



Docksway Disposal Site

Annual Environmental Review for Area 2

On behalf of **Newport City Council**





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1 Introduction

1.1 Background

Docksway Disposal Site is located approximately 3km south of Newport City Centre, Gwent, 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.

The site is approximately split into a northern half (Area 1) and a southern half (Area 2). Area 1 is an unlined ('dilute and disperse') landfill operated under waste management licence (WML) number EAWML30058 whilst Area 2 is an engineered containment landfill operated under Pollution Prevention Control (PPC) Permit No. DP3733BK. Variation Notice Number MP3730MJ.

It is a requirement of the PPC Permit for Area 2 (Condition 4.2.1) that a report is provided to the Environment Agency (EA) on an annual basis in order to report on the environmental performance of the site. This report is called an Annual Environmental Review.

1.2 Scope

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. The data review and analysis is used to provide a review of the 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 monitoring data collected.
- A review of the potential risks to sensitive environmental receptors.

Guidance for readers of this report is given in Section 10

1.3 Related Work

Much of the environmental data commented on in this report has been passed to the EA previously in the form of monthly or quarterly interim environmental monitoring reports.

2 Surface Water Quality Monitoring

2.1 Current Monitoring Programme

A surface water monitoring programme commenced at Docksway Disposal site in September 2003. Whilst it is not a condition of the Area 2 PPC Permit to monitor and sample surface water in relation to Area 2, this information is already obtained and reported to the EA (as a requirement of the Area 1 waste management licence) and also reported separately to the EA as part of the Area 2 reports. It is a requirement of Condition 62 of the Area 1 Waste Management Licence (WML) that monitoring and sampling of surface water in the vicinity of the site is carried out, recorded and reported to the EA on a monthly basis. Details of the monitoring programme for the site, (including the frequency of testing, the range of chemical testing suites used and the laboratory test methods and detection limits), are presented in the Monitoring Plan for Area 1, updated in August 2011^[1].

Area 1 of Docksway Disposal Site obtained definitive closure in October 2014 and therefore surface water monitoring will continue in 2015, in accordance with the aftercare monitoring plan.

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 2014

Position Monitored	Location
SW1A	Ebbw Upstream
SW11	North Pond
SW23	Discharge to Maes Glas Pill from Docks Drain Outfall (Disused Culvert)
SW24	Oxbow Lake Position 1
SW25	Surface Water Management System Discharge Point
SW26	Area 2 Surface Water

Additional surface water monitoring location SW02 (River Ebbw Downstream) has not been monitored or sampled since October 2012 due to ongoing safety concerns regarding the access to this location.

2.2 Surface Water Hydrochemistry over the Preceding 12 Months

2.2.1 Trigger Levels

It is not a requirement of the Area 1 WML to set surface water compliance limits for the site, and consequently none have been set by the EA. Therefore, comments on the surface water hydrochemistry with respect to compliance limits are not presented in this report, instead only the data and any temporal trends in the data are presented and commented upon.

The exceptions to this are surface water sampling points SW25 and SW26 which are subject to discharge consents (Consent Number AN0394301 and AN0401301 respectively) with limits attached as set by the EA. The chemical test results for SW25 and SW26 are therefore assessed against the discharge consent limits.

2.2.2 SW25

In the last 12 months, SW25 has been sampled on four occasions (Jan, Feb, Mar and Nov) and recorded as dry on each of the other monitoring visits. On the four occasions that SW25 was sampled,

the results (range between 1.09mg/l and 12.7mg/l) were significantly below the discharge limit (30mg/l) for Ammoniacal Nitrogen.

The results of the testing undertaken on the four samples obtained from SW25 during 2014 do not indicate exceedance of the discharge limit for Biological Oxygen Demand (BOD) (40mg/l) and have not recorded a pH value below 6 or above 9, in accordance with the discharge consent. However, on one occasion (March 2014), the limit for Total Suspended Solids (TSS) (60mg/l) was exceeded with a concentration of 123mg/l. This has since returned to a concentration well below the discharge consent limit.

Whilst meeting the discharge consent limits over the 2014 monitoring period, (with the exception of March 2014 for TSS), surface water monitoring point SW25 had historically exceeded the discharge consent limit for Ammoniacal Nitrogen on numerous occasions since 2006. However, for the last 4 years, the concentrations of Ammoniacal Nitrogen in SW25 have been consistently recorded below 4mg/l.

2.2.3 SW26

Surface water monitoring point SW26 was included in the monitoring programme for Area 1 at the start of 2013, and has only been sampled on five occasions during this period (and recorded as dry on each other occasion).

The results of the testing undertaken on the two samples obtained from SW26 during 2014 indicate that there were no exceedances of the discharge limits for TSS (60mg/l) or pH values outside of the specified limits of below 6 or above 9, in accordance with the discharge consent.

There is currently insufficient data to be able to determine any temporal trends in the data.

2.2.4 Ammoniacal Nitrogen

Appendix 1/1 presents the results of Ammoniacal Nitrogen concentrations since 2003 at each of the surface water monitoring locations. It can be seen that Ammoniacal Nitrogen concentrations in SW1A have predominantly been recorded below the method detection limit (MDL) for the laboratory (0.2mg/l) in the last 12 months and are therefore indicating a consistent trend.

In SW11 the Ammoniacal Nitrogen concentrations have been recorded predominantly below the method detection limit (MDL) for the laboratory (0.2mg/l) in the last 12 months and have been relatively consistent over the last 5 years.

In SW23 the Ammoniacal Nitrogen concentrations have been relatively consistent over the last 3 to 4 years, continuing a general gradual decrease in concentrations since 2003, and below 50mg/l in the last 3 years.

The remaining surface water monitoring point (SW24) shows a generally stable trend over the last 2 years, with concentrations predominantly below 1mg/l. The exception to this is the result from May 2014, where the concentration has been recorded at 6.2mg/l – and this has since returned to concentrations below 1mg/l.

2.2.5 BOD and COD

Appendices 1/2 and 1/3 present Biological and Chemical Oxygen Demand concentrations since 2003 at each of the Area 1 surface water monitoring locations.

All locations appear to be displaying a generally stable trend in BOD concentrations with most results recorded at concentrations below 10mg/l in the last 18 months.

In general, COD concentrations appeared to be relatively stable at most monitoring locations during 2014 with results generally below or around 100mg/l. The exception to this is SW23 which has recorded fluctuating concentrations of COD (up to 550mg/l – higher than previous results) during the last 12 months.

2.2.6 DO and Chloride

Appendix 1/4 presents the results of Dissolved Oxygen (DO) monitoring since 2005 at each of the current Area 1 surface water monitoring locations. In the last 12 months, DO has predominantly been recorded between 5mg/l and 15mg/l, and there appears to be generally stable trends at each monitoring location.

Appendix 1/5 presents 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 stable or decreasing trend of Chloride concentrations over the last 12 months with concentrations predominantly below 150mg/l. The exception to this is SW23 where concentrations of Chloride continue to fluctuate significantly (from below 100mg/l to over 5000mg/l) from month to month, as they have done since monitoring commenced.

At SW24 and SW25, Chloride concentrations appear to be displaying a gradually decreasing trend since commencement of monitoring, and concentrations have generally been recorded below 100mg/l in the last 2 years.

At SW11, Chloride concentrations have generally remained below 15mg/l in the last 12 months.

Chloride concentrations at SW26 have been recorded below 100mg/l in the last 12 months.

2.2.7 pH Value and Electrical Conductivity

Appendix 1/6 presents the results of pH monitoring of surface water since 2003 at each of the current Area 1 surface water monitoring locations. In the past 12 months all of the pH readings have been between 7 and 9, which is consistent with the rest of the data set.

Appendix 1/7 presents Electrical Conductivity (EC) readings in each of the surface water monitoring locations since 2003. The data indicates stable trends of Electrical Conductivity readings, generally below 5mS/cm at all monitoring locations (with the exception of SW23) over the last 12 months (and since 2006).

The EC readings in SW23 have fluctuated in the last 24 months from below 5mS/cm to over 20mS/cm.

2.2.8 Total Suspended Solids (SW25 only)

Appendix 1/8 presents the concentrations of Total Suspended Solids at SW25 since 2007 and SW26 since 2013. The data indicates a generally decreasing trend in SW25 over the last 3 years.

2.3 Review of Risks and Future Monitoring

The environmental data for surface water over the last 12 months does not indicate any significant decrease in water quality since the previous Environmental Performance Report.

There are generally stable or decreasing trends in Ammoniacal Nitrogen concentrations at the surface water monitoring locations currently being monitored.

There are generally stable trends in BOD and COD concentrations at the surface water monitoring locations currently being monitored, with the exception of fluctuating COD concentrations in SW23.

Dissolved Oxygen concentrations greater than 5mg/l have generally been recorded in the surface water in the last 12 months with no distinct trends.

There are generally stable or decreasing trends of Chloride in the surface water with the exception of SW23 which continues to show significant monthly fluctuations.

Generally, except where described above, concentrations of all of the monitored determinands are displaying a stable trend at all of the surface water monitoring locations.

The discharge consents for SW25 and SW26 include trigger limits for a number of chemicals. This is the means via which the chemistry of the water within the Docksway Disposal Site surface water drainage system is assessed. SW25 has been sampled four times during 2014 and SW26 has been sampled twice during 2014, and recorded as dry on all other monitoring visits. There was one exceedance of the discharge consent limit for Ammoniacal Nitrogen in SW25 in March 2014 – however concentrations have since been recorded below the discharge consent limit.

3 Groundwater Quality Monitoring

3.1 Monitoring Programme

A groundwater monitoring/sampling programme commenced at Docksway Disposal Site in September 2003. Details of the monitoring programme for the site (including the frequency of testing, the range of chemical testing suites used and the laboratory test methods and detection limits), were presented in the Monitoring Plan for Area 2: Landfill Extension, dated 2005, which has previously been submitted to the EA (PBA, 2005)^[2].

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

Interim groundwater quality reports have previously been provided to the EA on a quarterly basis (in accordance with the PPC Permit Conditions 3.6.1 and 3.6.2) providing both factual data and interpretive comments.

3.2 Monitoring Locations and Compliance Levels

There are fourteen compliance monitoring wells across Area 2, although only eleven of these currently have agreed compliance limits. It is intended that the remaining three wells (GW12_30, GW12_33 and GW12_38) will have compliance limits set once sufficient baseline data has been collected. The groundwater monitoring wells are screened within the river terrace gravels present beneath the site.

Table 3.1 – Groundwater Monitoring Locations

Monitoring Location	National Grid Reference	
GW07_40	ST310852	(331007E, 185204N)
GW12_30	ST311852	(331089E, 185194N)
GW09_31	ST312851	(331165E, 185095N)
GW03_09	ST312850	(331166E, 184999N)
GW09_32	ST311849	(331118E, 184919N)
GW12_33	ST311848	(331055E, 184834N)
GW06_34	ST310847	(331015E, 184732N)
GW09_35	ST309848	(330904E, 184755N)
GW06_36	ST308848	(330811E, 184777N)
GW06_37	ST307848	(330715E, 184801N)
GW06_13	ST306849	(330602E, 184887N)
GW12_38	ST307850	(330705E, 184986N)
GW06_14a	ST308851	(330829E, 185098N)
GW06_39	ST309851	(330932E, 185137N)

Control and Compliance limits for eight of the compliance monitoring wells were proposed as part of the 4 yearly review of the Hydrogeological Risk Assessment (HRA) for Area 2 produced in December 2010^[3] and accepted by the EA in August 2013. In addition, Control and Compliance limits for the three 'GW09' compliance wells (31, 32 and 35) were proposed in September 2013, and following amendment were subsequently accepted by the EA.

The current control and compliance levels are reproduced in Table 3.2.

Table 3.2 – Accepted Area 2 Groundwater PPC Permit Compliance Limits for Emissions to Groundwater

Monitoring Well	Benzene	Naphthalene	Xylene	Arsenic
	Compliance Limit ug/l	Compliance Limit ug/l	Compliance Limit ug/l	Compliance Limit 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

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

3.3 Gravel Groundwater Quality over the Preceding 12 Months

3.3.1 Ammoniacal Nitrogen

Appendices 2/1 to 2/5 present the results of Ammoniacal Nitrogen since 2003 for the Area 2 groundwater monitoring locations. Ammoniacal Nitrogen concentrations in all compliance wells have been relatively consistent in the last 12 months, and there are no distinct trends in the data sets.

No exceedances of the compliance limits for Ammoniacal Nitrogen took place in any of the monitoring wells during 2014.

3.3.2 Arsenic

Appendices 2/6 to 2/14 present the results of Arsenic concentration since 2003 for the current Area 2 groundwater monitoring locations. In general Arsenic concentrations in many of the compliance wells have been relatively consistent in the last 12 months.

In GW09_32 concentrations of Arsenic appeared to be rising slowly during 2012 and 2013 but without exceeding the Compliance Limit. GW09_32 exceeded the Compliance Limit for Arsenic in March 2014 but has subsequently recorded levels below the Compliance Limit.

In GW06_14a, Arsenic concentrations appeared to be displaying a rising trend during 2012 and 2013, and exceeded the Compliance Limit on two occasions. This borehole was sampled in March 2014 only, and once again recorded a level above the Compliance Limit; (Note: Since this date the well has been recorded as containing silt and as such NCC has been unable to obtain samples).

Arsenic concentrations in GW06_37 have previously indicated a rising trend during 2012 and the first half of 2013, which exceeded the Compliance Limit twice in 2013. This borehole was not monitored during 2014 and was described as 'temporarily unavailable' by the NCC monitoring engineer. The NCC engineer has confirmed that this well is now serviceable and will continue to be sampled from during 2015.

Concentrations of Arsenic in GW09_31 appear to be gradually decreasing with time.

3.3.3 Benzene, Naphthalene and O-Xylene

Appendices 2/15 to 2/22 present the results of Benzene, Naphthalene and O-Xylene concentrations.

In general Benzene concentrations in all compliance wells have been relatively consistent in the last 12 months. There were no exceedances of the Compliance Limit for Benzene during 2014.

All current Area 2 groundwater monitoring locations are showing stable trends of Naphthalene and O-Xylene at or below the current method detection limit.

Note 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.

3.3.4 Extractable Petroleum Hydrocarbons

Appendices 2/23 to 2/24 present the results of Extractable Petroleum Hydrocarbons (EPH) concentrations. Concentrations of EPH have generally been recorded below 1000ug/l in all of the monitoring wells in Area 2 during 2014. There are no distinct trends.

3.3.5 Nickel and Potassium

Appendices 2/25 to 2/33 present the results of Nickel and Potassium concentrations in the monitoring wells.

All current Area 2 groundwater monitoring locations are showing stable trends of Potassium with no exceedances of the compliance limits in the last 12 months.

Nickel concentrations at the majority of the compliance wells have remained relatively stable in the last 12 months and no distinct trends are evident. The exceptions to this are: GW07/40 which exceeded the Compliance Limit three times, and; GW09/35 and GW06/36 both exceeded the Control Level twice during 2014. The most recent sampling results indicate that the Nickel concentrations in all three of these wells are now reducing back to within the normal dataset range.

3.4 Review of Risks and Future Monitoring

The environmental data for the groundwater compliance wells in Area 2 indicates that in general the 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. Most of the data sets are showing steady trends over time with no exceedances of the compliance limits.

There have been exceedances of the compliance limits for Nickel and Arsenic in some compliance wells in the last 12 months. The Nickel concentrations appear to be a time defined spike that has now returned to within the normal dataset range and therefore it is considered that remedial action is not required for any of these compliance wells at the current time. The concentrations of Arsenic in three wells (GW06/14a, GW09/32 and GW06/37) are indicating gradually rising trends over the last 2 to 3 years although there have been problems with sampling from both GW06/14a and GW06/37 during 2014 and therefore very little data has been collected in this period. The rising trend of Arsenic concentrations is not considered to be a widespread issue as other compliance wells in Area 2 are not displaying the same trend.

It is recommended that where the three compliance wells (GW06/14a, GW09/32 and GW06/37) can continue to be sampled, they should be closely monitored in the next 6 to 12 months to determine whether there are continued exceedances or adverse trends developing.

4 Leachate Monitoring

4.1 Leachate Control Measures and Management System

In accordance with Conditions 2.10.13 and 2.10.16 of the PPC Permit, leachate levels are recorded monthly (when access permits) at five locations in Cell 1 and three locations in Cell 2 with analytical testing being undertaken on a quarterly basis at LF08_07 located within Cell 1 of Area 2, and C2B (when access permits) within Cell 2 of Area 2. Cell 1 began receiving waste in 2007 and ceased temporarily in 2010 when a part permanent, part temporary cap was constructed.

Cell 2 in Area 2 began receiving waste in 2010, and in 2012 analytical testing commenced on leachate samples obtained from Cell 2 on a quarterly basis.

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

4.2 Leachate Measurements

Leachate head levels at LF08_07, C1A, C1B, C1D, C1E (Cell 1), C2A, C2B and C2C (Cell 2) are recorded on a monthly basis at the site. In accordance with Condition 2.10.15 of the PPC Permit, leachate head levels should not exceed 2m above the base of any cell. Leachate removed from Area 2 and leachate head levels in all cells, recorded over the last 12 months are presented in Table 4.1.

Table 4.1 Leachate Measurements at Cell 1 and Cell 2

Monitoring Round	Leachate Head Level above base of cell (m)								Leachate Removed (tonnes)
	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)	
January 2014	2.60	n/a	4.11	n/a	2.31	n/a	n/a	n/a	13714.7
February 2014	2.45	n/a	3.91	n/a	2.21	n/a	n/a	n/a	
March 2014	2.55	4.75	4.01	2.33	1.91	n/a	n/a	n/a	
April 2014	2.53	4.63	4.01	2.21	1.81	n/a	n/a	n/a	
May 2014	2.46	4.58	3.86	2.16	1.81	n/a	n/a	n/a	
June 2014	2.95	4.65	3.95	2.29	1.71	n/a	4.25	n/a	
July 2014	2.70	4.60	4.04	2.41	1.56	n/a	n/a	n/a	
August 2014	2.77	4.65	4.06	2.49	1.26	n/a	n/a	n/a	
September 2014	2.95	4.94	4.11	2.54	1.16	n/a	n/a	n/a	
October 2014	3.05	5.05	4.31	2.61	1.36	n/a	n/a	n/a	
November 2014	3.08	4.83	3.76	2.86	1.81	n/a	n/a	n/a	
December 2014	3.28	4.82	4.11	1.60	2.36	n/a	n/a	n/a	

Leachate head levels in LF08_07, C1A and C1D have been relatively consistent with previous years. In C1B leachate levels were generally higher during 2014 than during 2013. In C1E leachate levels were generally lower during 2014 than during 2013. There are not enough measurements of leachate levels in Cell 2 to compare against previous years.

