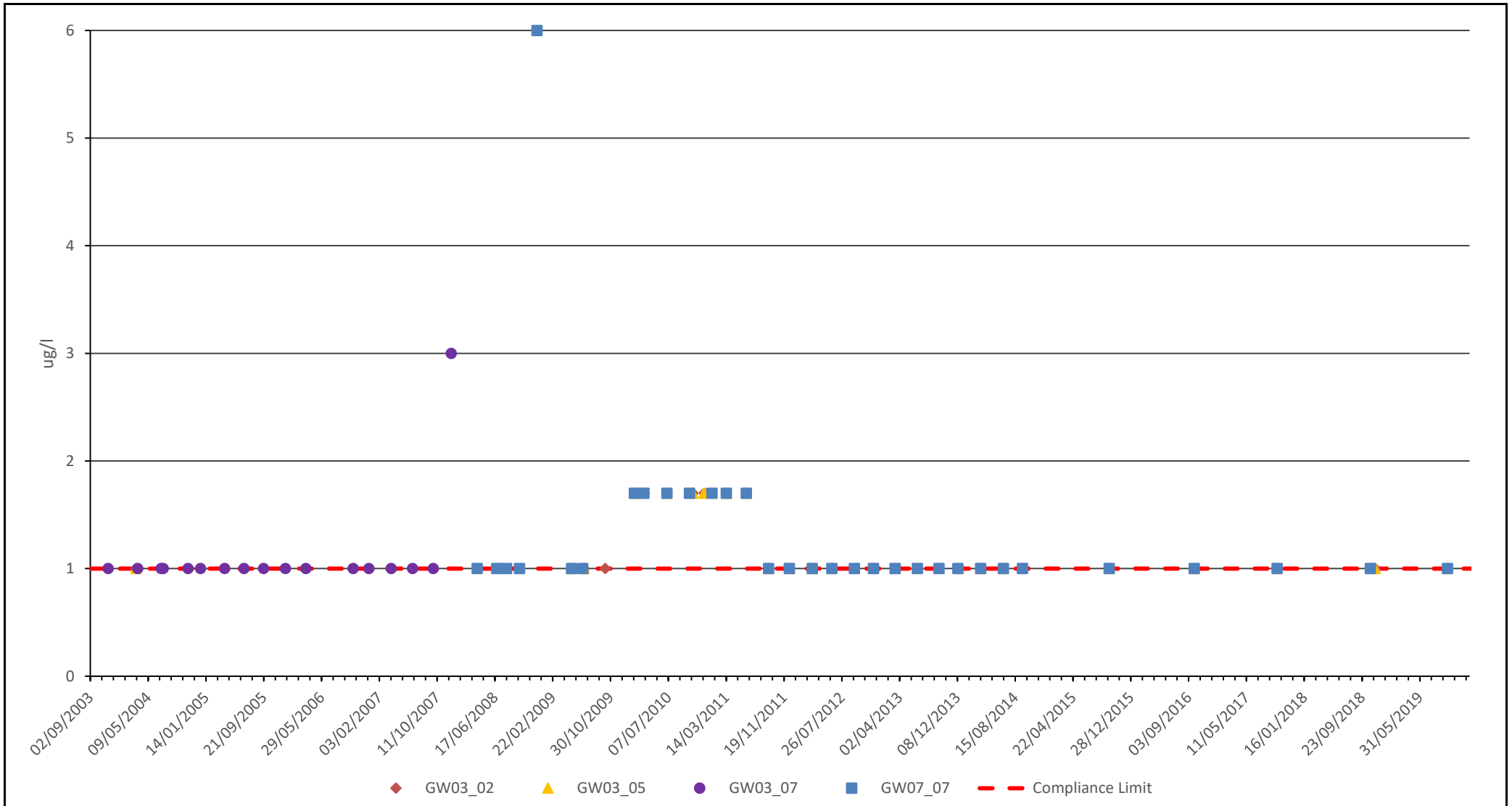
**Total Phenols in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-10**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-10 Phenols.xlsm]Summary

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**Docksway Disposal Site**

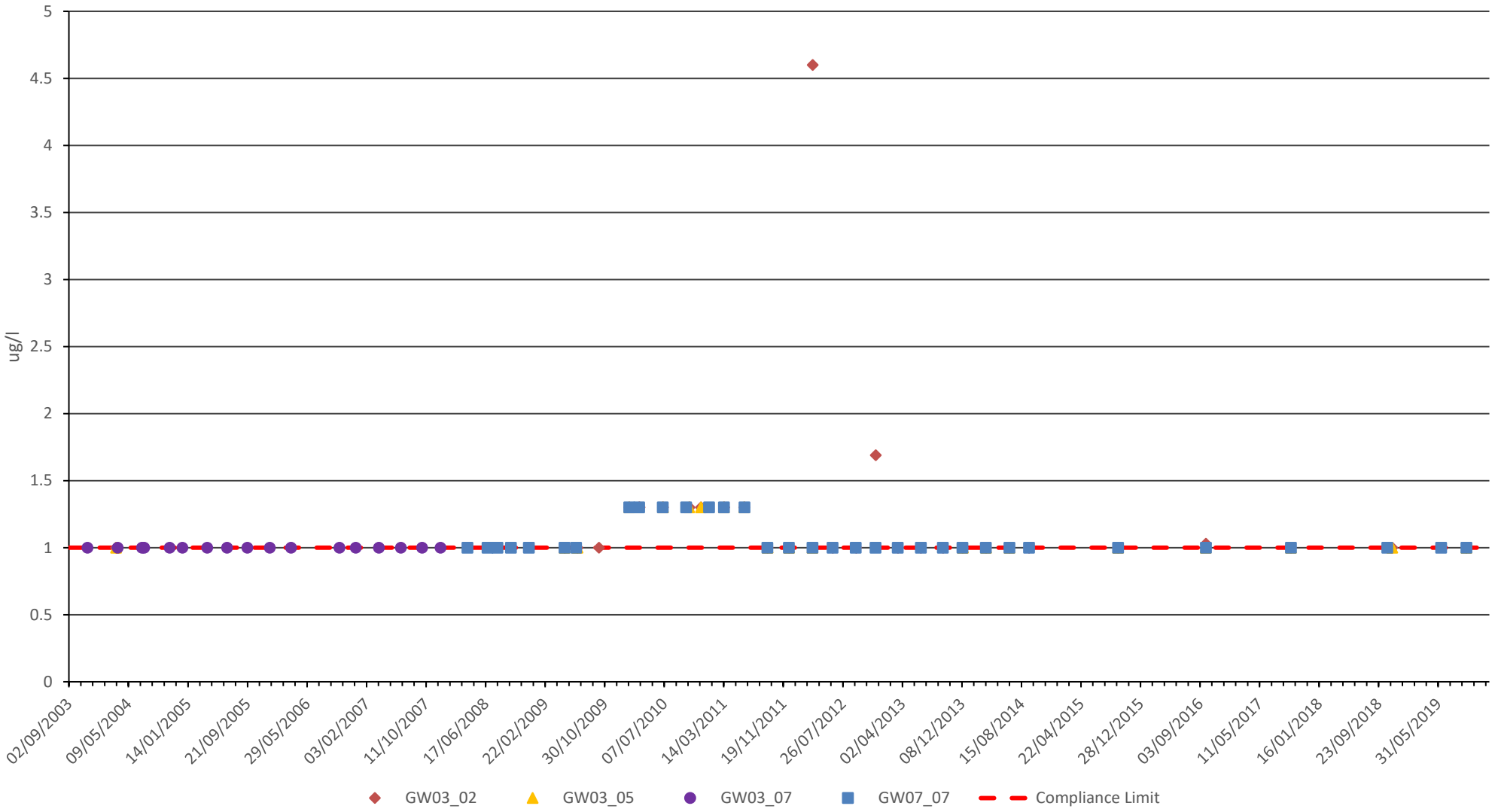
**Xylene in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-11**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-11 o-Xylene.xlsm]Summary

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**Docksway Disposal Site**

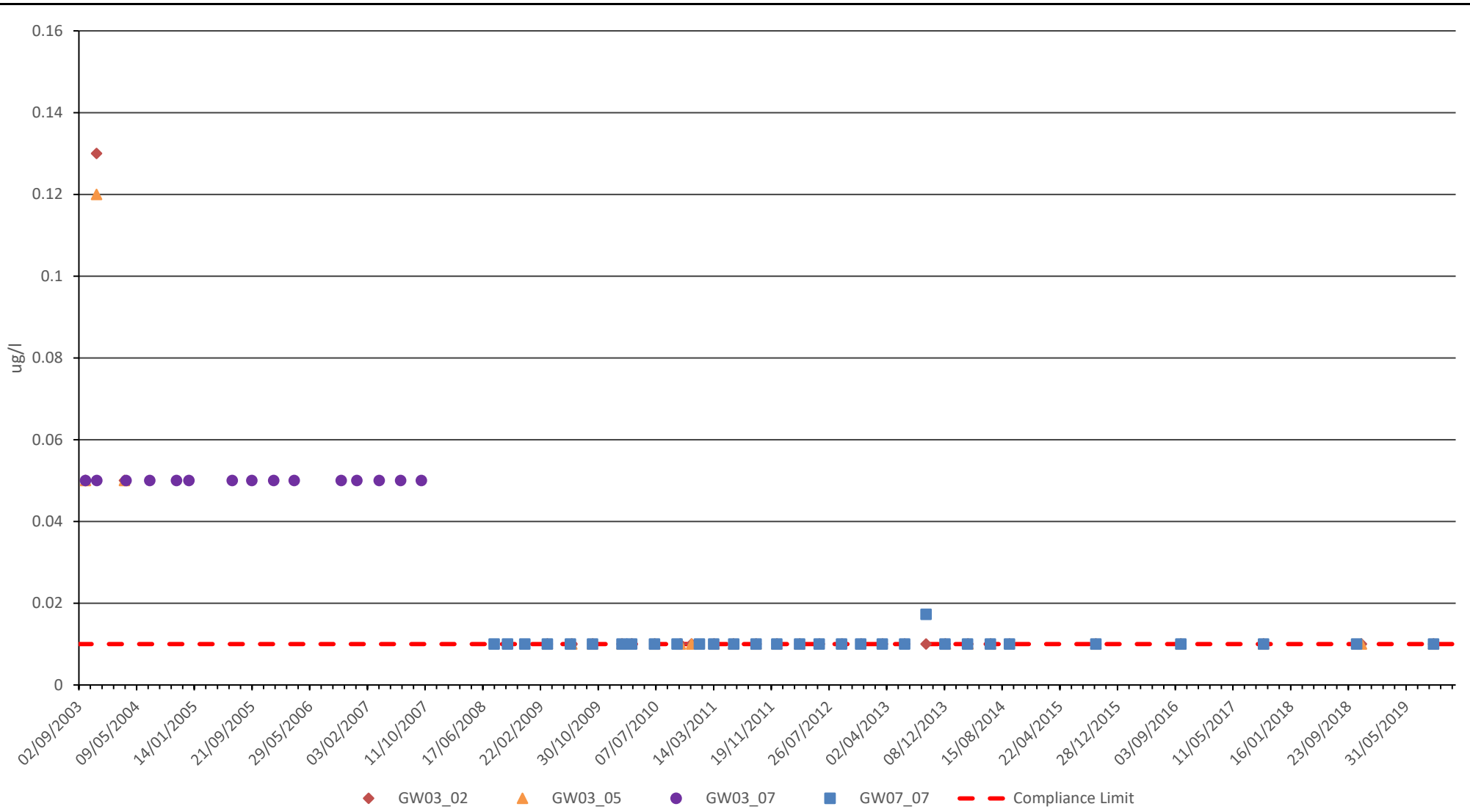
**Benzene in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-12**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-12 Benzene .xlsm]Summary

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**Docksway Disposal Site**

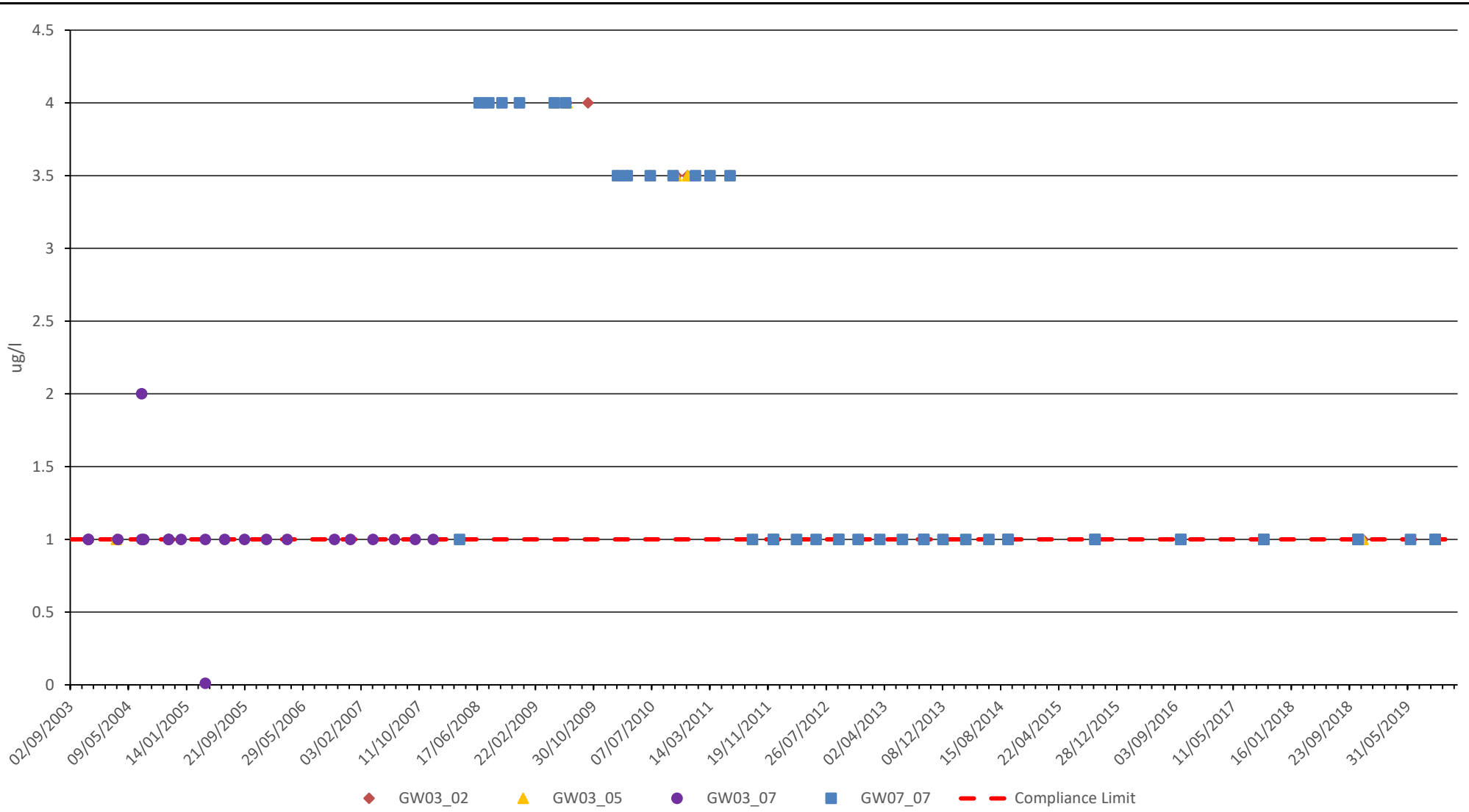
**Mercury in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-13**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-13 Mercury.xlsm]Summary

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**Docksway Disposal Site**

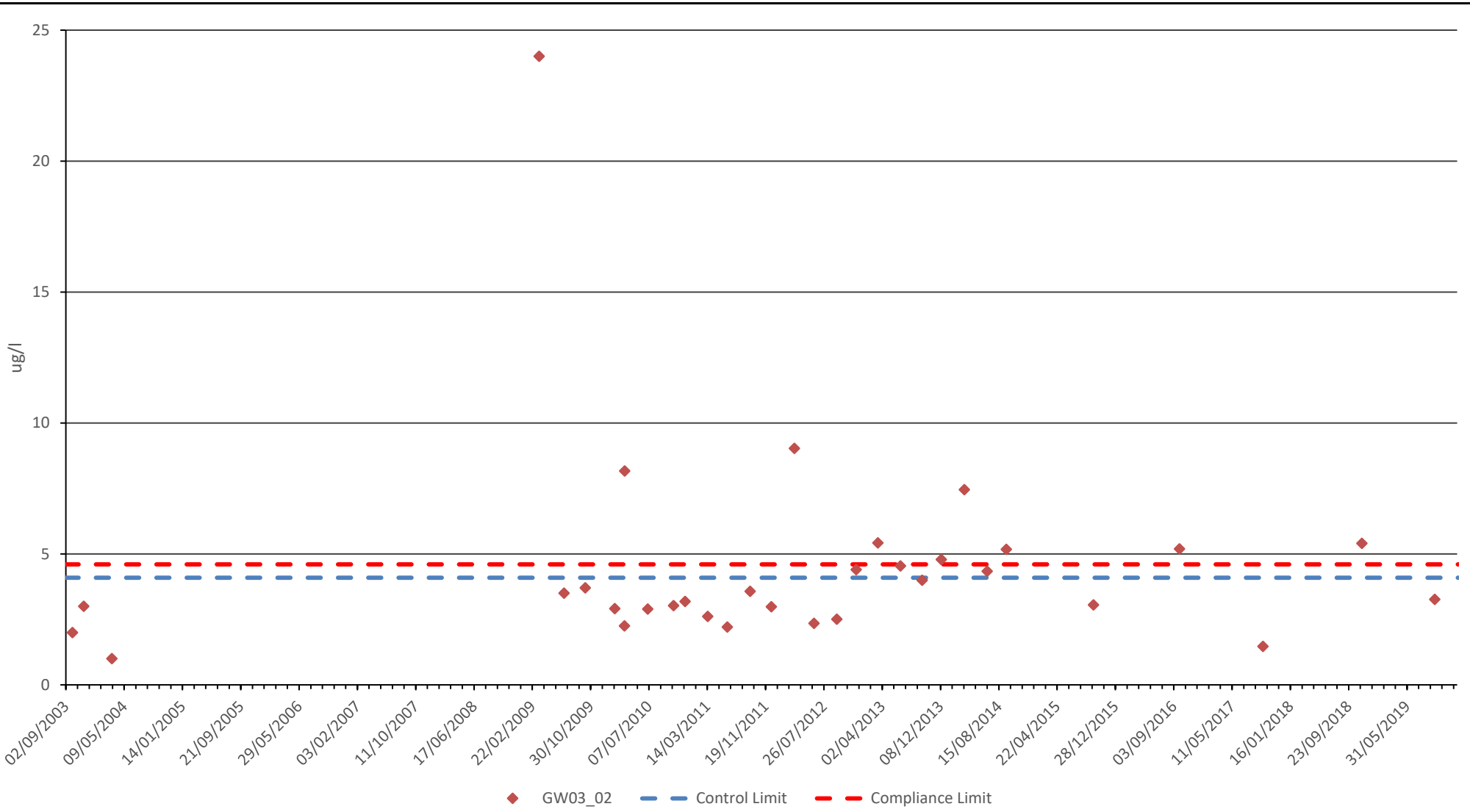
**Napthalene in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-14**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-14 Naphthalene.xlsm]Summary

