



Docksway Disposal Site

Annual Environmental Review for Area 2 - 2021

On behalf of **Newport City Council**



Project Ref: 332510236/3506 | Rev: 00 | Date: January 2022

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Document Control Sheet

Project Name: Docksway Disposal Site

Project Ref: 332510236/3506

Report Title: Annual Environmental Review for Area 2 - 2021

Doc Ref: 332510236/3506/AEPR/AREA2/2021/R0

Date: January 2022

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Revision	Date	Description	Prepared	Reviewed	Approved
00	Jan 22	Issue	NC	VKR	VKR

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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 V005 (Jan 2022).
- 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 2021 to December 2021. 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

- 1.3.1 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 continues 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 generally on a 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], in relation to surface water, 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 and assessed in accordance with those consents, whilst all other locations will continue to be monitored and assessed in accordance with the Environmental Permit.
- 2.1.4 It should be 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 six 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 Monitored during 2021

Position Monitored	Location
SW_1A	Ebbw Upstream
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

Note: SW02 and SW07 were not sampled during 2021 due to unsafe access and SW11 was not sampled as there is no requirement.

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 six times (January, February, March, May, October and November 2021) 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 2021 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 2021 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 2021, which is within the acceptable range of between 6 and 9 set in the discharge consent and is similar to previously recorded pH values.
- The concentration of Total Suspended Solids (TSS) was recorded below the discharge consent limit of 60mg/l during all samples taken in 2021. The concentrations are similar to those previously seen at this monitoring location and adverse trends have not been identified in the longer-term data.
- There is no limit value for Chloride in the discharge consent for SW_25, however concentrations have slowly increased across the six sampling dates from 45.5mg/l in February to 252mg/l in November which is the highest concentration recorded since 2009.

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 with reference to the parameters tested.

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 four times (January, February, March and May 2021) 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 limit value for Ammoniacal Nitrogen in the discharge consent for SW_26. However, concentrations recorded in 2021 are slightly higher than those recorded in 2020 but are similar to those seen in previous years with no adverse trends being identified.

- The results of the TSS testing undertaken on the samples obtained from SW_26 during 2021 recorded concentrations generally below the method detection limit (MDL) of <2mg/l, except during January where the concentration was recorded 117mg/l which is above the discharge consent limit of 60mg/l, however the subsequent monitoring visits recorded concentration below the limit of detection on the testing and below the discharge consent.
- During 2021, 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 with reference to the parameters tested and data reviewed.

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 2021, samples were taken from this location on twelve occasions for the presence of asbestos fibres and other hydrochemistry parameters. The laboratory did not identify the presence of asbestos fibres on any of the twelve occasions that they tested for asbestos fibres. The hydrochemistry parameters are commented on below alongside other testing locations.

Commentary on Other Surface Water Monitoring Locations

Ammoniacal Nitrogen

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

2.2.13 SW_1A was sampled on twelve occasions during 2021. Concentrations of Ammoniacal Nitrogen 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.

2.2.14 SW_23 was sampled twelve times during 2021 and the Ammoniacal Nitrogen concentrations have been relatively consistent, being recorded generally below 25mg/l in the last 7 years.

2.2.15 Ammoniacal Nitrogen within C3_ASB was recorded on twelve occasions with concentrations generally below 5mg/l and within the range of the concentrations previously detected at this location.

2.2.16 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 twelve samples obtained from SW_24 in 2021 were below the limit of detection (<0.2mg/l) with the exception of the sample taken in May which returned a concentration of 0.377mg/l.

Biochemical and Chemical Oxygen Demand

2.2.17 **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.

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

2.2.19 In general, COD concentrations appear to be relatively consistent at all monitoring locations during 2021 with results generally below 100mg/l. The exception to this is SW_26 where a COD concentration of 116mg/l was recorded in March.

Chloride

2.2.20 **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.

2.2.21 The exceptions to this are SW_23 where concentrations of Chloride have fluctuated from month to month in 2021 (from about 29.8mg/l up to 1120mg/l). These concentrations are within the overall dataset. Concentrations of Chloride at C3_Asb have fluctuated between 182mg/l and 264mg/l during 2021, which is within the longer-term dataset.

pH

2.2.22 **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 10 years.

Electrical Conductivity

2.2.23 **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, all below 5mS/cm at all monitoring locations in the last 12 months. This is within the range of the overall dataset.

Total Suspended Solids

2.2.24 **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

2.2.25 **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 12mg/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 2021 for surface water locations does not indicate any significant adverse trends developing in surface water quality, with reference to the parameters tested, 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 – 2020 ^[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 levels and compliance limits 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 limits have been set (in accordance with EA guidance), with other determinands having both control levels and compliance levels set.

Table 3-2 Area 2 Groundwater 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 2021. The exception to this is in GW12_33 which has shown a notable increase in the Ammoniacal Nitrogen concentration recorded in March 2021, at 57.5mg/l, and staying fairly consistent in the subsequent four monitoring occasions (June, July, August and September) ranging from 52.5mg/l to 54.5mg/l which exceeds the Compliance Limits of 18mg/l and are the highest concentrations ever recorded at this location. The concentration was then recorded as 3.94mg/l in November and 14.6mg/l in December, returning to below the Compliance Limit and in the range of concentrations normally seen at this location.
- 3.3.3 GW06_37 has previously shown a slow increase in the concentration of Ammoniacal Nitrogen since 2010, and the Compliance Limit of 35mg/l has been exceeded on a number of occasions between 2010 and 2020. The concentration recorded in 2021 have shown a steady decrease with all concentrations below the Compliance Limit.
- 3.3.4 All other monitoring locations remained below the compliance limits throughout the monitoring period with no indication of adverse trends developing.

Arsenic

- 3.3.5 **Appendices 2-6 to 2-15** present the recorded Arsenic concentrations for the current Area 2 groundwater monitoring locations. There were no exceedances of the Compliance Limits for Arsenic in the Area 2 groundwater monitoring wells during 2021 and no distinct adverse trends are apparent in any of the monitoring locations.

Benzene, Naphthalene and o-Xylene

- 3.3.6 **Appendices 2-16 to 2-23** present the results of Benzene, Naphthalene and o-Xylene concentrations.
- 3.3.7 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).
- 3.3.8 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

- 3.3.9 **Appendices 2-24 and 2-25** present the results of Extractable Petroleum Hydrocarbons (EPH) concentrations. Concentrations of EPH have generally been recorded below 500µg/l in all of the monitoring wells in Area 2 during 2021, with the exception of GW06_34, where one monitoring occasion recorded a concentration of 733µg/l (December). There are, however, no compliance limits for EPH, and the data does not indicate any adverse trends at the current time.

Nickel and Potassium

- 3.3.10 **Appendices 2-26 to 2-38** present the results of Nickel and Potassium concentrations in the monitoring wells.
- 3.3.11 Nickel and Potassium concentrations at the majority of the compliance wells have generally remained consistent throughout the 12-month monitoring period, with no recorded Compliance Limit exceedances.
- 3.3.12 The exceptions to this were Nickel at GW09_31 and Potassium in GW12_33 and GW12_38. GW09_31 recorded a Nickel concentration of 10.4µg/l in June 2021, which marginally exceeds the compliance limit of 10µg/l. However, during the following monitoring rounds the Nickel concentration in GW09_31 has returned to below the Control Limit. GW12_33 recorded Potassium concentrations exceeding the Compliance Limit of 55mg/l on five monitoring occasions (March, June, July, August and September) with concentrations ranging from 107mg/l to 118mg/l, which are the highest concentrations ever encountered at this location. During the following monitoring rounds however the Potassium concentrations returned to below the Control Limit. A marginal exceedance of the Compliance Limit (70mg/l) was also recorded for Potassium in GW_12_38 in September 2021, with a concentration of 70.5mg/l. The other two monitoring visits undertaken in 2021 recorded concentrations below the Compliance Limit.

Review of Potential Risks and Future Monitoring

- 3.3.13 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 - 2020^[4].

3.3.14 During 2021, 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 when access to the monitoring locations has not been possible. As such, for this period of reporting, leachate levels have been monitored at five locations in Cell 1, three locations, in Cell 2, two locations in Cell 3, and two locations within Cell 4. Leachate samples have been recovered for analytical testing (similarly when access permits) on a quarterly basis at LF08_07 located within Cell 1, C2B within Cell 2, C3B within Cell 3 and C4B within Cell 4.

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 in 2021	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)	C3A (Cell 3)	C3B (Cell 3)	C4B (Cell 4)	C4A (Cell 4)
January	1.99	3.31	3.03	1.51	1.59	3.21	3.31	3.11	-	2.77	n/a	-
February	2.36	3.40	2.77	1.65	1.95	2.99	n/a	2.30	-	2.61	n/a	-
March	2.56	2.87	3.06	1.63	2.18	3.26	n/a	2.62	2.35	2.60	n/a	1.50
April	1.81	2.76	2.89	1.49	1.43	1.98	n/a	2.91	0.32	2.40	3.24	1.46
May	1.96	2.21	1.24	1.69	1.87	1.55	n/a	2.60	1.87	1.98	1.98	1.50
June	1.99	2.18	1.40	1.45	1.91	1.93	n/a	1.99	1.90	1.97	1.95	1.85
July	2.00	n/a	1.38	1.55	1.73	1.98	n/a	2.22	1.98	2.00	1.89	0.61
August	1.93	n/a	1.50	1.48	1.57	2.43	n/a	1.98	2.41	1.86	0.12	2.35
September	1.51	n/a	1.37	1.33	1.26	1.67	n/a	1.91	2.31	1.88	0.87	2.00
October	1.04	n/a	1.32	1.53	2.51	1.94	n/a	2.45	1.96	2.76	2.56	1.99
November	1.29	n/a	1.42	1.35	1.23	1.46	n/a	1.97	0.15	n/a	2.61	1.90
December	1.24	n/a	1.29	1.40	1.04	1.59	n/a	3.10	0.24	3.71	2.29	1.94

Leachate removed from Area 2 during 2021 = 27,920,120kg

Bold text indicates leachate head levels above the permitted leachate head level (2m).

N/A indicates the location was not accessible

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 The frequency of leachate sampling required by the Environmental Permit is quarterly. In 2021, samples were obtained from Cell 1, Cell 2, Cell 3 and Cell 4 on four occasions (March, June,

September and December). From June to December samples were taken from C2C rather than C2B within Cell 2 as C2B could not be sampled due to a possible obstruction/defect.

Ammoniacal Nitrogen

4.2.3 **Appendix 3-1** presents the results of Ammoniacal Nitrogen concentrations. The Ammoniacal Nitrogen concentrations recorded in Area 2 leachate during 2021 are as follows;

- Cell 1 between 544mg/l and 685mg/l
- Cell 2 between 1550mg/l and 1740mg/l
- Cell 3 between 1070mg/l and 1920mg/l.
- Cell 4 between 481mg/l and 567mg/l.

4.2.4 The results for each cell do not appear to show any distinct trend, although there are limited datasets for Cells 3B and 4 due to them being relatively new cells.

Arsenic

4.2.5 **Appendix 3-2** presents the results of Arsenic concentrations over time in leachate in Area 2, and the concentrations recorded in 2021 are as follows;

- Cell 1 between 16.6µg/l and 27.1µg/l.
- Cell 2 between 28.4µg/l and 50.0µg/l.
- Cell 3 between 33.9ug/l and 325ug/l.
- Cell 4 between 10.6ug/l and 28.8ug/l.

4.2.6 The results for Cells 1 and 2 are within the range of the overall datasets for these locations. The datasets for Cells 3 and 4 are limited, however the results for Cell 4 indicate some fluctuations during 2021 without any distinct trend. The increasing trend previously observed within Cell 3 is now decreasing.

Benzene

4.2.7 **Appendix 3-3** presents the results of Benzene concentrations in leachate from Area 2 and the concentrations recorded during 2021 are as follows;

- Cell 1, were between the method detection limit (MDL) of the testing (<1ug/l) and 5.46ug/l.
- Cell 2, were between the MDL of the testing and 5.81ug/l.
- Cell 3, were between the MDL of the testing and 3.06ug/l.
- Cell 4, were between the MDL of the testing and 2.69ug/l.

4.2.8 The Benzene results for all cells do not appear to indicate any distinct trends.

Naphthalene

4.2.9 **Appendix 3-4** present the results of Naphthalene concentrations in leachate from Area 2.

4.2.10 Naphthalene concentrations in Cell 1 leachate have been recorded below the MDL during all monitoring rounds since 2013. Concentrations of Naphthalene in Cell 2, recorded concentrations between the MDL and 2.27ug/l.

4.2.11 Naphthalene concentrations in Cell 3 recorded concentrations of between the MDL and 1.16ug/l. The Naphthalene concentrations in Cell 4 were recorded below the MDL during all monitoring rounds.

o-Xylene and EPH

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

4.2.13 Concentrations of o-Xylene in Cell 1 leachate have been recorded between 1.43ug/l and 2.1ug/l and in the Cell 2 leachate between 2.61ug/l and 4.31ug/l in 2021, which is within the range of the overall datasets. The concentrations of o-Xylene in C3B were recorded between 3.63ug/l and 5.73ug/l, and between 2.59ug/l and 2.87ug/l in Cell 4 in 2021.

4.2.14 Concentrations of EPH in Cell 1 were recorded between 650ug/l and 864ug/l, and in Cell 2 were recorded between 3250ug/l and 3690ug/l which are within the range of the overall datasets.

4.2.15 Concentrations of EPH in Cell 3 were recorded between 2720ug/l and 3550ug/l, and in Cell 4 were recorded between 1910ug/l and 2470ug/l.

4.2.16 There are no distinct trends of either o-Xylene or EPH in any of the Cells.

Nickel and Potassium

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

4.2.18 During 2021, Nickel concentrations in Cell 1 were recorded between 85.9ug/l and 110.0ug/l and in Cell 2 were recorded between 129ug/l and 158ug/l. These concentrations are within the overall range of the datasets with no indication of any adverse trends developing. Nickel concentrations within Cell 3 were recorded between 96.6ug/l and 209ug/l, and in Cell 4 were recorded between 83.1ug/l and 95.5ug/l.

4.2.19 The Potassium concentrations recorded in Cell 1 during 2021 were between 269mg/l and 329mg/l, and in Cell 2 were recorded between 461mg/l and 794mg/l. These concentrations are within the range of the overall datasets. Potassium concentrations within Cell 3 were recorded between 327mg/l and 658mg/l, and in Cell 4 were recorded between 235mg/l and 345mg/l.

4.2.20 There are no distinct trends of either Nickel or Potassium in any of the Cells.

Review of Potential Risks and Future Monitoring

4.2.21 The environmental monitoring data for LF08_07, C2B and C2C, C3B and C4B indicates that the leachate chemistry has been variable throughout the 12-month monitoring period in all four Cells, although generally the concentrations are within the range of the overall dataset for each of the parameters.

4.2.22 The data is not indicative of a significant change in the leachate quality in Area 2 during 2021.

4.2.23 The data indicates that during 2021 there have been exceedances of the permitted leachate levels (being greater than 2m above the base) in all Cells in Area 2.

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	-
GP18_18B	331028	184798	-
GP18_18C	331032	184795	Destroyed by site activity in 2021.
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 3.6.1 (d) 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 monitoring wells are taken to be 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_25 or for carbon dioxide in GP05_20 and GP05_21 – in accordance with NRW 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_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 2021. The exception to this is GP05_17, where Methane was recorded above the 1% trigger level in September, recording a concentration of 6.4%. However, in December 2021 the methane concentration at this location was recorded below the 1% trigger level. The concentration of methane in GP05_17 has fluctuated since early 2019.
- 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 typically fluctuated significantly in GP06_24 from around mid-2008, however this monitoring well has been destroyed by site activity and is no longer monitored.
- 5.3.4 GP06_25 was monitored twice during 2021 (March and June), and not monitored by mistake on the other two occasions. On the two visits, the Methane concentrations were recorded as 72.7% and 27.1% respectively, which are within the overall range for the dataset. The methane concentrations at this location have fluctuated significantly since the start of 2012 however, there appears to be a developing overall trend of increasing concentrations of methane.
- 5.3.5 **Appendix 4-3** presents the methane concentrations at GP09_18 and three surrounding monitoring wells GP18_18A, GP18_18B and GP18_18C which were predominantly monitored

on four occasions each, with the exception of GP18_18C which has been destroyed by site activity in 2021 and therefore was only monitored on two occasions.

- 5.3.6 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, and methane at these locations has also been recorded at significantly elevated concentrations.
- 5.3.7 In 2021, GP09_18 recorded methane concentrations of between about 5.1%v/v and 10.1%v/v, which is significantly lower than concentrations recorded at this location in recent years. In comparison, GP18_18A recorded methane concentrations of between 0.1%v/v and 9.8%v/v (also generally lower than recent years). GP18_18B recorded methane concentrations between 1.9%v/v and 86.1%v/v (within the range of the dataset). GP18_18C recorded methane concentrations of 52.3%v/v in March and 31.5%v/v in June (within the range of the dataset).
- 5.3.8 At the current time the reason for the elevated and fluctuating methane concentrations at this location are unknown. Concentrations of methane at the closest monitoring well to GP09_18 (GP05_17) had previously started to rise, however concentrations appear to have predominantly returned to concentrations below the trigger limit.
- 5.3.9 We have provided recommendations to NCC regarding additional investigation work to identify the potential causes of the elevated methane.
- 5.3.10 **Appendix 4-4** indicates that concentrations of Methane in GP05_20 and GP05_21 were recorded below the 1.5% trigger level throughout 2021 (where monitored). GP05_20 was not monitored in September 2021 as it could not be located. Elevated concentrations of methane previously seen in GP05_20 in 2019 and 2020 have not been observed in 2021 and concentrations have returned to below the trigger level.

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 2021.
- 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 2020 and have started to generally decrease in 2021 in GP09_18, 18A, 18B and 18C.
- 5.3.14 At the remaining locations, the carbon dioxide concentrations recorded during 2021 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 GP18_18A, B and C indicates continued elevated and fluctuating methane concentrations at this location, although there are indications that the concentrations have started to decrease in 18 and 18A.
- 5.4.2 With the exception of GP09_18 (discussed above), the only monitoring locations (excluding destroyed wells) that have consistently recorded significant Methane concentrations are

GP06_25 since 2012. This well is located some distance away from the part of the Area 2 site that has to date been used for waste disposal. GP06_25 is also showing an overall increasing trend in Methane concentrations which will continue to be monitored and options discussed with NCC.

- 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 1500m³/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 2021, the total production of energy from the Landfill Gas Utilisation Plant was 3442MWh with a site efficiency of 33.4%. In 2020 by comparison, the total production of energy was 4411MWh with a site efficiency of 33.8%. The total energy produced, and efficiency has decreased slightly from 2020 to 2021.
- 6.2.2 Engine downtime in 2021 was 431 hours, compared to 289 in 2020 which represents an increase in engine downtime. Engine operation time in 2021 was 3442 hours which is a decrease from the 8495 hours in 2020.
- 6.2.3 The flare operated in 2021 during periods when the engine was not operational. The flare was operating for 375 hours during 2021 based on the availability of the engine, compared to 339 hours in 2020. This is an increase from 2020.
- 6.2.4 Environmental Performance Indicators, provided by Infinis Energy, indicate that there has been an increase in Carbon Monoxide emissions in 2021 (13.6kg/MWh) compared to 2020 (1.7kg/MWh), and total Oxides of Nitrogen emissions also increased in the same period (7.0kg/MWh in 2021, compared to 2.7kg/MWh in 2020).
- 6.2.5 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 2021 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 Report by NCC and Infinis (Landfill Gas)

Leachate:	kg/year
Disposed of off-site (Area 2) (kg)	27,920,120
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	92,988
Combustion in gas engines	2,067,061
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	<i>1518</i>	Cubic metres
Energy Used (including for leachate treatment, excluding electricity generated)	Annually	<i>211,316</i>	kWh of electricity
Non Potable Water Use	Annually	0	Cubic metres

Italics – see below

- 7.2.1 NCC currently receives their water statement on a quarterly basis and has not currently received their statement for the period of October 2021 to December 2021 therefore the figure above is an estimate of the likely annual potable water use (pro rata'd) based on the previous 9 months of data (January to September 2021) which amounted to 1,138m³. The statement for energy used for December 2021 has also not currently been received by NCC and therefore the figure above is also an estimate based on the previous 11 months of data which amounted to 193,707kWh.

7.3 Topographic Surveys

- 7.3.1 The surface of Area 2 of Docksway Disposal Site was surveyed during December 2021 and the results of the survey are presented in **Appendix 6**.
- 7.3.2 It has been calculated by NCC that 92,557m³ of waste was placed in the non-hazardous Cells in Area 2 (12 month period December 2020 to December 2021), which is an increase from 2020 when 73,009m³ of waste was placed.

- 7.3.3 It has also been calculated by NCC that a total of 9879m³ of SNRHW was placed in Cell 3A (12 month period December 2020 to December 2021), which is a reduction from 2020 when 17,352m³ was placed.
- 7.3.4 As of December 2021, the cumulative waste volume deposited in Area 2 (excluding Cell 3A) was 1,261,879m³, and in Cell 3A was 81,370m³.
- 7.3.5 The maximum elevation of Area 2 was around 31m (Cells 1 and 2) Above Ordnance Datum (mAOD) as of December 2021. The greatest level change was an increase of about 9.5m in Cell 4A.
- 7.3.6 The cross sections provided indicate that slope angles of the external waste slopes are in accordance with the 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 six occasions that SW25 was monitored in 2021, the recorded parameters were within the discharge consent limits. On the four occasions that SW26 was monitored in 2021, the recorded parameters were within the discharge consent limits, with the exception of Total Suspended Solids which was recorded above the discharge limit in January. However, in subsequent monitoring visits this returned to concentrations below the discharge consent limit.
- 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 2021 there have been intermittent exceedances of the permitted leachate levels (of 2m above the base) in Cells 1, 2,3 and 4 in Area 2. Leachate extraction continues at the site in order to address leachate heads at the site, and as such a total of 27,920,120kg of leachate was removed during 2021 for offsite treatment and disposal.
- 8.1.5 The environmental monitoring data for LF08_07, C2B and C2C, C3B and C4B indicates that the leachate chemistry has been variable throughout the 12-month monitoring period in all four Cells, 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 2021.
- 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_18A, B and C still indicates continued elevated and fluctuating methane concentrations, although there are indications that the concentrations have started to decrease in GP09_18 and 18A. GP06_25 is also showing a generally overall increasing trend in Methane concentrations which will continue to be monitored and options discussed with NCC.

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.

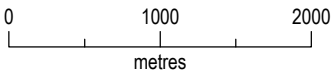
9 References

- [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] Stantec (2020) Docksway Disposal Site, Annual Environmental Review for Area 2 - 2020. Stantec, February 2021.

10 Essential Guidance for Report Readers

- 1) 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.
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- 5) The absence of cavity records in the Stantec natural and mining cavities (non-coal) databases is not considered as conclusive as to the absence of these features and we do not warranty that the data is complete or error free.
- 6) 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 considered in any analysis and reporting.
- 7) It should be noted that this report is a land condition assessment and does not purport to be an ecological, flood risk or archaeological survey and additional specific surveys may be required.
- 8) The identification of invasive and/or noxious plants such as Japanese Knotweed is outside the remit of our appointment.
- 9) This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the expressed written authorisation of Stantec. Any such party relies upon the report at its own risk.
- 10) 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 considered 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.
- 11) Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, 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**

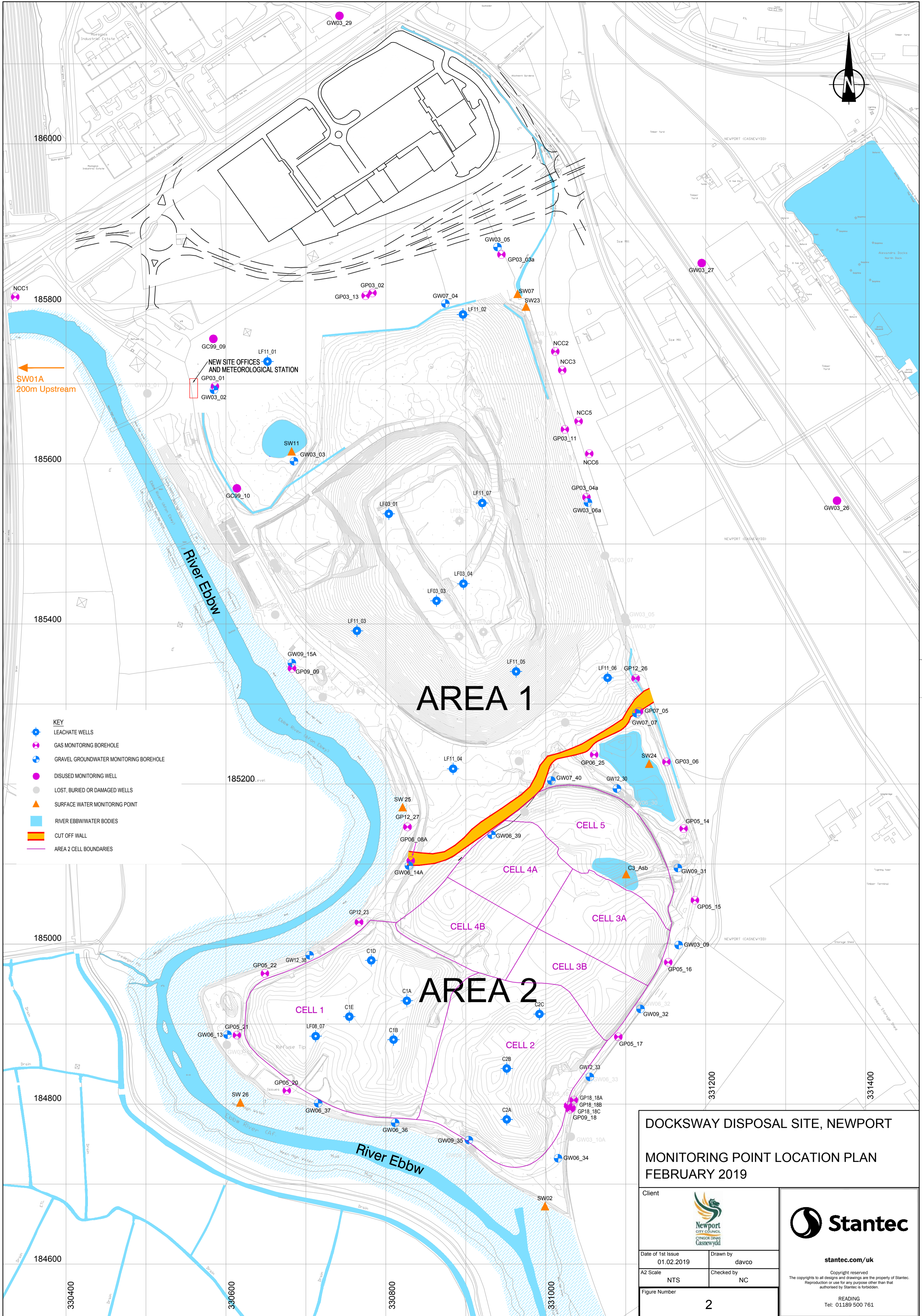
SITE LOCATION PLAN

Client NEWPORT CITY COUNCIL	
Date of 1st Issue 20.01.2020	Drawn by davco
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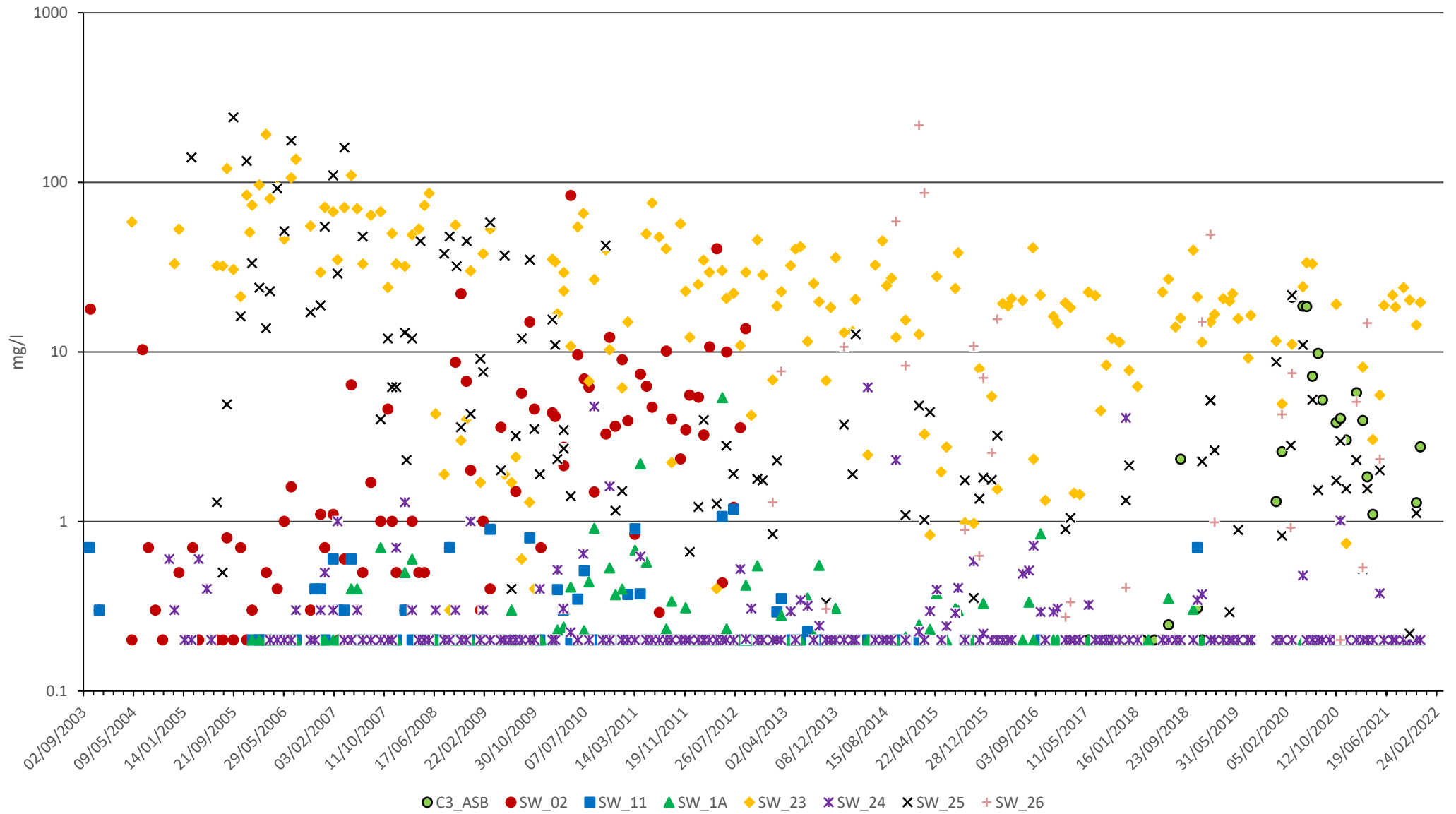
- KEY**
- LEACHATE WELLS
 - GAS MONITORING BOREHOLE
 - GRAVEL GROUNDWATER MONITORING BOREHOLE
 - DISUSED MONITORING WELL
 - LOST, BURIED OR DAMAGED WELLS
 - ▲ SURFACE WATER MONITORING POINT
 - RIVER EBBW WATER BODIES
 - CUT OFF WALL
 - AREA 2 CELL BOUNDARIES

DOCKSWAY DISPOSAL SITE, NEWPORT
MONITORING POINT LOCATION PLAN
FEBRUARY 2019

Client		 Newport City Council cynnalwlad Casnewydd
Date of 1st Issue	Drawn by	
A2 Scale	Checked by	 stantec.com/uk Copyright reserved The copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden. READING Tel: 01189 500 761
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Appendix 1 Surface Water Chemistry Graphs



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Docksway Disposal Site

Ammoniacal Nitrogen in Surface Water

Date January 2022

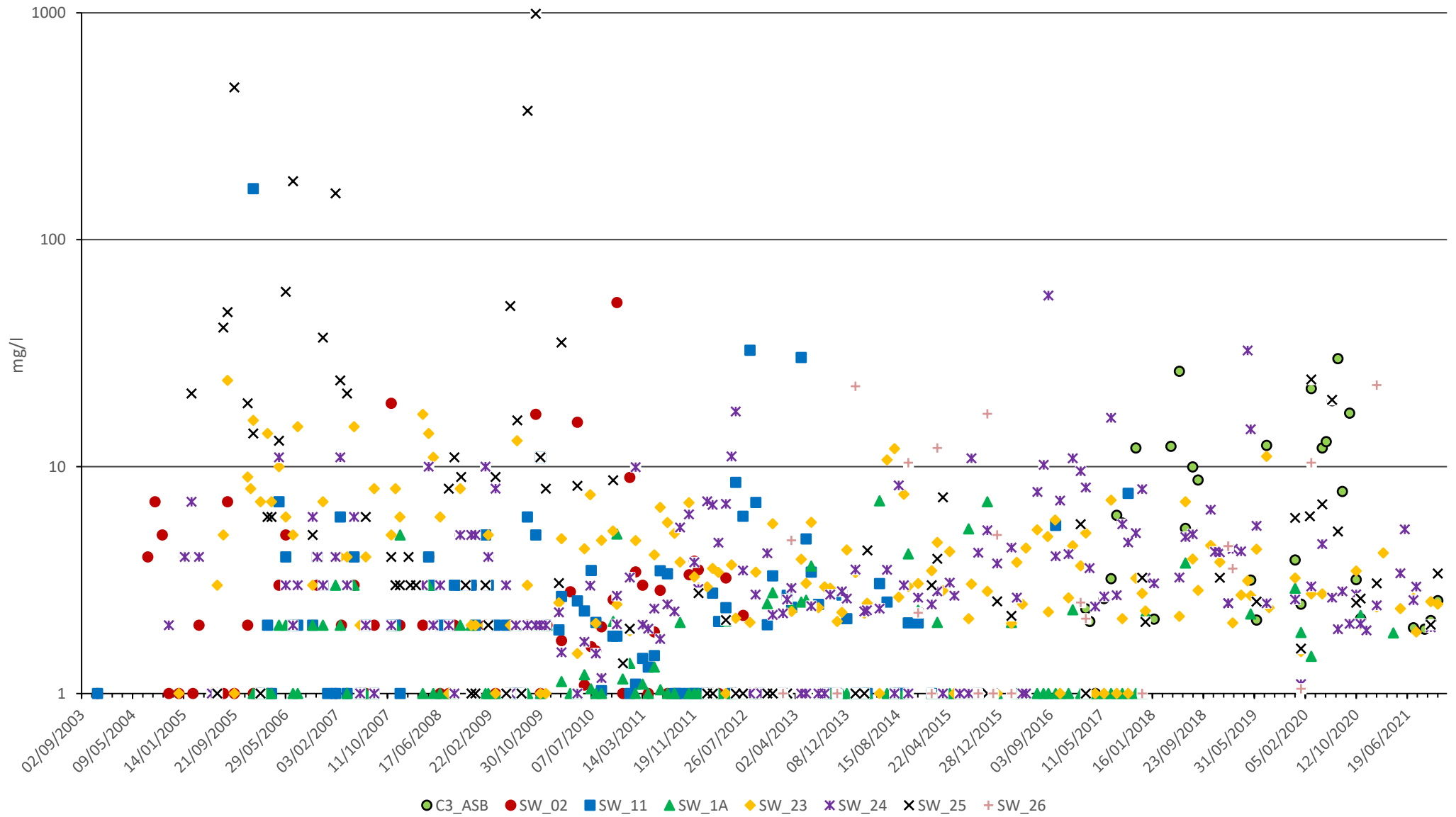
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Appendix

