Docksway Disposal Site

Annual Environmental Review for Area 2 - 2019

On behalf of **Newport City Council**

Project Ref: 14739/3548 | Rev: 00 | Date: February 2020

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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 Environmental Permit No. DP3733BK, Variation Number V004 (July 2016).

1.1.3 It is a requirement of the Environmental Permit for Area 2 (Conditions 4.2.1 and 4.2.2) that an Environmental Review report is provided to Natural Resources Wales (NRW) on an annual basis in order to provide a review of data collected in relation to the environmental performance of the site.

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 12-month period of January 2019 to December 2019. The data review and analysis are used to provide an appraisal of the potential environmental risks associated with Area 2 of the site. This document includes the following:

- Review and analysis of the Area 2 environmental monitoring results collated over the past 12 months,
- Comments on temporal trends observed in the longer-term monitoring data collected,
- A review of the potential risks to sensitive environmental receptors,
- Energy consumption at the site and annual production/treatment,
- Comparison of the current topographical survey and the previous topographical survey and assessment of the settlement behaviour together with volumetric difference,
- Calculation of the remaining capacity.

1.2.2 Guidance for readers of this report is given in **Section 10** of this report.

1.3 Related Work

The environmental data commented on in this report has been issued to NRW previously in the form of monthly or quarterly interim environmental monitoring reports but is provided in graphed format within this report as a series of Appendices for ease of reference.

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 continue in accordance with 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 Environmental Permit.

2.1.4 It is noted that sampling point C3_Asb was established at the start of 2017 and is specific to Cell 3a.

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

Table 2-1 Details of Surface Water Locations Monitoring during 2019

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.
C3_Asb	Cell 3 Settling Lagoon

2.2 Surface Water Hydrochemistry over the Preceding 12 Months

Compliance Limits

2.2.1 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.

2.2.2 Sampling location C3_Asb has compliance limit values which are set out in the Environmental Permit (EPR/DP3733BK).

2.2.3 Notwithstanding the surface water discharge consents, surface water compliance limits are not generally required by NRW for the site as part of the Environmental Permit, and consequently

none have been set, except for surface water sampling point C3_Asb. 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.

SW_25

2.2.4 In the last 12 months, SW_25 has been sampled five times (January, February, April, June and December 2019) and was recorded as dry on each of the other monthly monitoring visits.

2.2.5 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 2019 the concentration of Ammoniacal Nitrogen was 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 during 2019 for SW_25, and the longer term data does not indicate any developing adverse trends.
- The samples from SW_25 recorded pH values between 7.8 and 8.3 in 2019, which is within the acceptable range 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 2019 and adverse trends have not been identified in the longer term data.

2.2.6 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

2.2.7 Surface water monitoring point SW_26 was included in the monitoring programme for Area 1 at the start of 2013. In the last 12 months, SW_26 has been sampled twice (January and February 2019) and was recorded as dry on each of the other monthly monitoring visits.

2.2.8 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, however an adverse trend has not been identified.
- The results of the TSS testing undertaken on the samples obtained from SW_26 during 2019 recorded concentrations of 7.1 and 14.1 mg/l which is below the discharge consent limit of 60mg/l.
- During 2019, the pH values recorded at SW_26 were within the acceptable range of between 6 and 9, in accordance with the discharge consent.

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

C3_Asb

2.2.10 Surface water monitoring point C3_Asb is the settling lagoon for surface water from the Stable Non-Reactive Hazardous Waste (SNRHW) cell. A specific testing requirement for this location is for the presence of asbestos fibres.

2.2.11 During 2019 samples were taken from this location on nine occasions, however testing for asbestos fibres was only undertaken in January, March and April (lab error meant the test was not undertaken in February), where the laboratory did not identify the presence of asbestos fibres. The laboratory subsequently ceased to provide this test and therefore no further testing has been undertaken while an alternative is sought.

2.2.12 It is noted that in addition to testing for the presence of asbestos fibres other surface water hydrochemistry parameters are tested for at C3_Asb. These are commented on below alongside other testing locations.

Commentary on Other Surface Water Monitoring Locations

Ammoniacal Nitrogen

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

2.2.14 SW_1A was sampled on nine occasions during 2019. It can be seen that Ammoniacal Nitrogen concentrations in SW_1A have been recorded below the method detection limit (MDL) for the laboratory (0.2mg/l) in the last 12 months. This is consistent with the longer-term dataset.

2.2.15 SW_11 was sampled once during 2019 in September as part of the annual screen. The Ammoniacal Nitrogen concentration was recorded at 0.24mg/l which is consistent with the longer term dataset.

2.2.16 At SW_23 the Ammoniacal Nitrogen concentrations have been relatively consistent, being recorded generally below 25mg/l in the last 5 years, including the nine occasions SW_23 was sampled during 2019

2.2.17 The remaining surface water monitoring location, SW_24, shows a generally uniform trend since commencement of monitoring, with concentrations predominantly below 1mg/l. The concentrations of Ammoniacal Nitrogen recorded in the nine samples obtained from SW_24 in 2019 are below the limit of detection.

Biochemical and Chemical Oxygen Demand

2.2.18 **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.

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

2.2.20 In general, COD concentrations appear to be relatively consistent at all monitoring locations during 2019 and in the longer term with results generally below 100mg/l.

Chloride

2.2.21 **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 uniform trend of Chloride concentrations over the last 12 months and in the longer term, with concentrations at most locations predominantly below 100mg/l.

2.2.22 The exceptions to this are SW_23 where concentrations of Chloride have fluctuated significantly from month to month in 2019 (from about 50mg/l up to 2180mg/l), as they have done since monitoring commenced. Concentrations of Chloride at C3_Asb have fluctuated between about 150mg/l and 240mg/l during 2019.

pH

2.2.23 **Appendix 1-5** presents the results of pH monitoring of surface water since 2003 at each of the current surface water monitoring locations. In the past 12 months 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

2.2.24 **Appendix 1-6** presents Electrical Conductivity (EC) readings in each of the surface water monitoring locations since 2003. The data indicates a stable trend of Electrical Conductivity, mostly below 5mS/cm at all monitoring locations in the last 12 months. This is within the range of the overall dataset.

Total Suspended Solids

2.2.25 **Appendix 1-7** presents the concentrations of Total Suspended Solids (TSS) at SW_25 since 2007, SW_26 since 2013, and C3_Asb since 2017. The data does not currently indicate any developing trends for TSS.

Dissolved Oxygen

2.2.26 **Appendix 1-8** presents the Dissolved Oxygen (DO) concentrations recorded at the surface water monitoring locations in the last 12 months. 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 January to December 2019 for surface water locations does not indicate any significant adverse trends developing in surface water quality, and over the last 12 months does not indicate any significant decrease in surface water quality since the previous Annual Environmental Review for Area 2 - 2018[4].

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 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 2: Landfill Extension, (PBA, 2005)[2].

3.1.3 The locations of the boreholes used in the current monitoring and sampling programme are indicated on **Figure 2**.

3.1.4 Interim groundwater quality reports have previously been provided to NRW on a quarterly basis (in accordance with the Environmental Permit Conditions 3.6.1 and 3.6.2).

3.2 Monitoring Locations and Compliance Levels

3.2.1 There are fourteen monitoring wells across Area 2, and the coordinates for each are presented in Table 3-1 below.

Table 3-1 Groundwater Monitoring Well Locations

Monitoring Well	Easting	Northing
GW07_40	331007	185204
GW12_30	331089	185194
GW09_31	331165	185095
GW03_09	331166	184999
GW09_32	331118	184919
GW12_33	331055	184834
GW06_34	331015	184732
GW09_35	330904	184755
GW06_36	330811	184777
GW06_37	330715	184801
GW06_13	330602	184887
GW12_38	330705	184986
GW06_14a	330829	185098
GW06_39	330932	185137

3.2.2 The current control and compliance levels for Area 2 groundwater monitoring wells are reproduced in Table 3.2. It is noted that in relation to Benzene, Naphthalene, Xylene and Arsenic, only Compliance levels have been set, with other determinands having both control and compliance levels set.

Table 3-2 Area 2 Groundwater Environmental Permit Compliance Limits for Emissions to Groundwater

Monitoring Well	Benzene	Naphthalene	Xylene	Arsenic
	Compliance Limit	Compliance Limit	Compliance Limit	Compliance Limit
	ug/l	ug/l	ug/l	ug/l
GW03_09	2	5	3	35
GW06_13	2	5	3	50
GW06_14a	2	5	3	25
GW06_34	2	5	3	65
GW06_36	2	5	3	30
GW06_37	2	5	3	60
GW06_39	2	5	3	50
GW07_40	2	5	3	35
GW09_31	13	5	3	80
GW09_32	3	5	3	30
GW09_35	2	5	3	50
GW12_30	1	1	1	160
GW12_33	1	1	1	560
GW12_38	1	1	1	26

Monitoring Well	Nickel		Potassium		Ammoniacal Nitrogen	
	Control Level	Compliance Limit	Control Level	Compliance Limit	Control Level	Compliance Limit
	ug/l	ug/l	mg/l	mg/l	mg/l	mg/l
GW03_09	8	10	160	180	30	35
GW06_13	12	14	100	110	30	35
GW06_14a	12	14	160	180	53	60
GW06_34	12	14	310	350	30	35
GW06_36	8	10	100	110	20	23
GW06_37	8	10	100	110	30	35
GW06_39	26.4	30	100	110	20	23
GW07_40	8	10	39.6	45	20	23
GW09_31	8	10	100	110	50	50
GW09_32	8	10	160	180	50	50
GW09_35	8	10	100	110	30	35
GW12_30	25	30	35	40	10	12
GW12_33	5	6	50	55	15	18
GW12_38	25	30	65	70	10	12

3.3 Groundwater Quality

Ammoniacal Nitrogen

3.3.1 **Appendices 2-1** to **2-5** present the recorded concentrations of Ammoniacal Nitrogen for the Area 2 groundwater monitoring locations.

3.3.2 Ammoniacal Nitrogen concentrations in all monitoring wells have been relatively consistent in the last 12 months and also in the longer term and there have generally been no exceedances of the Compliance Limits for Ammoniacal Nitrogen in 2019, with the exception of GW06_37. GW06_37 has shown a slow increase in the concentration of Ammoniacal Nitrogen since 2010, and the Compliance Limit of 35mg/l was exceeded in June and September 2019 with recorded concentrations of 42.2mg/l and 37.0mg/l respectively. The concentration recorded in June is the highest concentration recorded at this location.

3.3.3 All other monitoring locations remained below the compliance limits throughout the monitoring period with no indication of adverse trends developing.

Arsenic

3.3.4 **Appendices 2-6** to **2-15** present the recorded Arsenic concentrations for the current Area 2 groundwater monitoring locations. There were generally no exceedances of the Compliance Limits for Arsenic in the Area 2 groundwater monitoring wells during 2019, and no distinct adverse trends are apparent, with the exception of GW06_37 and GW06_34.

3.3.5 In June 2019, GW06_37 recorded a concentration of 71.5mg/l, compared to a Compliance Limit of 60mg/l. This is however, within the range of the overall dataset, and the concentration recorded at this location was below the Compliance Limit in subsequent monitoring visits.

3.3.6 GW06_34 recorded a marginal exceedance of the Compliance Limit in in March 2019 with a concentration of 66.1mg/l compared to the Compliance Limit of 60mg/l. This has also recorded concentrations below the Compliance Limit in subsequent monitoring visits.

Benzene, Naphthalene and o-Xylene

3.3.7 **Appendices 2-16** to **2-23** present the results of Benzene, Naphthalene and o-Xylene concentrations.

3.3.8 Benzene, Naphthalene and o-Xylene concentrations in all Area 2 compliance wells have been consistent in the last 12 months, with no exceedances of the compliance limits and no concentrations recorded above the method detection limit (MDL).

3.3.9 It should be noted that the laboratory MDL has changed a number of times since 2004 for Benzene, Naphthalene and o-Xylene which gives a false impression that some of the results have occasionally exceeded the compliance limit, because the compliance limit tracks the MDL.

Extractable Petroleum Hydrocarbons

3.3.10 **Appendices 2-24** and **2-25** present the results of Extractable Petroleum Hydrocarbons (EPH) concentrations. Concentrations of EPH have generally been recorded below 400µg/l in all of the monitoring wells in Area 2 during 2019, with the exception of GW12_33 in September where the concentration recorded was 481ug/l. There are, however, no compliance limits for EPH, and the data does not indicate an adverse trend at the current time.

Nickel and Potassium

3.3.11 **Appendices 2-26** to **2-38** present the results of Nickel and Potassium concentrations in the monitoring wells.

3.3.12 Nickel and Potassium concentrations at the majority of the compliance wells have remained consistent throughout the 12-month monitoring period, with no recorded compliance limit exceedances, with the exception of Nickel at GW09_32 in December and GW06_39 in September where the concentrations recorded were 11.1µg/l, and 78.4µg/l respectively However, during the following monitoring round the Nickel concentration in GW06_39 had returned to below the control level.

3.3.13 The concentration of Nickel within GW09_32 will be reviewed following the next monitoring visit.

3.4 Review of Potential Risks and Future Monitoring

3.4.1 The environmental data obtained for the groundwater monitoring wells in Area 2 indicates that in general the River Terrace Gravel groundwater chemistry is in a stable condition and that there is therefore no significant deterioration in water quality since the previous Annual Environmental Review for Area 2 - 2018[4].

3.4.2 During 2019, a small number of intermittent exceedances of compliance limits were recorded in some monitoring wells, however, these are not generally considered to represent a significant risk to the groundwater quality and there is no indication of adverse trends developing.

4 Leachate Monitoring

4.1 Leachate Control Measures and Management System

4.1.1 In accordance with Condition 2.7.1 of the Environmental Permit, leachate levels should be recorded monthly. However, there have been occasions where either access to the monitoring locations has not been possible or a monitoring round has been missed. As such, for this period of reporting, leachate levels have been monitored at five locations in Cell 1, three locations in Cell 2, one location in Cell 3B and one location within Cell 4, with samples recovered for analytical testing (similarly when access permits) on a quarterly basis at LF08_07 located within Cell 1 of Area 2, C2B within Cell 2 of Area 2, and C3B within Cell 3 of Area 2. Filling commenced in Cell 4b in 2019 and therefore sampling of leachate from Cell 4 commenced in September 2019.

4.1.2 Leachate generated in Area 2 is pumped directly to tankers and removed off site for disposal.

Table 4-1 Leachate Measurements at Cells 1,2,3 and 4

Monitoring Round	Leachate Head Level above base of cell (m)									
	LF08_07 (Cell 1)	C1A (Cell 1)	C1B (Cell 1)	C1D (Cell 1)	C1E (Cell 1)	C2A (Cell 2)	C2B (Cell 2)	C2C (Cell 2)	C3B (Cell 3)	C4 (Cell 4)
January 2019	**2.67**	N/A	1.22	1.61	1.78	1.18	1.87	-0.47	N/M	N/M
February 2019	0.76	N/A	1.54	0.69	0.13	1.83	1.99	1.66	N/M	N/M
March 2019	1.39	N/A	1.24	0.41	0.76	1.87	1.99	0.11	N/A	N/M
April 2019	0.63	N/A	1.17	0.01	0.01	1.93	1.72	0.19	0.33	N/M
May 2019	0.88	N/A	1.23	0.01	0.31	**2.50**	1.95	0.32	1.70	N/M
June 2019	1.55	N/A	1.22	0.06	0.54	1.94	N/A	**2.32**	1.40	0.33
July 2019	0.03	N/A	1.25	0.38	0.01	1.42	1.96	1.16	0.85	0.42
August 2019	0.06	N/A	1.22	0.48	0.11	0.98	1.94	0.78	1.02	0.50
September 2019	1.93	N/A	1.37	0.06	0.31	1.36	1.76	0.66	1.02	0.34
October 2019	0.63	N/A	1.17	0.01	0.01	1.70	1.88	1.19	1.00	0.34
November 2019	1.90	N/A	0.72	0.10	0.20	0.90	2.05	0.75	1.22	1.02
December 2019	**2.02**	N/A	**3.05**	1.66	1.52	**2.02**	**2.10**	0.11	0.24	N/M
Leachate removed from Area 2 during 2019 = 13,576,320 kg										

Bold text indicates leachate head levels above the permitted leachate head level (2m).
N/A indicates the location was not accessible
N/M indicates the location was not monitored

4.2 Leachate Chemistry

4.2.1 The leachate wells in Cells 1 and 2 have been connected to the gas abstraction system and therefore there is currently no access for sampling leachate directly from the leachate wells (LF08_07 and C2B respectively). Leachate samples have however been obtained from the

closest side risers and submitted for laboratory analysis. For consistency with historical data, these have been referred to as LF08_07 and C2B throughout this Section.

4.2.2 During 2019, samples have been obtained from locations associated with LF08_07 (Cell 1), C2B (Cell 2), C3B (Cell 3) and C4 (Cell 4).

4.2.3 The frequency of leachate sampling required by the Environmental Permit is quarterly. In 2019, samples were obtained from both Cell 1 and Cell 2 on four occasions (May, June, September and December), from Cell 3 on two occasions (June and September) and from Cell 4 on one occasion (September).

Ammoniacal Nitrogen

4.2.4 **Appendix 3-1** presents the results of Ammoniacal Nitrogen concentrations. The Ammoniacal Nitrogen concentration recorded at LF08_07 were between 495mg/l and 756mg/l and concentrations of between 1020mg/l and 1310mg/l were recorded in C2B. These results are within the typical range of the datasets.

4.2.5 The Ammoniacal Nitrogen concentrations recorded at C3 were 760mg/l in June and 1170mg/l in September. C4 was sampled in September and recorded a concentration of 2010mg/l.

Arsenic

4.2.6 **Appendix 3-2** presents the results of Arsenic concentrations over time in leachate in Area 2. Arsenic in C2B was recorded at concentrations between 28µg/l and 93µg/l. These concentrations are within the range established during previous monitoring with no indication of adverse trends developing.

4.2.7 The leachate sample from LF08_07 (Cell 1) recorded concentrations between 8µg/l and 45 µg/l. These concentrations are within the range established during previous monitoring with no indication of adverse trends developing.

4.2.8 Arsenic concentrations within C3 were recorded at 24.5ug/l in June and 35ug/l in September. The leachate sample from C4, recovered in September, recorded a concentration of 89.8ug/l.

Benzene

4.2.9 **Appendix 3-3** present the results of Benzene concentrations in leachate from Cell 1 (LF08_07), Cell 2 (C2B) and Cell 3 (C3). The sample from Cell 4 (C4) that was obtained in September was not tested for Benzene.

4.2.10 Benzene concentrations recorded at LF08_07 were between the method detection limit (MDL) of the testing and 3ug/l. and concentrations of between 2.89ug/l and 5.57ug/l were recorded in C2B. These results are within the typical range of the datasets.

4.2.11 Benzene testing was only undertaken on one occasion (June) in C3 and recorded a concentration of 1.53ug/l.

Naphthalene

4.2.12 **Appendix 3-4** present the results of Naphthalene concentrations in leachate from Cell 1 (LF08_07), Cell 2 (C2B), Cell 3 (C3) and Cell 4 (C4).

4.2.13 Naphthalene concentrations in LF08_07 leachate have been recorded below the MDL during all monitoring rounds since 2013. Concentrations of Naphthalene were also mostly below the MDL in C2B, with the exception of the January and May monitoring rounds which recorded concentrations of 1.14ug/l and 1.39ug/l respectively.

4.2.14 Naphthalene concentrations in C3 and C4 were recorded below the MDL during all monitoring rounds.

o-Xylene and EPH

4.2.15 **Appendices 3-5** and **3-6** present the results of o-Xylene and EPH concentrations.

4.2.16 Concentrations of o-Xylene in C2B leachate have been recorded between 2.27ug/l and 6.32ug/l in 2019, which is within the range of the overall dataset. The concentrations of o-Xylene recorded in LF08_07 were mostly below the MDL with the exception of the June monitoring round which recorded a concentration of 1.57ug/l which is within the range of the overall dataset.

4.2.17 O-Xylene was not recorded within C4 and was only recorded during the June monitoring round within C3. with a concentration of 1.21ug/l.

4.2.18 Concentrations of EPH in LF08_07 were recorded between 613ug/l and 1360ug/l which is within the range of the overall dataset.

4.2.19 Concentrations of EPH in C2B during 2019 were recorded between 1390ug/l and 3490ug/l, which is also within the range of the overall dataset.

4.2.20 Concentrations of EPH in C3 were recorded at 1330ug/l and 1850ug/l. The concentration encountered in C4 was 1790ug/l.

Nickel and Potassium

4.2.21 **Appendices 3-7** and **3-8** present the results of Nickel and Potassium concentrations since commencement of monitoring.

4.2.22 During 2019, Nickel concentrations in C2B were recorded between 119ug/l and 213ug/l. In LF08_07 the Nickel concentrations were recorded between 93.5ug/l and 155ug/l. These concentrations are within the overall range of the datasets with no indication of any adverse trends developing. Nickel concentrations within C3 were recorded as 88.1ug/l in June and 139ug/l in September and at 81.6ug/l in C4 in September.

4.2.23 The Potassium concentrations recorded in LF08_07 were between 295mg/l and 391mg/l. In C2B the concentrations recorded were between the MDL and 670mg/l. These concentrations are within the range of the overall datasets. Potassium concentrations within C3 were recorded as 317mg/l in June and 164mg/l in September and 286mg/l in C4 in September.

4.1 Review of Potential Risks and Future Monitoring

4.1.1 The environmental monitoring data for LF08_07 and C2B indicates that the leachate chemistry has been variable throughout the 12-month monitoring period in both Cells 1 and 2, although generally the concentrations are within the range of the overall dataset for each of the parameters.

4.1.2 Samples were obtained from Cell 3 on two occasions and from Cell 4 on one occasion however, there is currently insufficient data to determine whether there are any trends developing.

4.1.3 The data is not indicative of a significant change in the leachate quality in 2019.

4.1.4 The data indicates that during 2019 there have been exceedances of the permitted leachate levels (being greater than 2m above the base) in both Cell 1 and Cell 2 in Area 2, although these are intermittent and by the subsequent monitoring round have generally been reduced below the permitted head level.

5 External Landfill Gas Monitoring

5.1 Gas Monitoring Locations

5.1.1 There are currently fifteen purpose drilled gas monitoring boreholes available around the perimeter of Area 2. The locations of the boreholes are shown on **Figure 2** and coordinates of the gas monitoring boreholes are shown within Table 5.1.

Table 5-1 Area 2 Landfill Gas Monitoring Boreholes

Gas Monitoring Borehole	Easting	Northing	Comments
GP03_06	331150	185227	-
GP06_08a	331830	185104	-
GP05_14	331172	185144	-
GP05_15	331187	185055	-
GP05_16	331153	184977	-
GP05_17	331091	184884	-
GP09_18	331033	184804	-
GP18_18A	331035	184805	New well – installed April 2018
GP18_18B	331028	184798	New well – installed April 2018
GP18_18C	331032	184795	New well – installed April 2018
GP05_20	330676	184817	-
GP05_21	330602	184887	-
GP05_22	330649	184963	-
GP12_23	330781	185028	-
GP06_24	330973	185165	Well destroyed
GP06_25	331060	185236	-

5.1.2 These boreholes all have their response zones situated in the shallow strata (the Alluvial Deposits and the Made Ground above, where it is present). Monitoring started at many of these boreholes before the commencement of landfilling in Cell 1 to enable comparison of the historical (baseline) soil gas regime around the perimeter of the site with the regime once waste disposal operations had commenced.

5.2 Monitoring Requirements and Trigger Levels

5.2.1 Landfill gas monitoring has generally been undertaken on a quarterly basis with reports being produced for NRW quarterly in accordance with Condition 3.1.7 of the Environmental Permit.

5.2.2 Trigger Levels for all the Area 2 wells have previously been submitted to and accepted by NRW. The exceptions to this are the new monitoring wells GP18_18, A, B and C that surround and are in close proximity to GP09_18. The trigger levels for these new monitoring wells are the same as for GP09_18.

5.2.3 Well-specific trigger levels for landfill gas as set out in the Environmental Permit are presented in Table 5.2 below. There are no trigger levels for carbon dioxide or methane in GP06_24 and

GP06_25 or for carbon dioxide in GP05_20 and GP05_21 – in accordance with NRW (formerly EA) requirements.

Table 5-2 Gas Monitoring Borehole Specific Trigger Levels for Area 2

Gas Monitoring Borehole	Methane (%Volume)	Carbon Dioxide (%Volume)
GP03_06	1.0	6.1
GP06_08A	1.0	2.4
GP05_14	1.0	2.2
GP05_15	1.0	10.4
GP05_16	1.0	7.7
GP05_17	1.0	13.5
GP09_18, GP18_18A, GP18_18B & GP18_18C	1.0	19.0
GP05_20	1.5	n/a
GP05_21	1.5	n/a
GP05_22	1.0	8.3
GP06_24	n/a	n/a
GP06_25	n/a	n/a

5.3 External Landfill Gas Monitoring

Methane

5.3.1 **Appendices 4-1, 4-2**, **4-3 and 4-4** present the results of Methane concentrations in the Area 2 gas monitoring wells since commencement of monitoring.

5.3.2 **Appendix 4-1** indicates that the majority of the Area 2 wells did not typically detect Methane above the trigger level of 1% during 2019. The exceptions to this are GP05_17 and GP05_15, where Methane was recorded above the 1% trigger level. In GP05_17 the exceedances were recorded during the March, June and September monitoring rounds, with recorded concentrations of 5.7%, 3.0% and 3.3% respectively. In GP05_15 the exceedance was recorded in the December monitoring round with a concentration of 2.5%.

5.3.3 **Appendix 4-2** presents the Methane concentrations in GP06_24 and GP06_25, constructed on the Area 2 side of the in-ground barrier installed between Area 1 and Area 2. Methane concentrations have typically fluctuated significantly in GP06_24 since mid-2008 and in GP06_25 since the start of 2012.

5.3.4 GP06_24 was not monitored during 2019 due to the well being destroyed by site activity.

5.3.5 GP06_25 was monitored four times during 2019 (quarterly - March, June, September and December). On the four visits the Methane concentrations were recorded in the range 27.4%v/v to 62.9%v/v which are within the overall range for the dataset.

5.3.6 **Appendix 4-3** presents the methane concentrations at GP09_18 and three surrounding monitoring wells GP18_18A, GP18_18B and GP18_18C. In late 2016 the methane (and carbon dioxide) concentrations at GP09_18 started to rise significantly and therefore the three additional monitoring wells were installed in 2018 at locations surrounding the original monitoring location. The new monitoring wells have been included as part of the monitoring programme for Area 2 since June 2018.

5.3.7 In 2019, GP09_18 has recorded methane concentrations of between about 0%v/v and 31.2%v/v. In comparison, GP18_18A was monitored on three occasions and recorded a methane concentration of between 48,2%v/v and 59.1%v/v. GP18_18B was monitored on four occasions and recorded methane concentrations between 74.9%v/v and 91%v/v. GP18_18C was also monitored on four occasions and recorded methane concentrations between 56.5%v/v and 86.5%v/v.

5.3.8 At the current time the reason for the elevated methane concentrations at this location are unknown. However, in 2019 concentrations of methane at the closest monitoring well to GP09_18 (GP05_17) have also started rising and on three of the four monitoring rounds, the methane concentrations exceeded the trigger level and were the highest recorded at this location, although they still remained significantly below the concentrations recorded at GP18_18A, B and C.

5.3.9 We are currently in consultation with NCC regarding the investigation process to identify the potential causes of the elevated methane.

5.3.10 **Appendix 4-4** indicates that concentrations of Methane in GP05_21 were recorded below the 1% trigger level throughout 2019. In GP05_20 elevated concentrations of Methane above the 1% trigger level were recorded during the June and December monitoring rounds, with concentrations of 6.1%v/v and 5.3%v/v respectively.

Carbon Dioxide

5.3.11 Carbon Dioxide concentrations have generally varied with time since the commencement of the landfill gas monitoring programme in the perimeter monitoring wells within Area 2. Graphs indicating the Carbon Dioxide concentrations recorded over time and showing well specific trigger levels are presented in **Appendices 4-5** to **4-16**.

5.3.12 In all of the monitoring wells where trigger levels have been set, the Carbon Dioxide concentrations have all been recorded below the well-specific trigger level during 2019.

5.3.13 In GP09_18 the concentrations of carbon dioxide started rising in late 2016, the same as for methane (see above), but without exceeding the trigger level, However, the carbon dioxide concentrations appear to have stabilised during 2019 and have not exceeded the trigger level during any monitoring round.

5.3.14 At the remaining locations, the carbon dioxide concentrations recorded during 2019 are generally within the typical range for the datasets and are not indicating that adverse trends are developing,

5.4 Review of Risks and Future Monitoring

5.4.1 The data for GP09_18 and GP18_18A, B and C indicates continued elevated methane concentrations at this location. In addition, the closest monitoring well to GP09_18, GP05_17, has also recorded a trend of rising concentrations of methane during 2019. This will be discussed with NCC to identify an investigative process to determine the cause of the rising methane.

5.4.2 With the exception of GP09_18 (discussed above), the only monitoring locations that have consistently recorded significant Methane concentrations are GP06_24 since 2006 and GP06_25 since 2012. These wells are located some considerable distance away from the part of the Area 2 site that has to date been used for waste disposal. The elevated Methane concentrations recorded at GP06_24 were present at the time that the in-ground gas barrier was constructed (separating the Area 1 and Area 2 sites) and may therefore represent background concentrations, or natural gas in the Alluvium. However, this monitoring well has been subsequently destroyed due to site activities during 2018, and therefore no further data can be collected at this location. It is not currently known why Methane concentrations in GP06_25 started fluctuating in 2012, however this will continue to be closely monitored and reported to NRW during 2020.

5.4.3 Landfill gas will continue to be monitored on a quarterly basis and gas conditions will continue to be reported to NRW on a quarterly basis in accordance with the Environmental Permit.

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 landfills. It currently comprises one 1MW Jenbacher (320) engine together with one 1500m^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 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**.

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, and the data collected over the last 12 months has been reported directly to NRW by Infinis.

6.2 Landfill Gas Extraction

6.2.1 In 2019, the total production of energy from the Landfill Gas Utilisation Plant was 5126MWh with a site efficiency of 30.9%. In 2018 by comparison, the total production of energy was 5938MWh with a site efficiency of 33%. The total energy produced, and efficiency has decreased slightly from 2018 to 2019.

6.2.2 Engine downtime in 2019 was 962 hours, compared to 773 in 2018 which represents an increase in engine downtime. Engine operation time in 2019 was 7798 hours which is a marginal reduction from the 7987 hours in 2018.

6.2.3 The flare operated in 2019 during periods when the engine was not operational. The flare was operating for 1107 hours during 2019 based on the availability of the engine, compared to 778 hours in 2018. This is an increase from 2018.

6.2.4 Environmental Performance Indicators, provided by Infinis Energy, indicate that there has been a increase in Carbon Monoxide emissions in 2019 (15.7kg/MWh) compared to 2018 (4.6kg/MWh), and total Oxides of Nitrogen emissions also increased in the same period (7.8kg/MWh in 2019, compared to 2.1kg/MWh in 2018). Emissions data critically depends on a number of factors including run hours of engines and availability of landfill gas to them, and whilst they are presented as EPI they should be treated with caution. The Annual Report provided by Infinis is presented in **Appendix 5**.

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 the flare was not subject to emissions testing in 2019 as the flare 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.

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:	**kg/year**
Disposed of off-site (Area 2)	13,576,320
Disposed of to any onsite effluent treatment plant	None
Re-circulated into the waste mass	None
Surface water and/or groundwater:	**Cubic metres/year**
Disposed of off site	N/A
Disposed of to any onsite effluent treatment plant	None
Landfill Gas: (Whole site)	**Normalised cubic metres/year**
Combustion in flares	484,812
Combustion in gas engines	2,953,545
Other methods of gas utilisation	None

7.2 Performance Parameters

Table 7-2 Performance Parameters

Parameter	Frequency of Assessment	Annual Total	Unit
Potable Water Use	Annually	1,637	Cubic metres
Energy Used (including for leachate treatment, excluding electricity generated)	Annually	178,666	kWh of electricity
Non Potable Water Use	Annually	0	Cubic metres

7.3 Topographic Surveys

7.3.1 The surface of Area 2 of Docksway Disposal Site was surveyed during December 2019 and the results of the survey are presented in **Appendix 6**.

7.3.2 It has been calculated by NCC that 91,025m^3 of waste was placed in the non-hazardous Cells in Area 2 (15 month period October 2018 to December 2019), and this is similar to 2018 when 90,947m^3 of waste was placed in Cells 2 and 3B (in the 12 month period Jan to Dec 2018).

7.3.3 It has also been calculated by NCC that a total of 22,996m^3 of SNRHW was placed in Cell 3A (15 month period October 2018 to December 2019), an increase from 17,717m^3 in the 12 month period Jan to Dec 2018. As of December 2019, the cumulative waste volume deposited in Area 2 (excluding Cell 3A) was 1,096,293m^3, and in Cell 3A was 54,139m^3.

7.3.4 The maximum elevation of Area 2 was 32m (Cell 1) Above Ordnance Datum (mAOD) as of December 2019.

7.3.5 The cross sections provided indicate that the slope angles of the external waste slopes are in accordance with permitted slope angles (no greater than 1:4).

8 Conclusions

8.1 Assessment of Environmental Performance Trends

8.1.1 This document reviews the environmental data from the last 12 months and also provides an indication of data trends both over the last 12 months and since the various monitoring programmes commenced.

8.1.2 Surface water monitoring indicates generally stable trends since the previous Environmental Performance Review, with no evidence of significant adverse trends developing. On the two occasions that SW26 was monitored in 2019, the recorded parameters were within the discharge consent limits. On the five occasion that SW25 was monitored in 2019, the recorded parameters were within 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 12 months.

8.1.3 Data from the groundwater monitoring wells in Area 2 indicate generally stable trends in the groundwater chemistry since the previous Environmental Performance Review. A small number of intermittent exceedances of compliance limits were recorded in some monitoring wells, however, these are not generally considered to represent a significant risk to the groundwater quality because they are not consistently exceeding the compliance limits at the current time. On the basis of the data available, it is considered that there has been no significant deterioration of the groundwater quality in the last 12 months and there is no indication of adverse trends developing.

8.1.4 The data indicates that during 2019 there have been intermittent exceedances of the permitted leachate levels (of 2m above the base) in Cells 1 and 2 in Area 2, however the levels have generally been reduced within the permitted levels in subsequent rounds.

8.1.5 The environmental monitoring data for LF08_07 and C2B indicates that the leachate chemistry has been variable throughout the 12-month monitoring period in both Cells 1 and 2, although generally the data is within the typical range for each of the parameters and is not indicative of a significant change in the leachate quality in 2019. Samples were obtained from Cell 3 on two occasions and from Cell 4 on one occasion, however there is currently insufficient data for these locations to determine trends.

8.1.6 External landfill gas concentrations at Area 2 are predominantly indicating generally stable trends in methane and carbon dioxide. However, the data for GP09_18 and GP18_18A, B and C indicates continued elevated methane concentrations. In addition, the closest monitoring well to GP09_18, (GP05_17), has recorded a trend of rising concentrations of methane during 2019.

8.2 Future Monitoring Requirements

8.2.1 It is intended that the Docksway Disposal Site Area 2 monitoring programmes shall continue in line with the Environmental Permit requirements (and as approved by NRW), providing data which will enable the ongoing assessment of the environmental performance of the site and the provision of environmental performance reports on an annual basis

9 References

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

[2] PBA (2004). Docksway Disposal Site, Newport. Monitoring Plan for Area 2: Landfill Extension. Peter Brett Associates LLP report reference 14739/010B/CBH. October 2004.

[3] PBA (2010) Docksway Disposal Site, Newport. Review of the Hydrogeological Risk Assessment for Area 2. Peter Brett Associates, December 2010.

[4] PBA (2018) Docksway Disposal Site, Annual Environmental Review for Area 2 - 2018. Peter Brett Associates, February 2019.