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**Docksway Disposal Site**

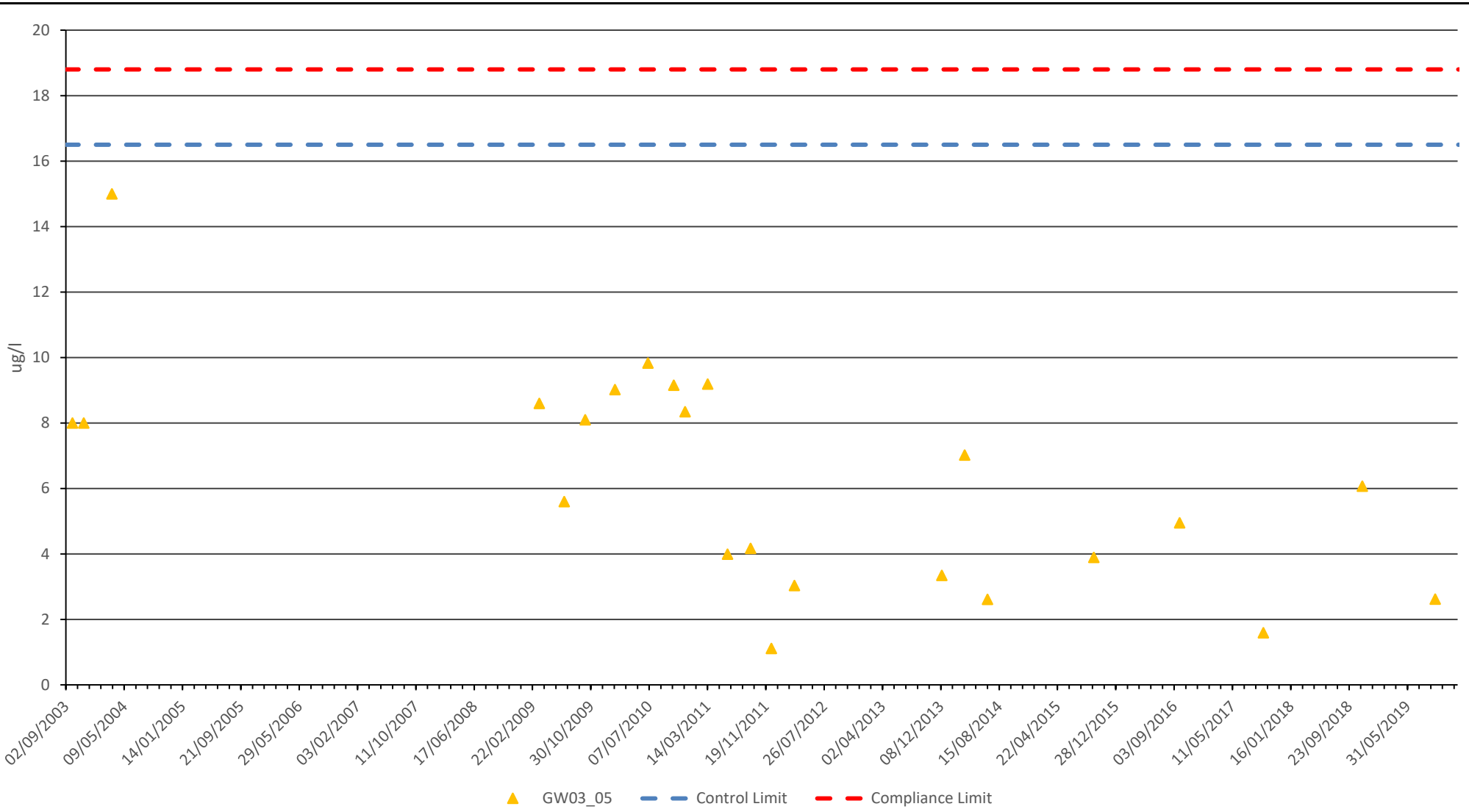
**Nickel in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-15**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-15 Nickel.xlsm]Summary

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**Docksway Disposal Site**

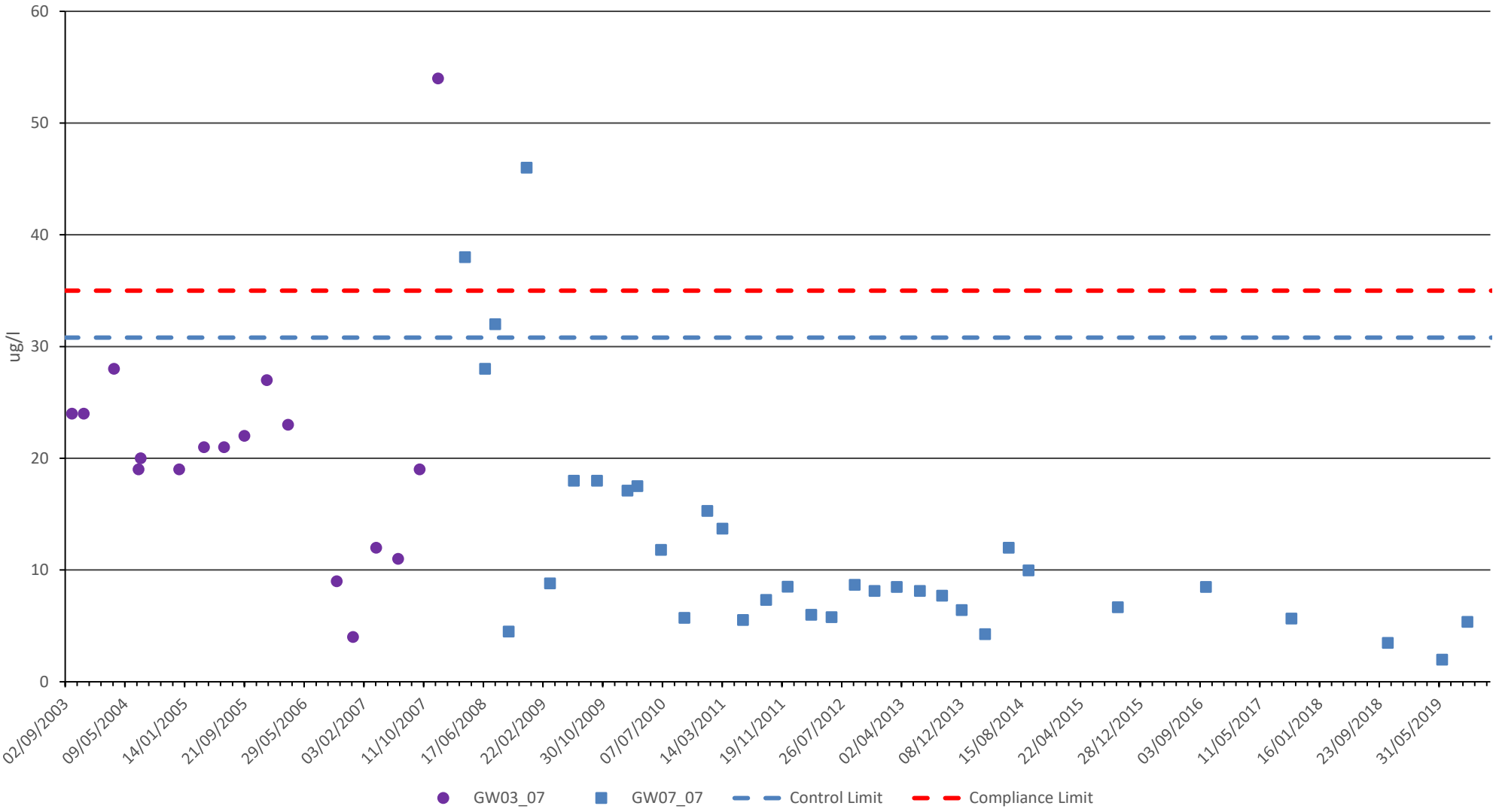
**Nickel in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-16**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-16 Nickel.xlsm]Summary

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**Docksway Disposal Site**

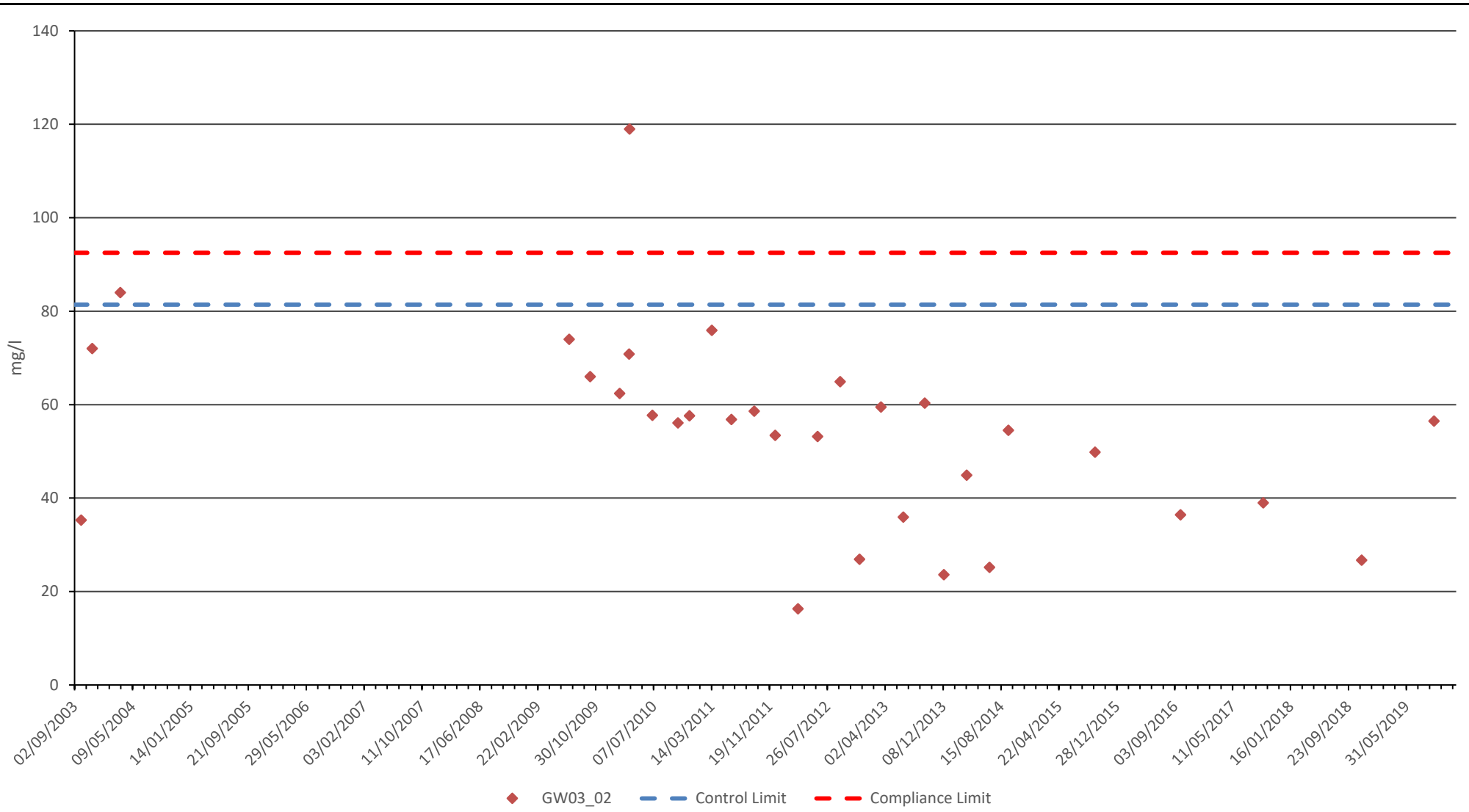
**Nickel in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-17**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-17 Nickel.xlsm]Summary

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**Docksway Disposal Site**

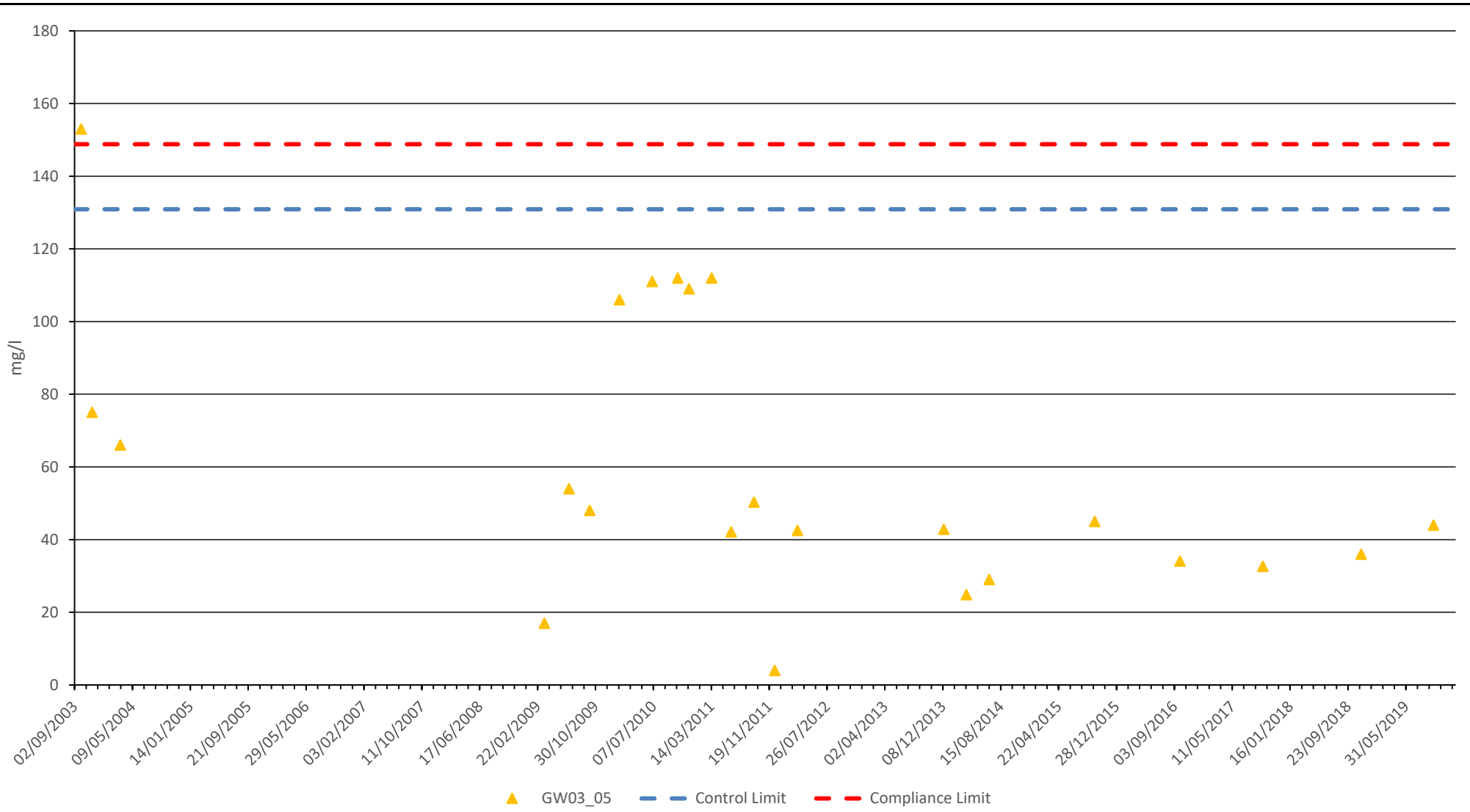
**Potassium in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-18**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-18 Potassium.xlsm]Summary

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**Docksway Disposal Site**

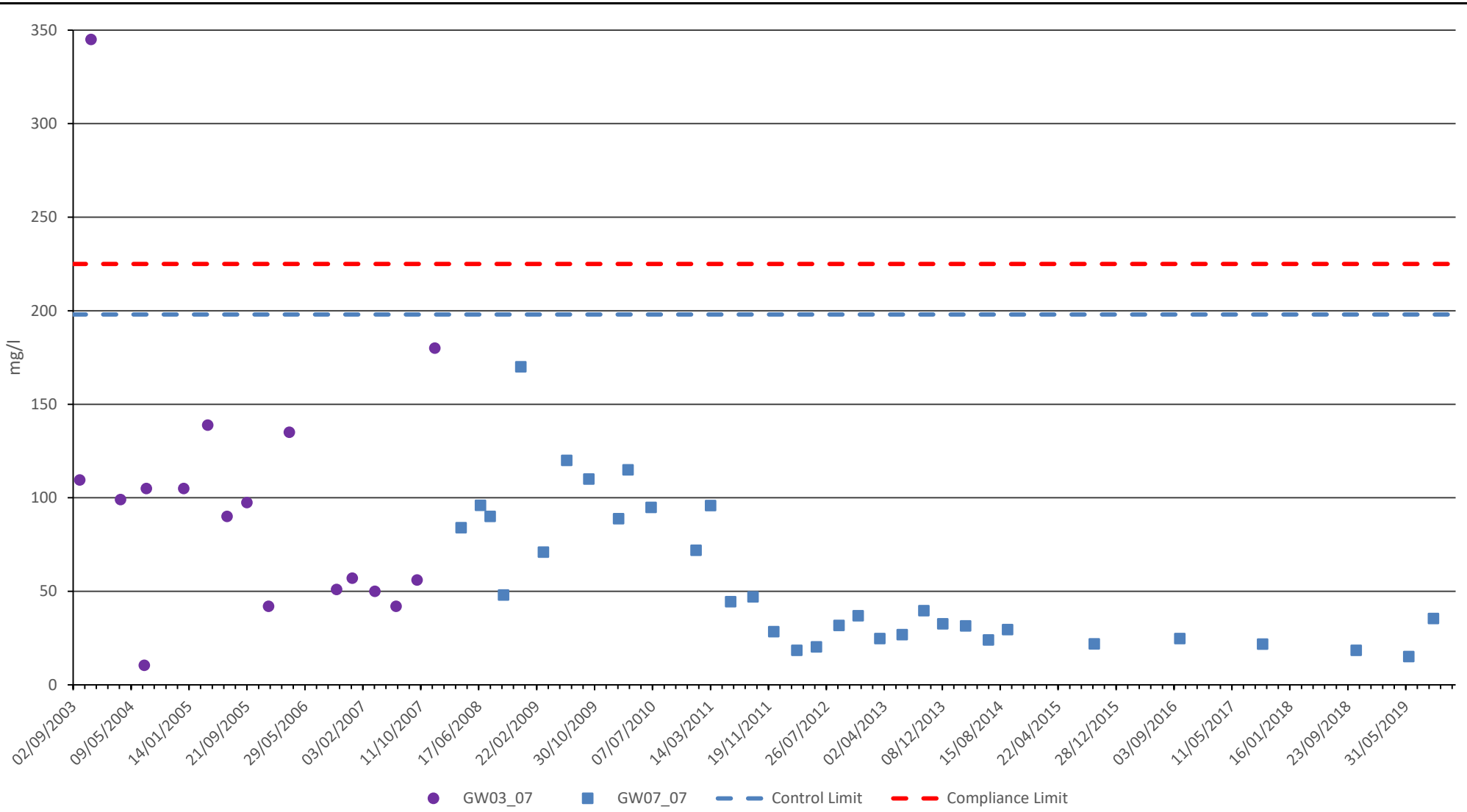
**Potassium in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-19**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-19 Potassium.xlsm]Summary