4.3 Leachate Chemistry

4.3.1 Ammoniacal Nitrogen

Appendix 3/1 presents the results of Ammoniacal Nitrogen concentrations. Ammoniacal Nitrogen concentrations at LF08_07 have been relatively consistent during 2014.

Appendix 3/1 also presents the Ammoniacal Nitrogen concentrations in Cell 2 of Area 2 since sampling commenced in 2012. One sample has been obtained from Cell 2 during 2014 and the Ammoniacal Nitrogen concentration was consistent with previous results.

4.3.2 Arsenic

Appendix 3/2 presents the results of Arsenic concentrations over time in LF08_07 and Cell 2. Arsenic concentrations indicate a relatively stable trend in the range of concentrations recorded during 2014.

4.3.3 Benzene and Naphthalene

Appendices 3/3 and 3/4 present the results of Benzene and Naphthalene concentrations in LF08_07 and Cell 2.

Benzene concentrations in LF08_07 and Cell 2 have fluctuated in 2014 with no distinct trend. This is consistent with previous years.

Naphthalene concentrations have also fluctuated at the two monitoring locations, with no distinct trends.

4.3.4 O-Xylene and EPH

Appendices 3/5 and 3/6 present the results of O-Xylene and EPH concentrations in LF08_07 and Cell 2 since commencement of monitoring in each well.

O-Xylene concentrations in both LF08_07 and Cell 2 have been consistent in the last 12 months.

EPH concentrations in LF08_07 have been relatively stable in the last 12 months, but have continued to increase in Cell 2.

4.3.5 Nickel and Potassium

Appendices 3/7 and 3/8 present the results of Nickel and Potassium concentrations at LF08_07 and Cell 2 since commencement of monitoring.

Both Nickel and Potassium concentrations in LF08_07 indicate a gradually decreasing trend. In Cell 2, Nickel concentrations have also decreased in the last 12 months, and the Potassium concentrations have increased.

4.4 Review of Risks and Future Monitoring

The environmental monitoring data for LF08_07 indicates that in general the leachate chemistry is in a stable condition and that there is therefore no significant increase in risk since the previous Annual Environmental Review. Many of the data sets indicate steady or generally decreasing trends since Cell 1 was capped.

The leachate chemistry data available from Cell 2 (C2B) is limited (6 rounds of monitoring) and therefore any temporal trends observed at the current time and commented on here should be read with caution until further data is obtained and a more rigorous assessment can be made. Concentrations of EPH and Potassium appear to have been rising in Cell 2 in the last 12 months, although these trends would be expected in leachate that is developing in a new waste body. However the remaining datasets are stable or indicating decreasing trends.

Leachate head levels have been recorded above the target level of 2m above the cell base and NCC are currently working to reduce levels where possible.

NCC will continue to monitor (and report) leachate head levels closely and take action where appropriate. ndfill Gas Monitoring

5 External Landfill Gas Monitoring

5.1 Gas Monitoring Locations

There are currently thirteen purpose drilled gas monitoring boreholes present around the perimeter of Area 2 which are monitored monthly in accordance with Condition 2.10.11 of the PPC Permit. The locations of the boreholes are shown on Figure 2 and coordinates of the gas monitoring points are shown within Table 5.1.

Table 5.1 – Area 2 Landfill Gas Monitoring Boreholes

Monitoring Point	Easting	Northing
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
GP05_20	330676	184817
GP05_21	330602	184887
GP05_22	330649	184963
GP12_23	330781	185028
GP06_24	330973	185165
GP06_25	331060	185236

These boreholes all have their response zones situated in the shallow strata (the Alluvial Deposits and the Made Ground above where present). Monitoring started at these boreholes prior to 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 Compliance Levels

Landfill gas monitoring has generally been undertaken on a monthly basis with reports being produced for the EA quarterly in accordance with Condition 2.10.11 of the PPC Permit.

Compliance Levels for all the Area 2 wells have previously been submitted to and accepted by the EA.

Well specific compliance levels for landfill gas as set out in the PPC Permit are presented in Table 5.2 below.

Table 5.2 – Well Specific Compliance Levels for Landfill Gas Monitoring for Area 2

Well	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	1.0	19.0
GP05_20	1.5	n/a
GP05_21	1.5	n/a
GP05_22	1.0	8.3
GP06_24	n/a	n/a
GP06_25	n/a	n/a

5.3 External Landfill Gas Monitoring over the Preceding 12 Months

5.3.1 Methane

Appendices 4/1, 4/2 and 4/3 present the results of Methane concentrations. Appendices 4/1 and 4/2 indicate that the majority of the Area 2 wells do not typically detect Methane above the detection limit of the monitoring equipment. In July 2014 there was one marginal exceedance of the methane trigger level, at GP05_14.

Appendix 4/3 presents the Methane concentrations in GP06_24 and GP06_25. These wells are constructed on the Area 2 side of the in-ground barrier installed between Area 1 and Area 2. Methane concentrations have typically fluctuated significantly in GP06_24 since mid 2008 and in GP06_25 since the start of 2012. GP06_24 has recorded a maximum Methane concentration of 89.2%v/v during 2014. GP06_25 typically recorded Methane concentrations of less than 1.1%v/v prior to 2012, but since 2012 has fluctuated with a maximum concentration of 57%v/v in December 2012.

It is not known why GP06_24 is recording elevated Methane concentrations. The well response zone is constructed in the lower alluvial deposits, between approximately 3.5mbgl and 6.5mbgl. It is possible that the elevated concentrations may be linked with the generation of natural marsh gas in the Alluvium.

It is not currently known why Methane concentrations in GP06_25 have started fluctuating in the last 36 months.

5.3.2 Carbon Dioxide

Carbon Dioxide concentrations have varied with time since the commencement of the landfill gas monitoring programme in the thirteen Area 2 monitoring wells. All of the wells recorded Carbon Dioxide concentrations below the well specific Compliance Levels during 2014. Carbon Dioxide graphs showing well specific Compliance Levels are presented in Appendices 4/4 to 4/15.

The graphs indicate that in general the data sets all show stable or gradually decreasing trends.

5.4 Review of Risks and Future Monitoring

Adverse trends (rising or uncommonly fluctuating concentrations) have been observed in GP06_25 (Methane) in the last 12 months, although the range of methane concentrations recorded is consistent with the overall dataset. No other adverse trends in landfill gas concentrations have been observed. It is considered that ground gas concentrations in this well should continue to be monitored closely to determine whether these adverse trends continue and whether further investigative or remedial action is required.

The only monitoring location that has consistently recorded significant Methane concentrations is GP06_24. This well is located some considerable distance away from the part of the Area 2 site that has to date been used for waste disposal. The elevated Methane concentrations recorded at GP06_24 were present at the time that the in-ground gas barrier was constructed (separating the Area 1 and Area 2 sites) and may therefore represent background concentrations, or natural marsh gas in the Alluvium.

Landfill gas will continue to be monitored on a monthly basis and gas conditions will continue to be reported to the EA on a quarterly basis in accordance with the PPC Permit.

6 Landfill Gas Generation and Usage

6.1 Landfill Gas Utilisation Plant

Docksway Disposal Site has a Landfill Gas Utilisation Plant. The plant currently comprises one 1MW Jenbacher (320) engine together with one 1250m³/hr flare. It is noted that the current plant size has been reduced, with a separate 330kW Jenbacher (208) engine removed in January 2014 as a result of a reduction in gas availability at the site.

Infinis Energy are currently responsible for the general running and minor routine maintenance of the gas plant and has provided information to assist in the compilation of this section of the report.

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 the EA.

6.2 Landfill Gas Extraction

In 2014, the total production of energy from the Landfill Gas Utilisation Plant was about 6045MWh with a site efficiency of 31.3%. In 2013 by comparison, the total production of energy was about 6090MWh with a site efficiency of 35.6%. The site efficiency and total energy produced have therefore remained at similar levels in the last 12 months compared to the previous year.

Engine downtime hours in 2014 were 670, compared to 8833 in 2013 which represents a decrease in engine downtime from 2013. This is largely due to the removal of the infrequently used second engine in January 2014. Engine operation time in 2014 was 8090 hours which is similar to the 8687 hours in 2013.

The flare only operated in 2014 during periods the engine was down for maintenance or during a period of excess landfill gas production. The flare was operating for 1283 hours during 2014 based on the availability of the engine, compared to 314 hours in 2013. This is a significant increase from 2013 and is due to the removal of the infrequently used second engine in January 2014.

Environmental Performance Indicators provided by Infinis Energy indicate that there has been a slight increase in Carbon Monoxide emissions in 2014 compared to 2013, although total Oxides of Nitrogen emissions decreased slightly in the same period. Emissions depend on a number of factors including run hours of engines and availability of landfill gas to them.

6.3 Monitoring of Extracted Gas

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 the EA by Infinis Energy.

Flare monitoring is only required if the flare is in operation greater than 10% of the time, in accordance with Condition 58 of the WML. Infinis have indicated that the flare was operational for greater than 10% of the time in 2014, due to the removal of the second engine, and they will therefore make arrangements for emissions testing of the flare to be undertaken.

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

7 Annual Production/Treatment and Performance Parameters

7.1 Introduction

In accordance with Schedule S4.2, NCC is required to produce details of the annual production/treatment of leachate, surface and groundwater and landfill gas. In addition, NCC is also required to report on both the energy and water consumed at the site. The relevant details based on information prepared and provided by NCC are included in Tables 7.1 and 7.2.

7.2 Annual Production/Treatment

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

Leachate:	Tonnes/year
Disposed of off site (Area 2)	13,715
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	None
Disposed of to any onsite effluent treatment plant	None
Landfill Gas: (Whole site)	Normalised cubic metres/year
Combustion in flares	523,824
Combustion in gas engines	3,302,989
Other methods of gas utilisation	None

7.3 Performance Parameters

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

Parameter	Frequency of Assessment	Annual Total	Unit
Potable Water Use	Annually	770 (to 7/03/14)	Cubic metres
Energy Used (including for leachate treatment, Excluding electricity generated)	Annually	142980 (to 31/12/14)	kWh of electricity
Non Potable Water Use	Annually	0	Cubic metres

7.4 Topographical Surveys

The topographical surface of Area 2 of Docksway Disposal Site was surveyed during January 2015 and the results of the survey are presented in Figure 3a (Cell 1) and Figure 3b (Cell 2)

It has been calculated by NCC that 117,084 m³ of waste was placed in Cell 2 in 2014. The permitted void space for the Area 2 landfill is 1.7M m³, and as of January 2015, the remaining Area 2 void space has been calculated at 0.98M m³.

8 Conclusions

8.1 Assessment of Environmental Performance Trends

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.

Surface water monitoring indicates generally relatively stable trends since the previous Environmental Performance Review, although there continue to be some significant fluctuations of some determinands over the 12 months. SW25 and SW26 have performed within the discharge consent limits on the three occasions they have been sampled within the last 12 months.

Data from the groundwater monitoring wells in Area 2 indicate generally stable trends in the groundwater chemistry since the previous Environmental Performance Review, with only occasional exceedances of the compliance limits in the last 12 months. It is considered that remedial action is not required for any of these compliance wells at the current time, and that these compliance wells should be closely monitored in the next 6 to 12 months to determine whether there are continued exceedances or adverse trends developing.

Leachate levels in Cell 1 and Cell 2 have been recorded above the trigger level of 2m above the cell base (up to 5m above cell base in Cell 1) in the last 12 months, and it is recommended that the leachate levels continue to be monitored closely during 2015 with active leachate management continuing as appropriate.

The Environmental monitoring data for LF08_07 indicates that in general the leachate chemistry is in a steady state condition and that there is therefore no significant increase in risk since the previous Annual Environmental Review.

The leachate chemistry data available from C2B is limited (5 rounds of monitoring) and therefore any temporal trends observed at the current time and commented on here should be read with caution until further data is obtained and a more rigorous assessment can be made. Concentrations of EPH and Potassium appear to have been rising in Cell 2 in the last 12 months, although these trends would be expected in leachate that is developing in a new waste body. However the remaining datasets are stable or indicating decreasing trends.

Landfill gas concentrations around Area 2 are indicating generally stable trends, albeit that this includes consistent trends of high concentrations of methane in GP06_24 and GP06_25.

Information received from Infinis Energy indicates that landfill gas generation in Area 1 is decreasing slowly over time.

8.2 Areas of Lower Performance

The leachate chemistry data from C2B in Cell 2 indicates rising trends in some of the datasets, and this will be closely monitored over the next 12 months.

The surface water quality at SW23 generally records poor water quality, particularly with respect to Ammoniacal Nitrogen concentrations. SW23 is likely to constitute drainage from the Docks to the east of the site, entirely or in part.

8.3 Future Monitoring Requirements

It is intended that the Docksway Disposal Site Area 2 monitoring programmes shall continue in line with the Permit requirements (and as approved by the EA), 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

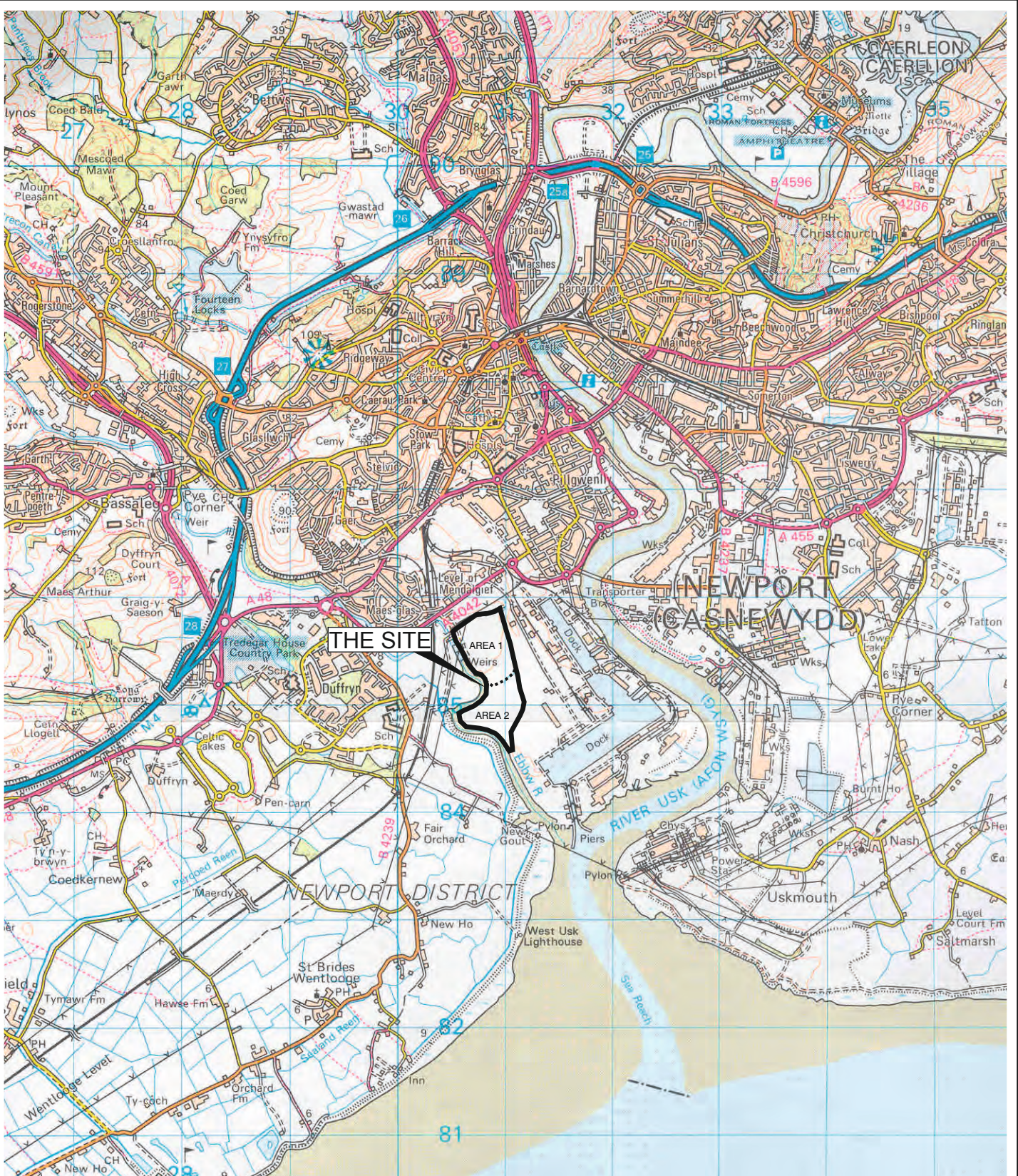
- [1] PBA (2011) Docksway Disposal Site, Newport. 2011 Monitoring Plan for Area 1. Peter Brett Associates, August 2011.
- [2] PBA (2004). Docksway Disposal Site, Newport. Monitoring Plan for Area 2: Landfill Extension. Peter Brett Associates LLP report reference 14739/010B/CBH. October 2004.
- [3] PBA (2010) Docksway Disposal Site, Newport. Review of the Hydrogeological Risk Assessment for Area 2. Peter Brett Associates, December 2010.