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Dockway Disposal Site

Biochemical Oxygen Demand in Surface Water

Date January 2022

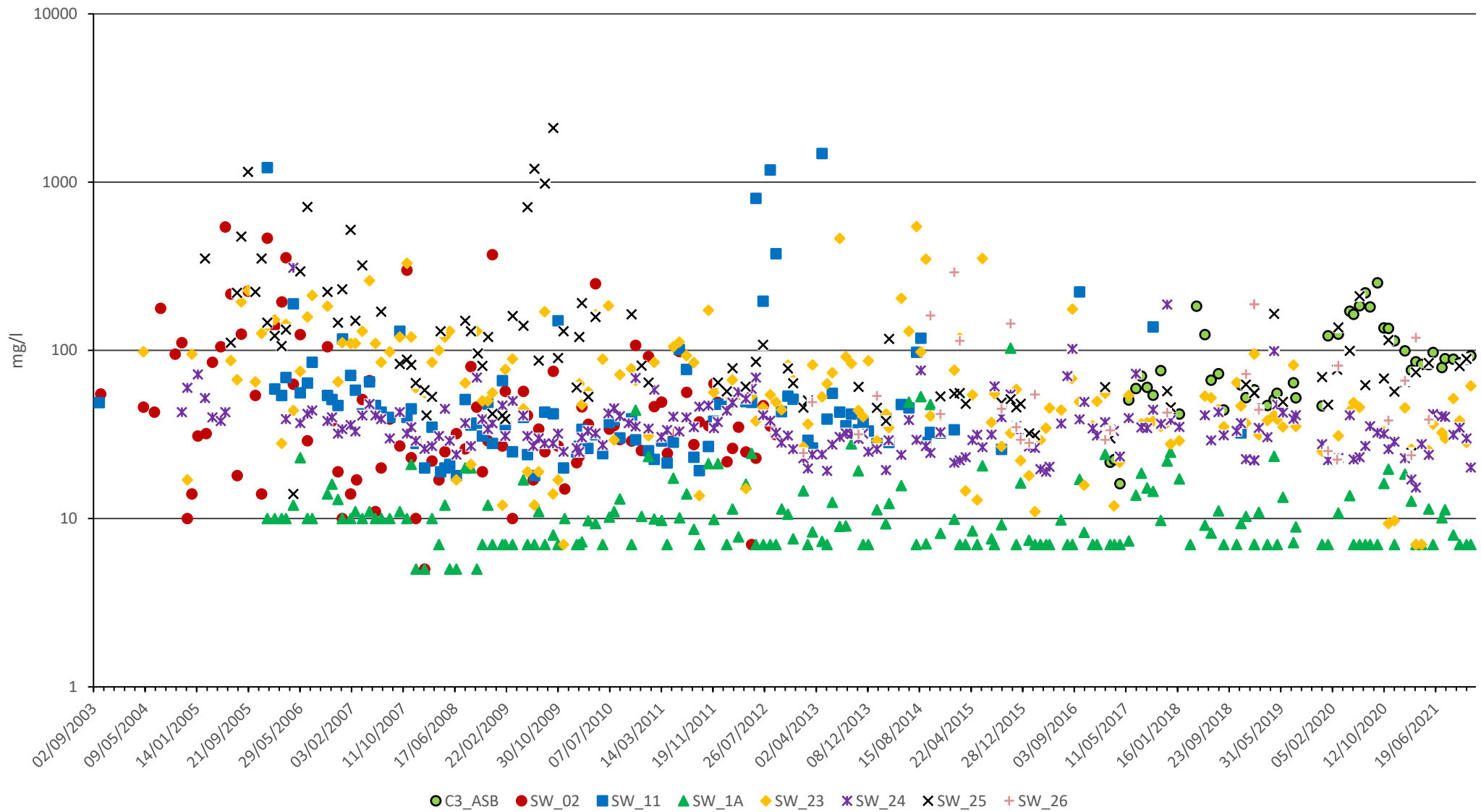
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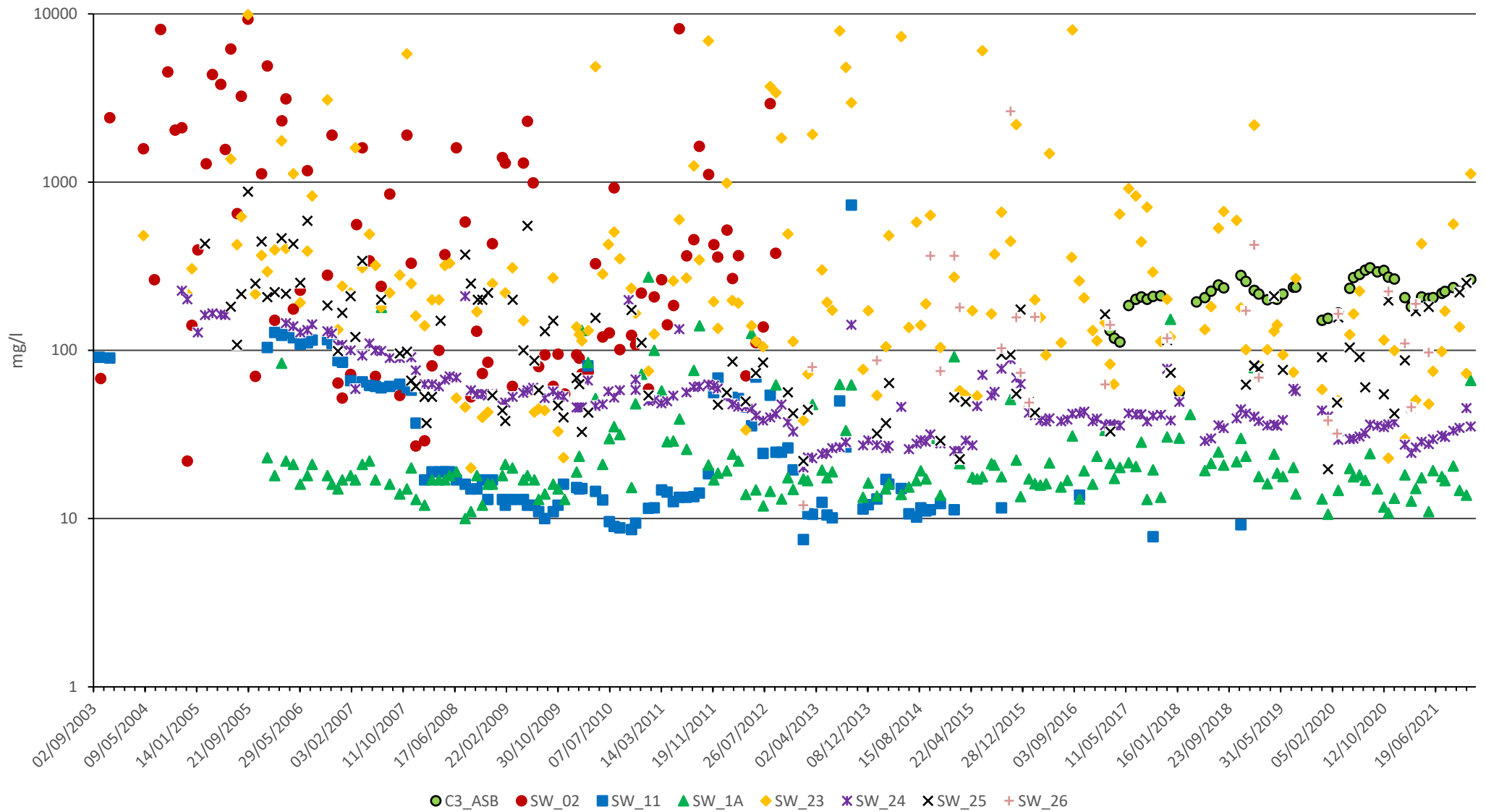
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Docksway Disposal Site

Chemical Oxygen Demand in Surface Water

Date	January 2022
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Appendix
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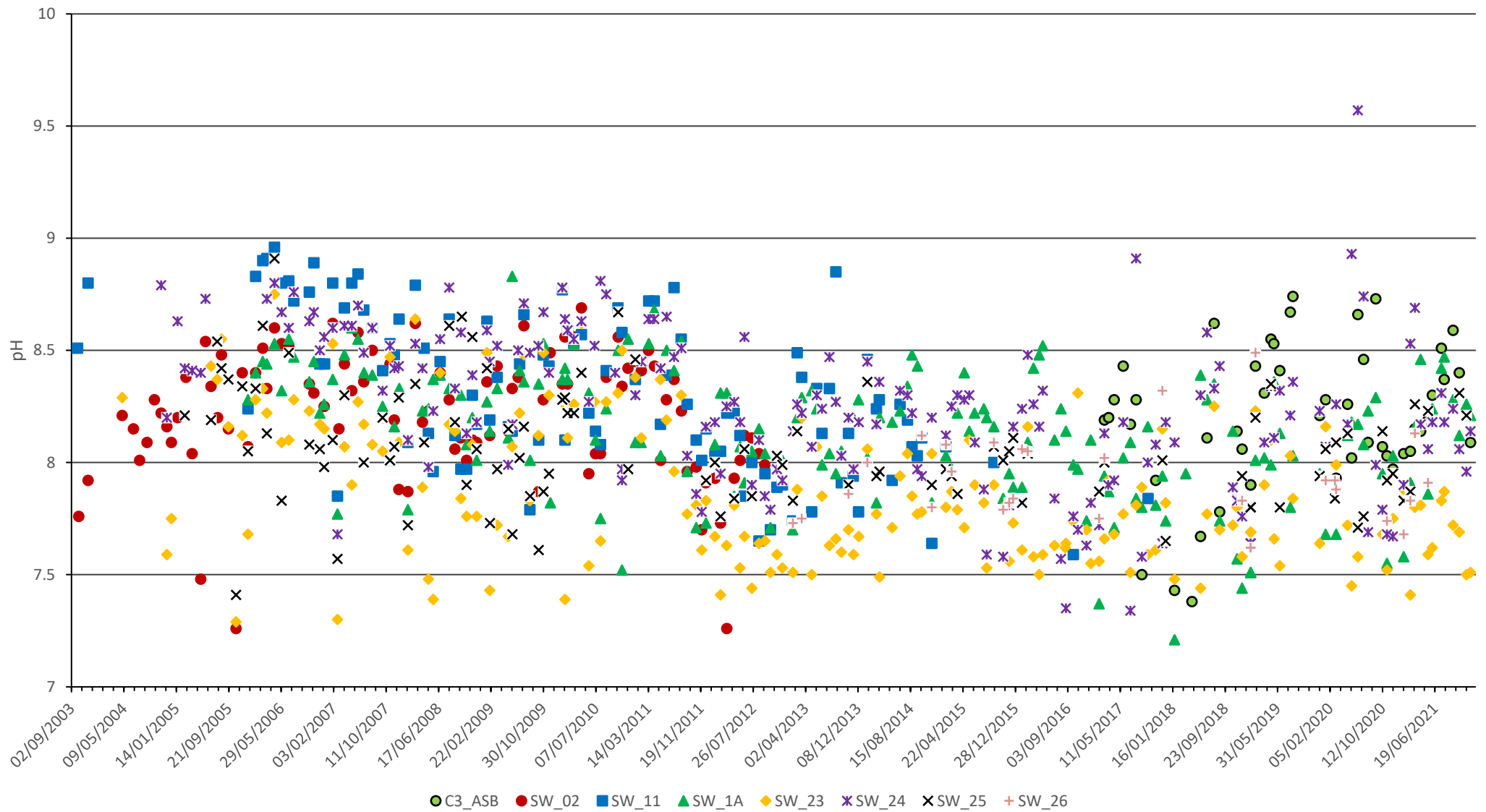
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Docksway Disposal Site

Chloride in Surface Water

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Appendix
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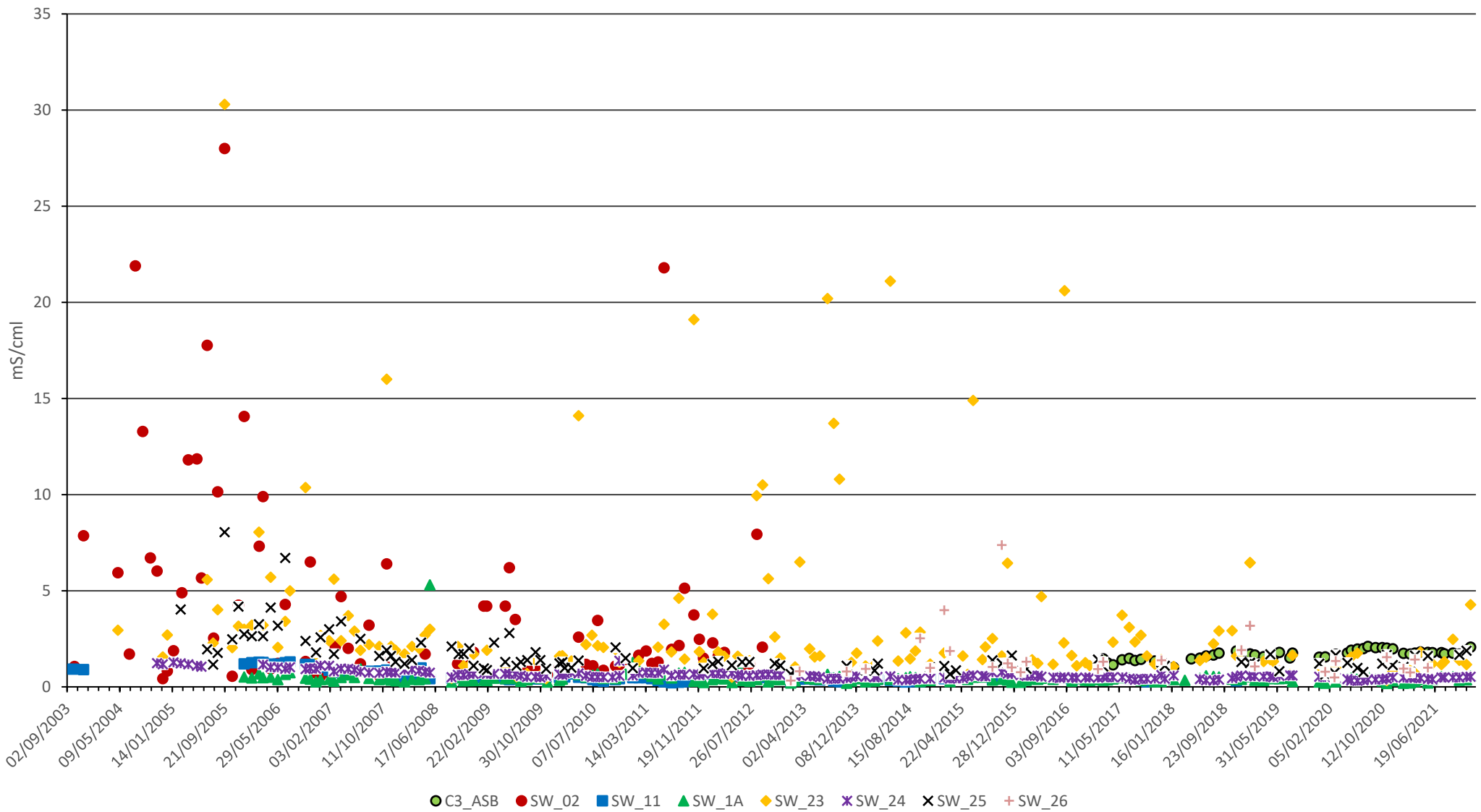
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Docksway Disposal Site

pH in Surface Water

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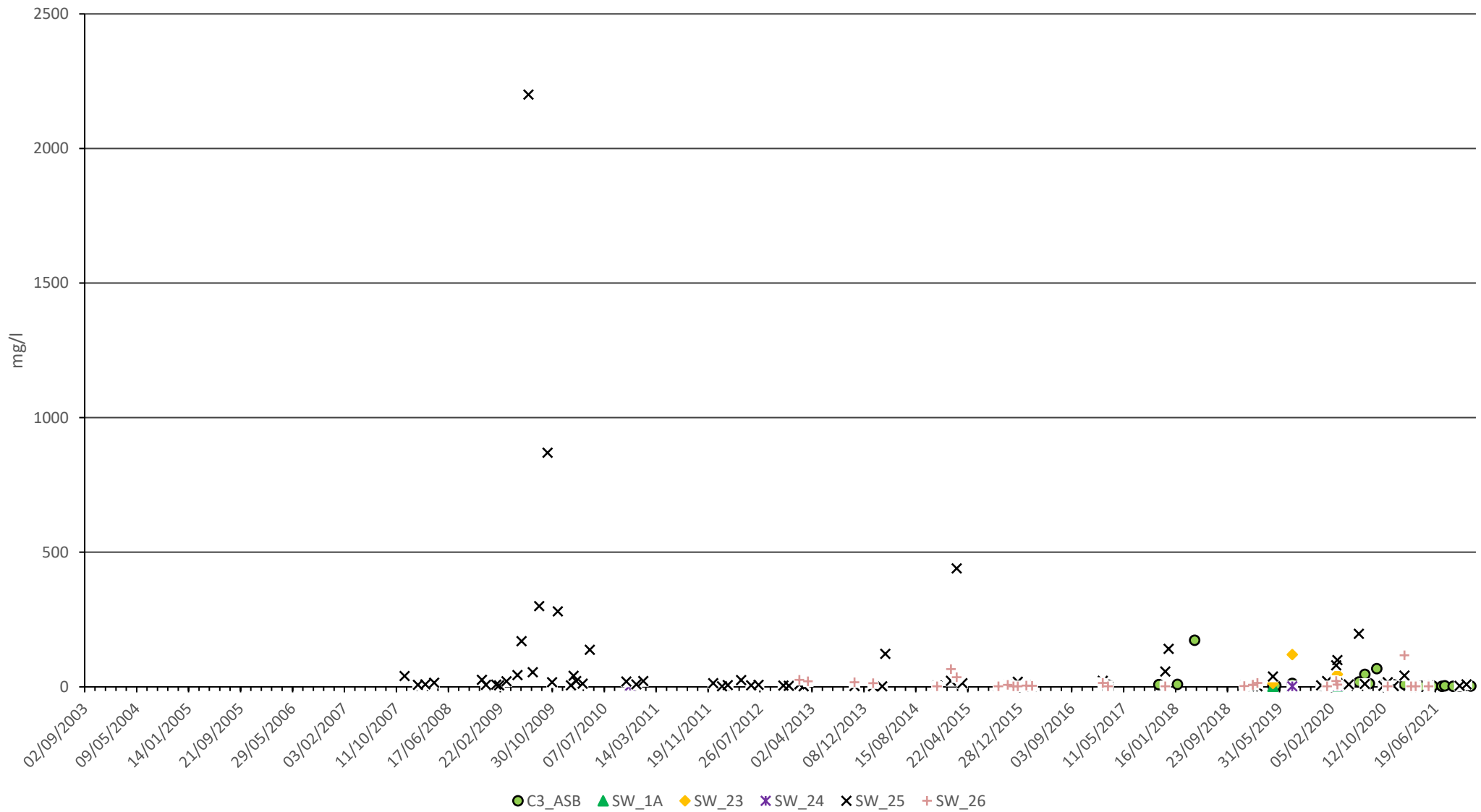
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Docksway Disposal Site

Electrical Conductivity in Surface Water

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Checked	NC

Appendix
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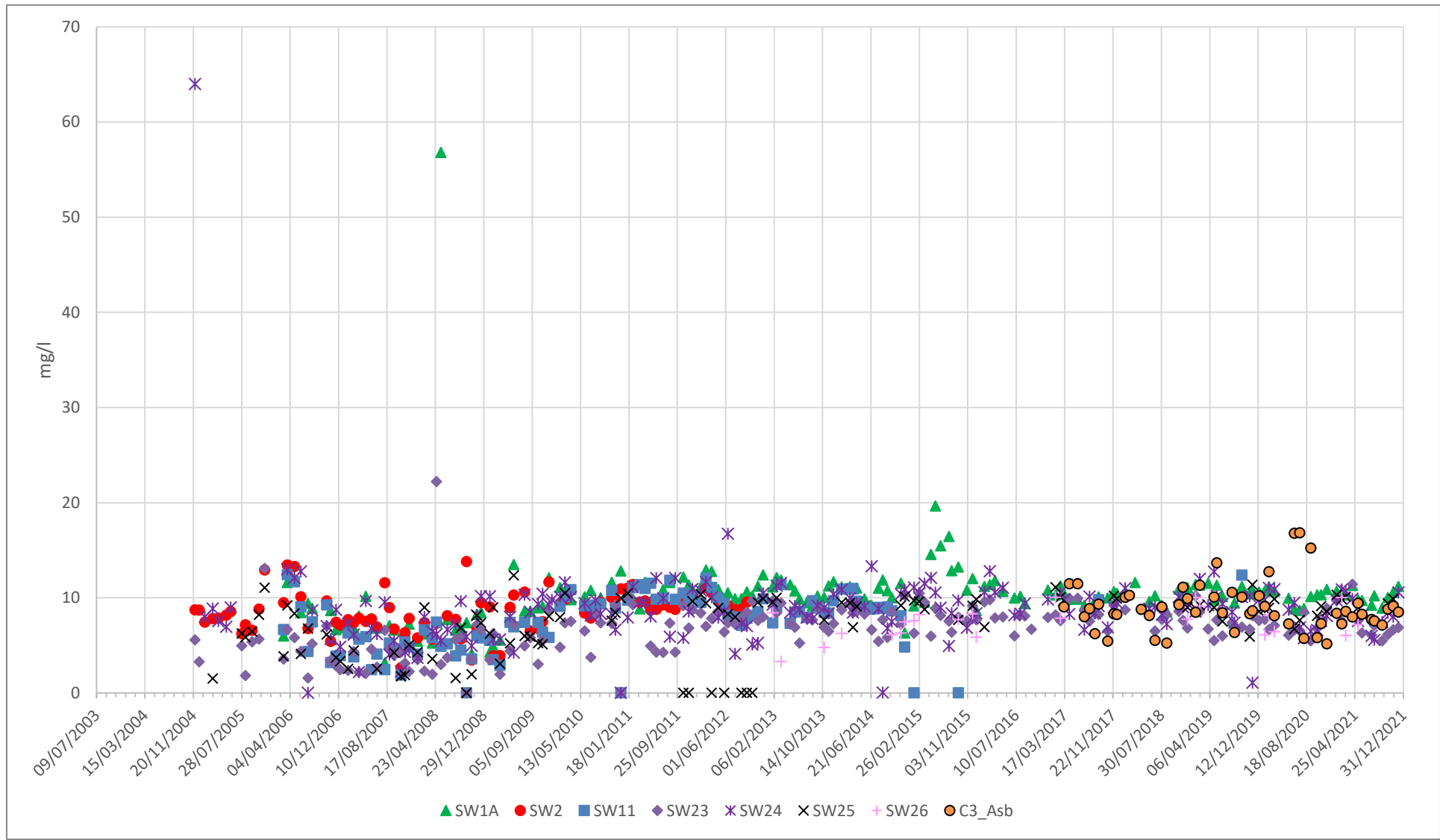
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Docksway Disposal Site

Total Suspended Solids in Surface Water

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
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Docksway Disposal Site

Dissolved Oxygen in Surface Water

Date January 2022

A4 Scale nts

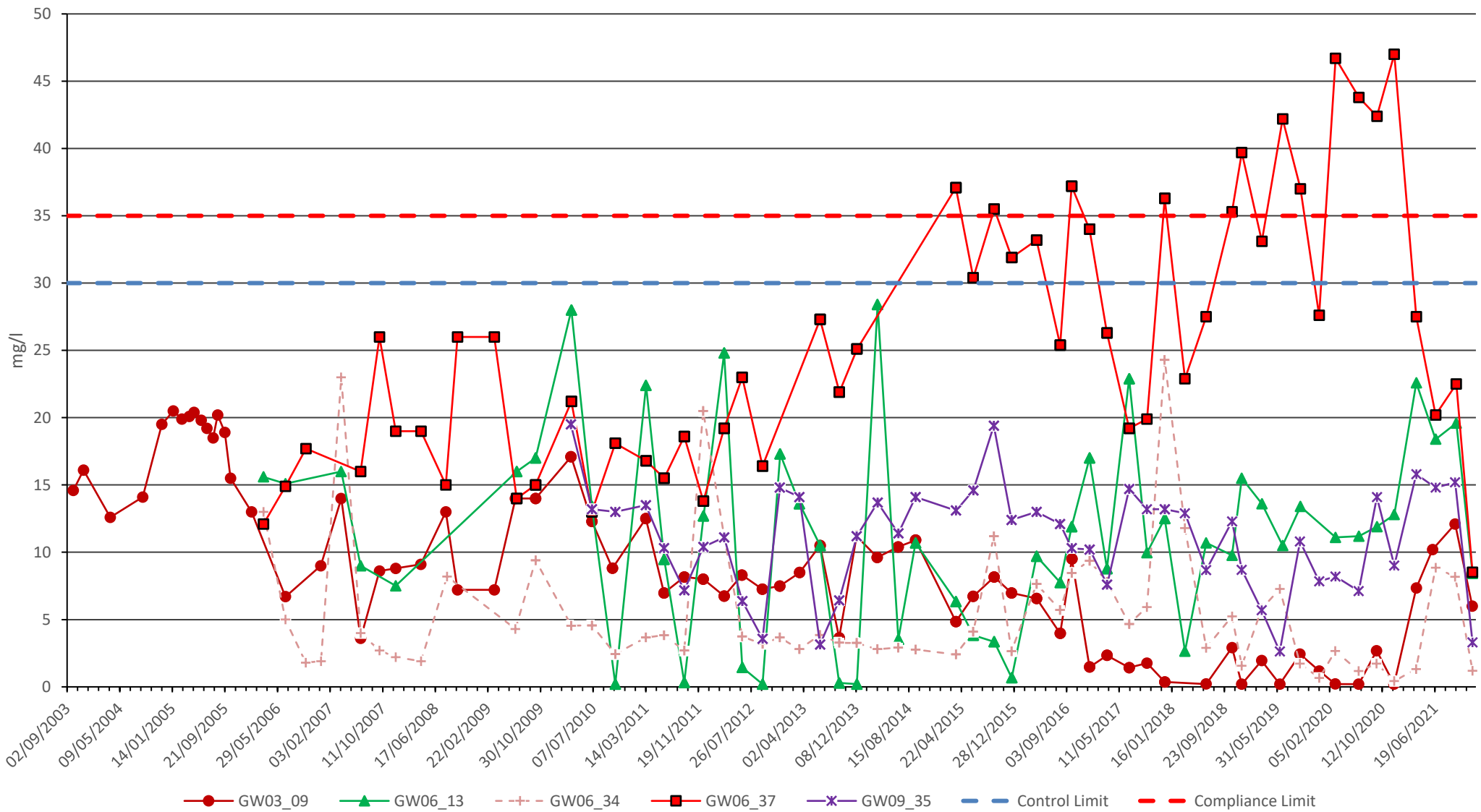
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Appendix 2 Groundwater Chemistry Graphs



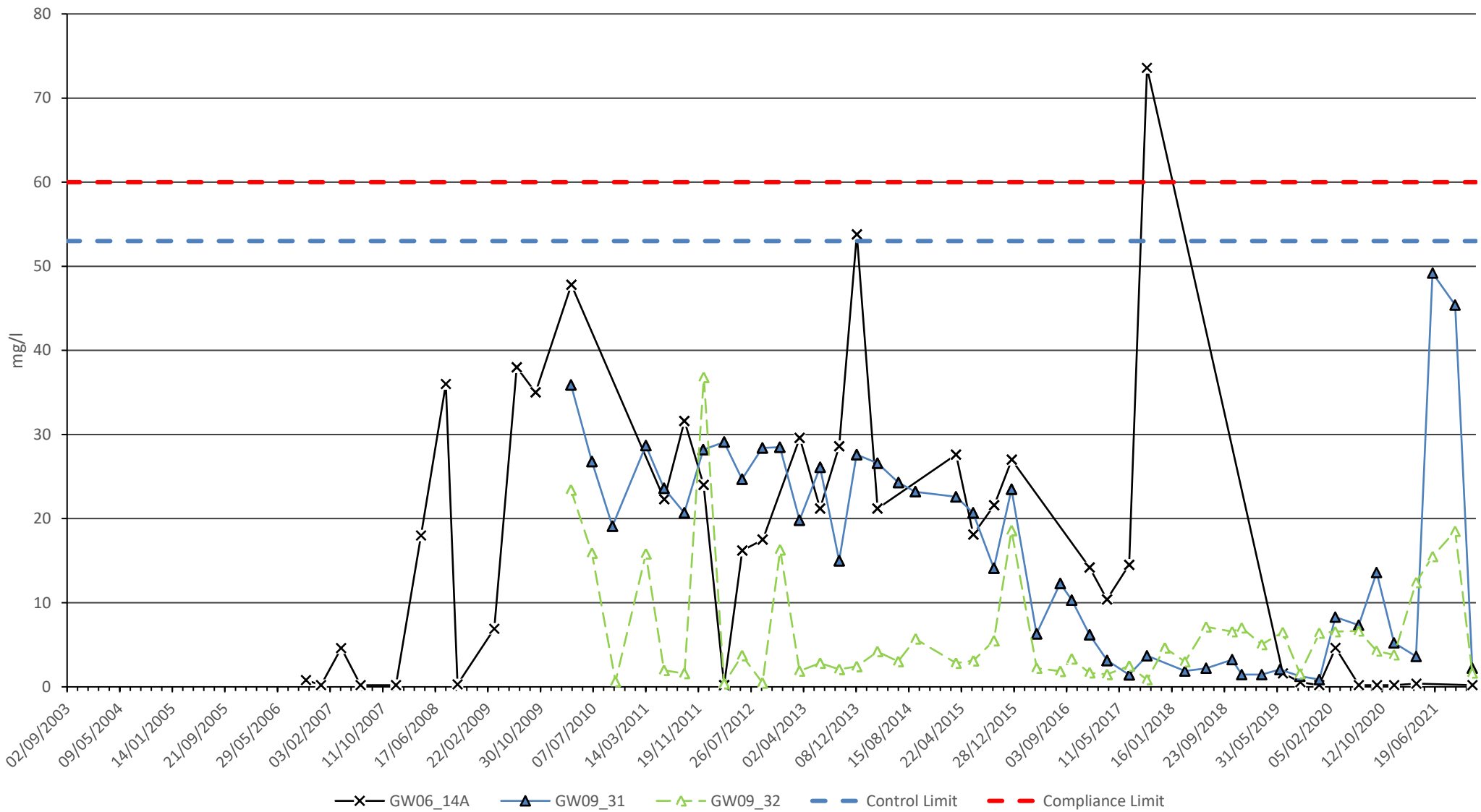
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Docksway Disposal Site

Ammoniacal Nitrogen in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix	2-1
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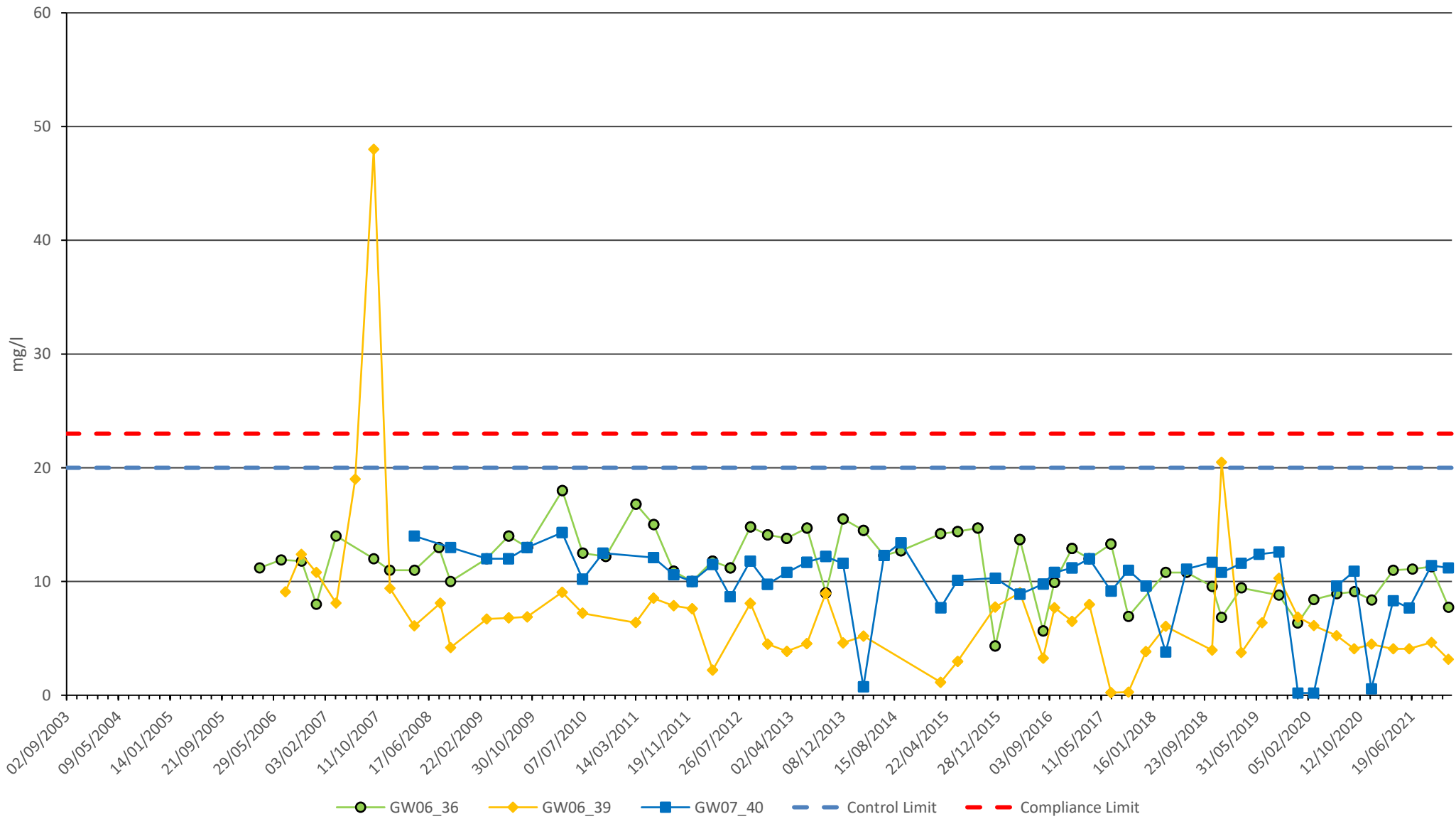
Newport City Council

Docksway Disposal Site

Ammoniacal Nitrogen in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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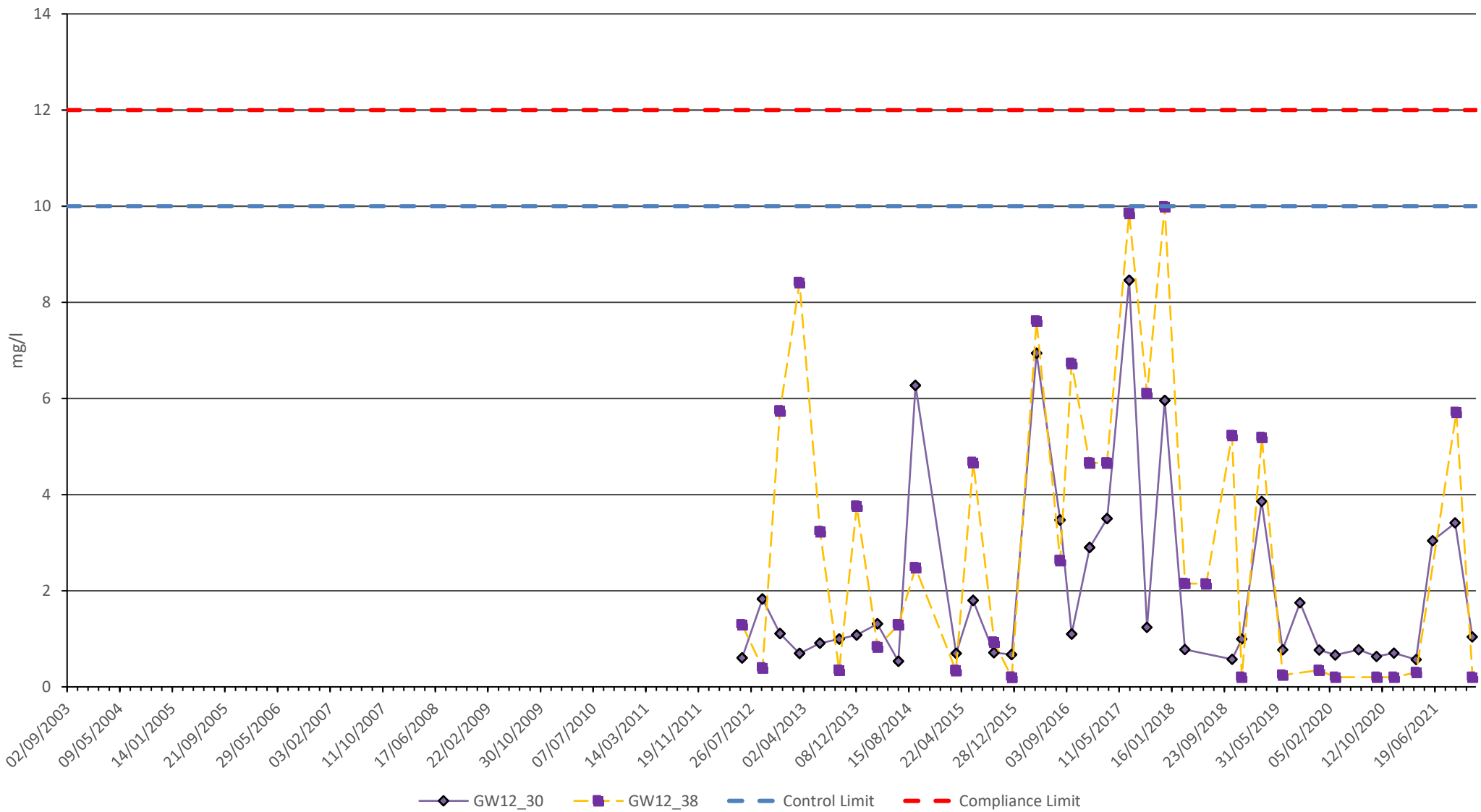
Newport City Council