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**Newport City Council**

**Docksway Disposal Site**

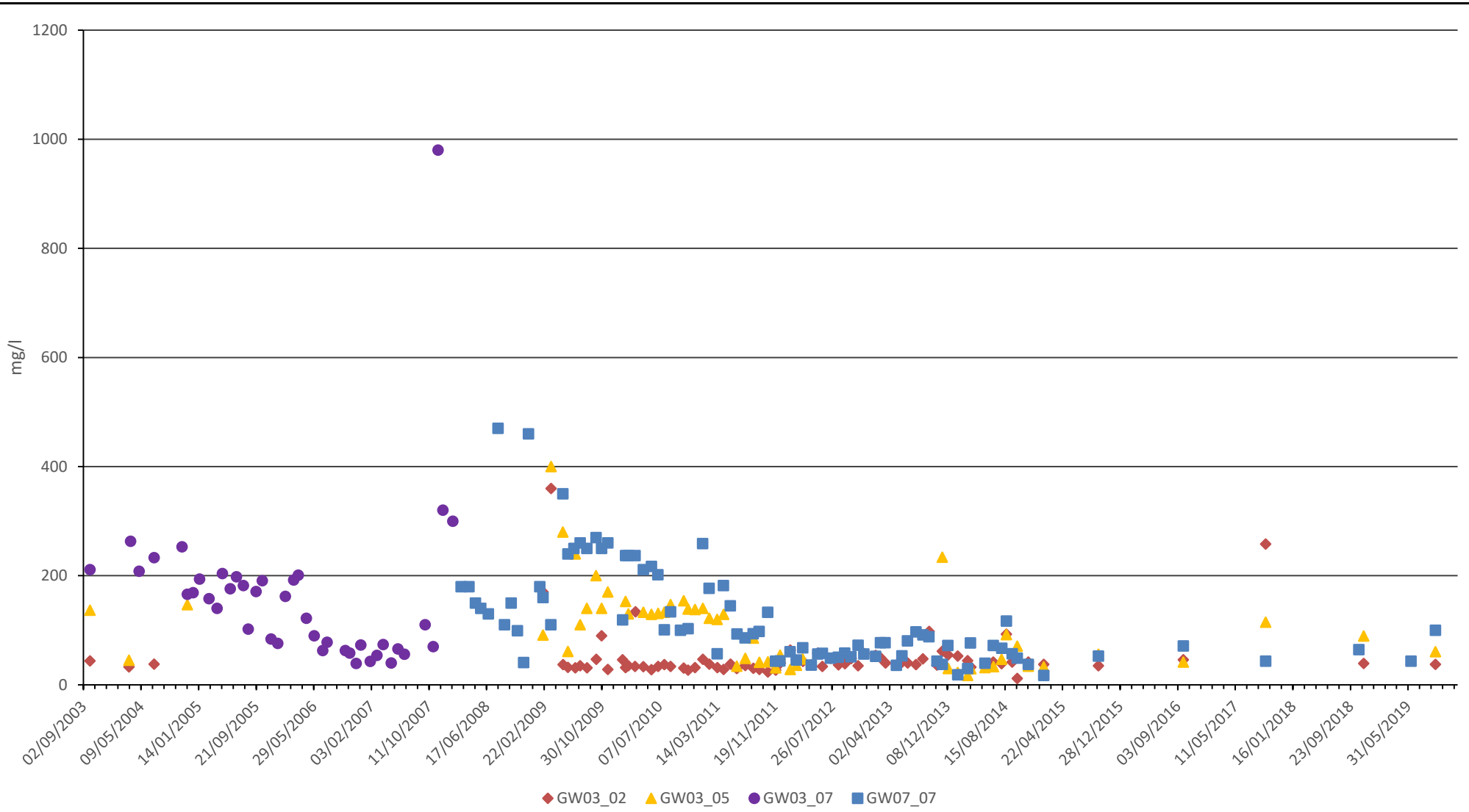
**Potassium in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-20**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-20 Potassium.xlsm]Summary

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**Docksway Disposal Site**

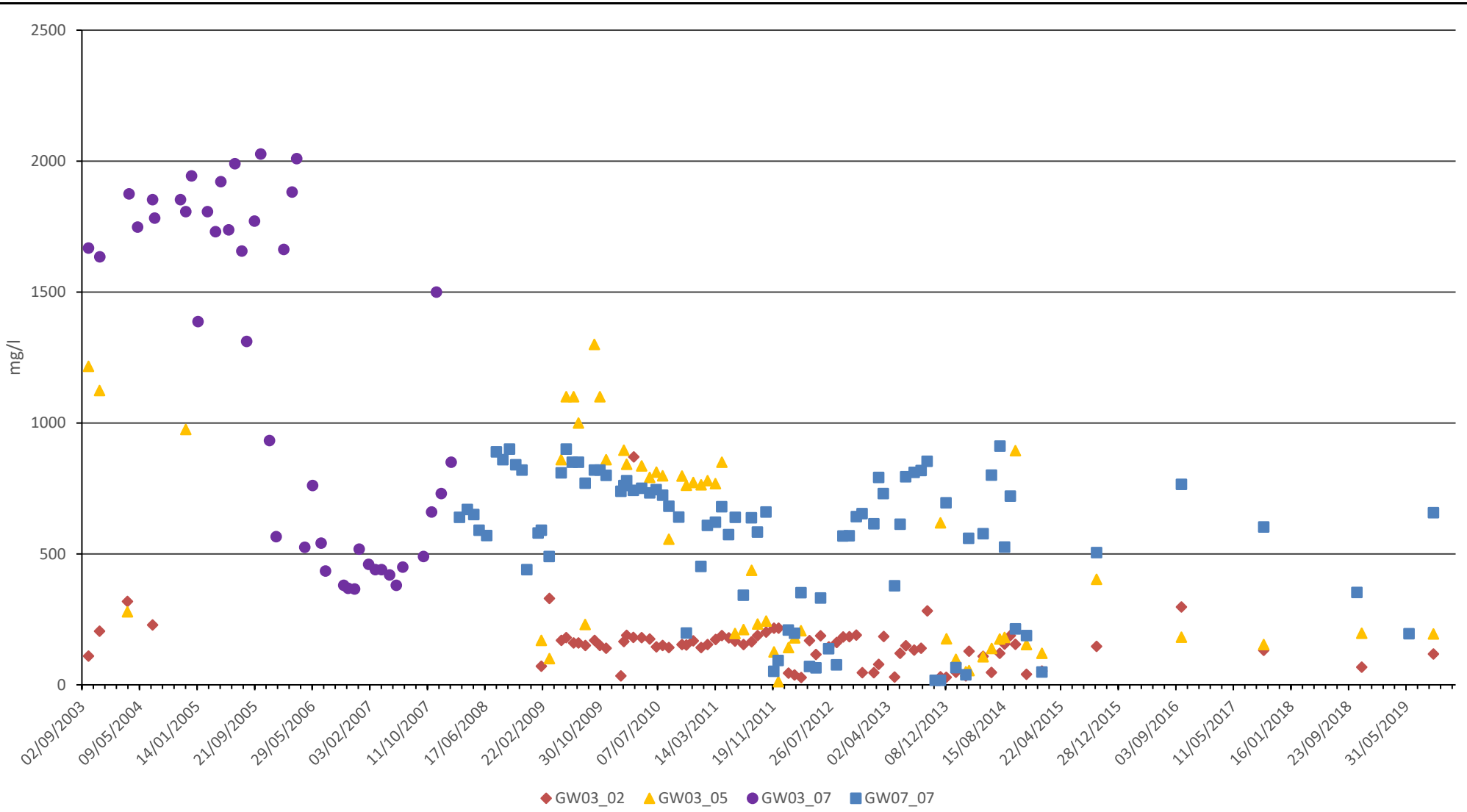
**Chemical Oxygen Demand in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-21**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-21 Chemical Oxygen Demand.xlsm]Summary

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**Docksway Disposal Site**

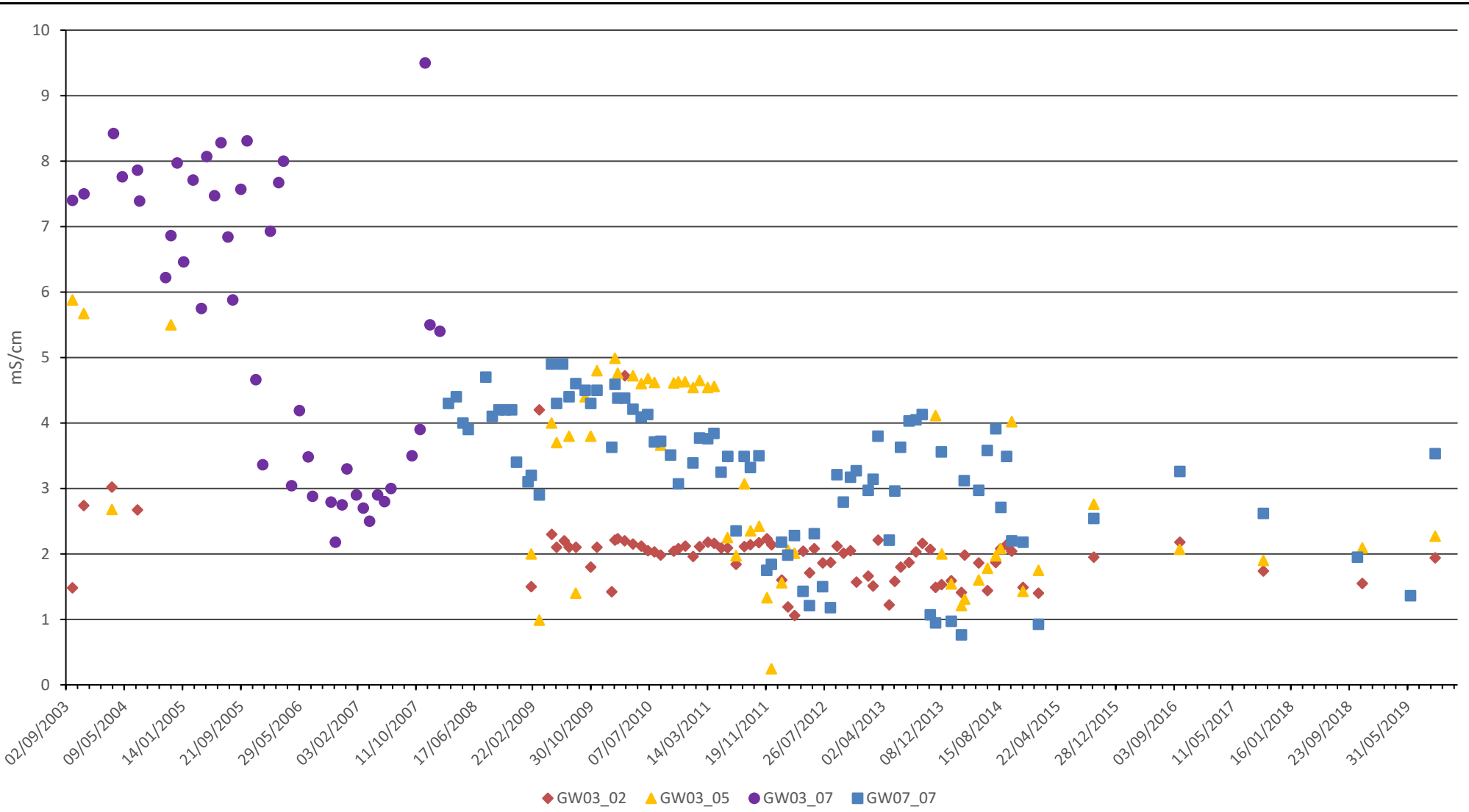
**Chloride in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-22**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-22 Chloride.xlsm]Summary

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**Docksway Disposal Site**

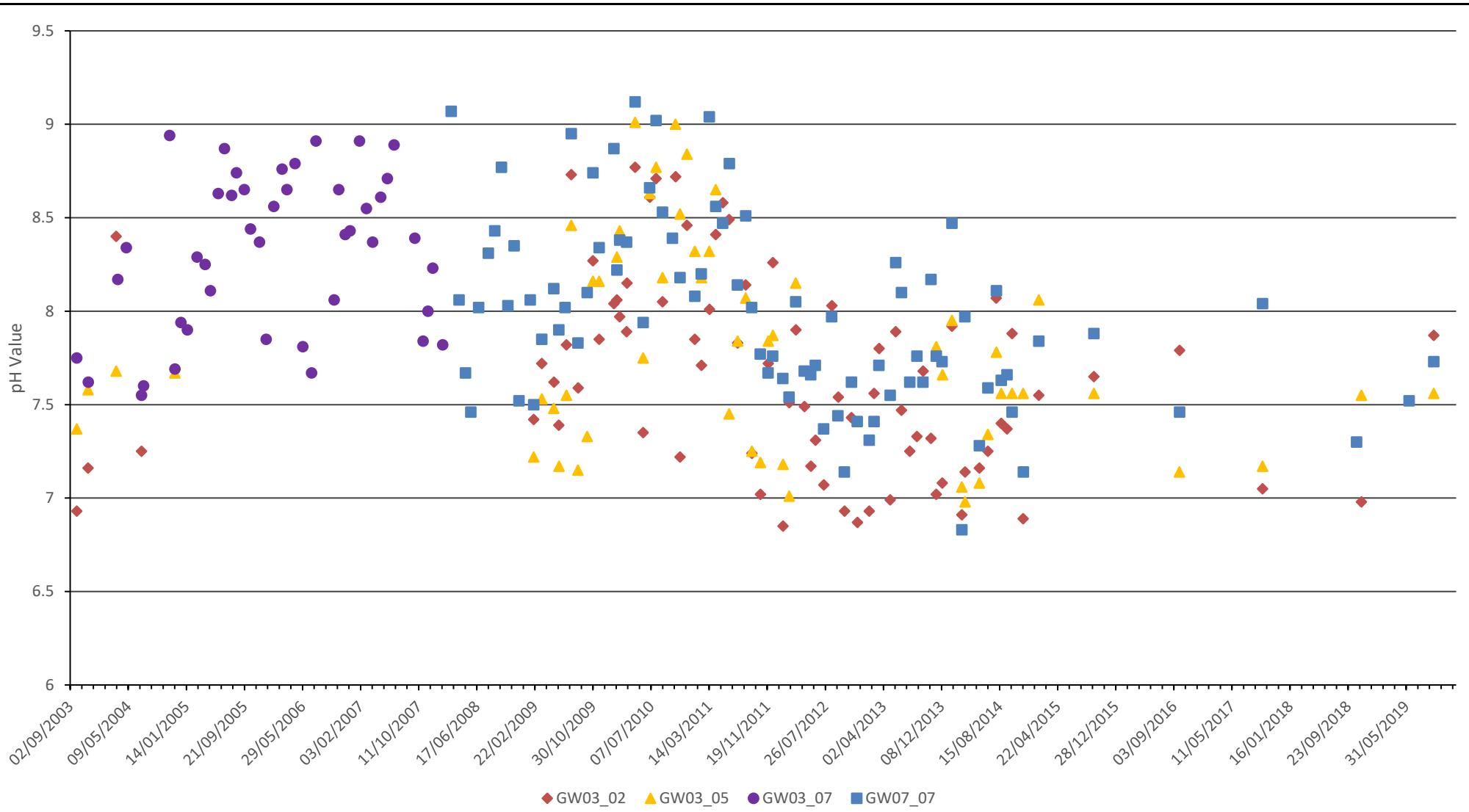
**Electrical Conductivity in Groundwater**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-23**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-23 EC.xlsm]Summary

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**Docksway Disposal Site**

**pH in Groundwater**

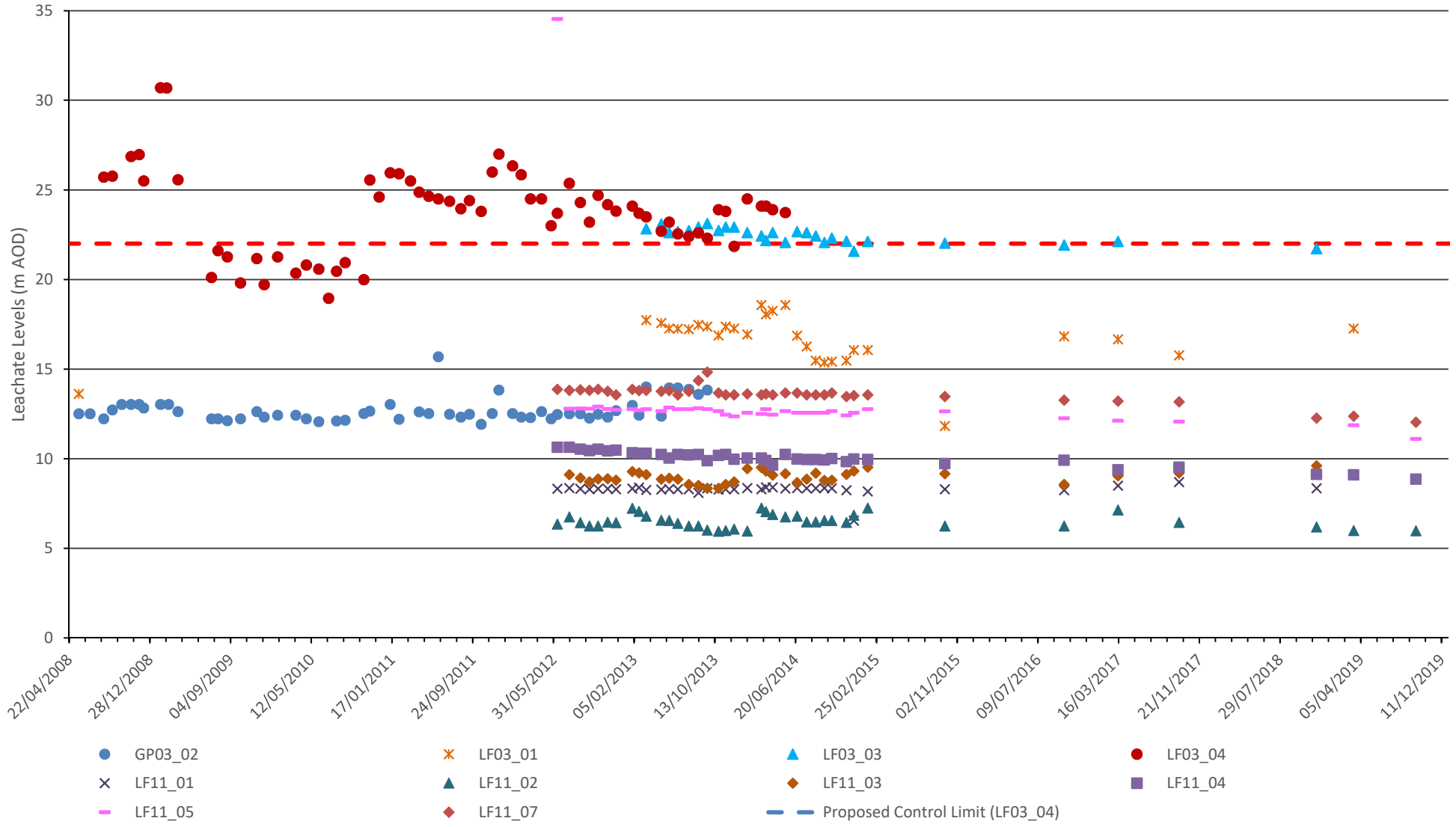
| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | NC |
| Checked | VKR |