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

Figures



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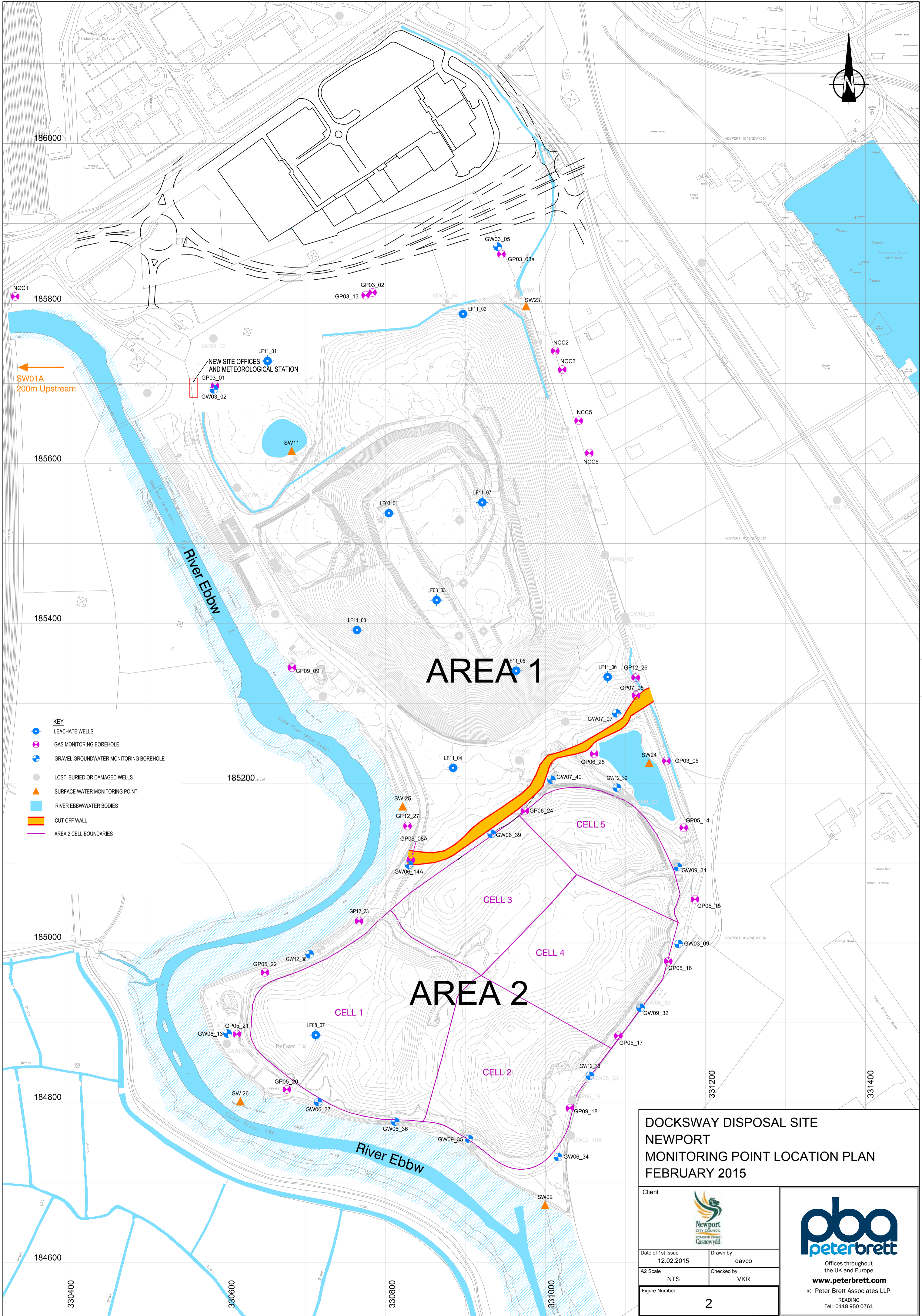
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DOCKSWAY DISPOSAL SITE
 NEWPORT

SITE LOCATION PLAN

Date	19.02.2013
Scale	1:50,000
Drawn by	DJM
Checked by	VKR
Revision	-

FIGURE 1



186000

185800

185600

185400

185200

185000

184800

184600

330400

330600

330800

331000

331200

331400

SW01A
200m Upstream

NEW SITE OFFICES
AND METEOROLOGICAL STATION

AREA 1

AREA 2

CELL 1

CELL 2

CELL 3

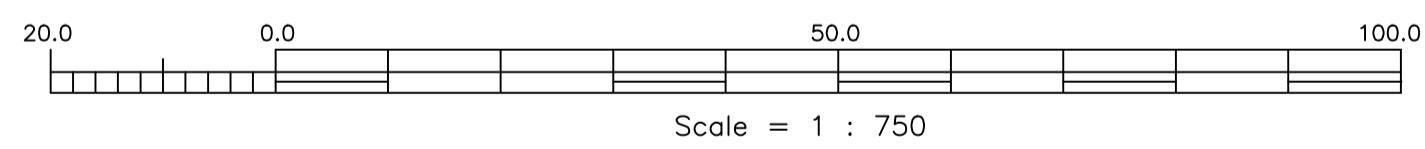
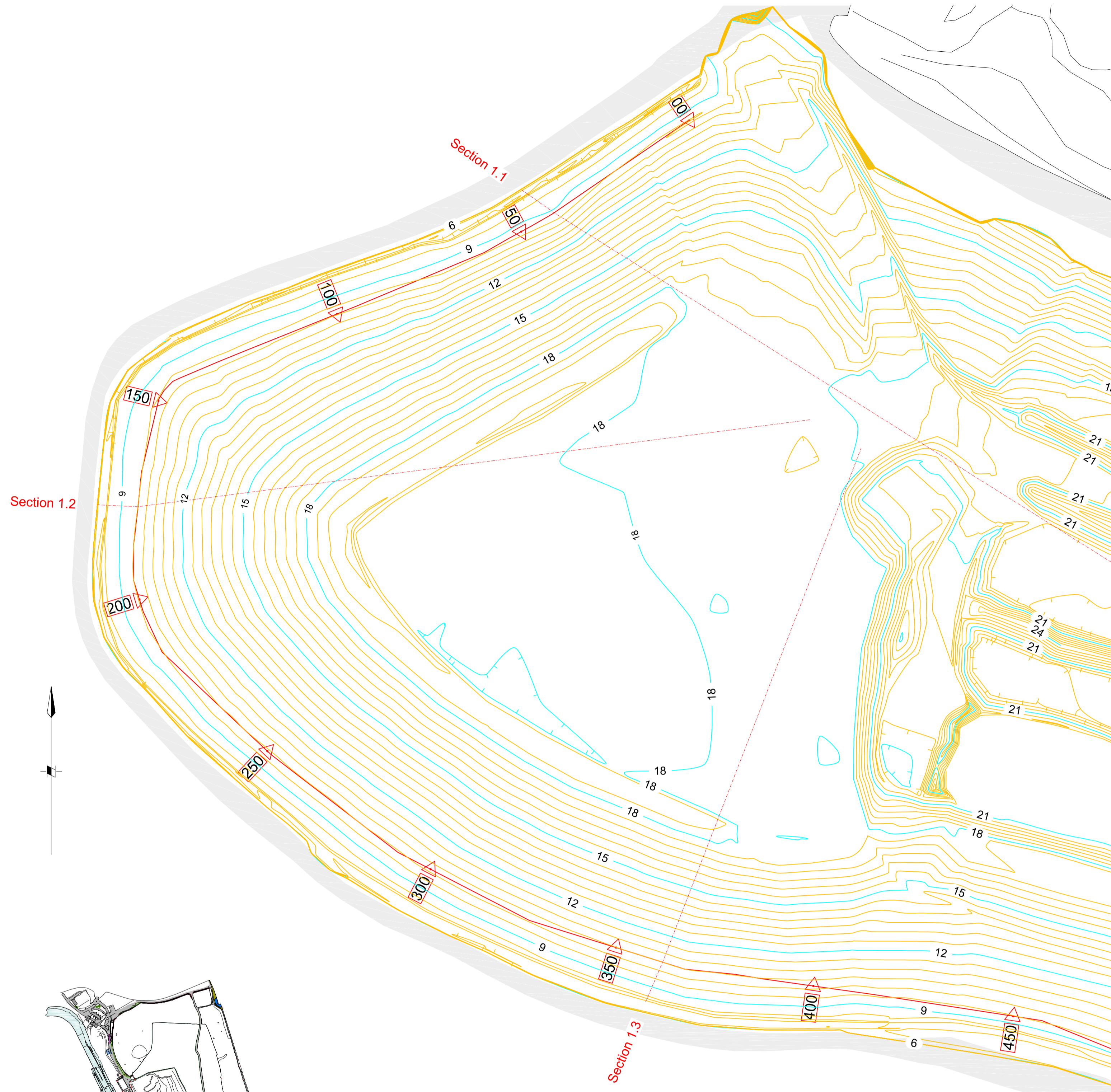
CELL 4

CELL 5

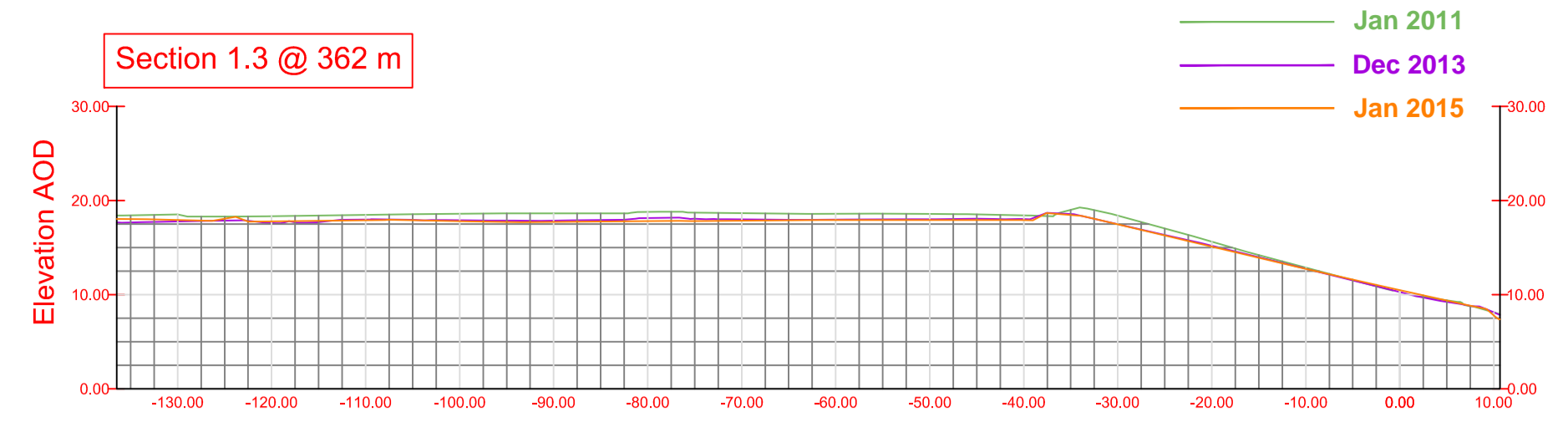
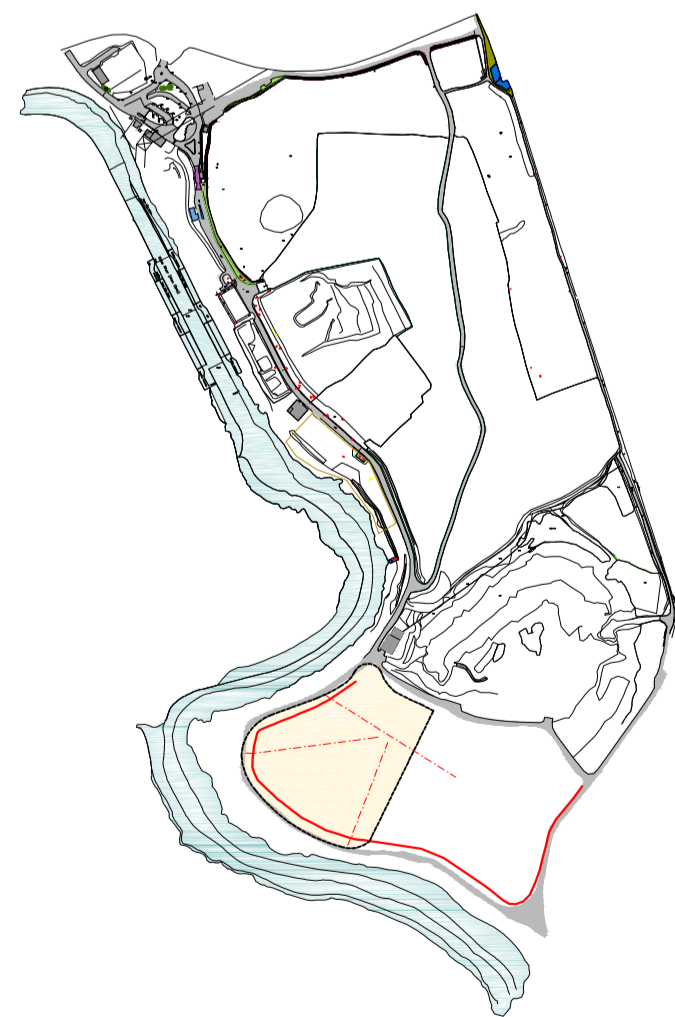
DOCKSWAY DISPOSAL SITE
NEWPORT
MONITORING POINT LOCATION PLAN
FEBRUARY 2015

Client			
Date of 1st Issue	12.02.2015	Drawn by	davco
A2 Scale	NTS	Checked by	VKR
Figure Number	2		

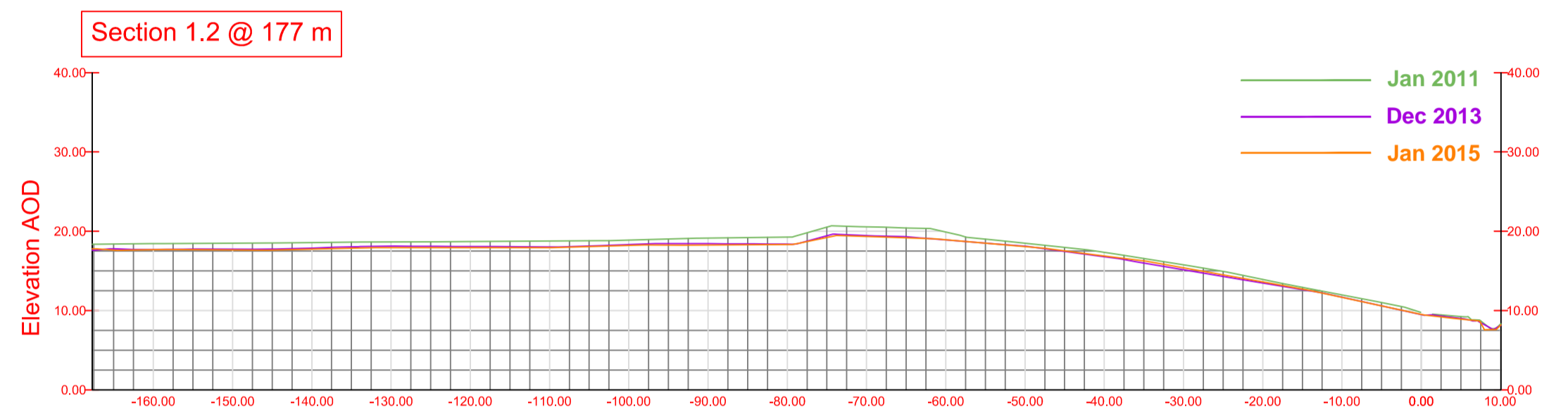
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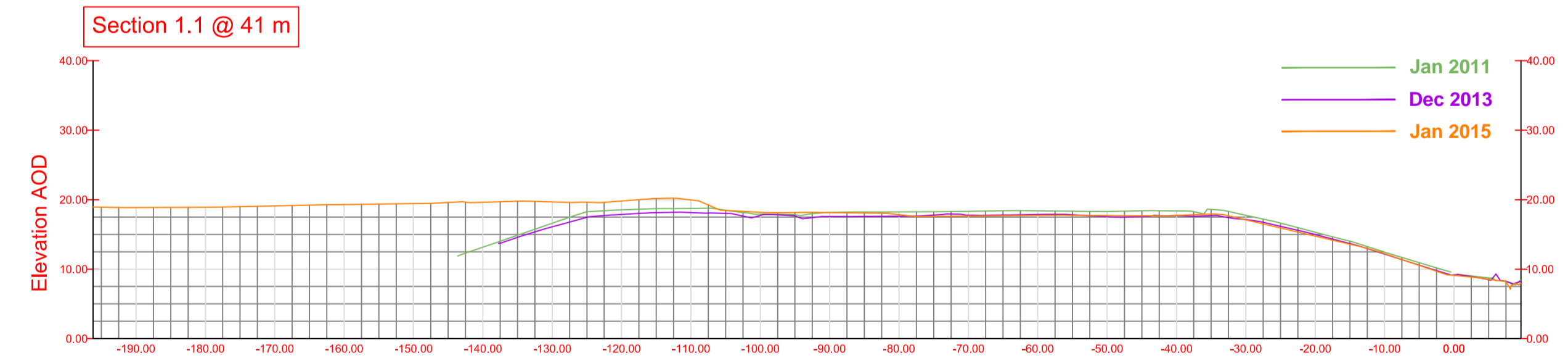
Cell 1 Topo Survey
Dec 2014 vs Jan 2015