Docksway Disposal Site

Ammoniacal Nitrogen in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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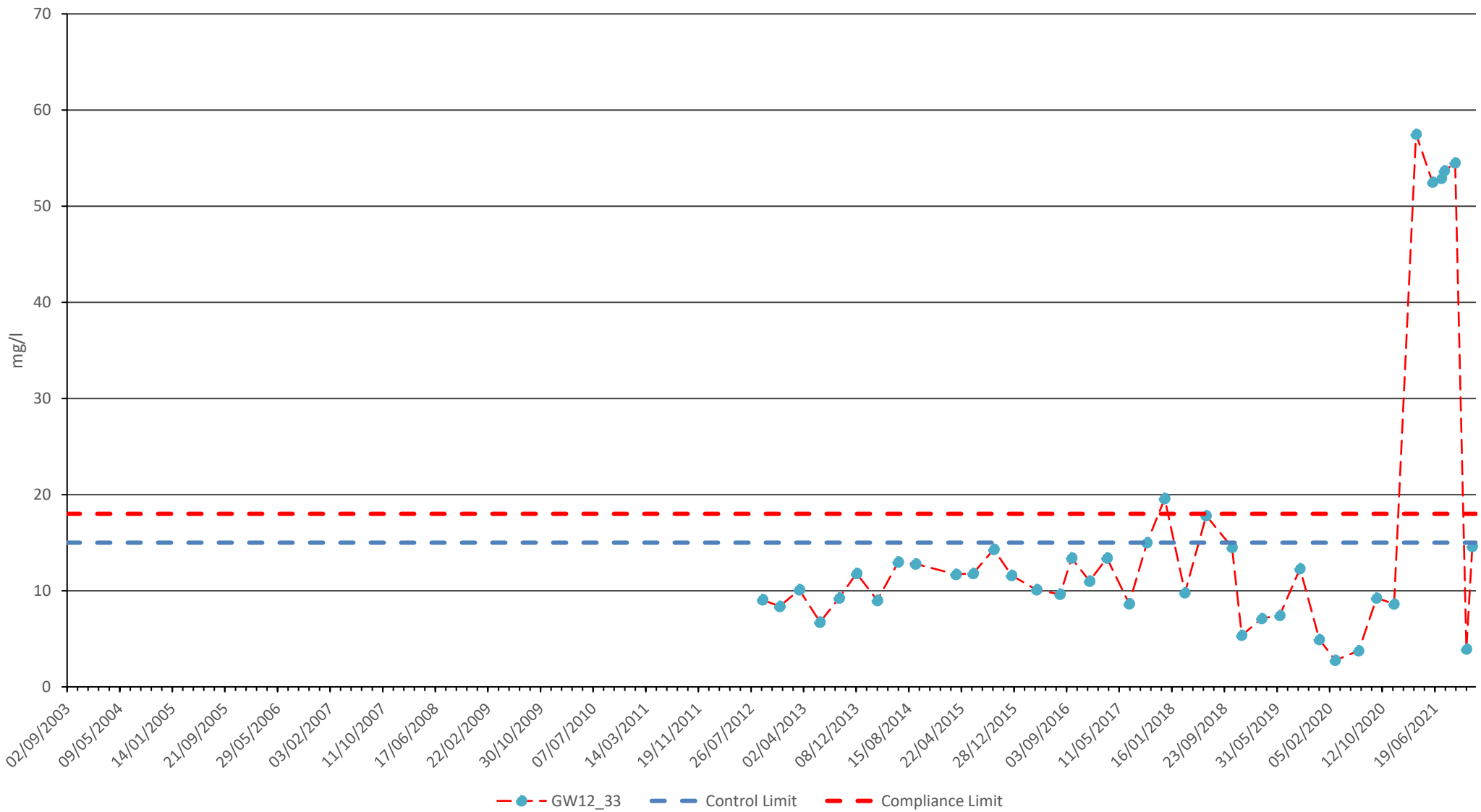
Newport City Council

Docksway Disposal Site

Ammoniacal Nitrogen in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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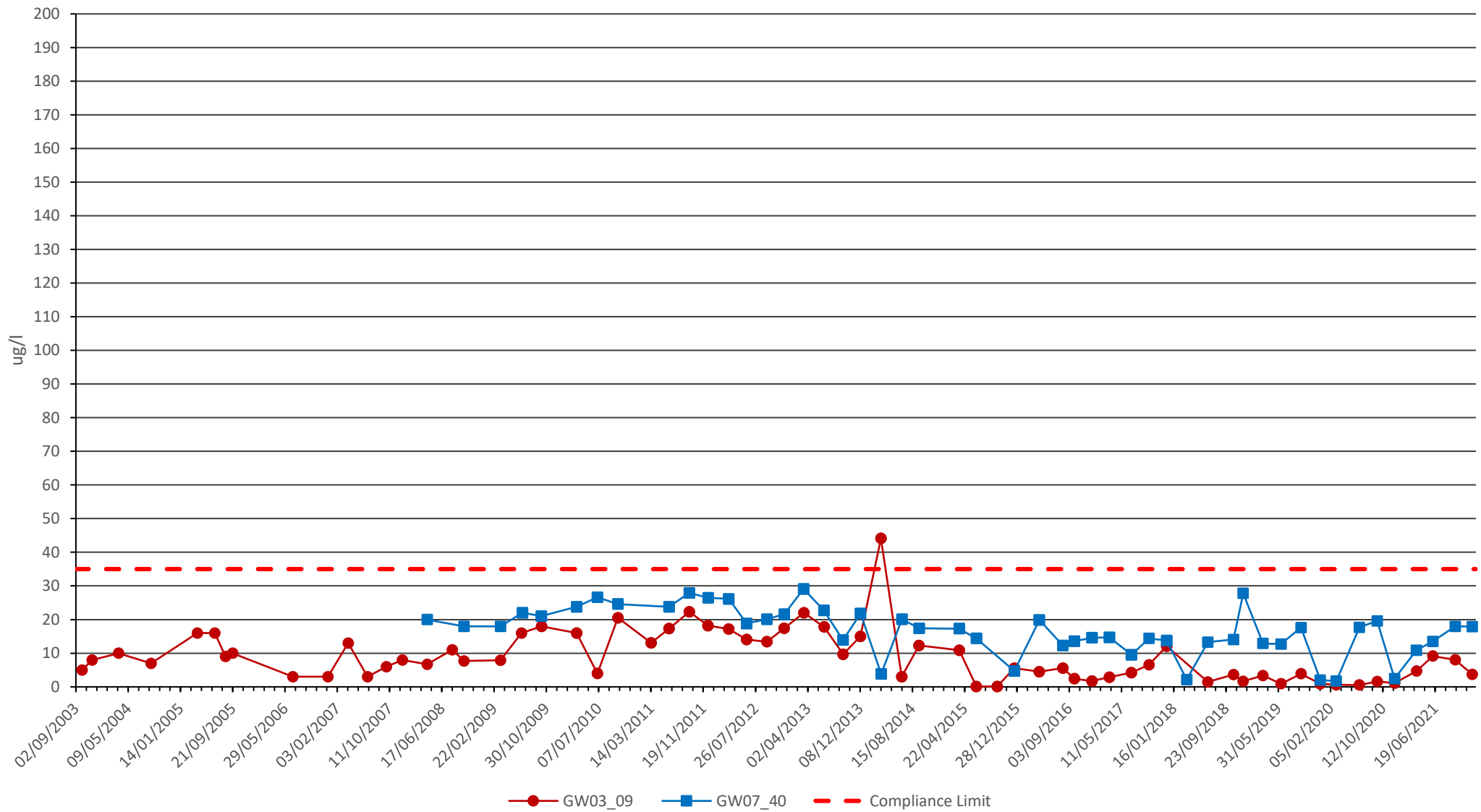
Newport City Council

Docksway Disposal Site

Ammoniacal Nitrogen in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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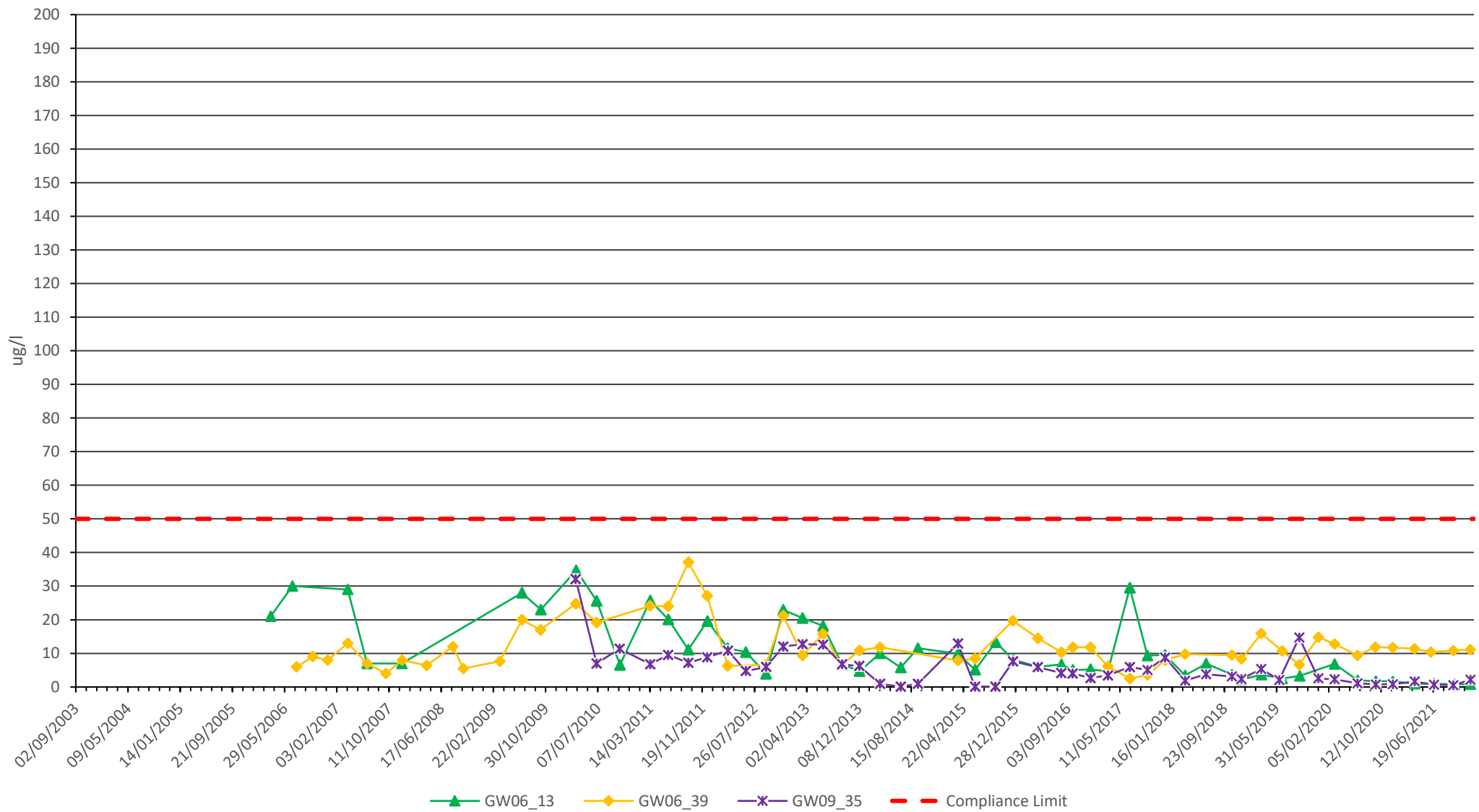
Docksway Disposal Site

Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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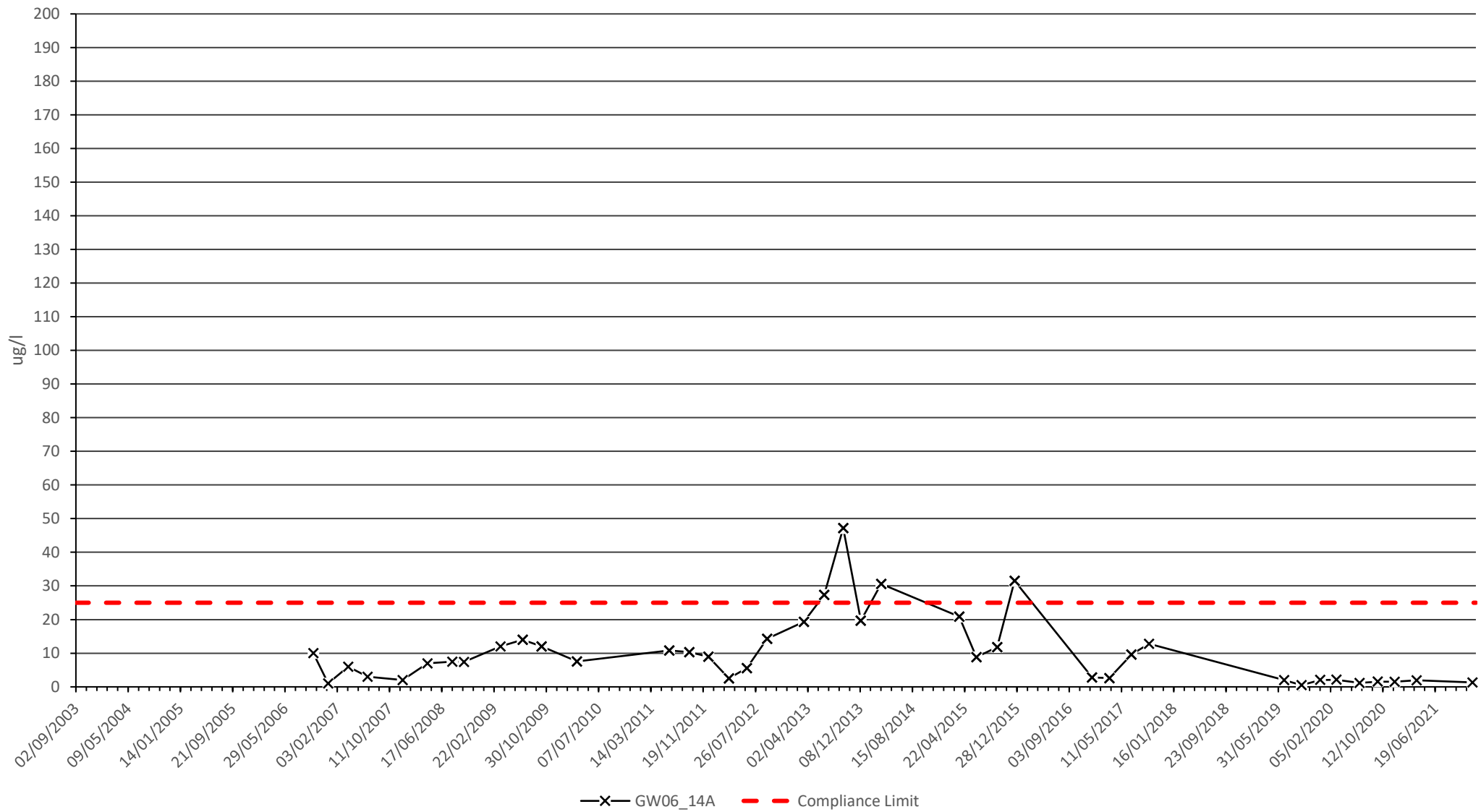
Newport City Council

Docksway Disposal Site

Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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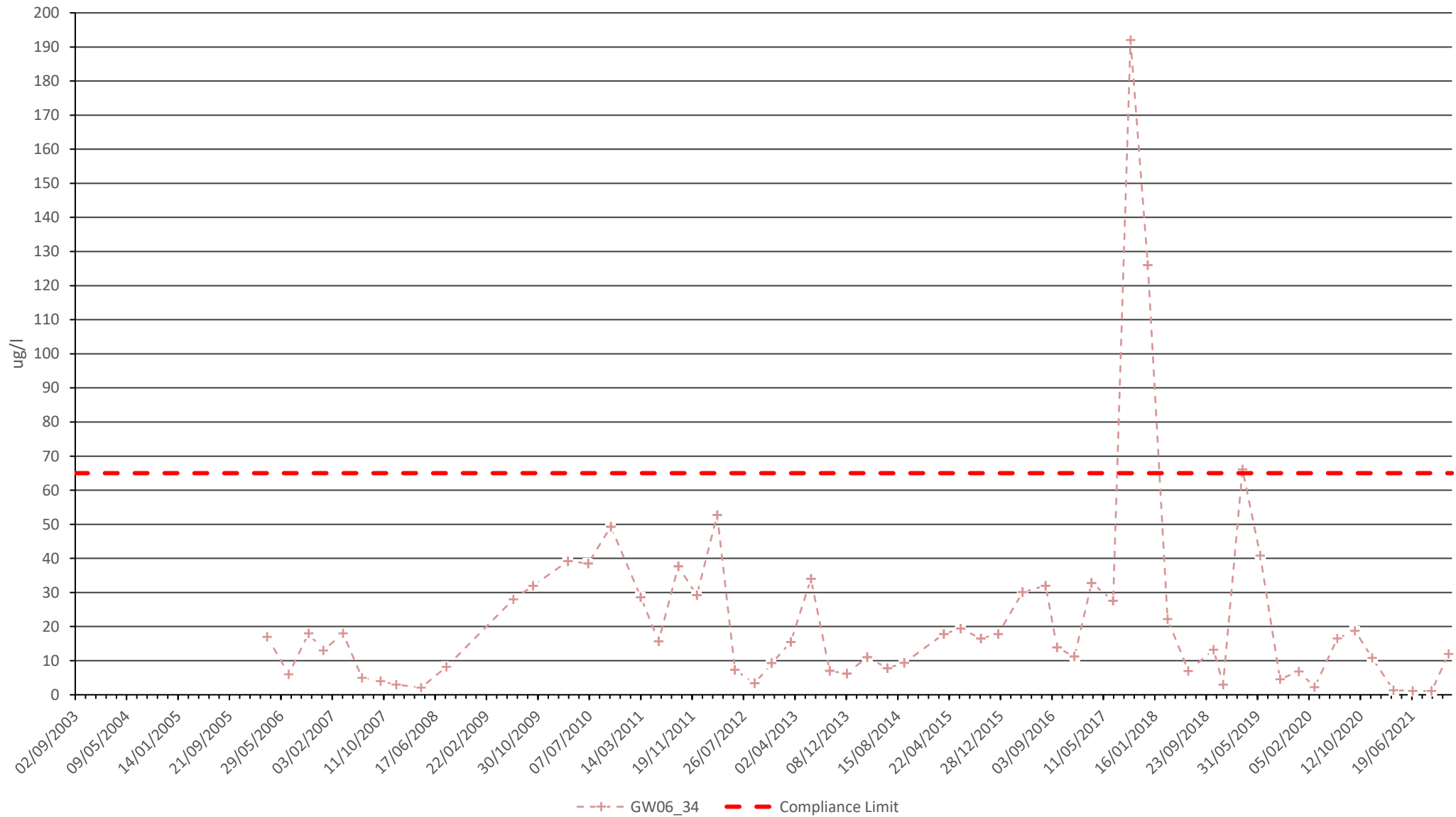
Newport City Council

Docksway Disposal Site

Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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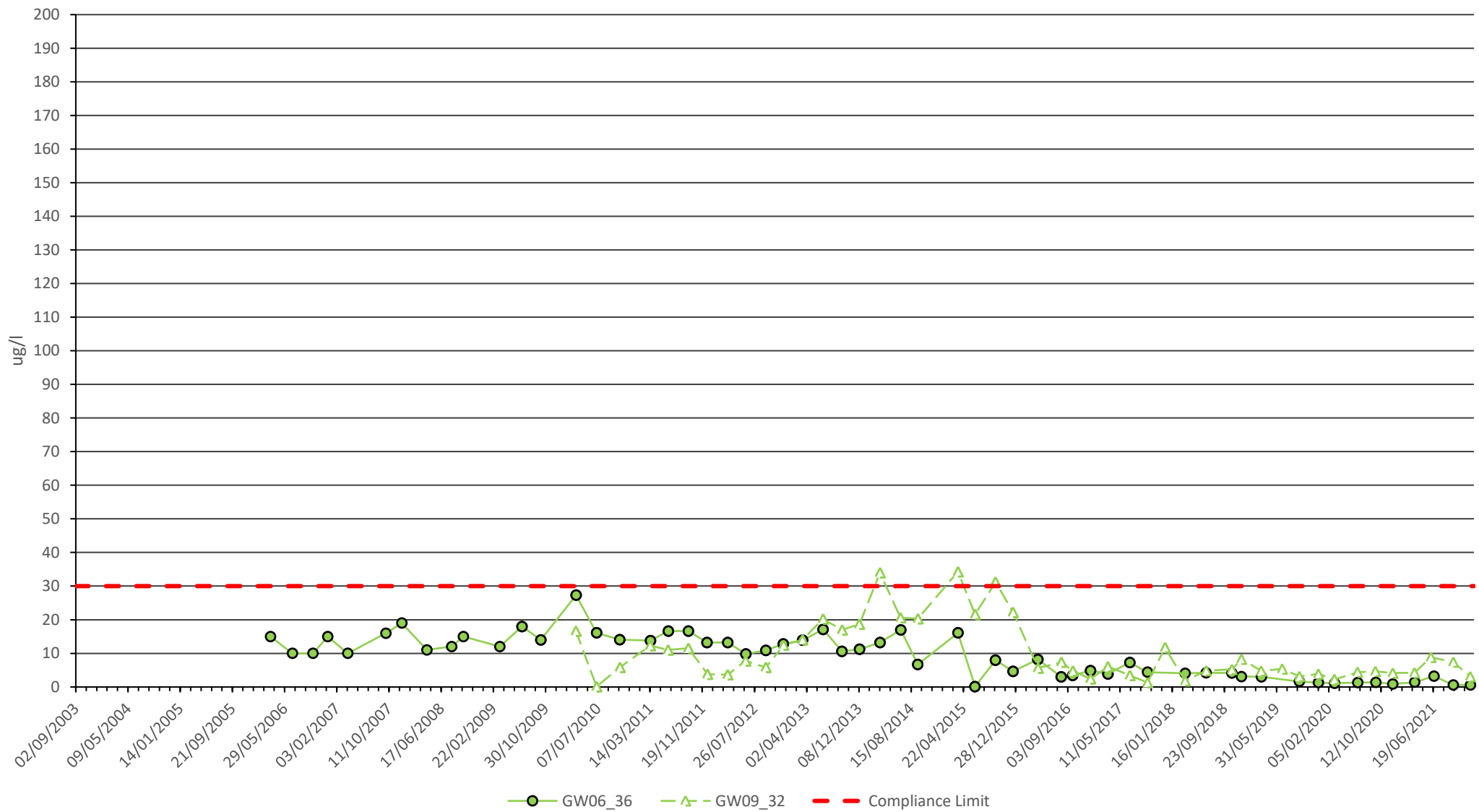
Newport City Council

Docksway Disposal Site

Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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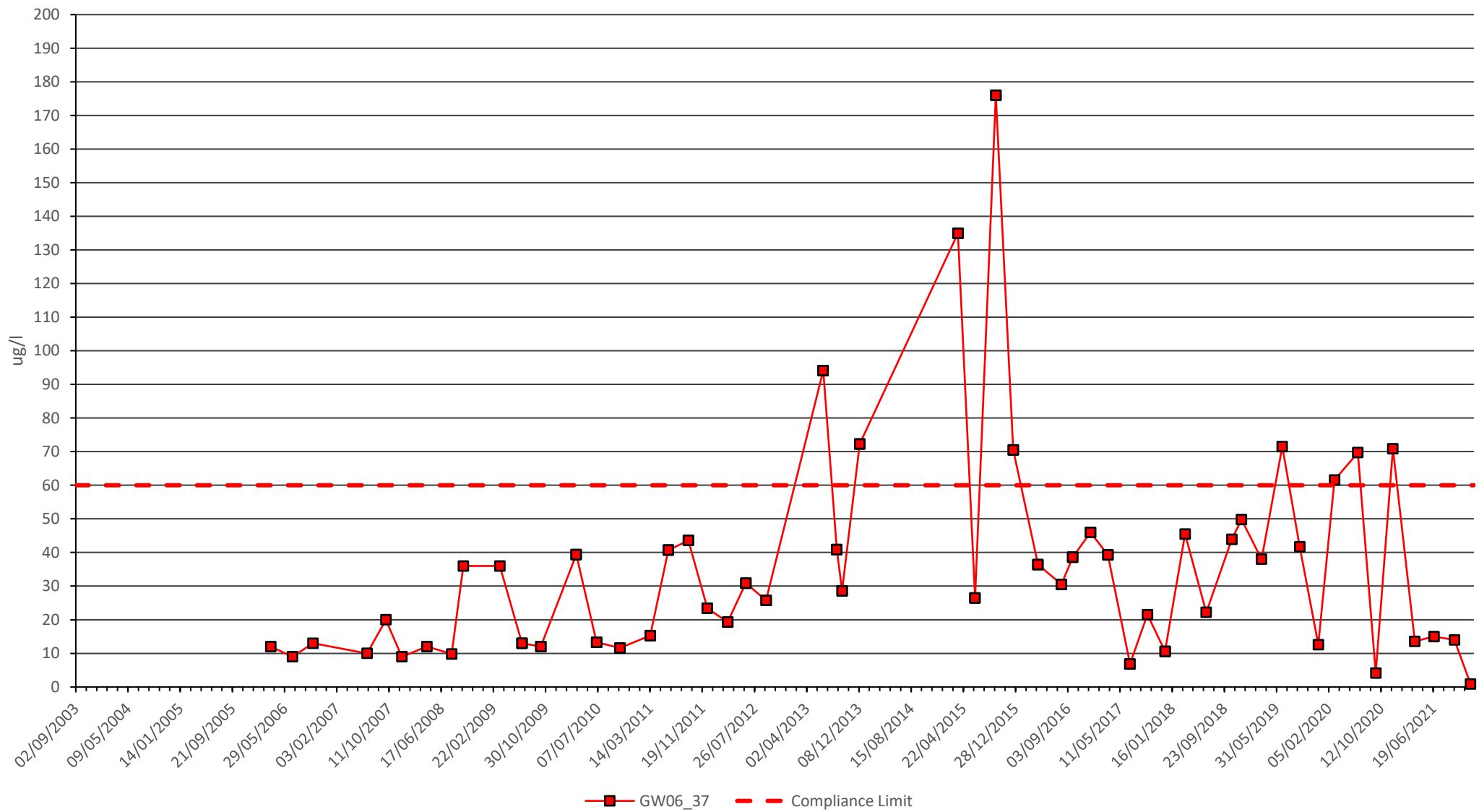



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Docksway Disposal Site
Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC
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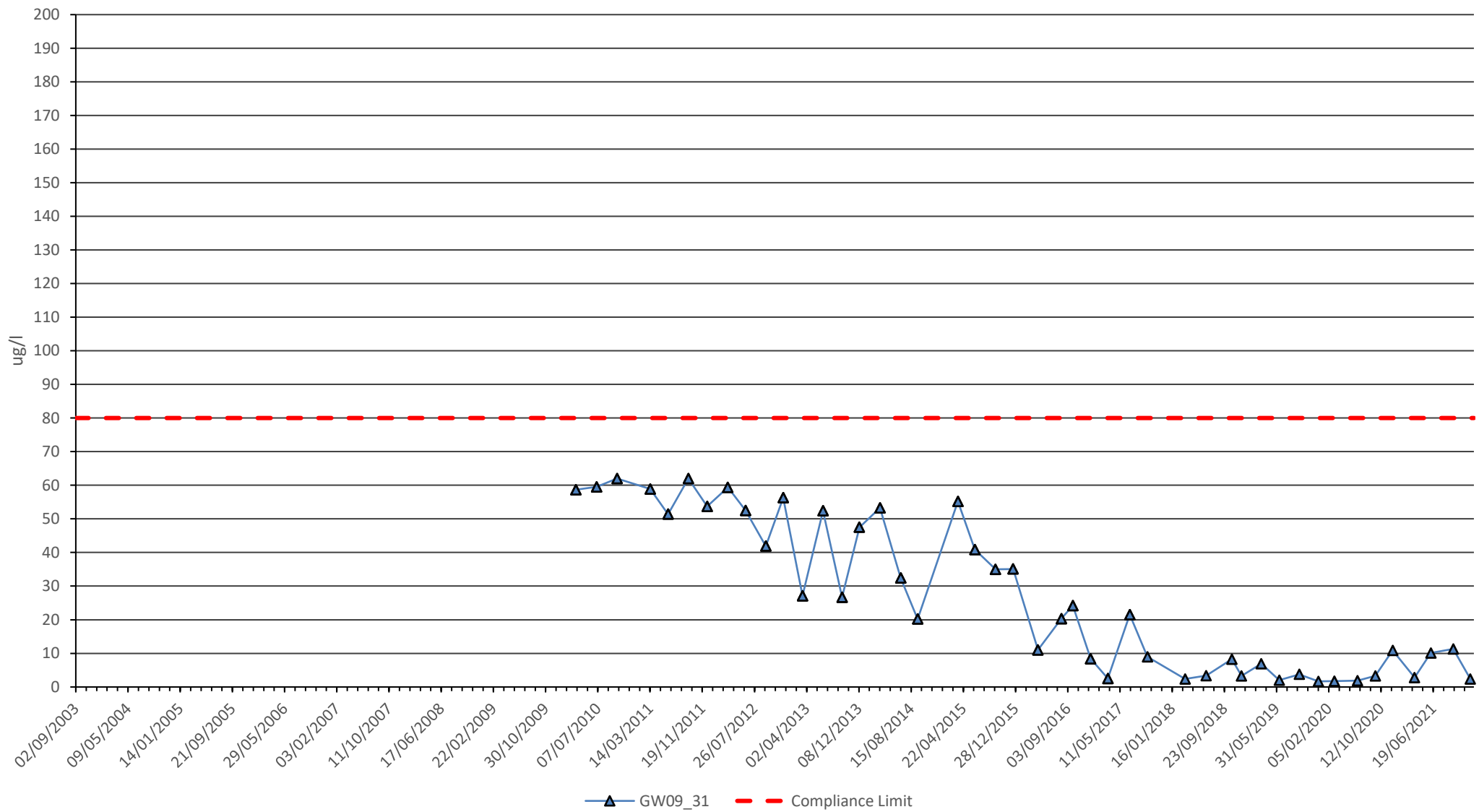
Newport City Council

Dockway Disposal Site

Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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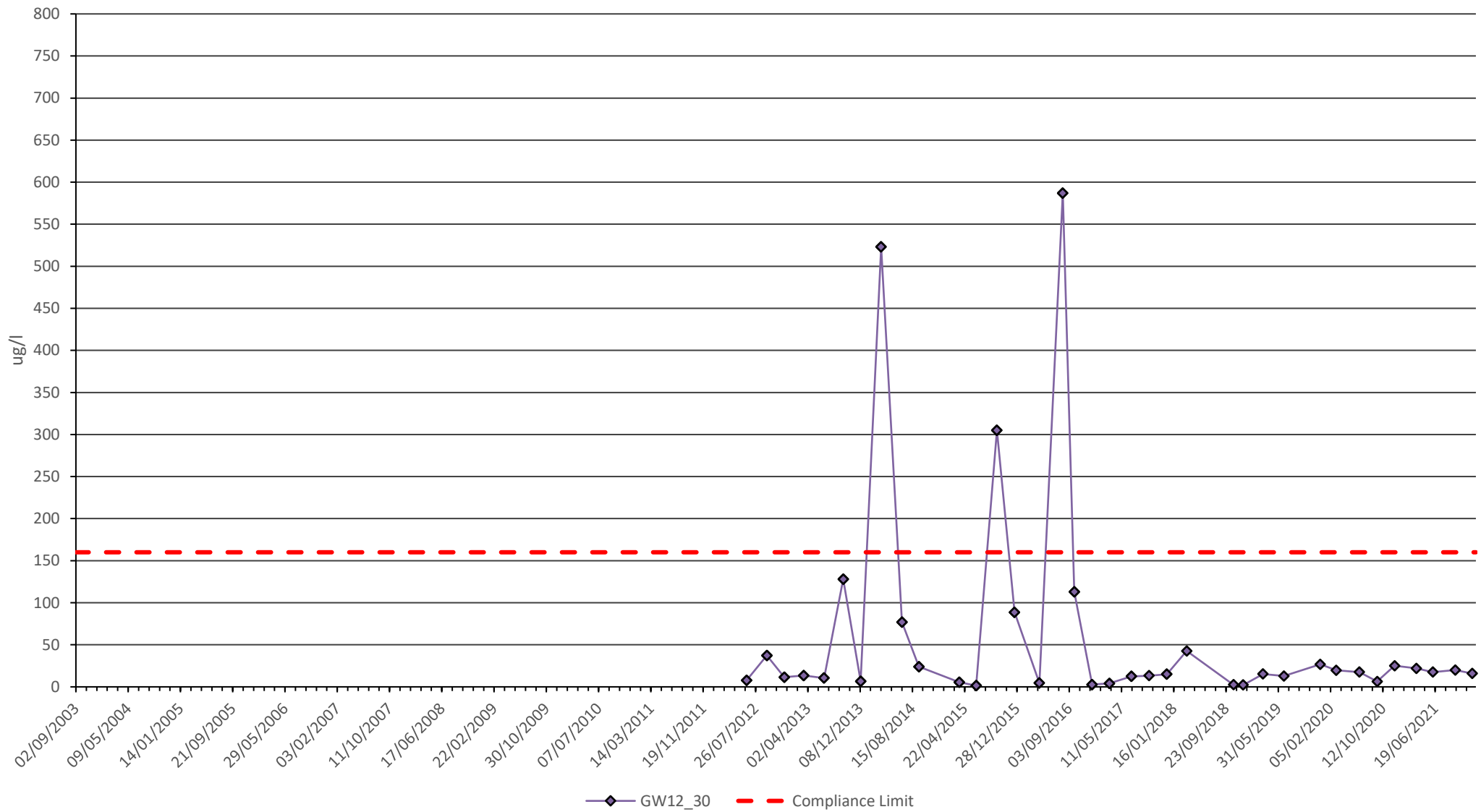



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Newport City Council

Docksway Disposal Site
Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC
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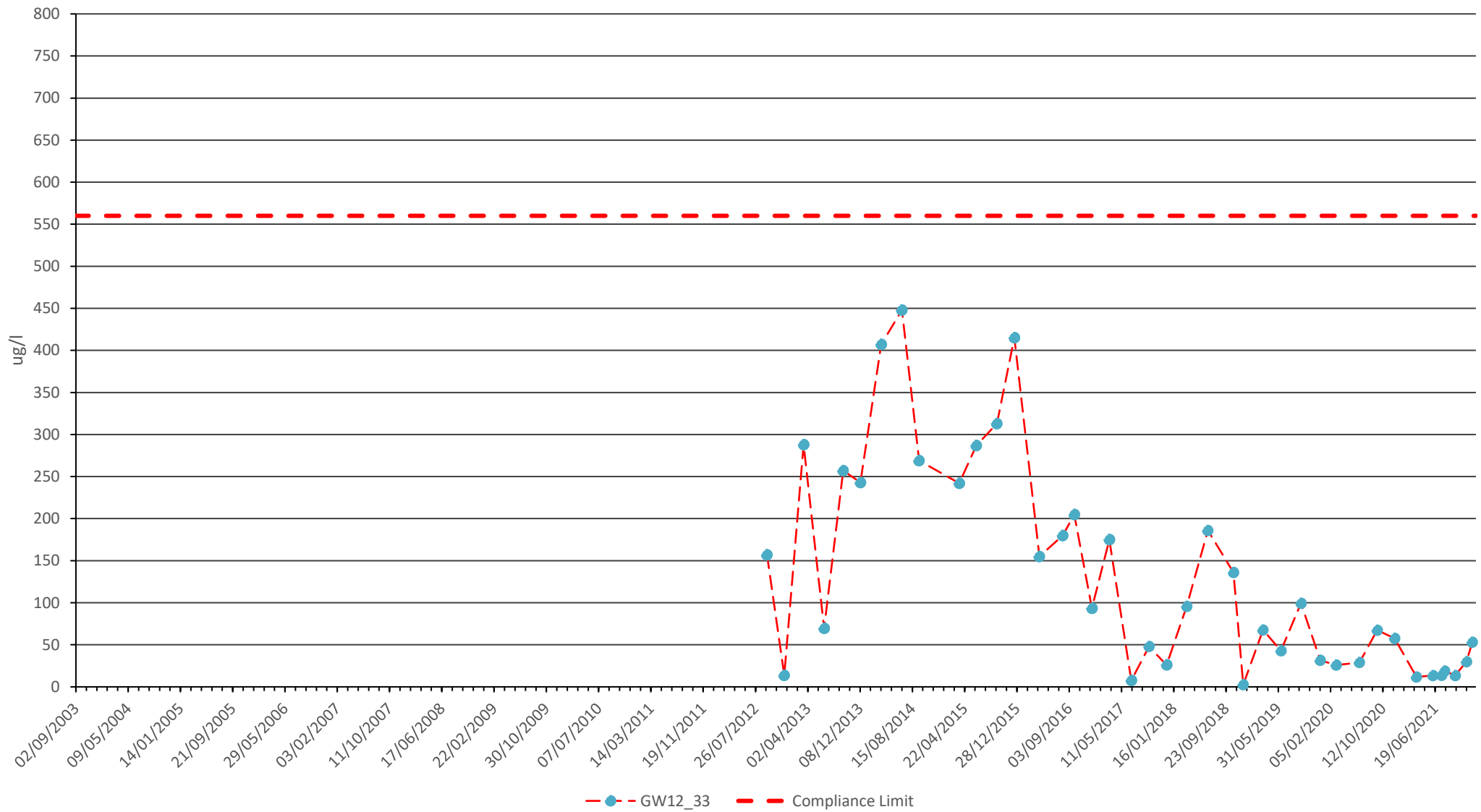



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Docksway Disposal Site
Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC
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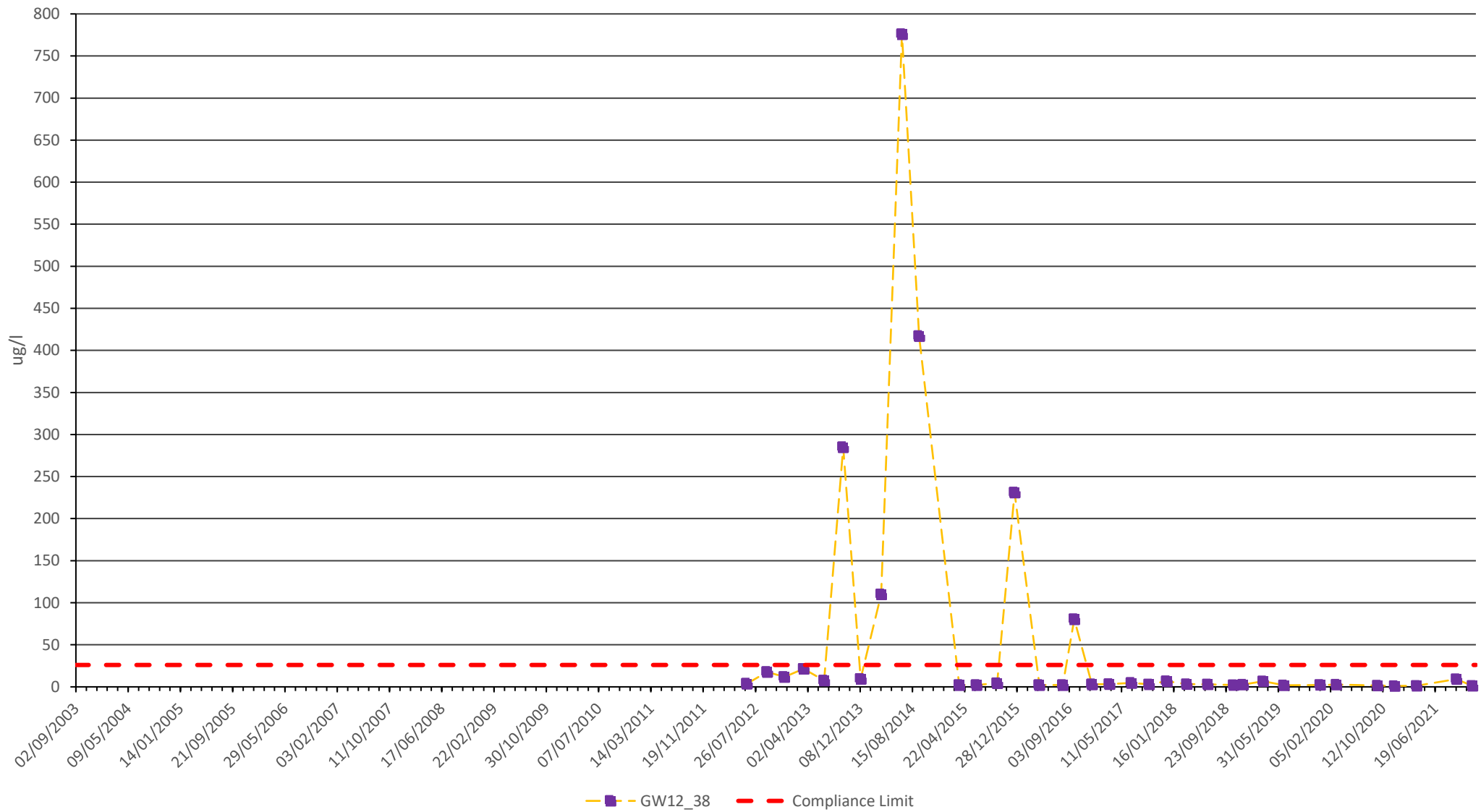
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Docksway Disposal Site

Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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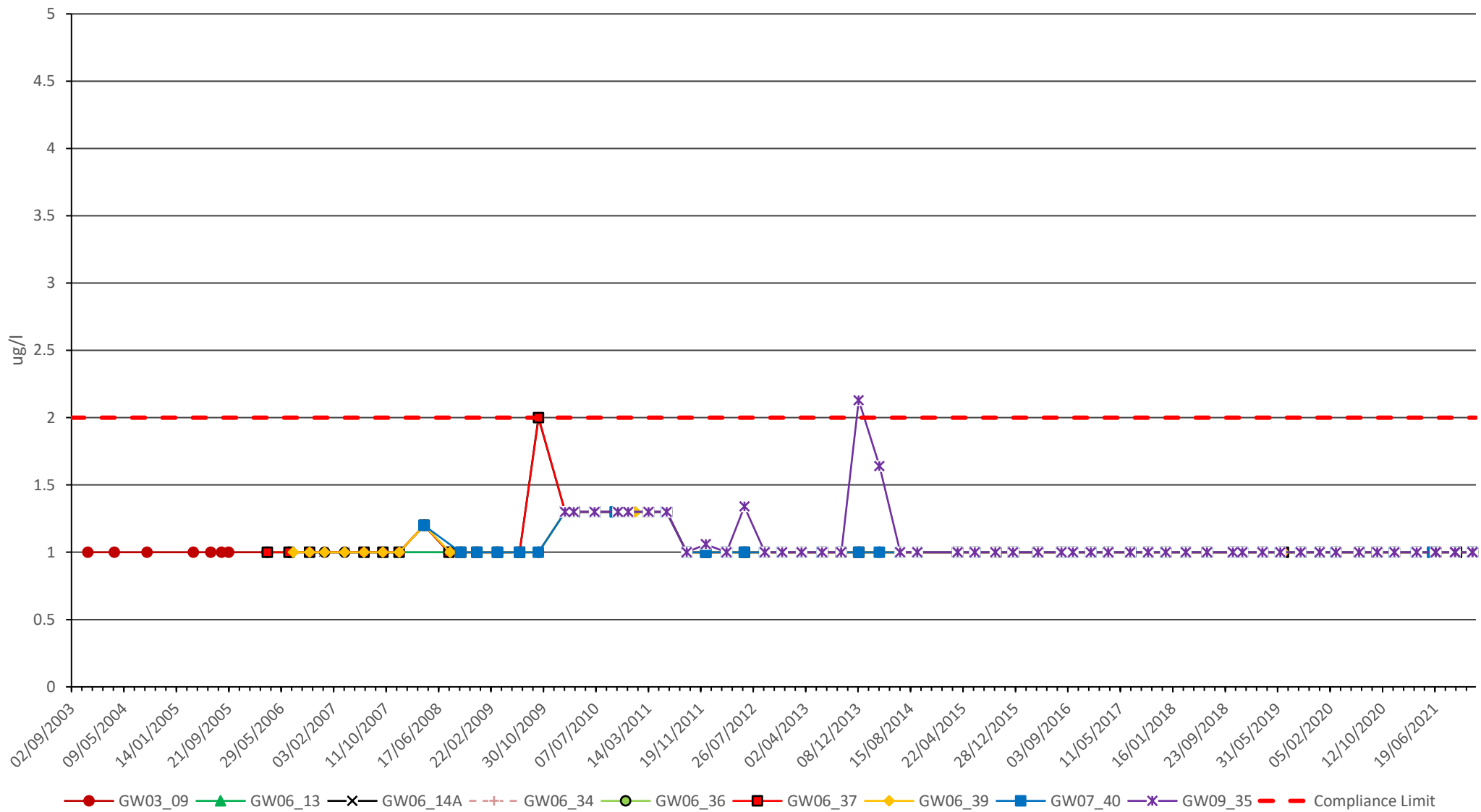
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Docksway Disposal Site

Arsenic in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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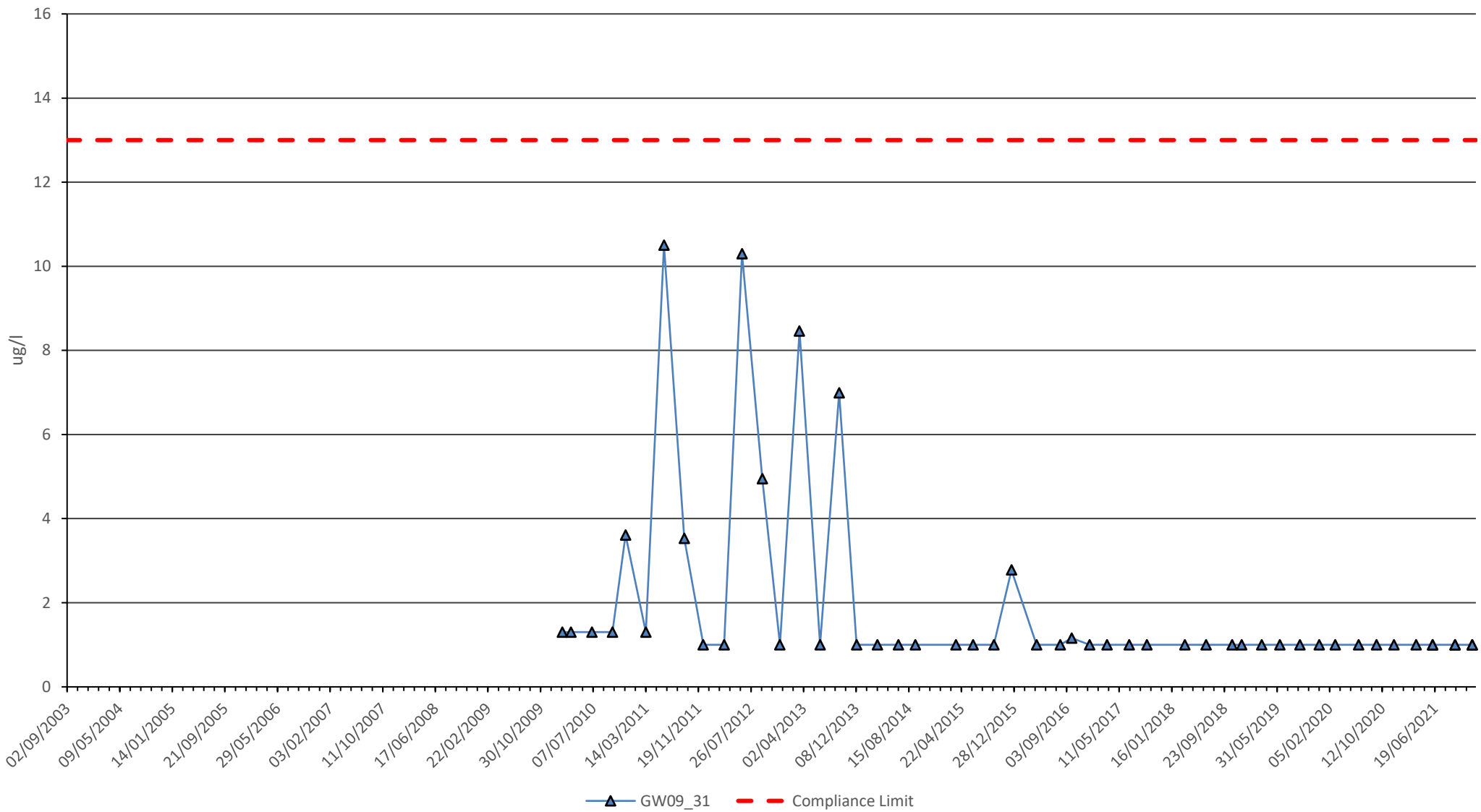
Newport City Council

Docksway Disposal Site

Benzene in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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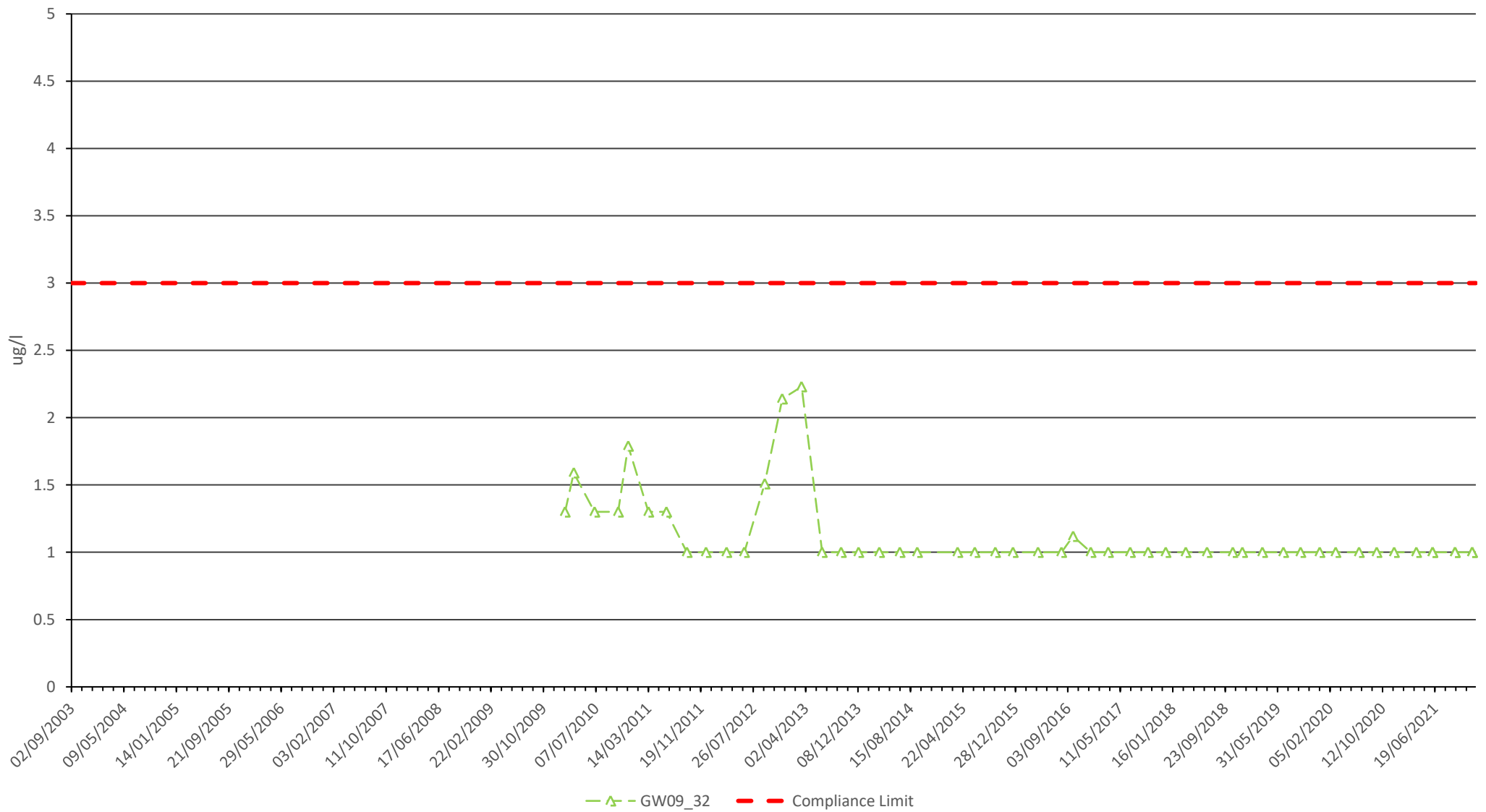


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Newport City Council

Docksway Disposal Site

Benzene in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC
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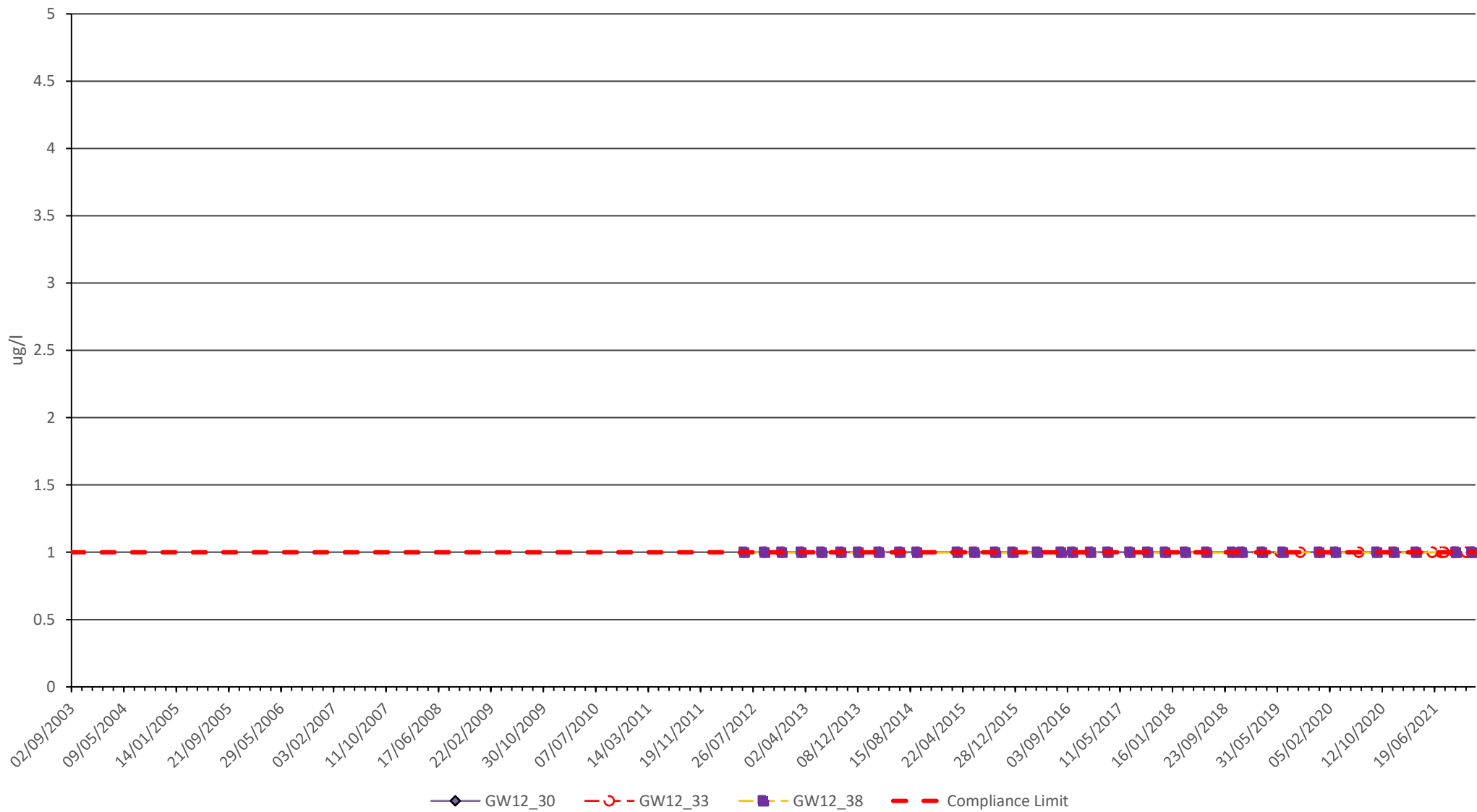
Newport City Council

Docksway Disposal Site

Benzene in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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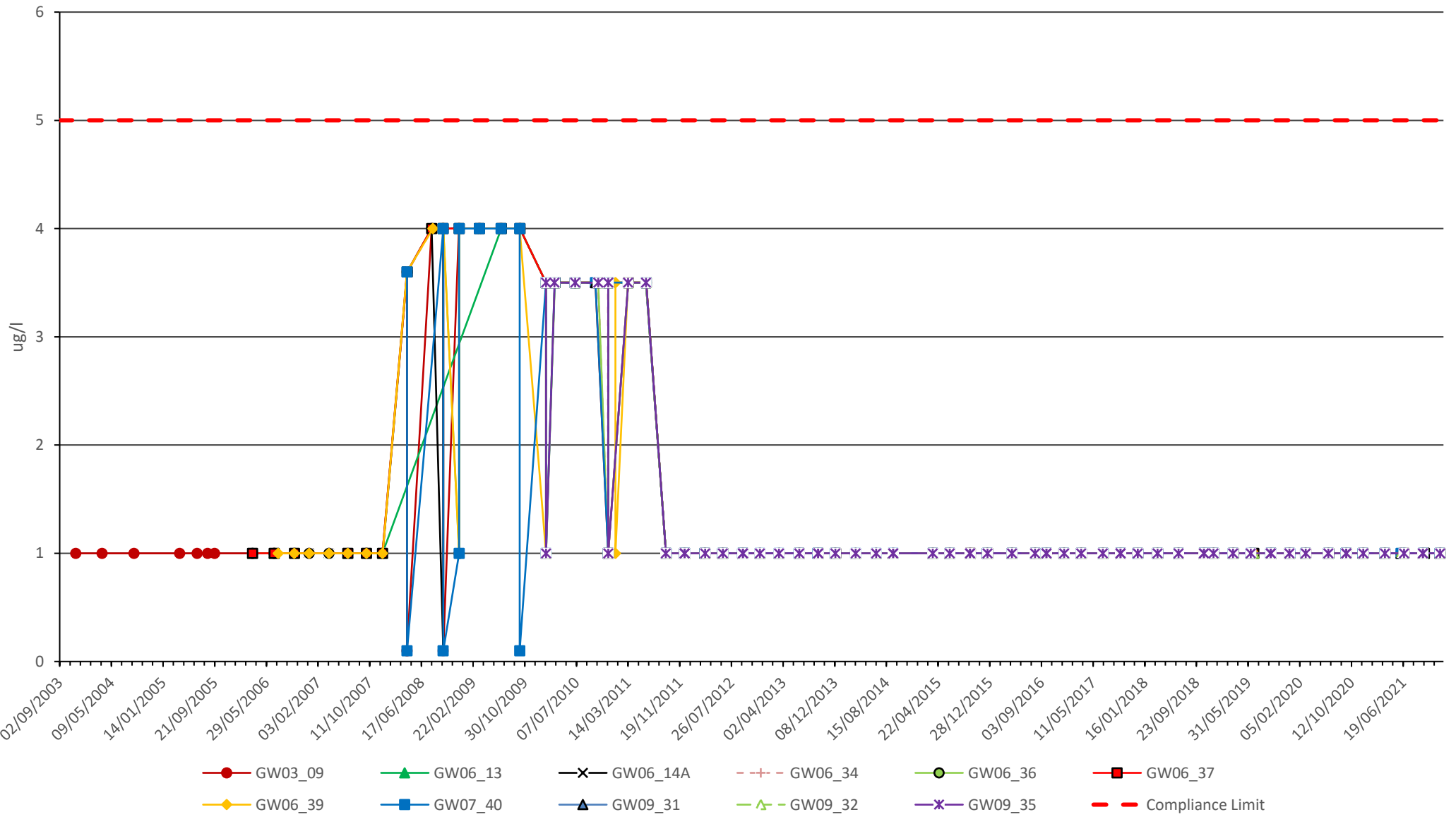
Newport City Council

Docksway Disposal Site

Benzene in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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Docksway Disposal Site

Naphthalene in Groundwater

Date January 2022

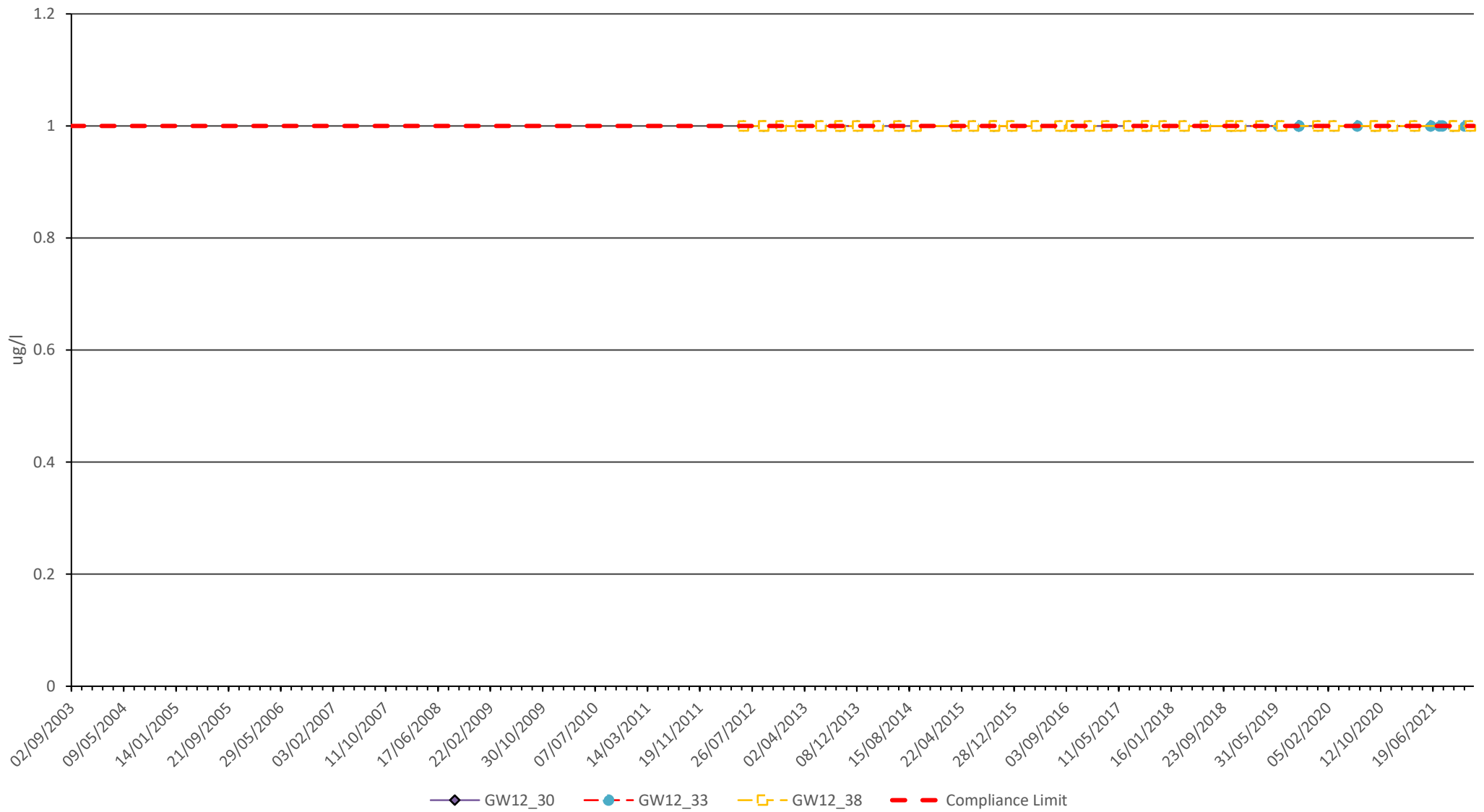
A4 Scale nts

Drawn FBI

Checked NC

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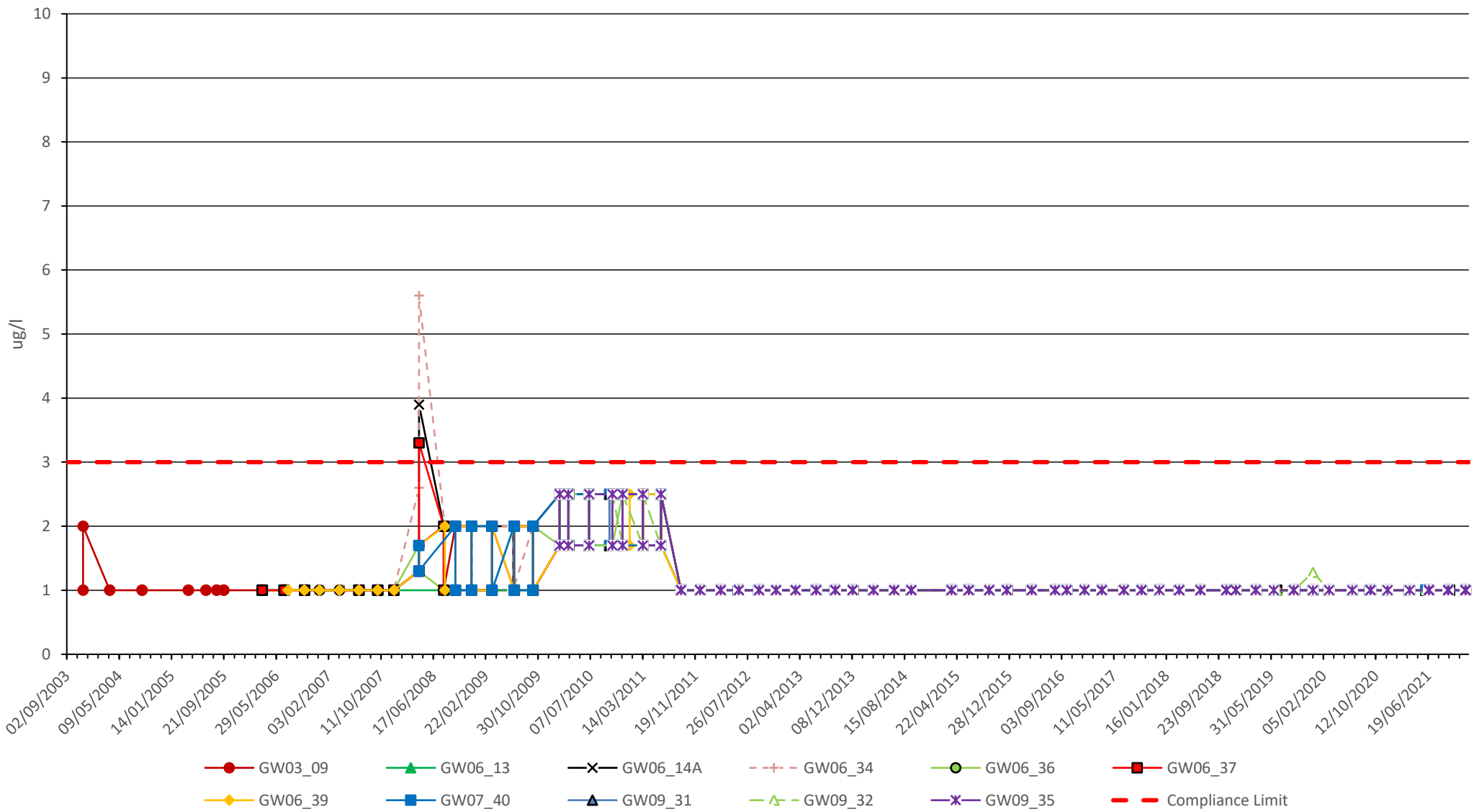
Newport City Council

Docksway Disposal Site

Naphthalene in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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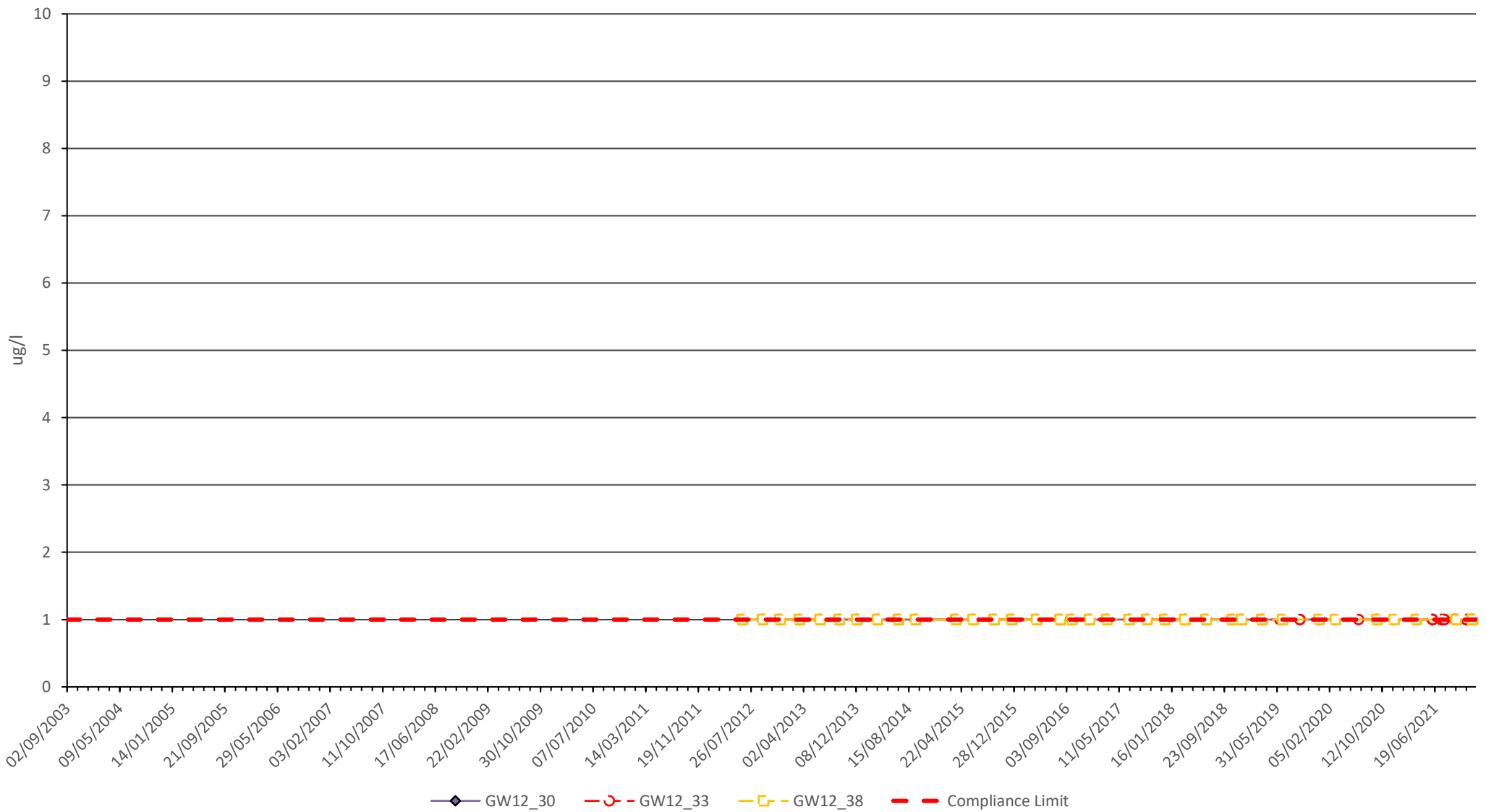
Newport City Council

Docksway Disposal Site

Xylene in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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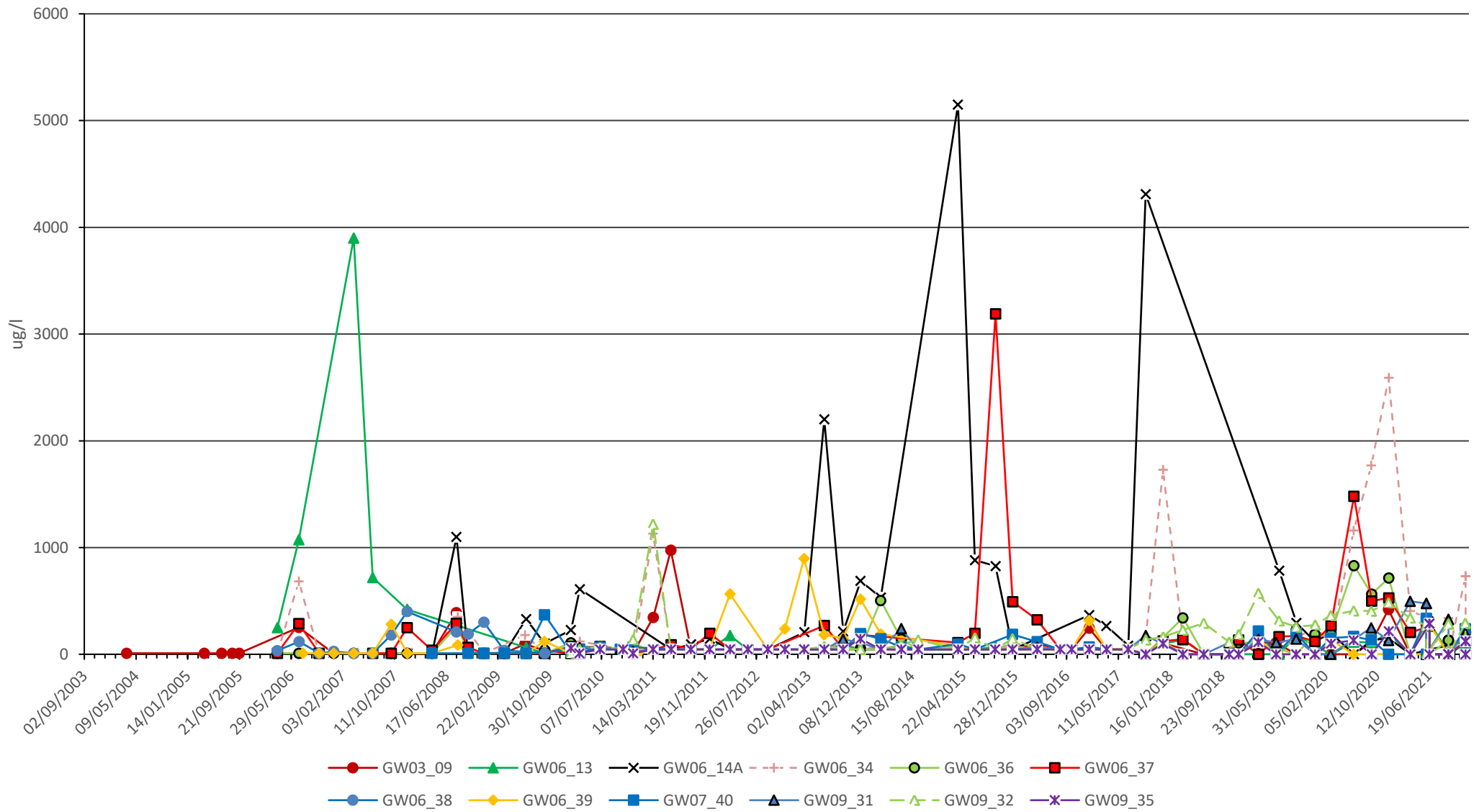
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Docksway Disposal Site