10 Guidance for Readers of the Report

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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Figure Number
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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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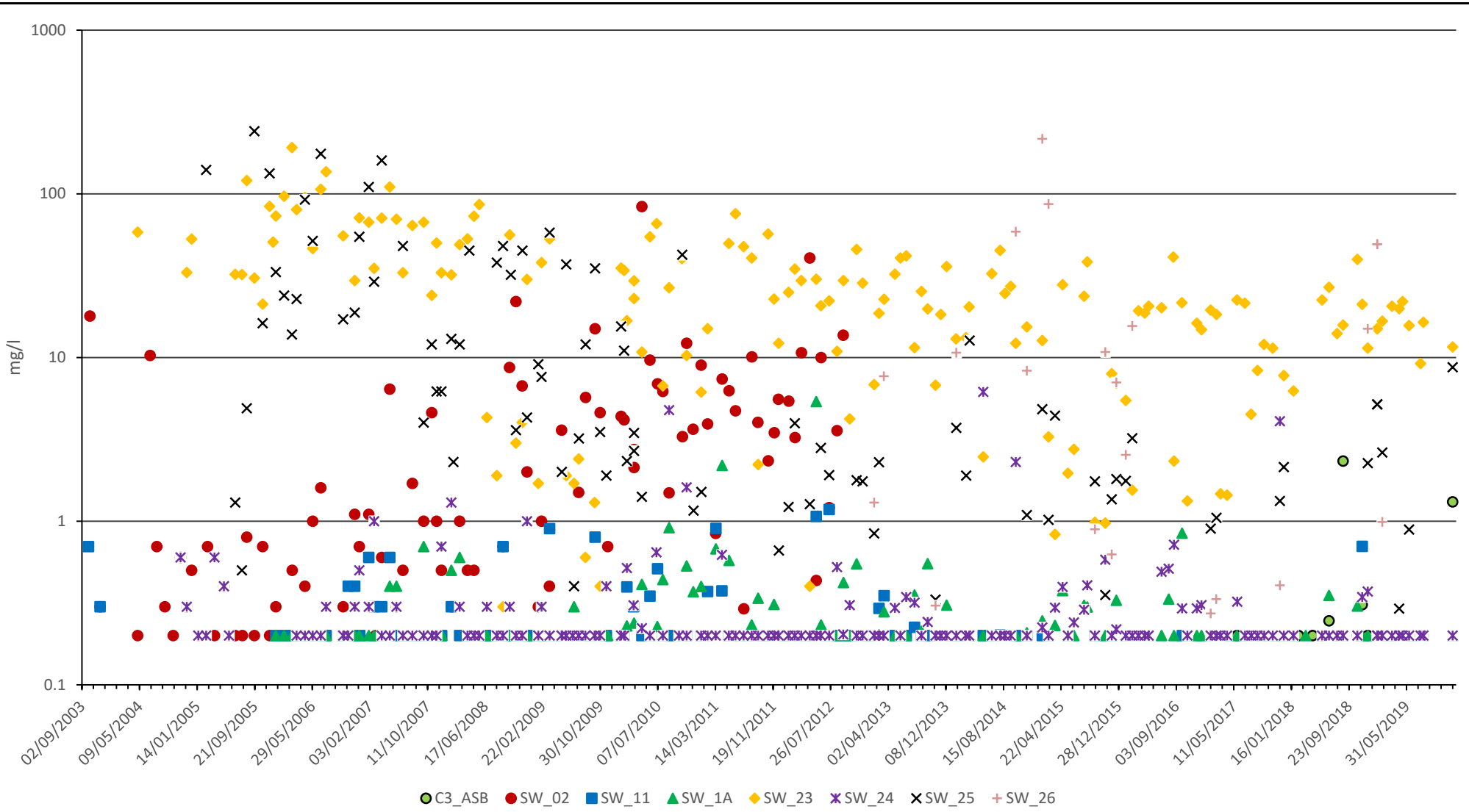
Appendix 1 Surface Water Chemistry Graphs



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Docksway Disposal Site

Ammonical Nitrogen in Surface Water

Date	January 2020
A4 Scale	nts
Drawn	NC
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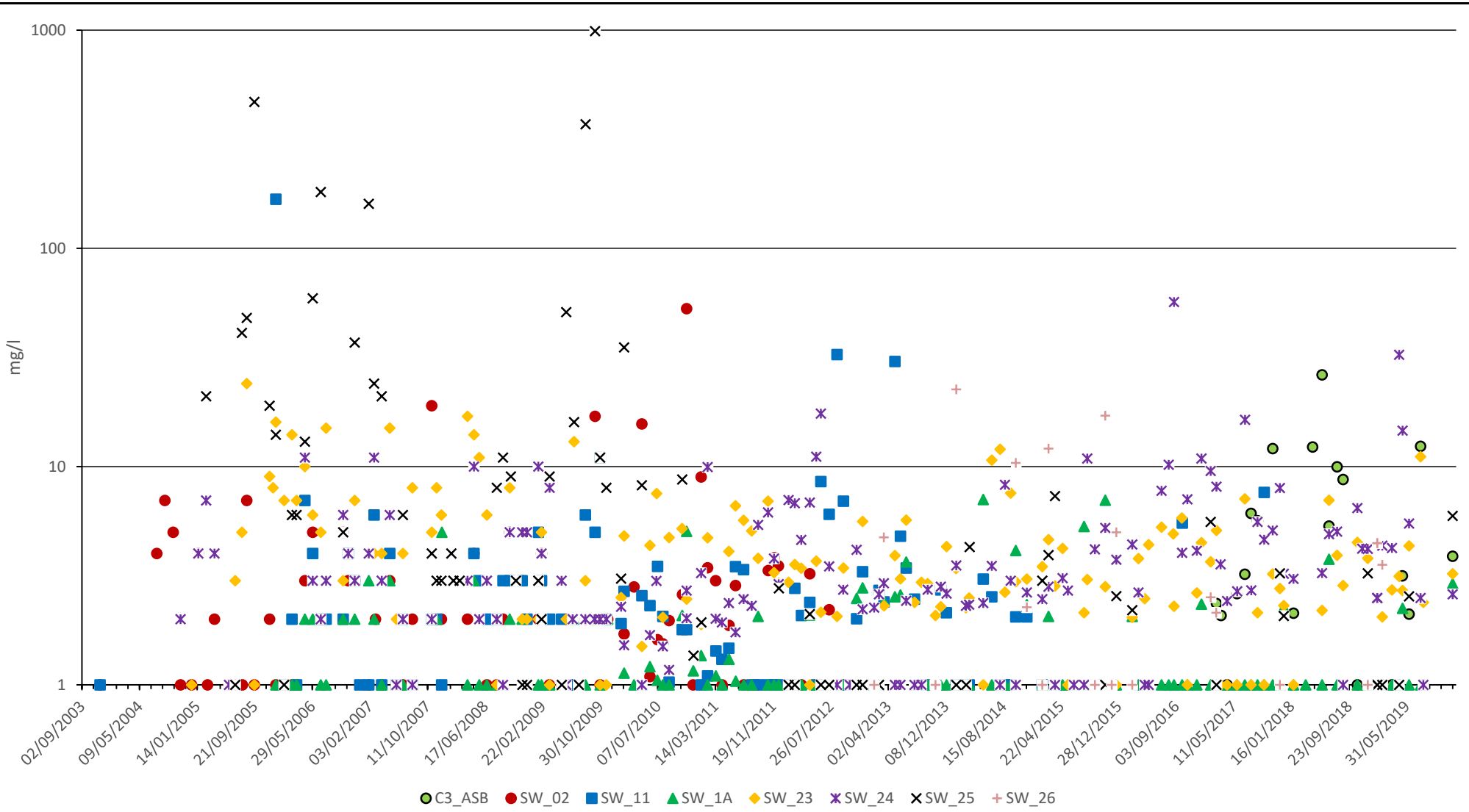
Appendix

1-1

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 1 - Surface Water\[1-1 Ammonixal Nitrogen SW.xlsm]Summary



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Biochemical Oxygen Demand in Surface Water

Date	January 2020
A4 Scale	nts
Drawn	NC
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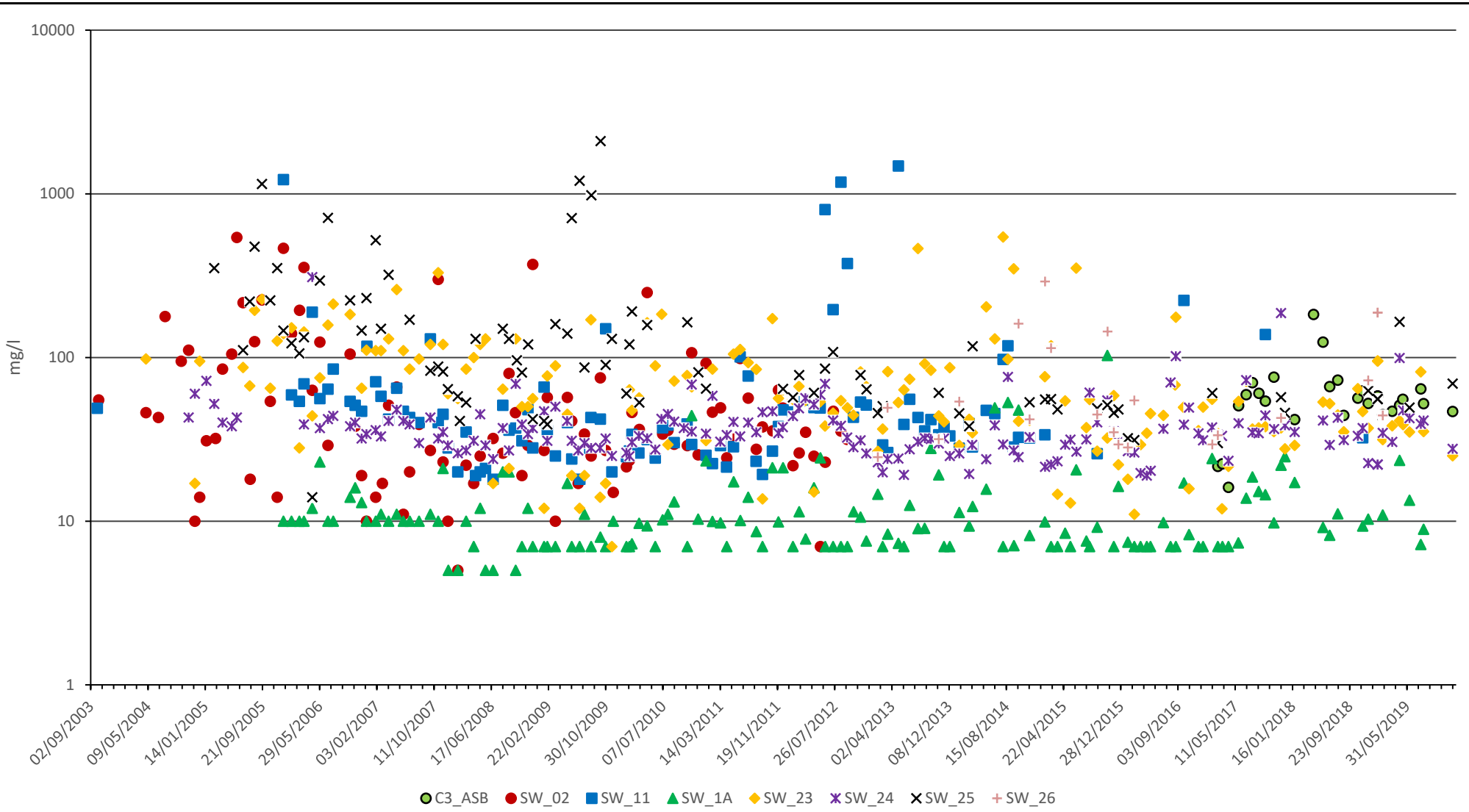
Appendix

1-2

J:\14739\AEPRs\AEPR Area 2\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
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Appendix

1-3

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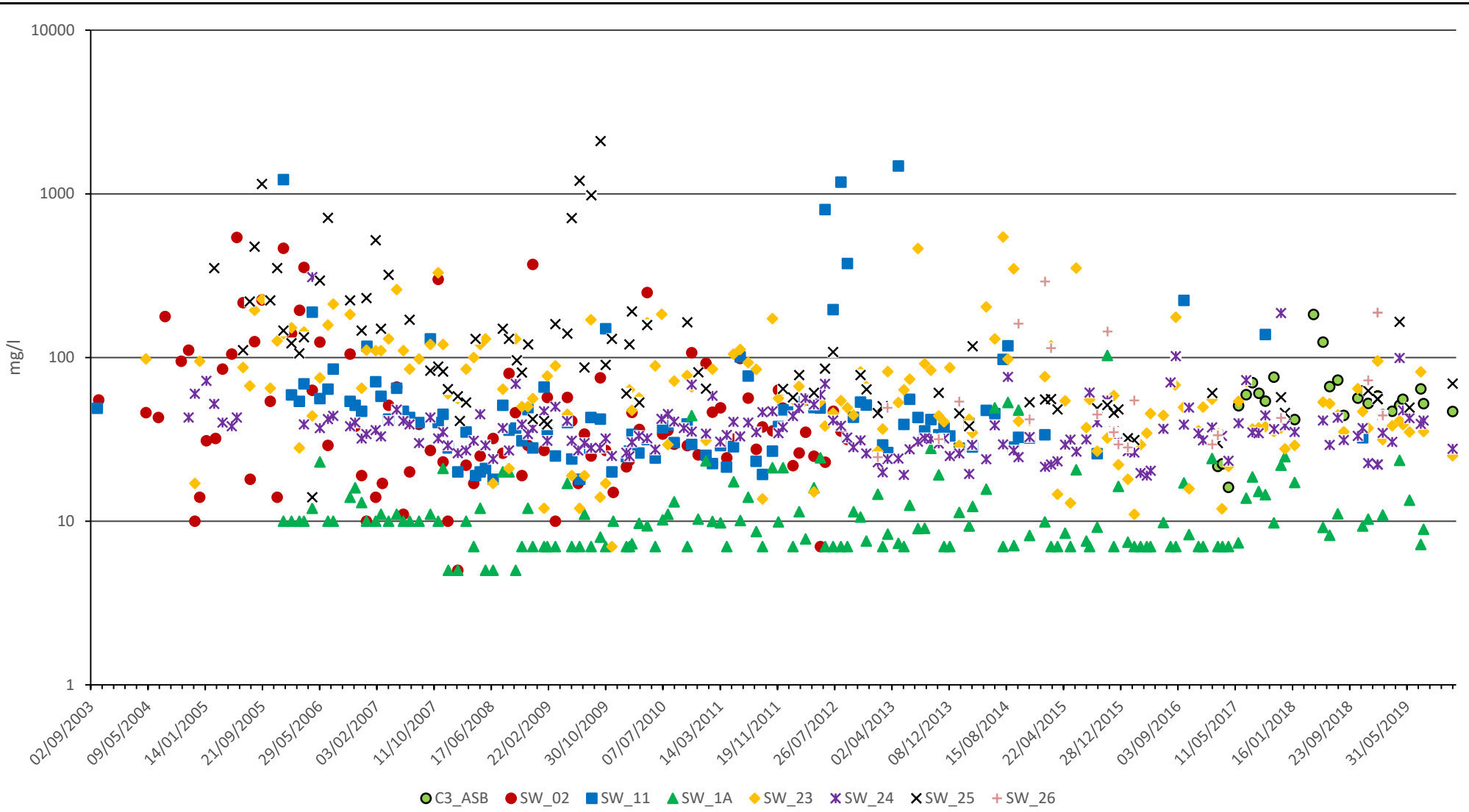

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Chemical Oxygen Demand in Surface Water

Date	January 2020
A4 Scale	nts
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Appendix

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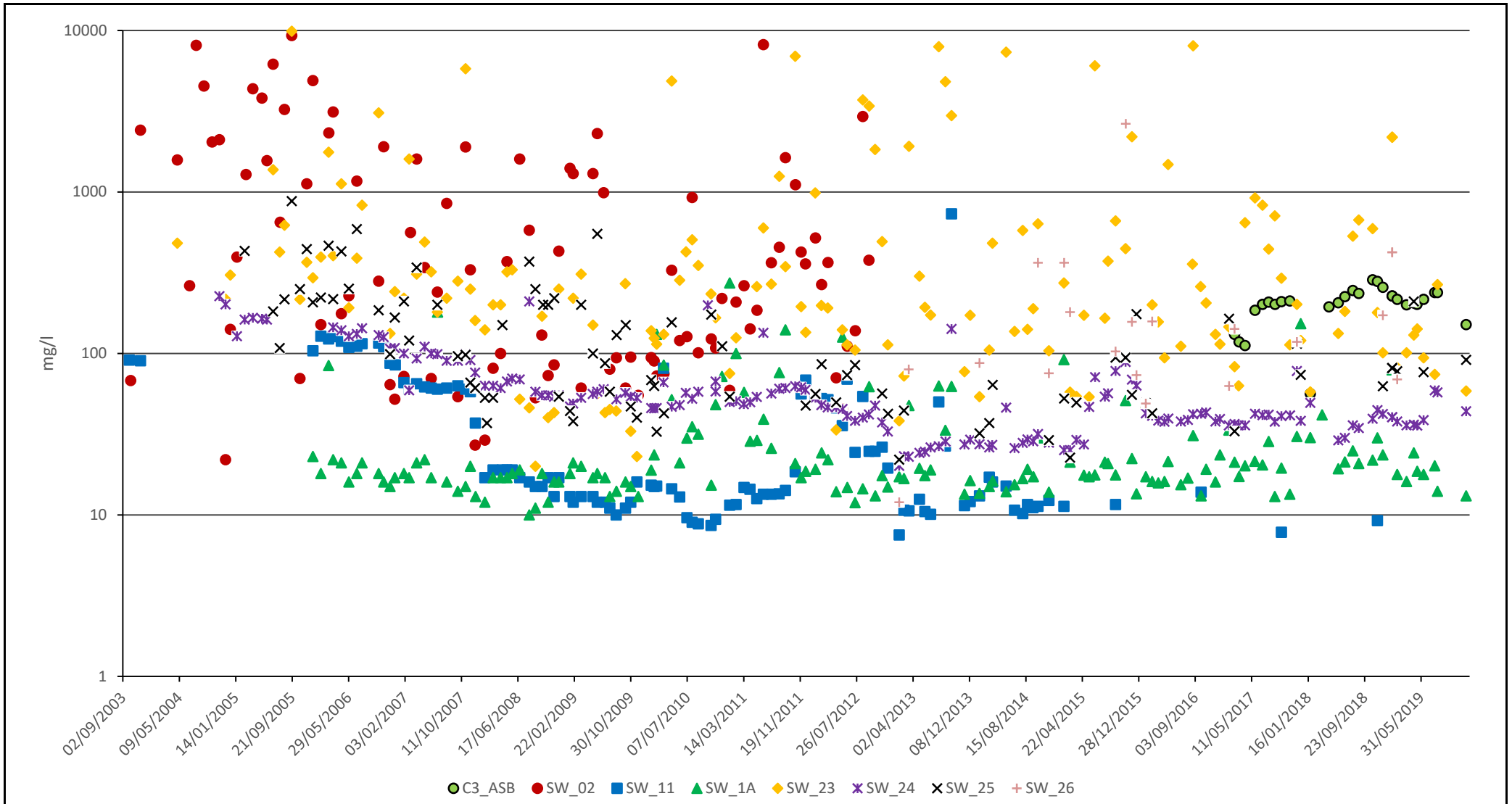

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Docksway Disposal Site

Chloride in Surface Water

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

1-4

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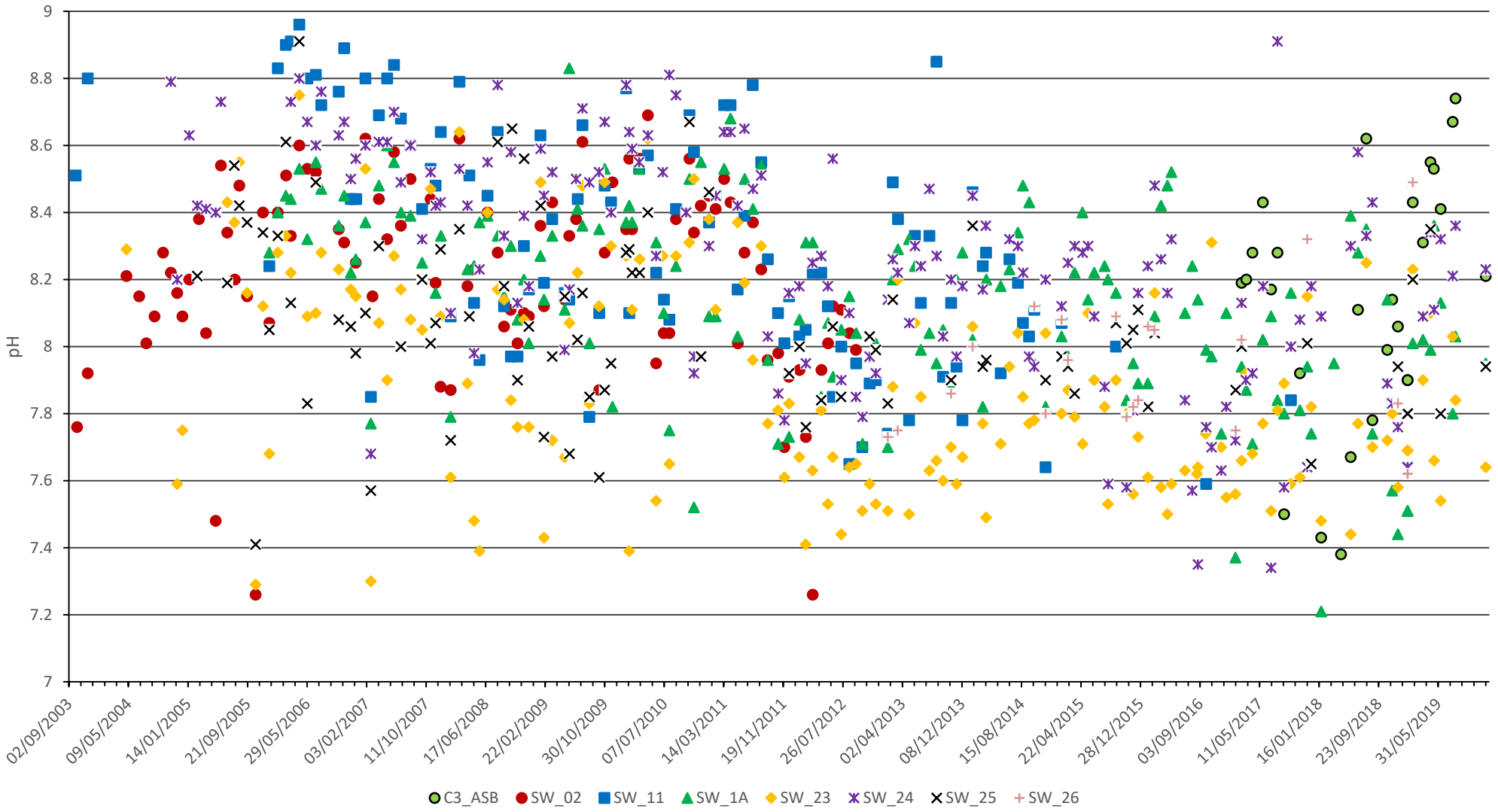

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Docksway Disposal Site

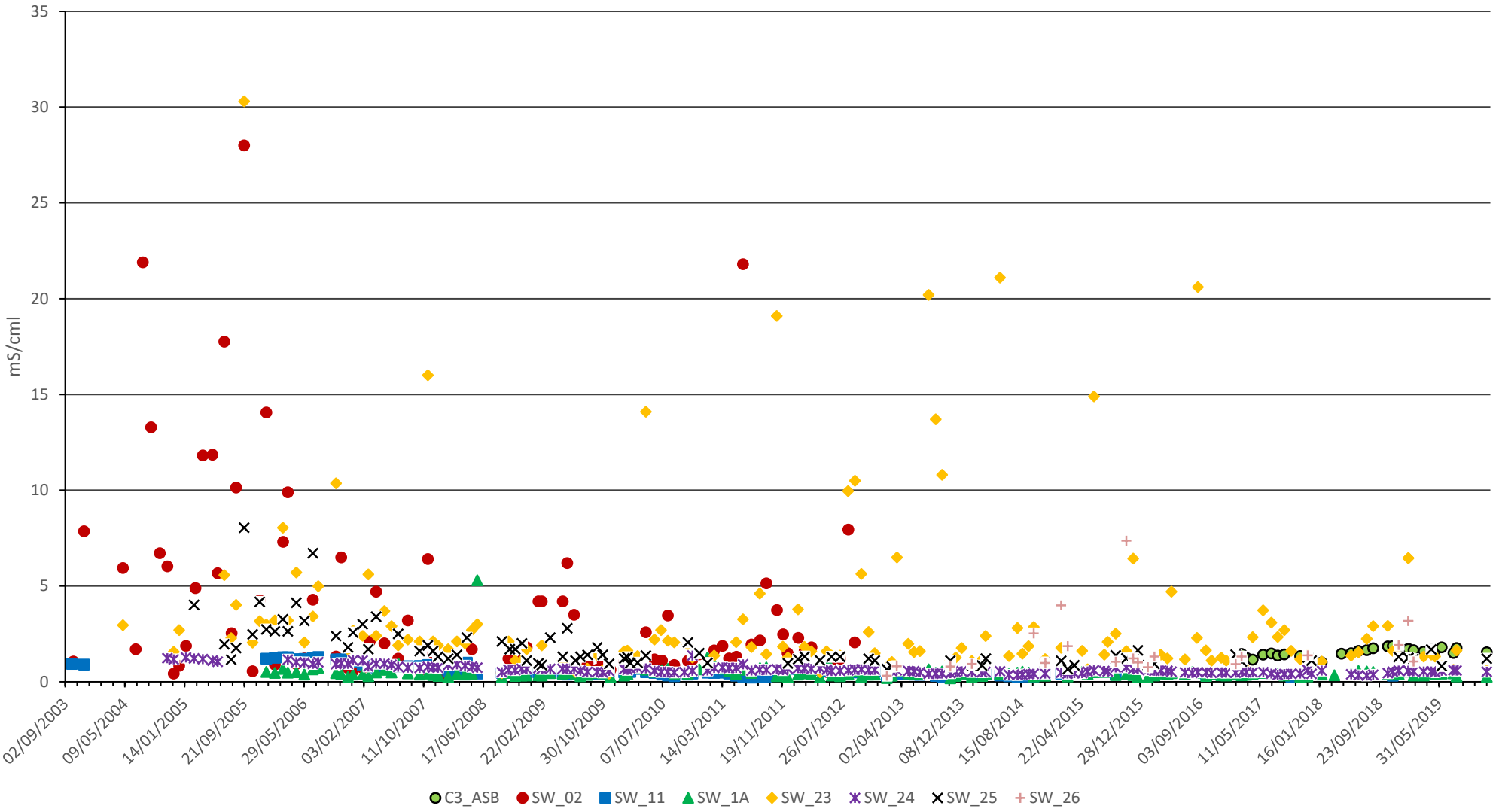
pH in Surface Water

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

1-5

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 1 - Surface Water\[1-5 pH SW.xlsm]Summary



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Docksway Disposal Site

Electrical Conductivity in Surface Water

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

1-6

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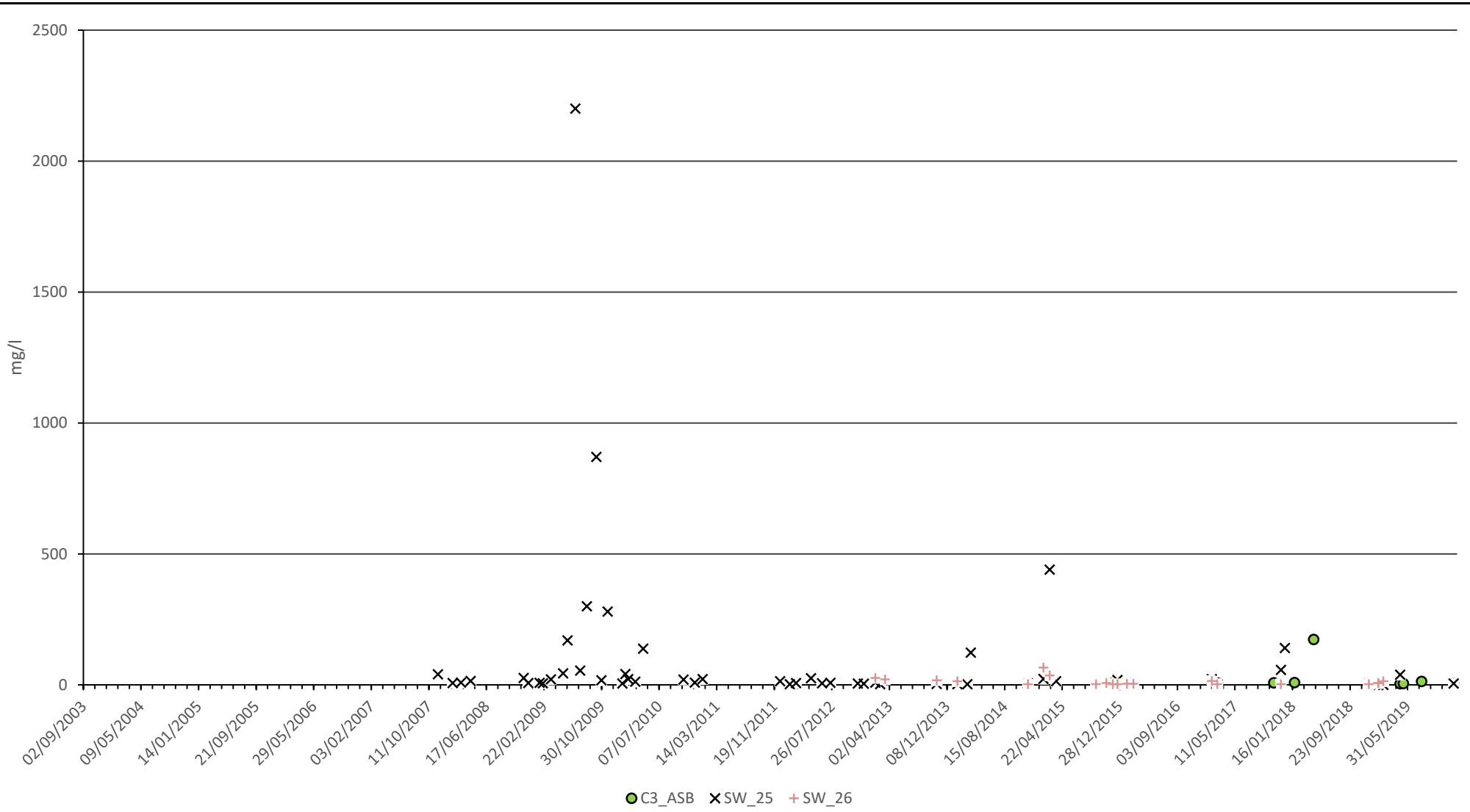

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Docksway Disposal Site

Total Suspended Solids in Surface Water

Date	January 2020
A4 Scale	nts
Drawn	NC
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Appendix

1-7

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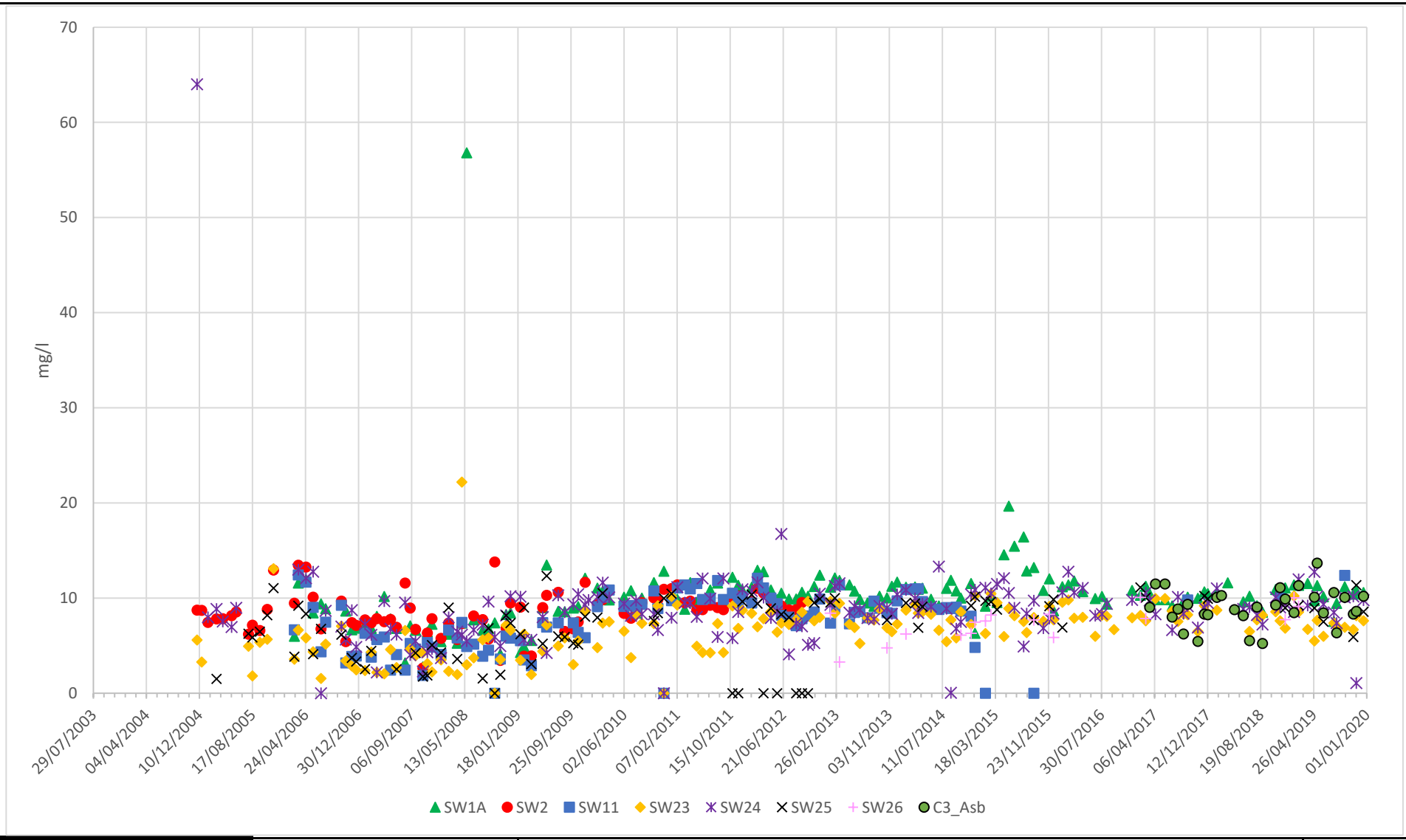

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Docksway Disposal Site

Dissolved Oxygen in Surface Water

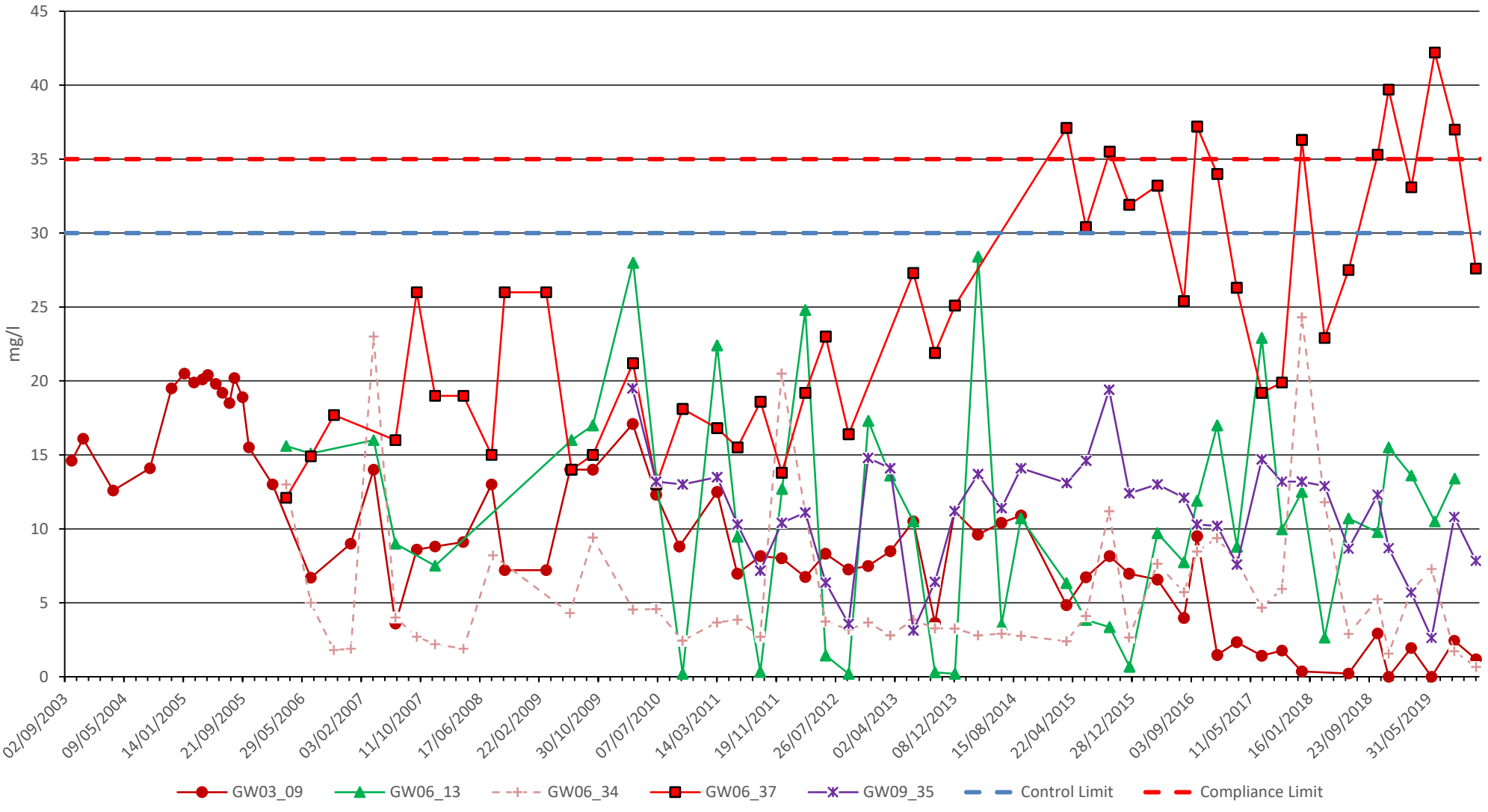
Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

1-8

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 1 - Surface Water\[1-8 DO Graph SW.xlsm]Summary

Appendix 2 Groundwater Chemistry Graphs



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Docksway Disposal Site

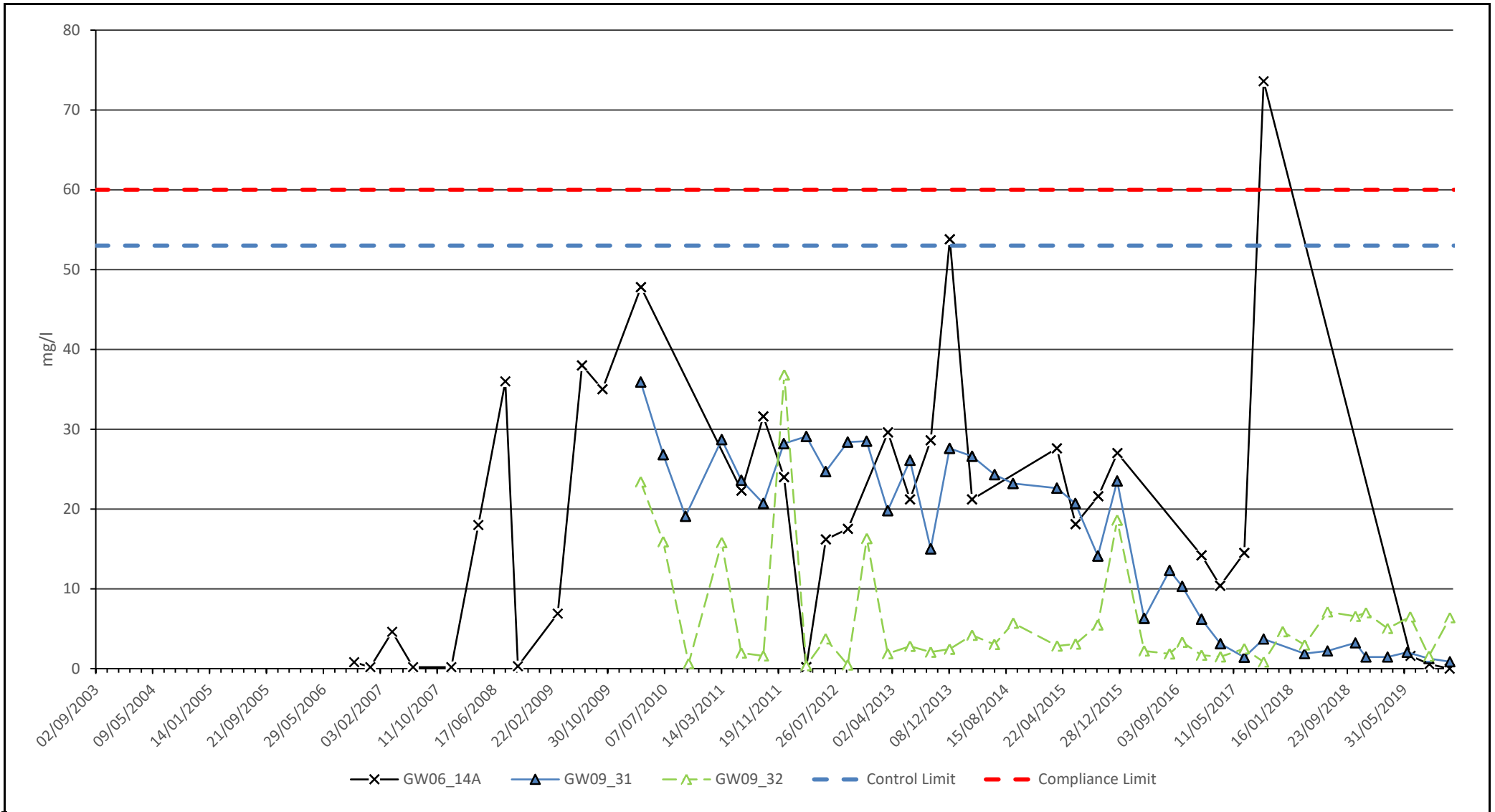
Ammoniacal Nitrogen in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-1

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-1 Ammoniacal Nitrogen GW.xlsm]Summary



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Docksway Disposal Site

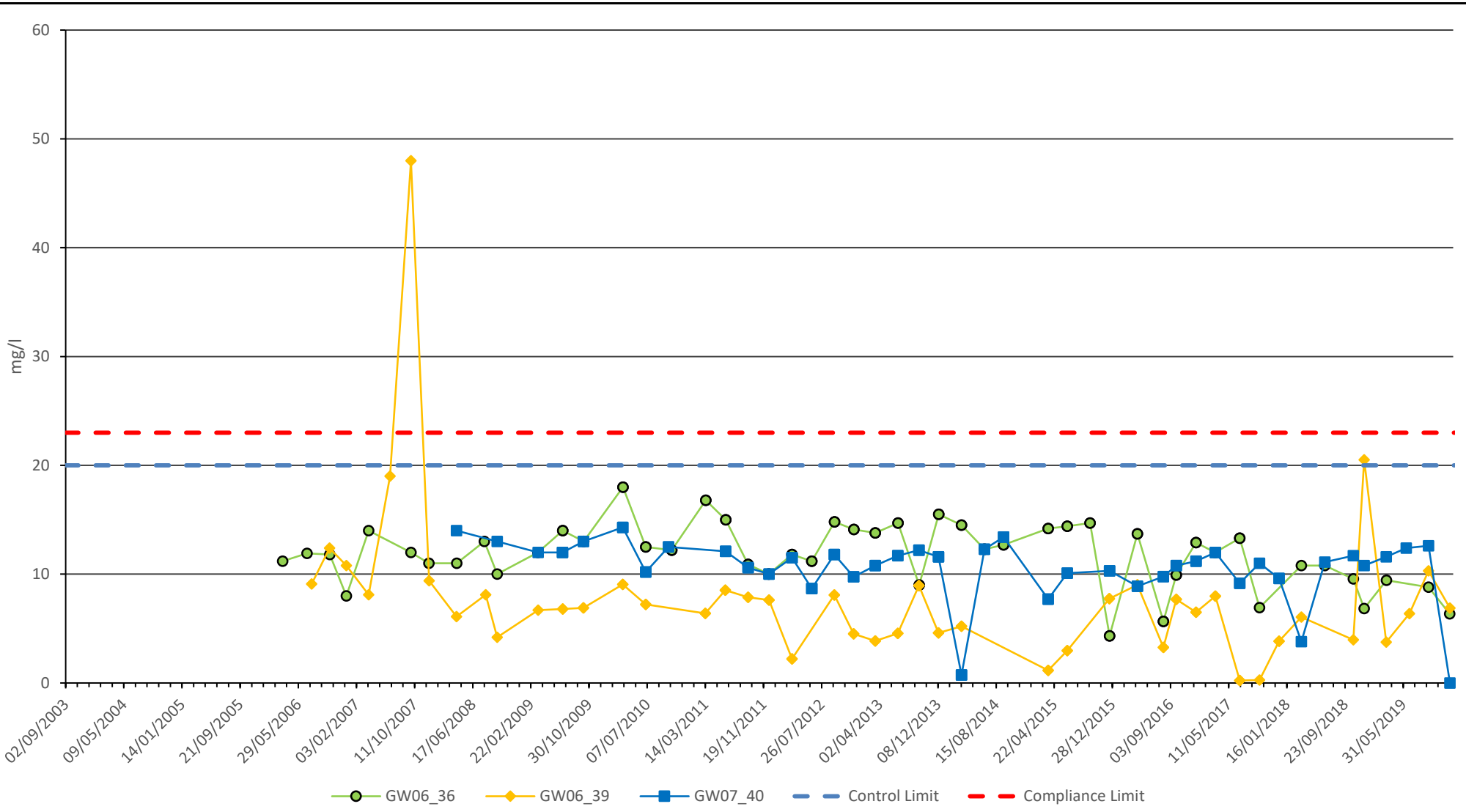
Ammonical Nitrogen in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-2