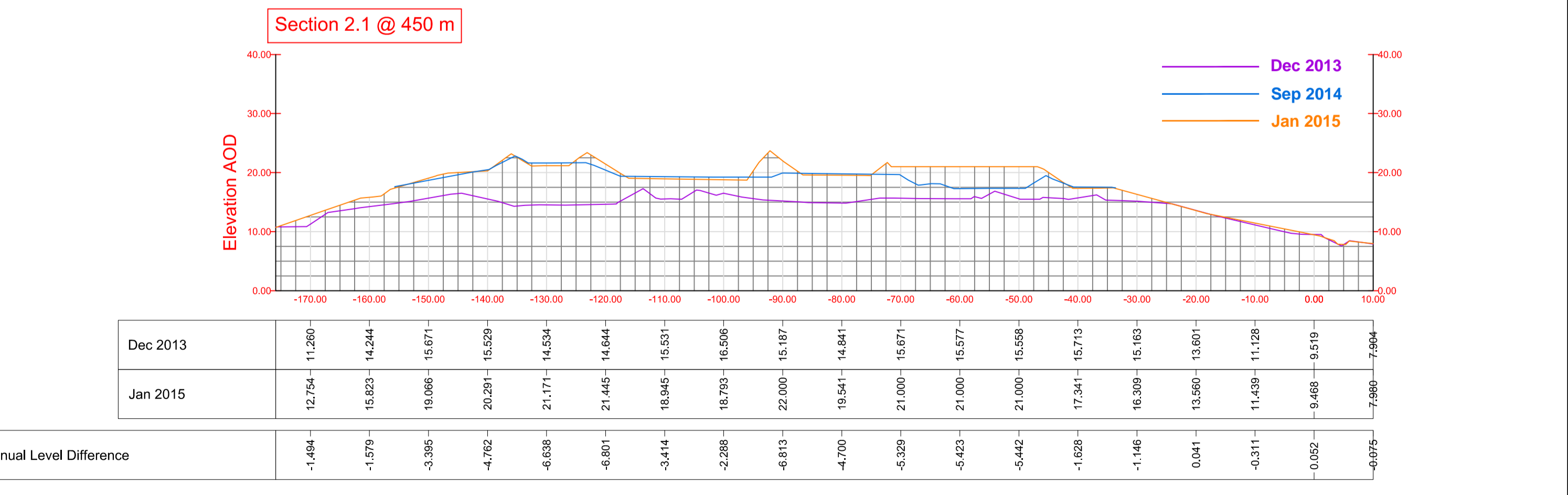
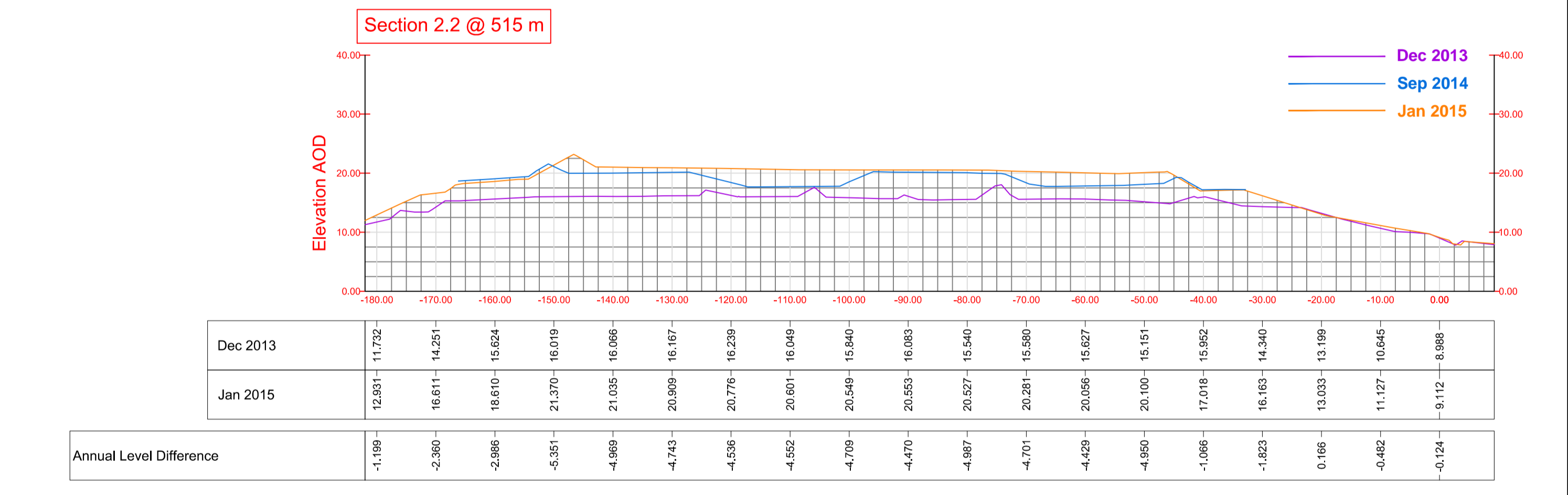
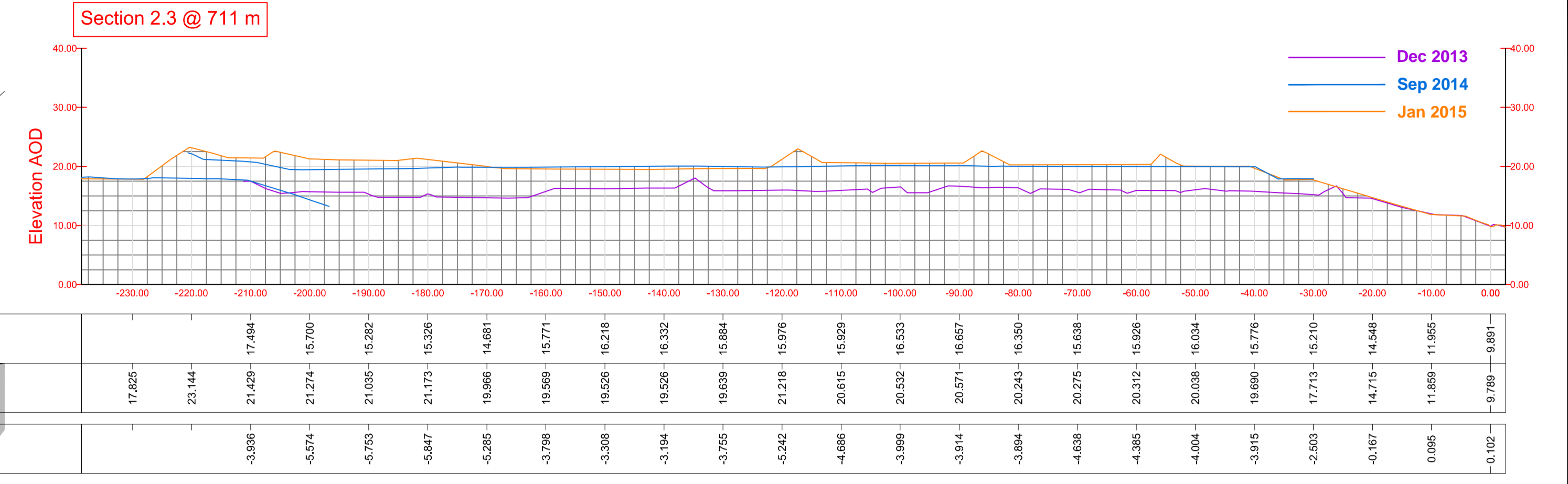
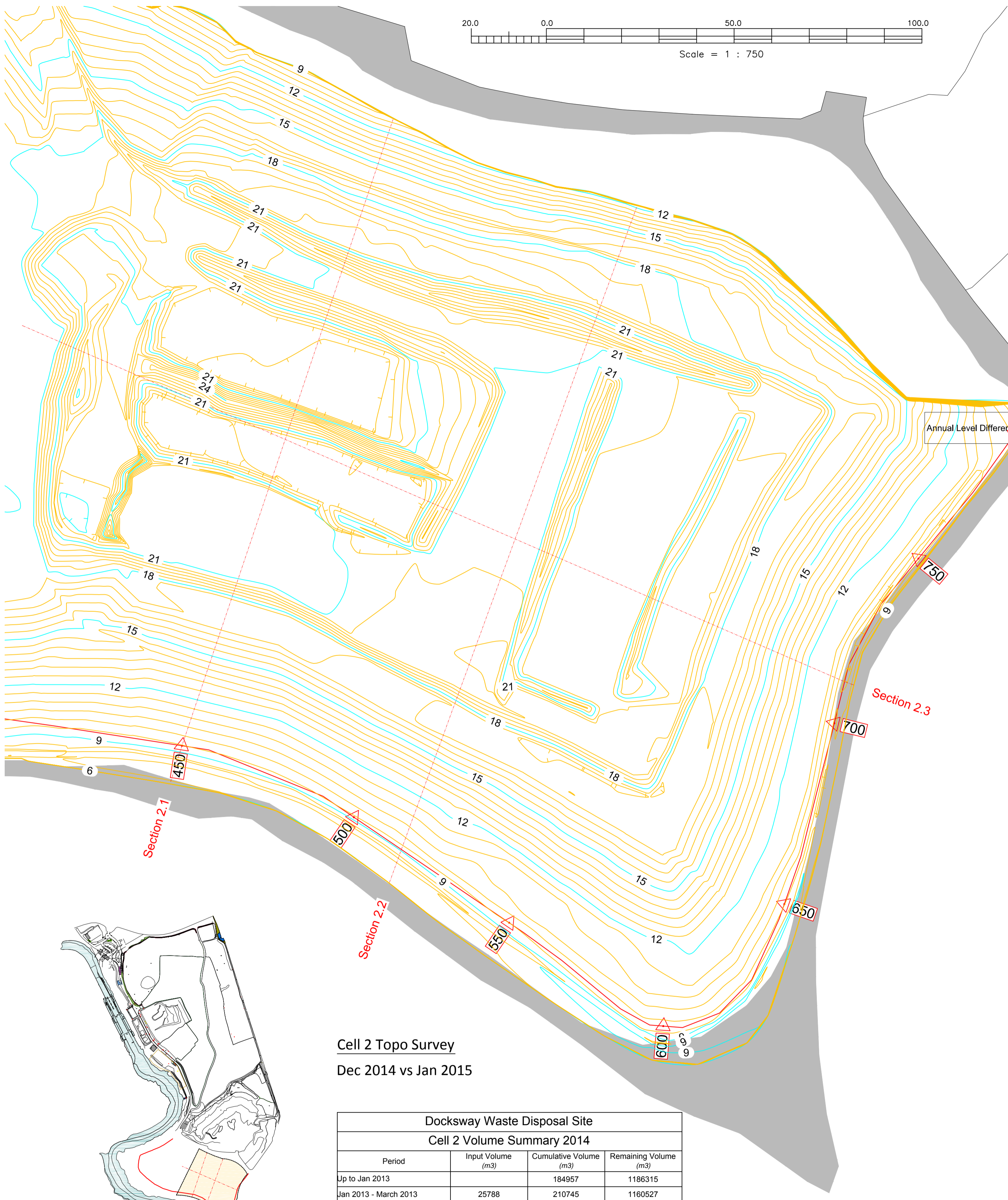
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January 2011 (As Built)	17.928	17.767	17.903	17.905	17.868	17.813	17.905	17.868	17.905	17.868	17.905	17.868	17.905	17.868	17.905
Dec 2013	17.928	17.767	17.903	17.905	17.868	17.813	17.905	17.868	17.905	17.868	17.905	17.868	17.905	17.868	17.905
Jan 2015	17.928	17.767	17.903	17.905	17.868	17.813	17.905	17.868	17.905	17.868	17.905	17.868	17.905	17.868	17.905
Annual Level Difference	-0.161	-0.178	0.075	0.092	0.127	0.075	0.121	0.054	0.077	0.113	0.022	0.099	0.022	-0.216	0.333
Cumulative Level Difference	0.588	0.568	0.571	0.760	0.905	0.981	0.792	0.676	0.636	0.516	0.933	0.534	0.143	-0.062	0.332



	-160.00	-150.00	-140.00	-130.00	-120.00	-110.00	-100.00	-90.00	-80.00	-70.00	-60.00	-50.00	-40.00	-30.00	-20.00	-10.00	0.00	10.00
January 2011 (As Built)	17.680	17.709	17.645	17.854	17.918	18.113	18.650	18.687	18.758	18.220	18.326	18.882	18.440	19.130	19.264	19.329	19.452	20.543
Dec 2013	17.680	17.709	17.645	17.854	17.918	18.113	18.650	18.687	18.758	18.220	18.326	18.882	18.440	19.130	19.264	19.329	19.452	20.543
Jan 2015	17.680	17.709	17.645	17.854	17.918	18.113	18.650	18.687	18.758	18.220	18.326	18.882	18.440	19.130	19.264	19.329	19.452	20.543
Annual Level Difference	0.029	0.101	0.116	0.198	0.151	0.080	0.106	0.172	0.055	0.113	-0.026	0.051	-0.101	-0.232	-0.138	0.315	0.307	-0.043
Cumulative Level Difference	0.750	0.837	0.852	0.732	0.780	0.824	0.852	0.862	0.947	1.204	0.986	0.440	0.488	0.390	0.315	0.307	-0.043	-0.024



	-190.00	-180.00	-170.00	-160.00	-150.00	-140.00	-130.00	-120.00	-110.00	-100.00	-90.00	-80.00	-70.00	-60.00	-50.00	-40.00	-30.00	-20.00	-10.00	0.00	
January 2011 (As Built)	18.867	18.916	19.090	19.298	19.433	19.613	19.691	16.092	16.800	16.596	16.801	18.447	17.793	17.572	18.163	18.249	18.324	18.384	17.755	15.314	12.452
Dec 2013	18.867	18.916	19.090	19.298	19.433	19.613	19.691	16.092	16.800	16.596	16.801	18.447	17.793	17.572	18.163	18.249	18.324	18.384	17.755	15.314	12.452
Jan 2015	18.867	18.916	19.090	19.298	19.433	19.613	19.691	16.092	16.800	16.596	16.801	18.447	17.793	17.572	18.163	18.249	18.324	18.384	17.755	15.314	12.452
Annual Level Difference							-3.599	-1.925	-1.817	-0.451	-0.558	-0.215	0.131	0.121	-0.156	0.002	0.054	0.532	-0.065	0.073	
Cumulative Level Difference						-6.450	-3.091	-4.264	-4.216	-4.274	0.033	0.405	0.663	0.652	0.566	0.655	0.656	0.569	0.223		

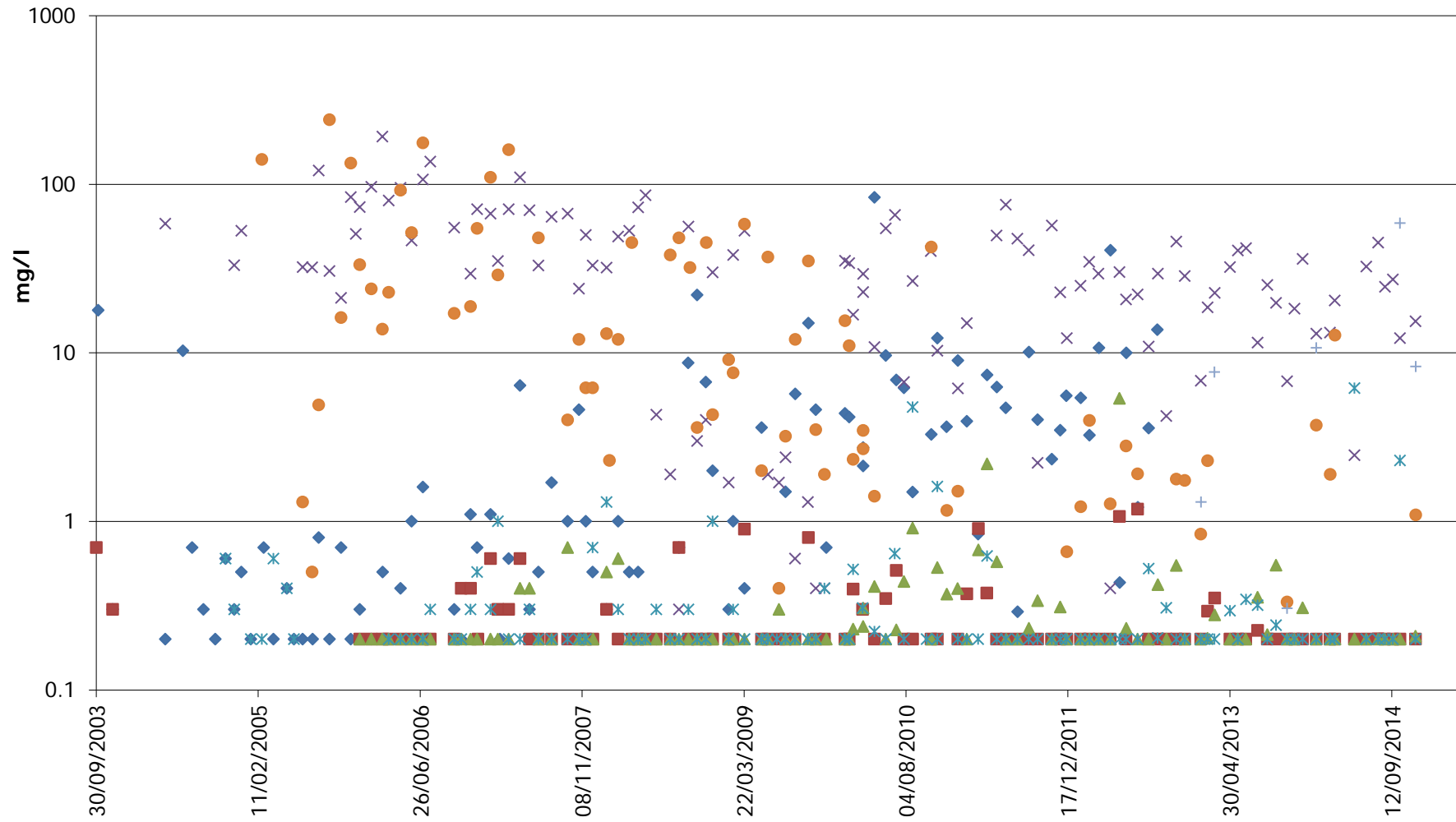


Cell 2 Topo Survey
Dec 2014 vs Jan 2015

Docksway Waste Disposal Site Cell 2 Volume Summary 2014			
Period	Input Volume (m3)	Cumulative Volume (m3)	Remaining Volume (m3)
Up to Jan 2013	184957	184957	1186315
Jan 2013 - March 2013	25788	210745	1160527
March 2013 - June 2013	12595	223340	1147932
June 2013 - September 2013	24992	248332	1122940
September 2013 - Dec 2013	25967	274299	1096973
Dec 2013 - Jan 2015	117084	391382	979889
Total Waste Deposited 2014	117084		