Xylene in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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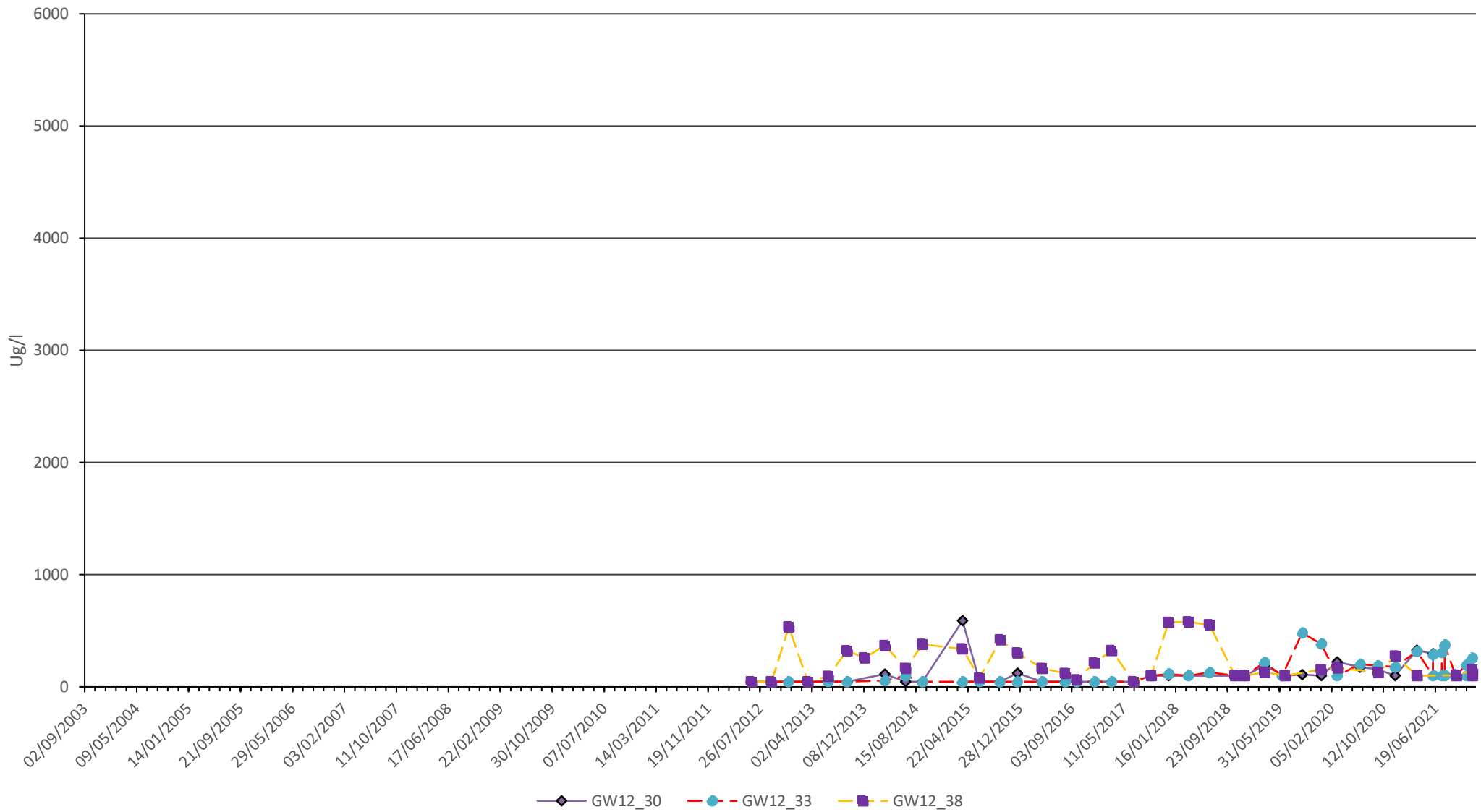
Newport City Council

Docksway Disposal Site

EPH in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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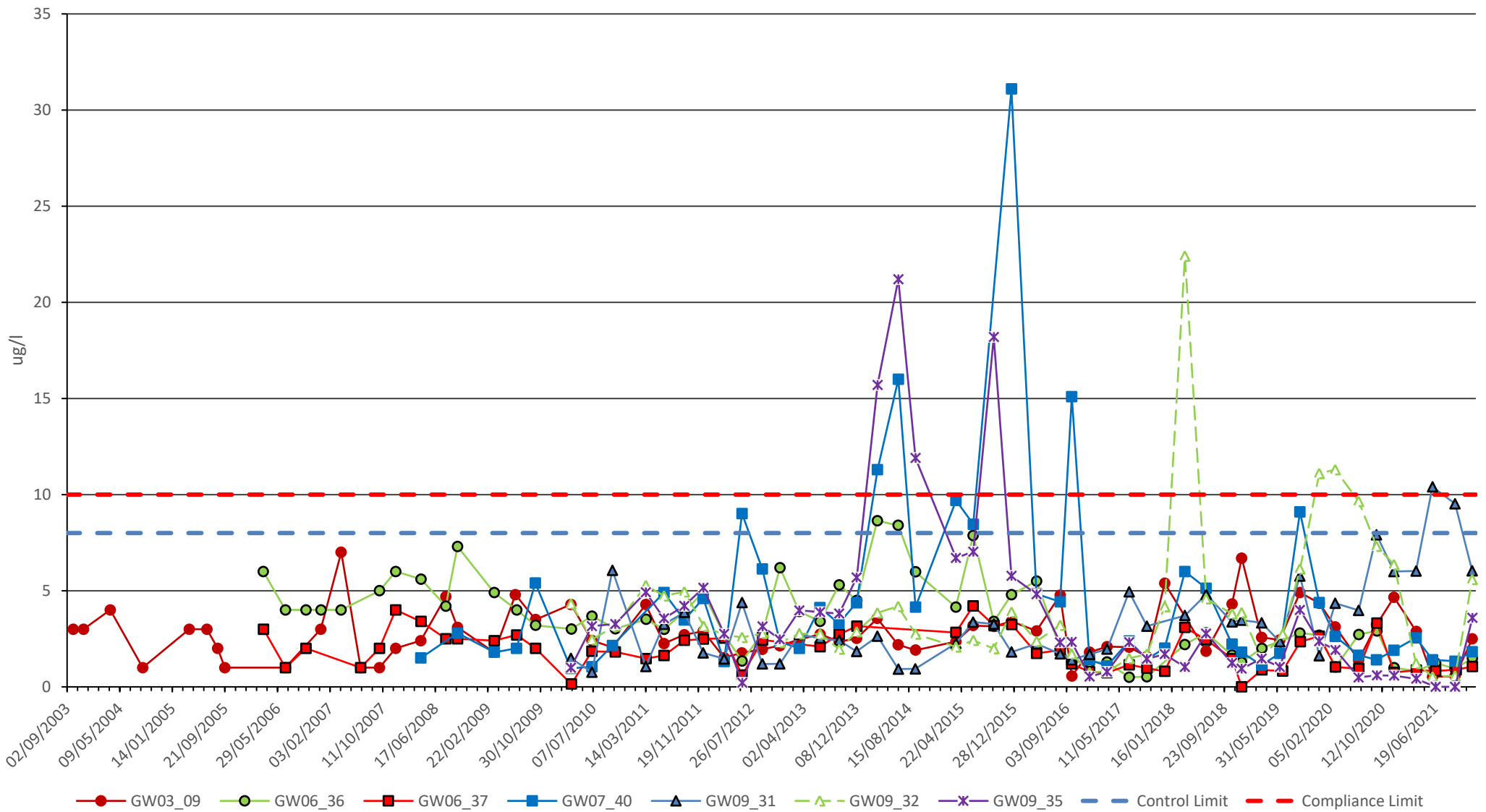
Newport City Council

Docksway Disposal Site

EPH in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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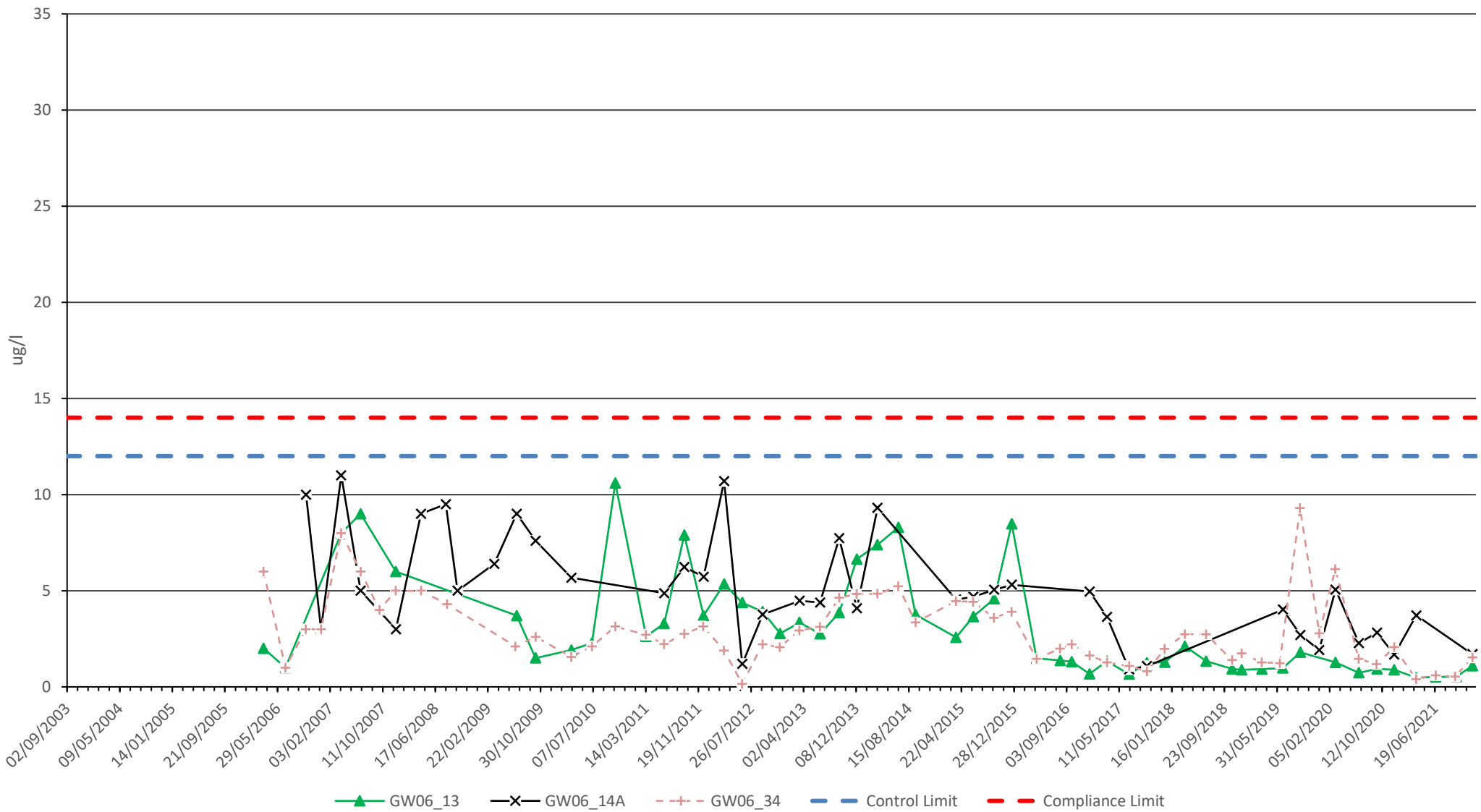
Newport City Council

Docksway Disposal Site

Nickel in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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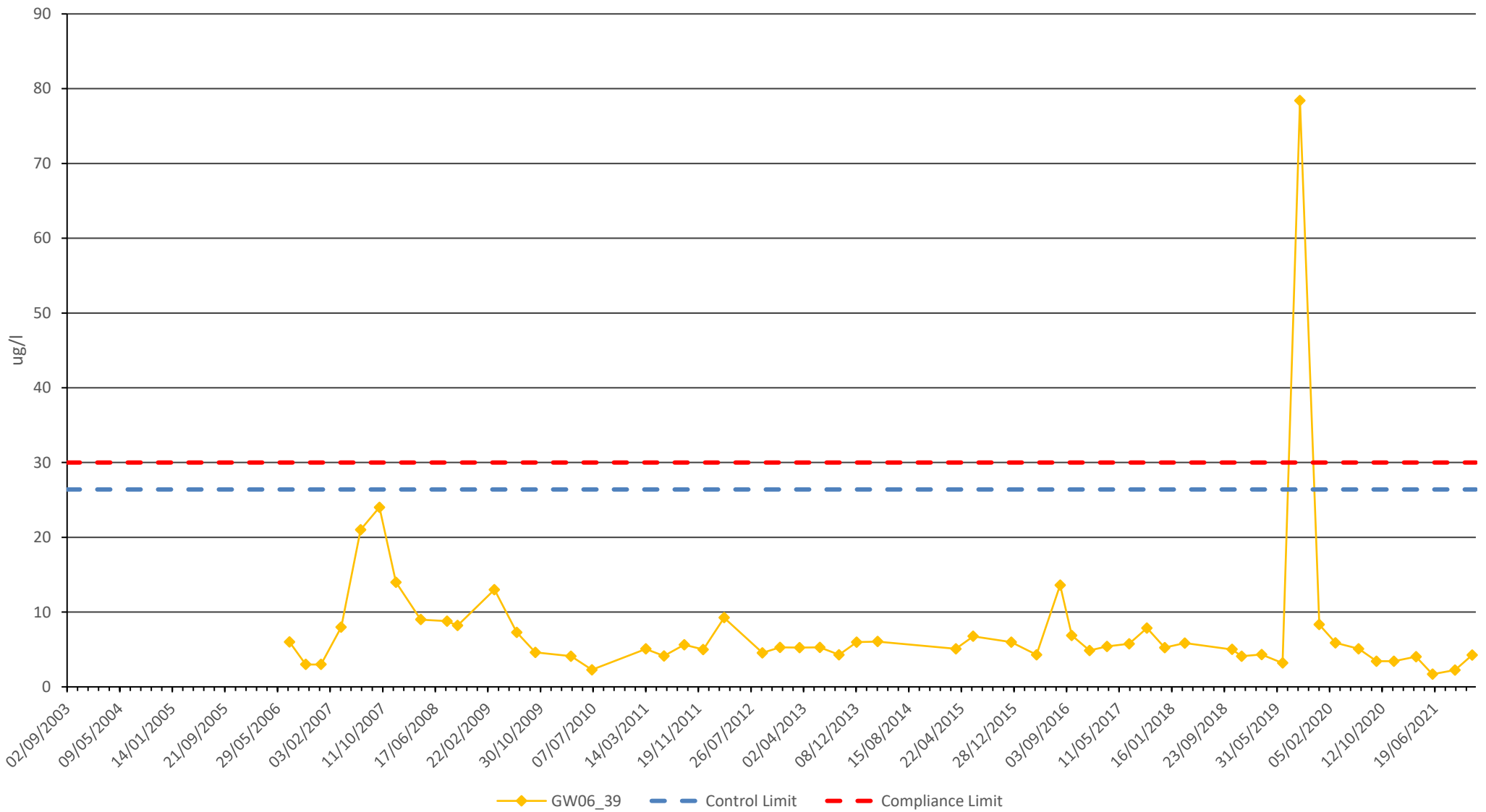
Newport City Council

Docksway Disposal Site

Nickel in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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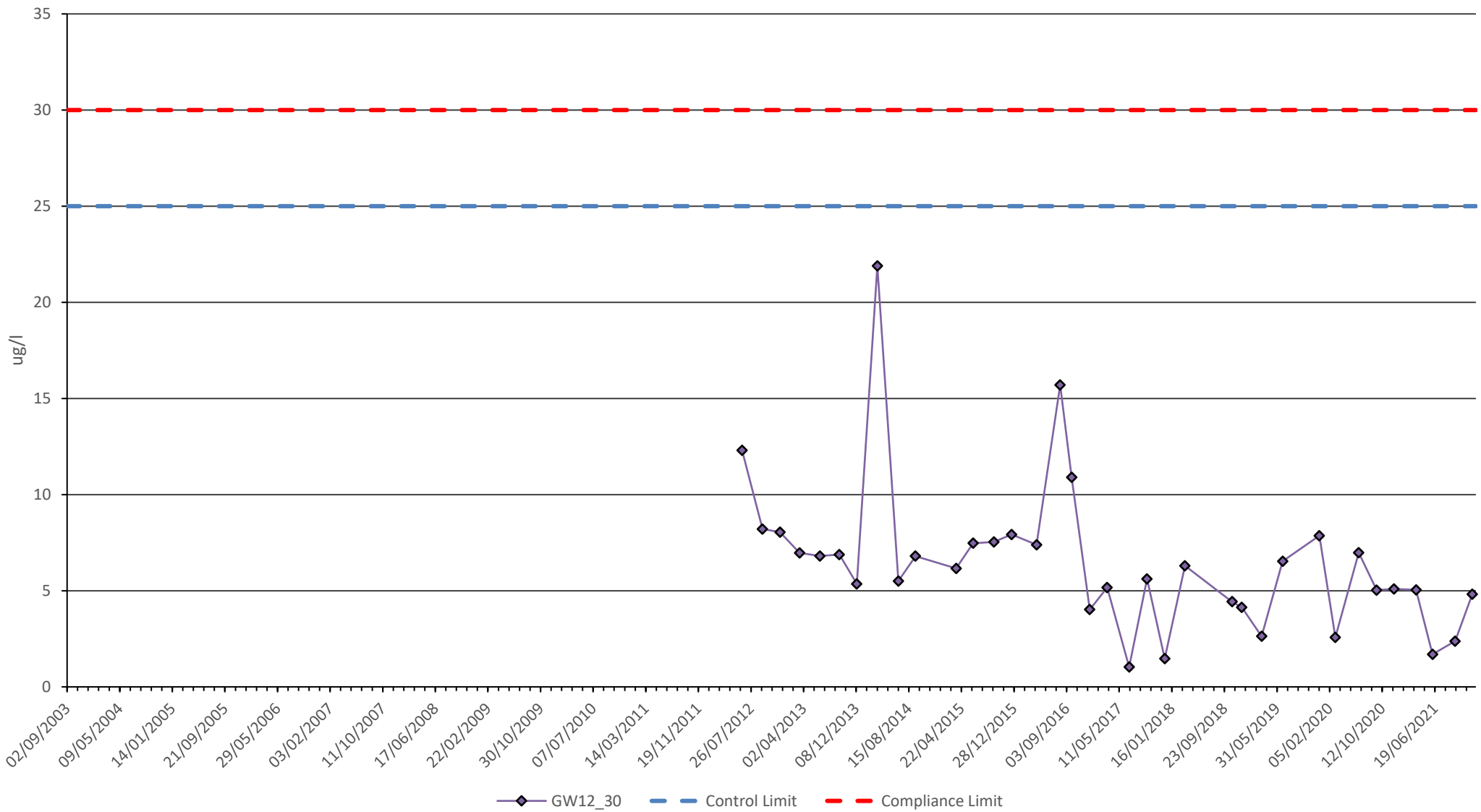
Newport City Council

Dockway Disposal Site

Nickel in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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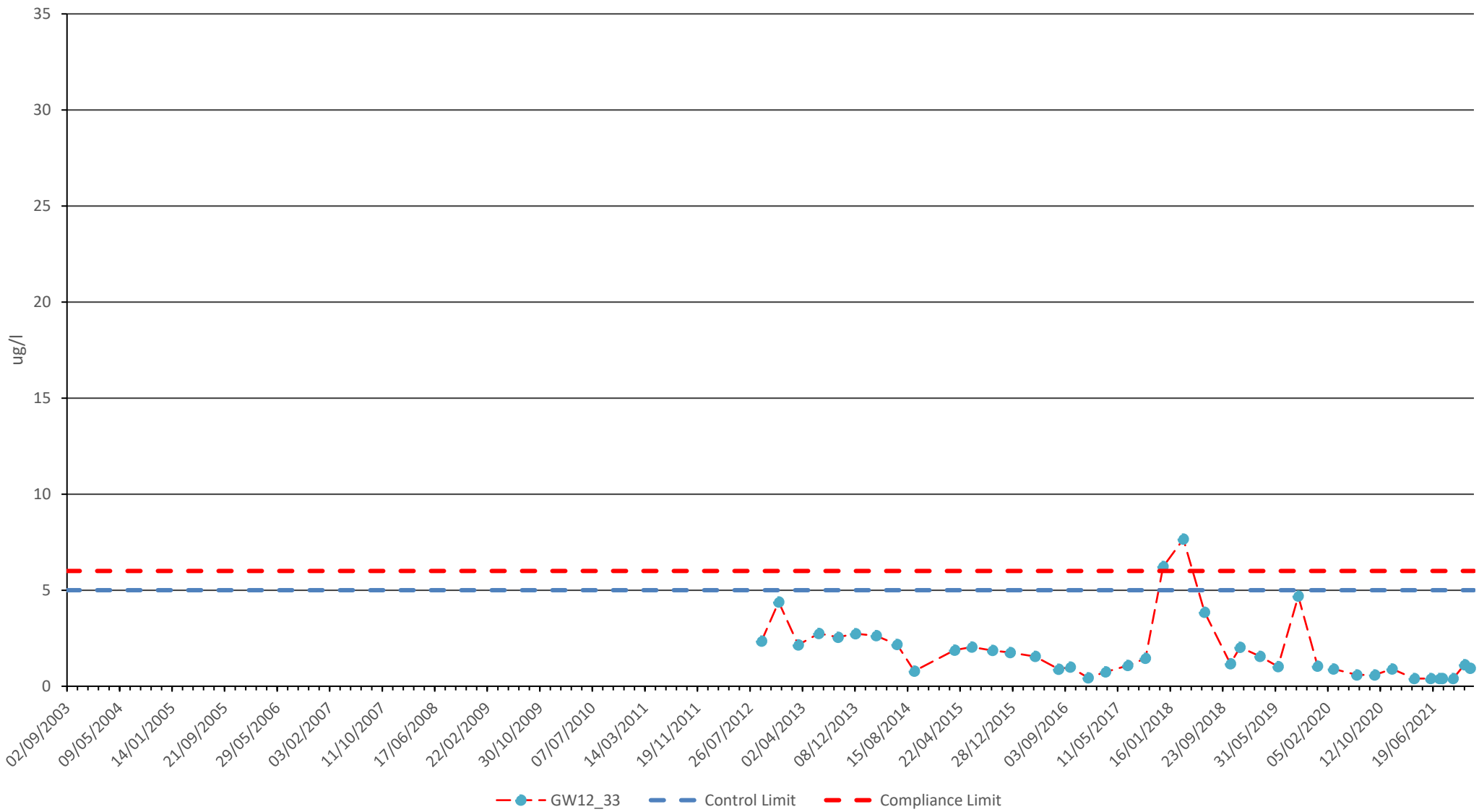
Newport City Council

Docksway Disposal Site

Nickel in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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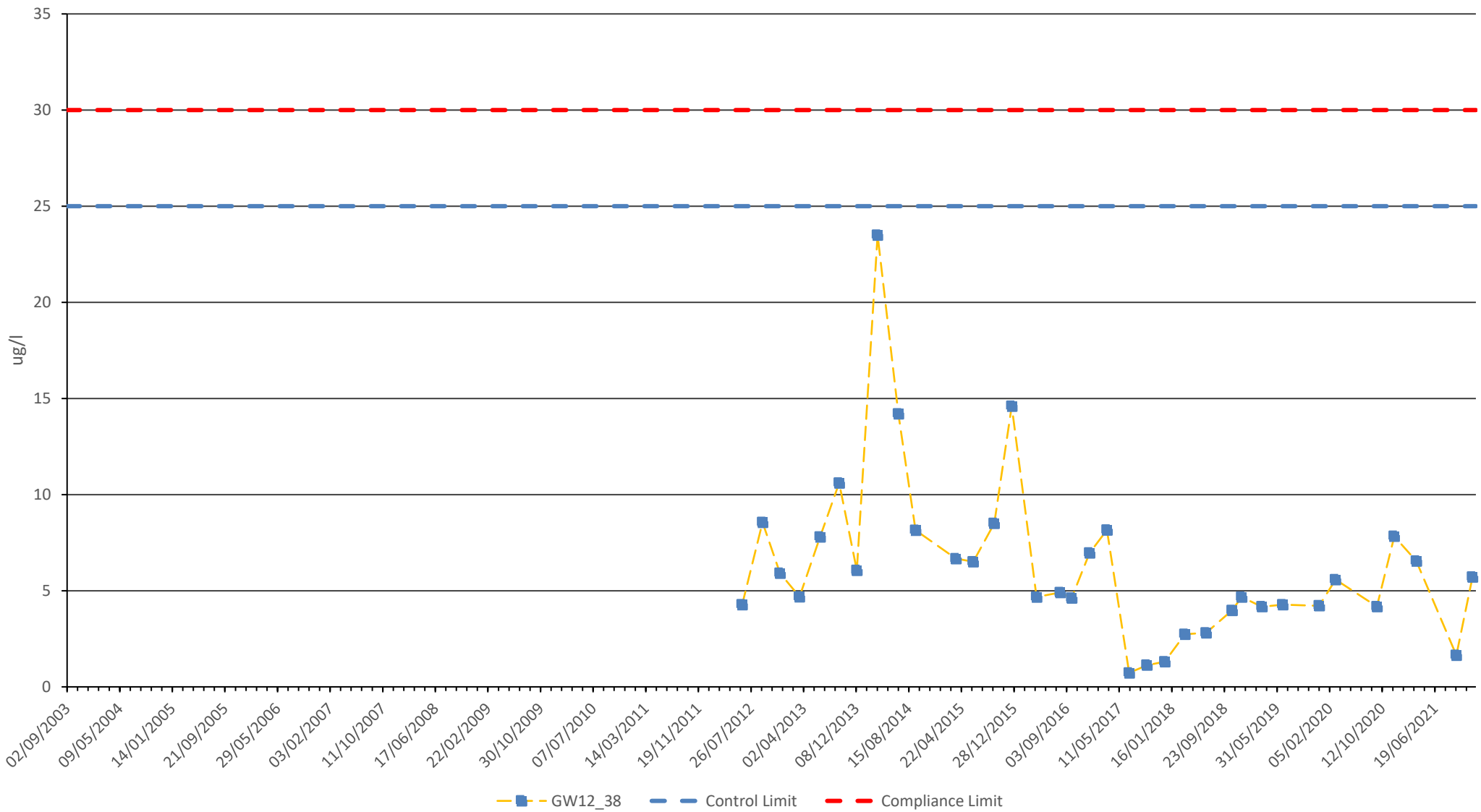
Client
Newport City Council

Docksway Disposal Site

Nickel in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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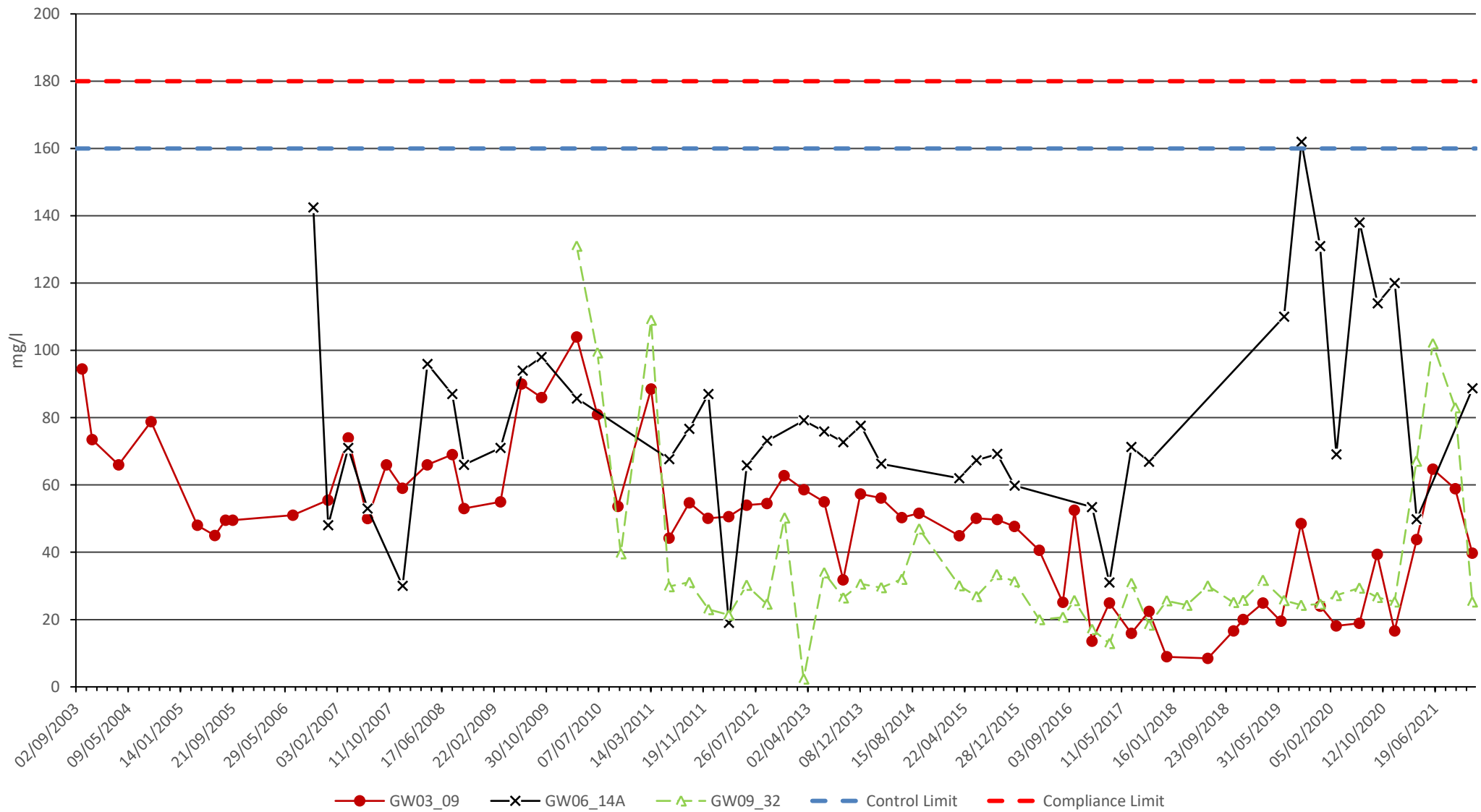
Newport City Council

Docksway Disposal Site

Nickel in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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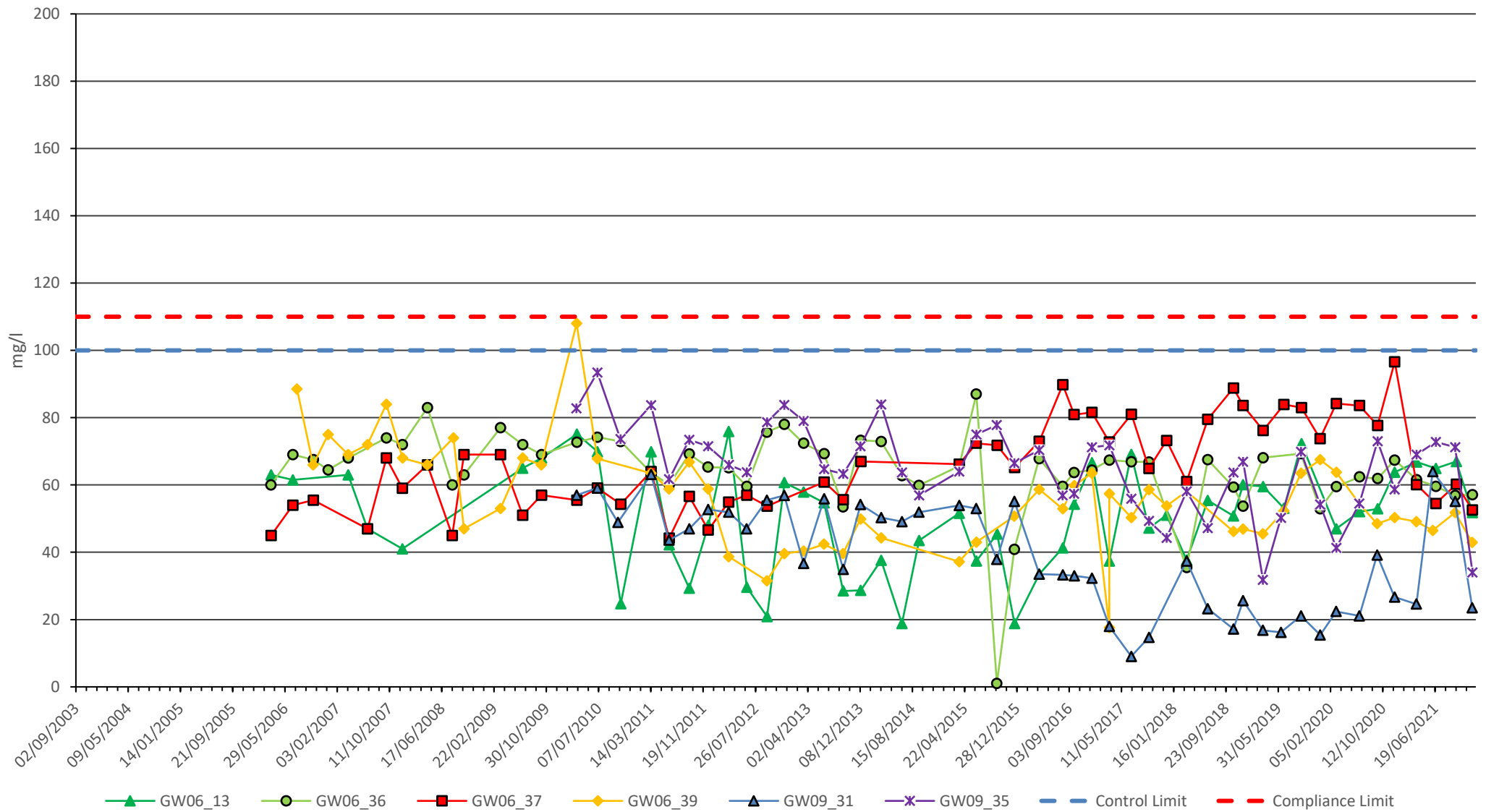
Newport City Council

Docksway Disposal Site

Potassium in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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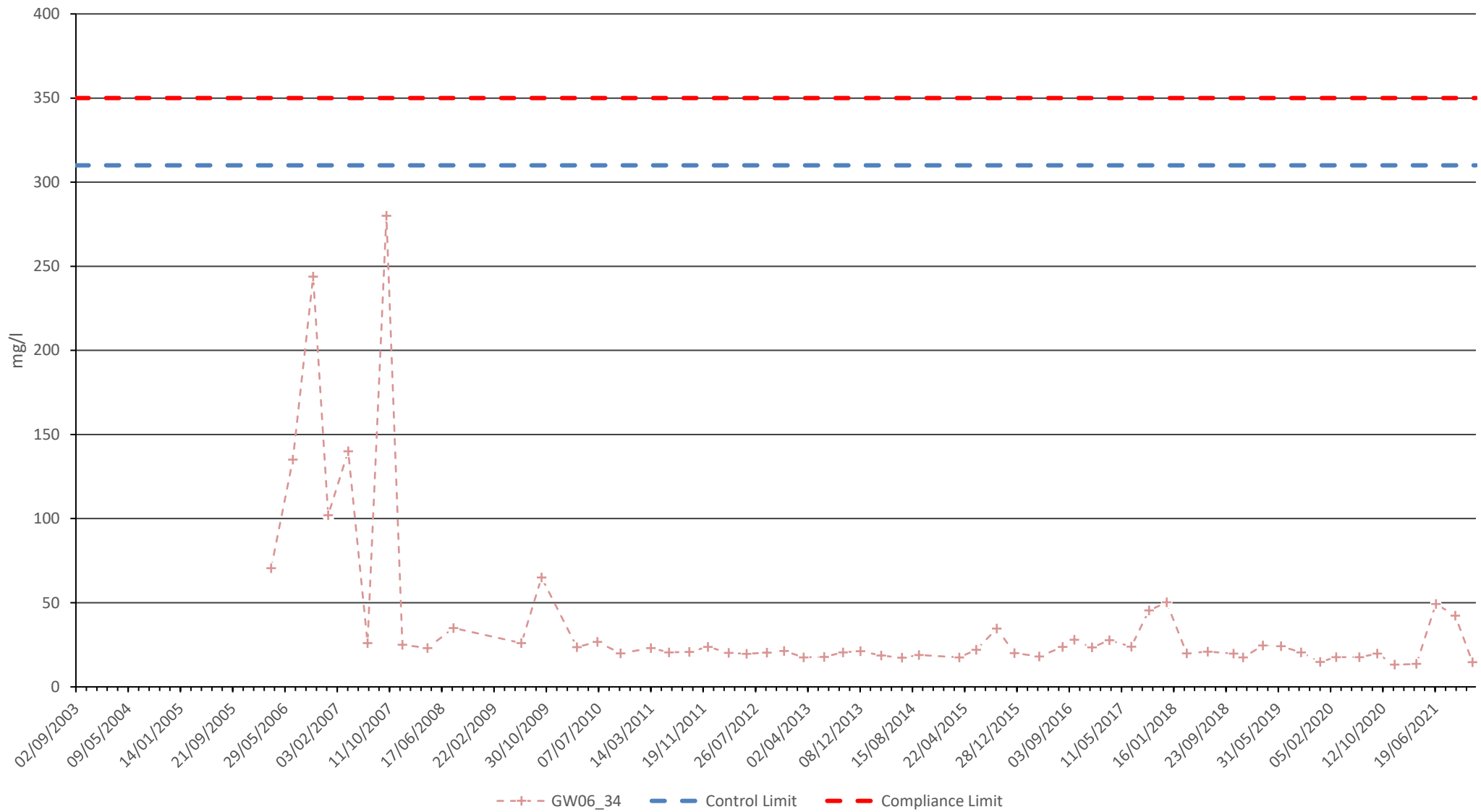