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-2 Ammoniacal Nitrogen GW.xlsm]Summary



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Docksway Disposal Site

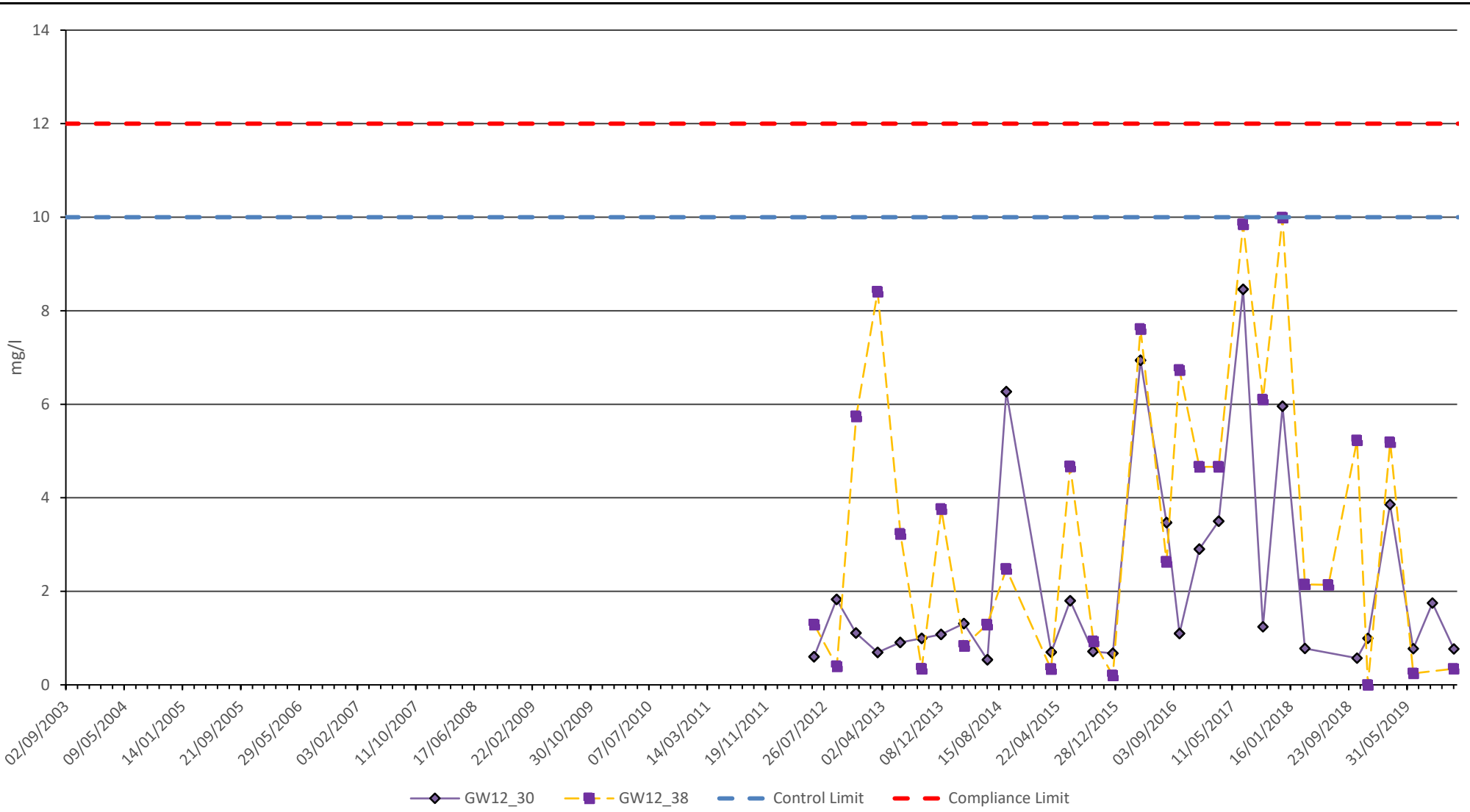
Ammoniacal Nitrogen in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-2

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-3 Ammoniacal Nitrogen GW.xlsm]Summary



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Docksway Disposal Site

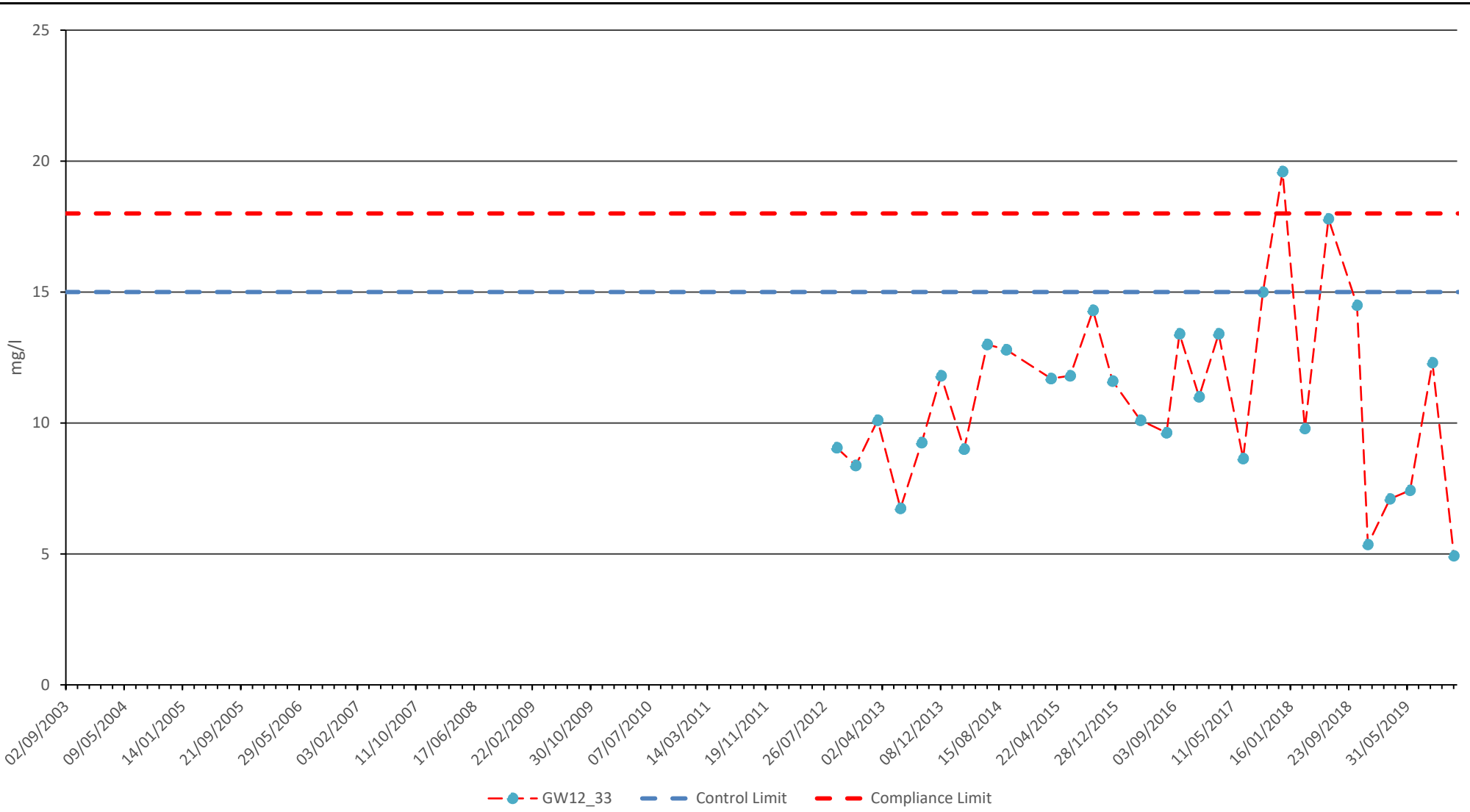
Ammoniacal Nitrogen in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-4

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-4 Ammoniacal Nitrogen GW.xlsm]Summary



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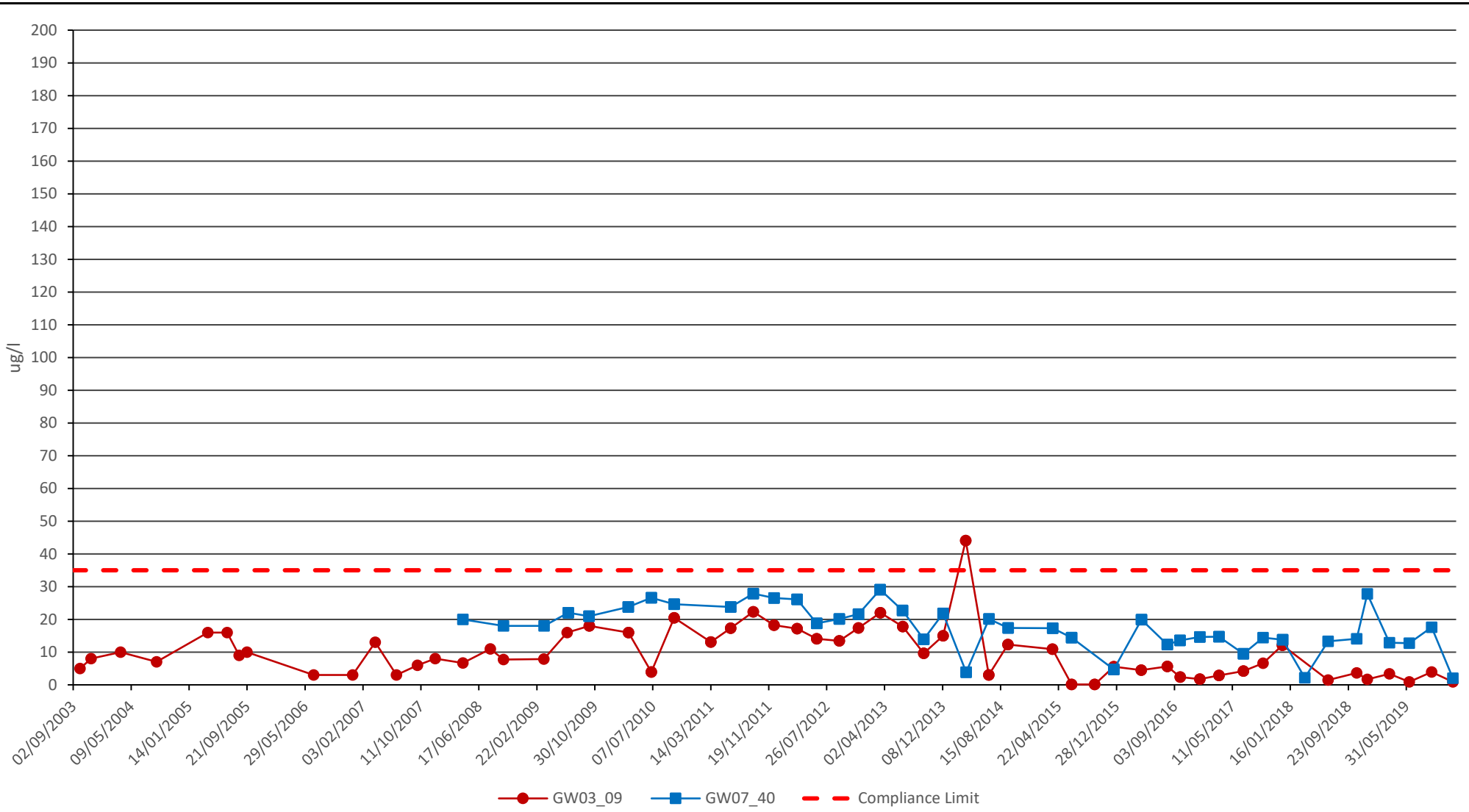
Ammoniacal Nirtogen in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-5

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-5 Ammoniacal Nitrogen GW.xlsm]Summary



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Docksway Disposal Site

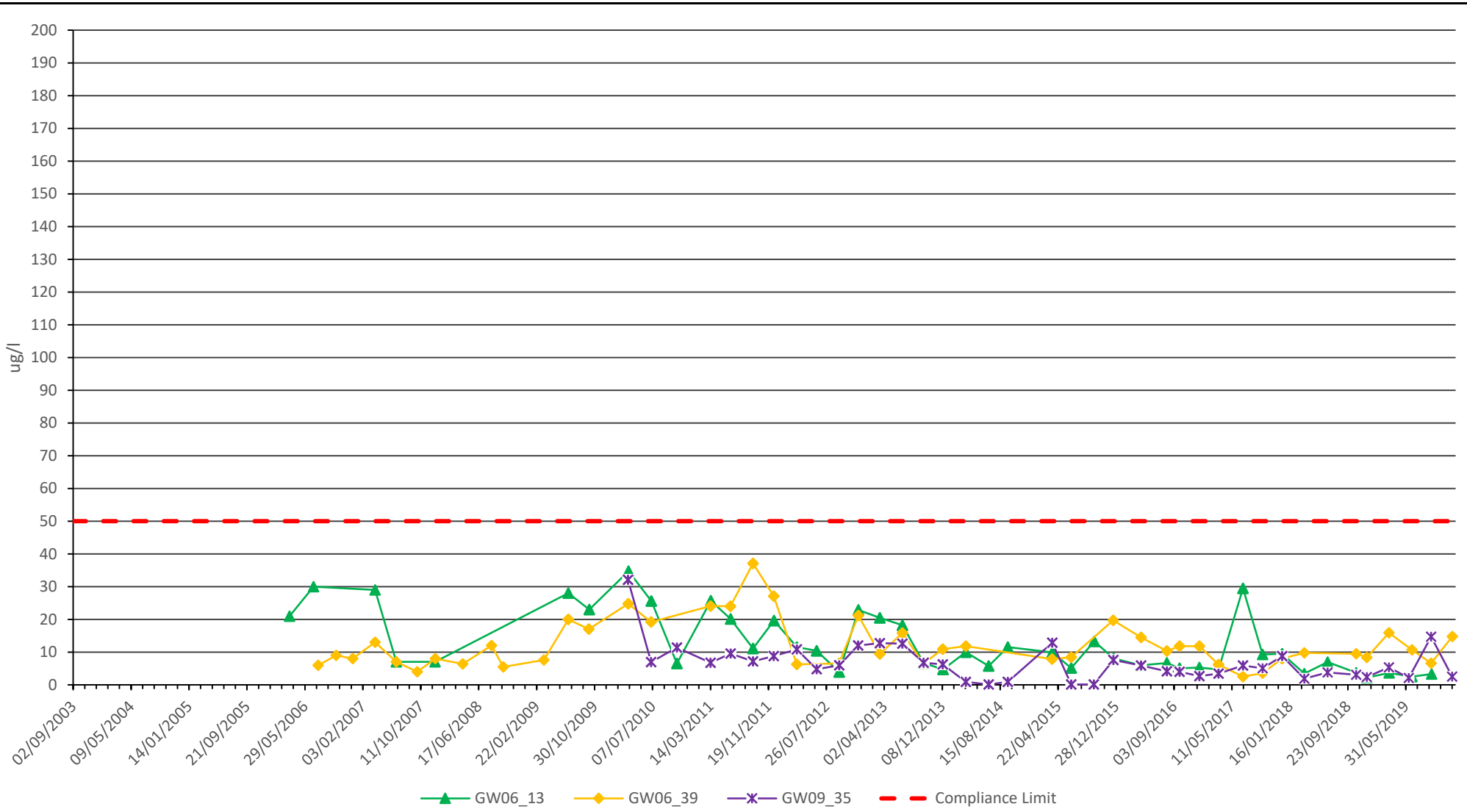
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-6

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-6 Arsenic GW.xlsm]Summary



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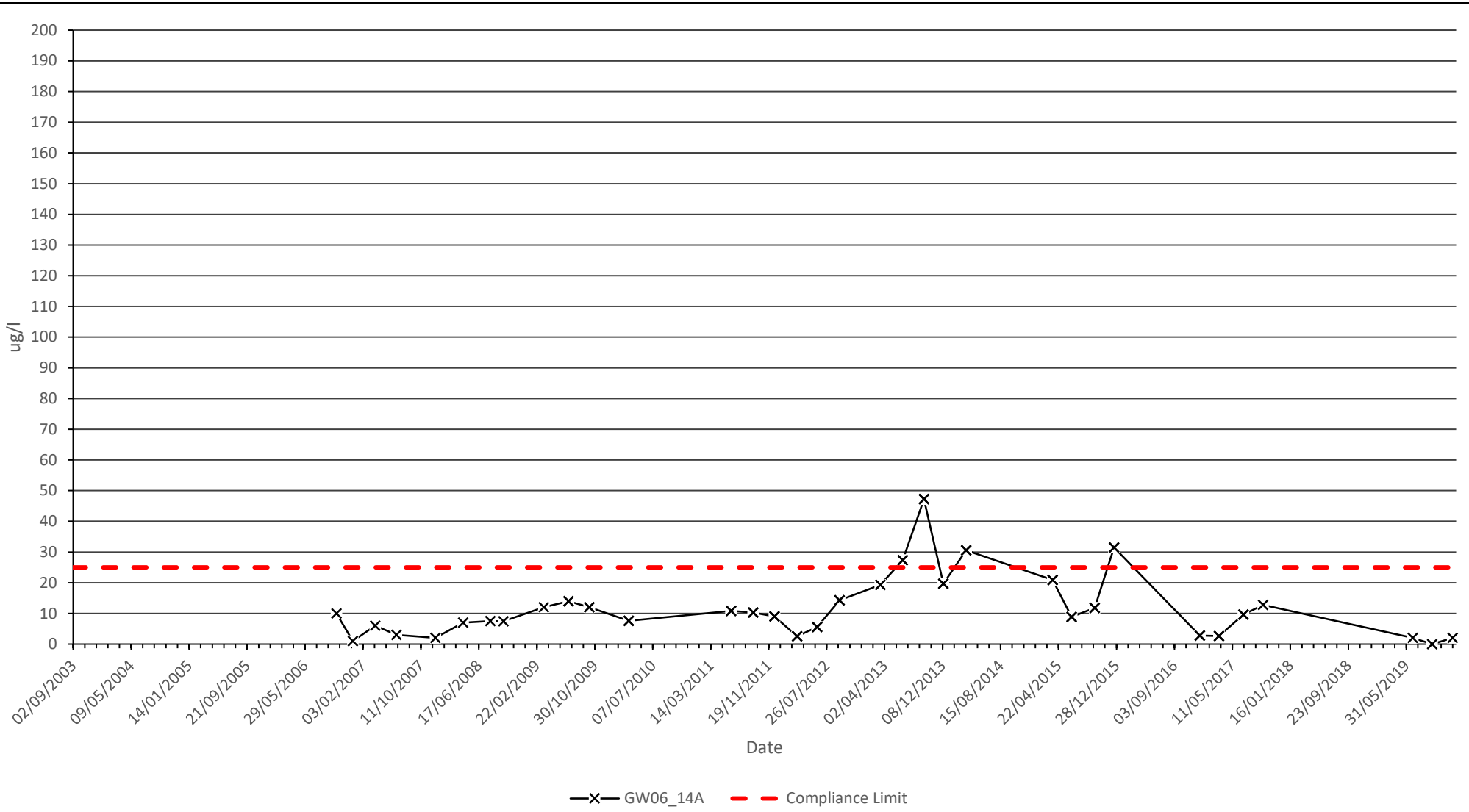
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-7

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-7 Arsenic GW.xlsm]Summary



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Docksway Disposal Site

Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-8

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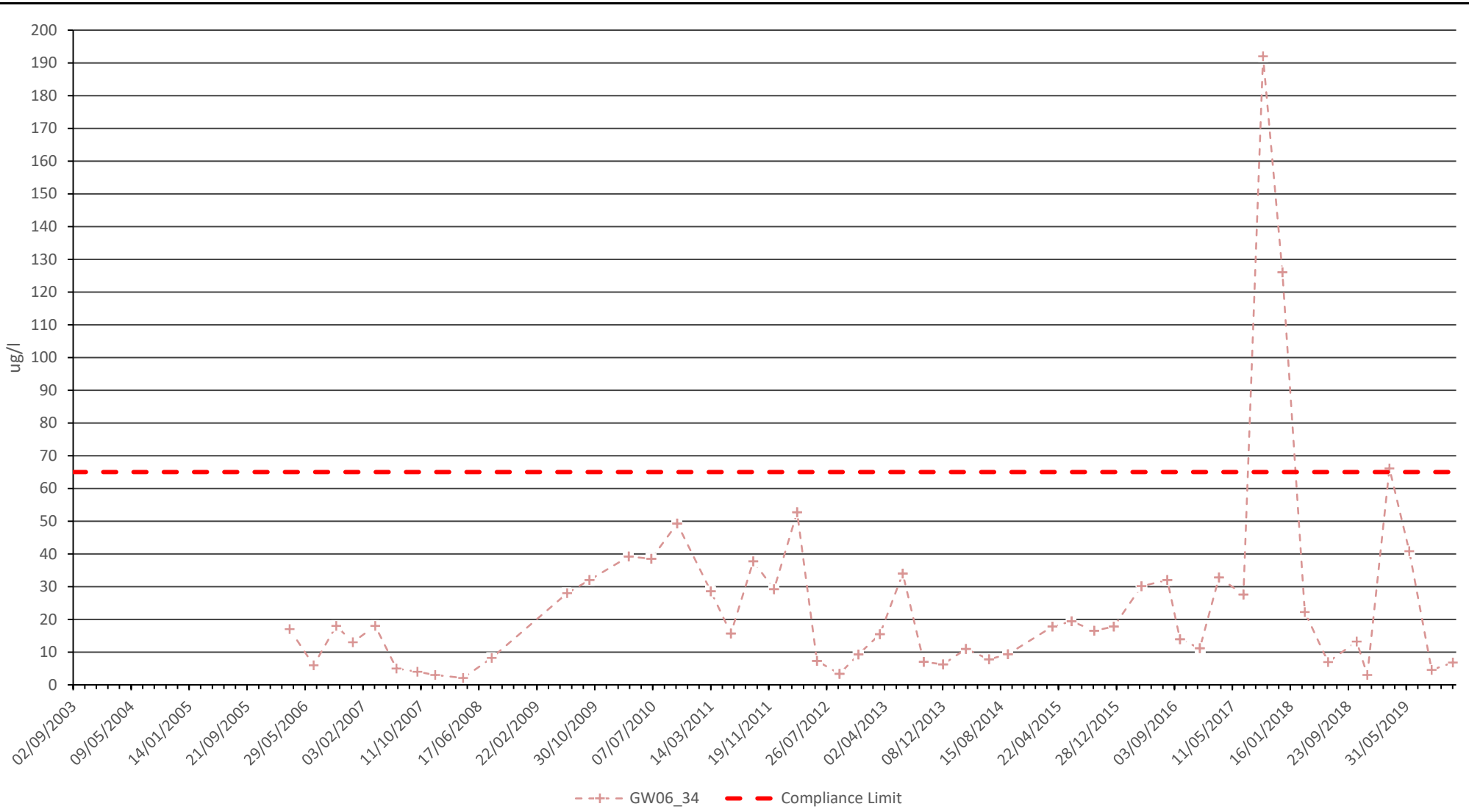

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Docksway Disposal Site

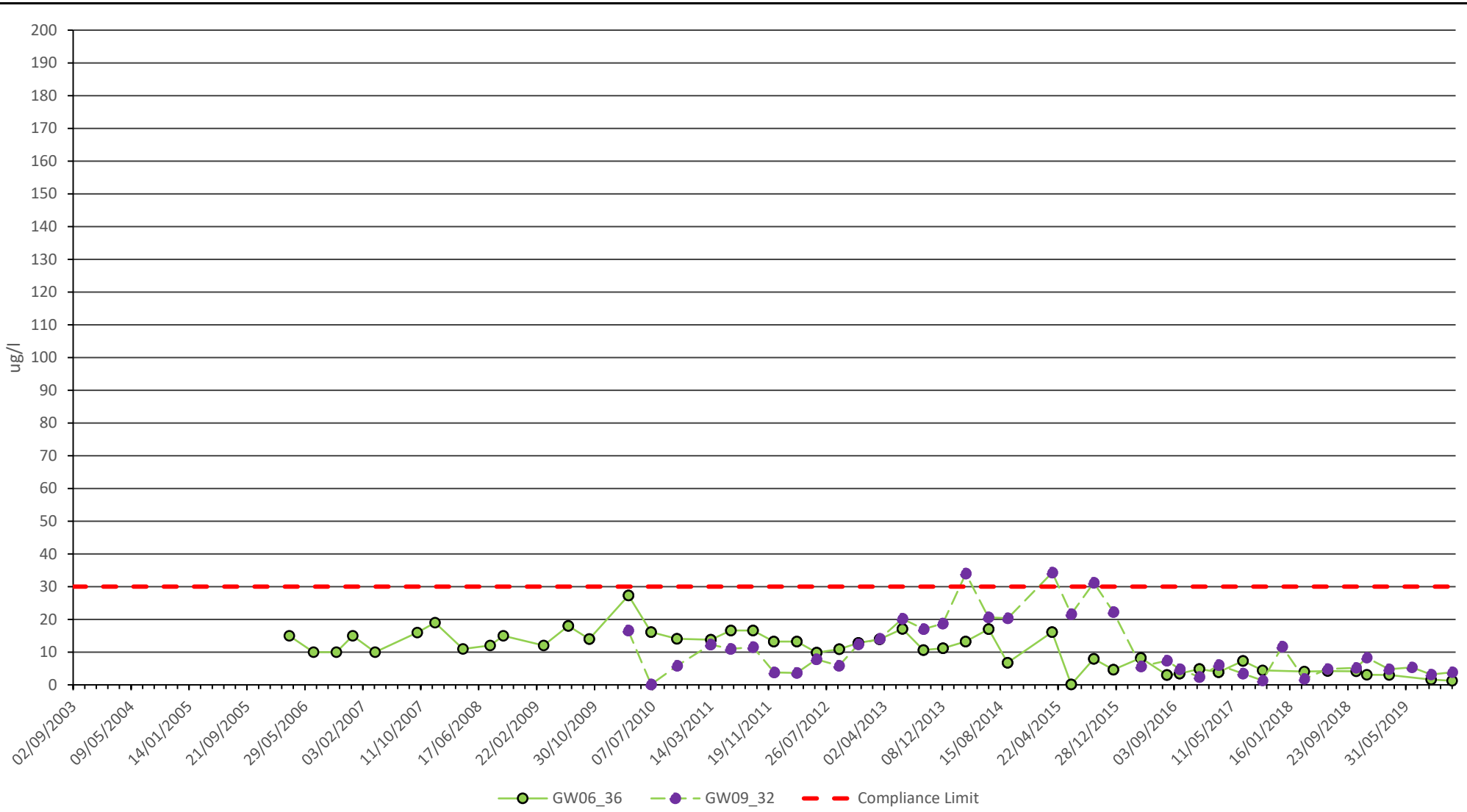
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-9

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-9 Arsenic GW.xlsm]Summary



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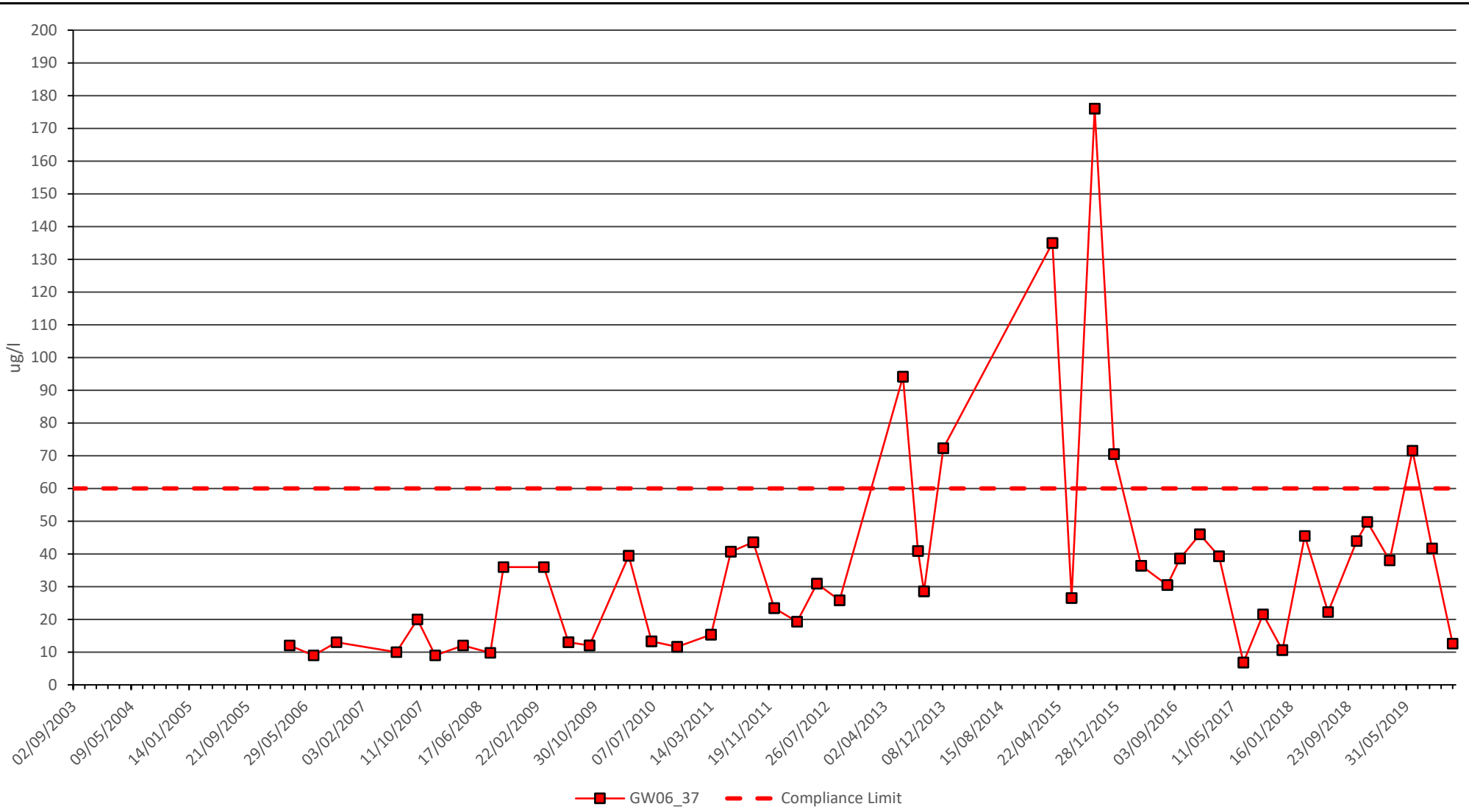
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-10

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-10 Arsenic GW.xlsm]Summary



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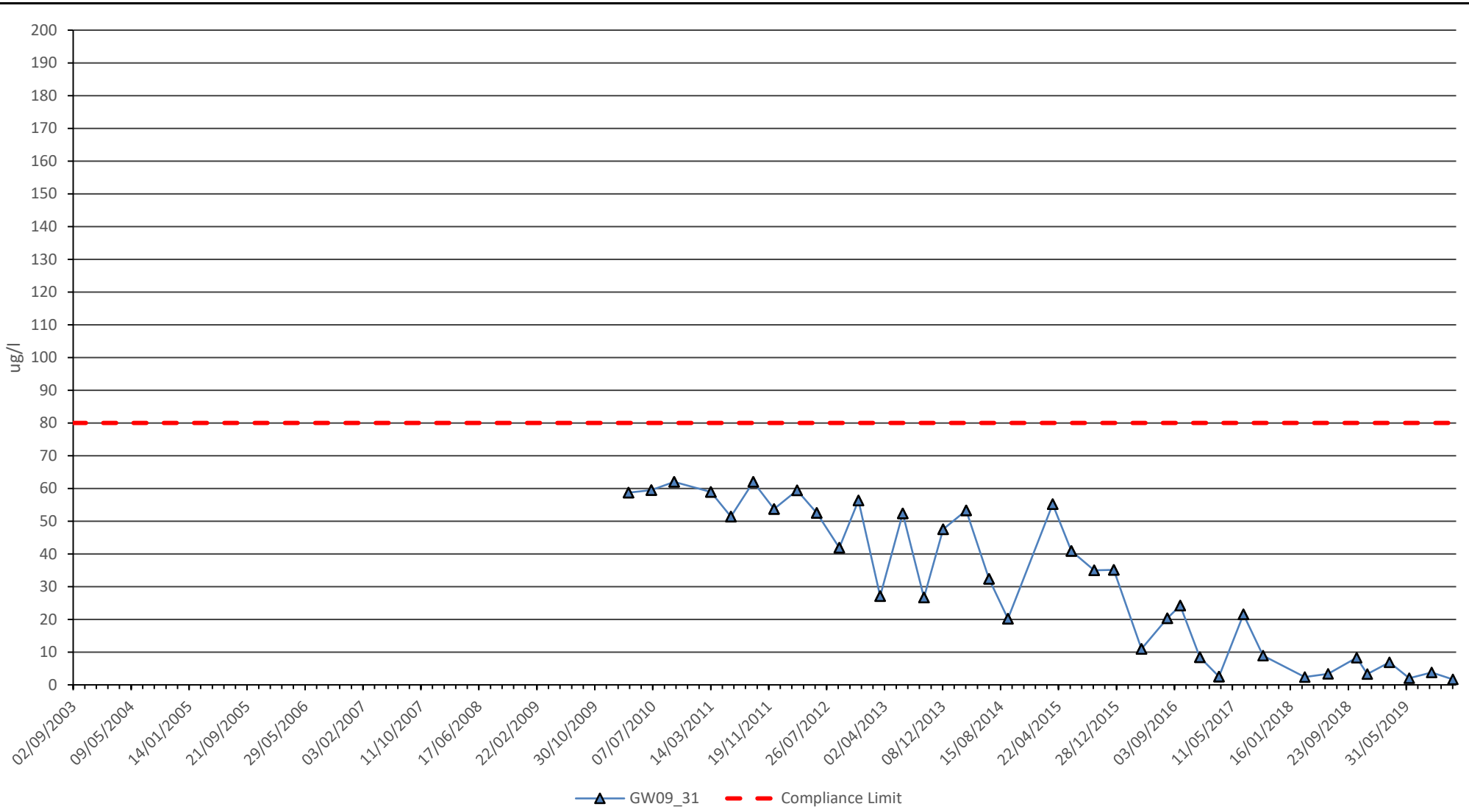
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-11

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-11 Arsenic GW.xlsm]Summary



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Docksway Disposal Site

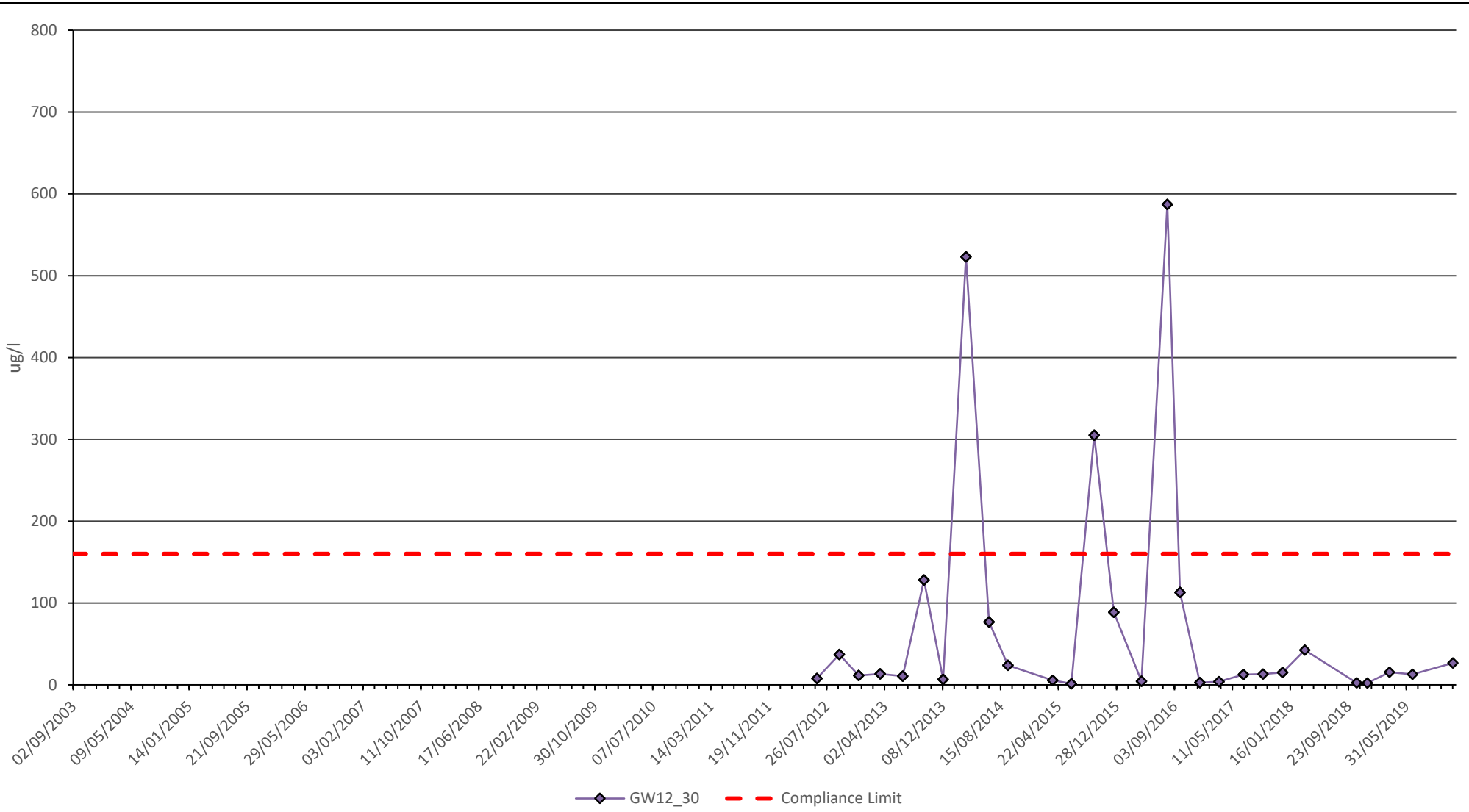
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-12