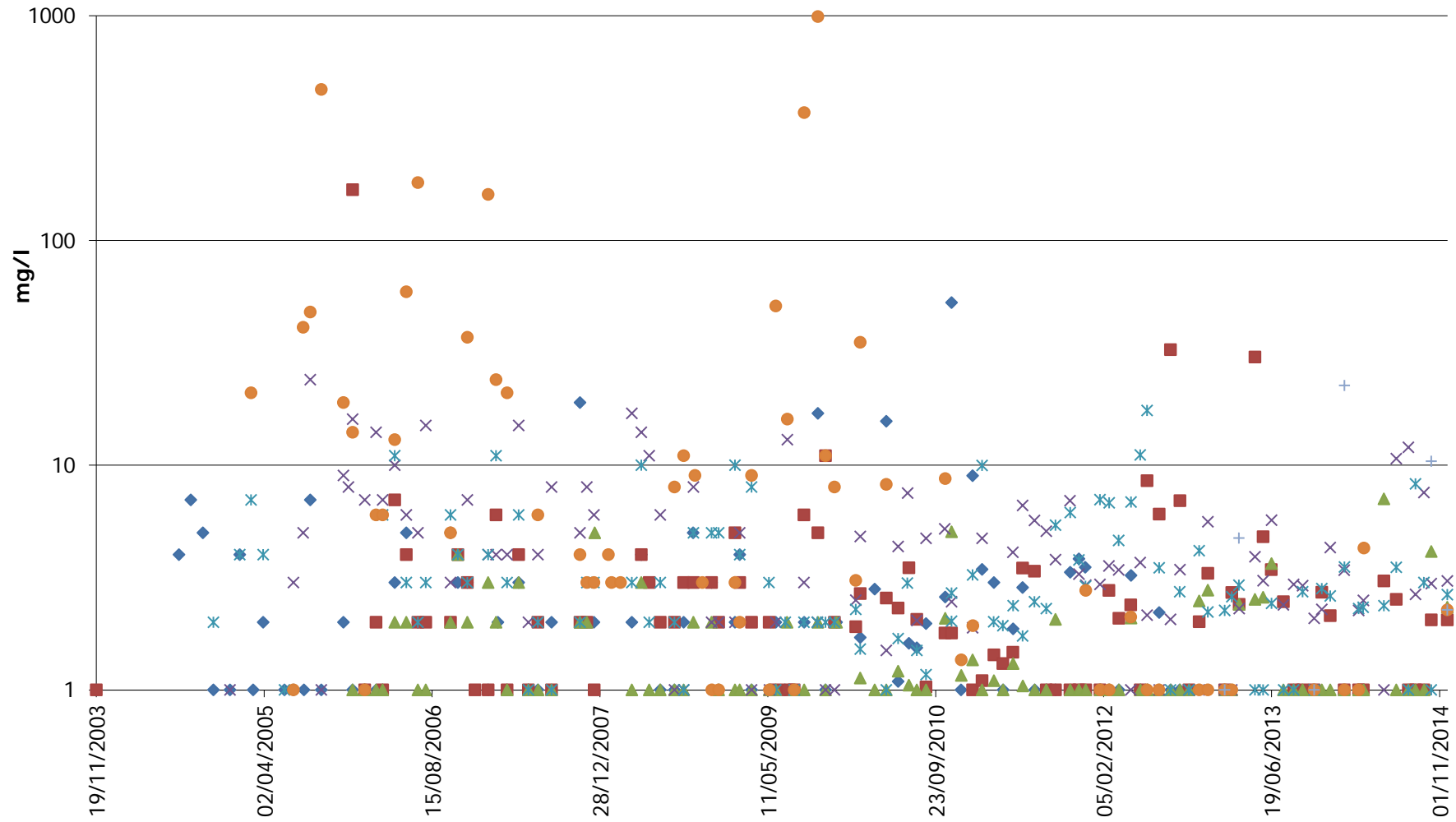
Appendix 1

Docksway Disposal Site - Ammoniacal Nitrogen in Surface Water



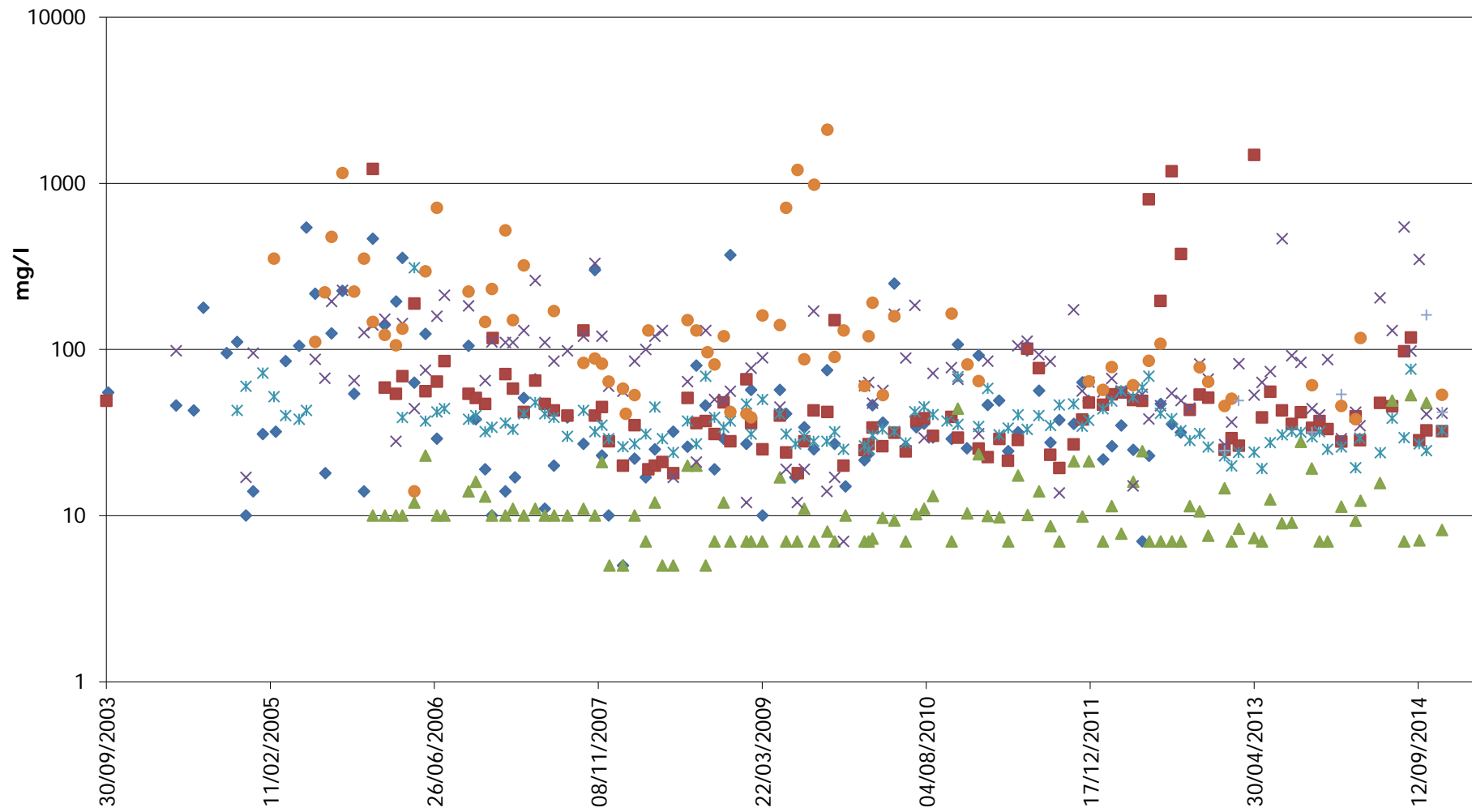
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Biochemical Oxygen Demand in Surface Water



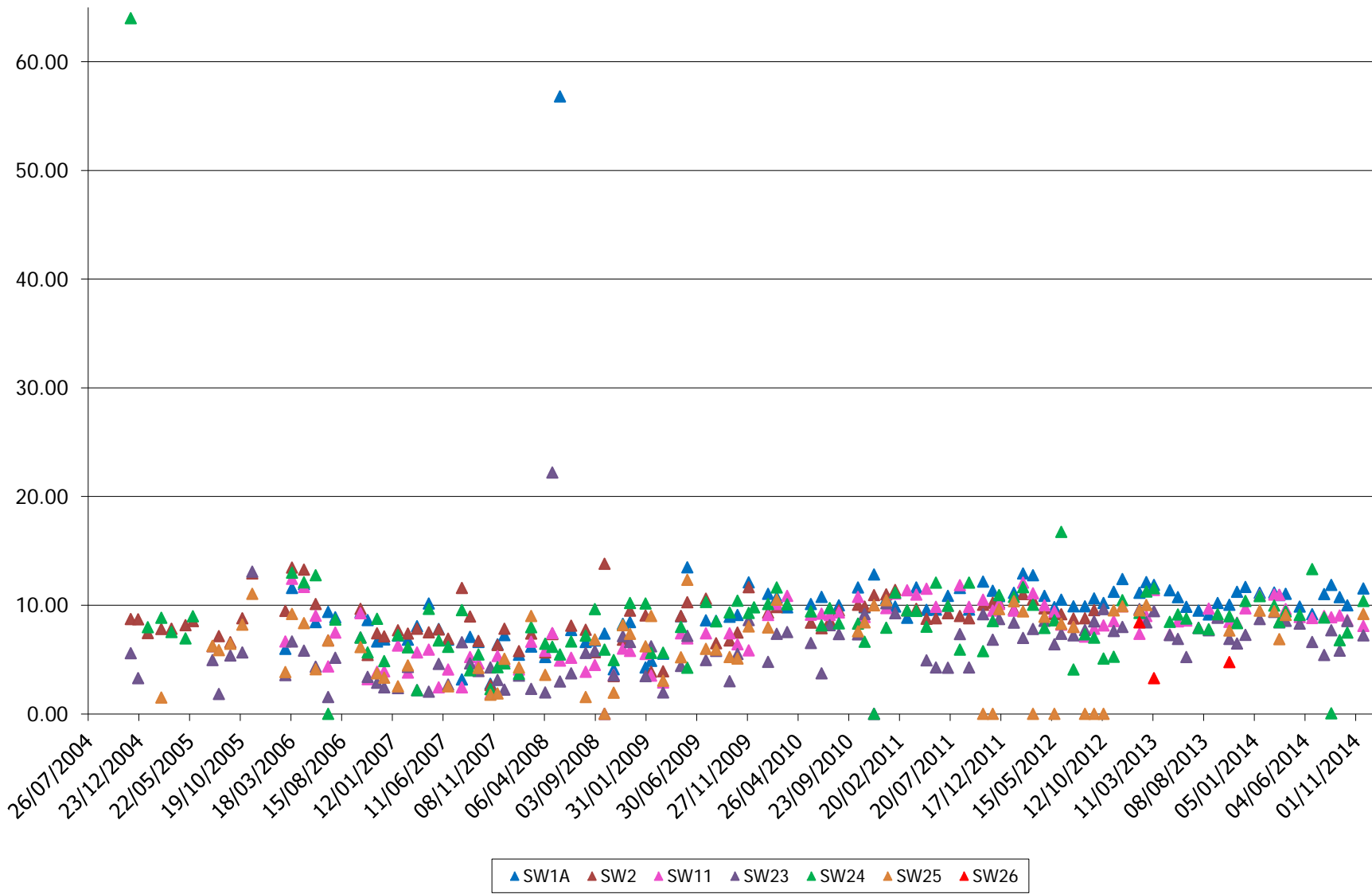
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Docksway Disposal Site - Chemical Oxygen Demand in Surface Water

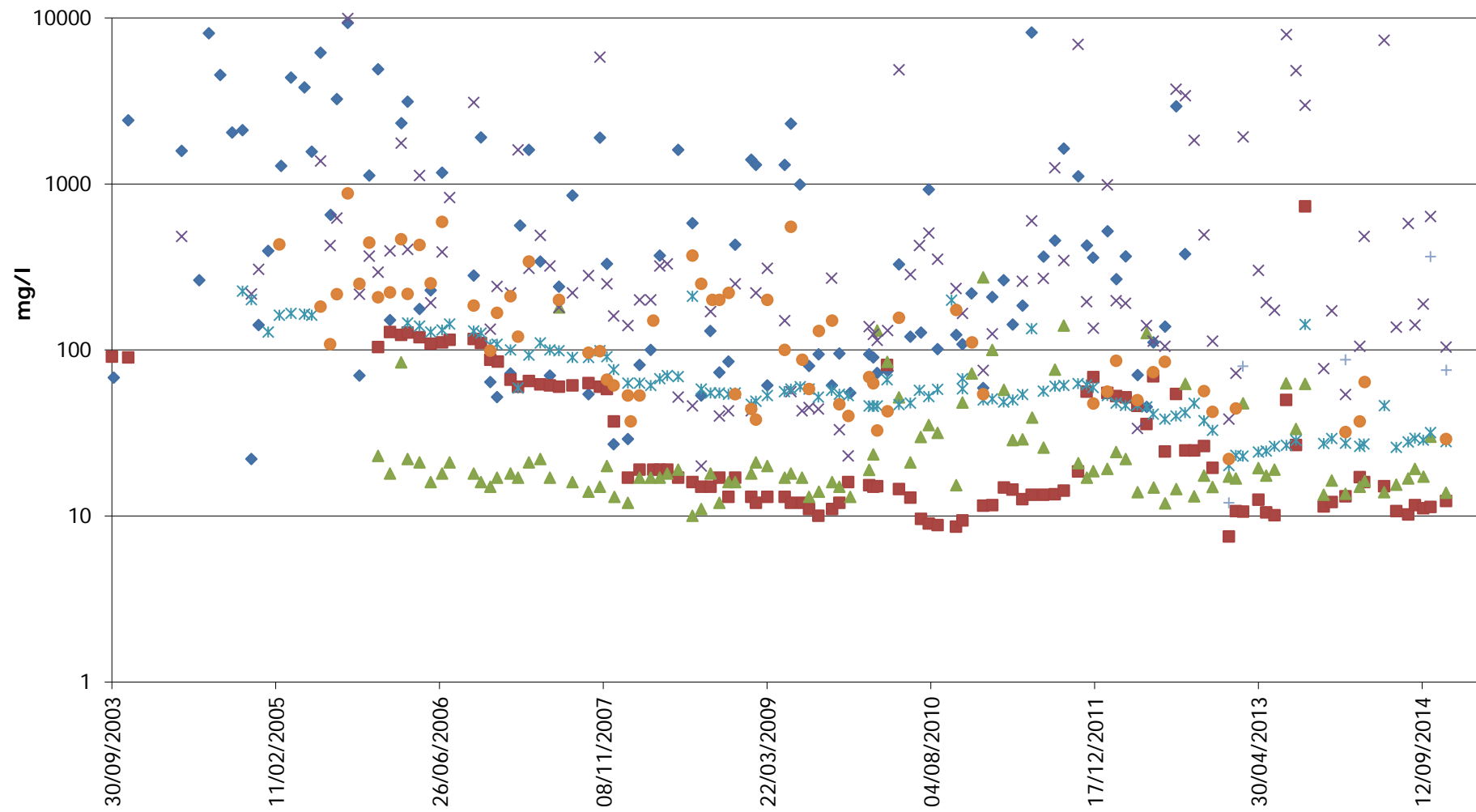


◆ SW02 ■ SW11 ▲ SW1A ✕ SW23 * SW24 ● SW25 + SW26

Appendix 1/4
Docksway Disposal Site - Dissolved Oxygen in Surface Water (mg/l)

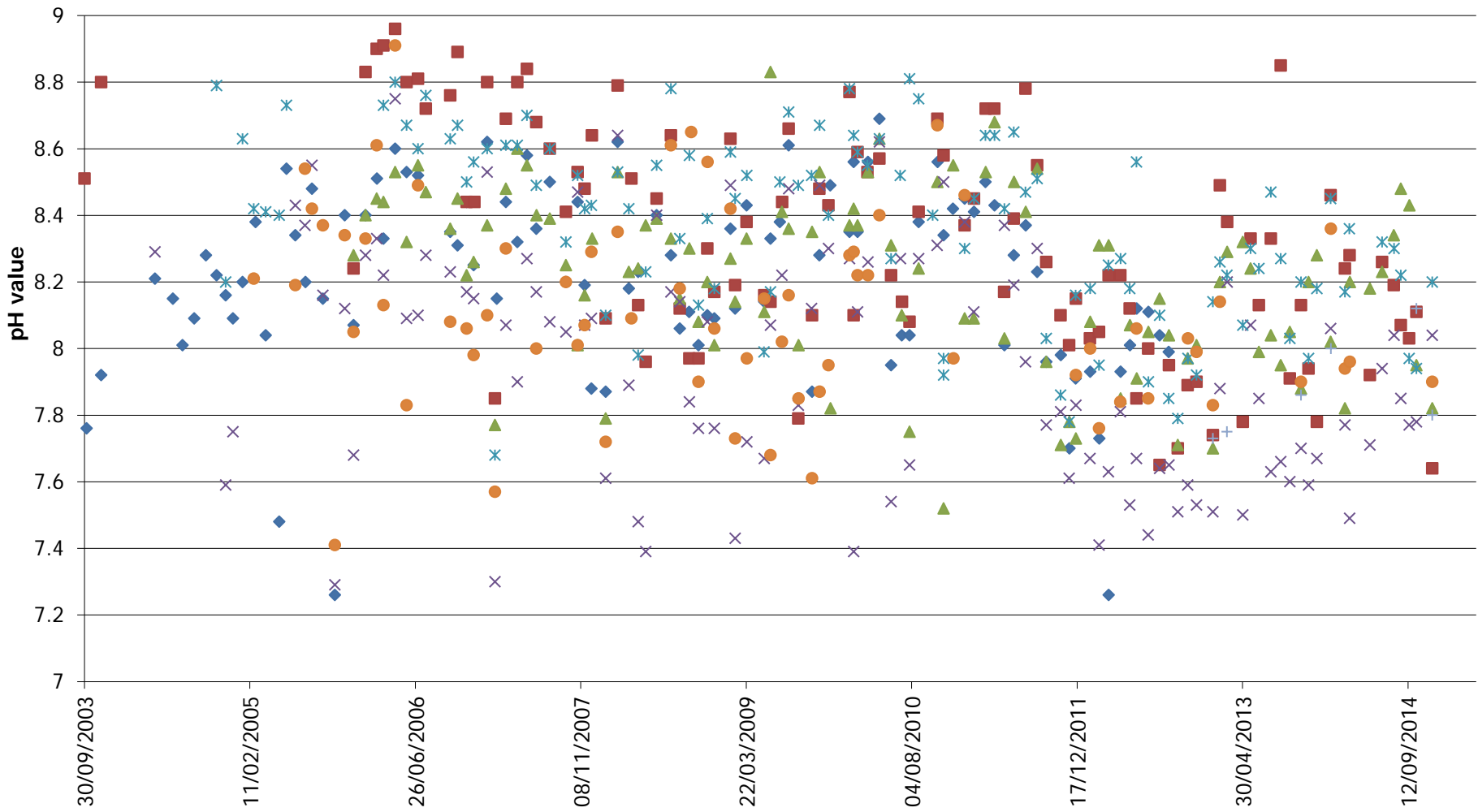


Docksway Disposal Site - Chloride in Surface Water



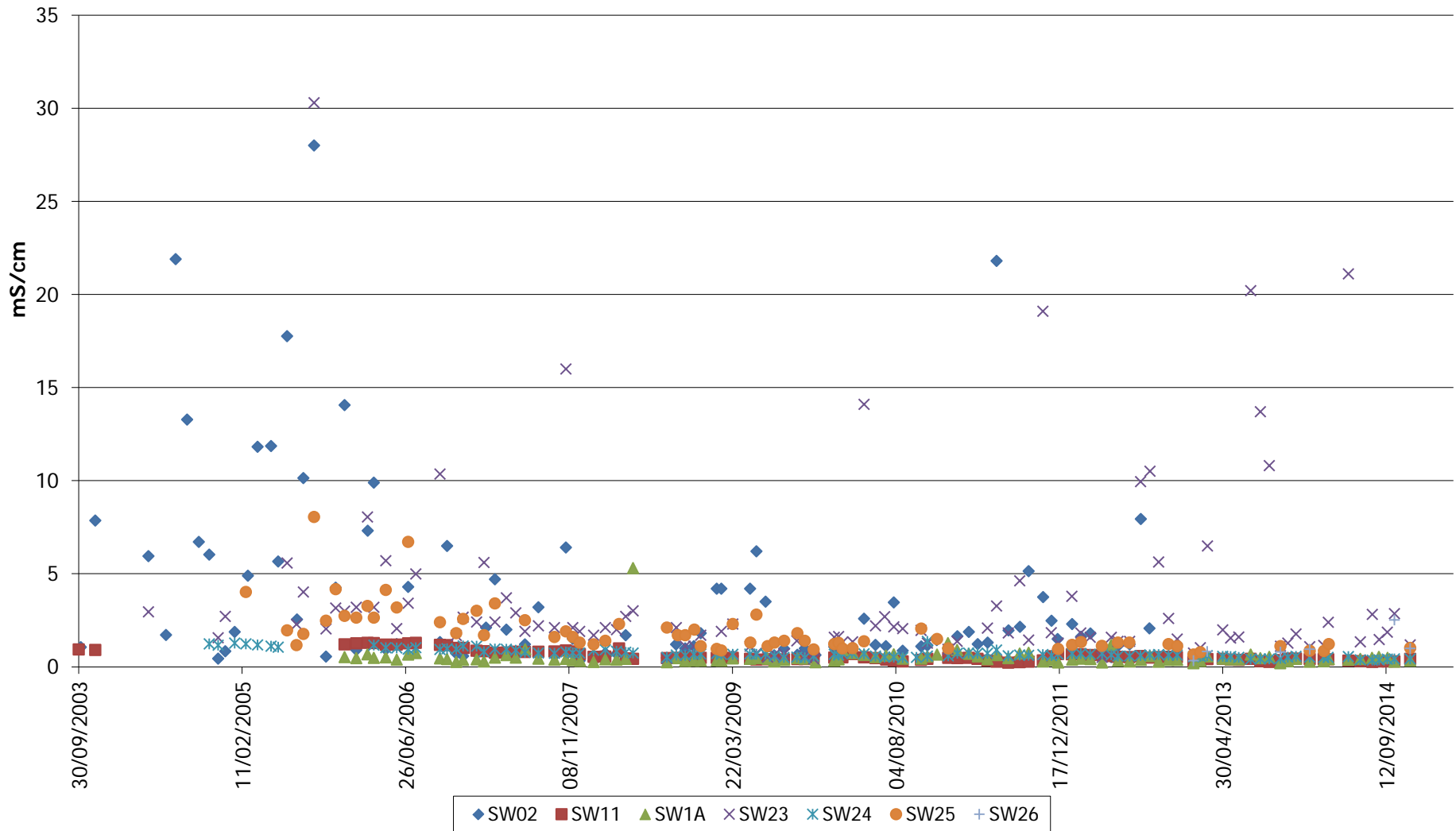
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Docksway Disposal Site - pH in Surface Water