**Appendix**

**2-24**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 2 - Groundwater\[2-24 pH.xlsm]Summary

# Appendix 3 Leachate Graphs

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**Docksway Disposal Site**

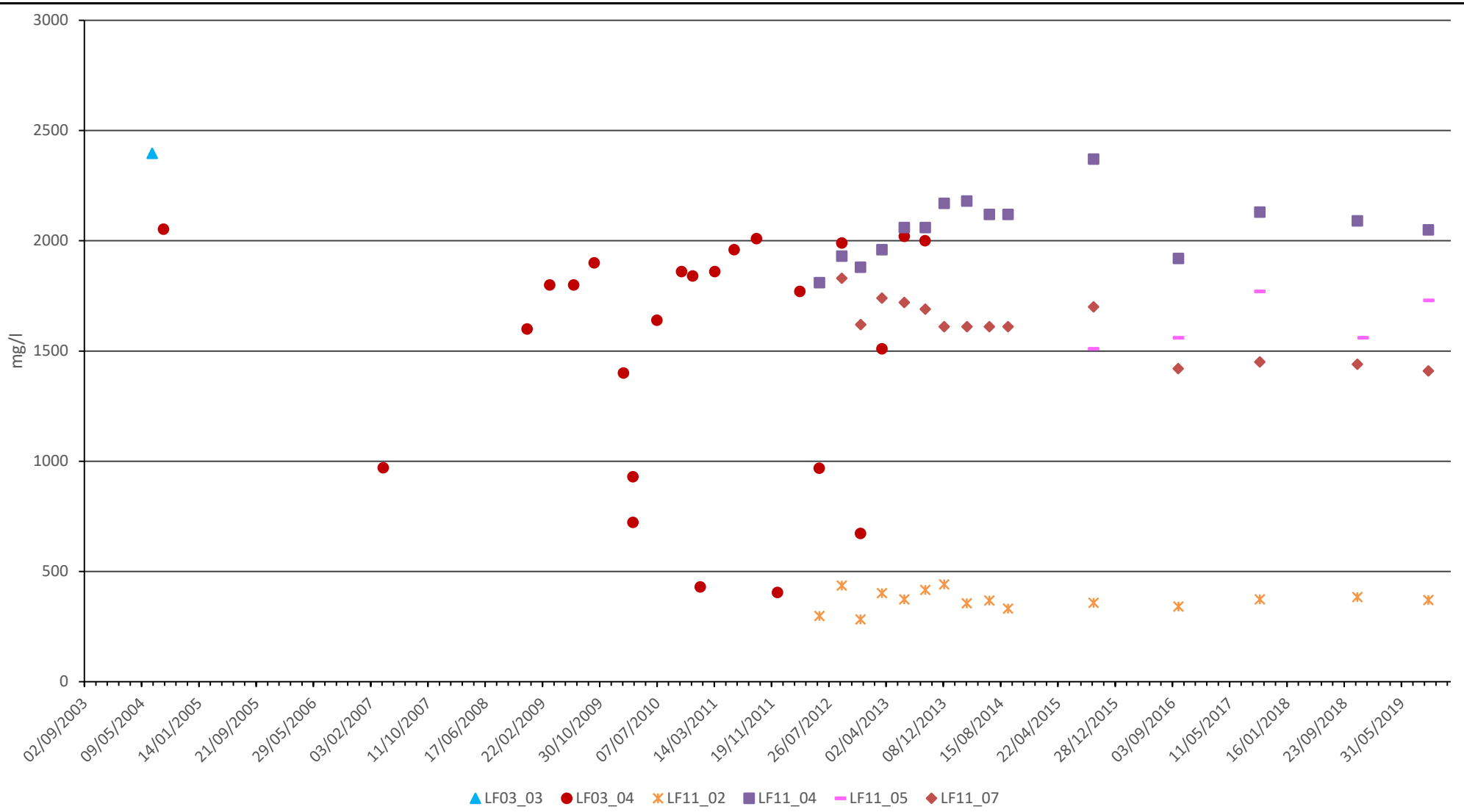
**Leachate Levels at Area 1**

| | |
|---|---|
| Date | February 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-1**

J:\14739\3547 Area 1 AEPR 2019\APER Area 1\Appendix\[Leachate Level at Area 1.xlsm]Summary

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**Docksway Disposal Site**

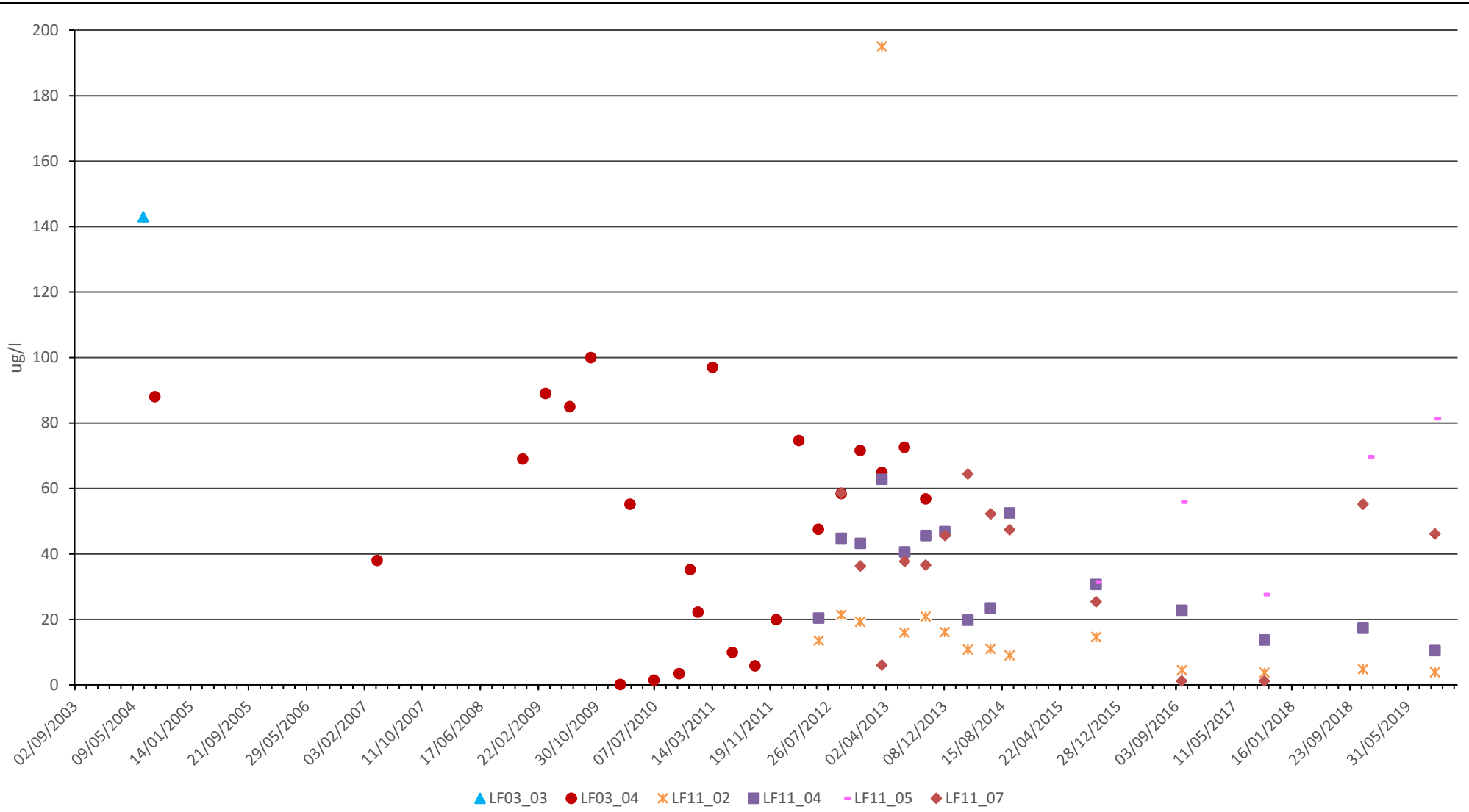
**Ammoniacal Nitrogen in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-2**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-2 Ammoniacal Nitrogen.xlsm]Summary

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**Docksway Disposal Site**

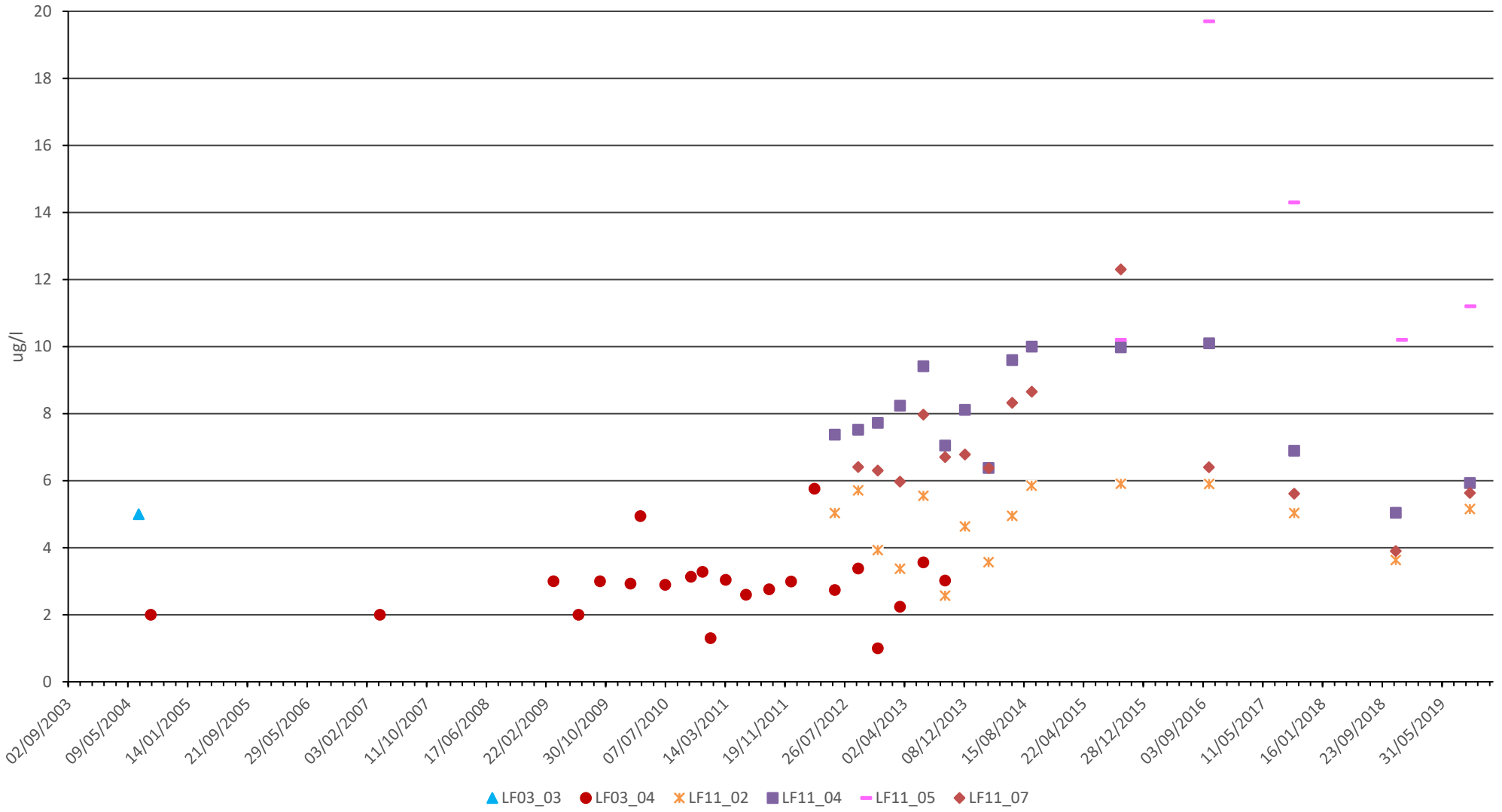
**Arsenic in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-3**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-3 Arsenic.xlsm]Summary

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**Docksway Disposal Site**

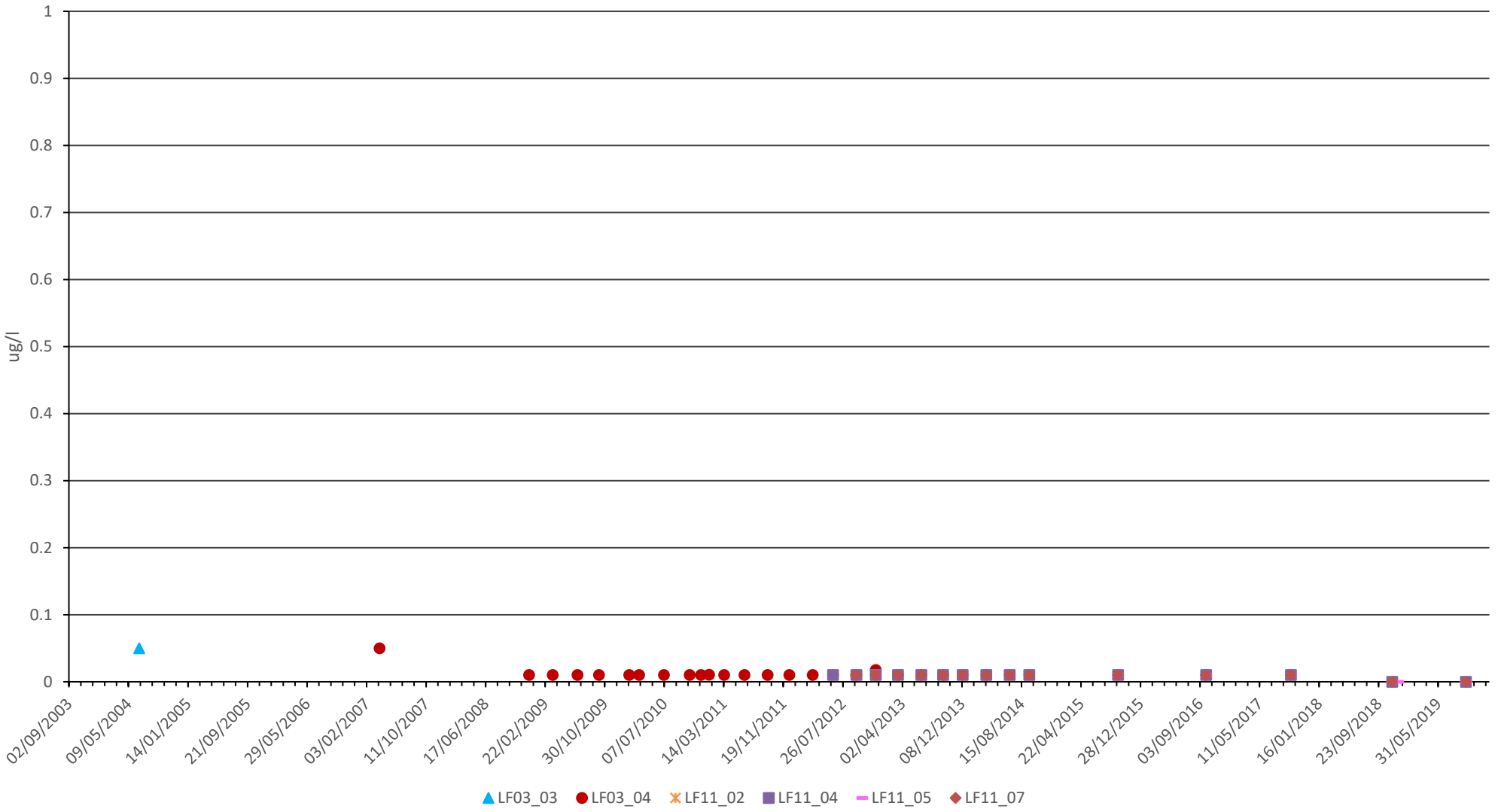
**Benzene in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-4**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-4 Benzene.xlsm]Summary