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Docksway Disposal Site
Potassium in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC
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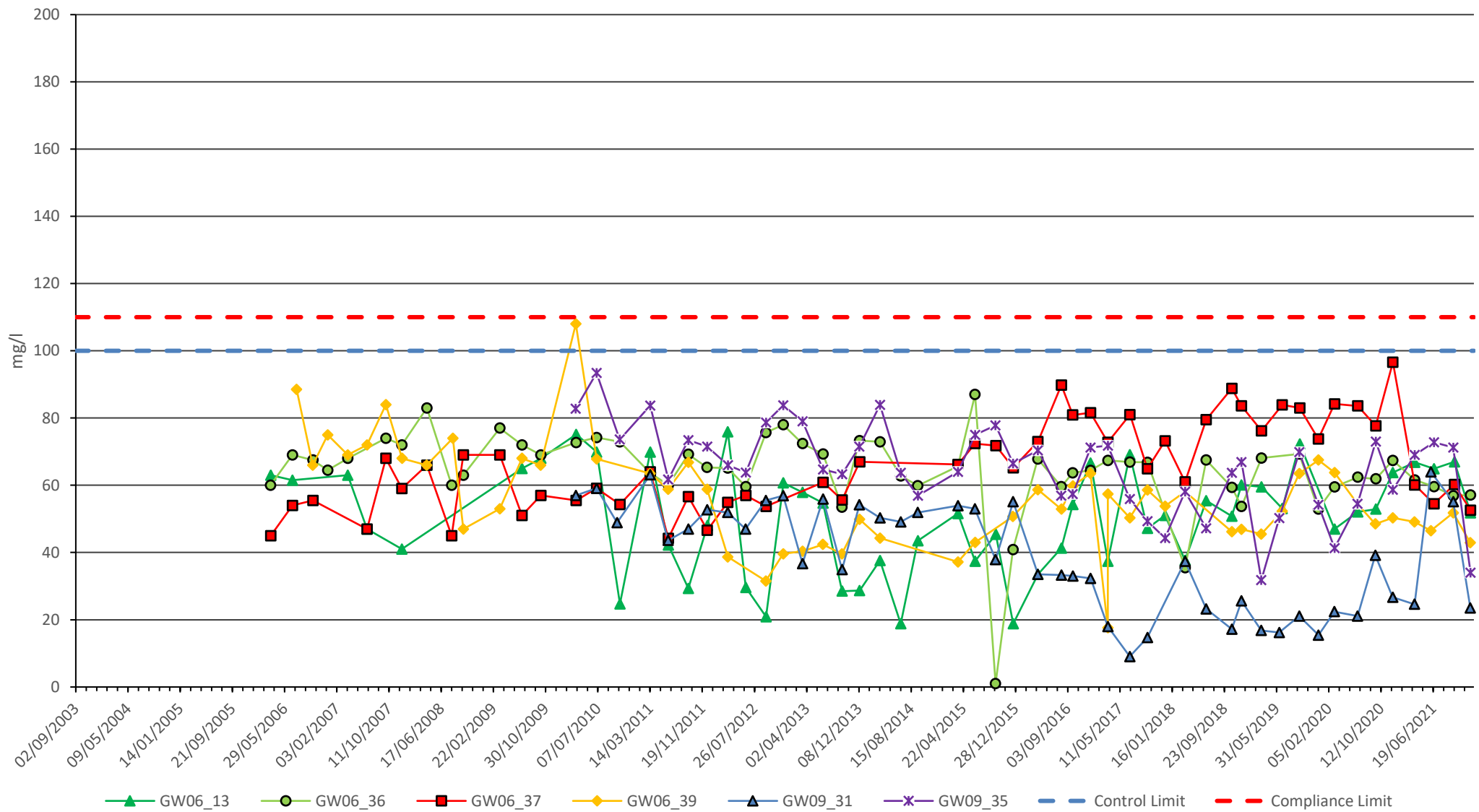
Newport City Council

Docksway Disposal Site

Potassium in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

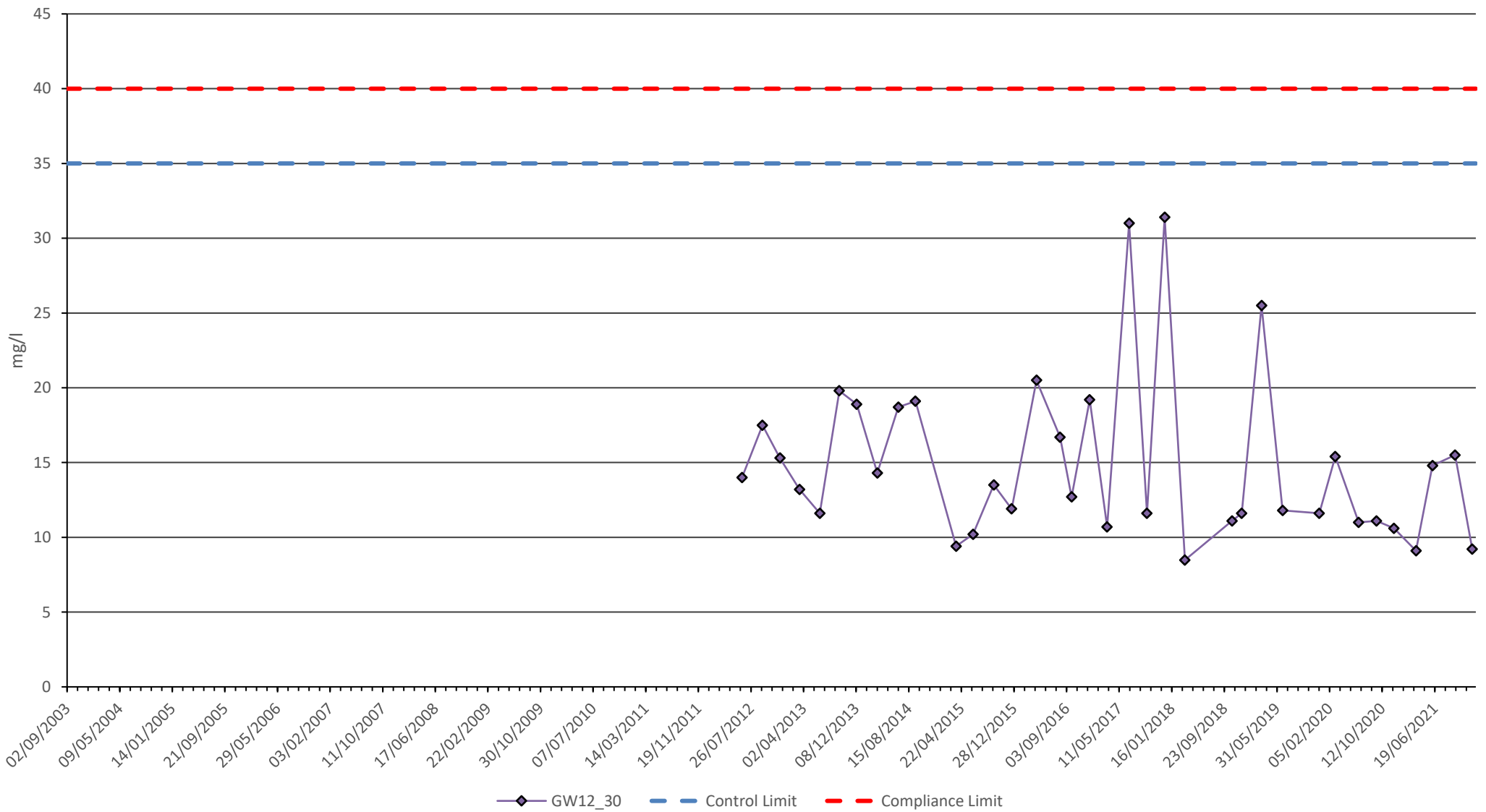
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Newport City Council

Docksway Disposal Site
Potassium in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC
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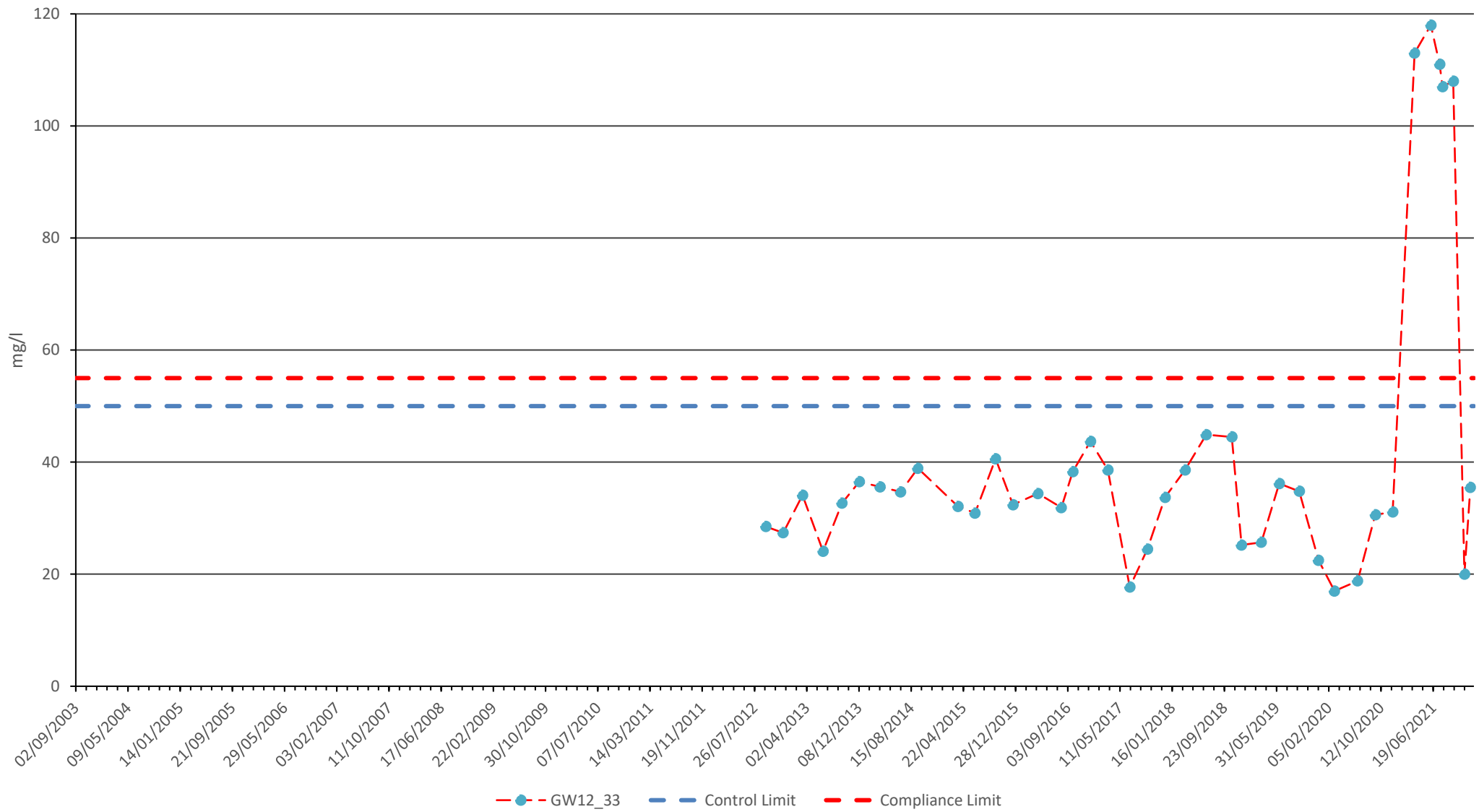
Newport City Council

Docksway Disposal Site

Potassium in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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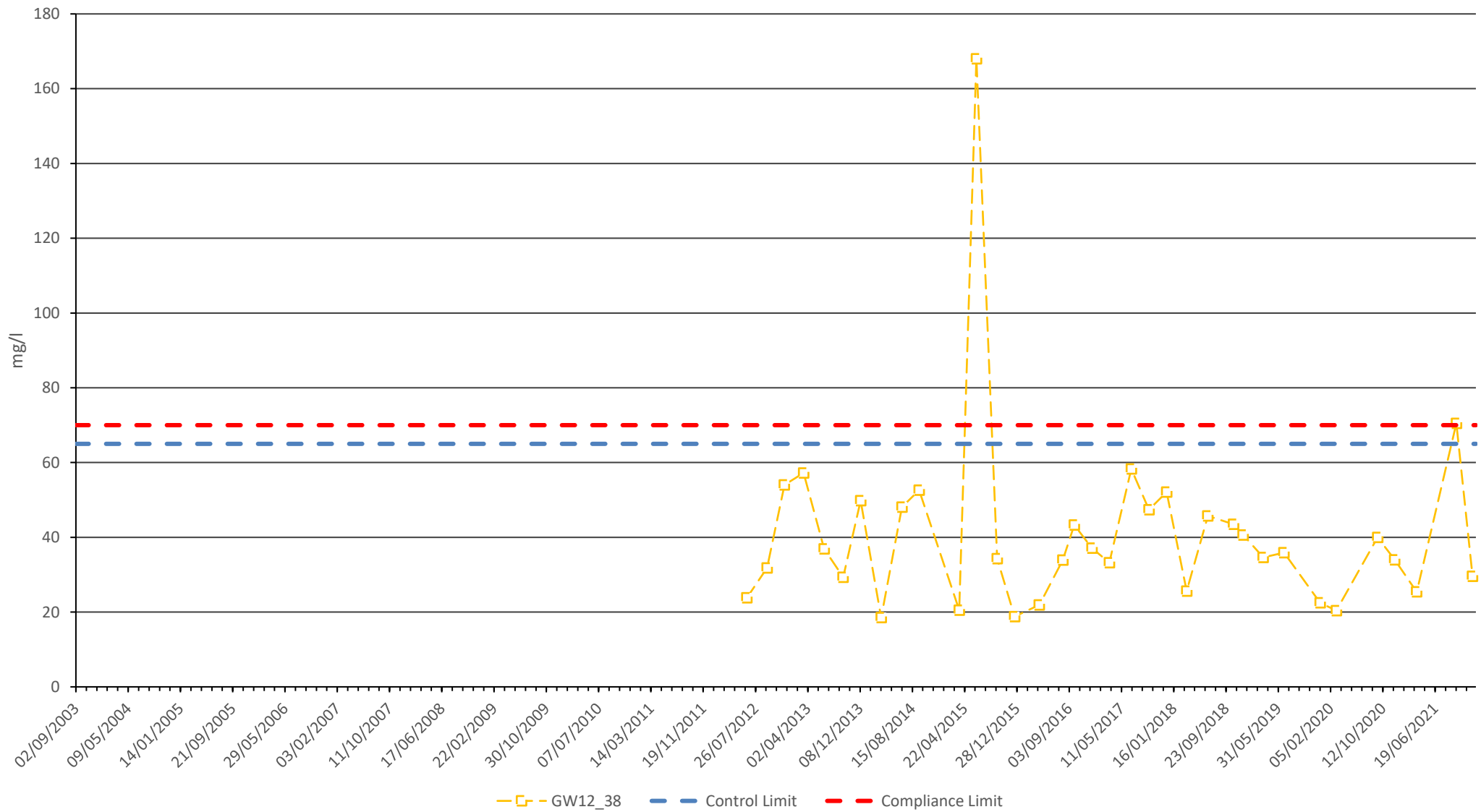
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Docksway Disposal Site

Potassium in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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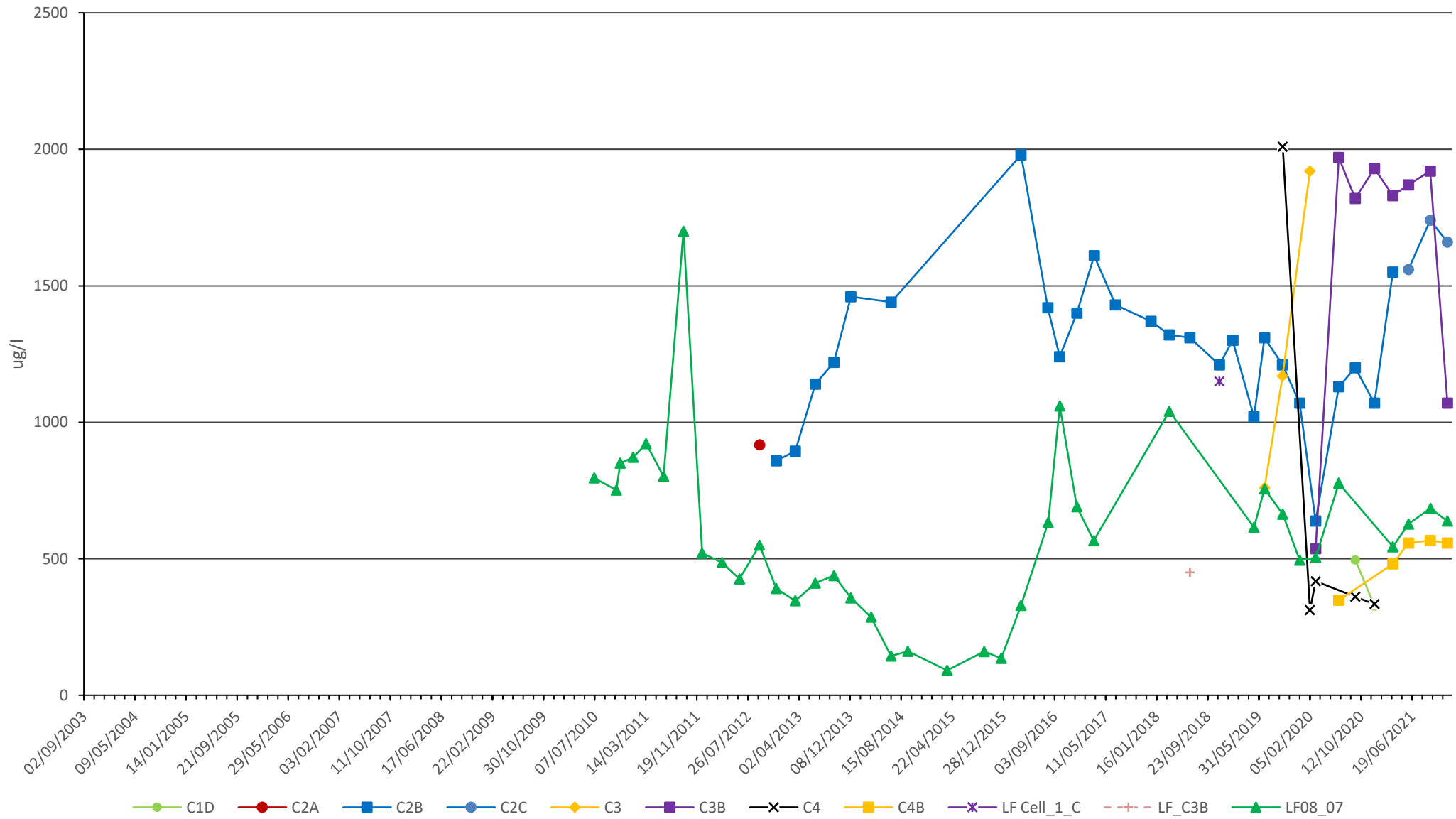
Docksway Disposal Site

Potassium in Groundwater

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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Appendix 3 Leachate Chemistry Graphs



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Docksway Disposal Site

Ammoniacal Nitrogen in Leachate

Date January 2022

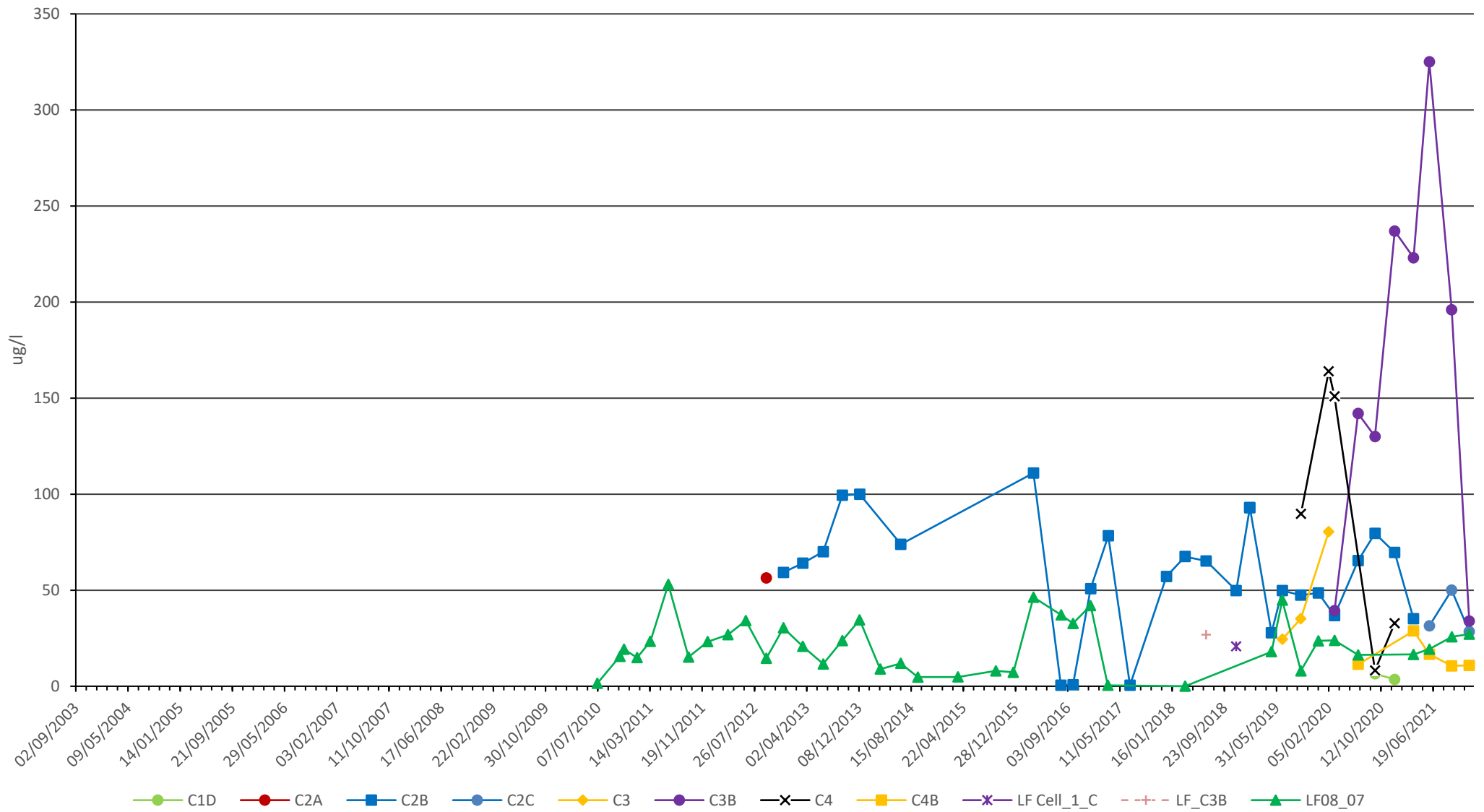
A4 Scale nts

Drawn FBI

Checked NC

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Docksway Disposal Site

Arsenic in Leachate

Date January 2022

A4 Scale nts

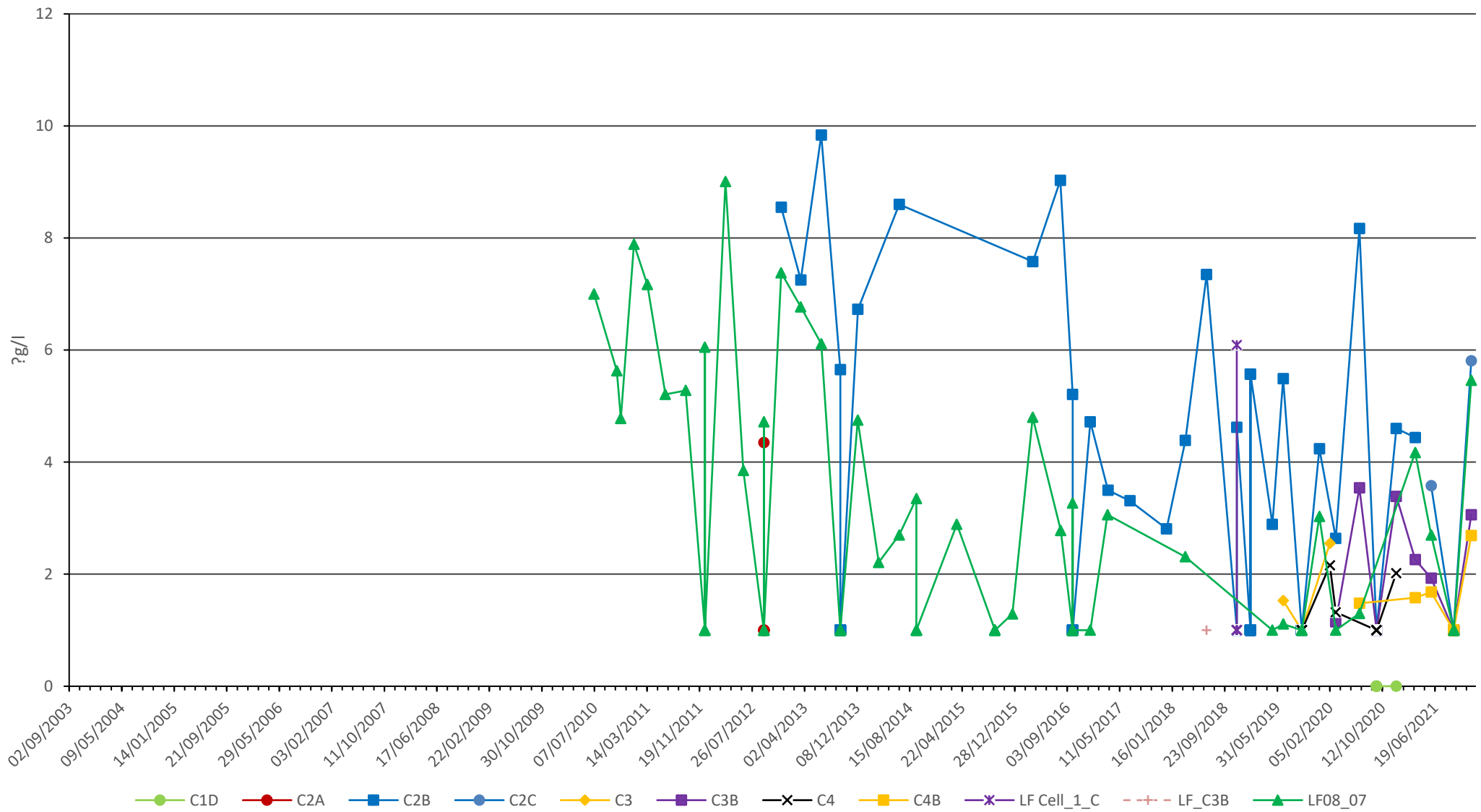
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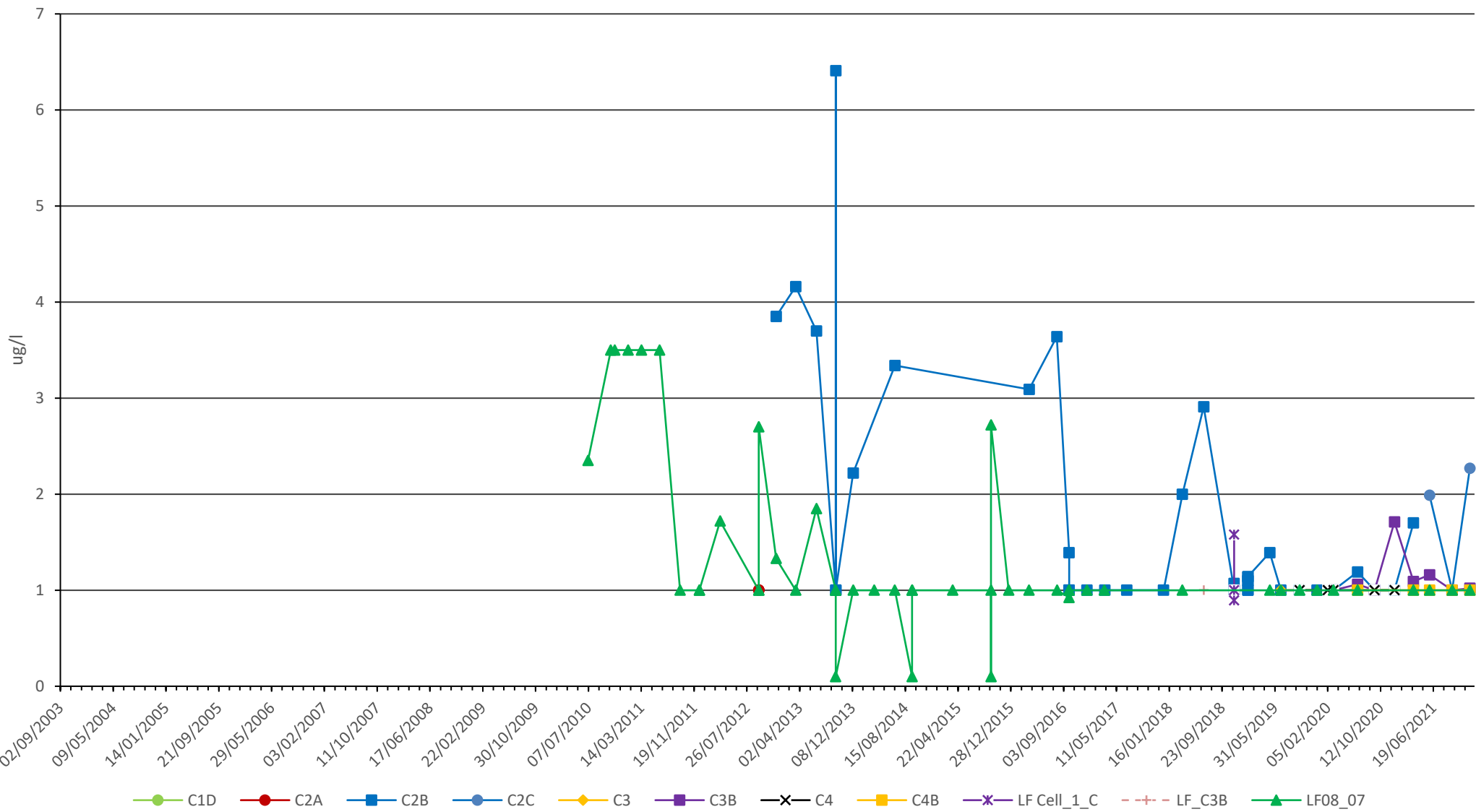



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Docksway Disposal Site
Benzene in Leachate

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC
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Docksway Disposal Site

Napthalene in Leachate

Date January 2022

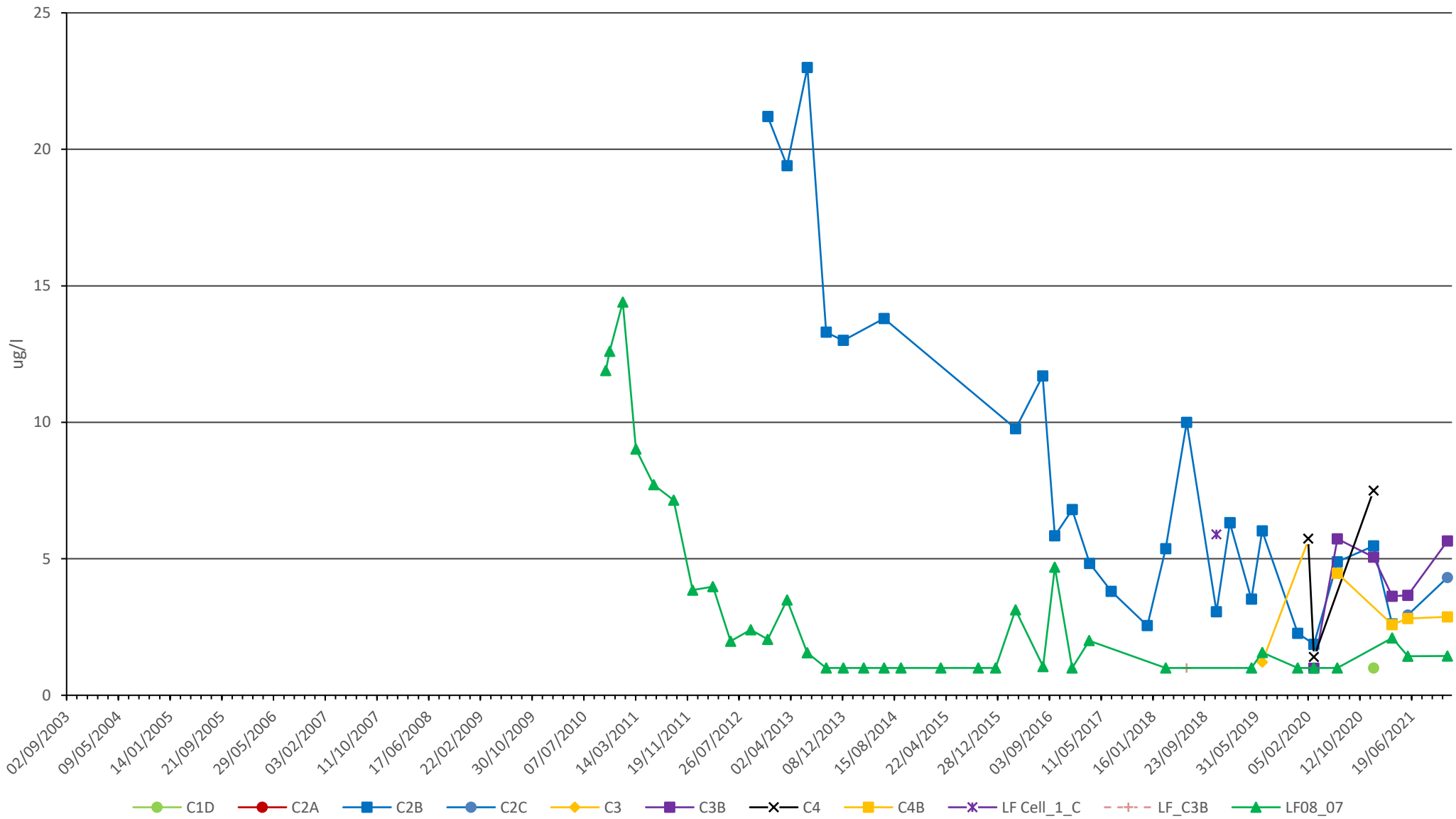
A4 Scale nts

Drawn FBI

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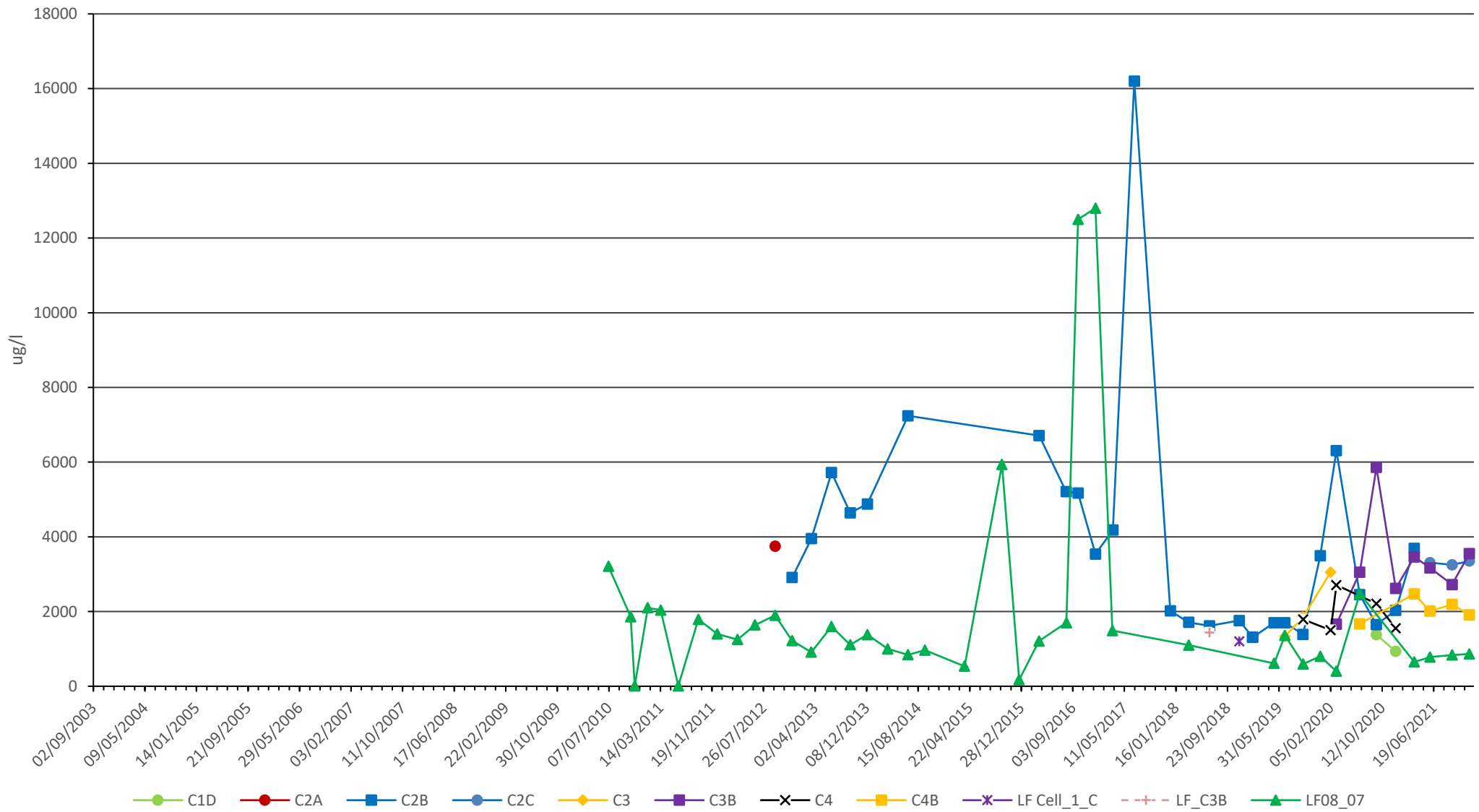
Newport City Council