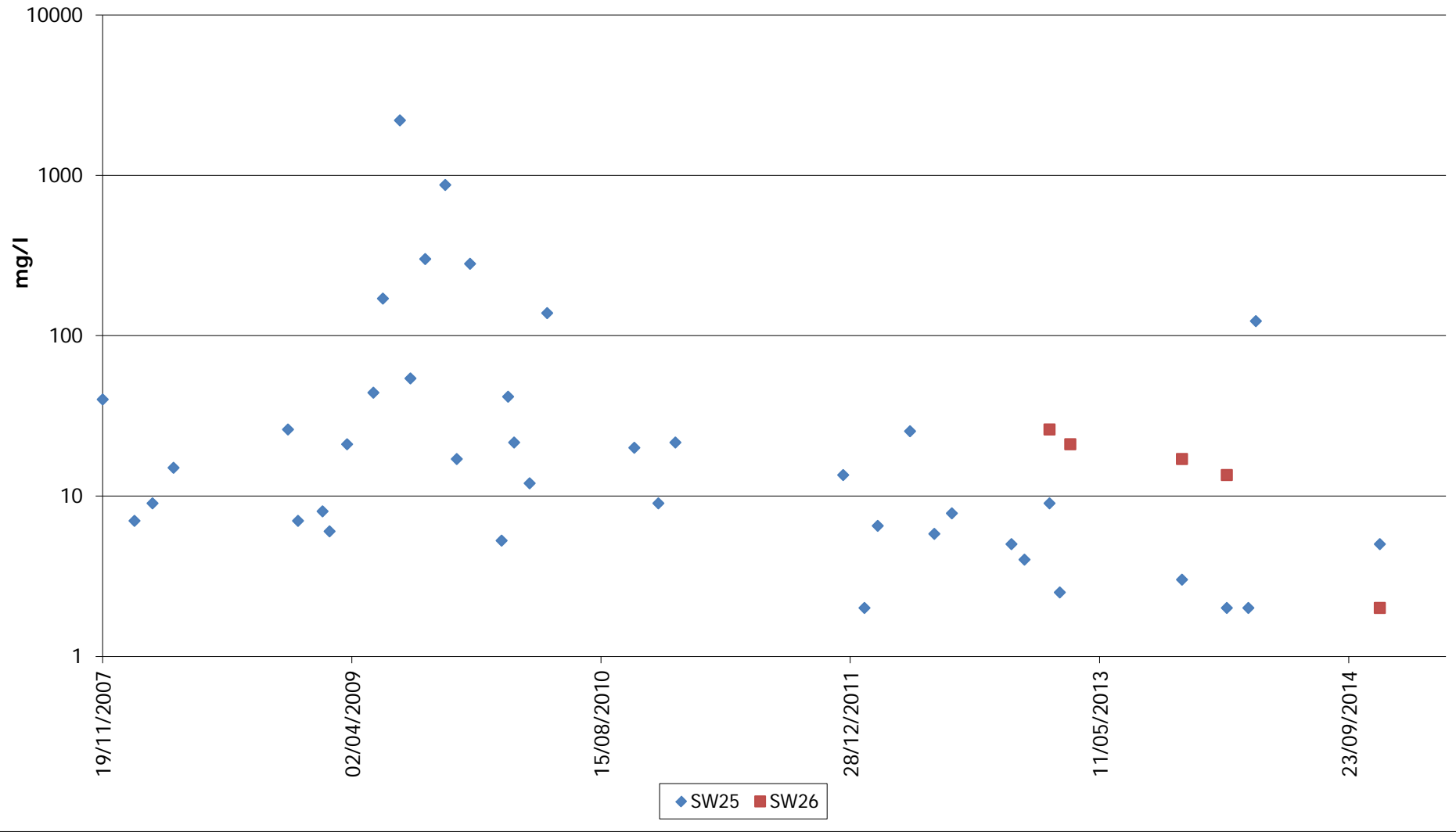


◆ SW02 ■ SW11 ▲ SW1A × SW23 * SW24 ● SW25 + SW26

Docksway Disposal Site - Electrical Conductivity in Surface Water

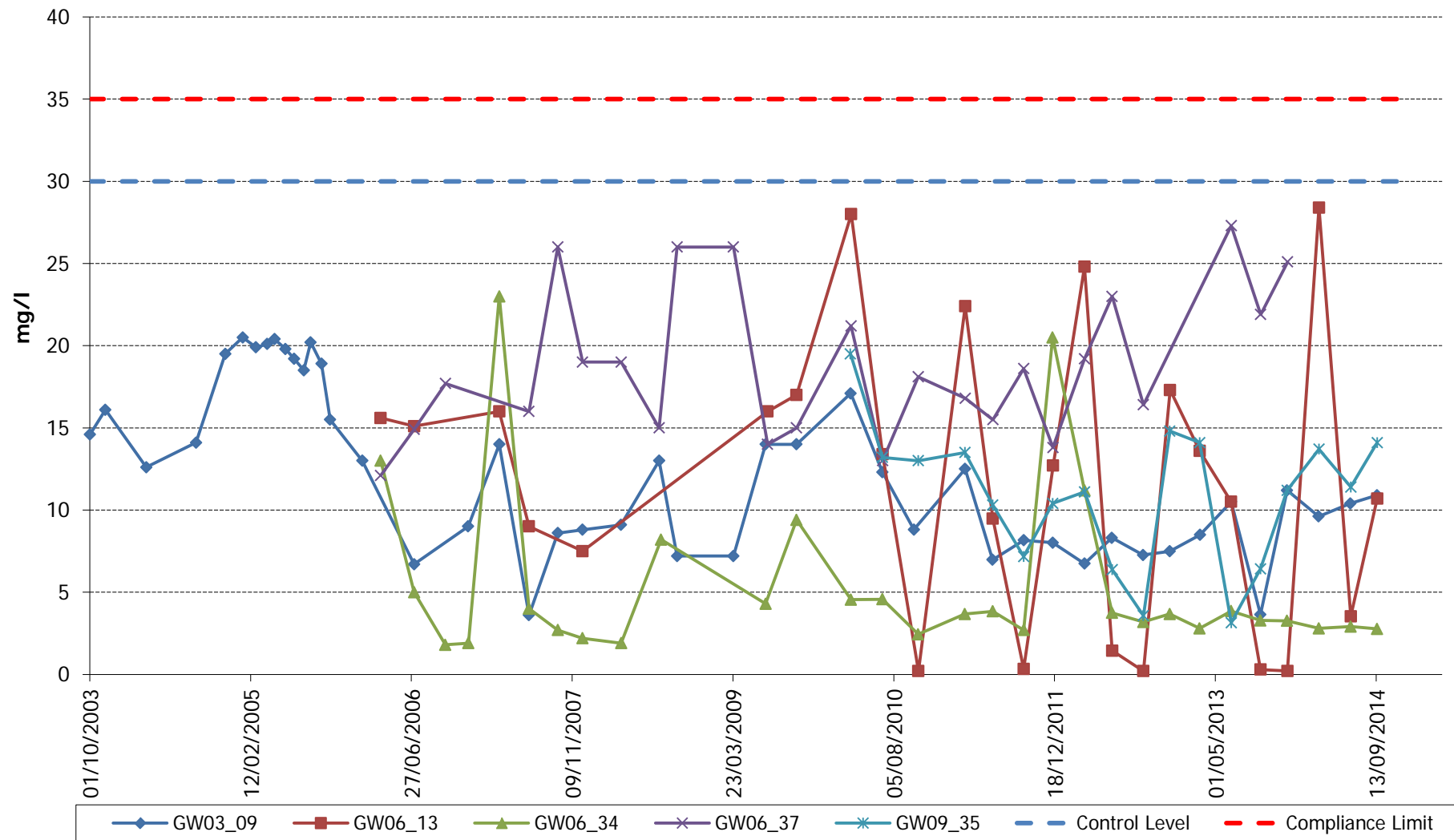


Docksway Disposal Site - Total Suspended Solids in Surface Water

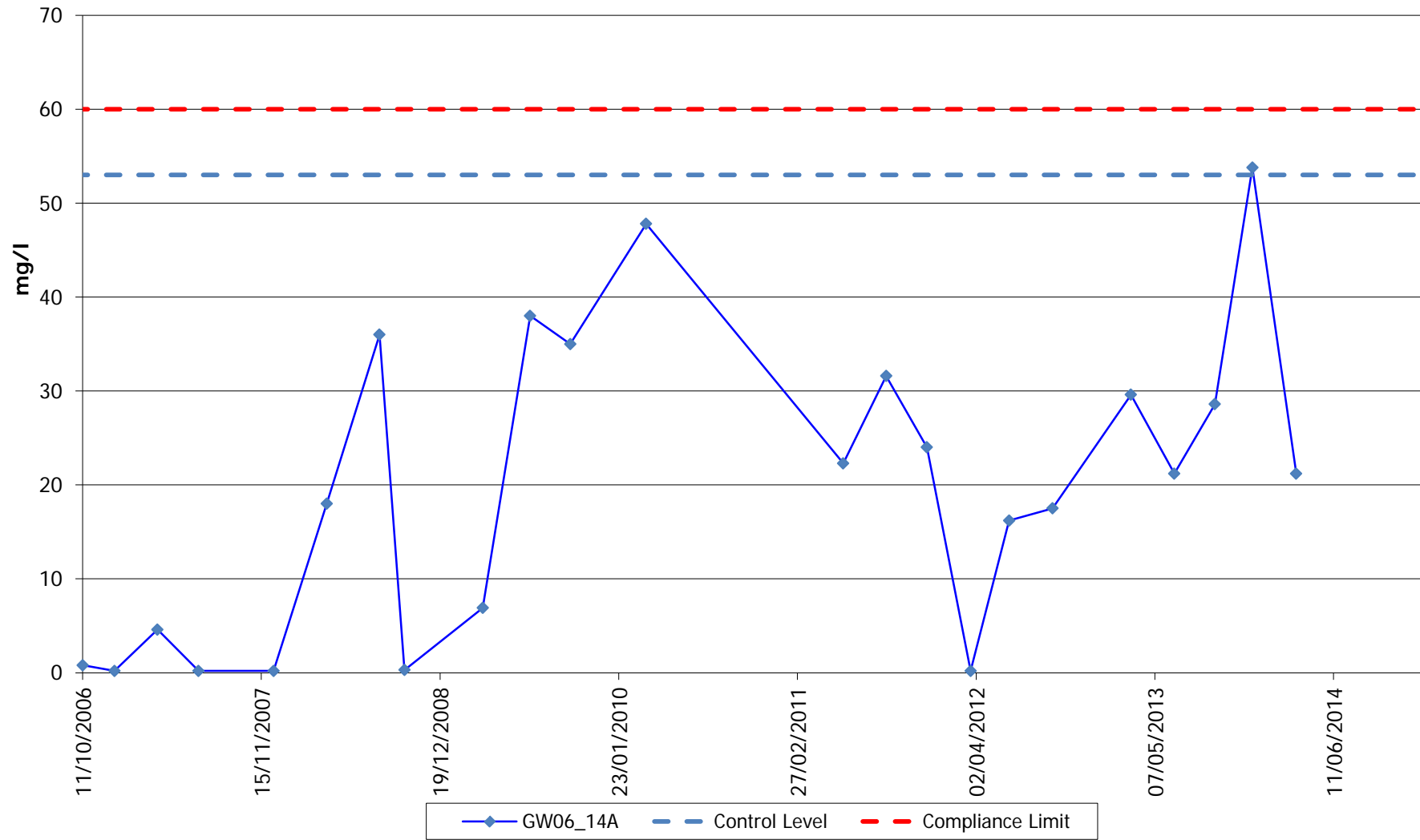


Appendix 2

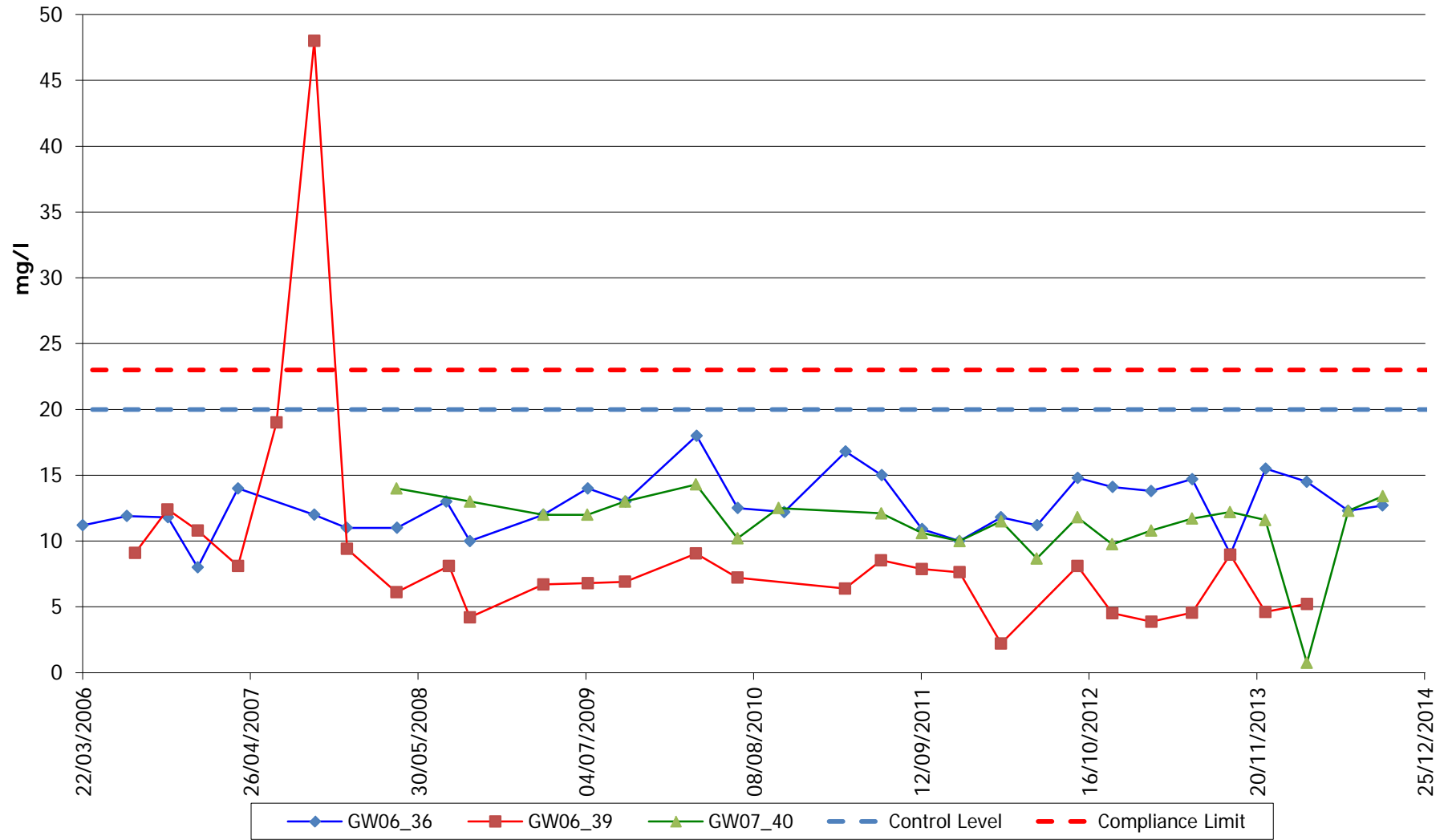
Docksway Disposal Site - Ammoniacal Nitrogen in Groundwater