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**Docksway Disposal Site**

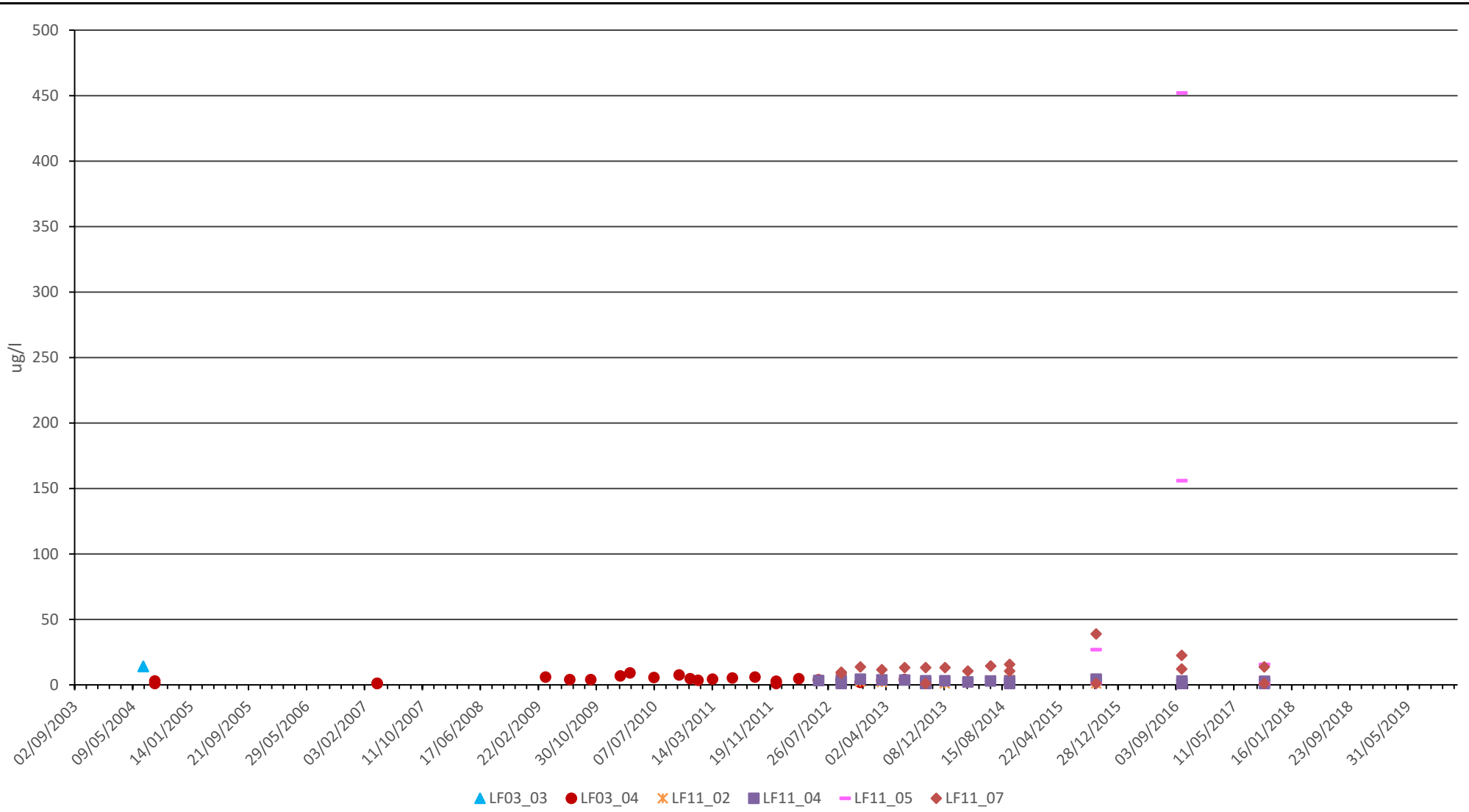
**Mercury in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-5**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-5 Mercury.xlsm]Summary

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**Docksway Disposal Site**

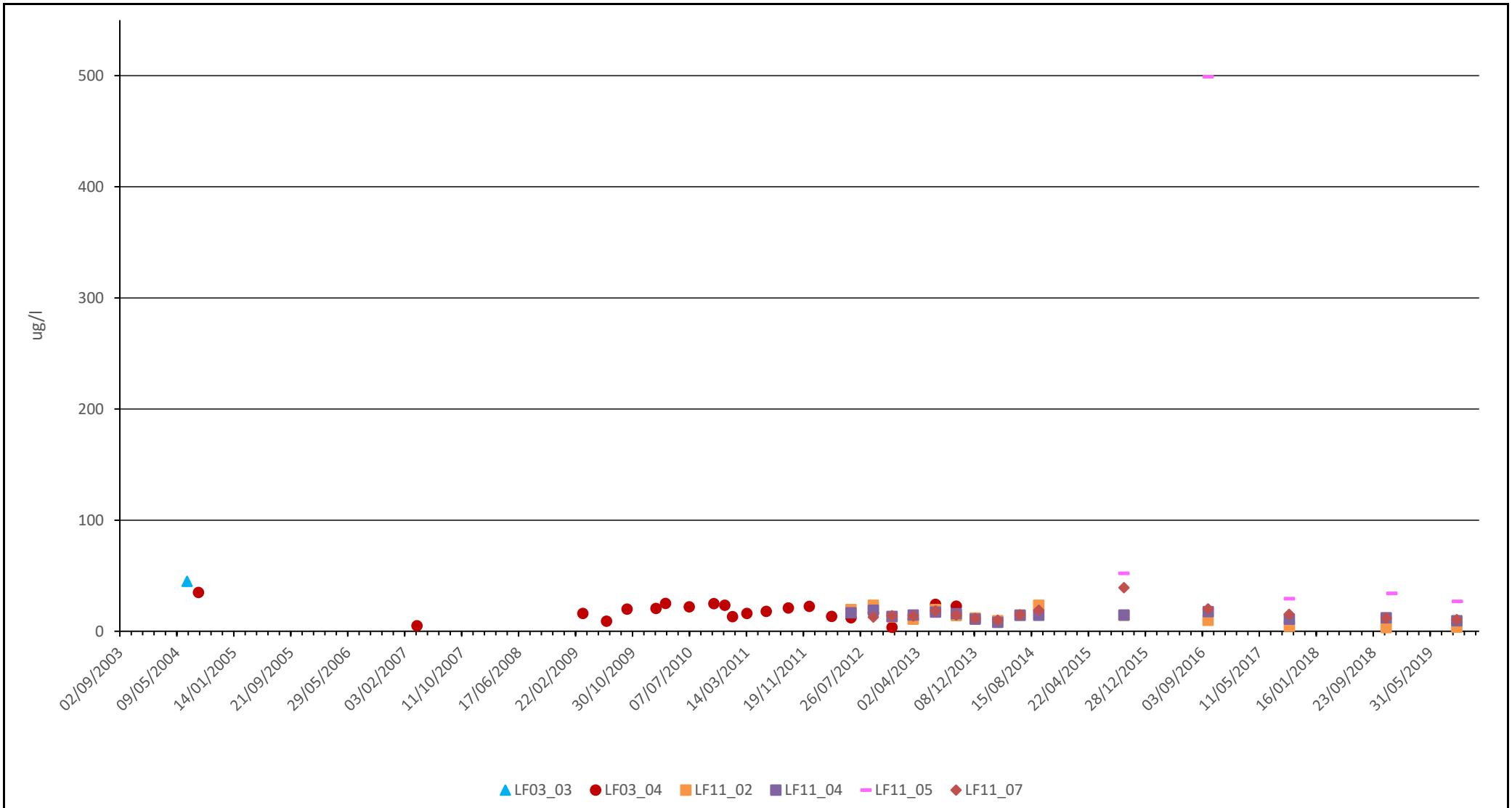
**Naphthalene in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-6**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-6 Naphthalene.xlsm]Summary




Stantec

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Client

**Newport City Council**

**Docksway Disposal Site**

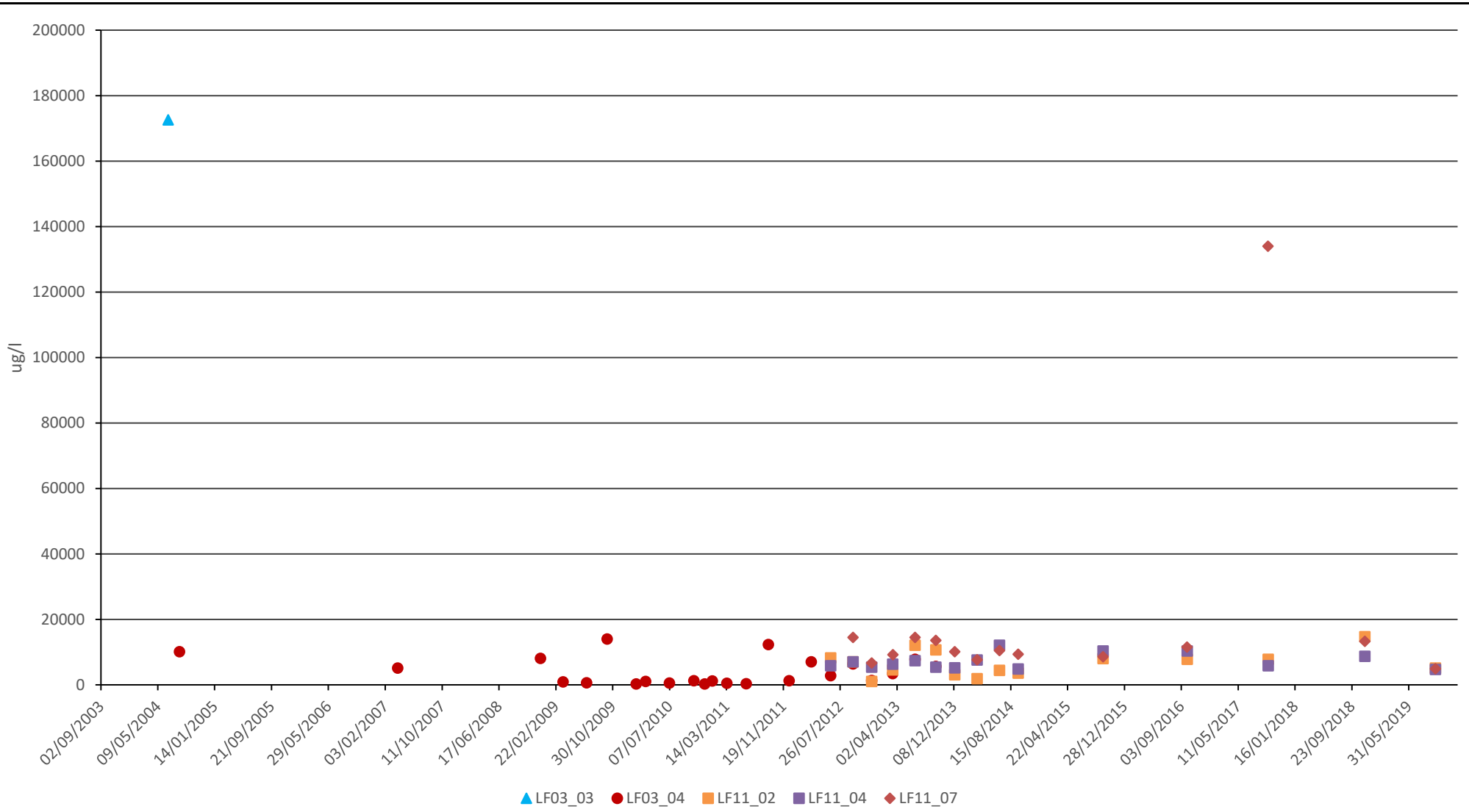
**o-Xylene in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-7**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-7 o-Xylene.xlsm]Summary

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**Newport City Council**

**Docksway Disposal Site**

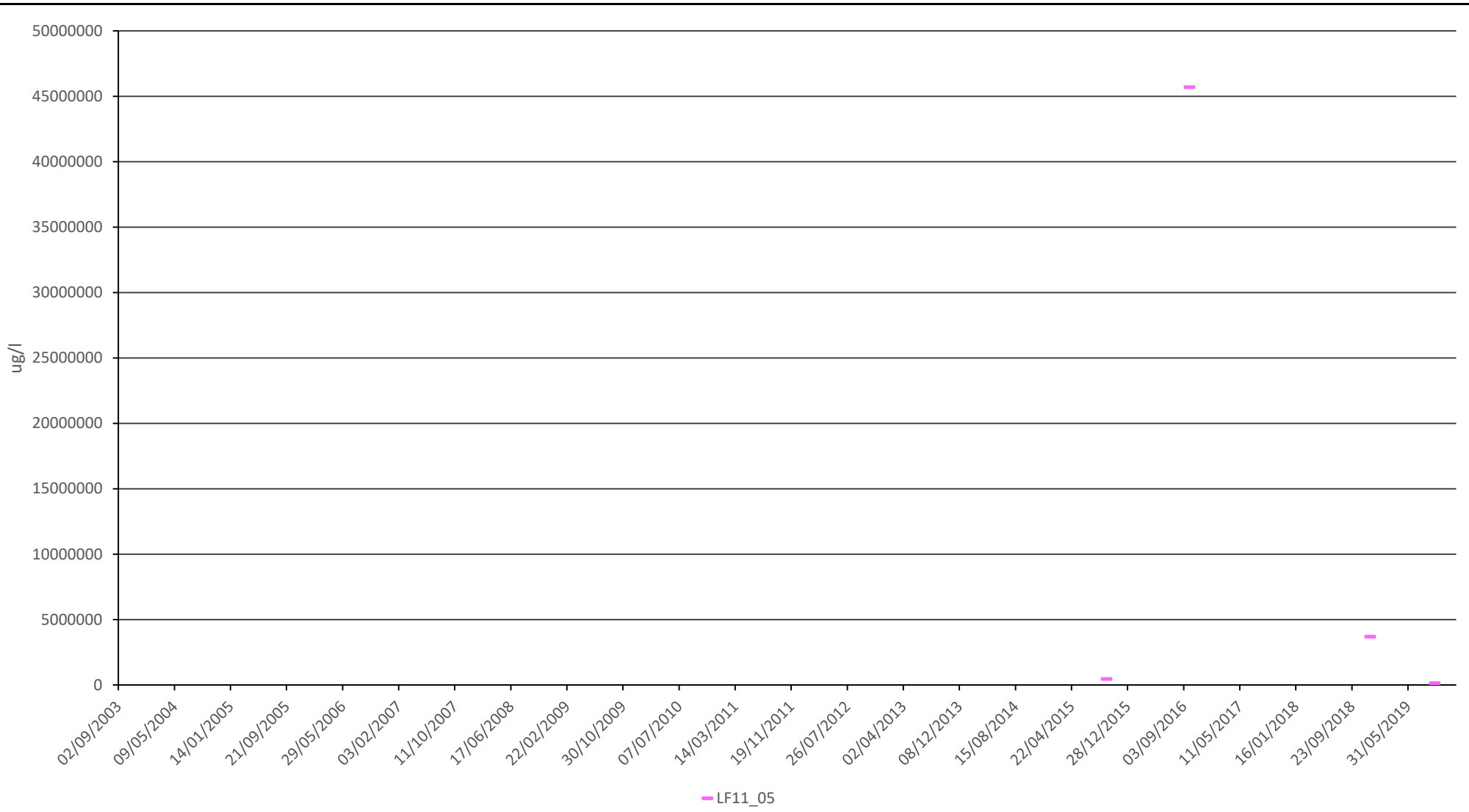
**EPH in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-8**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-8 total Diesel Range Organics.xlsm]Summary

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**Newport City Council**

**Docksway Disposal Site**

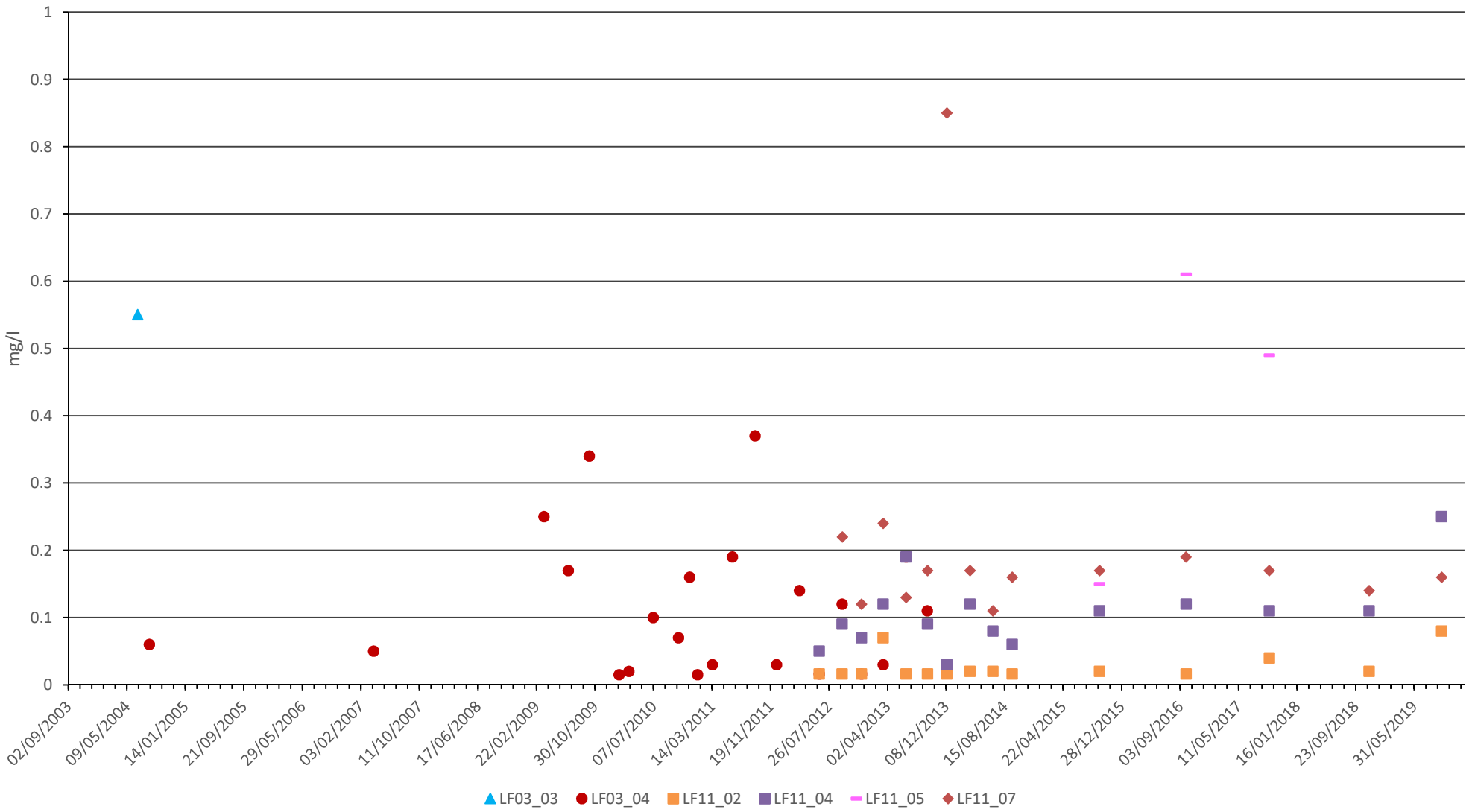
**EPH in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-9**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-9 total Diesel Range Organics LF11 05.xlsm]Summary