Docksway Disposal Site

O-Xylene in Leachate

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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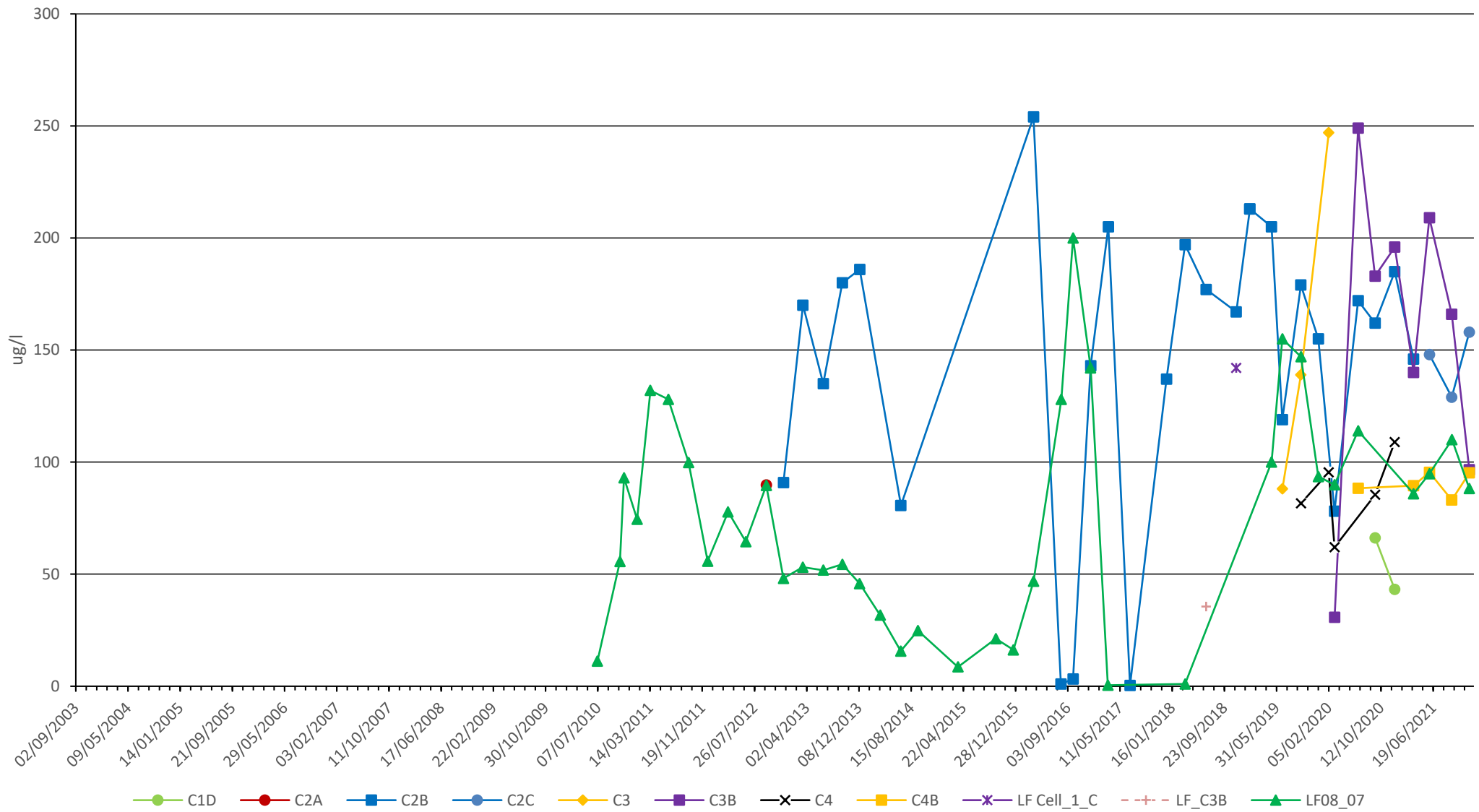
Newport City Council

Docksway Disposal Site

EPH in Leachate

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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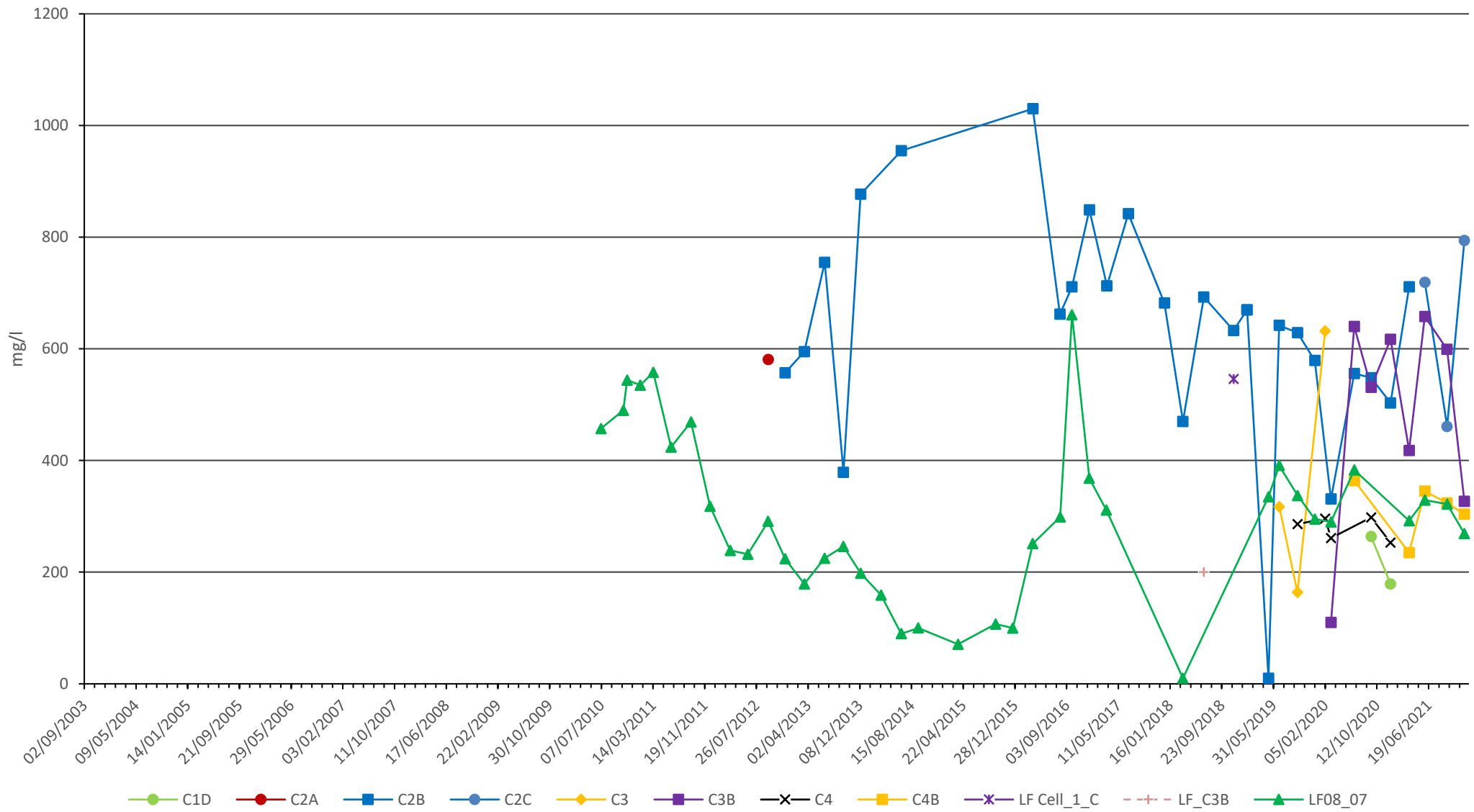
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Docksway Disposal Site

Nickel in Leachate

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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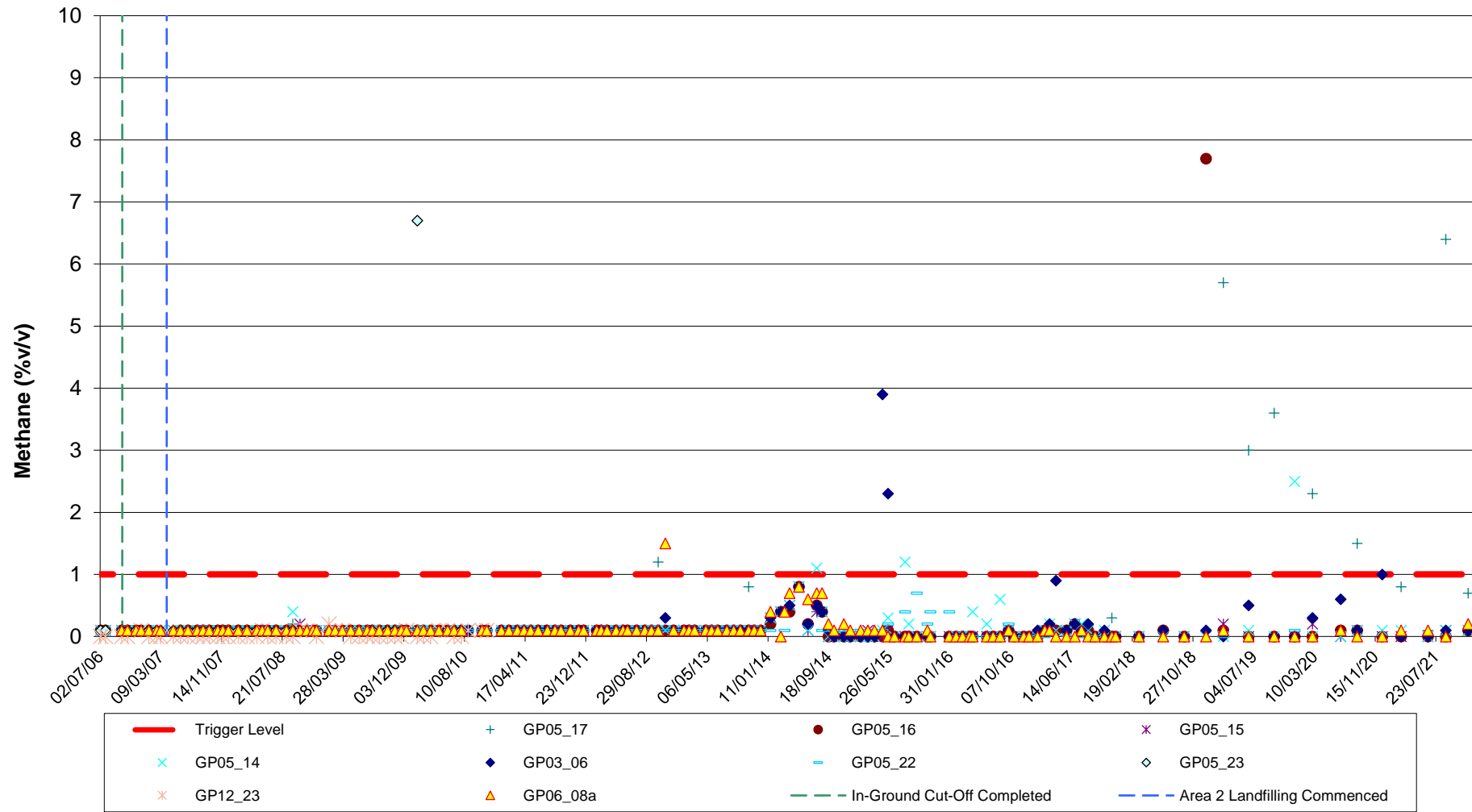
Docksway Disposal Site

Potassium in Leachate

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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Appendix 4 Gas Concentrations Graphs



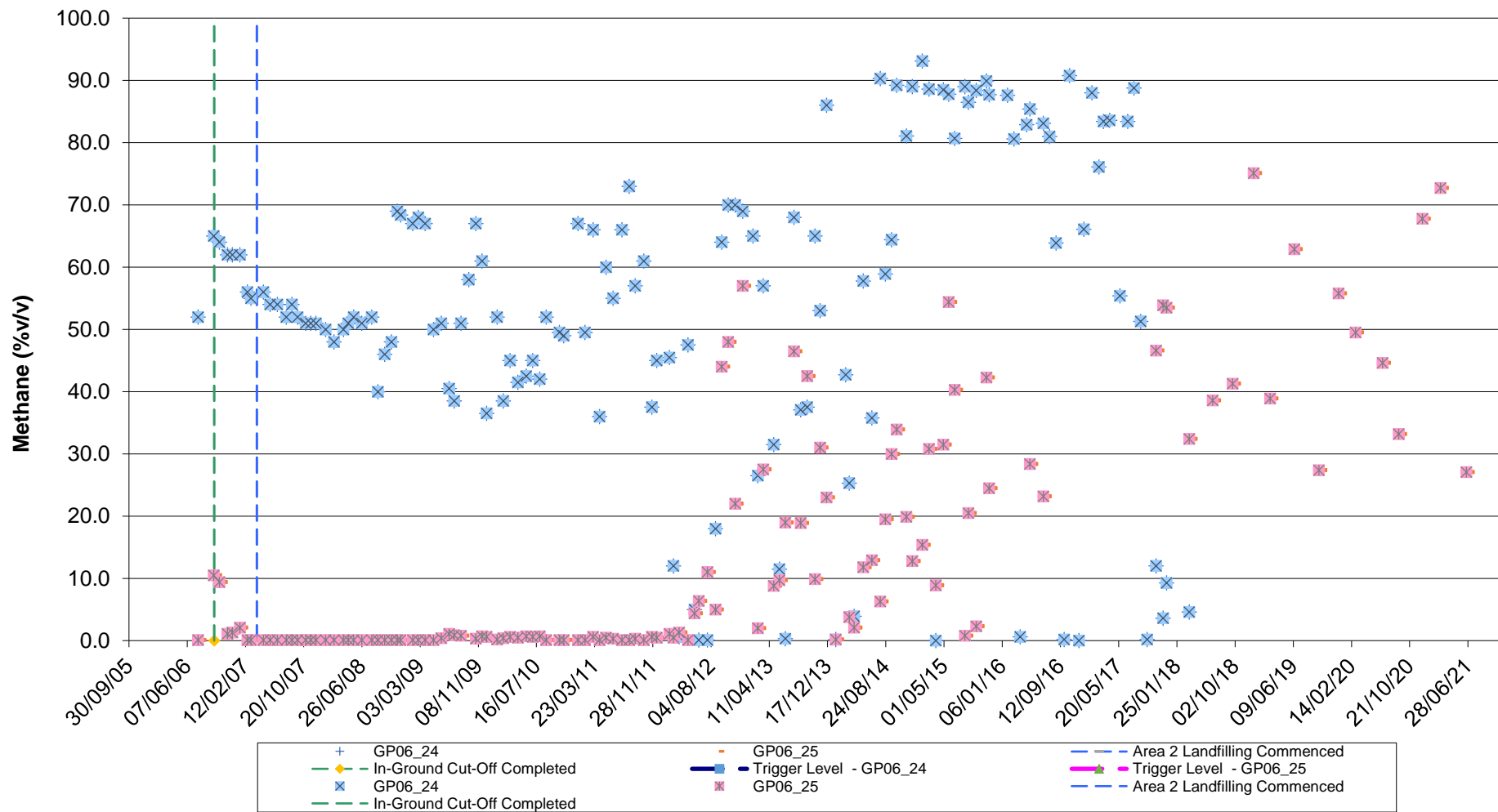
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Docksway Disposal Site

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

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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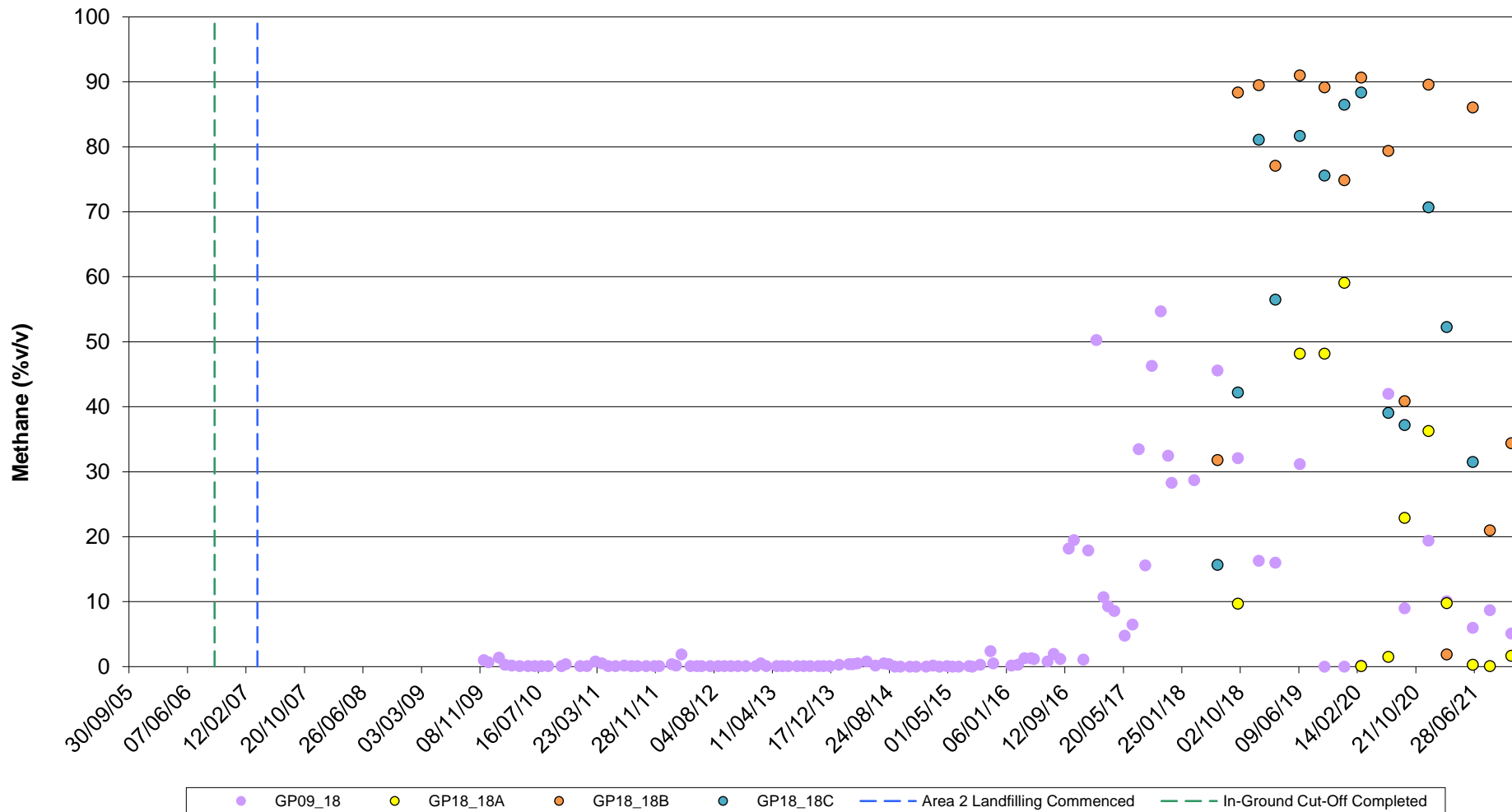
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Docksway Disposal Site

Recorded Methane Concentrations for GP06_24 and GP06_25

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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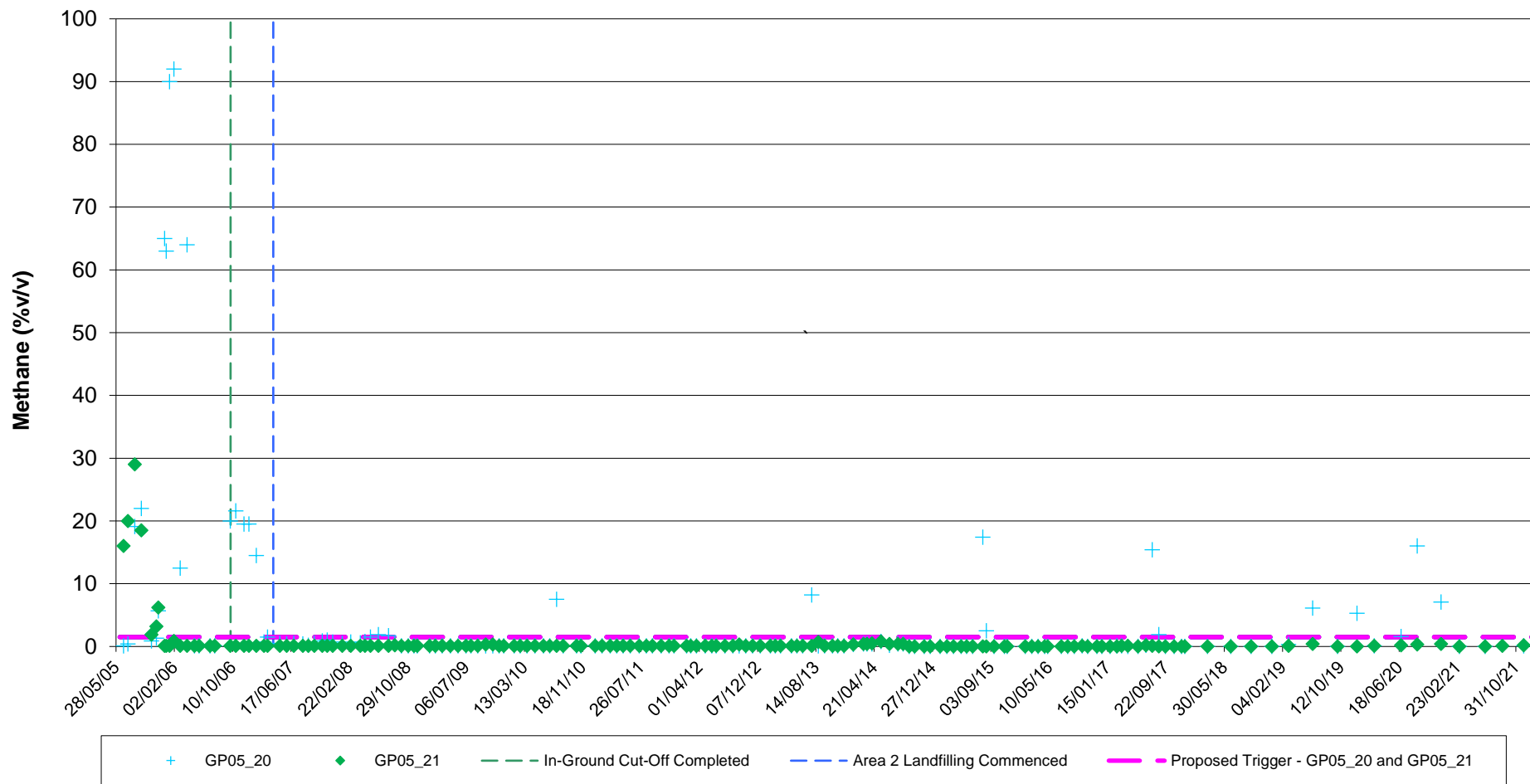
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Docksway Disposal Site

Recorded Methane Concentrations for GP09_18, GP18_18A, GP18_18B and GP18_18C

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

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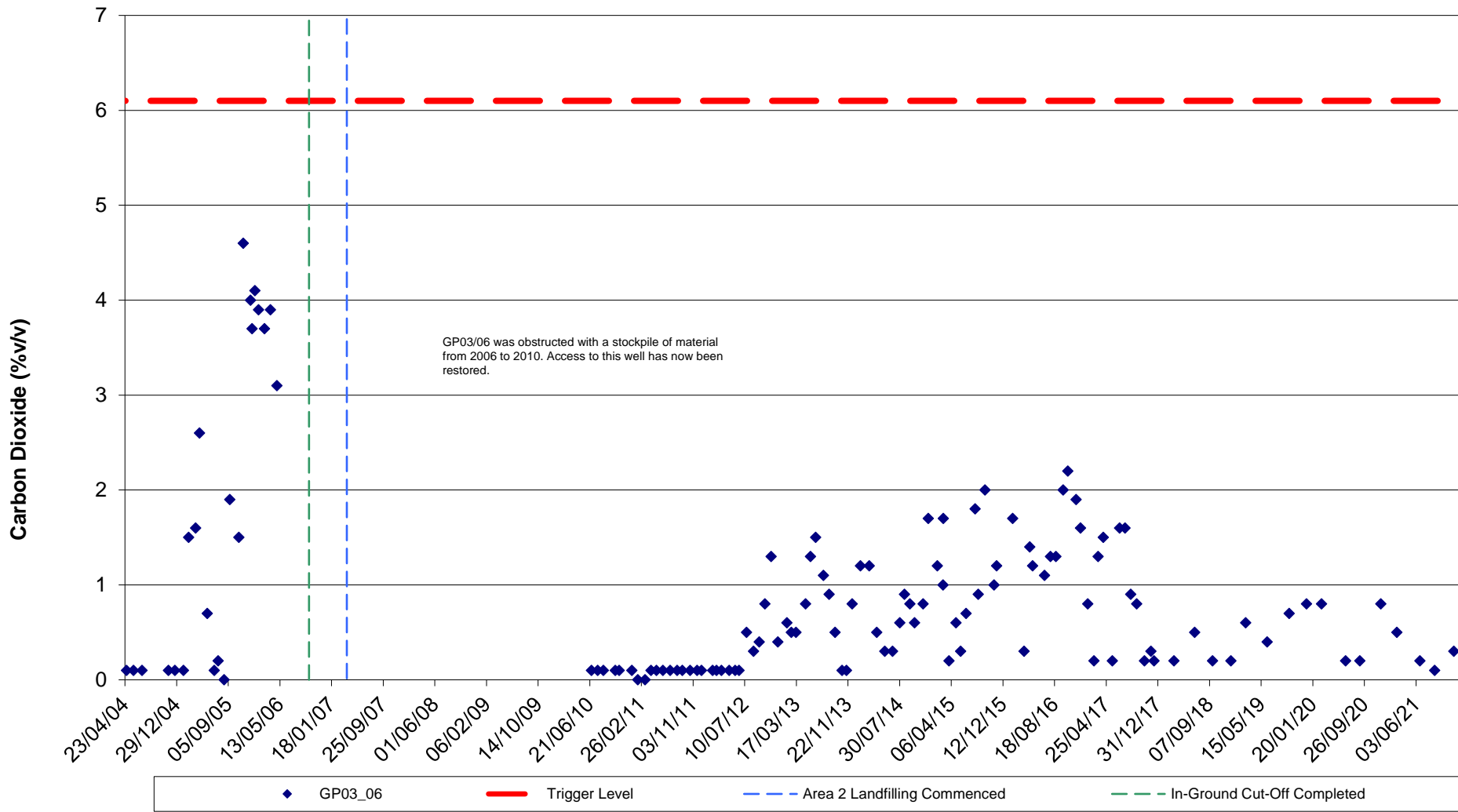
Docksway Disposal Site

Recorded Methane Concentrations in GP05_20 and GP05_21

Date	January 2022
A4 Scale	nts
Drawn	FBI
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Client

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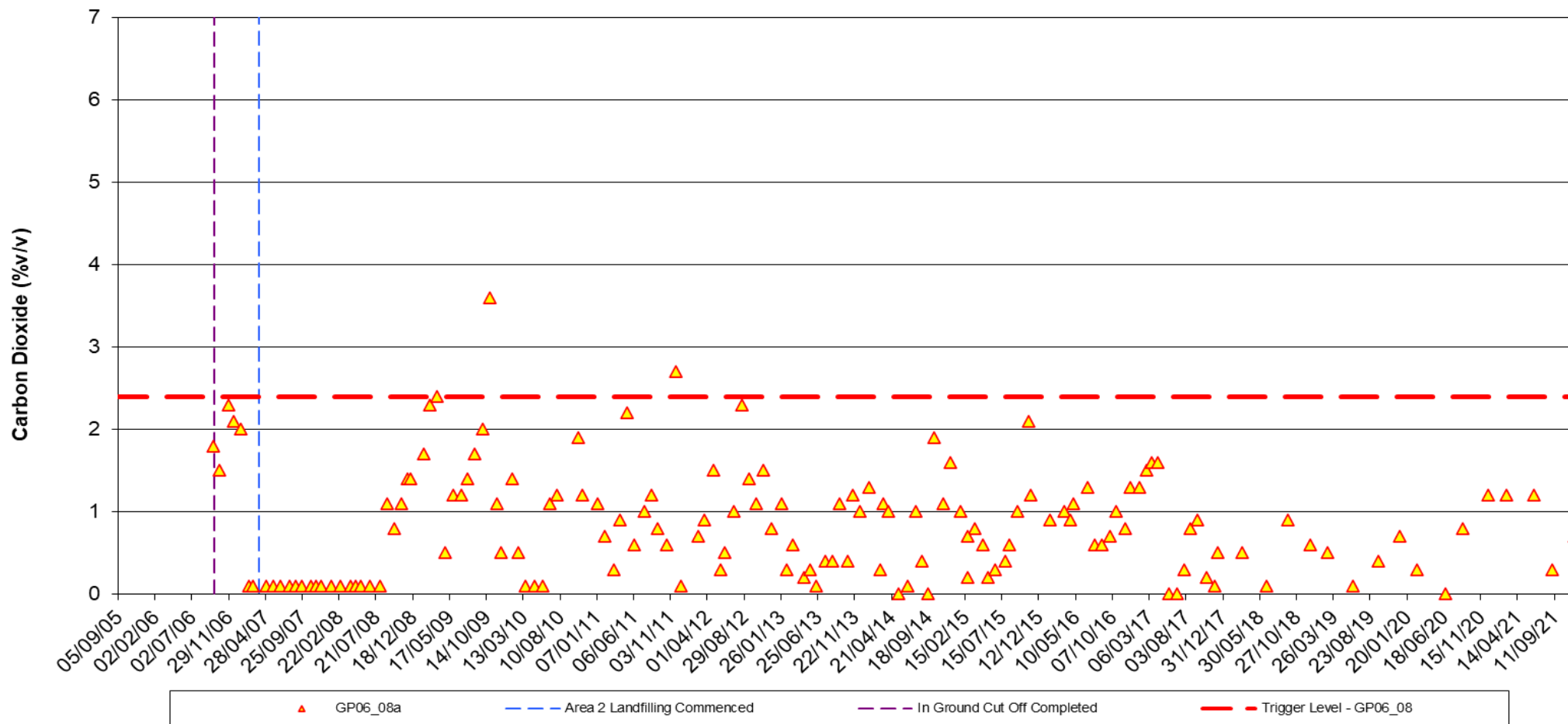
Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP03_06

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
4-5

**Appendix 4/6
Docksway Disposal Site
Recorded Carbon Dioxide Concentrations in GP06_08a**



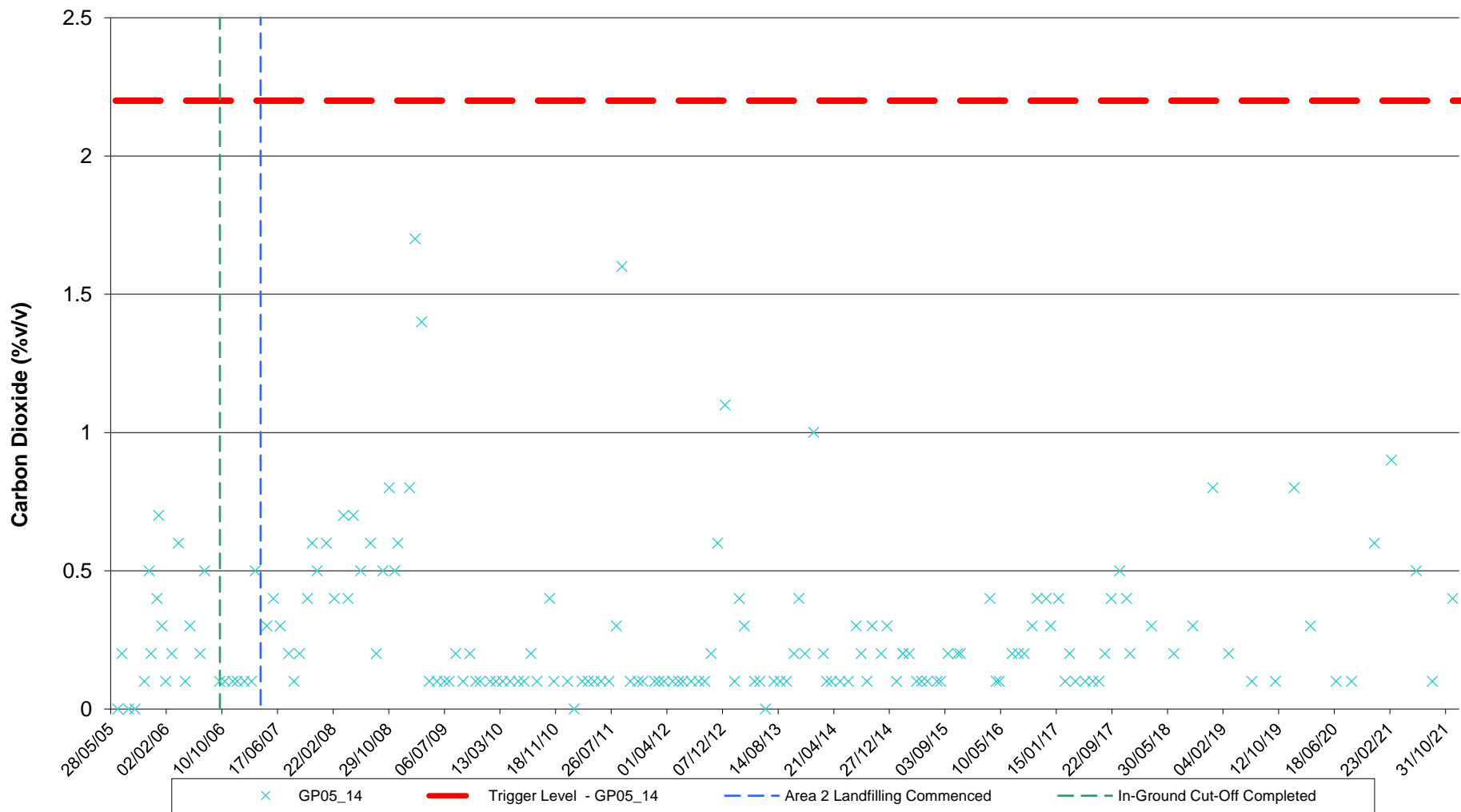
Client
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP06_08a

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

**Appendix
4-6**



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Client

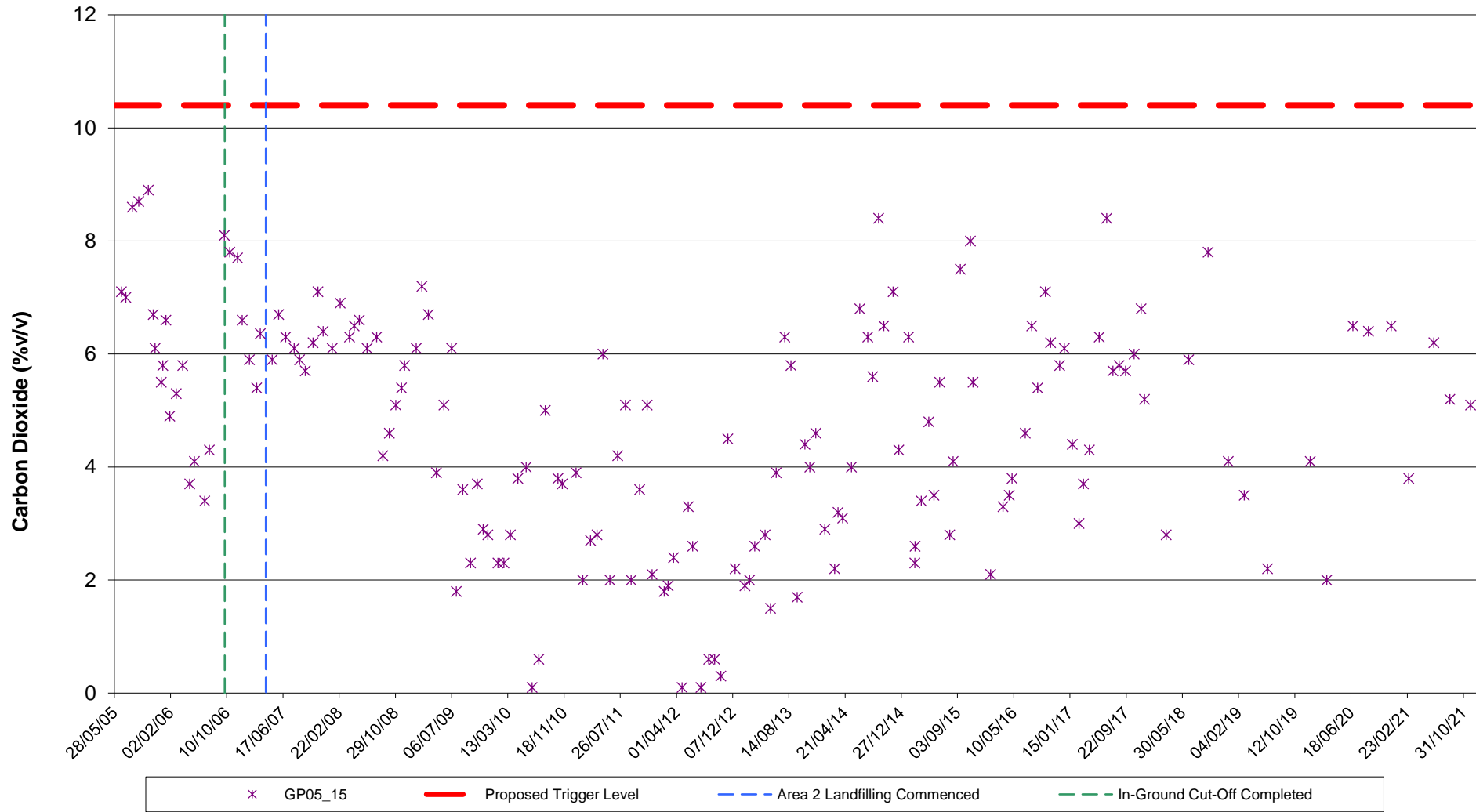
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_14