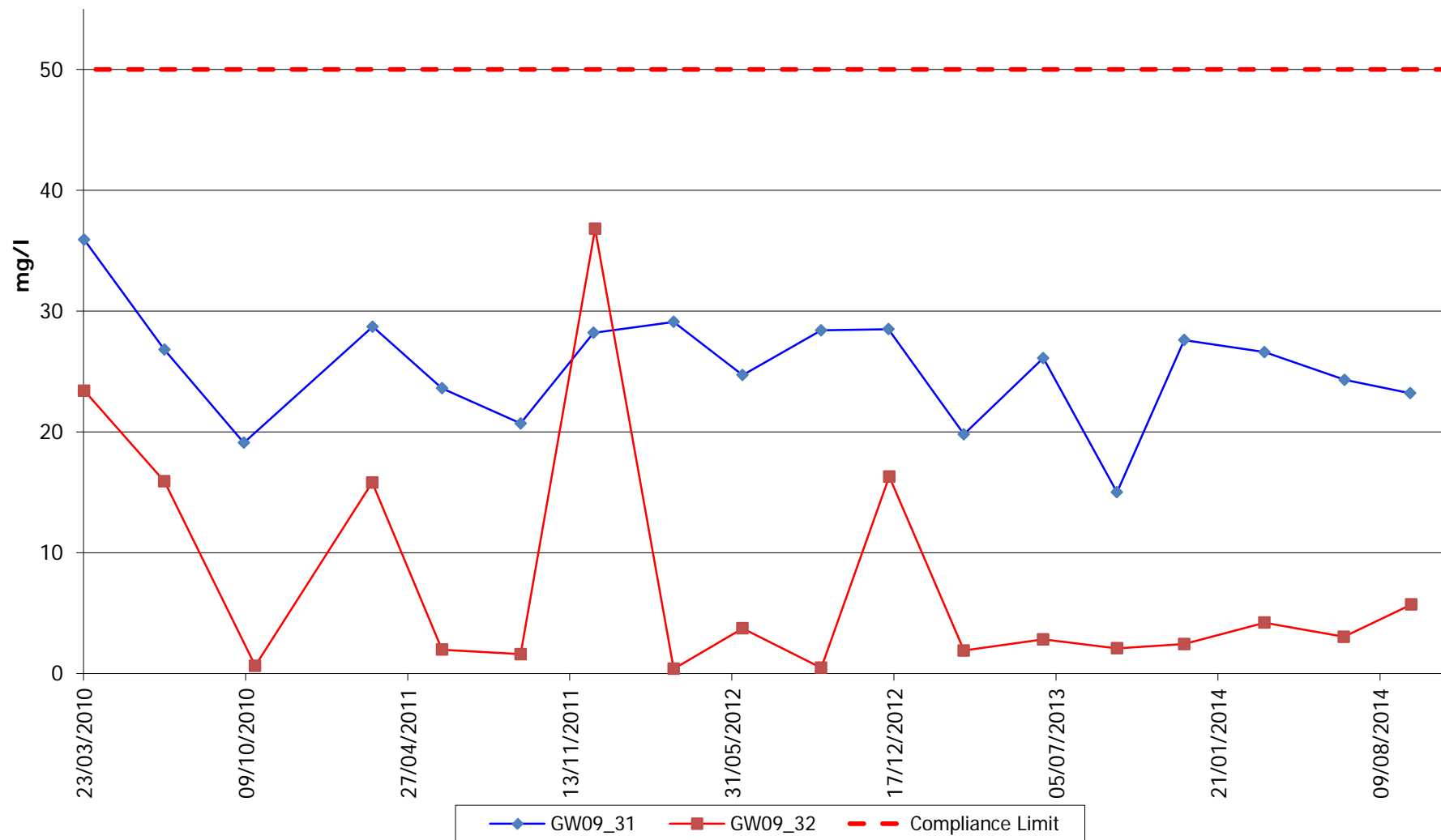
Docksway Disposal Site - Ammoniacal Nitrogen in Groundwater



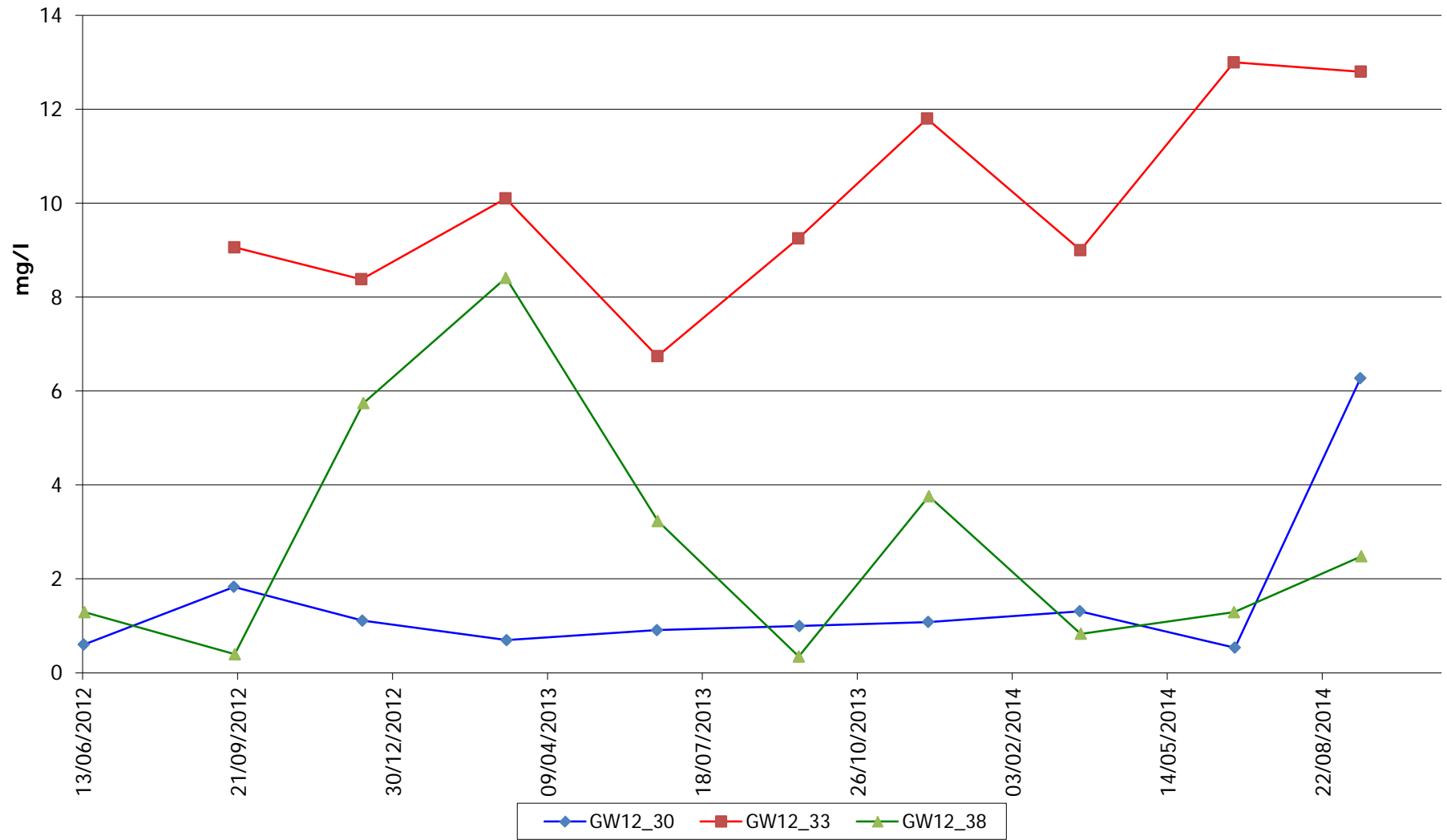
Docksway Disposal Site - Ammoniacal Nitrogen in Groundwater



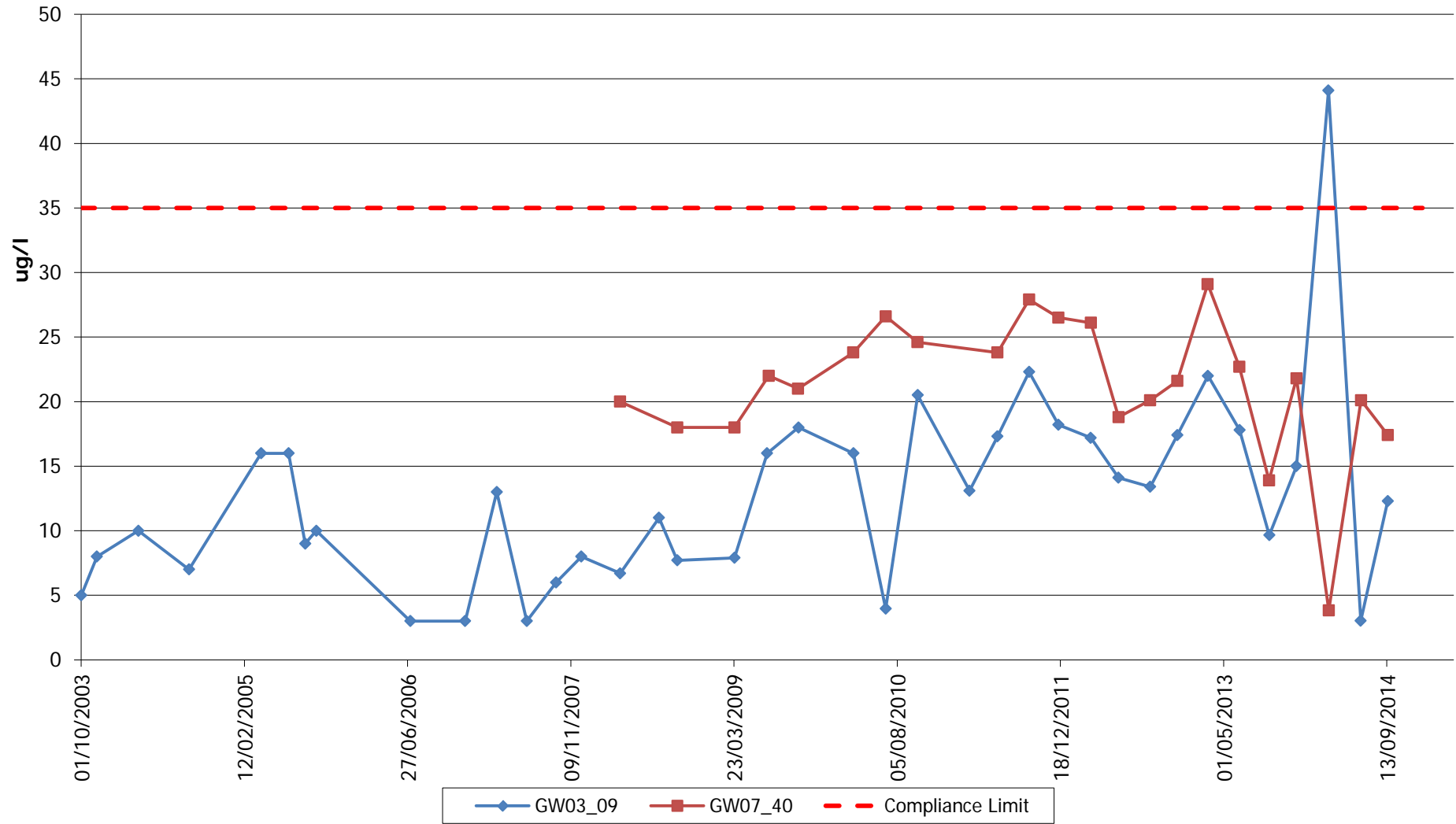
Docksway Disposal Site - Ammoniacal Nitrogen in Groundwater



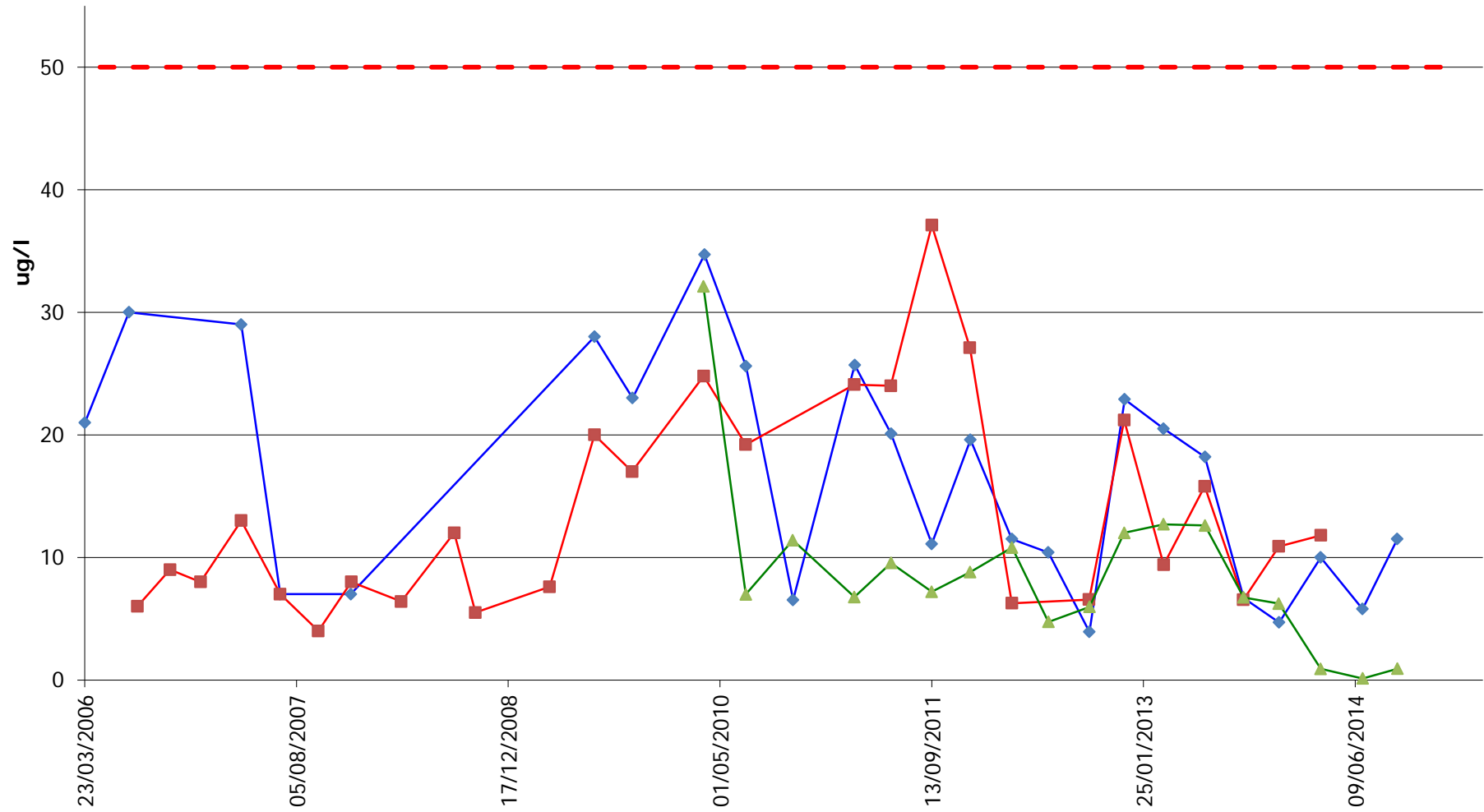
Docksway Disposal Site - Ammoniacal Nitrogen in Groundwater