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-12 Arsenic GW.xlsm]Summary



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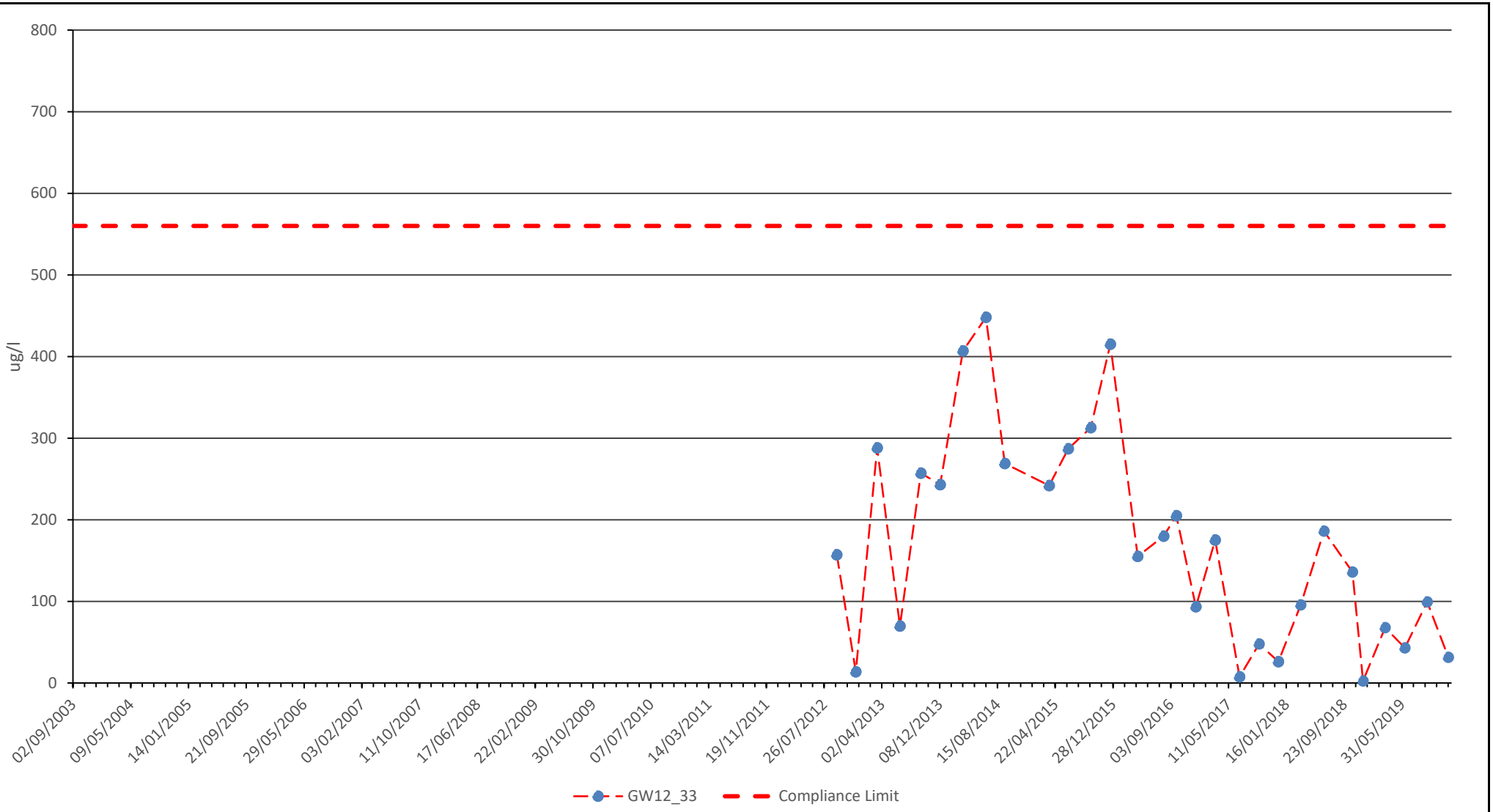
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-13

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-13 Arsenic GW.xlsm]Summary



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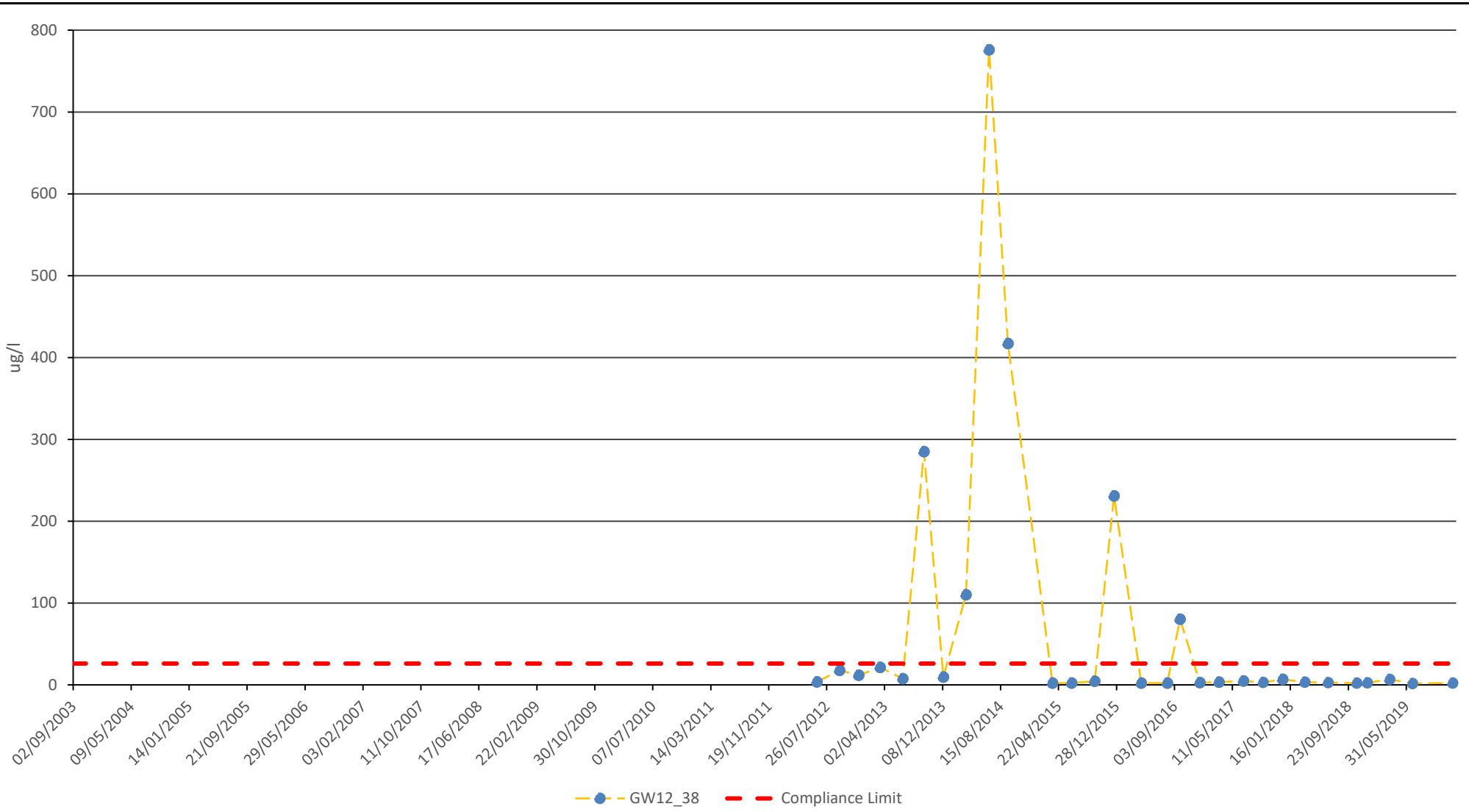
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-14

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-14 Arsenic GW.xlsm]Summary



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Docksway Disposal Site

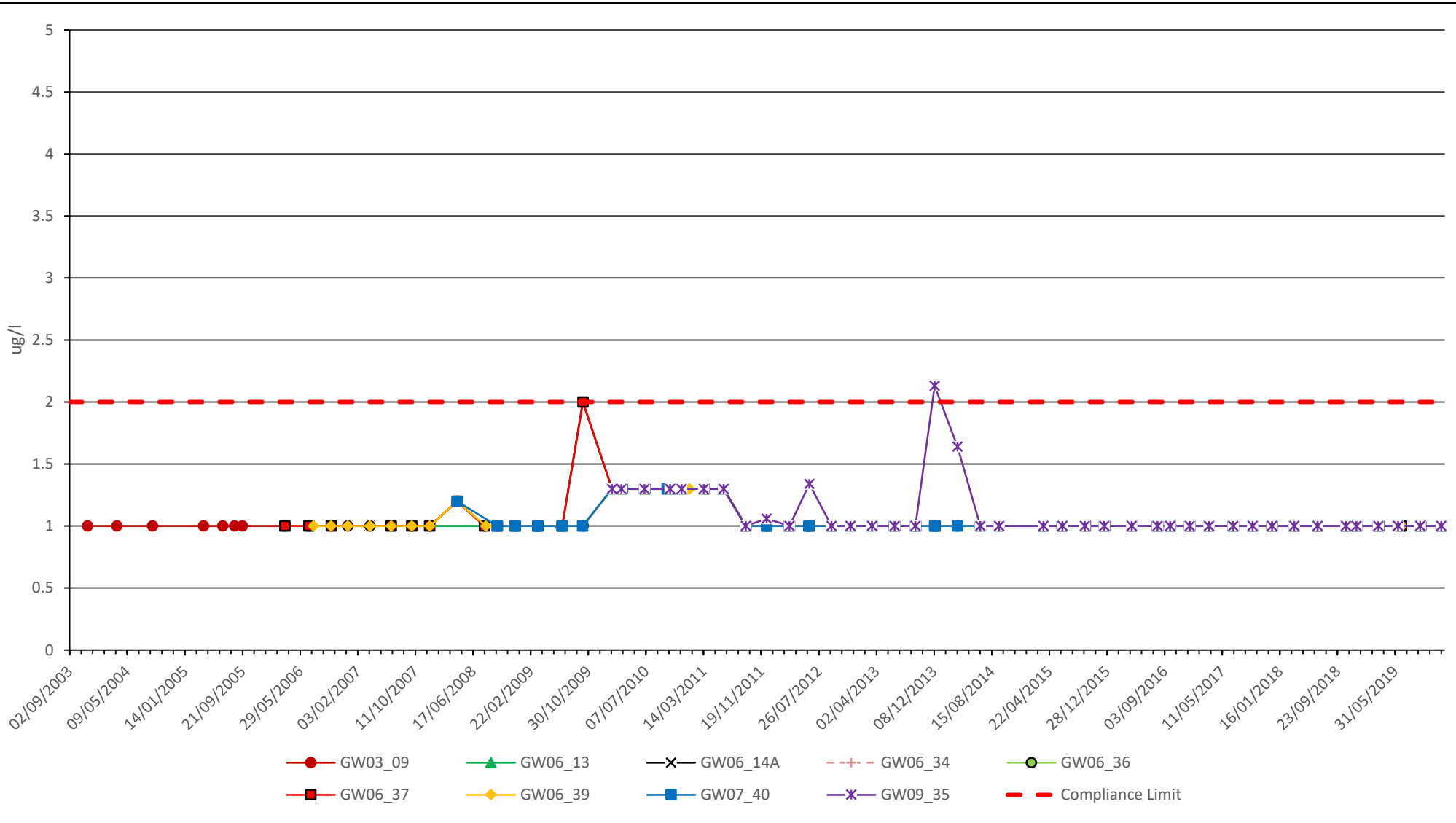
Arsenic in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-15

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-15 Arsenic GW.xlsm]Summary



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Docksway Disposal Site

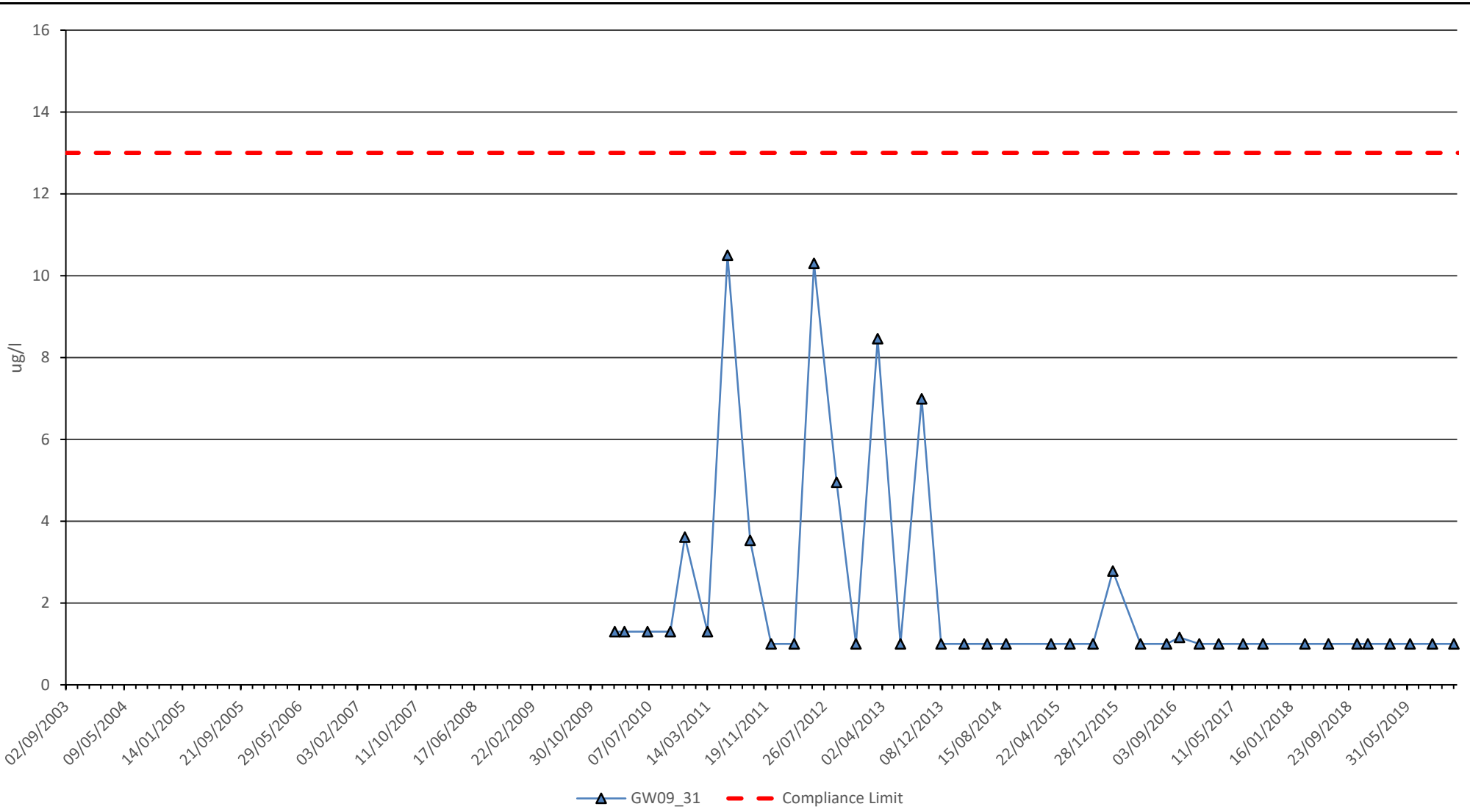
Benzene in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-16

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-16 Benzene GW.xlsm]Summary



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Docksway Disposal Site

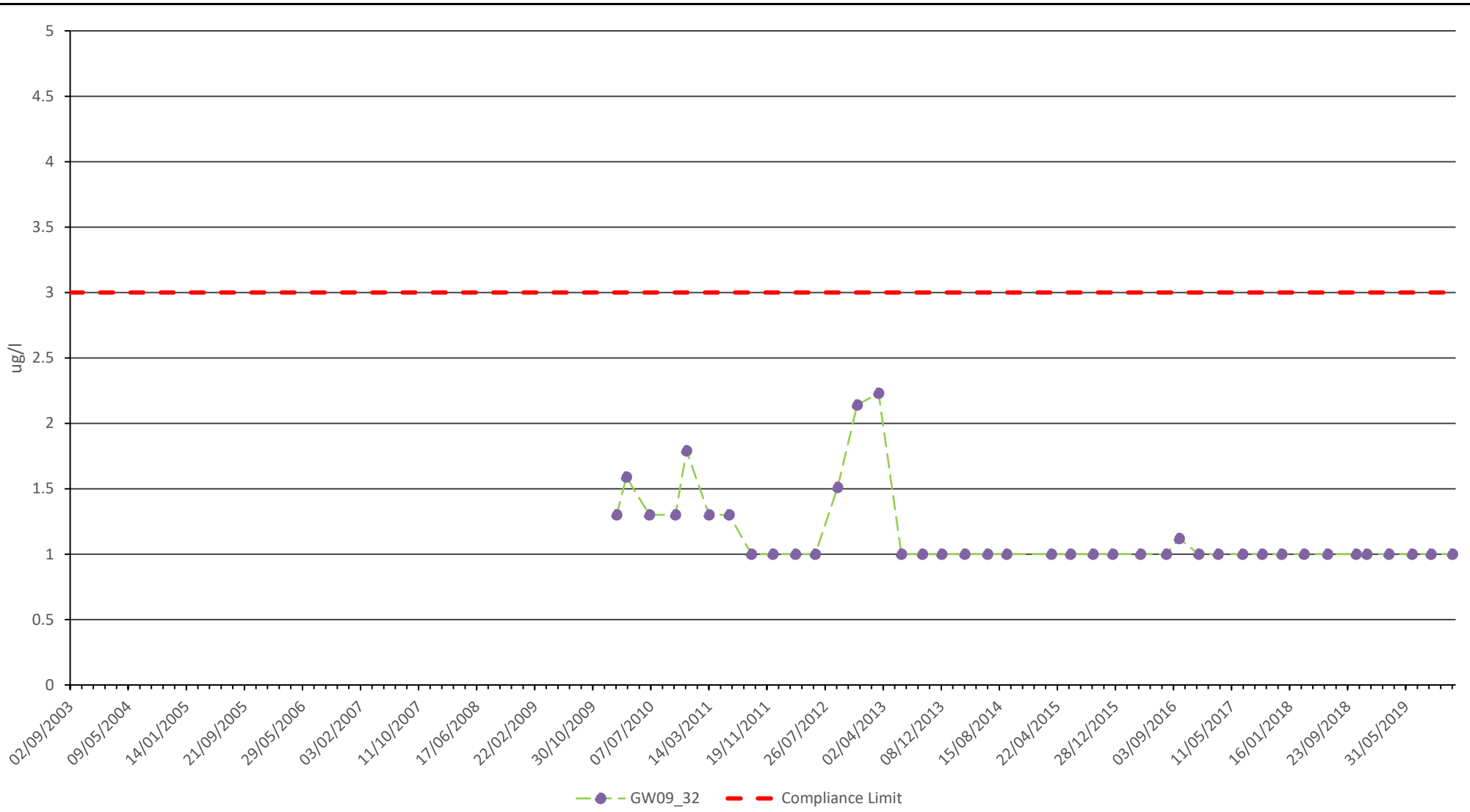
Benzene in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-17

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-17 Benzene GW.xlsm]Summary



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Docksway Disposal Site

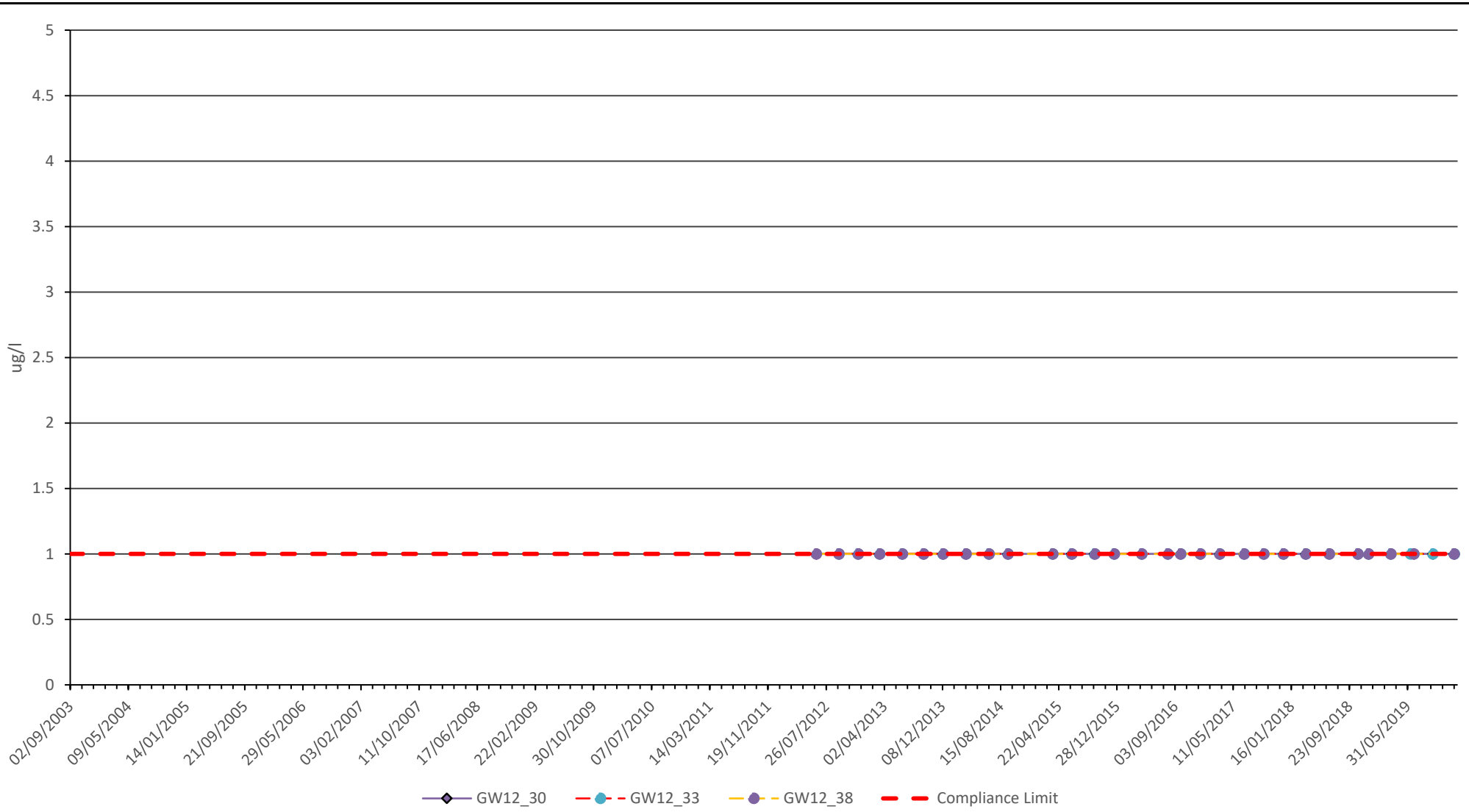
Benzene in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-18

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-18 Benzene GW.xlsm]Summary



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Docksway Disposal Site

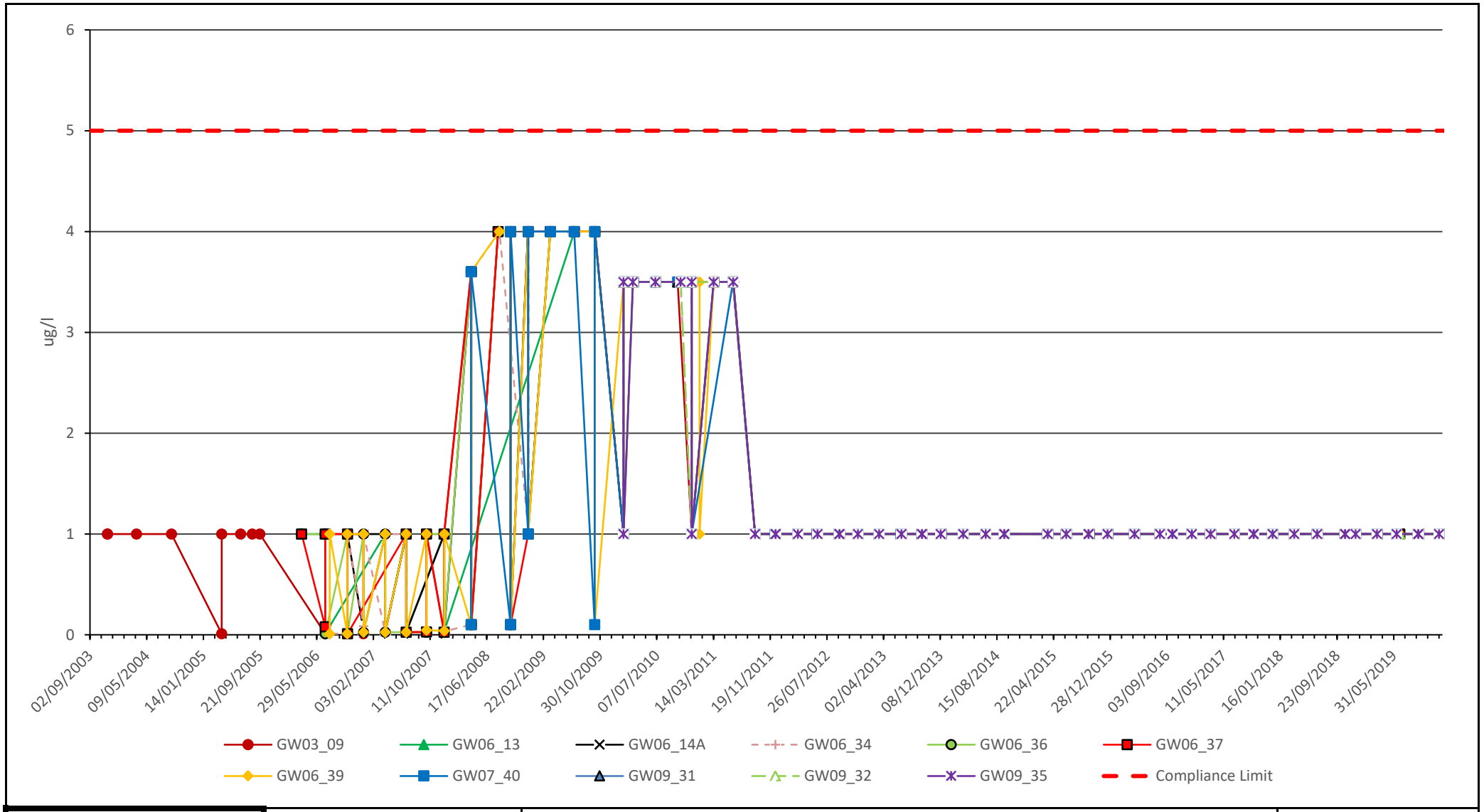
Benzene in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-19

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-19 Benzene GW.xlsm]Summary



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Docksway Disposal Site

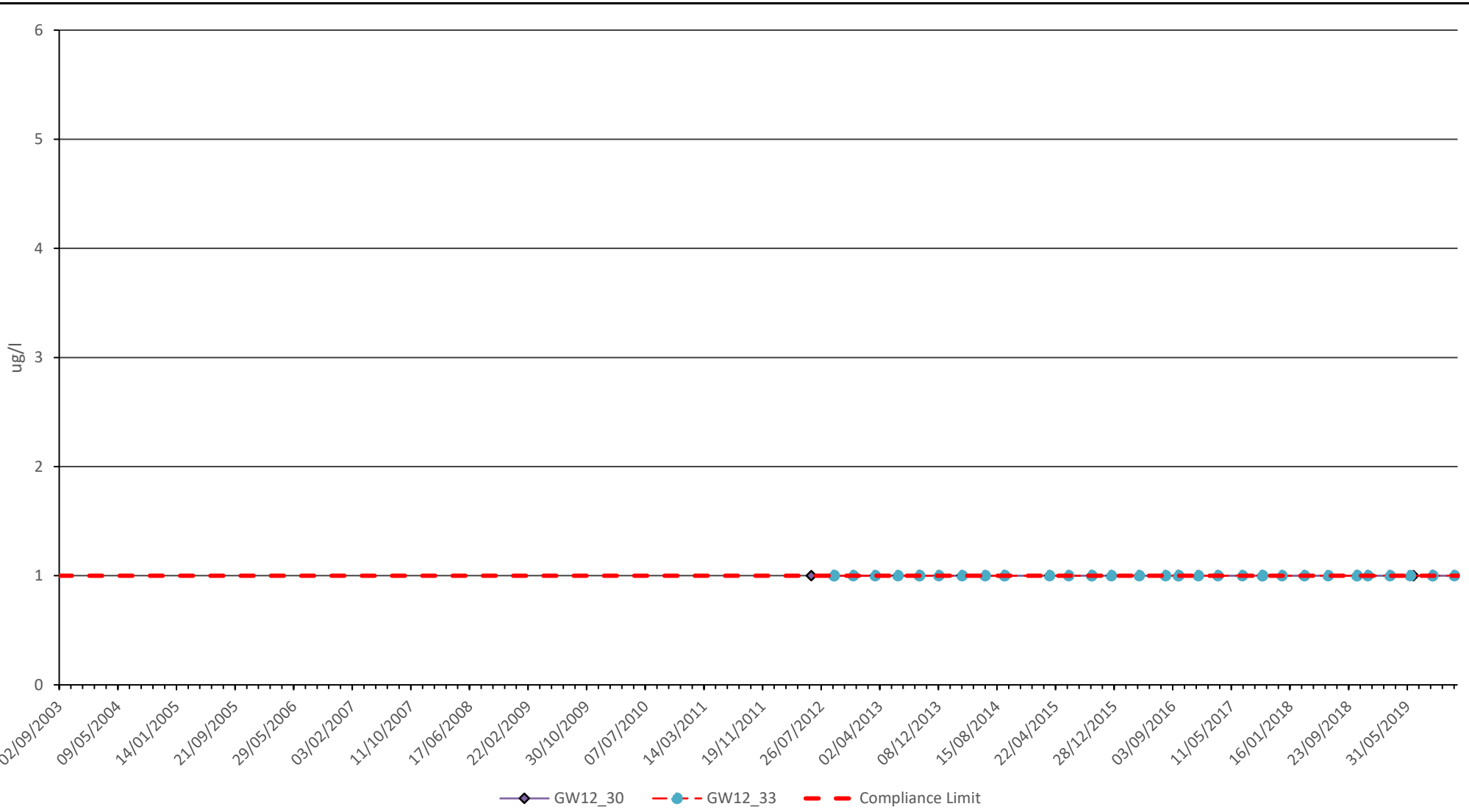
Naphthalene in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-20

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-20 Napthalene GW.xlsm]Summary



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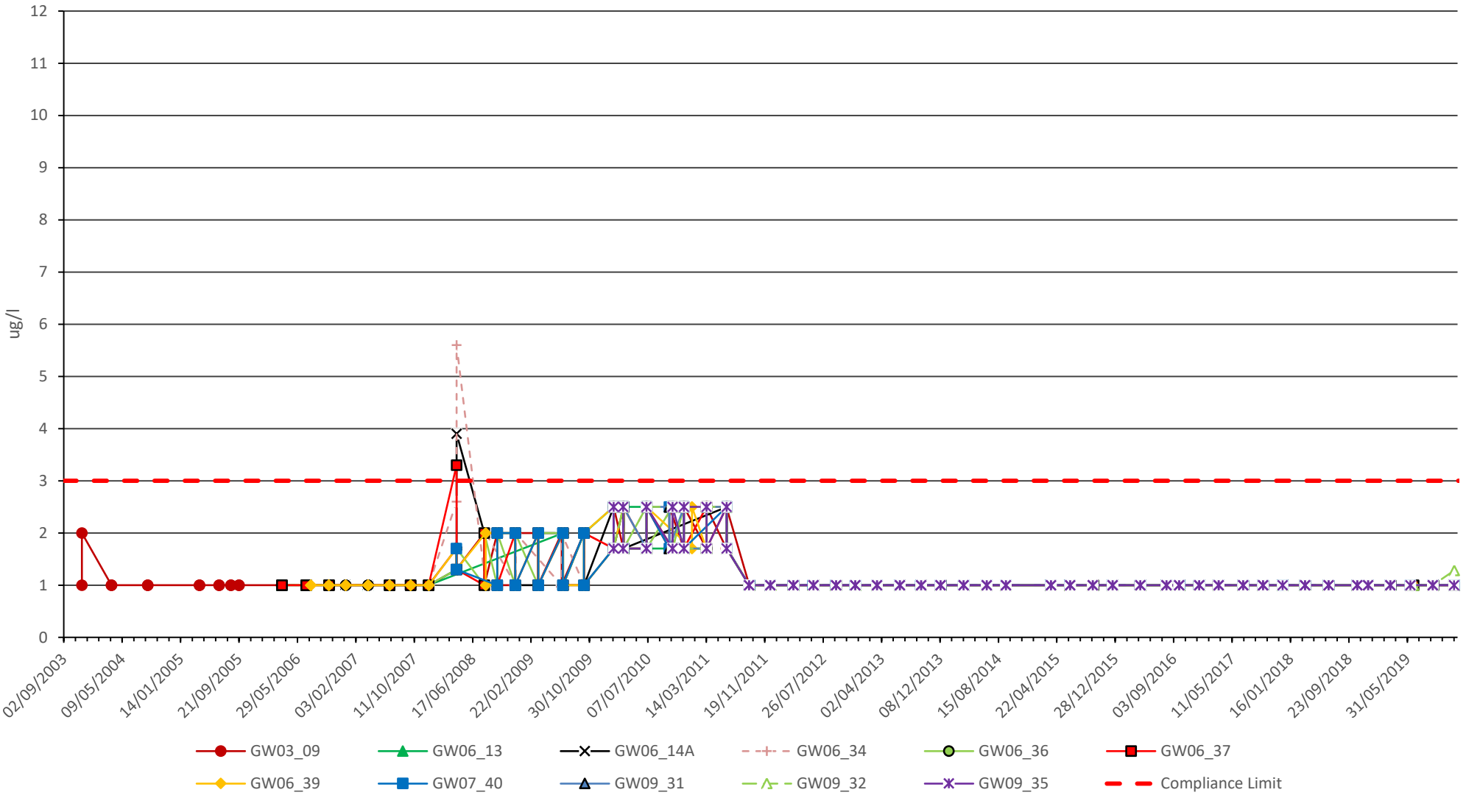
Napthalene in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-21

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-21 Napthalene GW.xlsm]Summary



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Docksway Disposal Site

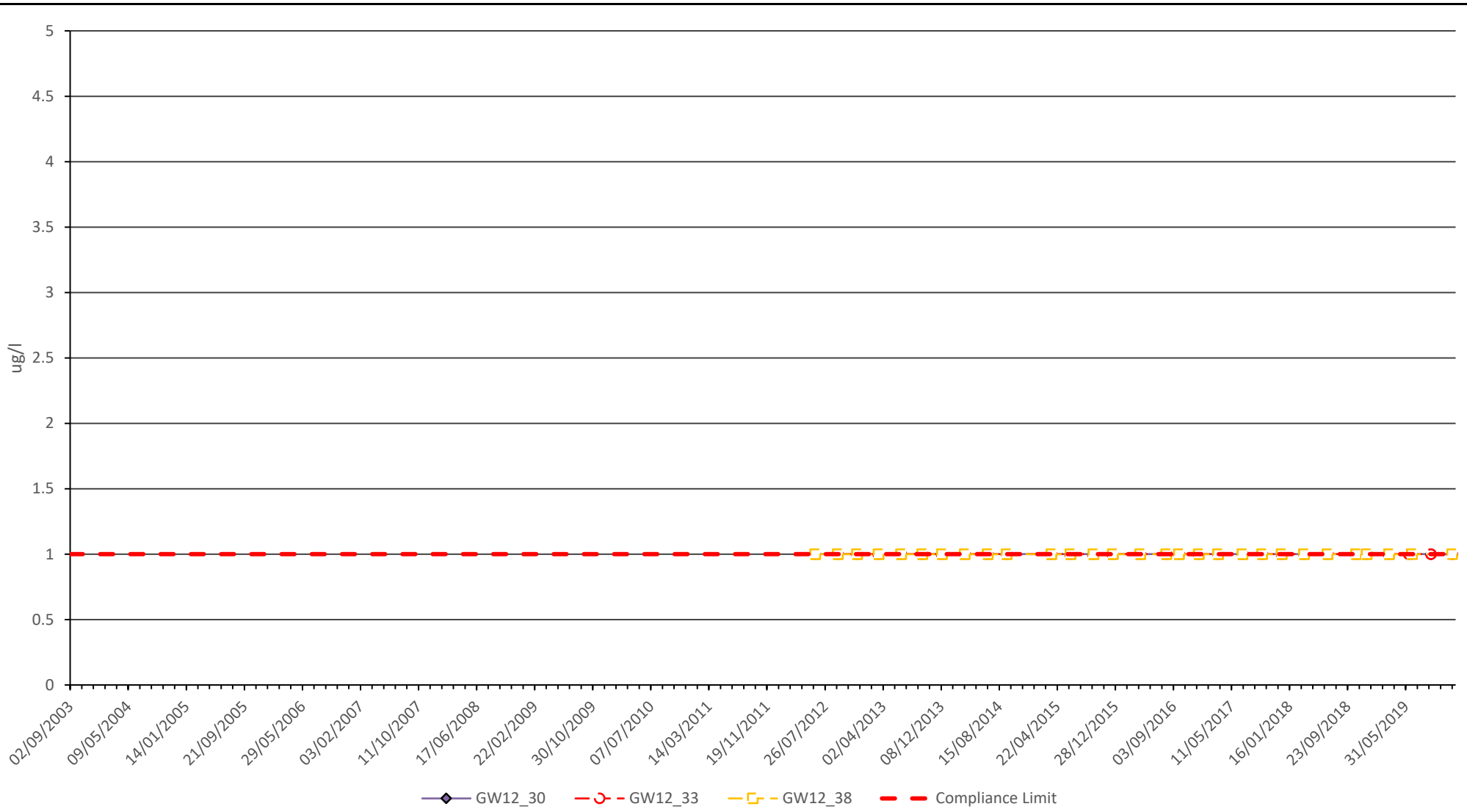
Xylene in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-22