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
4-7



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Client

Newport City Council

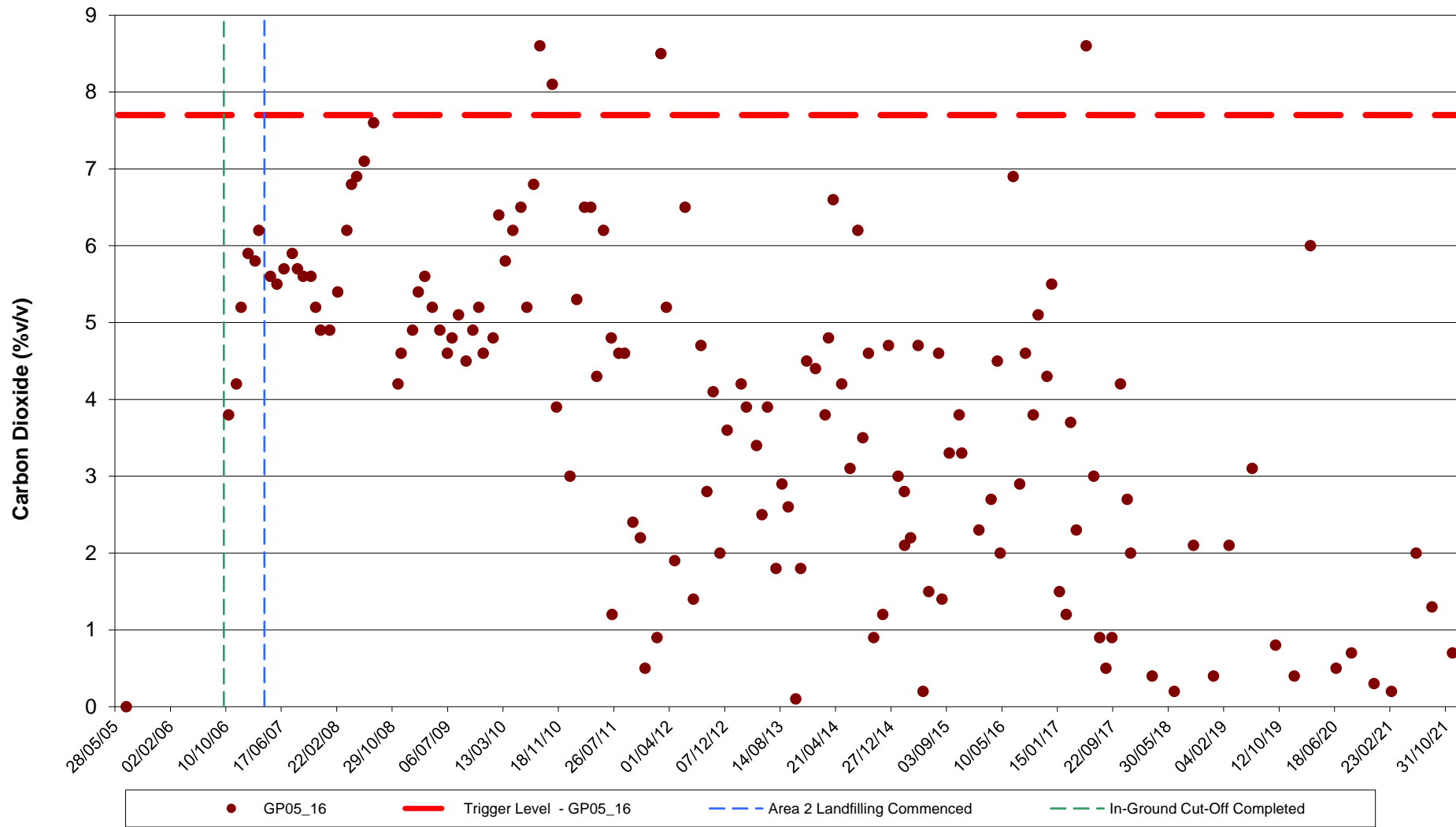
Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_15

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix

4-8



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Client

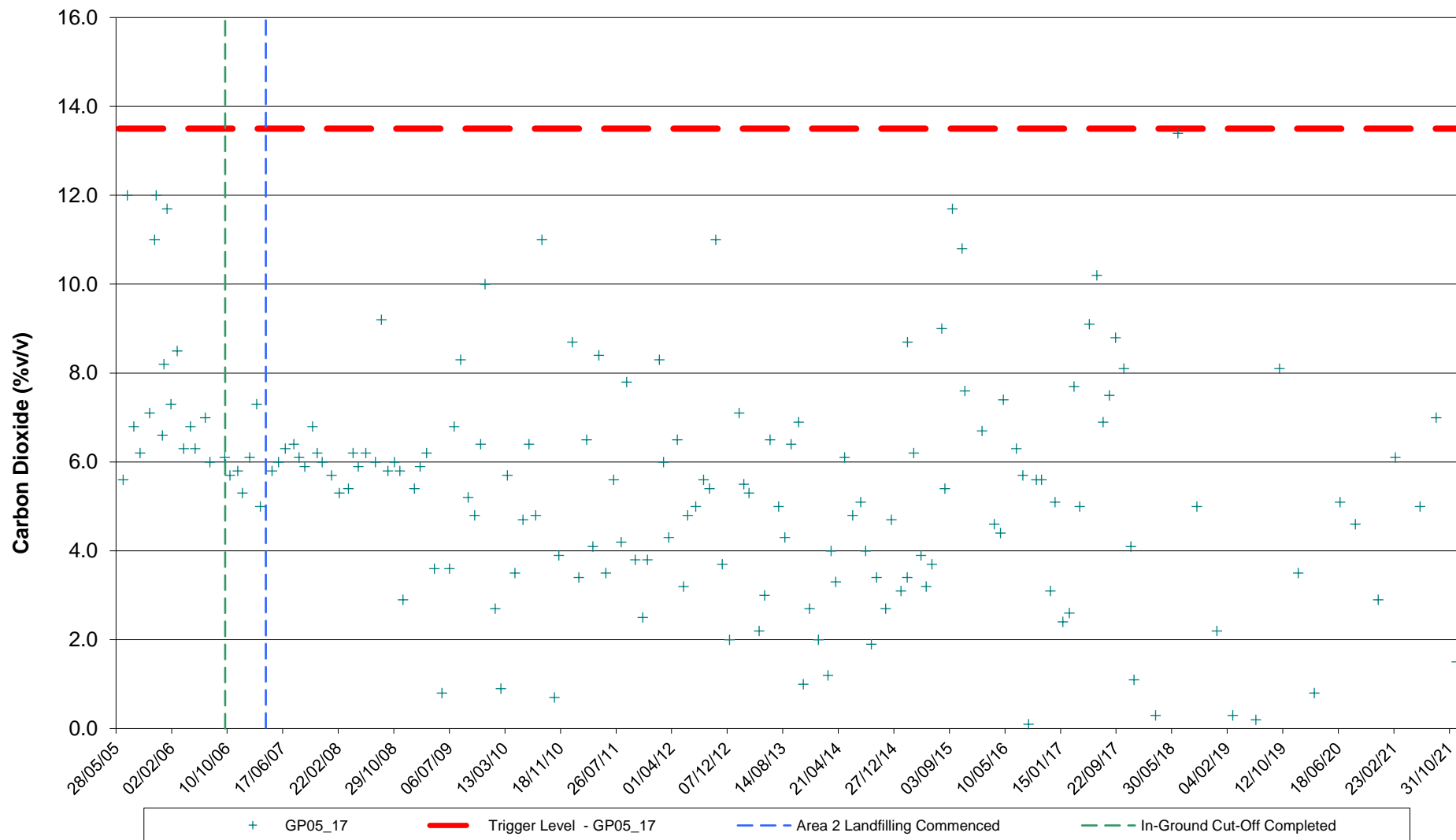
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_16

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
4-9



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Client

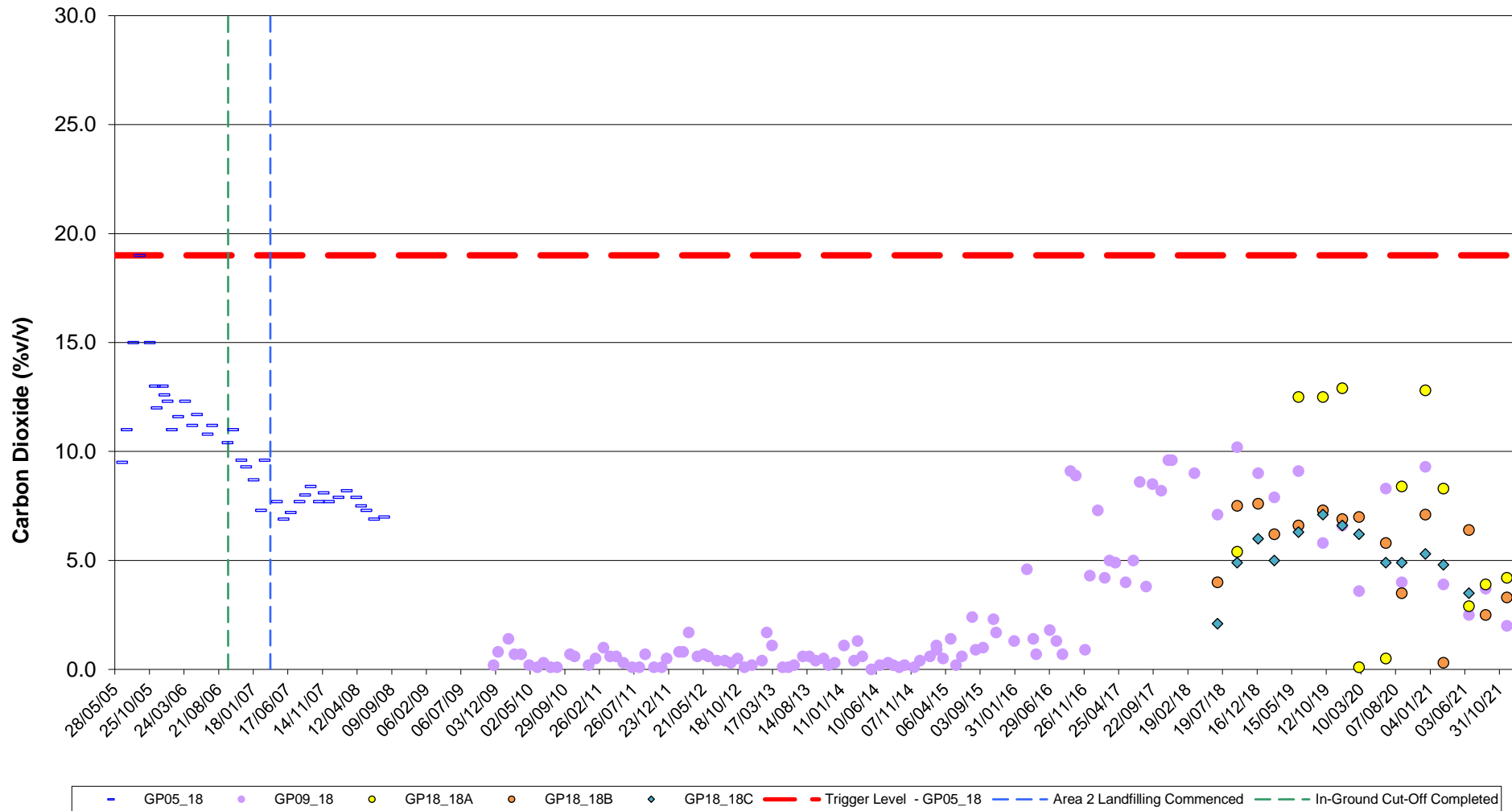
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_17

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
4-10



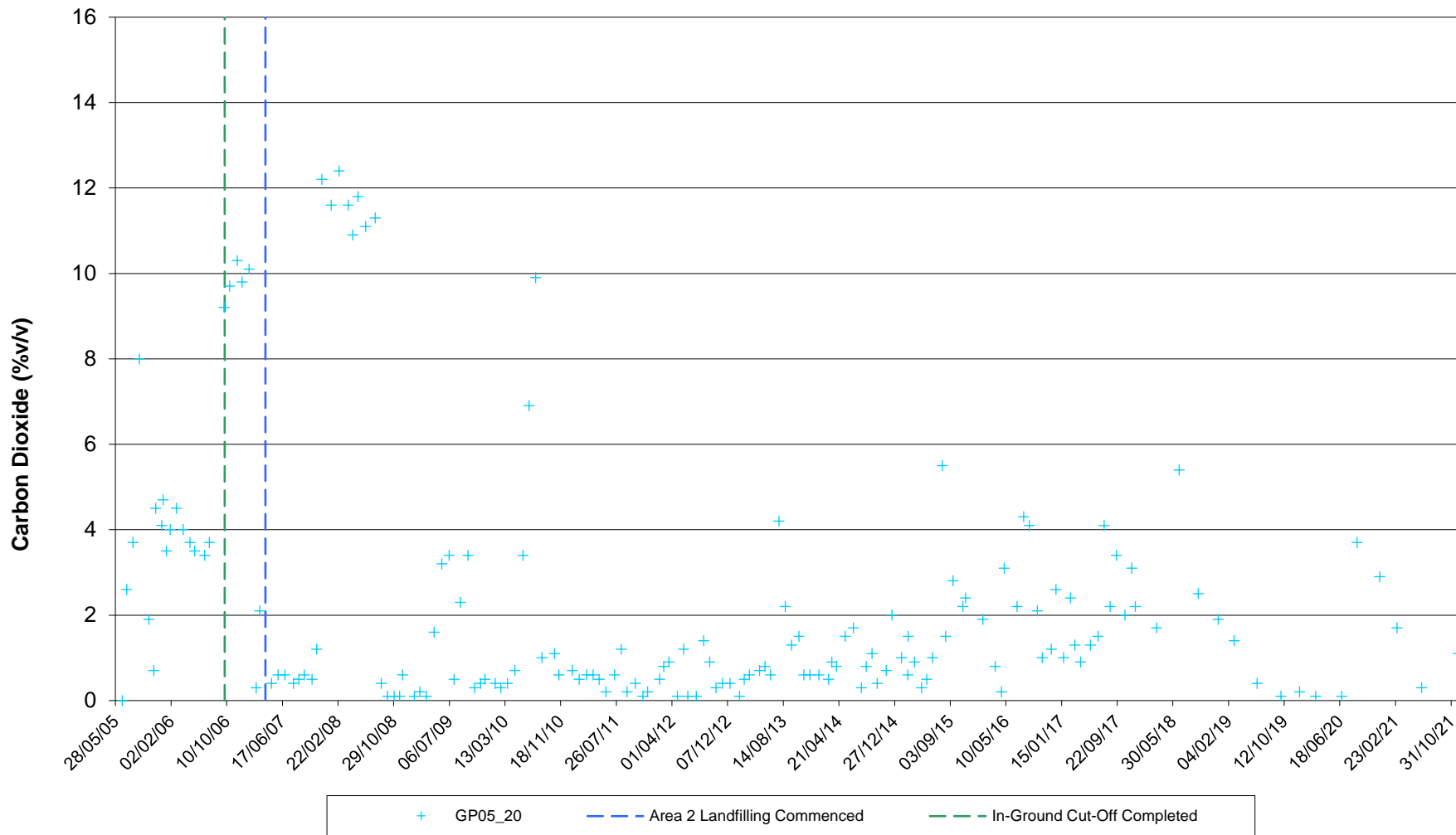
Client
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_18

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
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Client

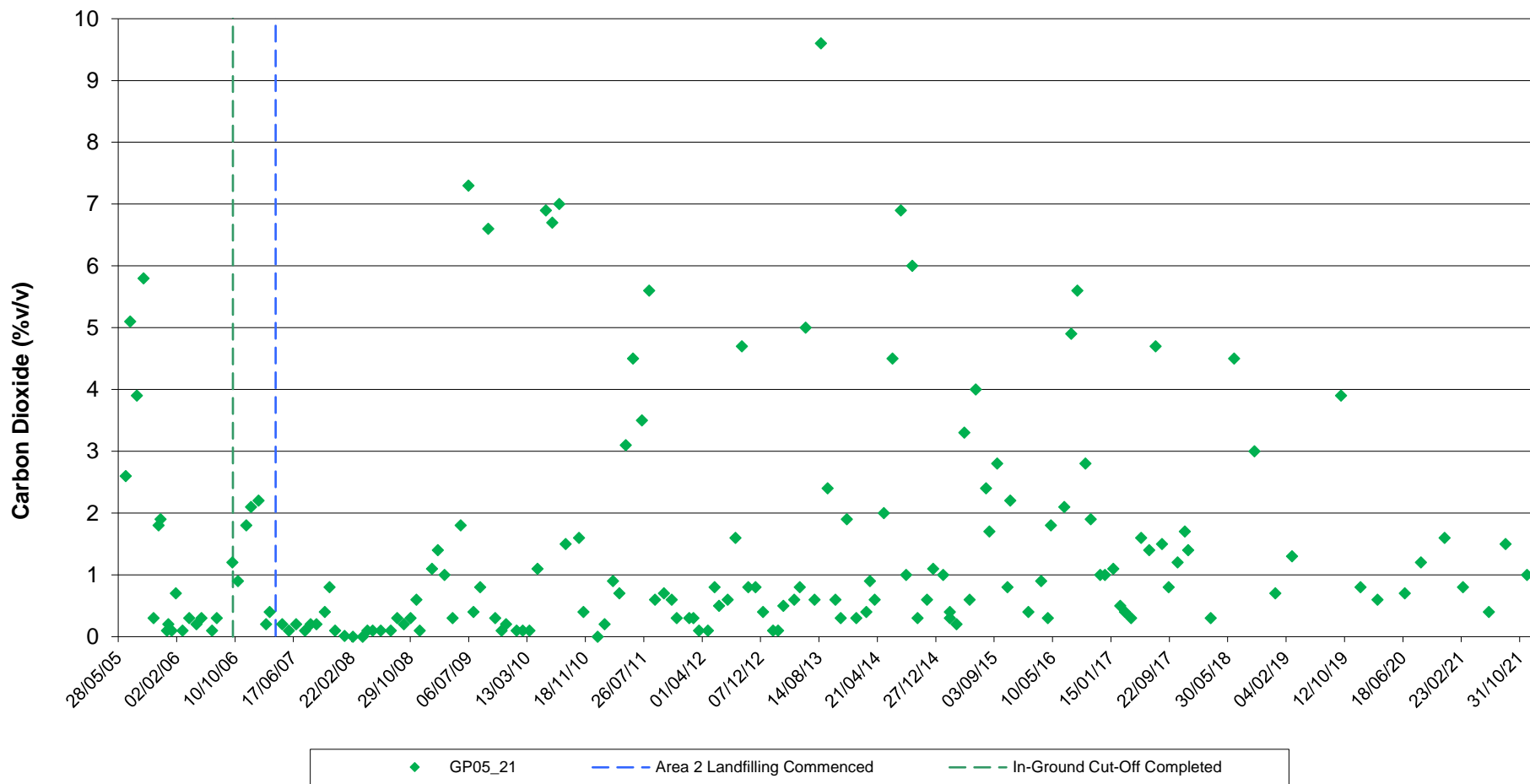
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_20

Date	January 2022
A4 Scale	nts
Drawn	NC
Checked	VKR

Appendix
4-12



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Client

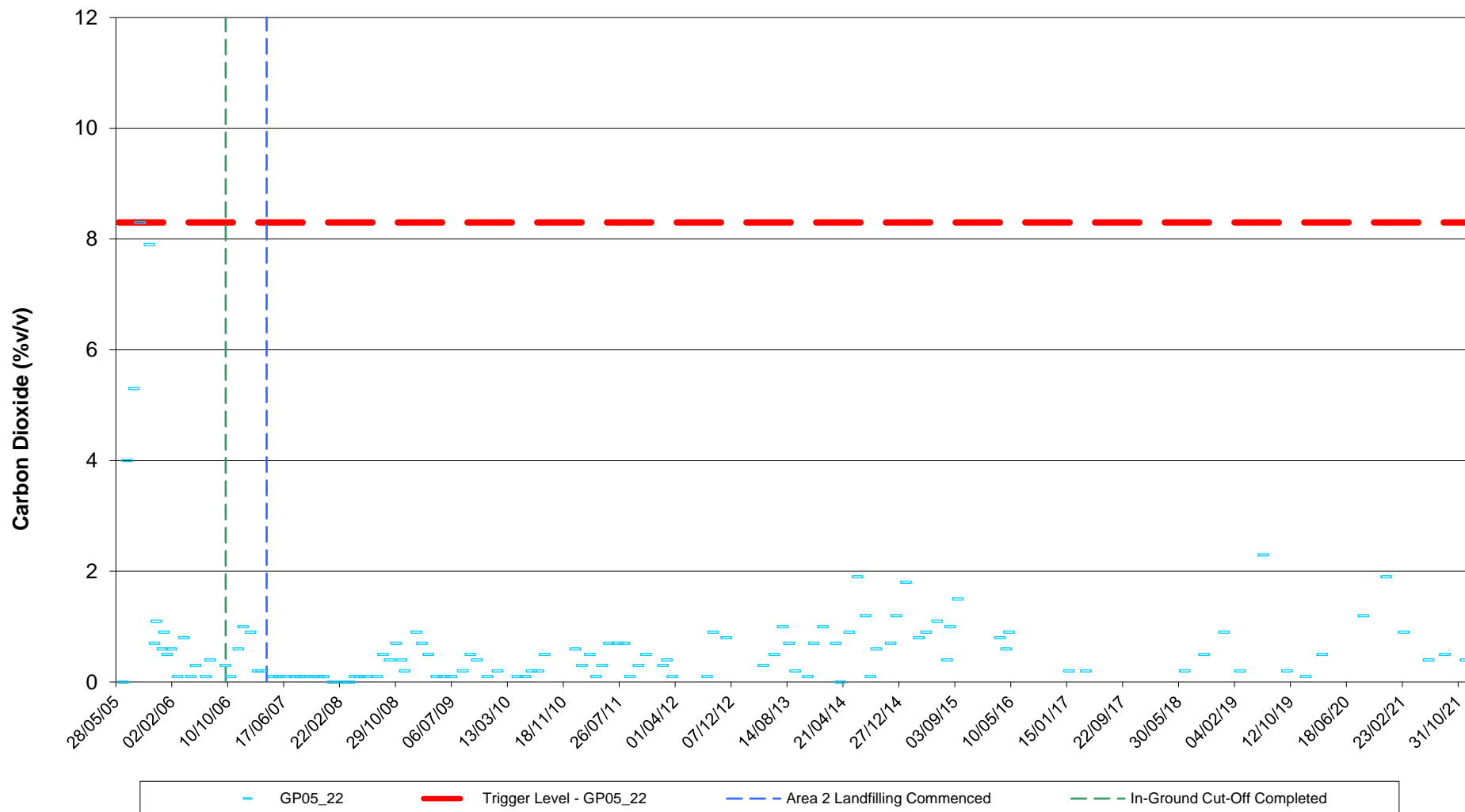
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_21

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
4-13



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Client

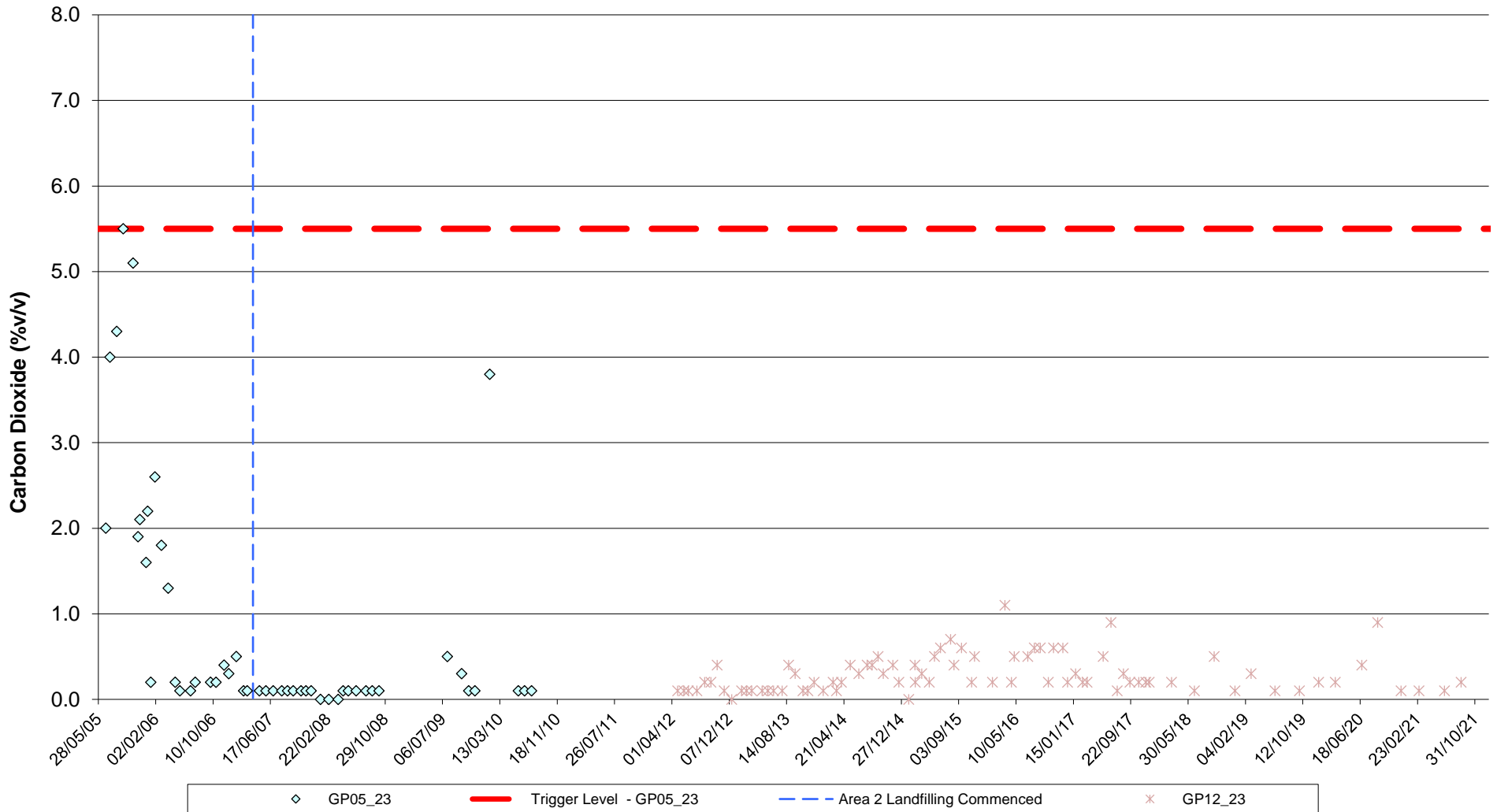
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_22

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
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Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_23

Date January 2022

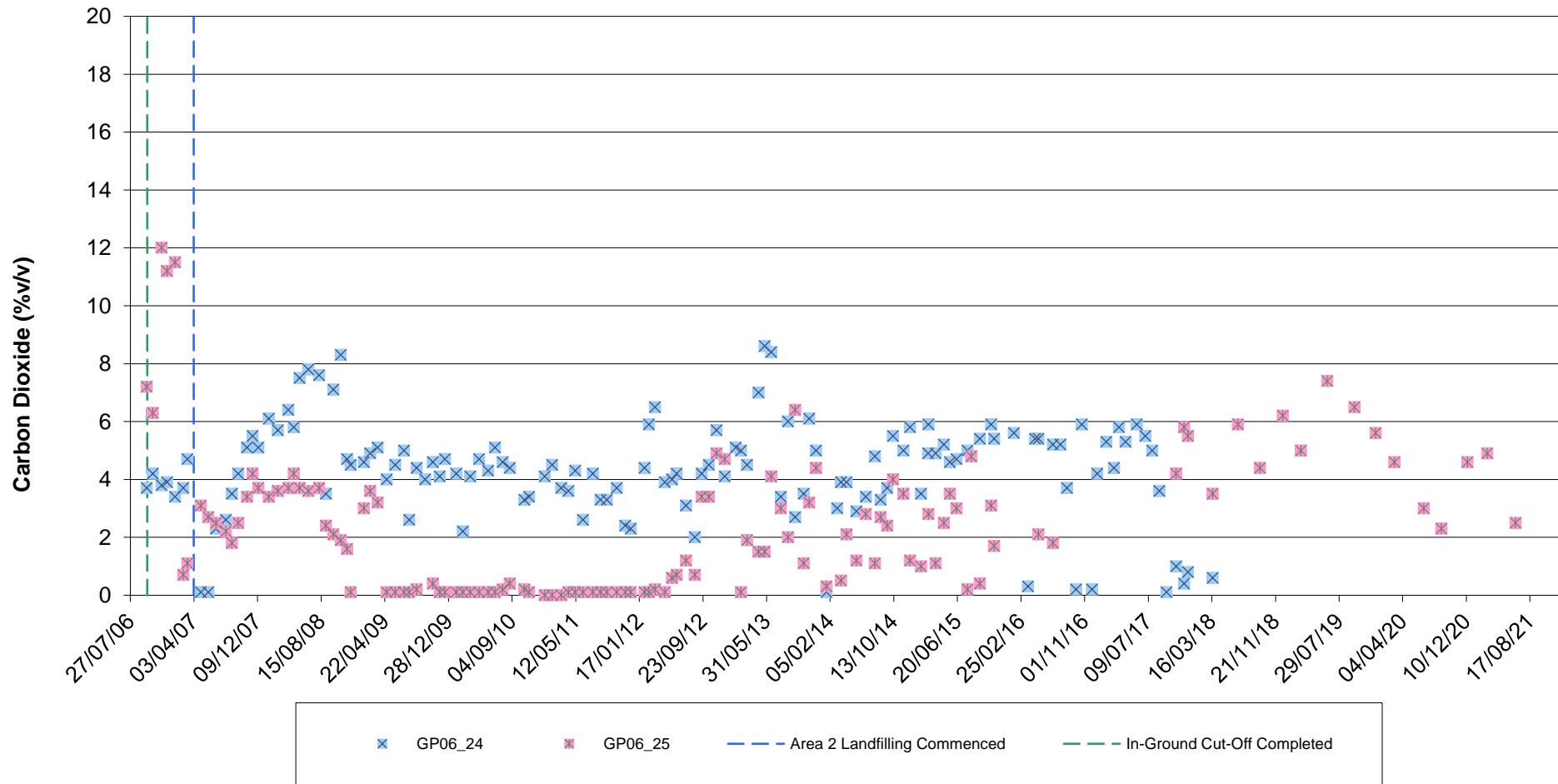
A4 Scale nts

Drawn FBI

Checked NC

Appendix

4-15



Client
Newport City Council

Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP06_24 and GP06_25

Date	January 2022
A4 Scale	nts
Drawn	FBI
Checked	NC

Appendix
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Appendix 5 Infinis Annual Report



Business Management System

Annual permit report

Installation	Docksway
Permit reference	LP3135SB
Reporting period	2021
Permit Operator	Novera Energy

Author: Kate Phillips

Date: 17/01/2022

Authorised to sign as representative of the Operator

Fugitive Emissions Review (4.1.4)		Reporting period:	2021
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		

Author:Kate Phillips

#####

Raw Materials (& Water) Assessment Table (S4.2 / 2.4)

Site: Docksway **Reporting period:** 2021 **Permit Reference:** LP3135SB

Raw Materials	Application	Current Measures to Ensure Efficiency and Waste Minimisation	2021	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 specialised 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. Infnis 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 (2.6.2)

Installation Name: Docksway Gas Utilisation Plant	Permit Reference: LP3135SB	Reporting period: 2021
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2021

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 absorbency 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 (4.1.3)

Installation: Docksway Landfill Gas Utilisation Plant		Permit Reference: LP3135SB
Parameter	2021	Units
Flare operation hours	375	hrs
Gas engine downtime hours	431	hrs*
Gas engine operation hours	3442	hrs
Volume of landfill gas combusted	92,988	m3 (treated by flare)
	2,067,061	m3 (treated by engines)
	2,160,049	m3 (total treated by engines & flare)

Operator's Comments:

The gas treated in 2021 was as expected based on the naturally declining gas levels with time. Please contact permit-compliance@infinis.com for any queries regarding the above.

Reporting of Performance Indicators (Form Ref: PI1) Condition 2.7.1 (Table S3)

Installation: Docksway Landfill Gas Utilisation Plant	Permit Reference: LP3135SB
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Annual Production/Treatment (MWh) (Form E1 - Table S3)

Total production of energy	3442
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Environmental Performance Indicators (Form PI1 S3)

Parameter	Annual Average 2021	Units	Trends in Environmental Performance	
			2019	2020
Total oxides of nitrogen (expressed as NO2) emission	7.0	Kg/MWh	1.5	2.7
Total carbon monoxide emission	13.6	Kg/MWh	3.0	1.7
Total engine downtime (downtime hrs/available operation time in hrs)	4.9	%	11.0	3.3

Condition 2.7.1 / 4.1.3 (Schedule 4)

Reporting period	Energy Imported (Primary Energy Usage) (MWh)	Parasitics (MWh)	Energy Exported (MWh)	Energy Used on Site (MWh)	Site Efficiency
2021	37	242	3199	280	33.4

*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
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Accident Management Plan Review	2021
Date of next review	
Reviewed monthly following a review of notifiable events	

(Permit condition 2.8.1)

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 (4.1.2.1)	2021		
Annual Report Submission Date			22-Apr-21
Submitted to			Tyrone Ward and Elizabeth Parr

Emission reports required by the permit (condition 4.1.2 / 4.1.3) were submitted to the relevant officer in 2021. The results indicated compliance with the levels noted in the permit.

Author:Kate Phillips

#####

Appendix 6 NCC Topographical Survey and Cross Sections

1. Refer to drawing number 1476 / Ph2/ AEPR 2021_01 for sections

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Rev	Details	Dr	Ch	Ap	Date

Streetscene

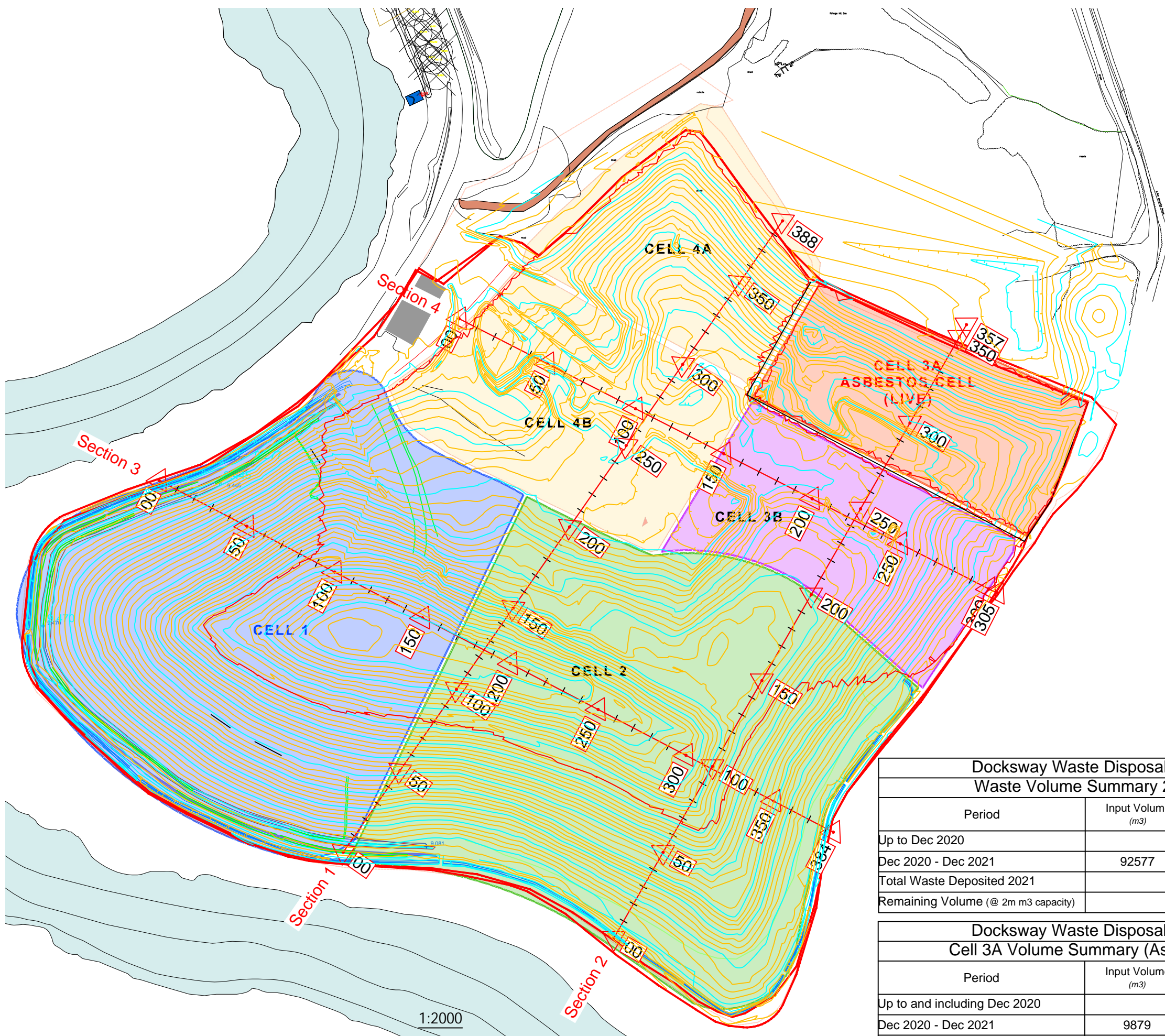
Paul Symonds
Head of Streetscene
Newport City Council
Civic Centre, Newport
South Wales, NP20 4UR.
Telephone: 01633 656656
Email: streetscene@newport.gov.uk



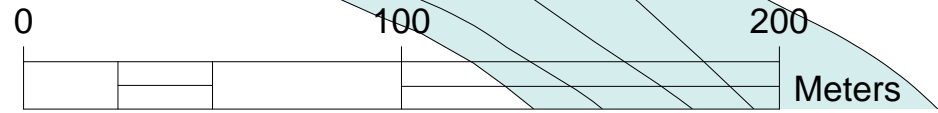
Newport
CITY COUNCIL
CYNGOR DINAS
Casnewydd

Project
Dockway Waste Disposal Site
Cells 1 & 2 & 3 & 4 TOPO Survey Dec 2021
Waste Input Dec 2020 - Dec 2021

File No. 1476	Status: Consultation			
Drawn	MDH	Checked		Approved
Date	09.12.21	Date		Date
Scales	see drawing panes			
Drawing No.	1476/PH2/AEPR 2020_02			



Phase 2 Topo Survey Dec 2021
1:2000 @ A3



Dockway Waste Disposal Site Waste Volume Summary 2020		
Period	Input Volume (m3)	Cumulative Volume (m3)
Up to Dec 2020		1169302
Dec 2020 - Dec 2021	92577	1261879
Total Waste Deposited 2021		92577
Remaining Volume (@ 2m m3 capacity)		738121

Dockway Waste Disposal Site Cell 3A Volume Summary (Asbestos)		
Period	Input Volume (m3)	Cumulative Volume (m3)
Up to and including Dec 2020		71491
Dec 2020 - Dec 2021	9879	81370