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Client

**Newport City Council**

**Docksway Disposal Site**

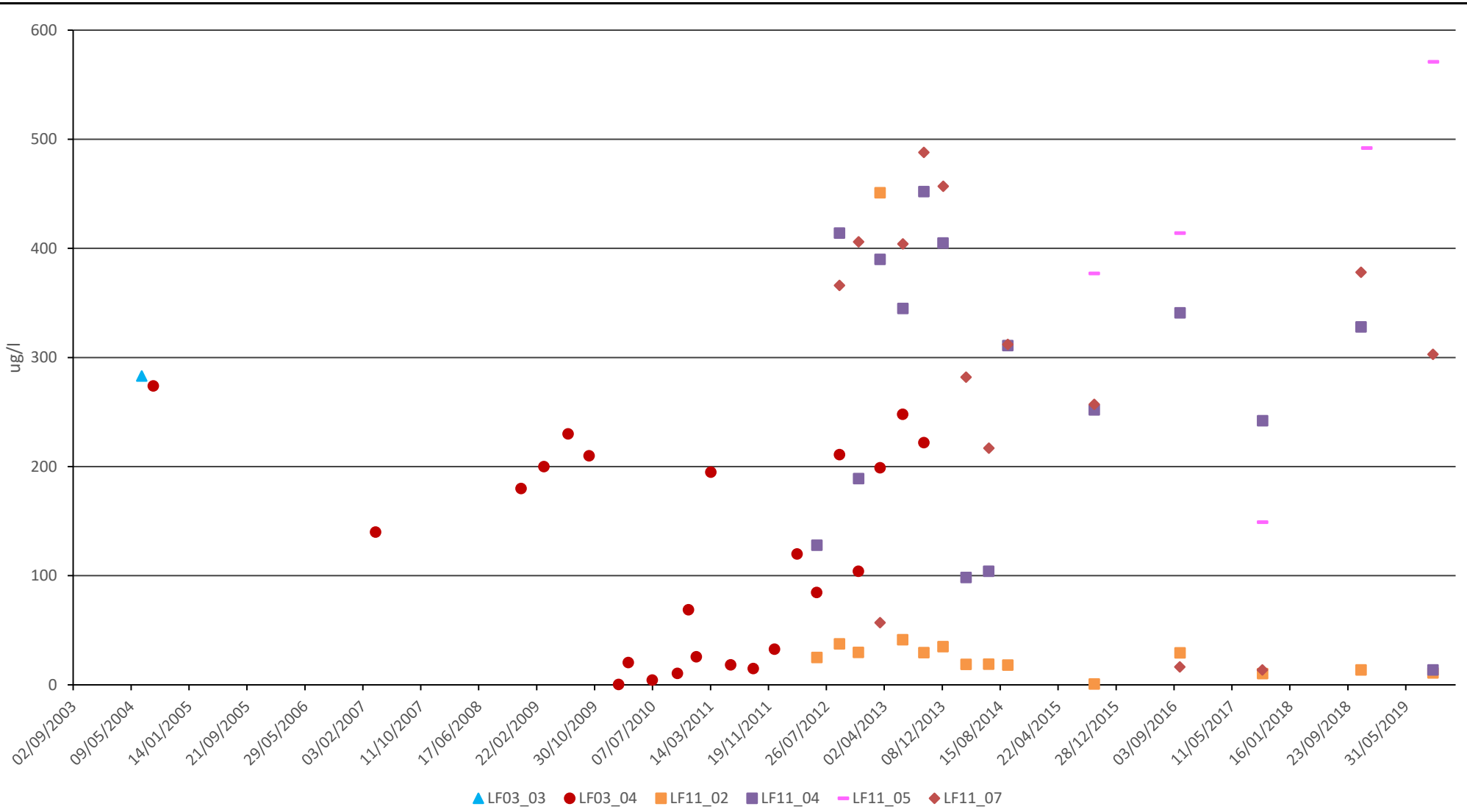
**Total Phenols in Leachate**

| | |
|---|---|
| Date | February 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-10**

J:\14739\AEPRs\APER Area 1\Appendix\Appendix 3 - Leachate\[3-10 Total Phenols.xlsm]Summary

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Client

**Newport City Council**

**Docksway Disposal Site**

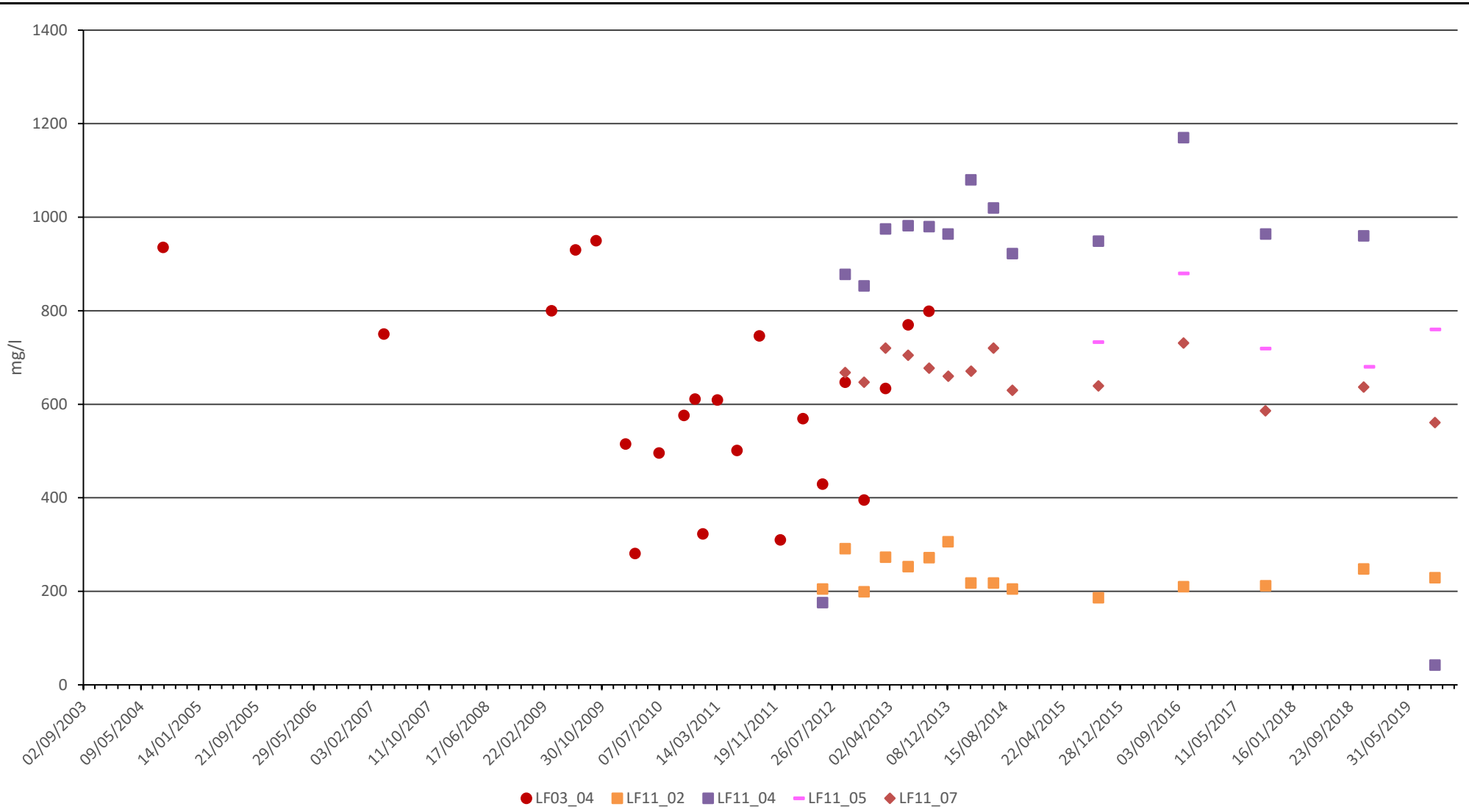
**Nickel in Leachate**

| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-11**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-11 Nickel.xlsm]Summary

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**Newport City Council**

**Docksway Disposal Site**

**Potassium in Leachate**

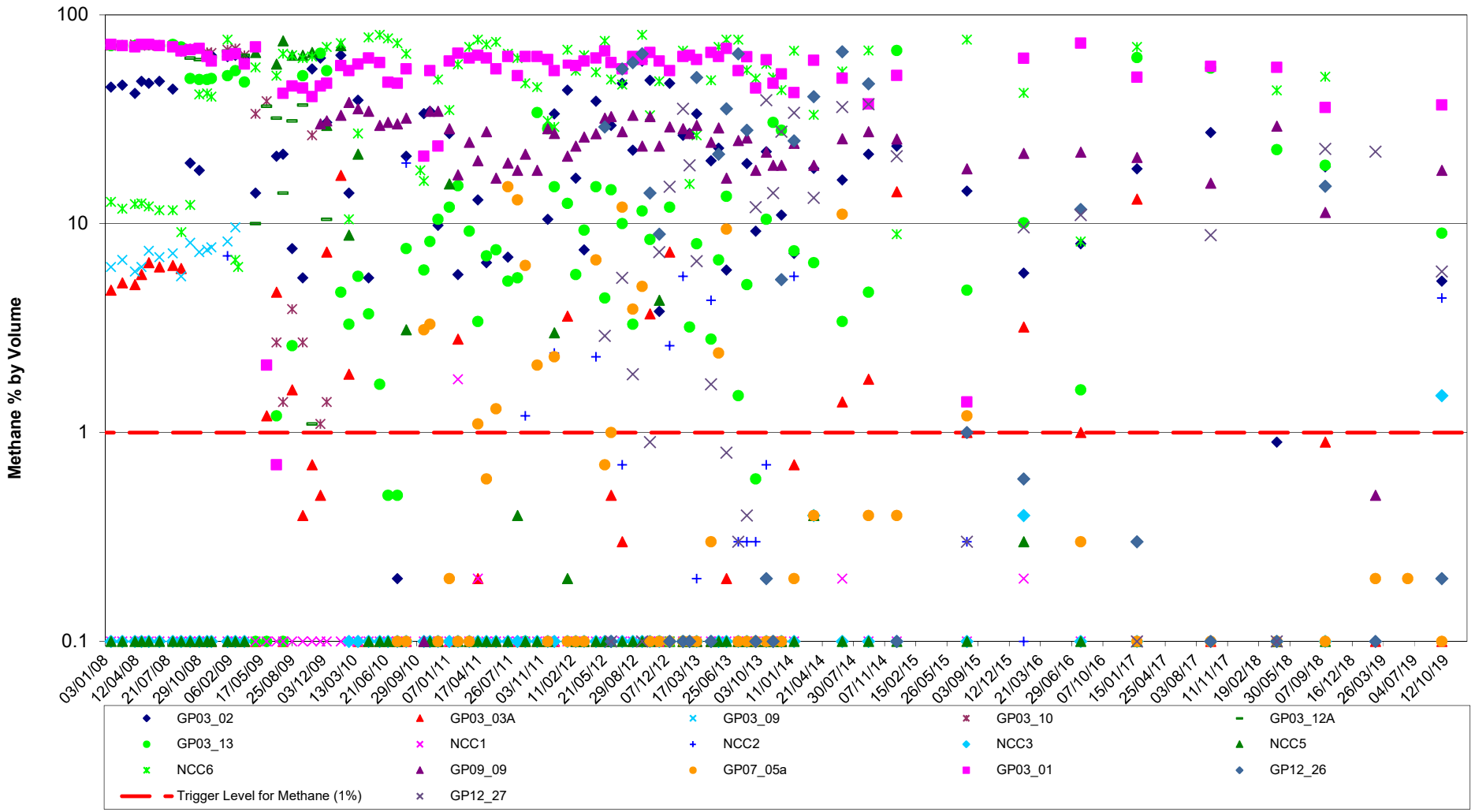
| | |
|---|---|
| Date | January 2020 |
| A4 Scale | nts |
| Drawn | RN |
| Checked | VKR |

**Appendix**

**3-12**

J:\14739\AEPRs\APER Area 1\Graphs\Appendix 3 - Leachate\[3-12 Potassium.xlsm]Summary

# Appendix 4 Gas Graphs

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**Newport City Council**

**Docksway Disposal Site**

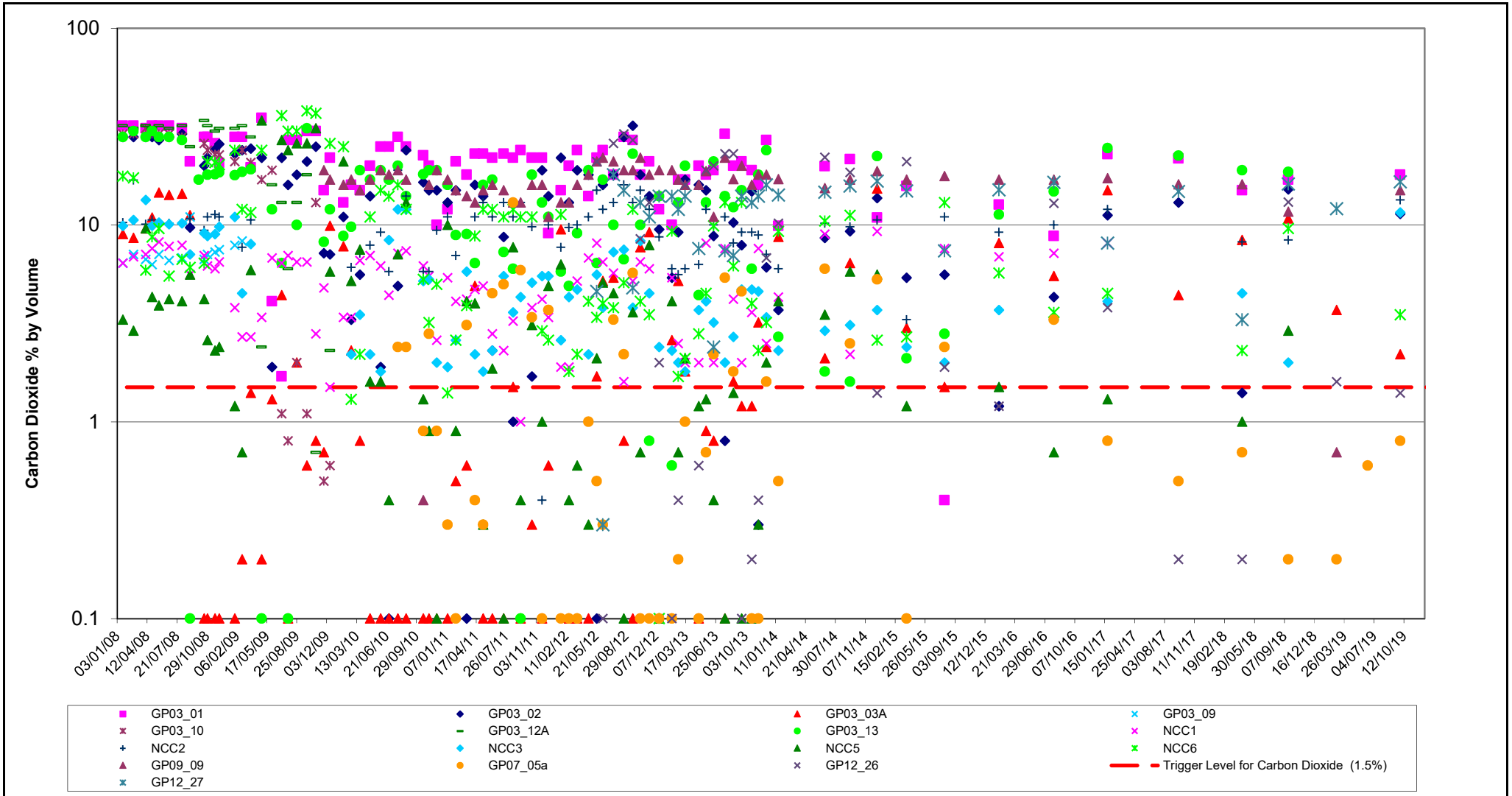
**Methane Concentrations in Area 1 Gas Monitoring Wells**

| | |
|---|---|
| Date | February 2020 |
| A4 Scale | nts |
| Drawn | NH |
| Checked | VKR |

**Appendix**

**4-1**

J:\14739\AEPRs\APER Area 1\Appendix\Appendix 4 - Gas\[Area 1 Graphs.xls]01 Methane

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Client

**Newport City Council**

**Docksway Disposal Site**

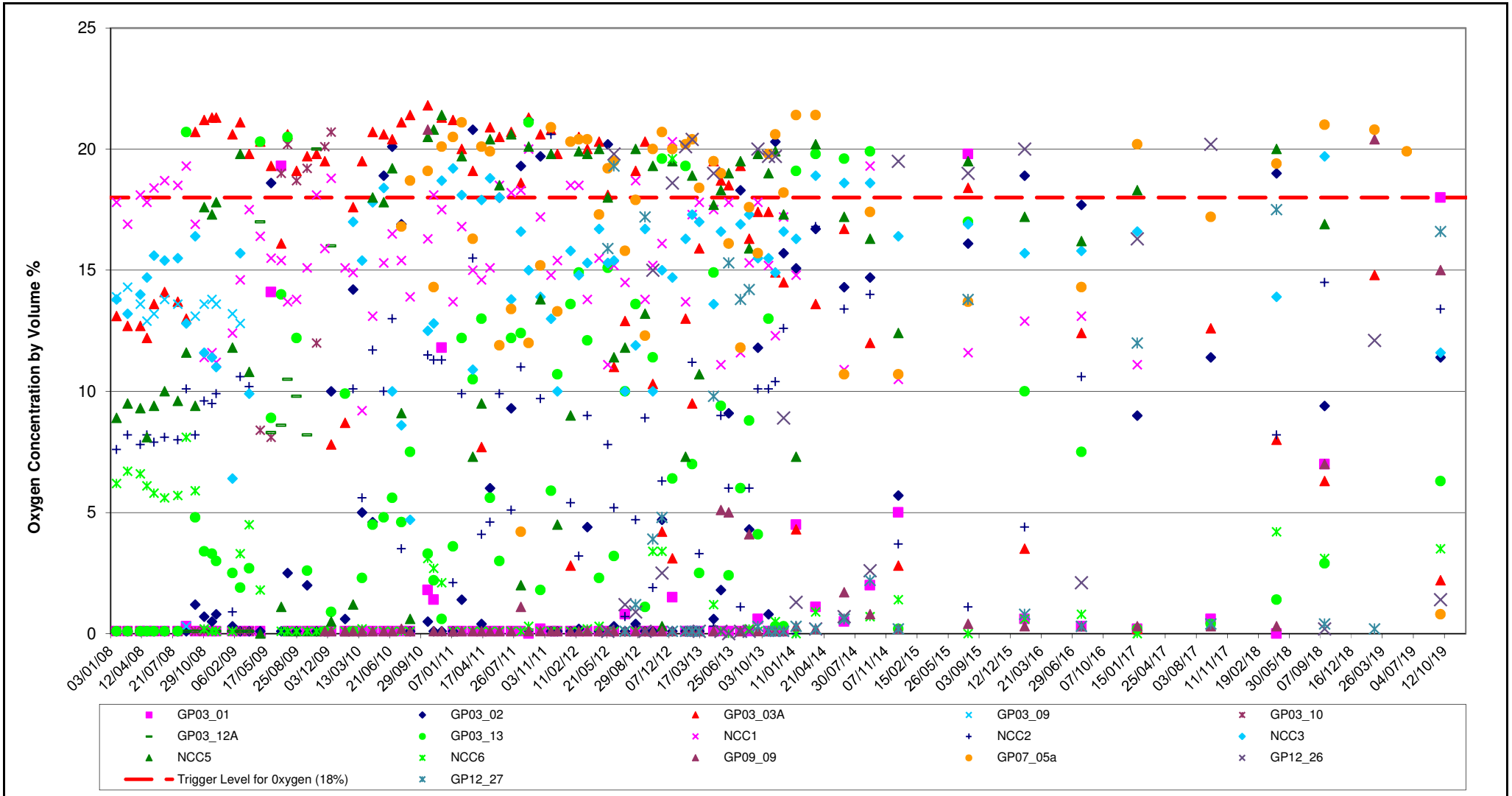
**Carbon Dioxide Concentrations in Area 1 Gas Monitoring Wells**

| | |
|---|---|
| Date | February 2020 |
| A4 Scale | nts |
| Drawn | NH |
| Checked | VKR |