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-22 Xylene GW.xlsm]Summary



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Docksway Disposal Site

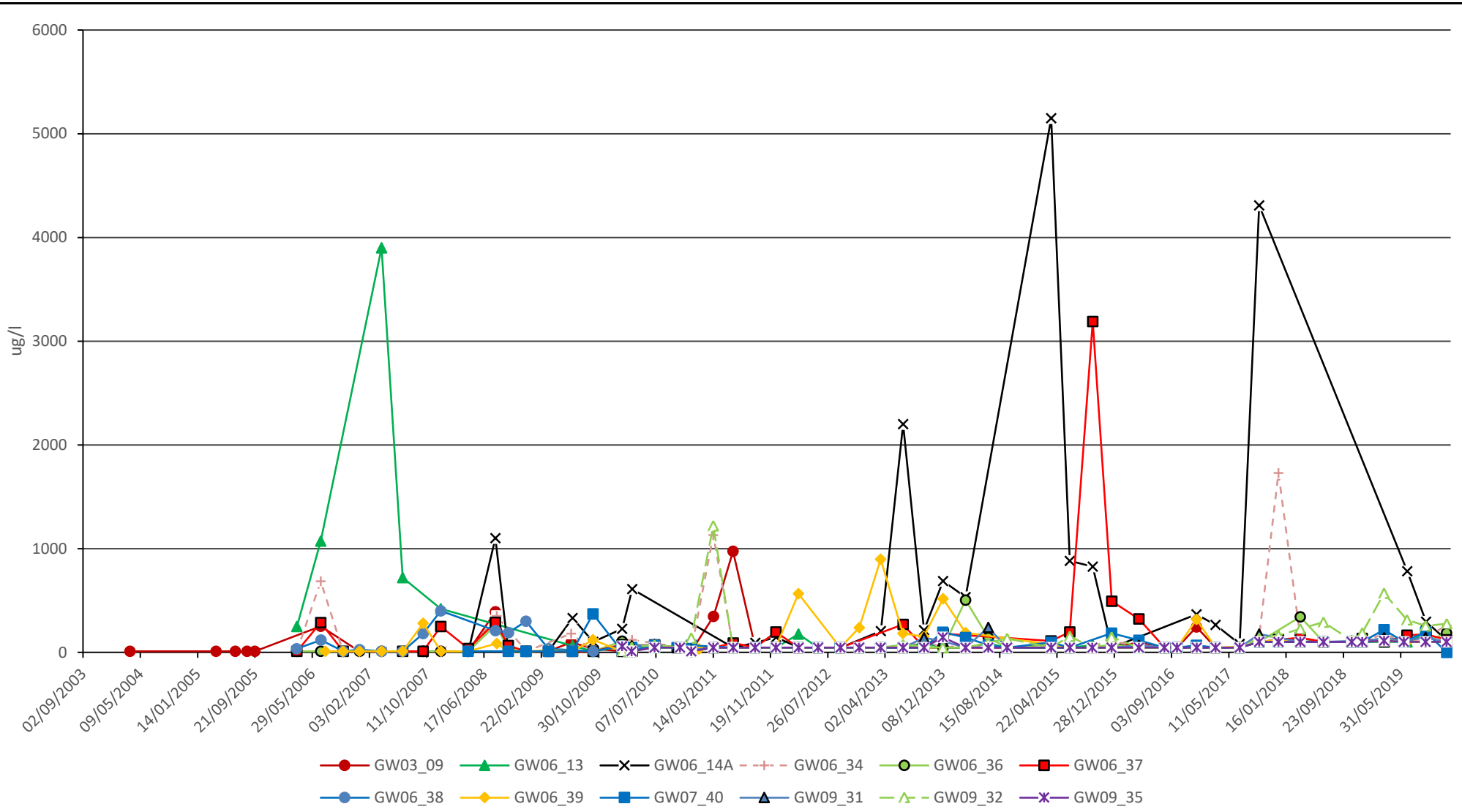
Xylene in Groundwater

Date	January 2020
A4 Scale	
Drawn	NC
Checked	VKR

Appendix

2- 23

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-23 Xylene GW.xlsm]Summary



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Docksway Disposal Site

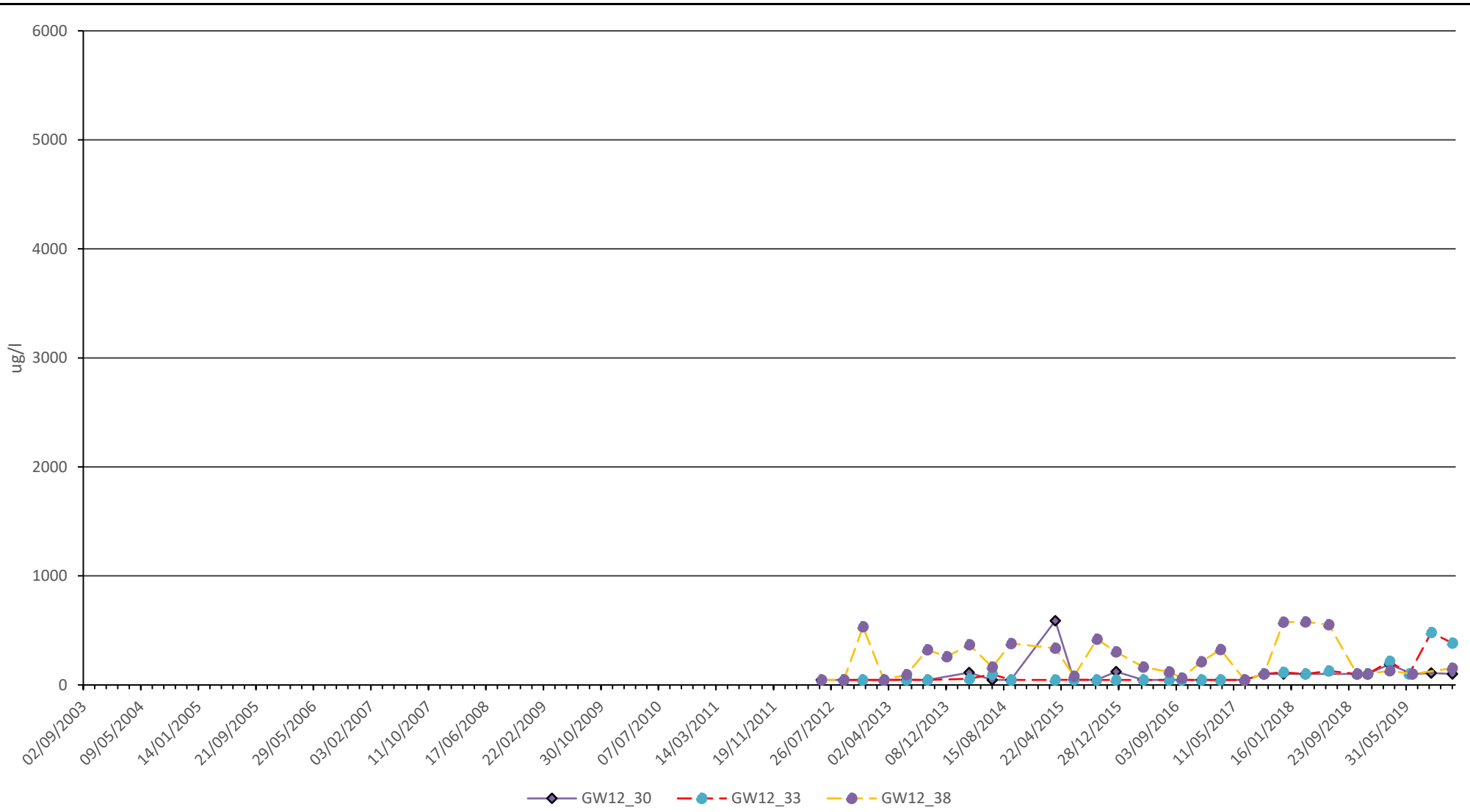
EPH in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2- 24

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2-24 EPH GW.xlsm]Summary



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Docksway Disposal Site

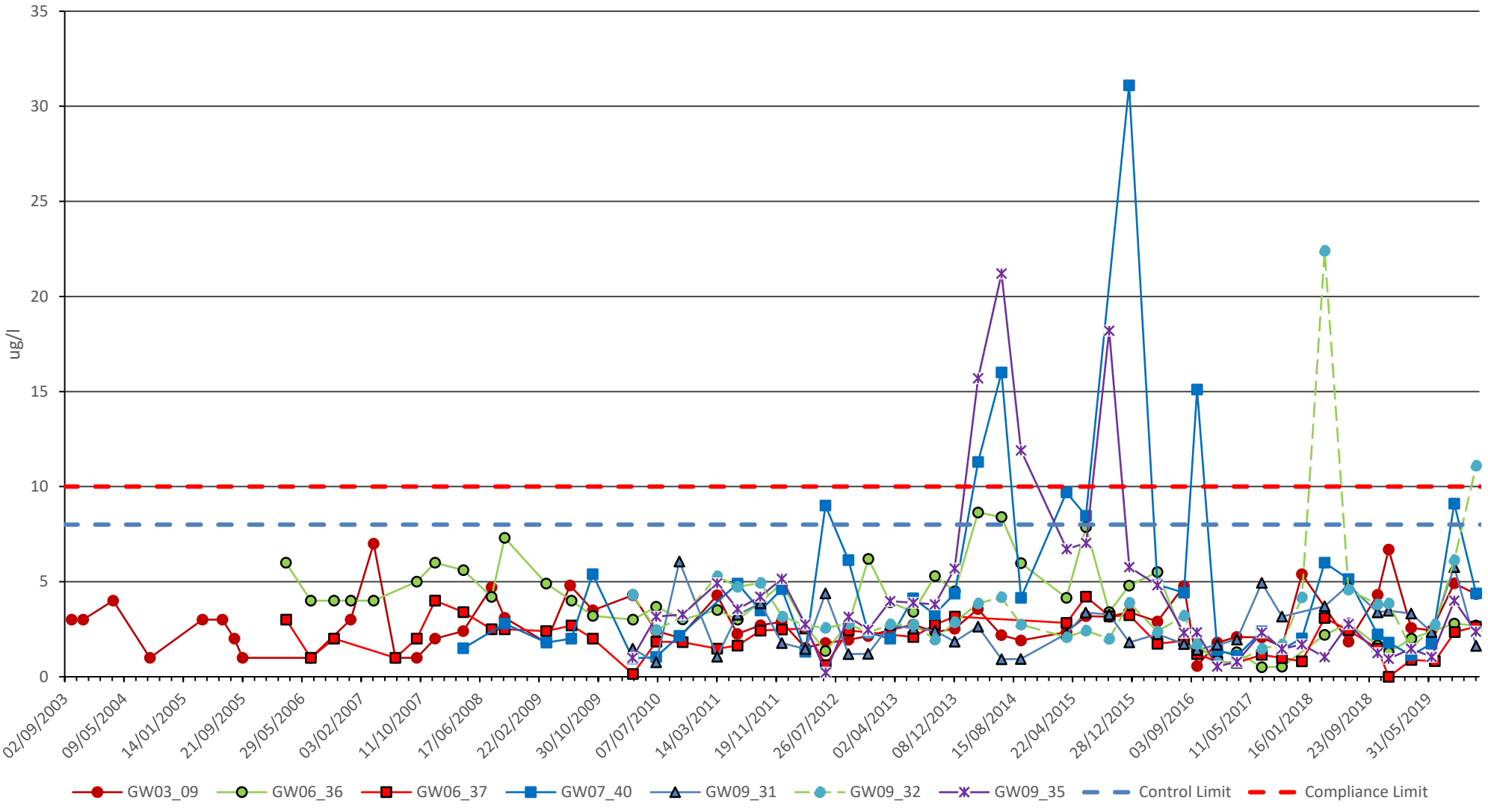
EPH in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2- 25

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 25 EPH GW.xlsm]Summary



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Docksway Disposal Site

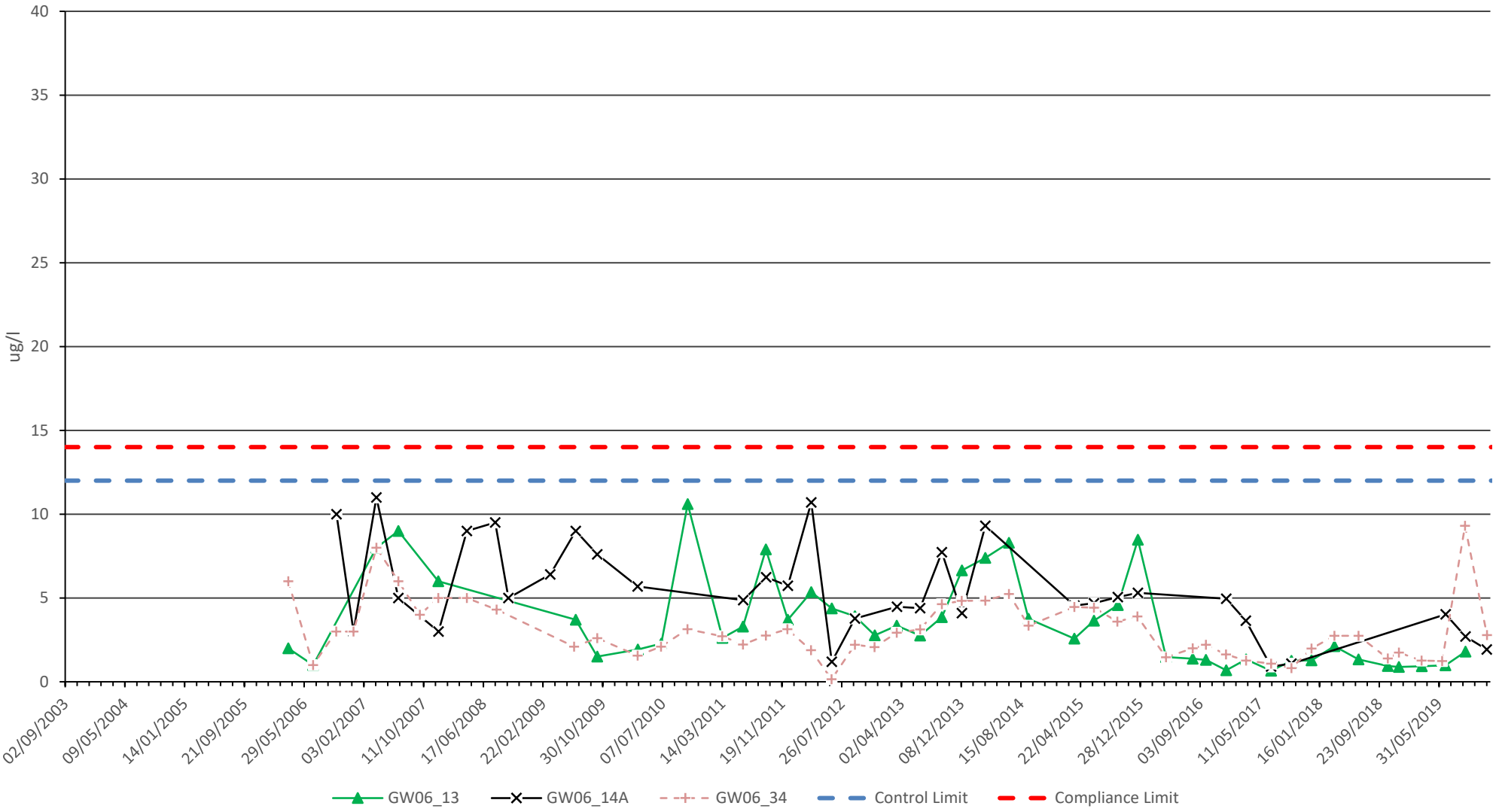
Nickel in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-26

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 26 Nickel GW.xlsm]Summary



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Nickel in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-27

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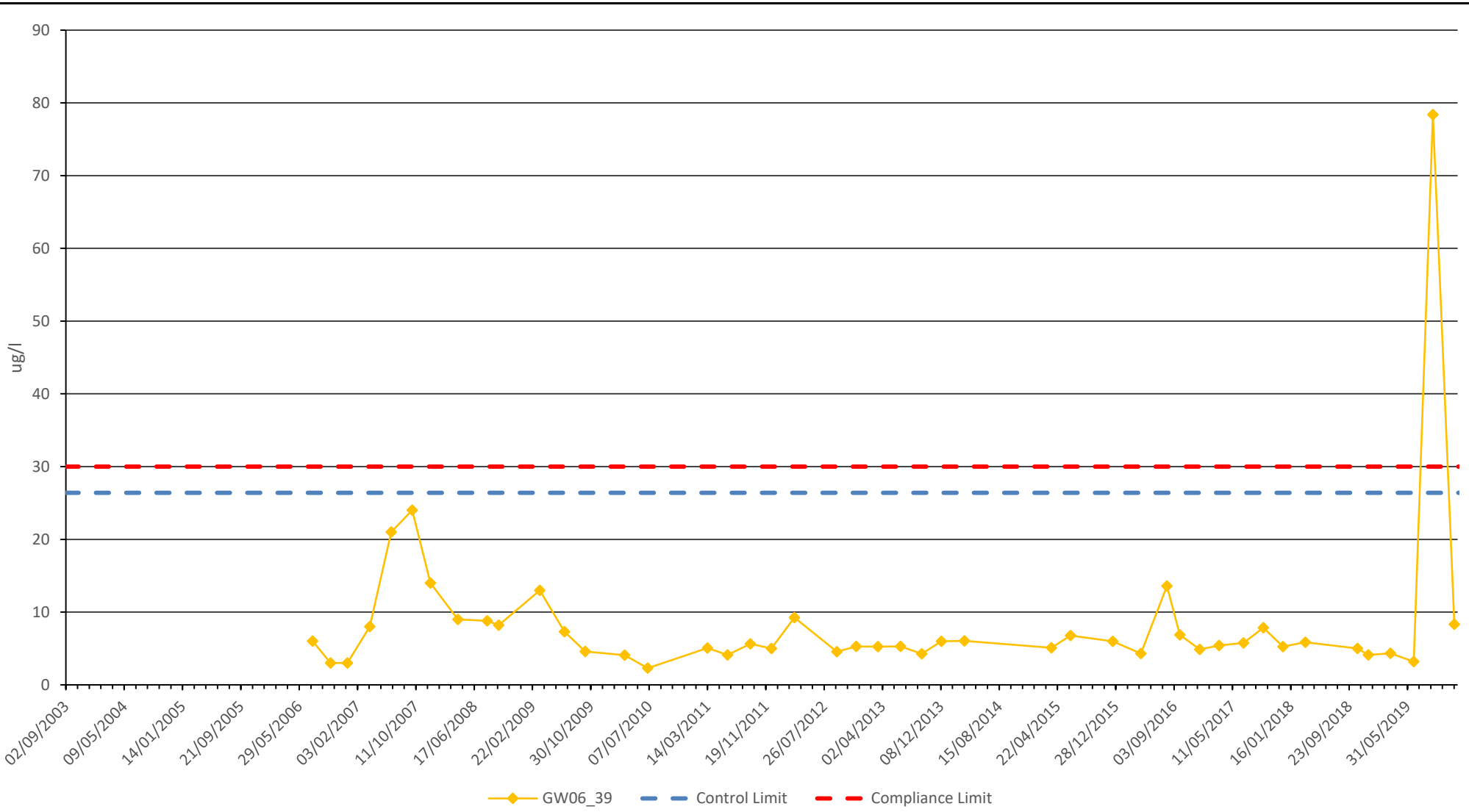

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Docksway Disposal Site

Nickel in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-28

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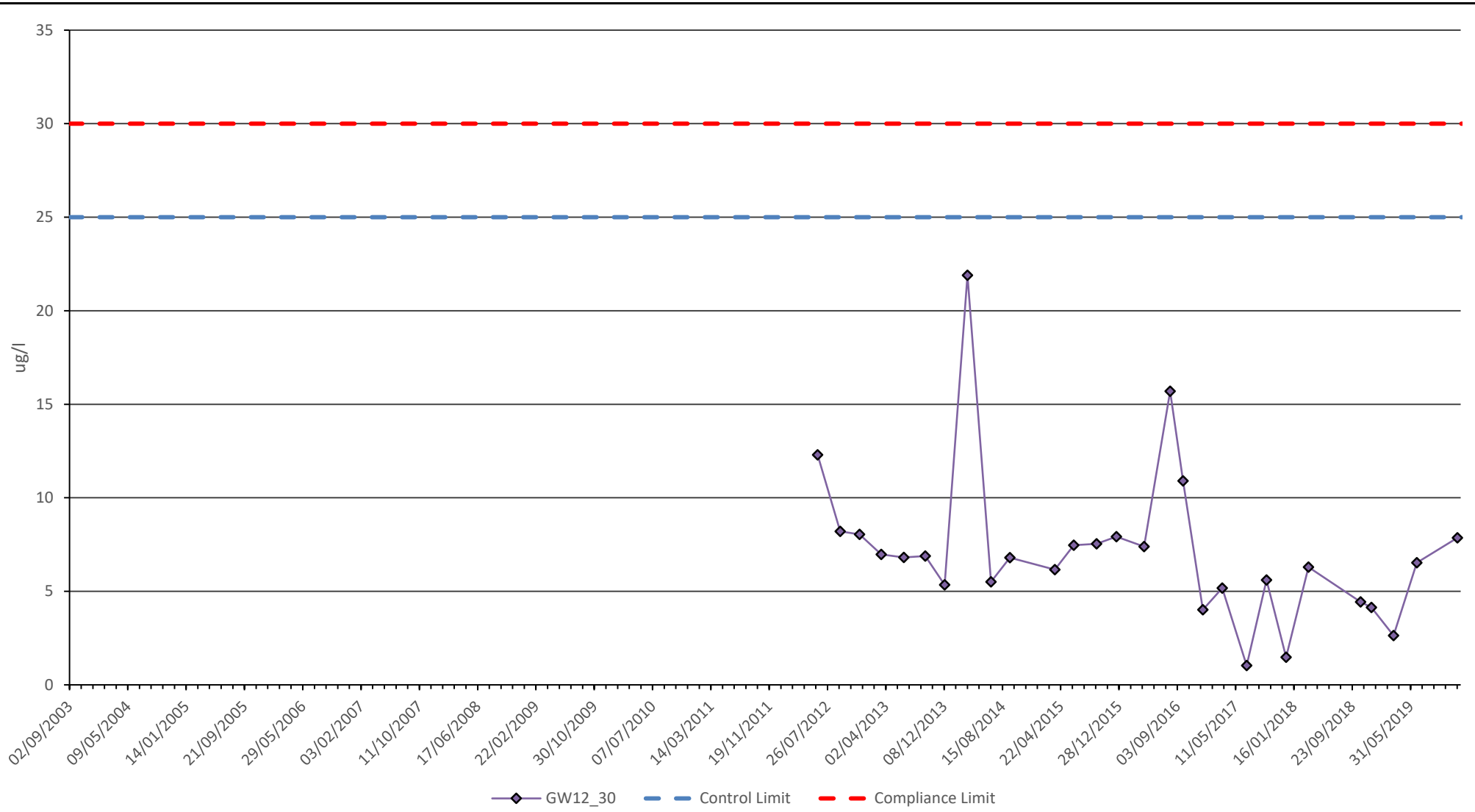

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Docksway Disposal Site

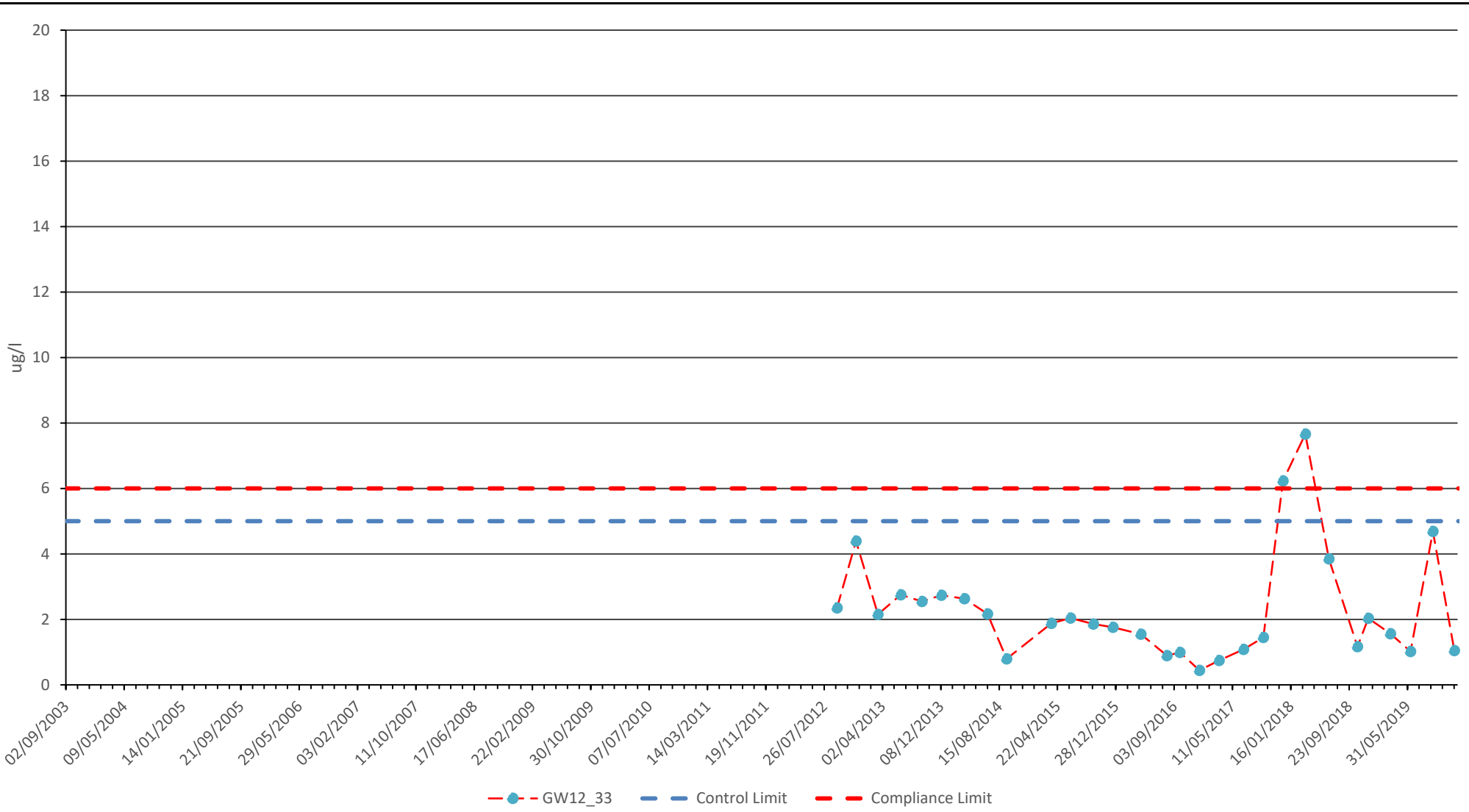
Nickel in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-29

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 29 Nickel GW.xlsm]Summary



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Docksway Disposal Site

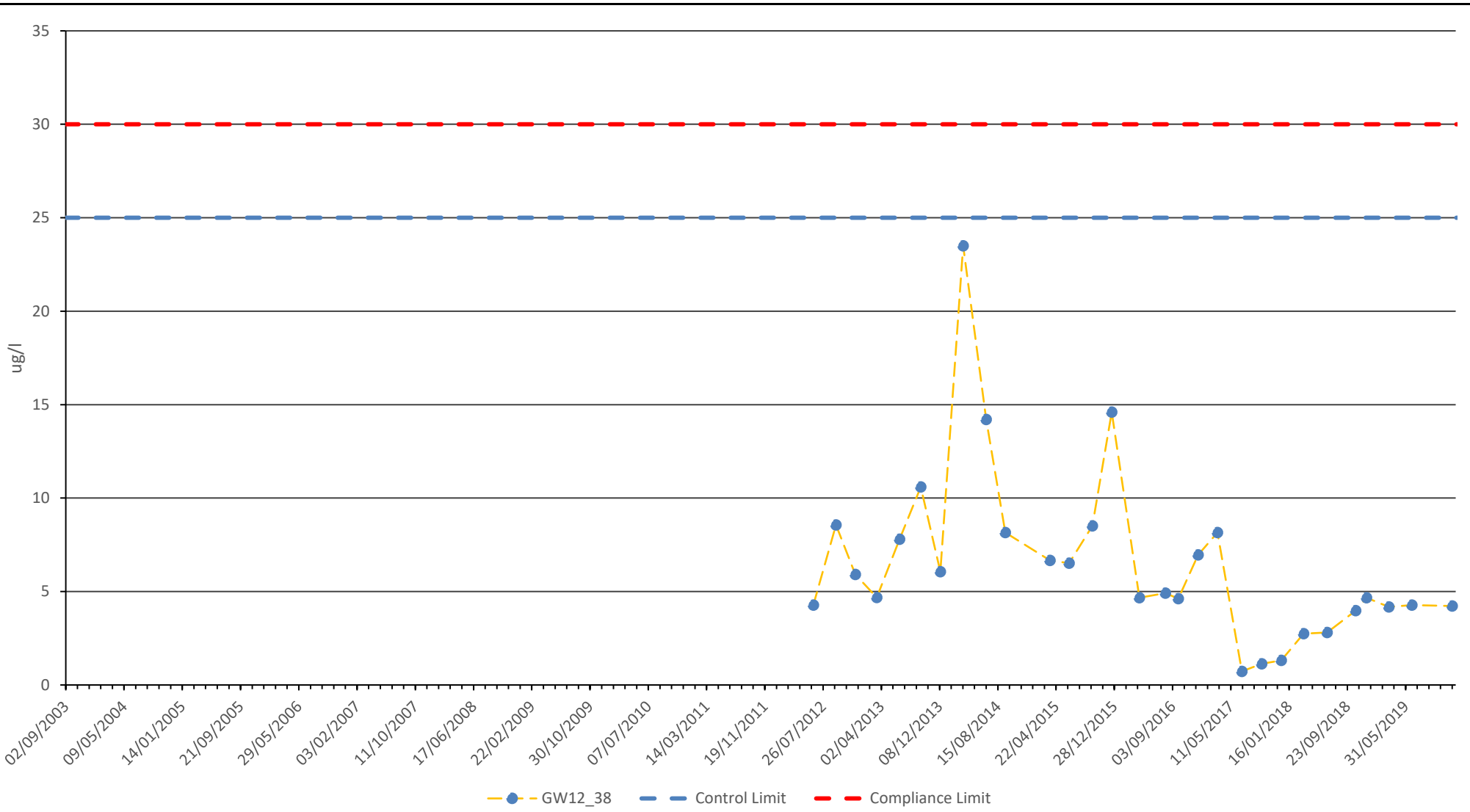
Nickel in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-30

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 30 Nickel GW.xlsm]Summary



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Docksway Disposal Site

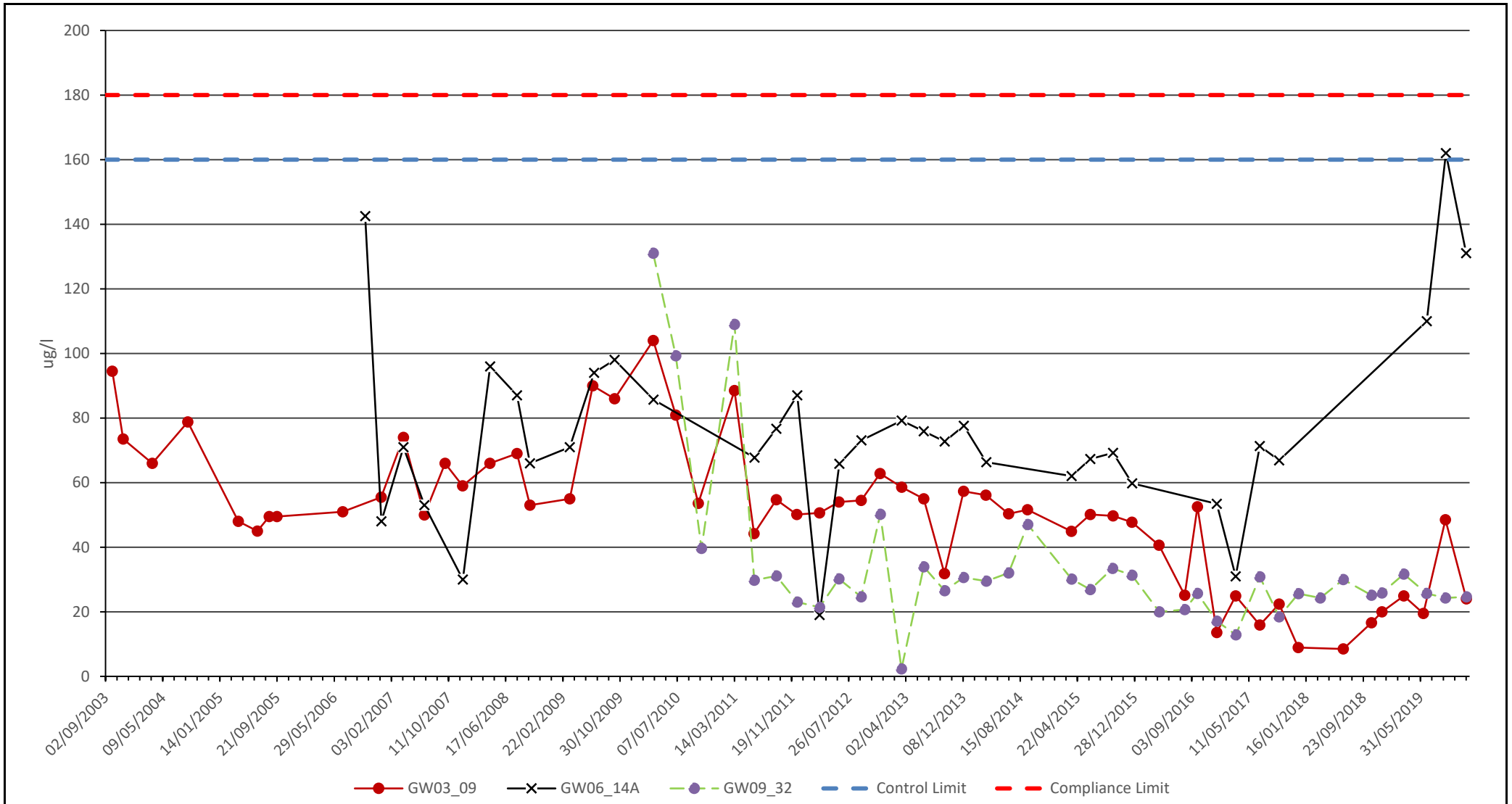
Nickel in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-31

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 31 Nickel GW.xlsm]Summary



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Docksway Disposal Site

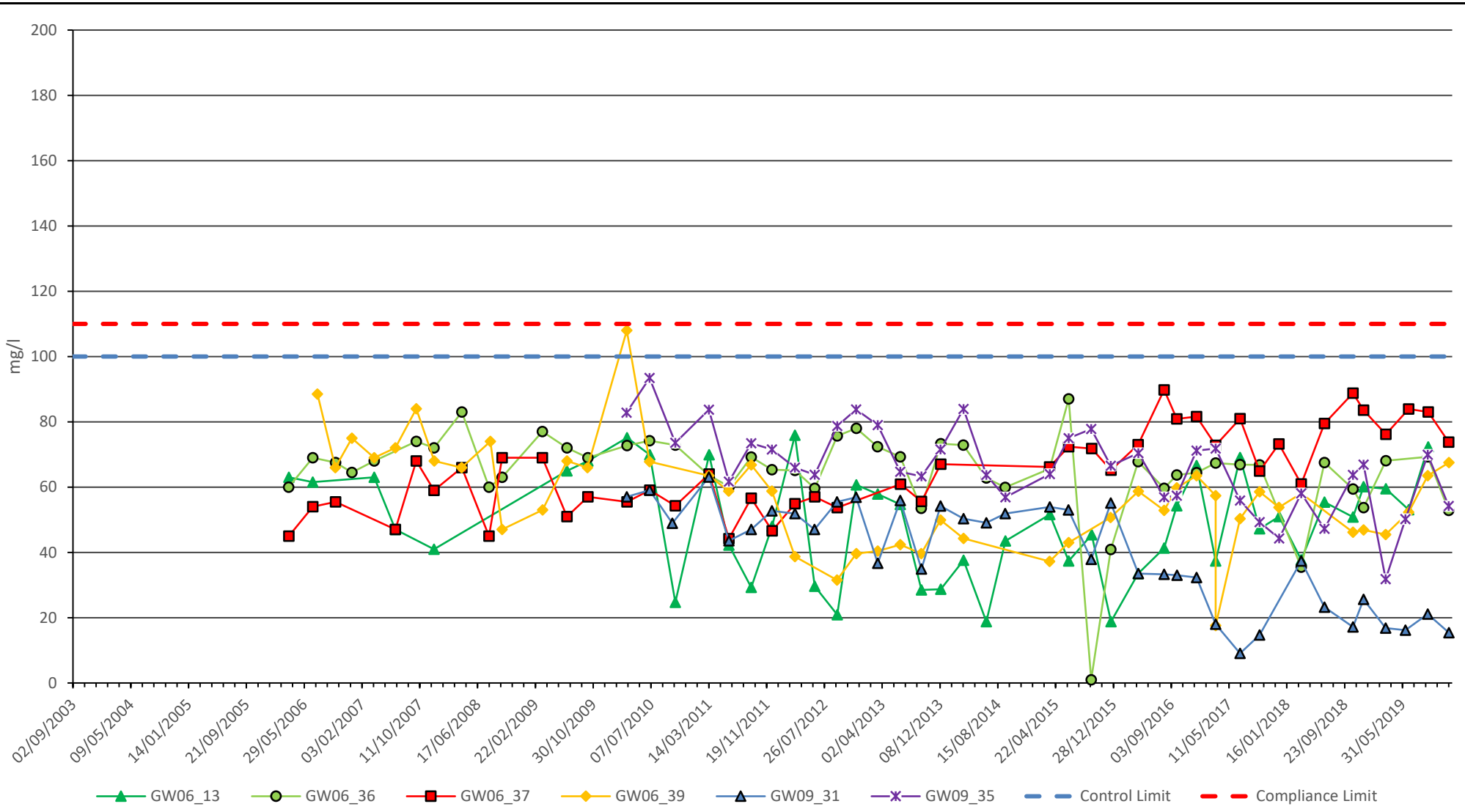
Potassium in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-32

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[Copy of 2 - 32 Potassium GW.xlsm]Summary



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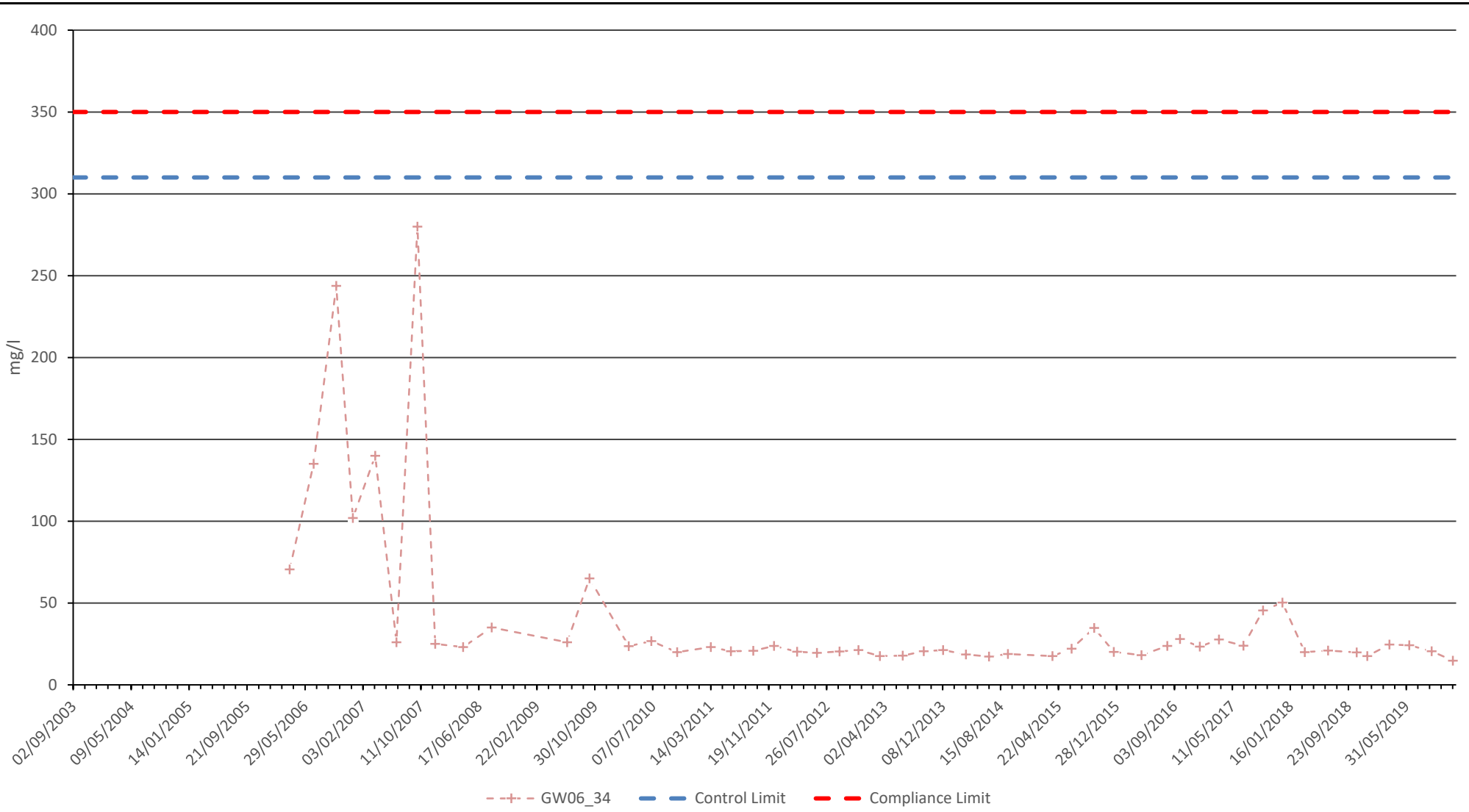
Potassium in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-33

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 33 Potassium GW.xlsm]Summary