**Appendix**

**4-2**

J:\14739\AEPRs\APER Area 1\Appendix\Appendix 4 - Gas\[Area 1 Graphs.xls]02 CO2

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Client

**Newport City Council**

**Docksway Disposal Site**

**Oxygen Concentrations in Area 1 Gas Monitoring Wells**

| | |
|---|---|
| Date | March 2020 |
| A4 Scale | nts |
| Drawn | NH |
| Checked | VKR |

**Appendix**

**4-3**

J:\14739\3547 Area 1 AEPR 2019\AEPR Area 1\Appendix\Appendix 4 - Gas\[Area 1 Graphs.xls]03 O2

# Appendix 5 Infinis Annual Reports

# Annual permit report

| | |
|---|---|
| Installation | Docksway |
| Permit reference | LP3135SB |
| Reporting period | Jan - Dec 2019 |
| Permit Operator | Novera Energy |

Author: Kate Phillips  Date: 28/01/2020

Authorised to sign as representative of the Operator

| Fugitive Emissions Review | | Reporting period: Jan - Dec 2019 |
|---|---|---|
| Installation Name: | Docksway Landfill gas utilisation plant | Permit reference LP3135SB |

| Substances Released/Potentially | Description of event and any contamination/decontamination of the site which has occurred |
|---|---|
| Landfill gas | Details of any notifiable events have been submitted to NRW in accordance with our notification procedure |
| Spillages | No significant spillages, contamination or decontamination to report for this installation |

| Raw Materials (& Water) Assessment Table | | | | | |
|---|---|---|---|---|---|
| **Site:** | Docksway | **Reporting period:** | Jan - Dec 2019 | **Permit Reference:** | LP3135SB |

| Raw Materials | Application | Current Measures to Ensure Efficiency and Waste Minimisation | Annual Quantity Used | Fate of Material | Environmental Impact Potential | Reason Alternatives are Not Practicable | Details of Process Modifications which Could Result in Savings |
|---|---|---|---|---|---|---|---|
| Landfill gas | Fuel for engines to produce electricity | Kilowatt generation from volumes processed is maximised through effective operation, maintenance and servicing of plant | Variable depending on site conditions | Combustion | Potentially flammable, explosive, toxic, asphyxiant, ecotoxic, corrosive and odorous, greenhouse gas | N/A - Combustion of landfill gas essential for environmental control | N/A - environmental benefits to be gained from conversion of methane to CO2 |
| Lubricating oils | To ensure efficiency of utilisation plant is maintained in accordance with manufacturer's instructions | Efficient use of lubricating oil is maximised through oil analysis to identify requirement for oil changes | Oil used is continually under review as part of the budgeting process | Reprocessing | Ecotoxic and odorous | Specification determined by engine manufacturer to ensure maximum performance and efficiency | Oil used is speciaised for landfill gas fuel as recommended by the OEM. Oil change intervals are based on oil analysis therefore maximising efficiency and minimising use |
| Water | Coolant for engine block and domestic water supply | Cooling water is recirculated around the engines to maximise efficiency and minimise consumption | No water supply on site. | Treatment | Inert | N/A - Inert therefore best practicable environmental option | Re-use of water for coolant purposes ensures volumes used are as low as reasonably practicable. Cleaning practices assessed and minimal volumes used, cleaning practices are infrequent |
| | Hygiene purposes | handwashing and (where available) toilet facilities | | where installed toilet waste is removed from site and treated as sewerage | Inert | n/a | n/a |
| Glycol | Antifreeze for use in coolant water | Glycol is recirculated around the engines to maximise efficiency and minimise consumption | Glycol contained within enclosed-loop system is drained into a container for re-use. OEM* recommends change of glycol every 20,000 hours. Infinis policy is to change following natural depletion or contamination. | Reprocessing | Toxic, ecotoxic | Specification determined by engine manufacturer to ensure maximum performance and efficiency | Antifreeze mix is specific to engine type and pre-determined by the OEM*. Levels are topped-up following natural depletion or contamination |
| Battery Acid | In batteries used for engine start-up and to provide back-up power to ensure rapid restart following any loss of mains power supply | Battery use is essential minimised to the applications listed (see left) | | Recycled | Corrosive | Portable electrical supply required for start-up | Minimal use of battery during start-up only therefore opportunity for savings is insignificant |

*OEM: Original Engine Manufacturer

# Waste Minimisation, Recovery and Disposal Assessment

| **Installation Name:** | Docksway Gas Utilisation Plant | **Permit Reference:** | LP3135SB | **Reporting period:** | Jan - Dec 2019 |
|---|---|---|---|---|---|

| **Waste Stream** | **Application/Source** | **Current Measures to Ensure Efficiency and Waste Minimisation** | **Fate of Material** | **Reason Alternatives are Not Practicable** | **Details of Process Modifications which Could Result in Savings** |
|---|---|---|---|---|---|
| Oil Filters (205ltr Drum) | Engine maintenance | Predetermined by manufacturers' recommendations to ensure efficiency | Reprocessing | Oil and filtration devices predetermined by manufacturers to ensure efficiency | Not applicable: oil filters changed at pre-determined life based on oil analysis and differential pressure |
| Oil Contaminated Rags & Absorbents (205ltr Drum) | Engine maintenance and housekeeping | Control measures in place to prevent spillage | Reprocessing | As above | No further modifications considered possible: Preventative maintenance and procedural practices minimise spillage and the requirement for oil absorbancy products |
| Waste Engine Oil (Bulk) | Engine maintenance | Efficient use of lubricating oil is maximised through oil analysis to identify requirement for oil changes | Reprocessing | As above | No further modifications considered possible: Oil used is specific to the landfill gas fuel in use and as recommended by the OEM*. Oil change intervals are based on oil analysis therefore maximising efficiency and minimising use |
| Batteries | Engine maintenance | Recharged | Recycled | Batteries essential for engine start-up and ensuring rapid restart | Batteries only replaced when they no longer hold a charge. Maintenance practices are in place to lengthen battery life |
| Fluorescent Tubes | Lighting | Replacement when faulty or damaged | Reprocessing | Alternatives not considered practicable due to warm-up time of energy saving bulbs | Tubes are only replaced when they have expired |
| General Waste | Packaging | Waste streams which can be reprocessed or recycled are identified and segregation facilities provided where appropriate | Disposal | Materials not segregated/ reprocessed are produced in small quantities only making alternatives not viable | Not applicable as a result of small quantities only being produced |
| Waste water/effluent | Welfare facilities | Facilities are maintained to ensure minimal water usage | Road tanker to treatment plant | Connection to mains sewer not practical - quantities produced are small. | Not applicable as a result of small quantities only being produced |

*Original Engine Manufacturer

## Annual Reporting of Other Performance Indicators

| **Installation:** | Docksway Landfill Gas Utilisation Plant | **Permit Reference:** | LP3135SB |
|---|---|---|---|

| **Parameter** | **Jan - Dec 2019** | **Units** |
|---|---|---|
| Flare operation hours | 1107 | hrs |
| Gas engine downtime hours | 962.0 | hrs* |
| Gas engine operation hours | 7798.0 | hrs |
| Volume of landfill gas combusted | 484,812 | m3 (treated by flare) |
| | 2,953,545 | m3 (treated by engines) |
| | 3,438,356 | m3 (total treated by engines & flare) |

| **Operator's Comments:** |
|---|
| Please contact permit-compliance@infinis.com for any queries regarding the above |

## Reporting of Performance Indicators (Form Ref: PI1)

| **Installation:** | Docksway Landfill Gas Utilisation Plant | **Permit Reference:** | LP3135SB |
|---|---|---|---|

| **Annual Production/Treatment (MWh)** | |
|---|---|
| **Total production of energy** | 5126 |

## Environmental Performance Indicators

| **Parameter** | **Annual Average Jan - Dec 2019** | **Units** | **Trends in Environmental Performance** | |
|---|---|---|---|---|
| | | | **2017** | **2018** |
| **Total oxides of nitrogen (expressed as NO2) emission** | 7.8 | Kg/MWh | 1.2 | 2.1 |
| **Total carbon monoxide emission** | 15.7 | Kg/MWh | 4.1 | 4.6 |
| **Total engine downtime (downtime hrs/available operation time in hrs)** | 11.0 | % | 8.8 | 8.8 |

| **Reporting period** | **Energy Imported (Primary Energy Usage) (MWh)** | **Parasitics (MWh)** | **Energy Exported (MWh)** | **Energy Used on Site (MWh)** | **Site Efficiency** |
|---|---|---|---|---|---|
| **Jan - Dec 2019** | 16 | 262 | 4864 | 278 | 30.9 |

*site efficiency has been calculated as follows: ((Engine efficiency (%) x (gas to generation/total gas) x (power export / (power generation + imported power)).

| **Installation:** | Docksway Landfill Gas Utilisation Plant | **Permit Reference:** | LP3135SB |
|---|---|---|---|

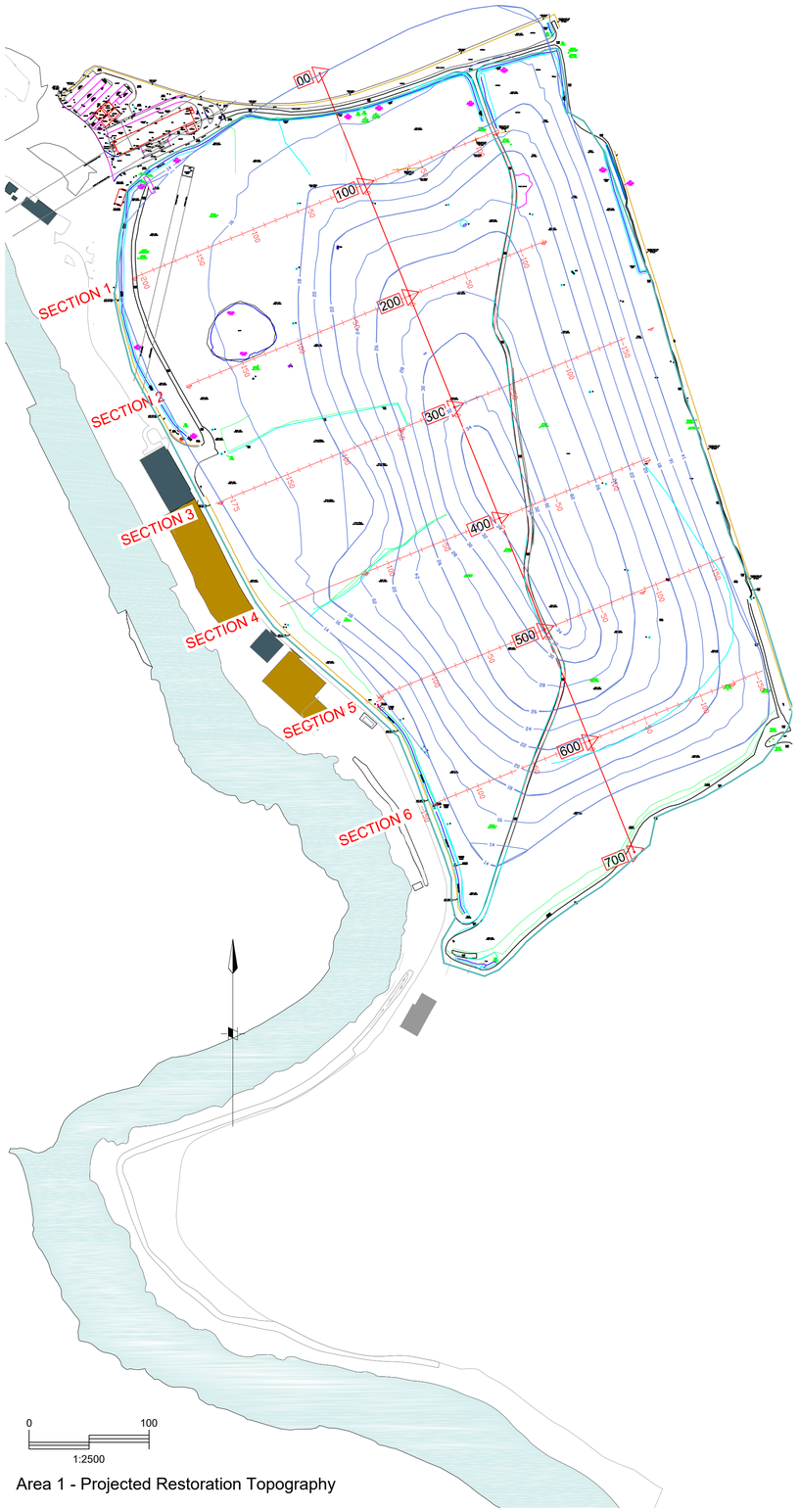
| **Accident Management Plan Review** | **Jan - Dec 2019** |
|---|---|
| **Date of next review** | |
| Reviewed monthly following a review of notifiable events | |

Permit requires that the accident management plan is reviewed at least every 2 years, or as soon as practicable after an accident (whichever is the earlier).

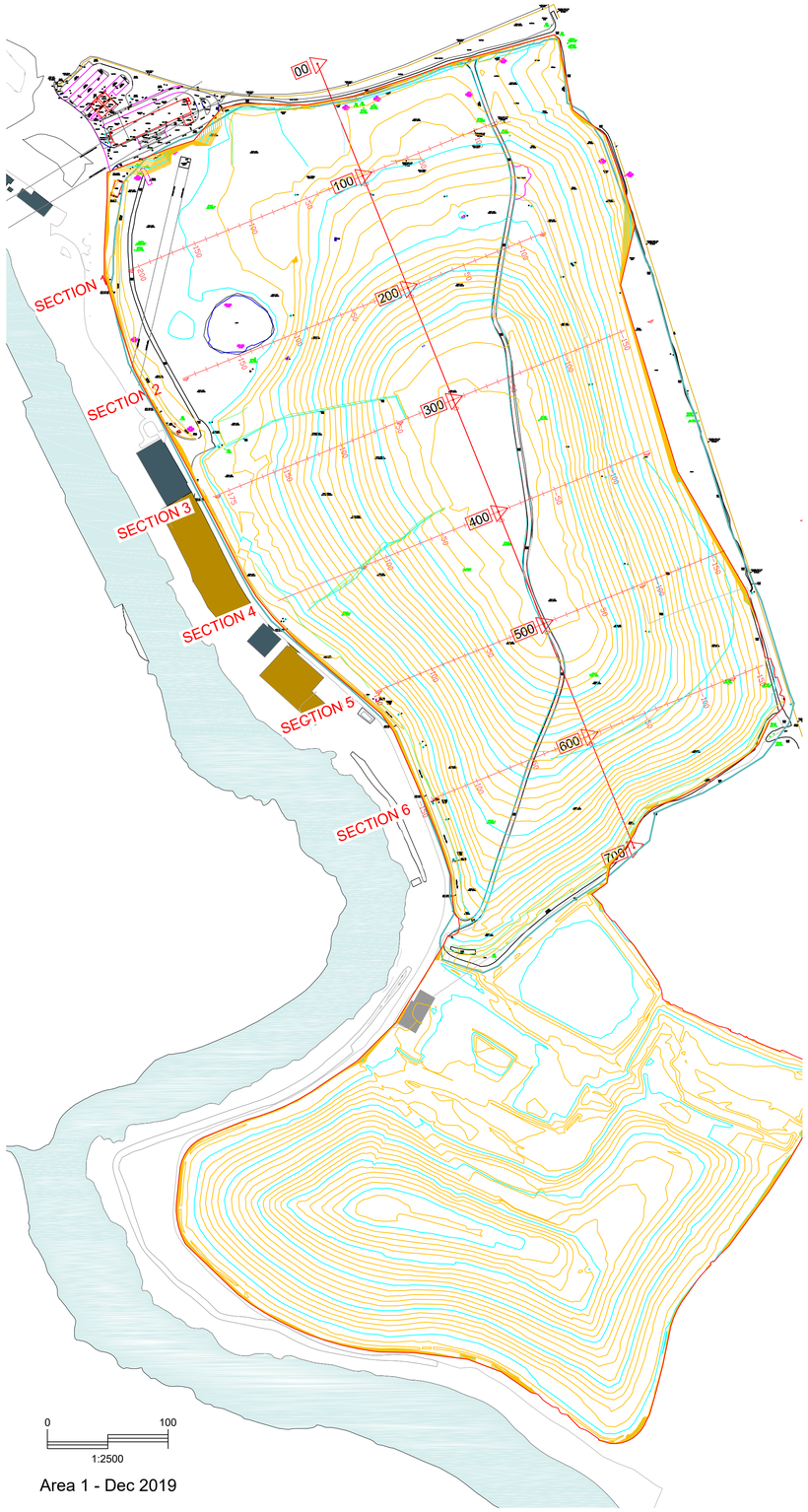
| **Operator's comments:** |
|---|
| No accidents occurred during this period which would require amendment to the Accident Management Plan for this installation. |

| | | | |
|---|---|---|---|
| **Installation:** | Docksway Landfill Gas Utilisation Plant | **Permit Reference:** | LP3135SB |
| **Emissions to Air Reporting** | **Jan - Dec 2019** | | |
| **Report Submission Date** | | | 20-May-19 |
| **Submitted to** | | | David Willey & Elizabeth Parr |

# Appendix 6 NCC Survey and Cross Sections

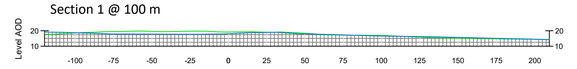



Area 1 - Projected Restoration Topography



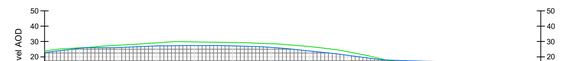

Area 1 - Dec 2019

## Section 1 @ 100 m



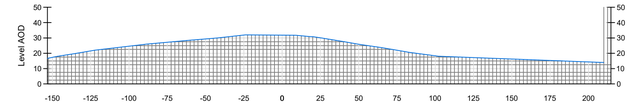

| | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2019 | 18.614 | 19.489 | 19.629 | 19.721 | 19.224 | 18.113 | 18.385 | 17.178 | 16.970 | 15.665 | 15.146 | 14.763 | 14.425 |
| Ph1 Projected Restoration | 18.749 | 17.967 | 17.860 | 17.769 | 18.054 | 16.914 | 18.000 | 17.319 | 16.549 | 16.203 | 15.693 | 15.115 | 14.516 |
| Settlement Remaining | 0.14 | -1.52 | -1.77 | -1.95 | -1.170 | -0.20 | -0.38 | 0.14 | -0.42 | 0.54 | 0.55 | 0.35 | 0.09 |