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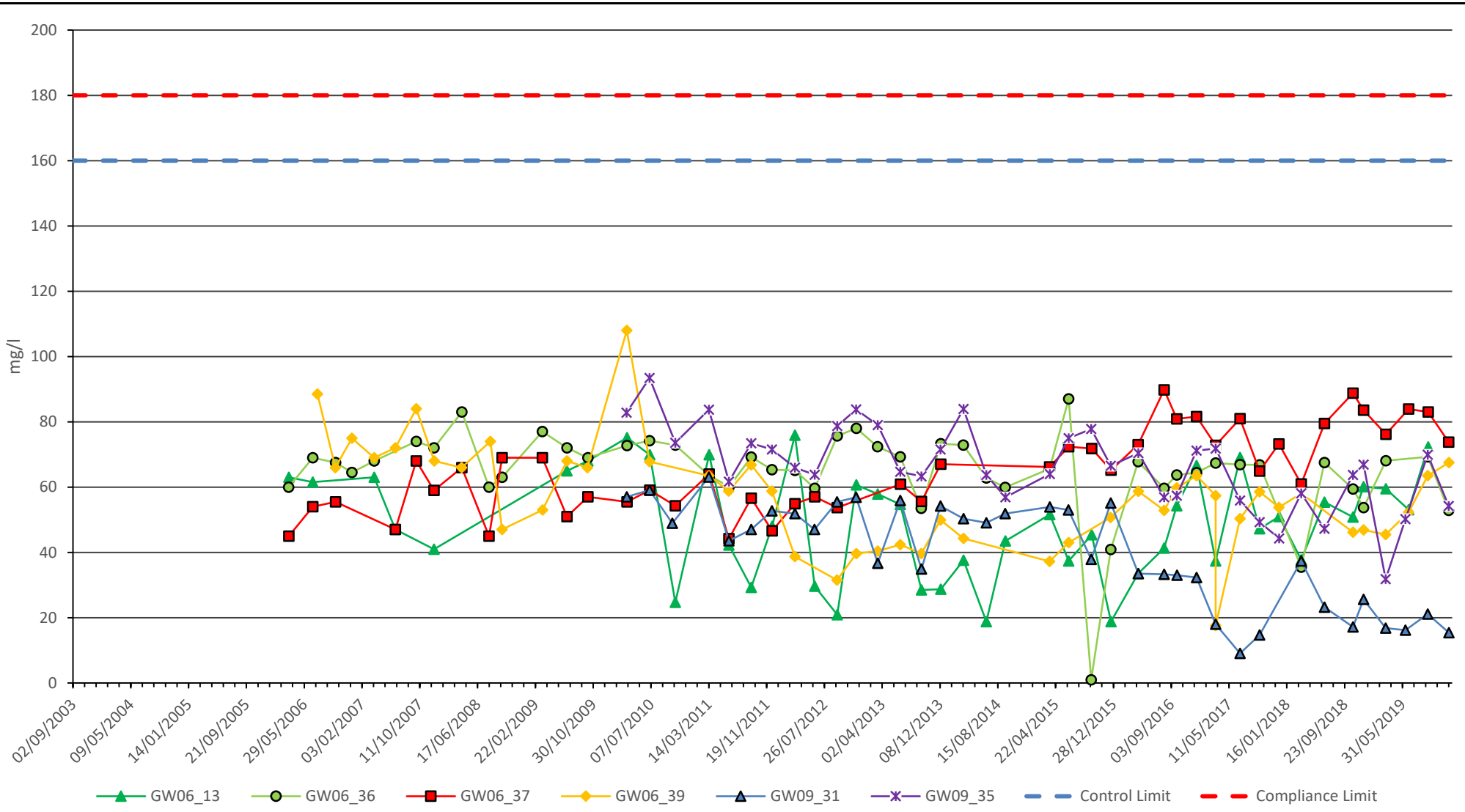
Potassium in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-34

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 34 Potassium GW.xlsm]Summary



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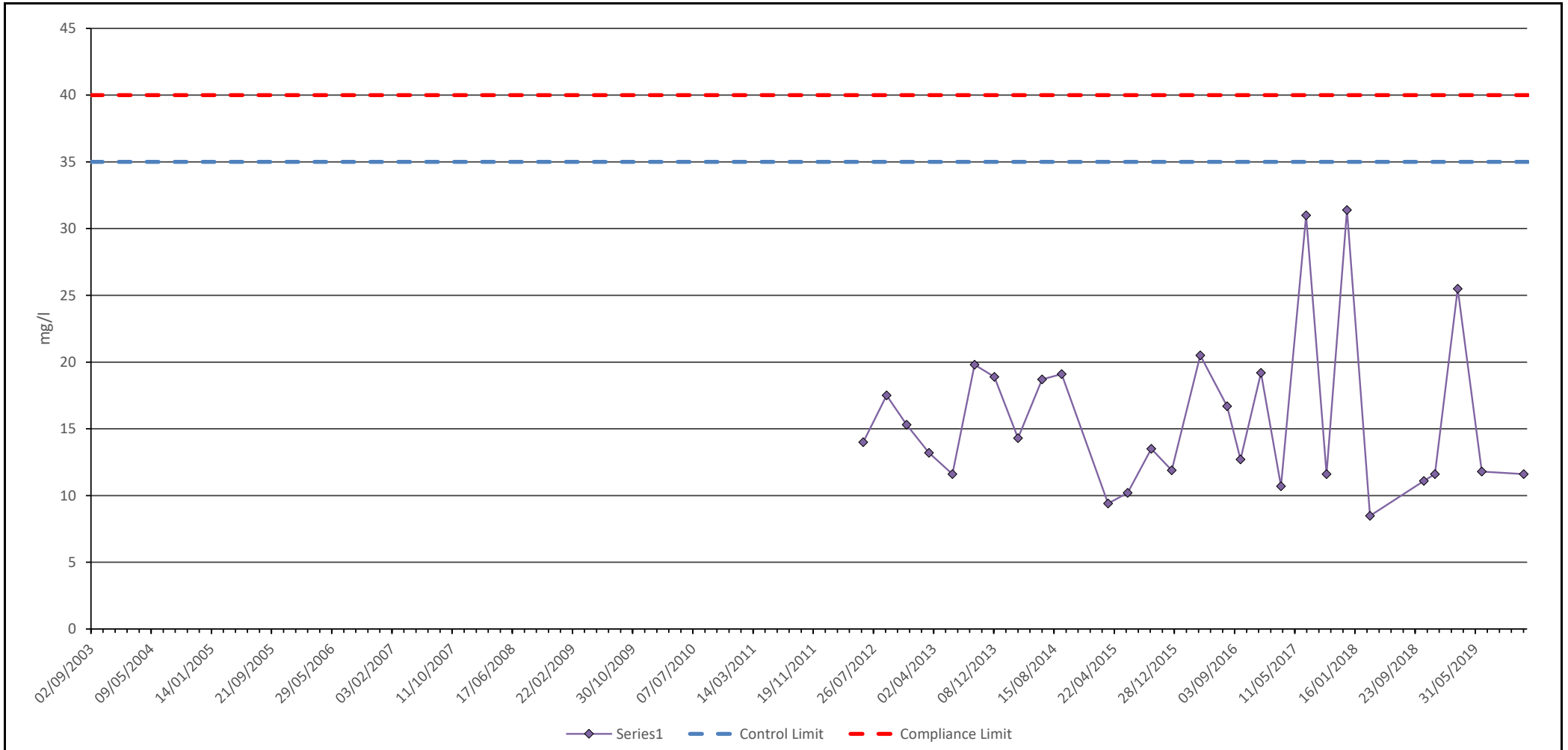
Potassium in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-35

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 35 Potassium GW.xlsm]Summary



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Docksway Disposal Site

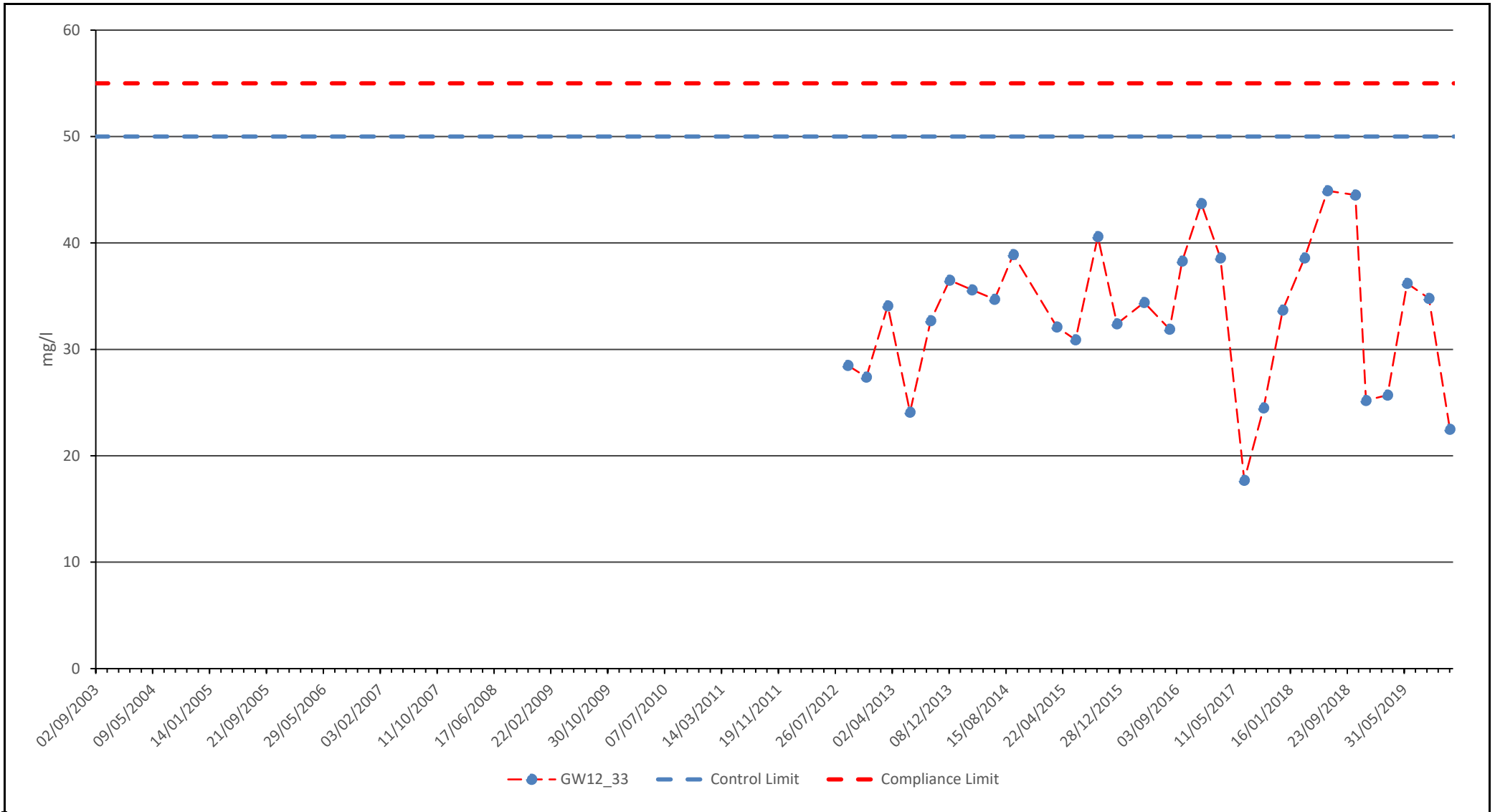
Potassium in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-36

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 36 Potassium GW.xlsm]GW12_30



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Docksway Disposal Site

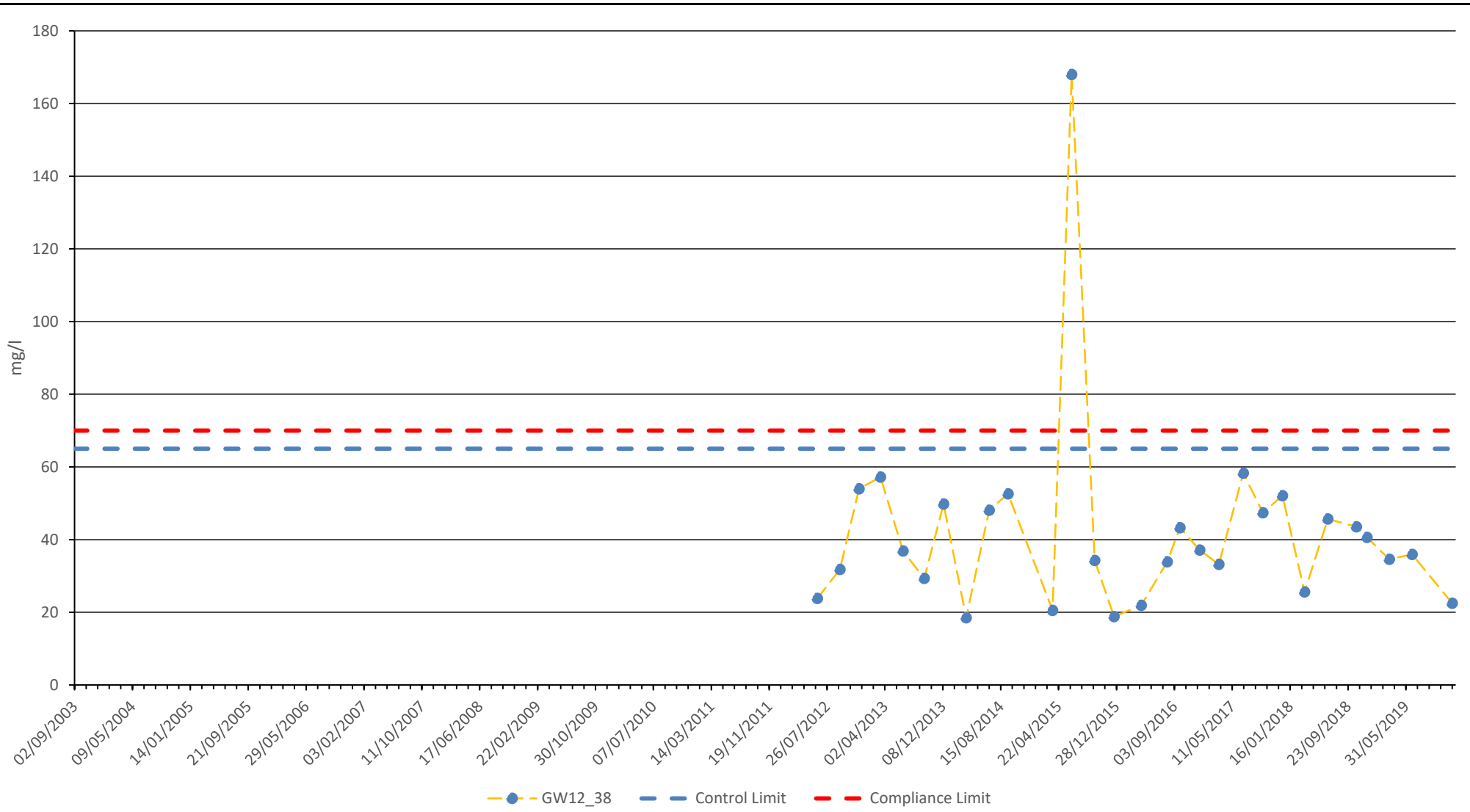
Potassium in Groundwater

Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-37

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 37 Potassium GW.xlsm]Summary



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Docksway Disposal Site

Potassium in Groundwater

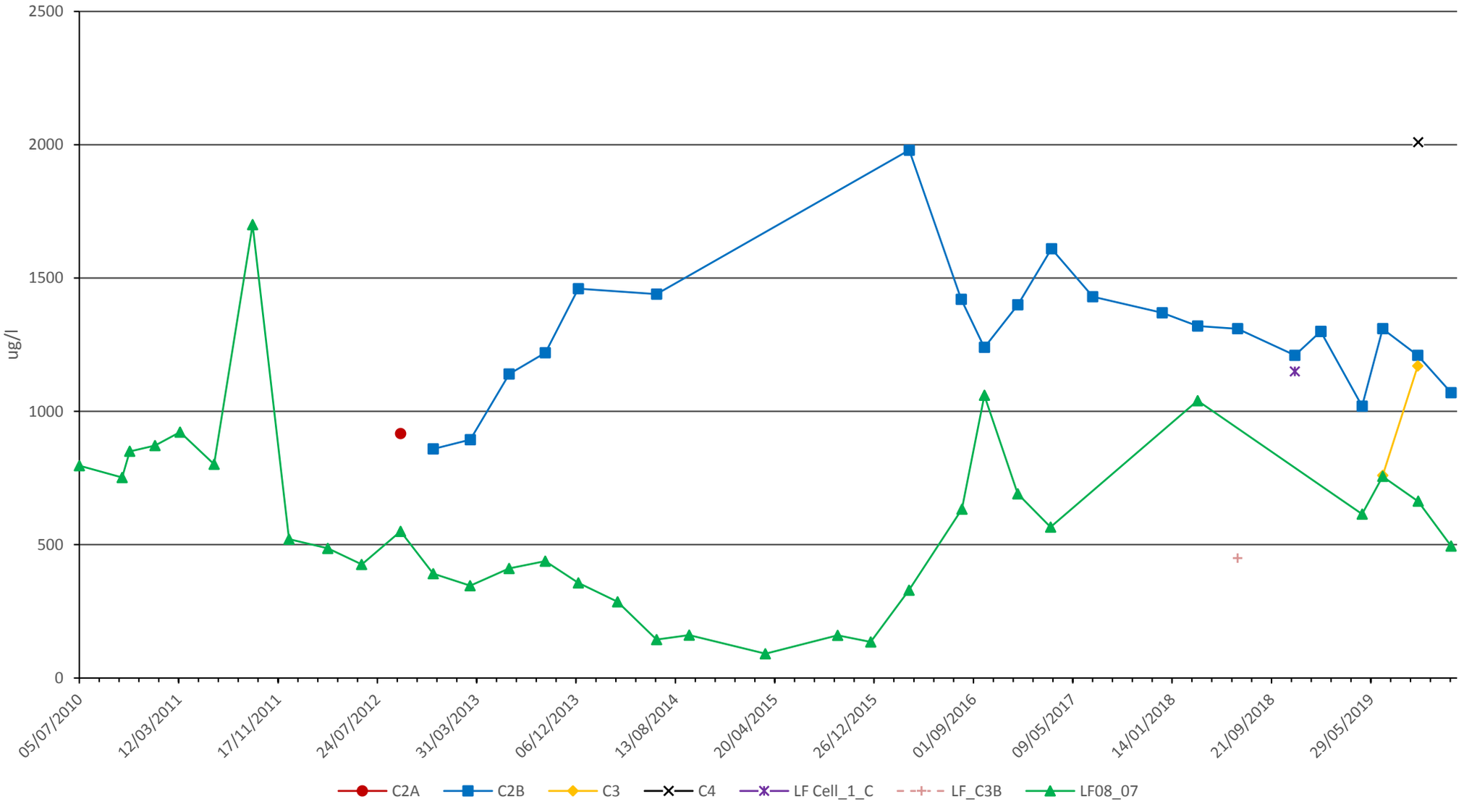
Date	January 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

2-38

J:\14739\AEPRs\AEPR Area 2\Graphs\Appendix 2 - GW\[2 - 38 Potassium GW.xlsm]Summary

Appendix 3 Leachate Chemistry Graphs



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Docksway Disposal Site

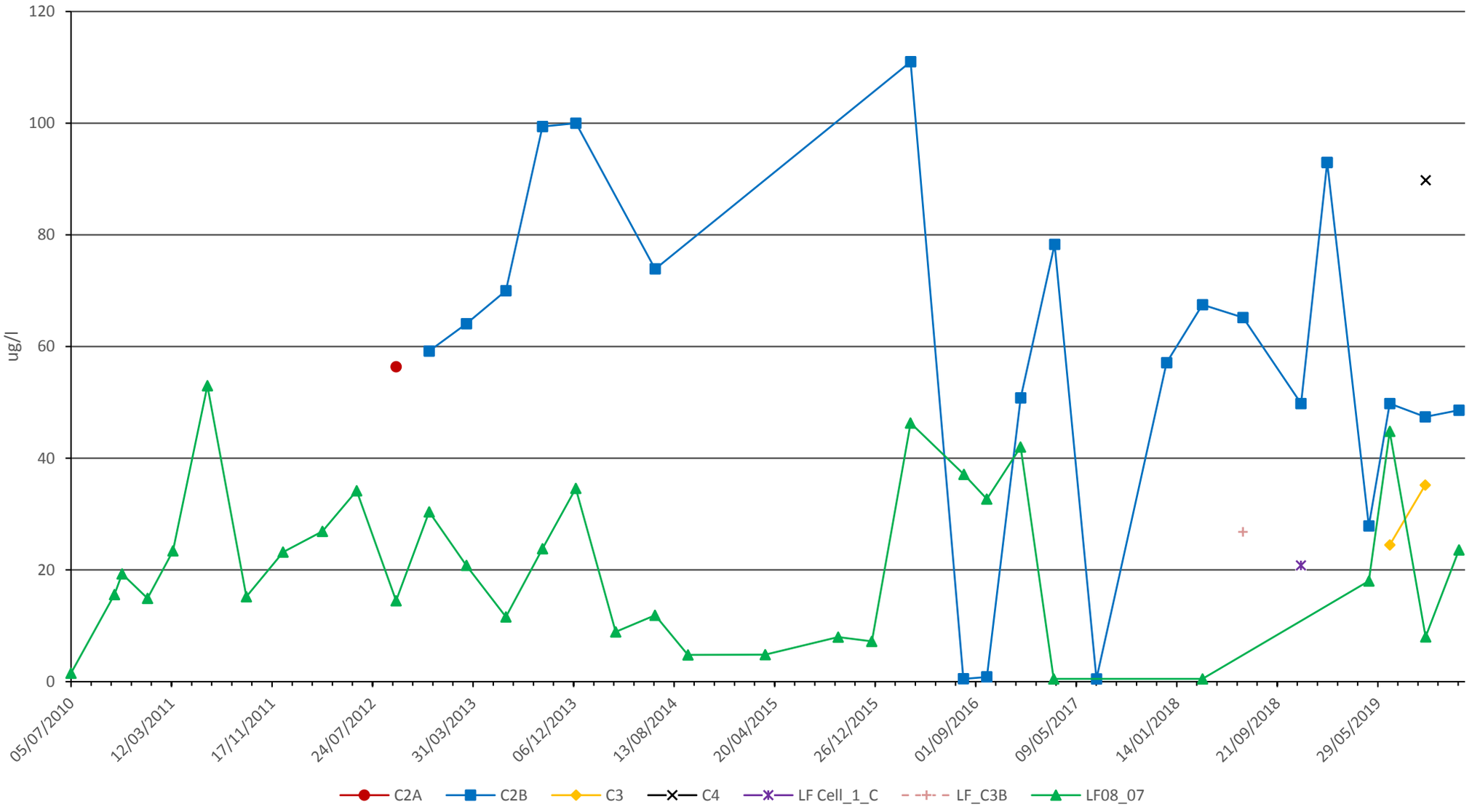
Ammoniacal Nitrogen in Leachate

Date	February 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

3-1

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-1 Ammonical Nitrogen.xlsm]Summary



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Docksway Disposal Site

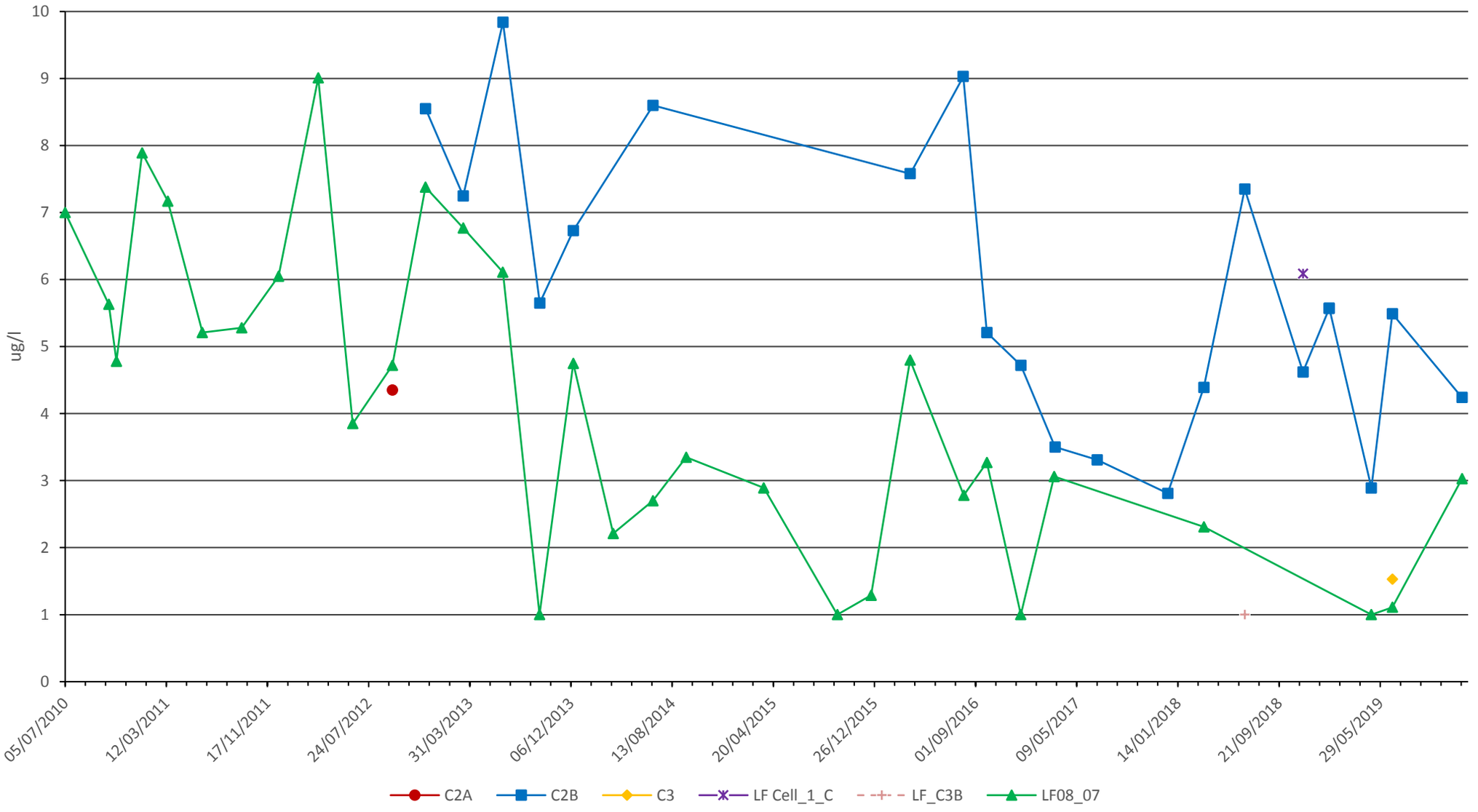
Arsenic in Leachate

Date	February 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

3-2

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-2 Arsenic.xlsm]Summary



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Docksway Disposal Site

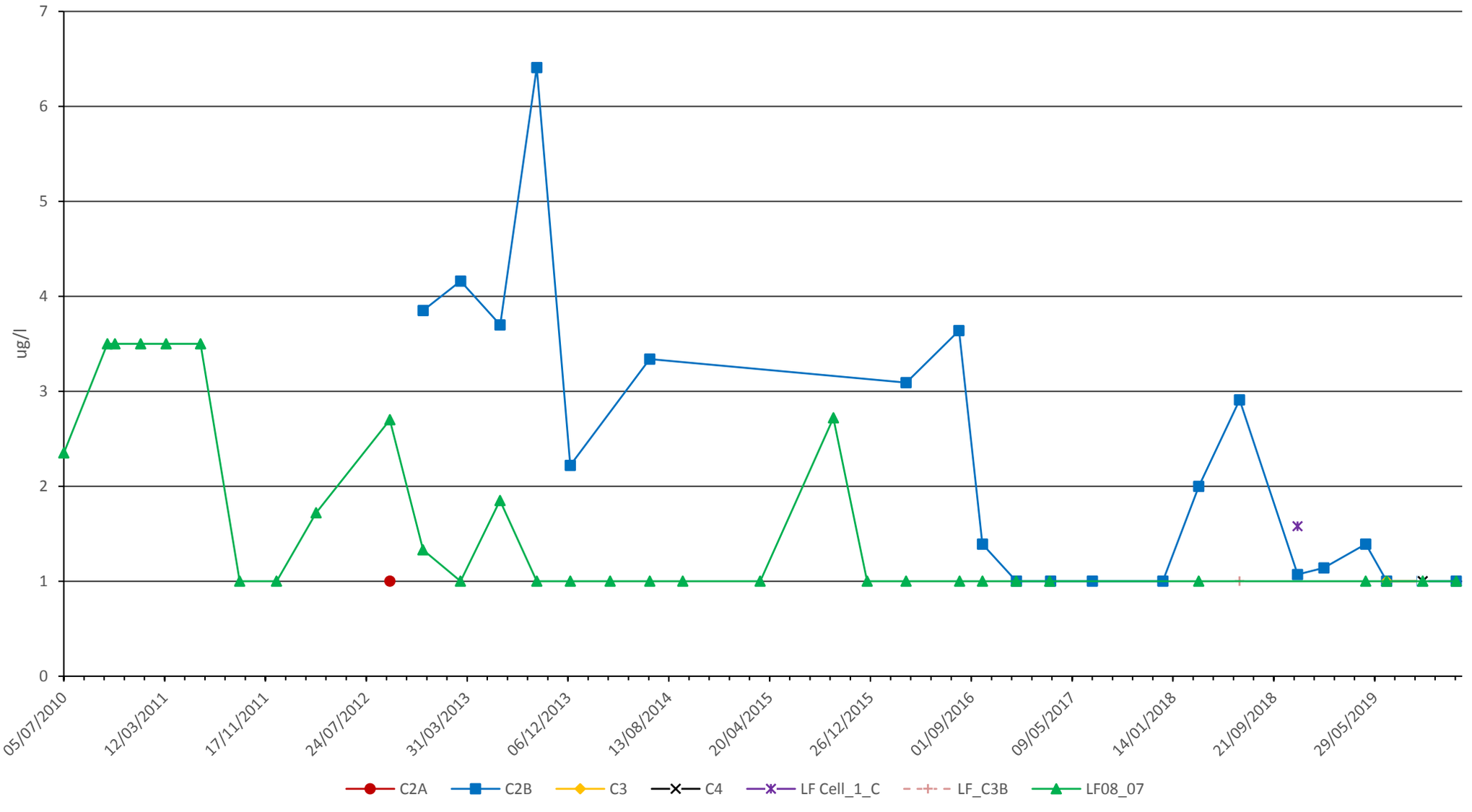
Benzene in Leachate

Date	February 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

3-3

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-3 Benzene.xlsm]Summary



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Docksway Disposal Site

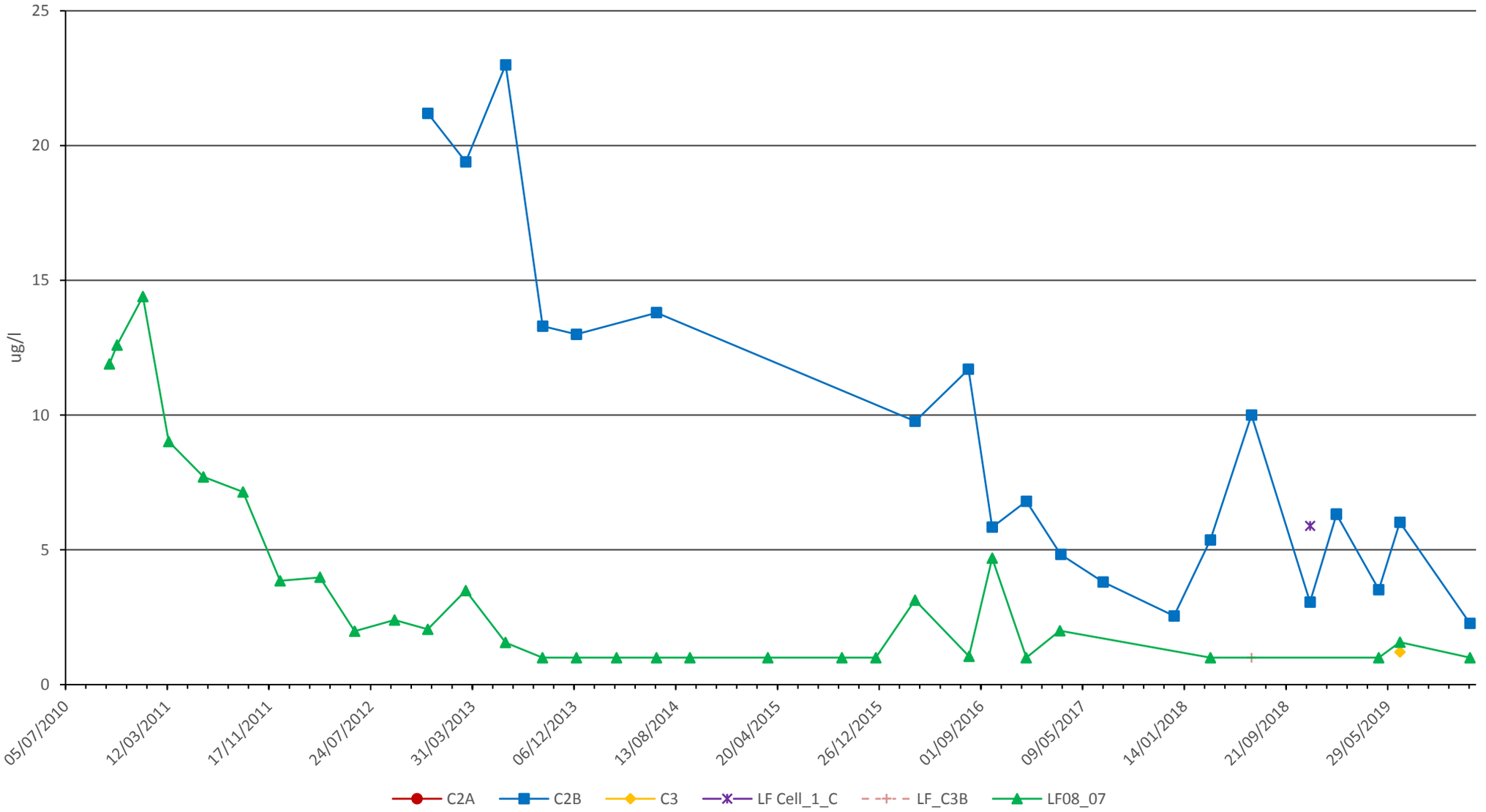
Naphthalene in Leachate

Date	February 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

3-4

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-4 Napthalene.xlsm]Summary



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Docksway Disposal Site

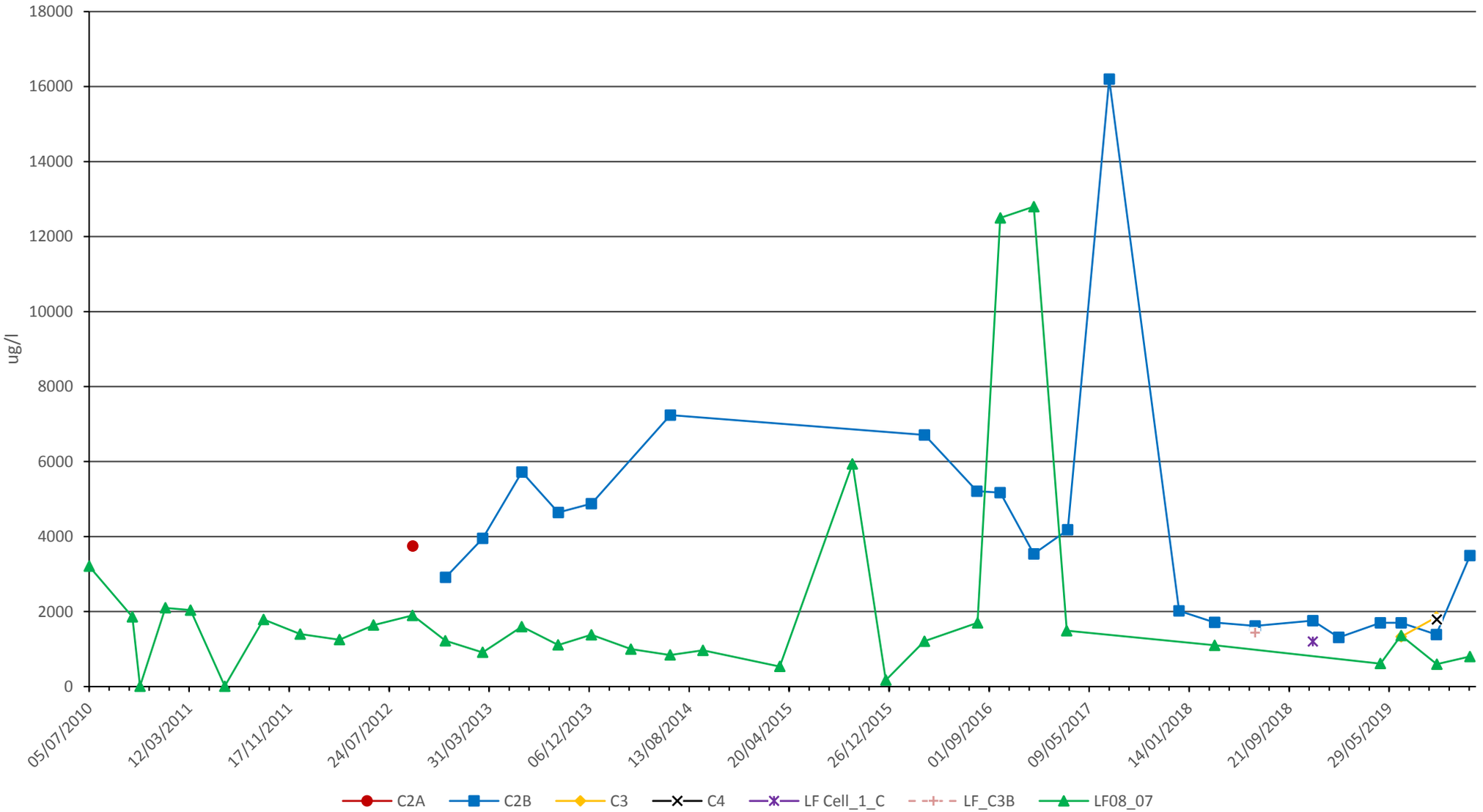
O-Xylene in Leachate

Date	February 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

3-5

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-5 O-Xylene.xlsm]Summary



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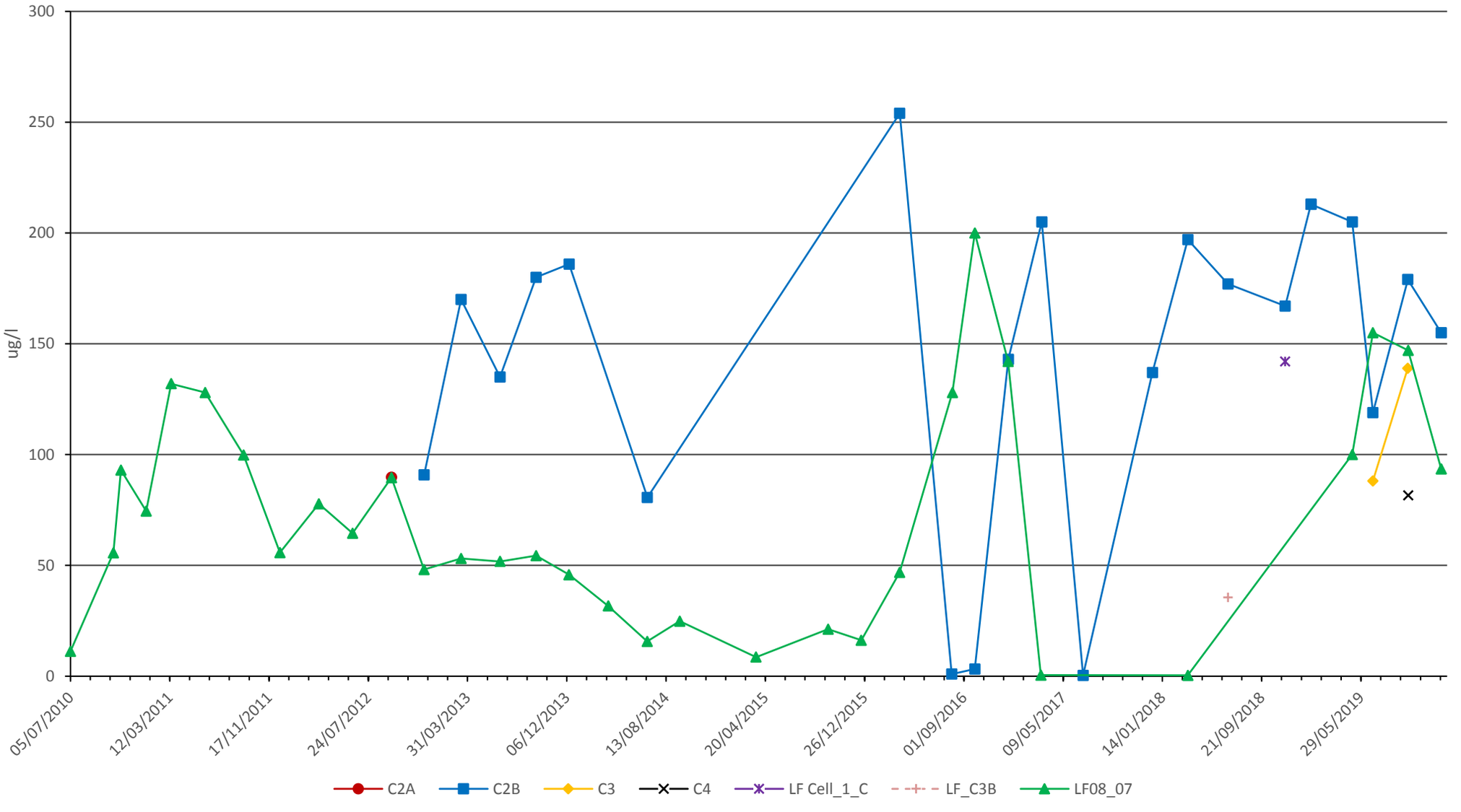
J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-6 EPH.xlsm]Summary



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Docksway Disposal Site

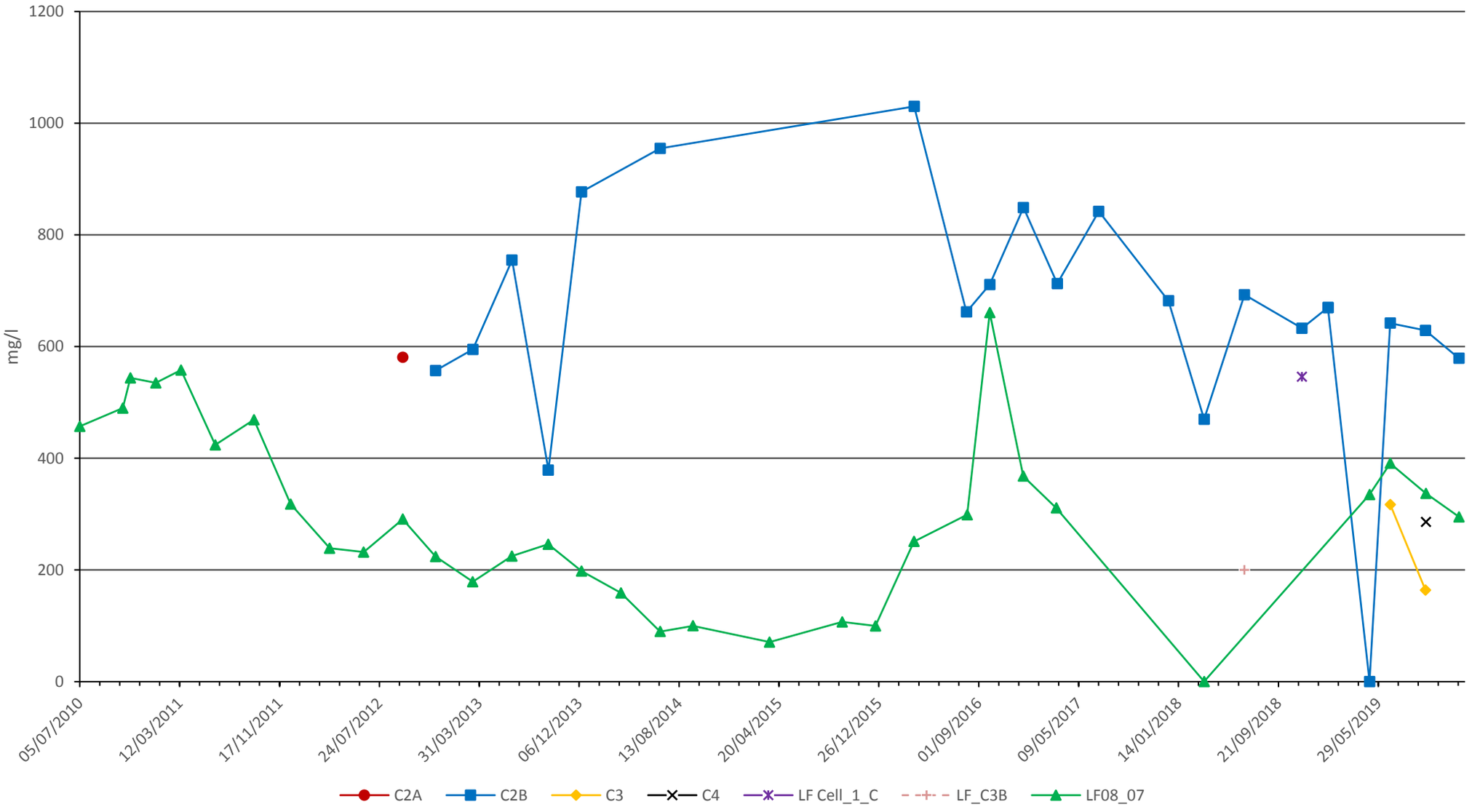
Nickel in Leachate

Date	February 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

3-7

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-7 Nickel.xlsm]Summary



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Docksway Disposal Site

Potassium in Leachate

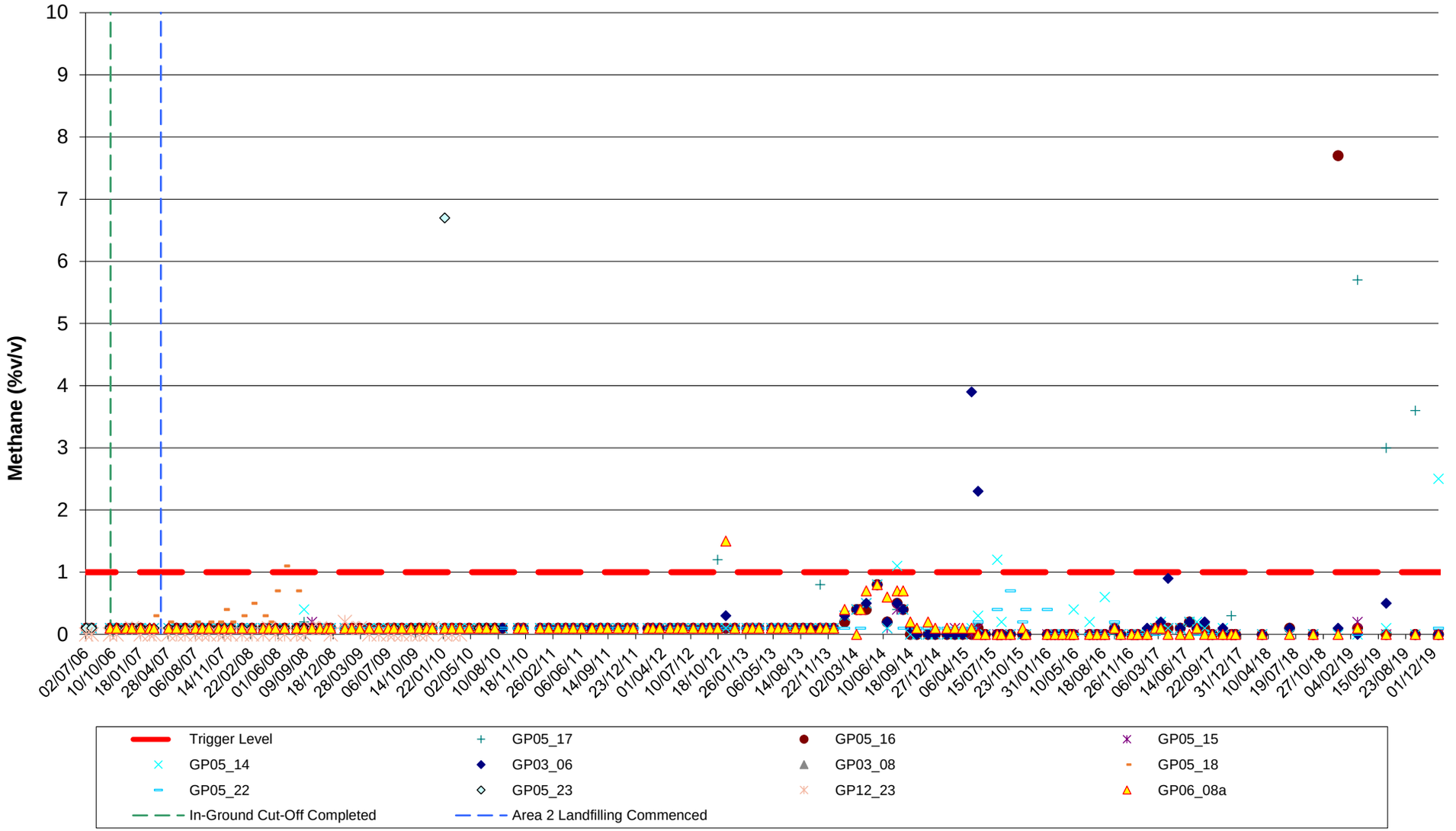
Date	February 2020
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix

3-8

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 3 - Leachate\[3-8 Potassium.xlsm]Summary

Appendix 4 Gas Concentrations Graphs



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Docksway Disposal Site

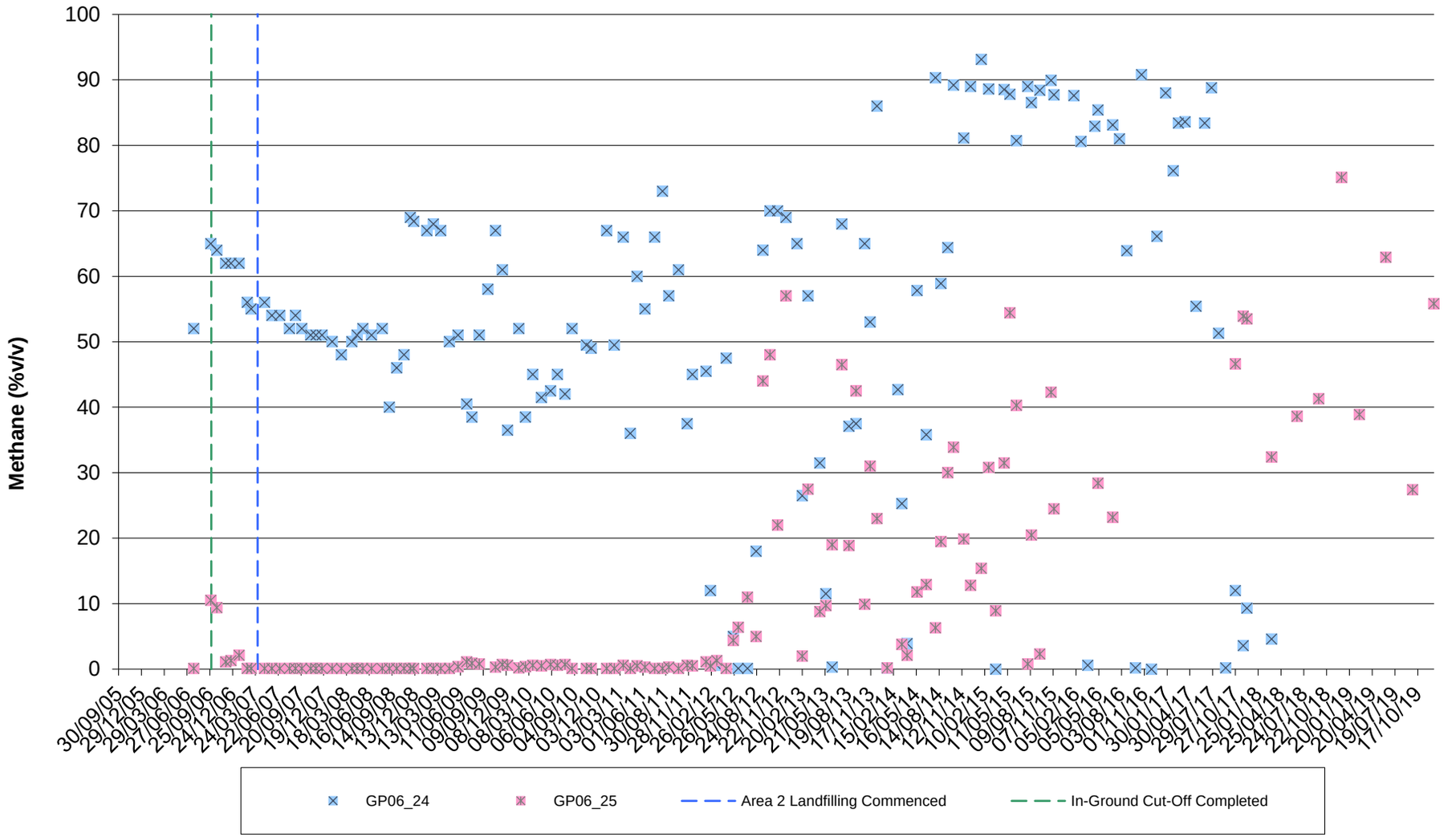
Methane Concentrations in Area 2 Gas Monitoring Wells (Excluding GP05_20, GP05_21, GP06_24, GP06_25, GP09_18)

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-1

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-1 CH4 But 20+21



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Docksway Disposal Site

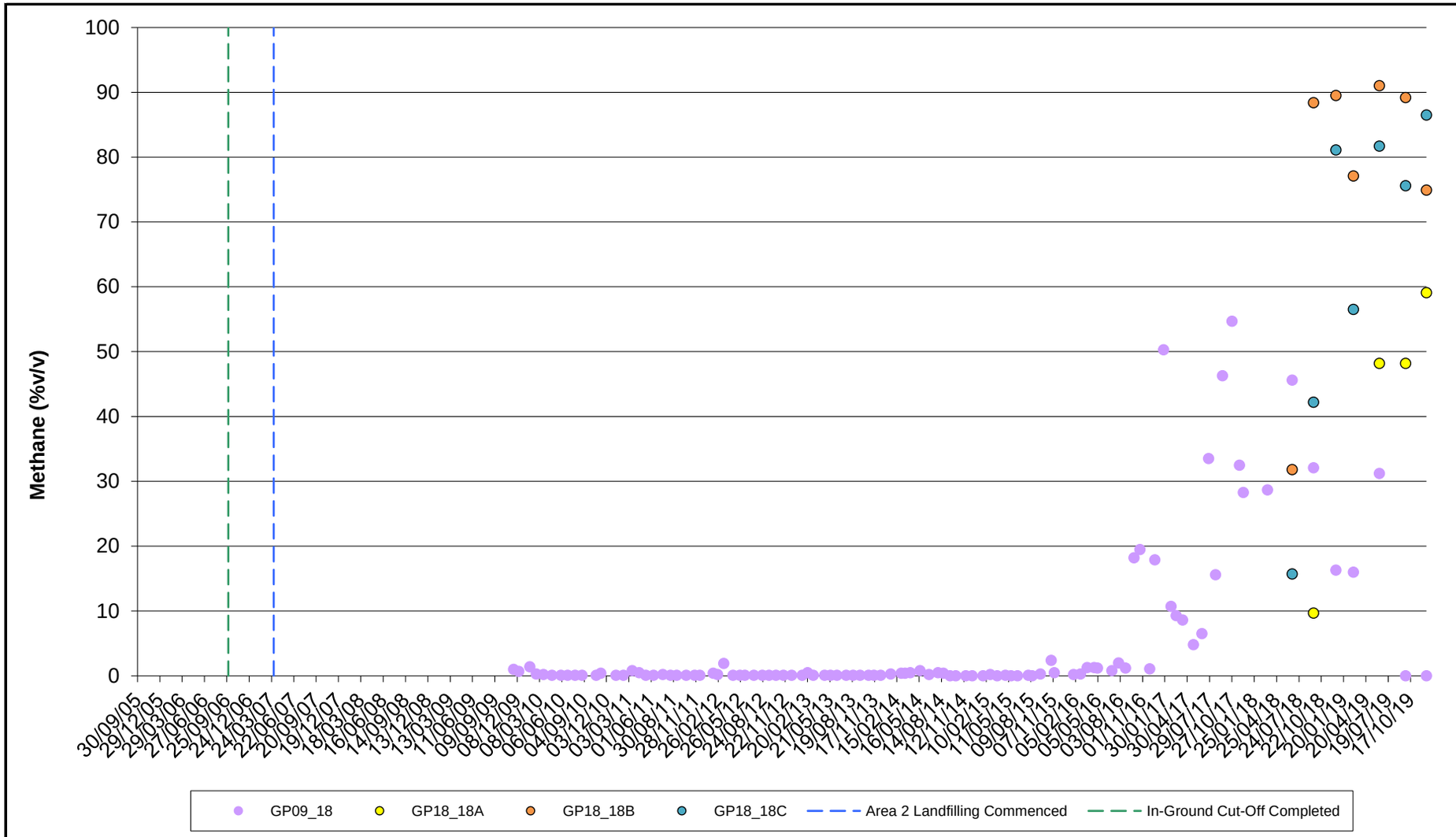
Recorded Methane Concentrations for GP06_24 and GP06_25

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-2

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-2 New Wells (CH4)



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Docksway Disposal Site

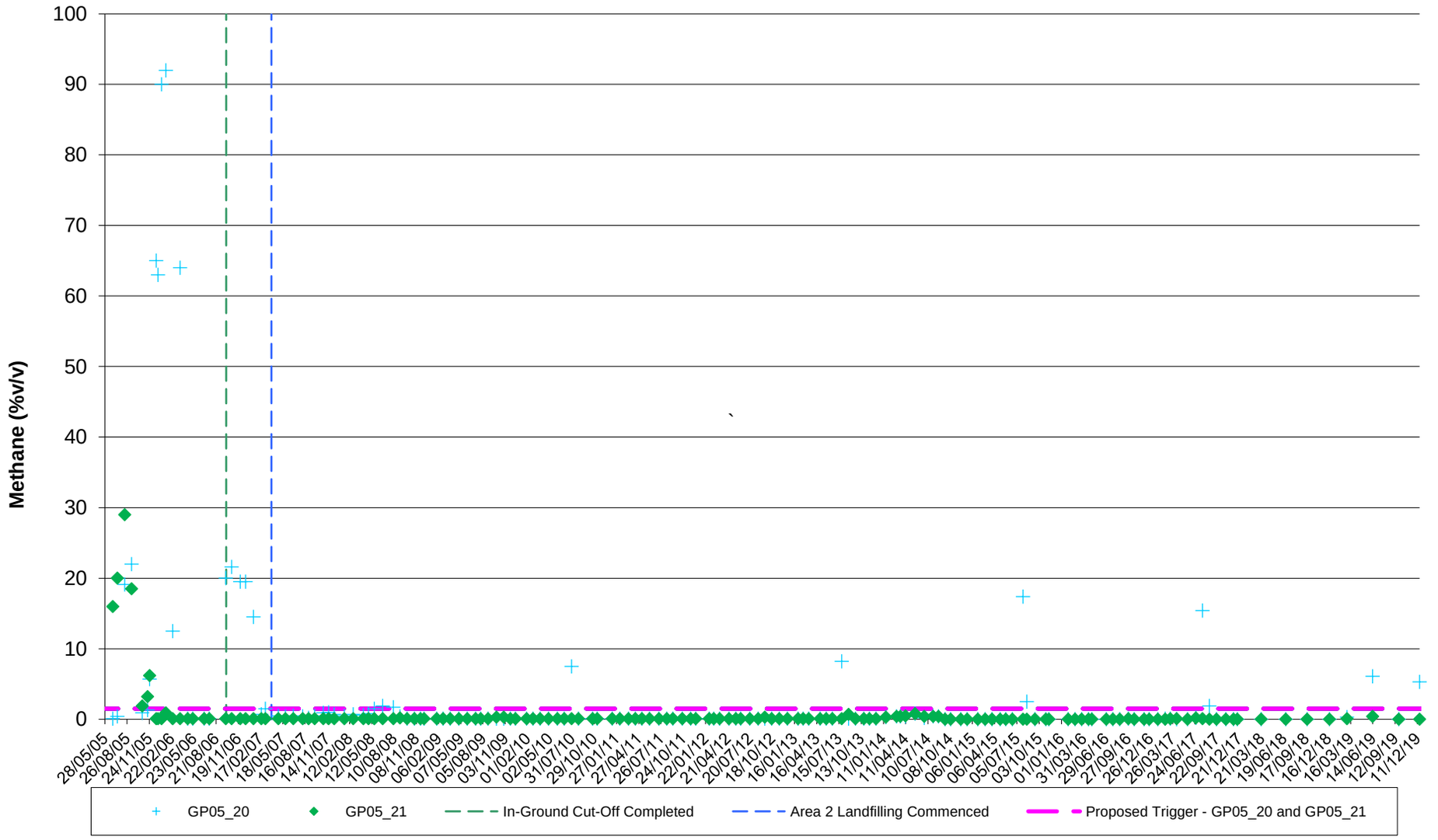
Recorded Methane Concentrations for GP09_18, GP18_18A, GP18_18B and GP18_18C

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-3

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-3 CH4 18,a,b,c



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Docksway Disposal Site

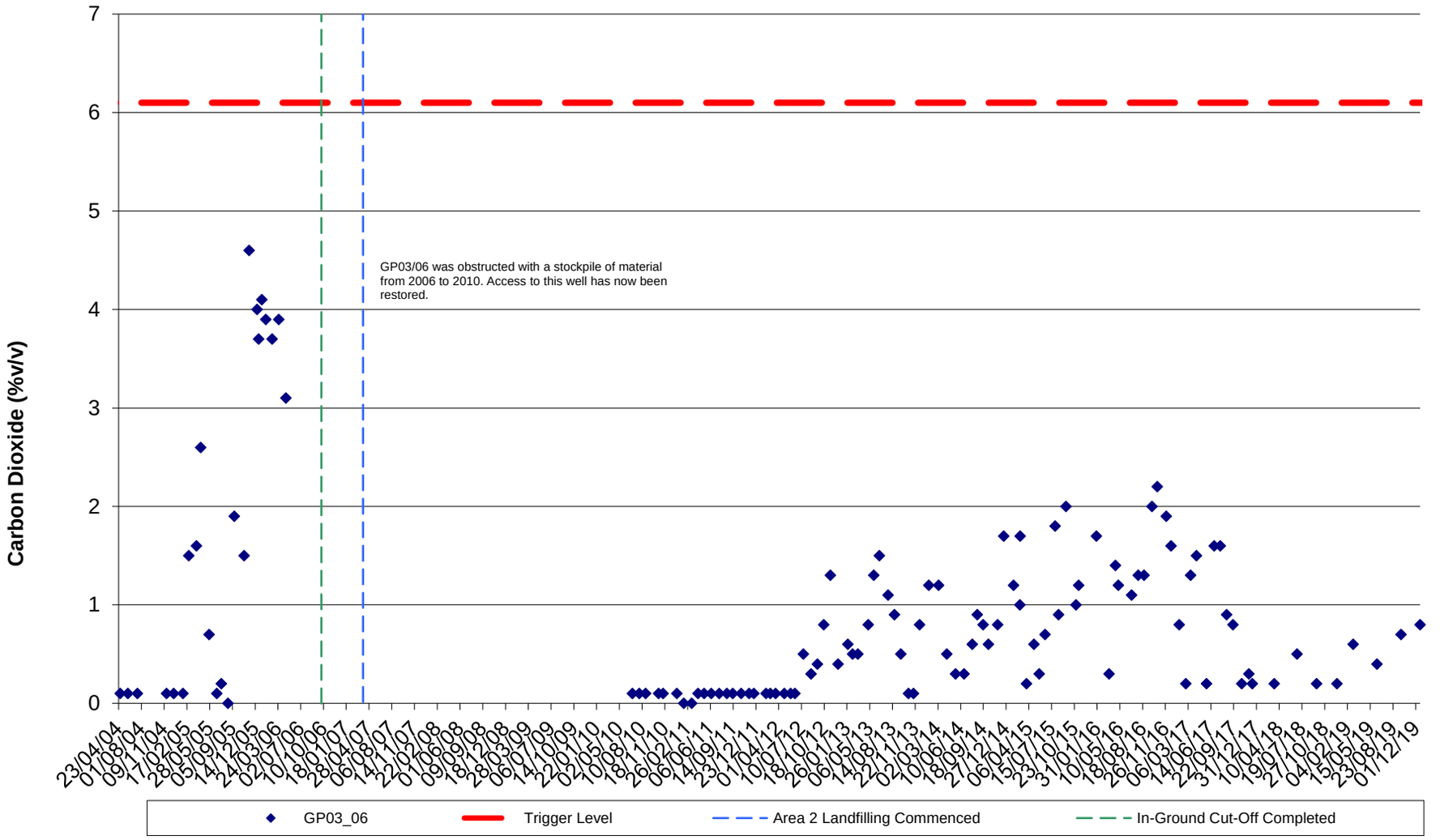
Recorded Methane Concentrations in GP05_20 and GP05_21

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-4

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-4 CH4 GP05_20+21



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Docksway Disposal Site

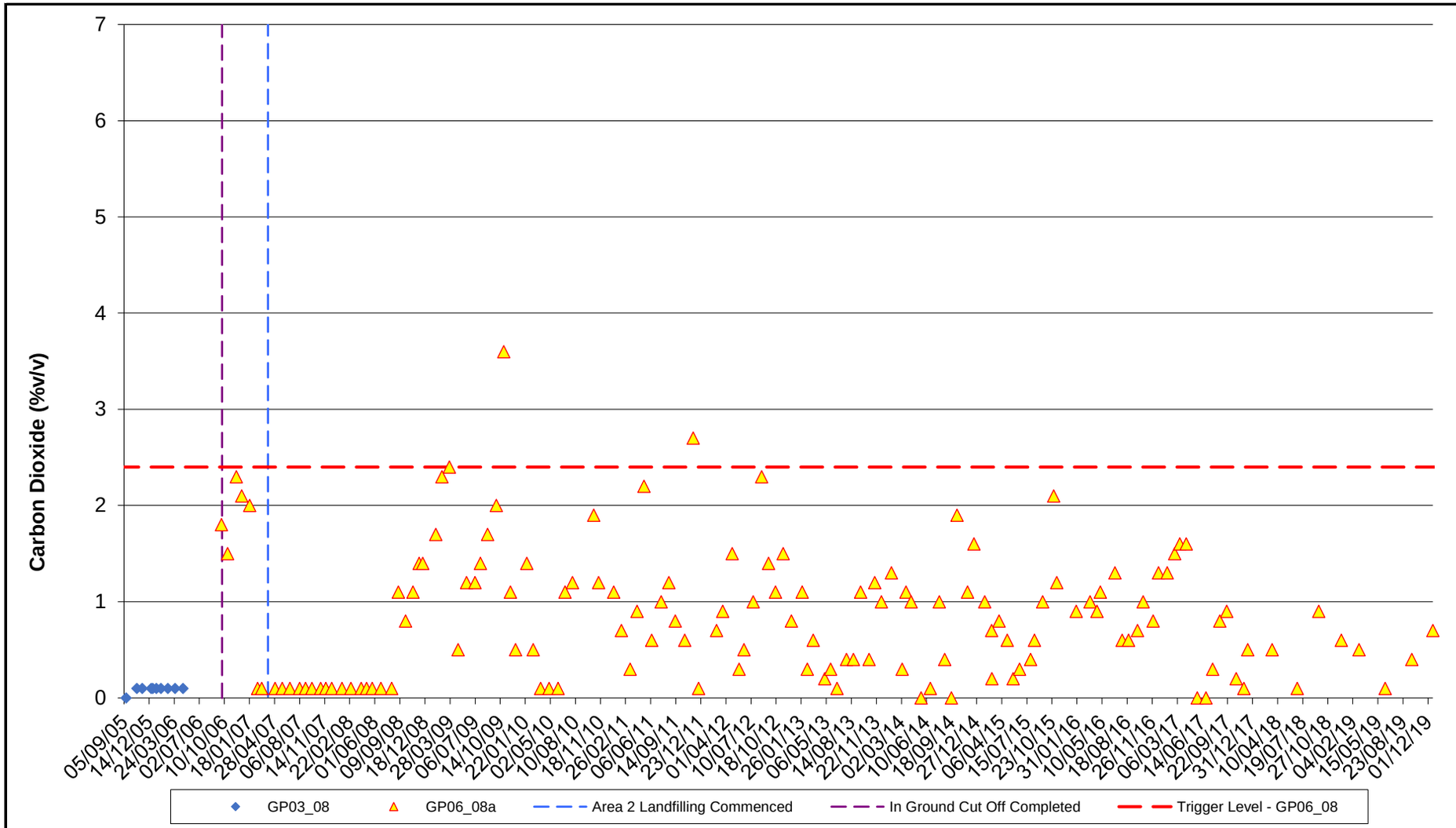
Recorded Carbon Dioxide Concentrations in GP03_06

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-5

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-5 CO2 GP03_06



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Docksway Disposal Site

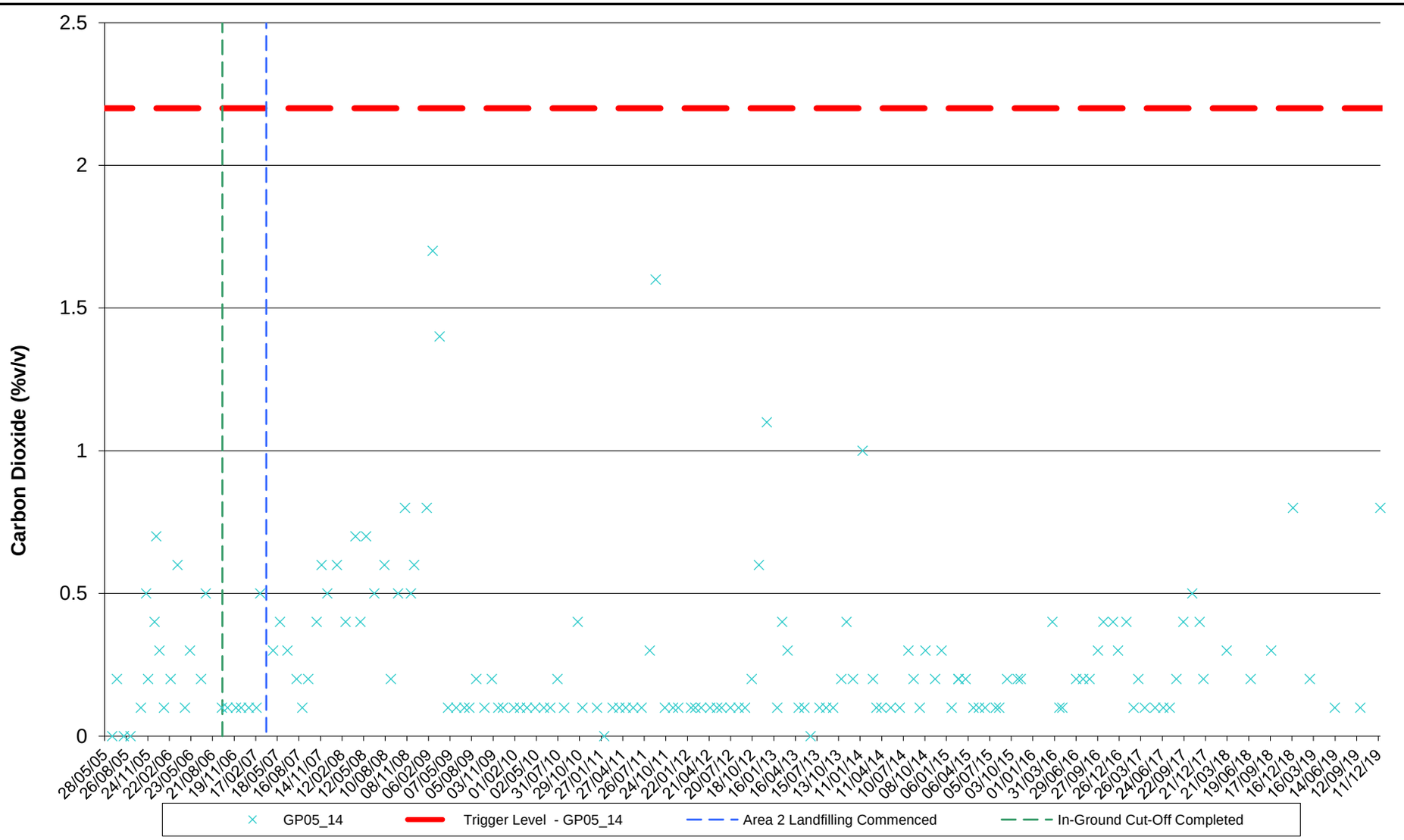
Recorded Carbon Dioxide Concentrations in GP06_08a

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-6

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-6 CO2 GP06_08a



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Docksway Disposal Site

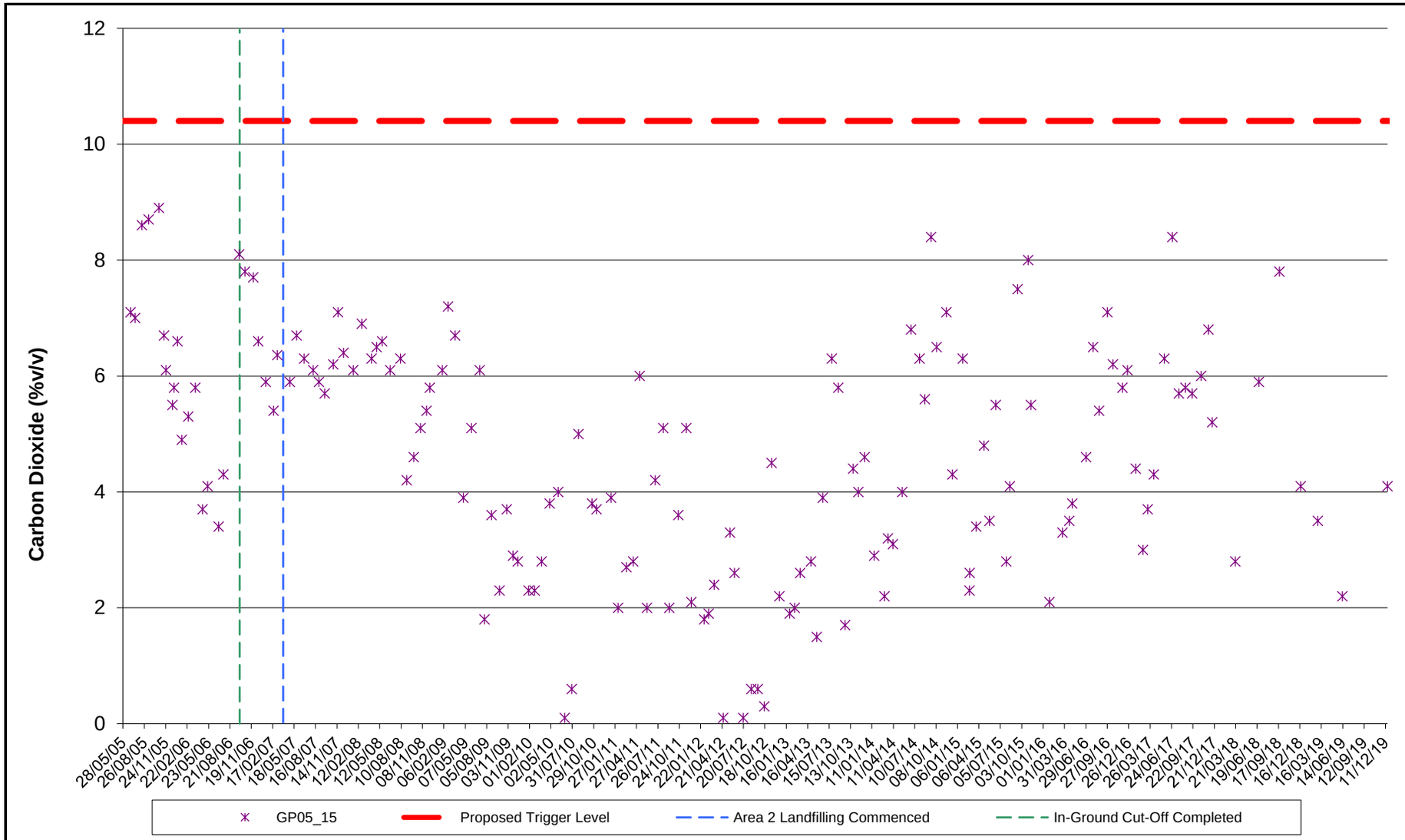
Recorded Carbon Dioxide Concentrations in GP05_14

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-7

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-7 CO2 GP05_14



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Docksway Disposal Site

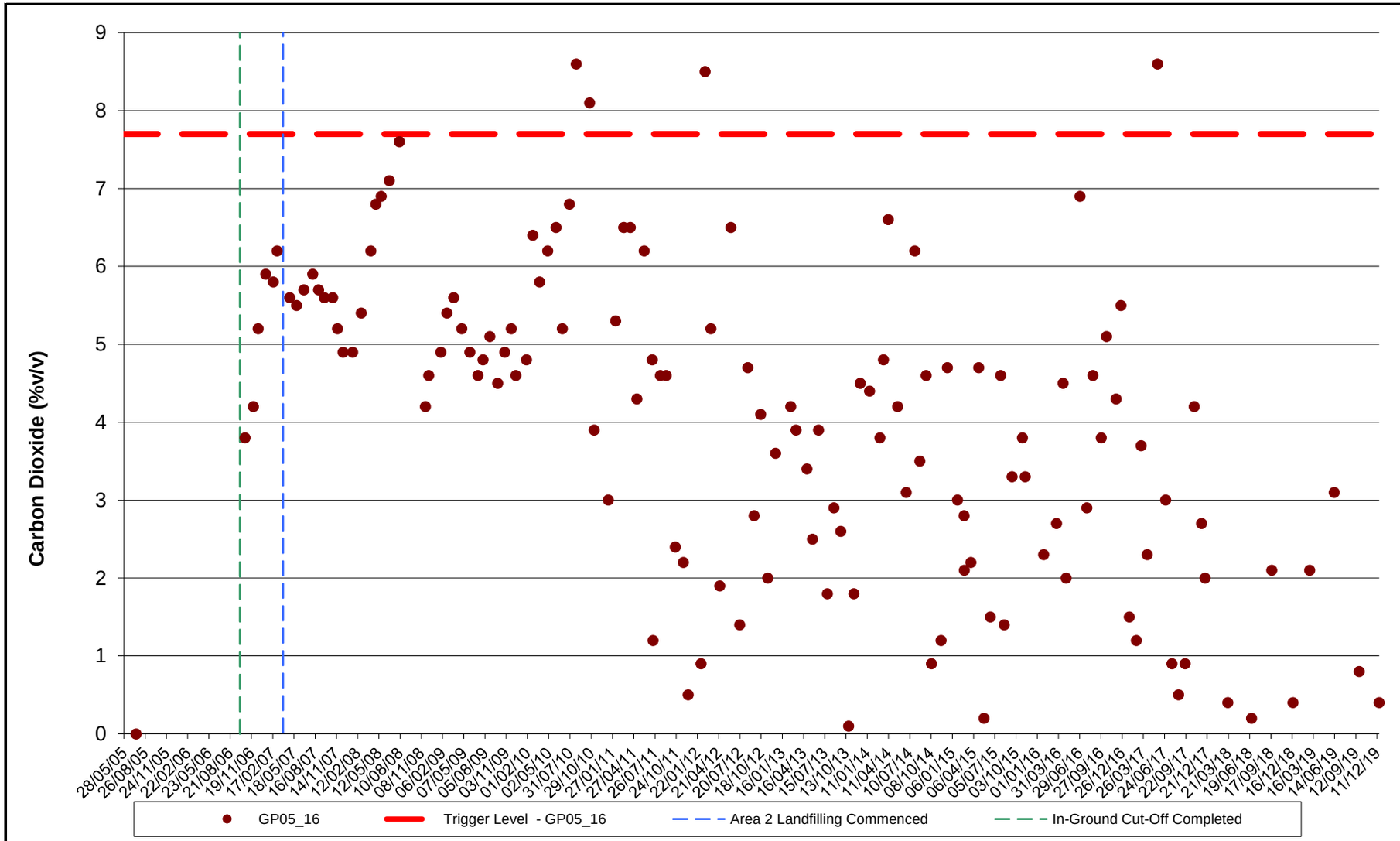
Recorded Carbon Dioxide Concentrations in GP05_15