## Section 2 @ 200 m



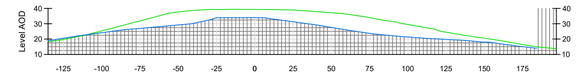

| | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2019 | 25.883 | 27.579 | 29.108 | 29.143 | 29.538 | 28.561 | 26.683 | 23.366 | 19.017 | 14.806 | 14.732 | 14.602 | 14.519 |
| Ph1 Projected Restoration | 25.564 | 26.090 | 27.098 | 27.360 | 27.118 | 26.185 | 25.872 | 21.015 | 17.932 | 17.144 | 16.347 | 15.540 | 14.752 |
| Settlement Remaining | -0.32 | -1.49 | -2.01 | -2.38 | -2.220 | -2.40 | -2.81 | -2.35 | -0.99 | 2.34 | 1.82 | 0.95 | 0.23 |

## Section 3 @ 300 m



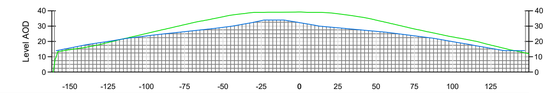

| | -150 | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2019 | 17.608 | 22.675 | 29.384 | 35.886 | 38.955 | 38.981 | 39.065 | 38.721 | 37.226 | 33.697 | 28.766 | 24.805 | 21.263 | 18.050 | 16.384 |
| Ph1 Projected Restoration | 17.946 | 21.539 | 24.983 | 27.177 | 29.357 | 31.891 | 31.839 | 30.118 | 25.985 | 21.974 | 18.305 | 17.166 | 16.234 | 15.303 | 14.372 |
| Settlement Remaining | -0.26 | -1.14 | -4.80 | -8.71 | -9.24 | -7.09 | -7.225 | -8.60 | -11.34 | -11.72 | -10.46 | -7.64 | -5.03 | -2.75 | -2.01 |

## Section 4 @ 400 m



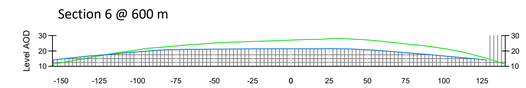

| | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2019 | 19.761 | 25.323 | 31.635 | 37.651 | 39.257 | 39.319 | 38.999 | 37.146 | 33.963 | 29.496 | 24.459 | 20.500 | 16.393 |
| Ph1 Projected Restoration | 20.540 | 24.145 | 26.961 | 29.204 | 33.986 | 34.000 | 31.279 | 27.574 | 23.727 | 21.345 | 19.819 | 18.000 | 15.011 |
| Settlement Remaining | 0.78 | -1.18 | -4.67 | -8.45 | -5.29 | -5.319 | -7.71 | -9.57 | -10.24 | -8.15 | -4.64 | -2.50 | -1.38 |

## Section 5 @ 500 m




| | -150 | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2019 | 14.625 | 19.306 | 25.182 | 30.952 | 36.109 | 39.004 | 39.198 | 38.023 | 33.919 | 28.155 | 22.963 | 17.592 |
| Ph1 Projected Restoration | 15.723 | 20.029 | 23.588 | 26.383 | 29.204 | 33.600 | 32.256 | 28.908 | 26.594 | 23.619 | 19.872 | 15.455 |
| Settlement Remaining | 1.10 | 0.72 | -1.59 | -4.59 | -6.90 | -5.40 | -6.942 | -9.12 | -7.33 | -4.54 | -3.09 | -2.14 |

## Section 6 @ 600 m




| | -150 | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2019 | 12.266 | 16.785 | 20.772 | 23.247 | 25.160 | 26.198 | 27.652 | 27.908 | 27.183 | 24.610 | 21.521 | 15.920 |
| Ph1 Projected Restoration | 14.755 | 17.213 | 19.450 | 20.900 | 21.168 | 21.320 | 21.414 | 21.469 | 20.713 | 18.846 | 16.702 | 14.346 |
| Settlement Remaining | 2.49 | 0.43 | -1.32 | -2.35 | -3.99 | -4.88 | -5.638 | -6.42 | -6.47 | -5.76 | -4.82 | -1.57 |



A1

| NOTES | Rev | Details | Dr | Ch | Ap | Date |
|---|---|---|---|---|---|---|
| | | | | | | |

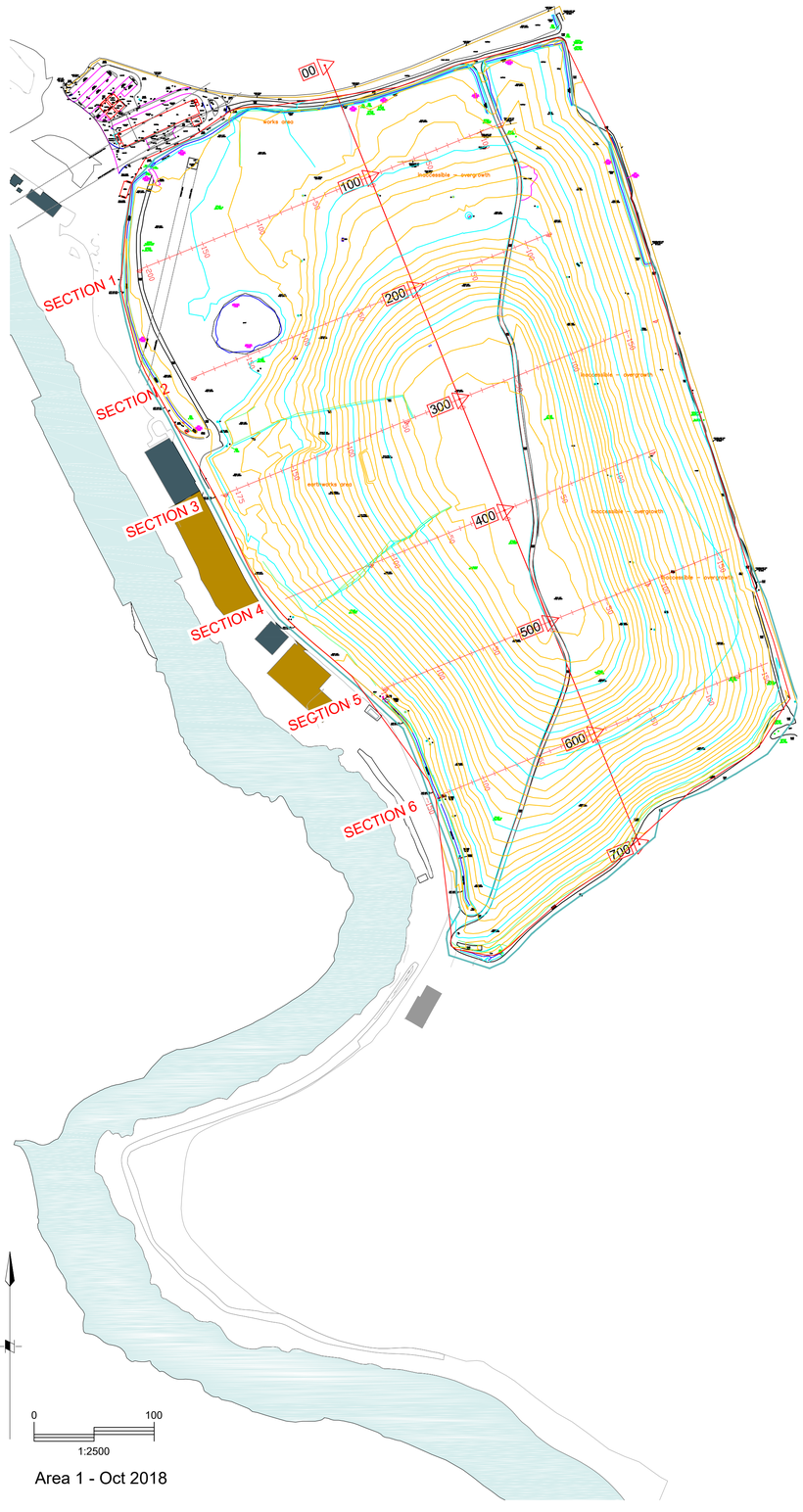
Streetscene
John Lamb
Head of Streetscene
Newport City Council
Civic Centre, Newport
South Wales, NP20 4UR.
Telephone: 01633 656656
Email: streetscene@newport.gov.uk

Newport CITY COUNCIL CYNGOR DINAS Casnewydd

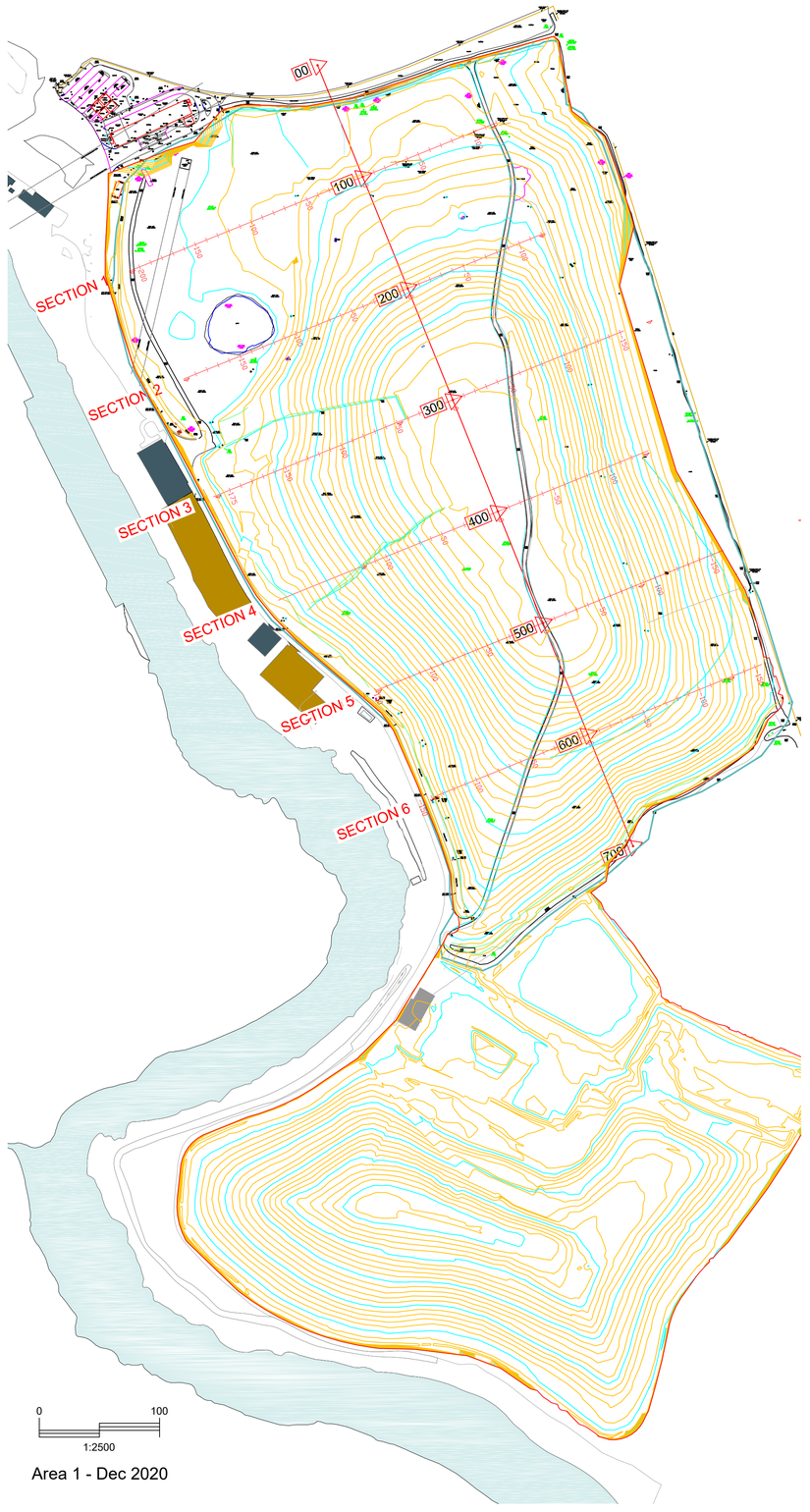
Project
Docksway Waste Disposal Site

Area 1 AEPR 2019 - Settlement

| File No. | | Status: | |
|---|---|---|---|
| Drawn By | MDH | Checked By | Approved By |
| Date | 03.02.20 | Date | Date |
| Scales | | | |
| Drawing No. | 1475_AEPR_PH1_19_01 | | |

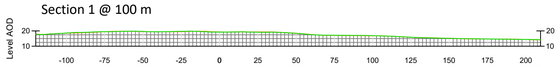



Area 1 - Oct 2018



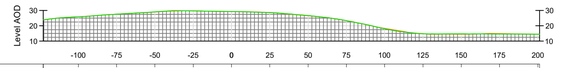

Area 1 - Dec 2020

Section 1 @ 100 m



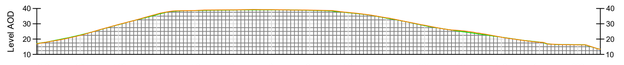

| | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2018 | 18.538 | 19.520 | 19.565 | 19.533 | 19.333 | 19.340 | 18.332 | 17.007 | 16.821 | 15.836 | 15.188 | 14.744 | 14.382 |
| Ph1 Topo Oct 2019 | 18.614 | 19.489 | 19.629 | 19.721 | 19.224 | 19.113 | 18.385 | 17.178 | 16.970 | 15.866 | 15.146 | 14.783 | 14.425 |
| Level Difference | 0.08 | -0.04 | 0.06 | 0.19 | -0.109 | -0.23 | 0.15 | 0.12 | 0.15 | 0.03 | -0.04 | 0.02 | 0.04 |

Section 2 @ 200 m



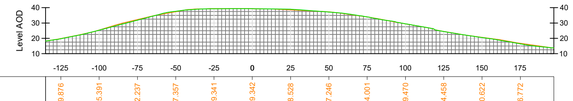

| | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2018 | 26.868 | 27.572 | 28.063 | 29.759 | 29.244 | 28.682 | 26.502 | 23.344 | 18.339 | 14.850 | 14.519 | 14.907 | 14.520 |
| Ph1 Topo Oct 2019 | 25.883 | 27.579 | 29.108 | 29.743 | 29.338 | 28.581 | 26.683 | 23.366 | 18.017 | 14.806 | 14.732 | 14.602 | 14.519 |
| Level Difference | 0.03 | 0.01 | 0.12 | -0.02 | 0.094 | -0.10 | 0.12 | 0.02 | -0.31 | -0.04 | 0.22 | -0.30 | 0.01 |

Section 3 @ 300 m



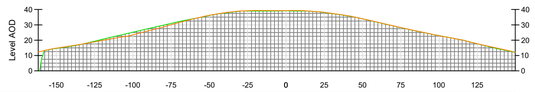

| | -150 | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2018 | 17.479 | 22.384 | 29.475 | 36.284 | 38.862 | 39.073 | 39.194 | 38.883 | 37.410 | 33.833 | 29.008 | 25.375 | 21.262 | 17.960 | 16.250 |
| Ph1 Topo Oct 2019 | 17.608 | 22.675 | 29.384 | 35.886 | 38.503 | 38.981 | 39.066 | 38.721 | 37.226 | 33.697 | 28.766 | 24.803 | 21.263 | 18.050 | 16.384 |
| Level Difference | 0.13 | 0.29 | -0.09 | -0.40 | -0.67 | -0.09 | -0.130 | -0.16 | -0.18 | -0.24 | -0.24 | -0.57 | 0.00 | 0.09 | 0.12 |

Section 4 @ 400 m



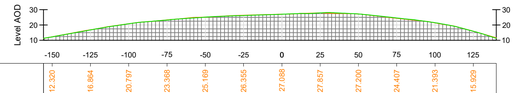

| | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 | 150 | 175 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2018 | 19.876 | 25.391 | 32.237 | 37.357 | 39.341 | 39.342 | 38.526 | 37.246 | 34.001 | 29.470 | 24.458 | 20.622 | 16.772 |
| Ph1 Topo Oct 2019 | 19.761 | 25.323 | 31.835 | 37.651 | 39.237 | 39.319 | 38.960 | 37.146 | 33.963 | 29.466 | 24.459 | 20.500 | 16.393 |
| Level Difference | -0.12 | -0.07 | -0.40 | 0.29 | -0.08 | -0.024 | 0.46 | -0.10 | -0.04 | 0.03 | 0.00 | -0.12 | -0.38 |

Section 5 @ 500 m




| | -150 | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2018 | 14.739 | 18.891 | 23.441 | 30.056 | 36.242 | 39.216 | 39.301 | 38.165 | 33.961 | 28.253 | 22.958 | 17.679 |
| Ph1 Topo Oct 2019 | 14.625 | 19.306 | 25.182 | 30.952 | 36.109 | 39.004 | 39.198 | 38.023 | 33.910 | 28.155 | 22.963 | 17.592 |
| Level Difference | -0.11 | 0.41 | 1.74 | 0.90 | -0.13 | -0.21 | -0.103 | -0.14 | -0.04 | -0.10 | 0.00 | -0.09 |

Section 6 @ 600 m




| | -150 | -125 | -100 | -75 | -50 | -25 | 0 | 25 | 50 | 75 | 100 | 125 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ph1 Topo Oct 2018 | 12.330 | 16.864 | 20.797 | 23.368 | 25.169 | 26.335 | 27.088 | 27.857 | 27.200 | 24.497 | 21.393 | 15.929 |
| Ph1 Topo Oct 2019 | 12.286 | 16.765 | 20.772 | 23.247 | 25.160 | 26.198 | 27.052 | 27.908 | 27.183 | 24.610 | 21.521 | 15.920 |
| Level Difference | -0.05 | -0.08 | -0.03 | -0.12 | -0.01 | -0.16 | -0.036 | 0.05 | -0.02 | 0.20 | 0.13 | -0.01 |



| A1 NOTES | Rev | Details | Dr | Ch | Ap | Date |
|---|---|---|---|---|---|---|
| | | | | | | |

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Newport CITY COUNCIL / CYNGOR DINAS Casnewydd

Project
Docksway Waste Disposal Site

Area 1 AEPR Oct 2018 vs Dec 2019

| File No. 1475 | | | | Status: | |
|---|---|---|---|---|---|
| Drawn By | MDH | Checked By | | Approved By | |
| Date | 03.01.20 | Date | | Date | |
| Scales | | | | | |
| Drawing No. | 1475_AEPR_PH1_19_02 | | | | |