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-8

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-8 CO2 GP05_15



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Docksway Disposal Site

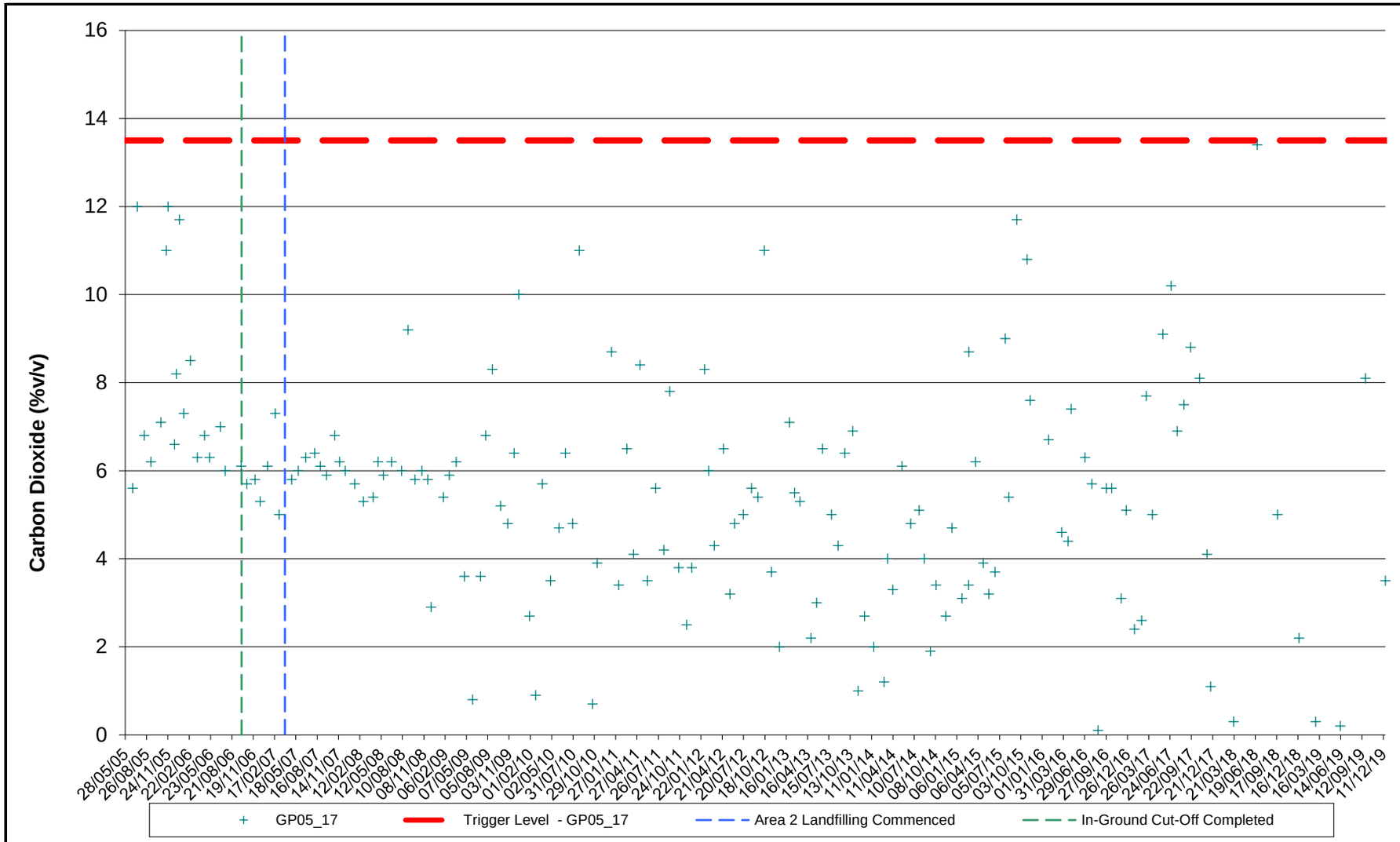
Recorded Carbon Dioxide Concentrations in GP05_16

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-9

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-9 CO2 GP05_16



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Docksway Disposal Site

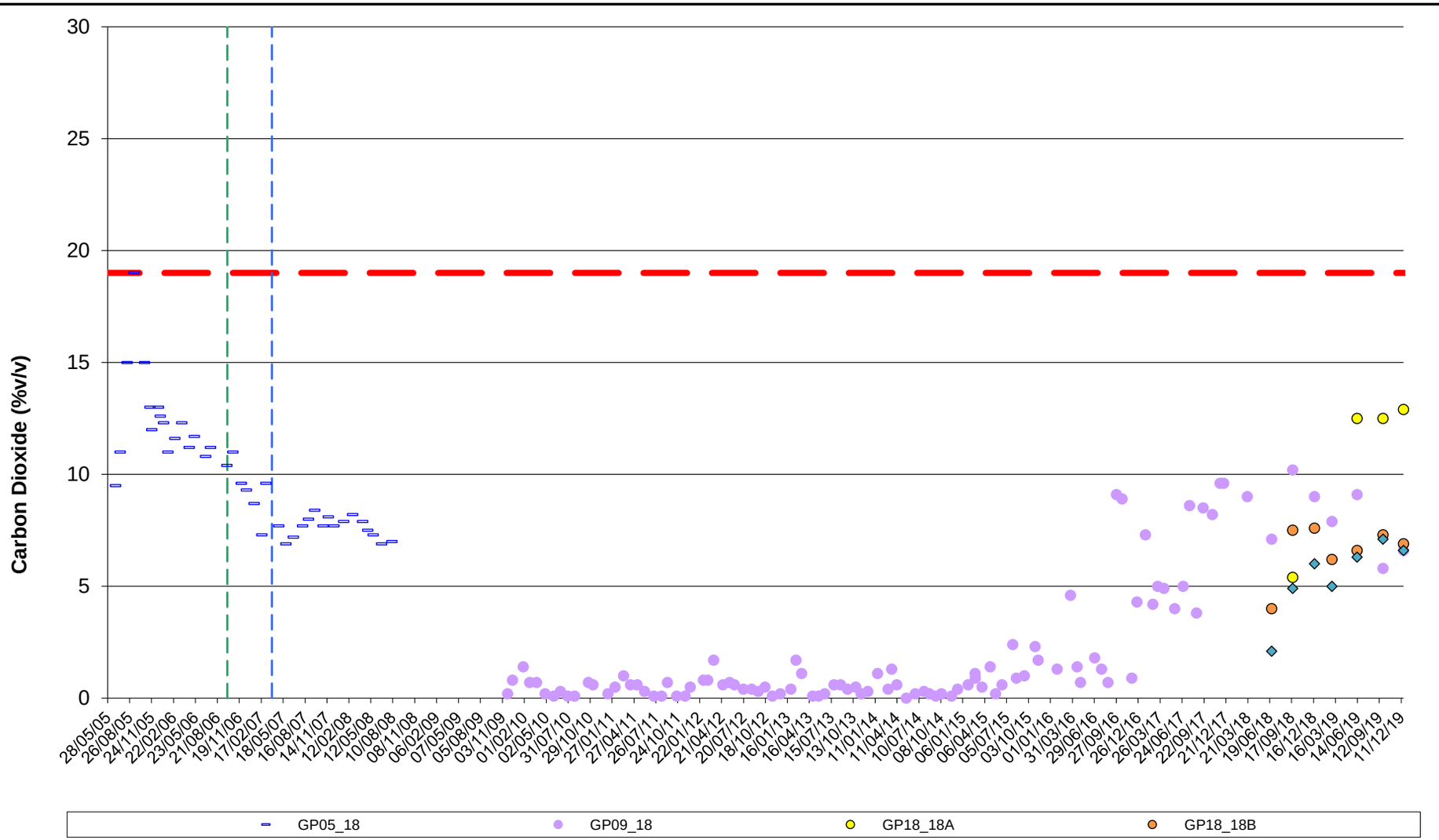
Recorded Carbon Dioxide Concentrations in GP05_17

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-10

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-10 CO2 GP05_17



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Docksway Disposal Site

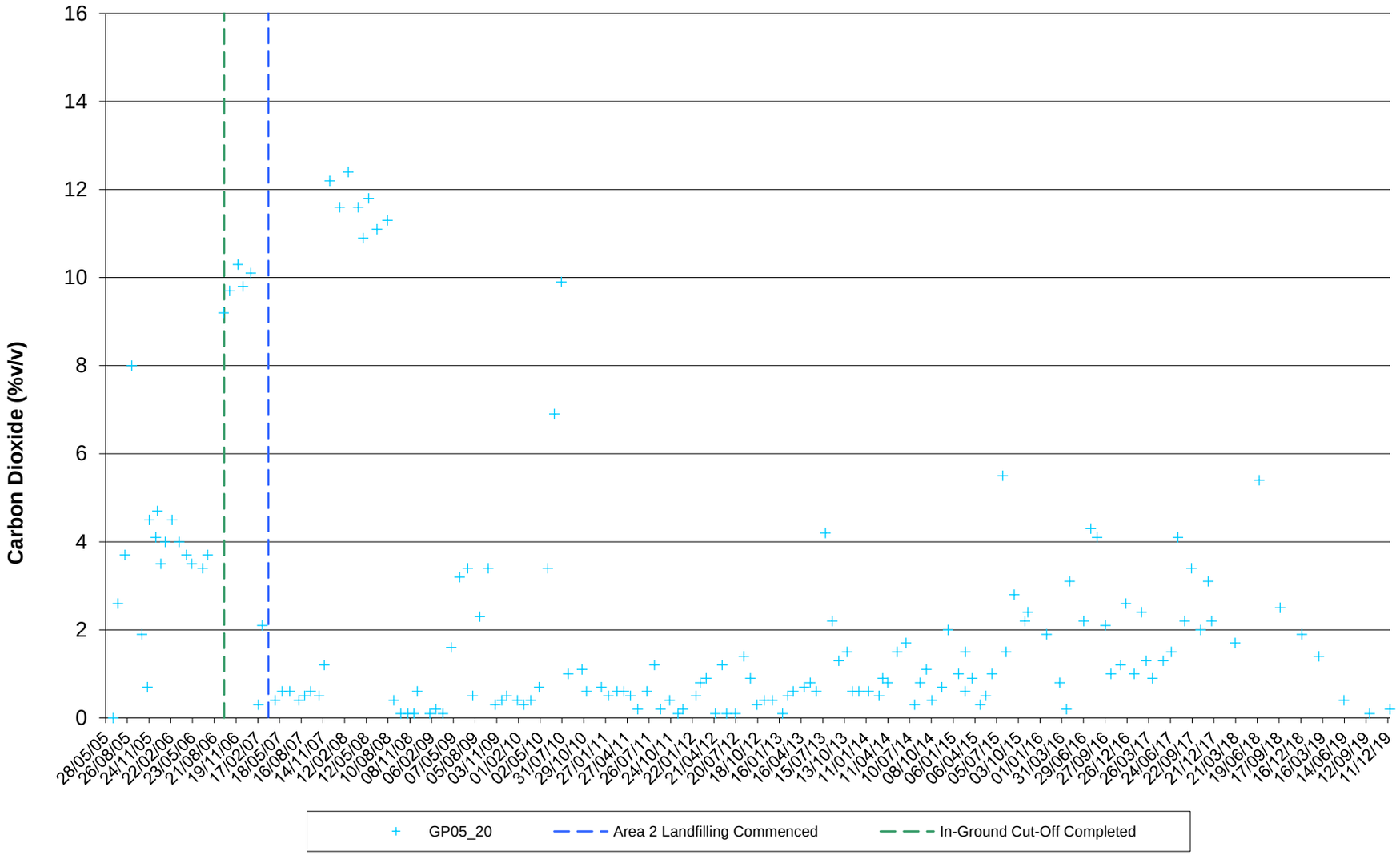
Recorded Carbon Dioxide Concentrations in GP05_18

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-11

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-11 CO2 GP05_18



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Docksway Disposal Site

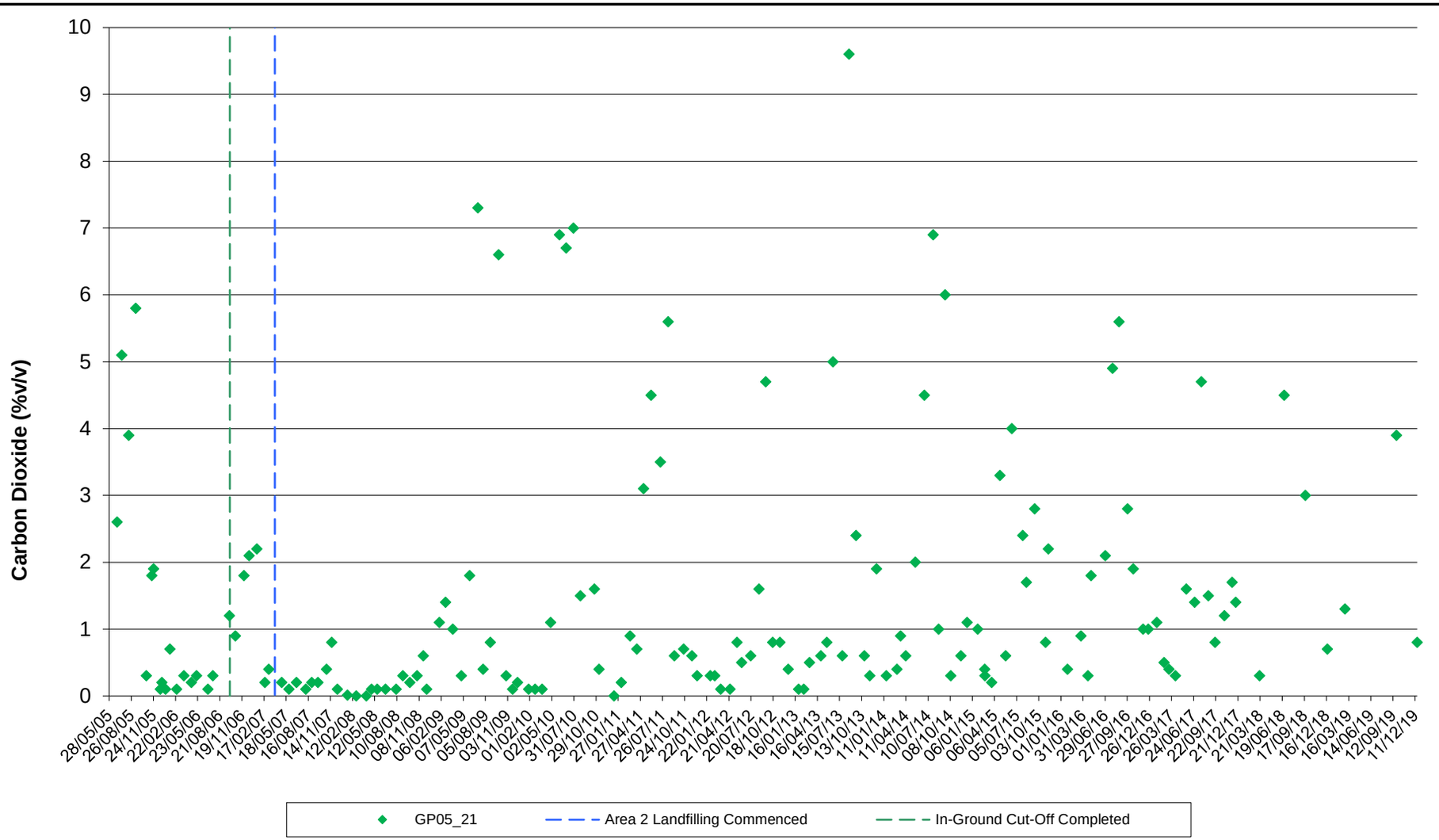
Recorded Carbon Dioxide Concentrations in GP05_20

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-12

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-12 CO2 GP05_20



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Docksway Disposal Site

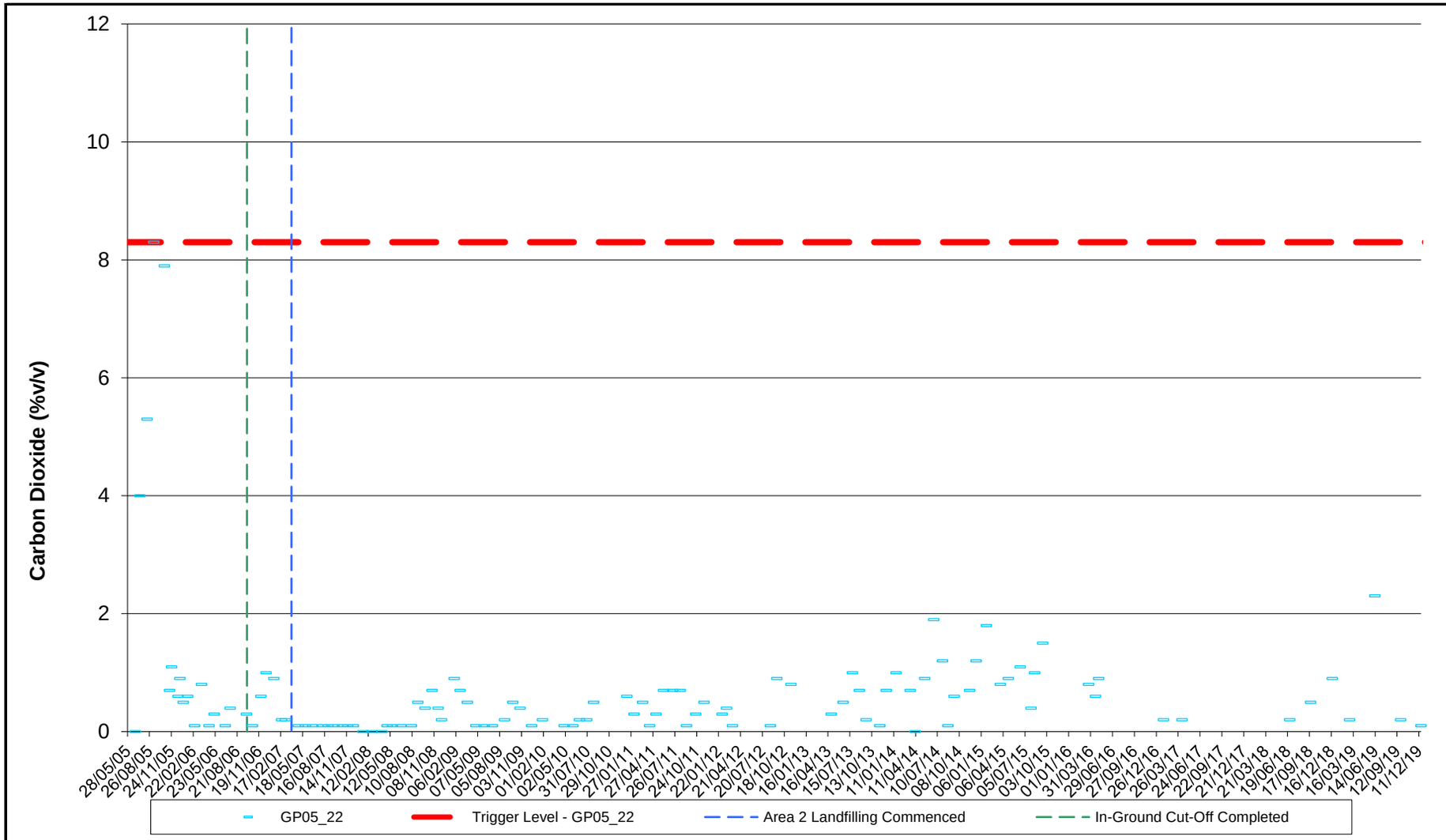
Recorded Carbon Dioxide Concentrations in GP05_21

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-13

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-13 CO2 GP05_21



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Docksway Disposal Site

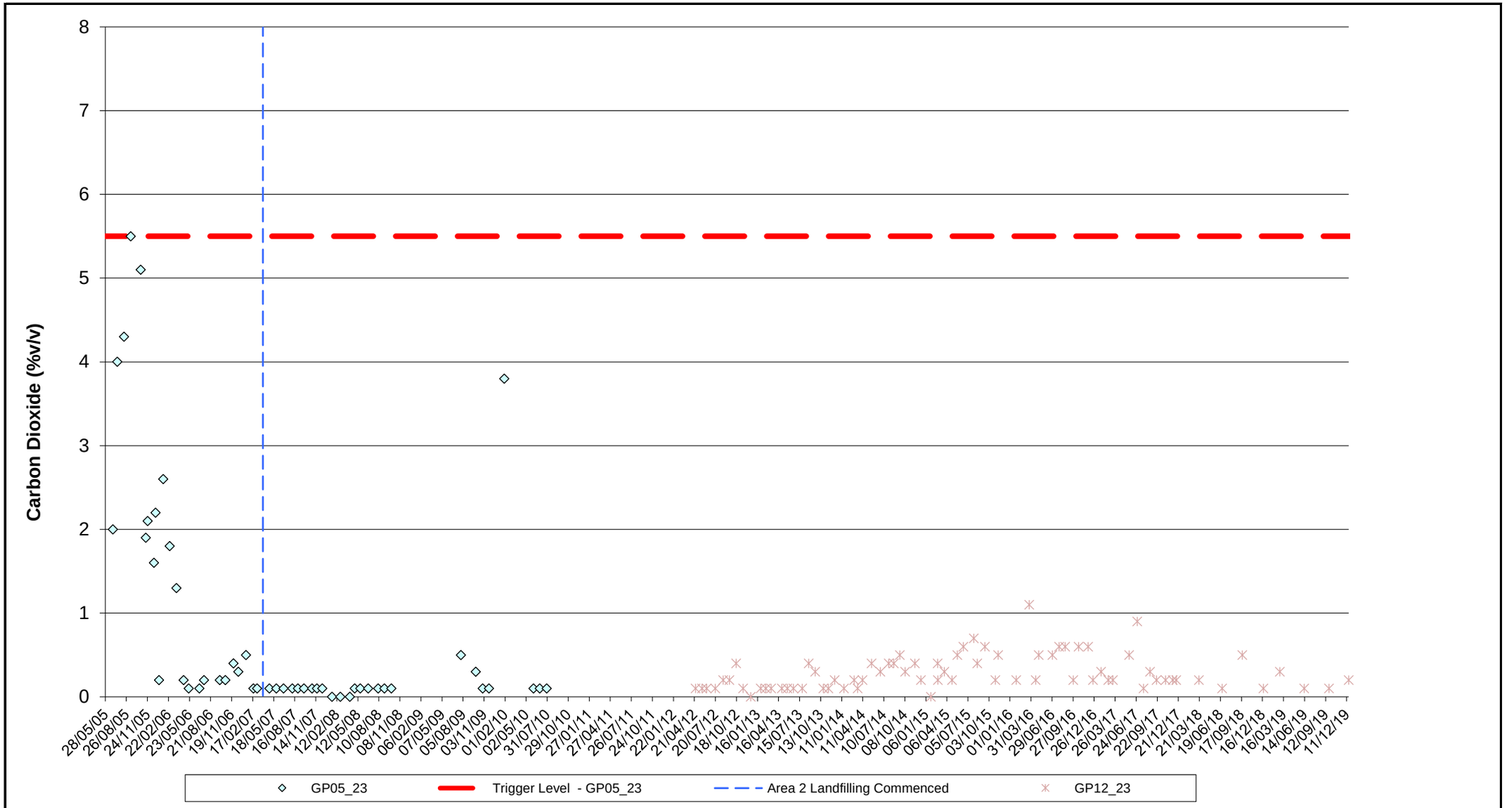
Recorded Carbon Dioxide Concentrations in GP05_22

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-14

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-14 CO2 GP05_22



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Docksway Disposal Site

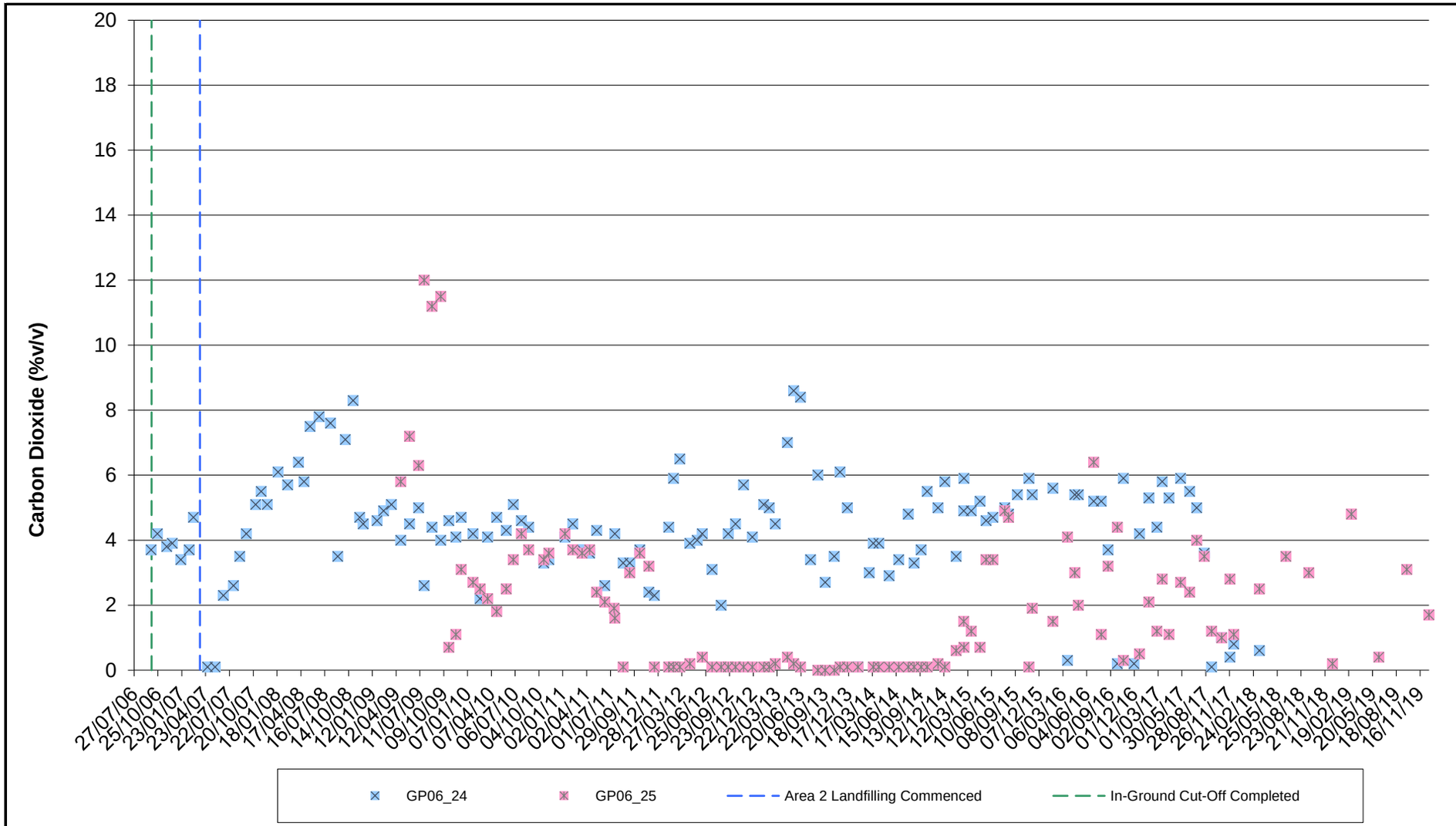
Recorded Carbon Dioxide Concentrations in GP05_23

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-15

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-15 CO2 GP05_23



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Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP06_24 and GP06_25

Date	February 2020
A4 Scale	nts
Drawn	NH
Checked	VKR

Appendix

4-16

J:\14739\3548 Area 2 AEPR 2019\AEPR Area 2\Appendix\Appendix 4 - Gas\[Area 2 Gas Graphs STANTEC.xlsx]4-16 New Wells (CO2)

Appendix 5 Infinis Annual Report

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	

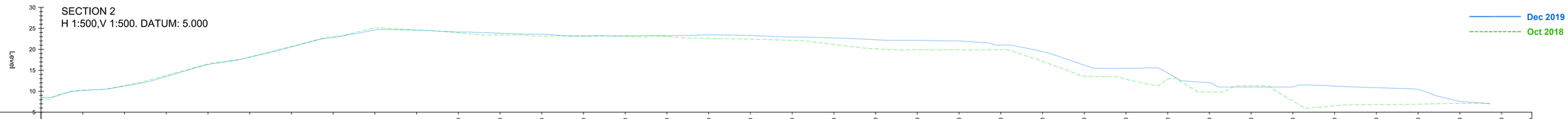
Permit requires that the accident management plan is reviewed at least every 2 years, or as soon as practicable after an accident (whichever is the earlier).

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 Topographical Survey and Cross Sections

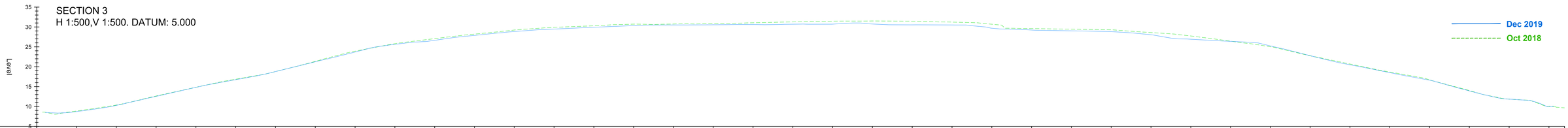
SECTION 2
H 1:500,V 1:500. DATUM: 5.000



Chainage	60	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	357
Oct 2018 Levels	8.221	10.234	11.369	13.792	16.517	18.177	20.733	23.078	25.058	24.590	23.941	23.433	23.173	23.257	23.095	23.069	22.623	22.411	22.167	21.150	20.132	19.505	19.507	17.137	13.543	12.861	12.858	9.794	12.032	11.289	7.613	6.512	6.800	6.939	7.096		
Dec 2019 Levels	8.471	10.174	11.226	13.519	16.355	18.102	20.577	22.821	24.627	24.576	24.131	23.844	23.611	23.166	23.225	23.233	23.449	23.302	22.936	22.739	22.281	22.153	20.995	19.492	16.231	15.481	14.378	12.632	11.008	11.081	11.234	11.234	10.843	10.473	7.568		
Level Difference	-0.052	-0.060	-0.143	-0.273	-0.162	-0.074	-0.156	-0.257	-0.431	-0.014	0.190	0.411	0.439	-0.091	0.130	0.164	0.826	0.891	0.769	1.589	2.149	2.648	2.107	1.088	2.355	2.887	2.620	1.520	2.238	-0.281	3.467	4.722	4.042	3.535	0.472		

Refer to drawing number 1476 / Ph2/ AEPR 2019_02 for section key plan

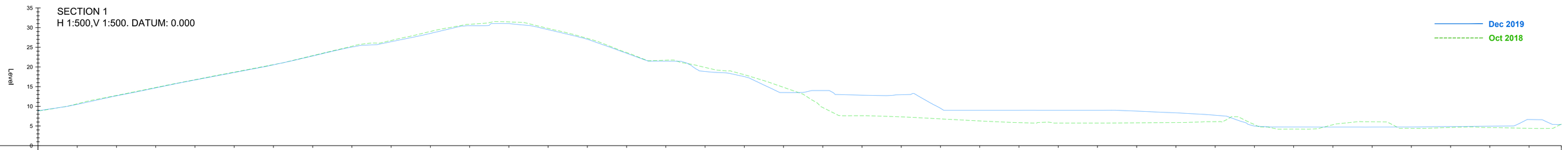
SECTION 3
H 1:500,V 1:500. DATUM: 5.000



Chainage	60	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	384
Oct 2018 Levels	8.691	8.856	10.353	12.629	14.826	16.858	18.783	21.340	23.897	25.799	27.064	28.200	29.222	29.921	30.291	30.706	30.755	30.867	31.059	31.279	31.450	31.514	31.450	31.224	30.687	29.597	29.441	29.293	28.595	27.733	26.427	25.036	22.743	20.682	18.674	16.702	14.002	11.846	10.050	9.659
Dec 2019 Levels	8.670	8.718	10.275	12.548	14.812	16.744	18.779	21.244	23.695	25.631	26.643	27.881	28.858	29.474	29.934	30.343	30.510	30.551	30.610	30.697	30.713	30.743	30.537	30.508	29.685	29.233	29.026	28.834	28.049	26.916	26.381	25.227	22.779	20.497	18.508	16.617	13.917	11.840	9.997	
Level Difference	-0.021	-0.139	-0.078	-0.081	-0.014	-0.114	-0.005	-0.096	-0.203	-0.168	-0.421	-0.319	-0.363	-0.447	-0.357	-0.363	-0.245	-0.317	-0.449	-0.582	-0.737	-0.771	-0.914	-0.717	-1.001	-0.364	-0.415	-0.459	-0.546	-0.817	-0.046	0.191	0.036	-0.186	-0.166	-0.085	-0.085	-0.005	-0.053	

Refer to drawing number 1476 / Ph2/ AEPR 2019_02 for section key plan

SECTION 1
H 1:500,V 1:500. DATUM: 0.000



Chainage	60	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	388
Oct 2018 Levels	8.693	10.638	12.761	14.780	16.753	18.680	20.587	22.875	25.270	26.727	29.013	30.838	31.438	29.789	27.260	23.656	21.709	19.885	18.026	14.824	9.684	7.612	7.311	6.804	6.283	5.855	5.742	5.746	5.802	5.873	6.105	5.353	4.212	5.325	6.064	4.399	4.630	4.605	4.408	5.461
Dec 2019 Levels	8.838	10.494	12.682	14.683	16.692	18.591	20.542	22.790	25.053	26.419	28.522	30.482	31.002	29.480	27.035	23.477	21.460	18.852	17.545	13.497	14.004	12.822	12.938	9.507	9.000	9.001	9.000	9.000	8.760	8.339	7.723	4.981	4.745	4.737	4.739	4.757	4.856	4.953	6.645	5.348
Level Difference	0.145	-0.144	-0.079	-0.097	-0.062	-0.089	-0.045	-0.085	-0.217	-0.308	-0.491	-0.357	-0.436	-0.309	-0.225	-0.179	-0.249	-1.033	-0.481	-1.327	4.321	5.210	5.626	2.704	2.717	3.146	3.258	3.254	2.978	2.466	1.618	-0.372	0.534	-0.588	-1.325	0.358	0.226	0.348	2.237	-0.113

Refer to drawing number 1476 / Ph2/ AEPR 2019_02 for section key plan

SECTION 4
H 1:500,V 1:500. DATUM: 5.000

Chainage	60	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	305
Oct 2018 Levels	8.891	6.512	6.119	5.845	5.674	5.466	5.299	5.372	5.255	5.389	5.609	6.120	6.371	6.496	7.144	8.789	12.698	14.338	13.593	13.683	13.670	15.679	15.942	15.883	15.535	15.601	15.666	15.240	14.488	12.723	10.767	
Dec 2019 Levels	8.670	8.713	10.348	9.800	10.082	10.681	11.002	10.861	10.649	9.793	9.000	9.035	8.940	10.056	10.769	10.845	12.662	15.745	16.971	17.900	18.691	18.536	18.429	18.537	18.608	18.266	17.444	15.697	14.012	12.093	10.598	
Level Difference	-0.221	2.202	4.230	3.956	4.408	5.215	5.703	5.488	5.394	4.405	3.391	2.915	2.569	3.561	3.625	2.055	-0.036	1.407	3.378	4.217	5.021	2.857	2.487	2.654	2.673	2.665	1.778	0.457	-0.476	-0.630	-0.169	

Refer to drawing number 1476 / Ph2/ AEPR 2019_02 for section key plan

A1

Docksway Waste Disposal Site Waste Volume Summary 2019		
Period	Input Volume (m3)	Cumulative Volume (m3)
Up to Oct 2018		1005268
Oct 2018 - Dec 2019	91025	1096293
Total Waste Deposited 2019	91025	
Remaining Volume (@ 2m m3 capacity)	903707	

Docksway Waste Disposal Site Cell 3A Volume Summary (Asbestos)		
Period	Input Volume (m3)	Cumulative Volume (m3)
Up to and including Oct 2018		31143
Oct 2018 - Dec 2019	22996	54139

NOTES

Refer to drawing number 1476 / Ph2/ AEPR 2019_02 for section key plan

Rev	Details	Dr	Ch	Ap	Date

Streetscene
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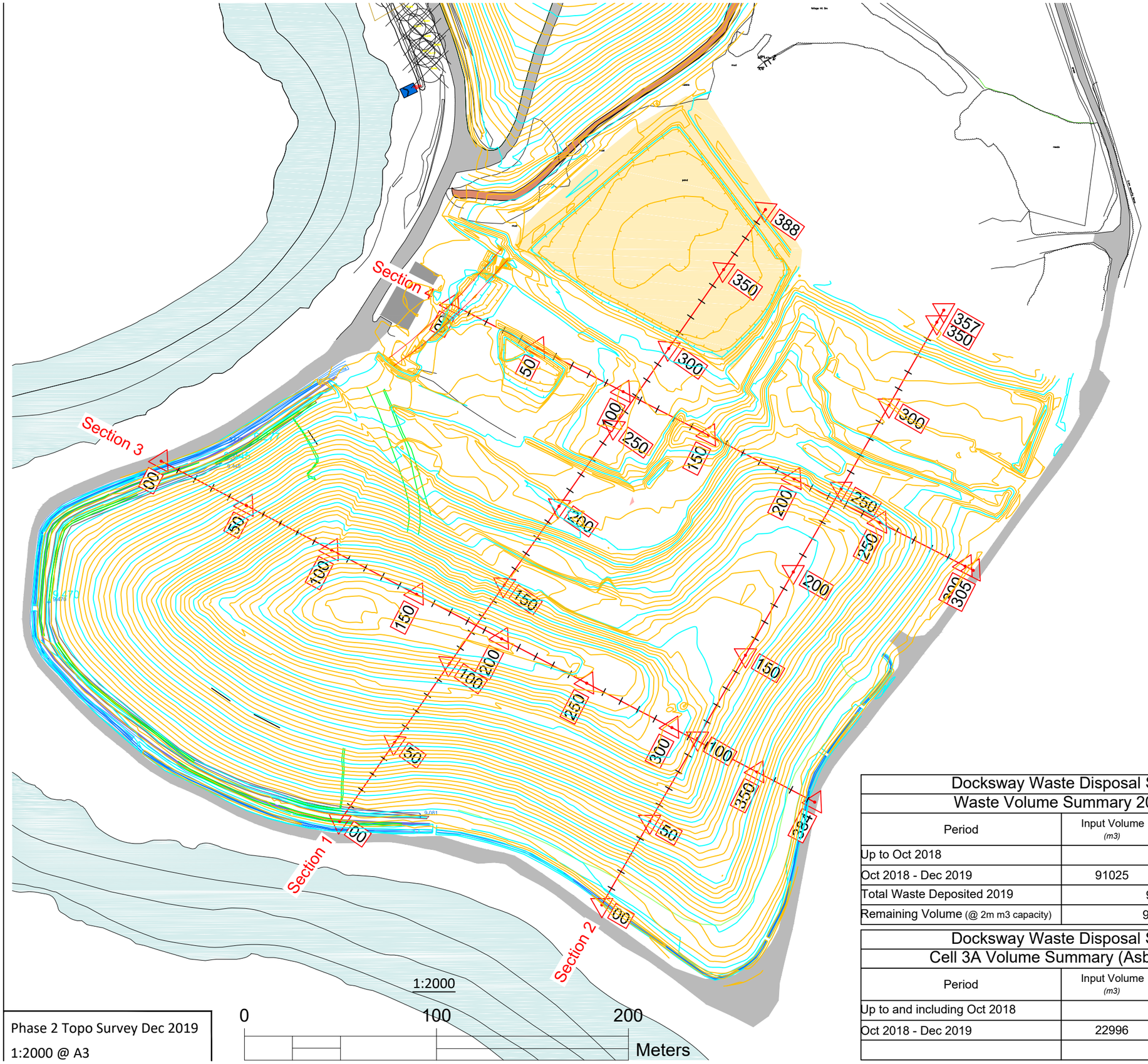
Newport City Council / Cyngor Dinas Casnewydd

Project
Docksway Waste Disposal Site

Cells 1 & 2 & 3 & 4 TOPO Survey Dec 2019

(Ph2 Waste Input Oct 2018- Dec 2019)

File No. JNA1476	Status: For Consultation	
Drawn By MDH	Checked By	Approved By
Date 03.02.20	Date	Date
Scales 1:2000		
Drawing No. 1476 / Ph2/ AEPR 2019_01		



Phase 2 Topo Survey Dec 2019

1:2000 @ A3

Docksway Waste Disposal Site		
Waste Volume Summary 2019		
Period	Input Volume *(m3)*	Cumulative Volume *(m3)*
Up to Oct 2018		1005268
Oct 2018 - Dec 2019	91025	1096293
Total Waste Deposited 2019	91025	
Remaining Volume (@ 2m m3 capacity)	903707	

Docksway Waste Disposal Site		
Cell 3A Volume Summary (Asbestos)		
Period	Input Volume *(m3)*	Cumulative Volume *(m3)*
Up to and including Oct 2018		31143
Oct 2018 - Dec 2019	22996	54139

NOTES A3

1. Refer to drawing number 1476 / Ph2/ AEPR 2019_01 for sections

Rev	Details	Dr	Ch	Ap	Date

Streetscene
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Project

Docksway Waste Disposal Site

Cells 1 & 2 & 3 & 4 TOPO Survey Dec 2019

Waste Input Oct 2018 - Dec 2019

File No. 1476		Status: Consultation			
Drawn	MDH	Checked		Approved	
Date	Feb 2020	Date		Date	
Scales	see drawing panes				

Drawing No. 1476/PH2/AEPR 2019 02