Docksway Disposal Site - Arsenic in Groundwater

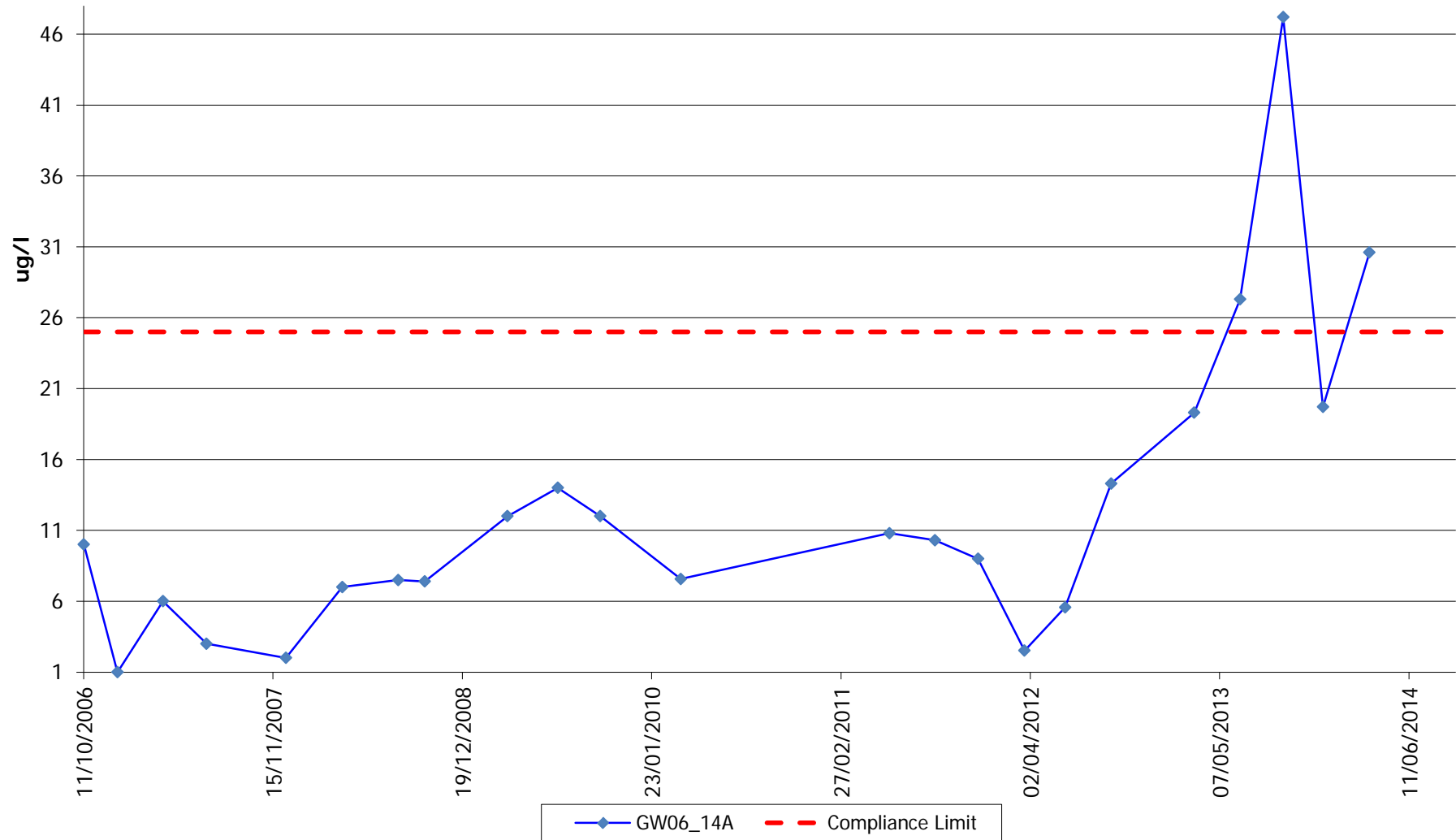


Docksway Disposal Site - Arsenic in Groundwater

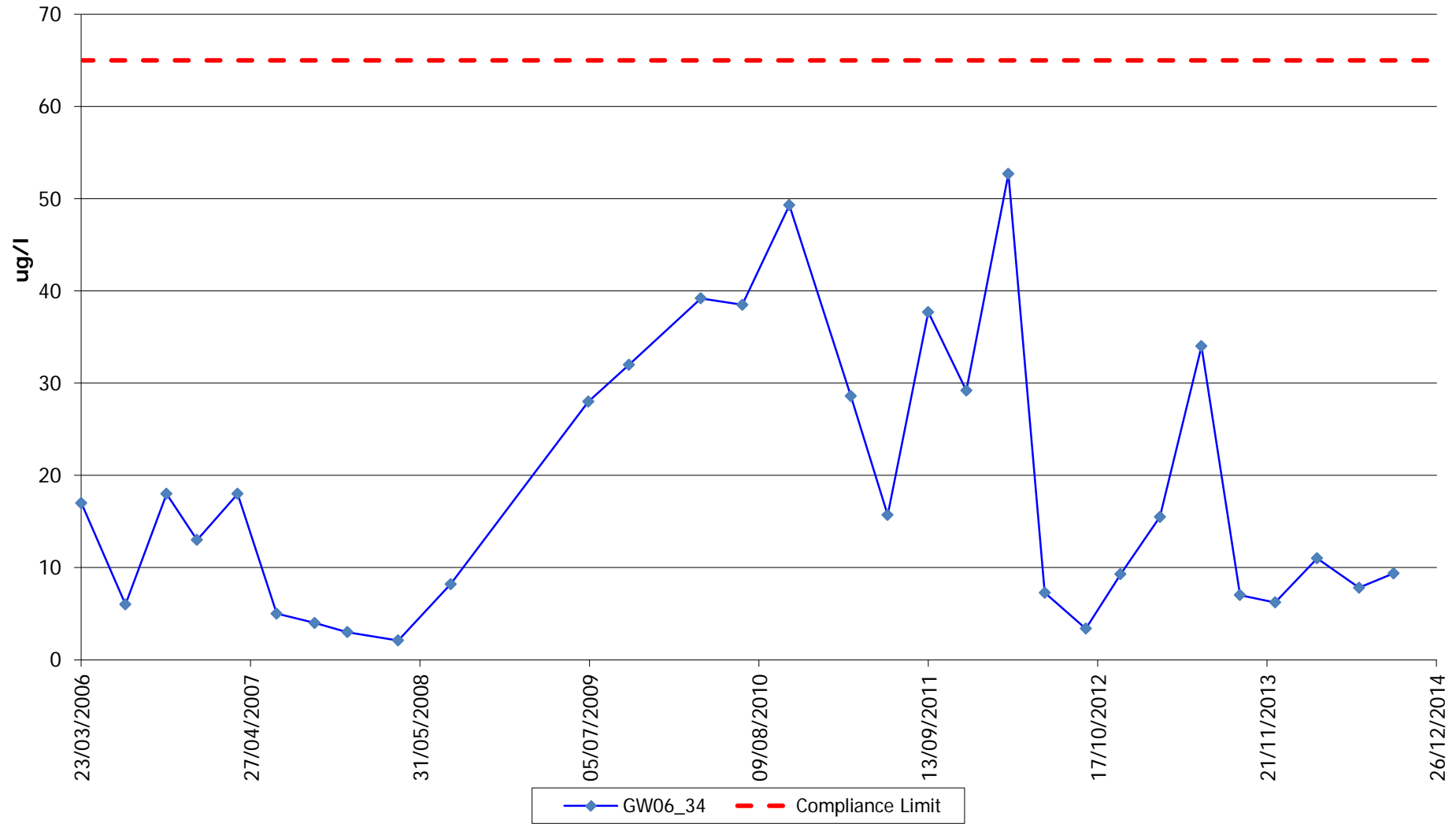


GW06_13 GW06_39 GW09_35 Compliance Limit

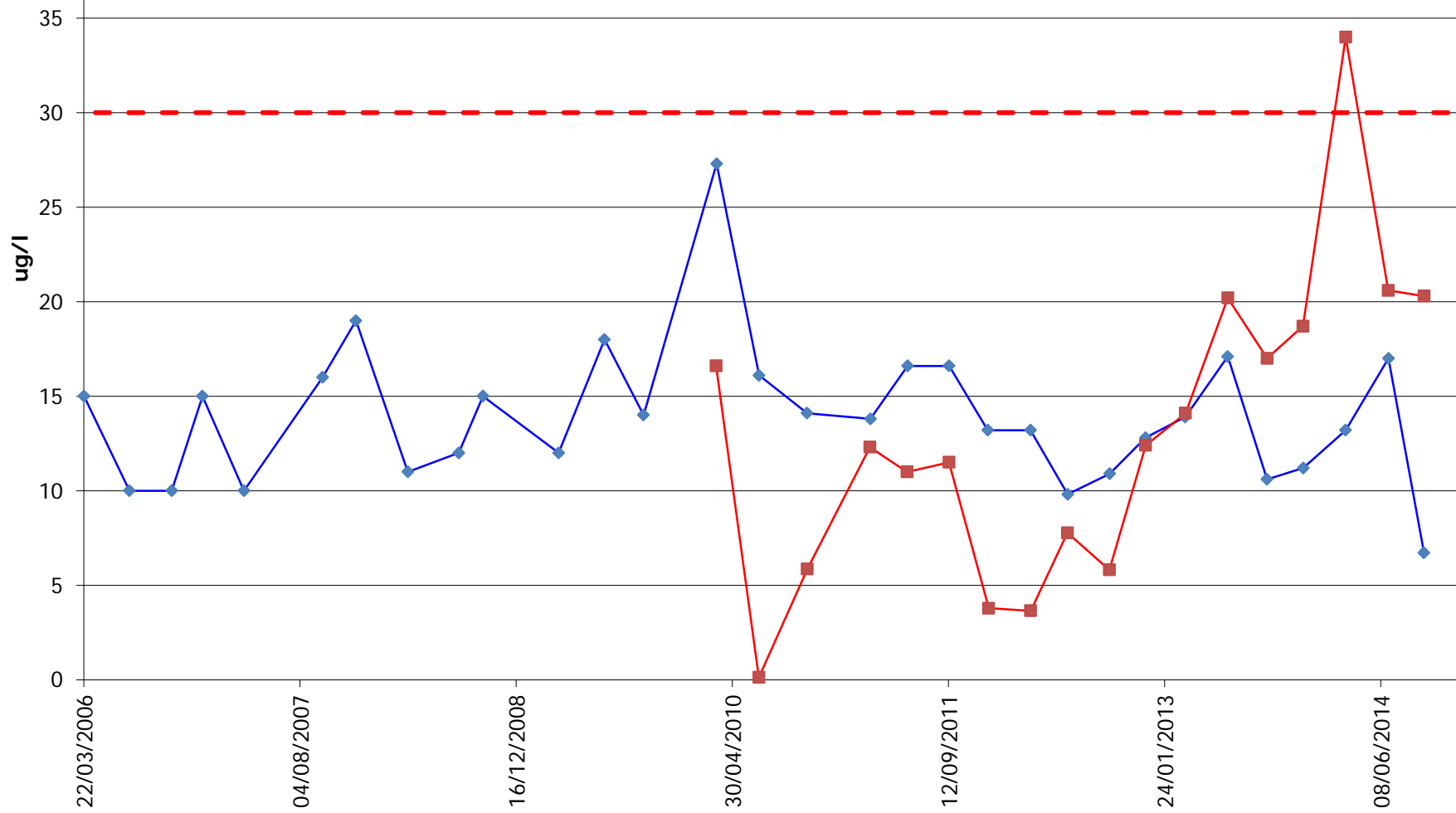
Docksway Disposal Site - Arsenic in Groundwater



Docksway Disposal Site - Arsenic in Groundwater

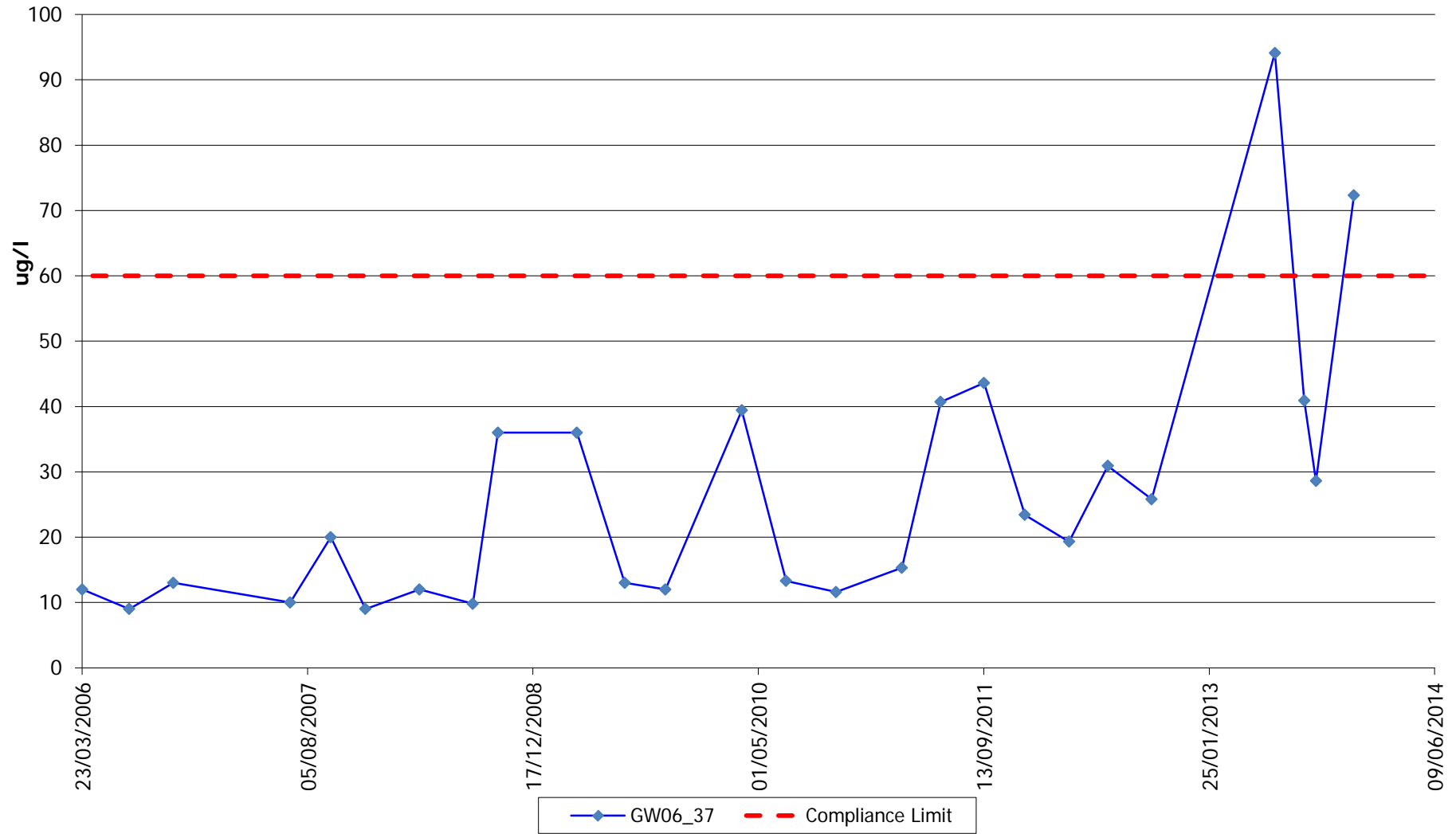


Docksway Disposal Site - Arsenic in Groundwater

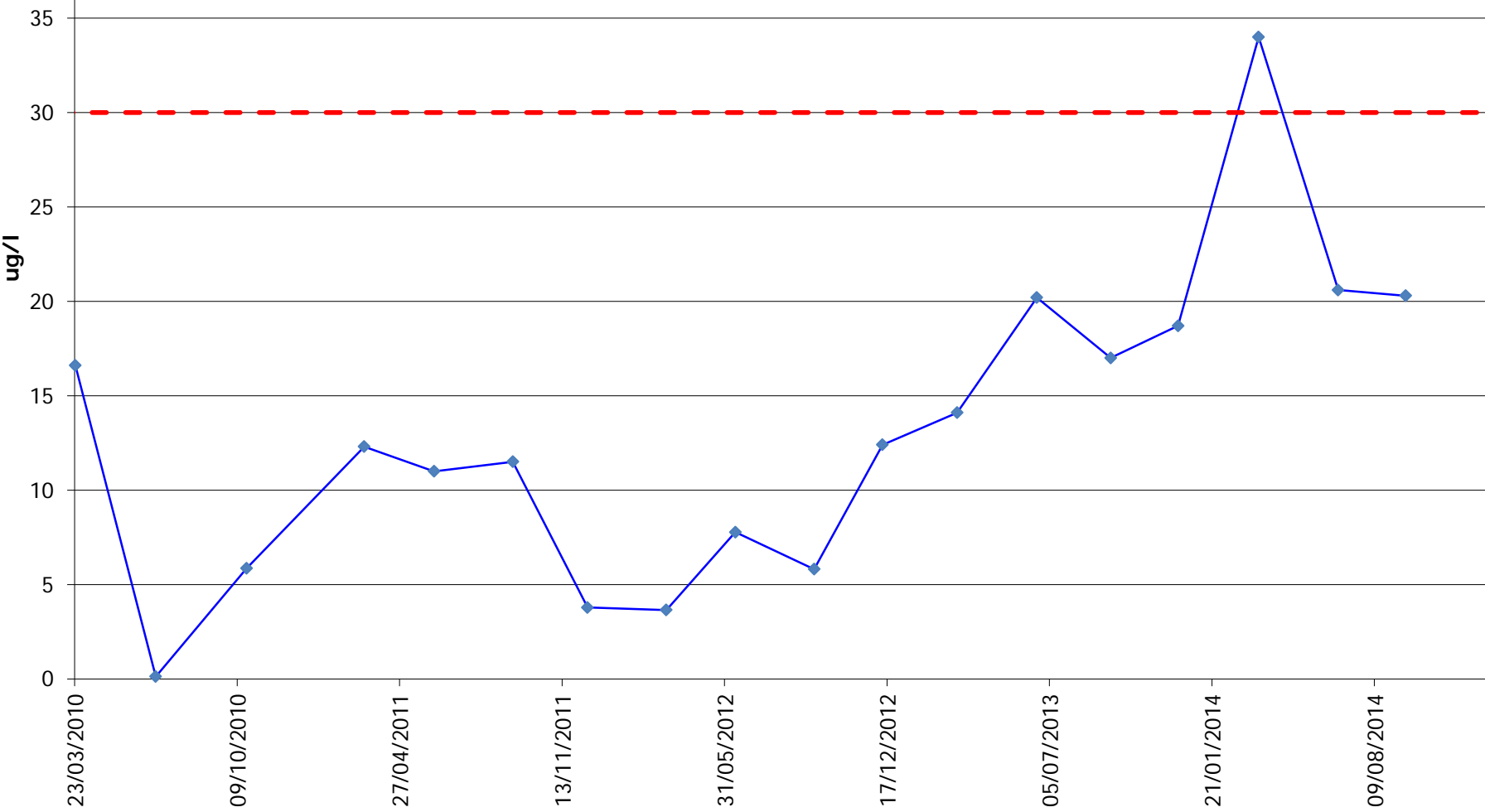


GW06_36 GW09_32 Compliance Limit

Docksway Disposal Site - Arsenic in Groundwater

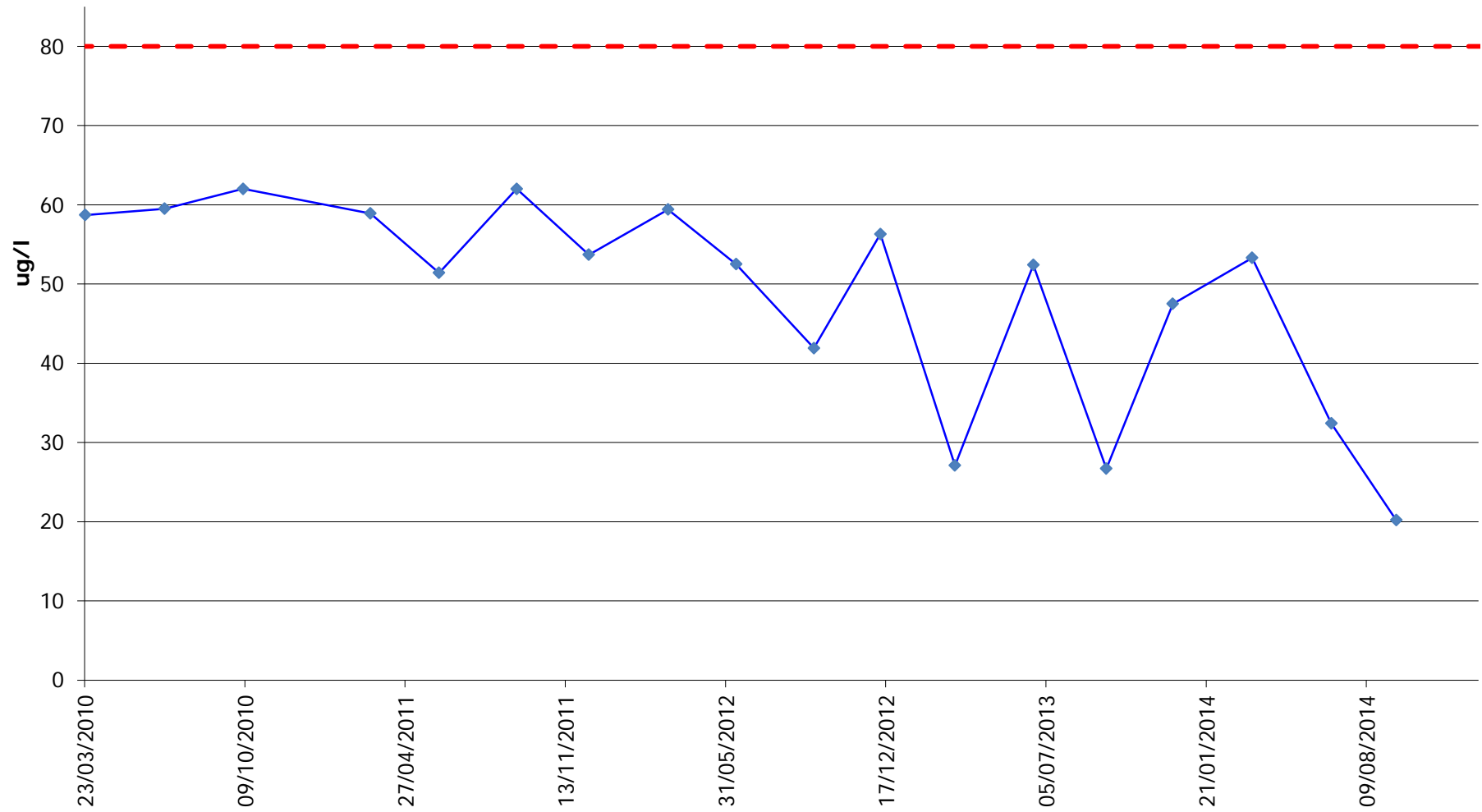


Docksway Disposal Site - Arsenic in Groundwater



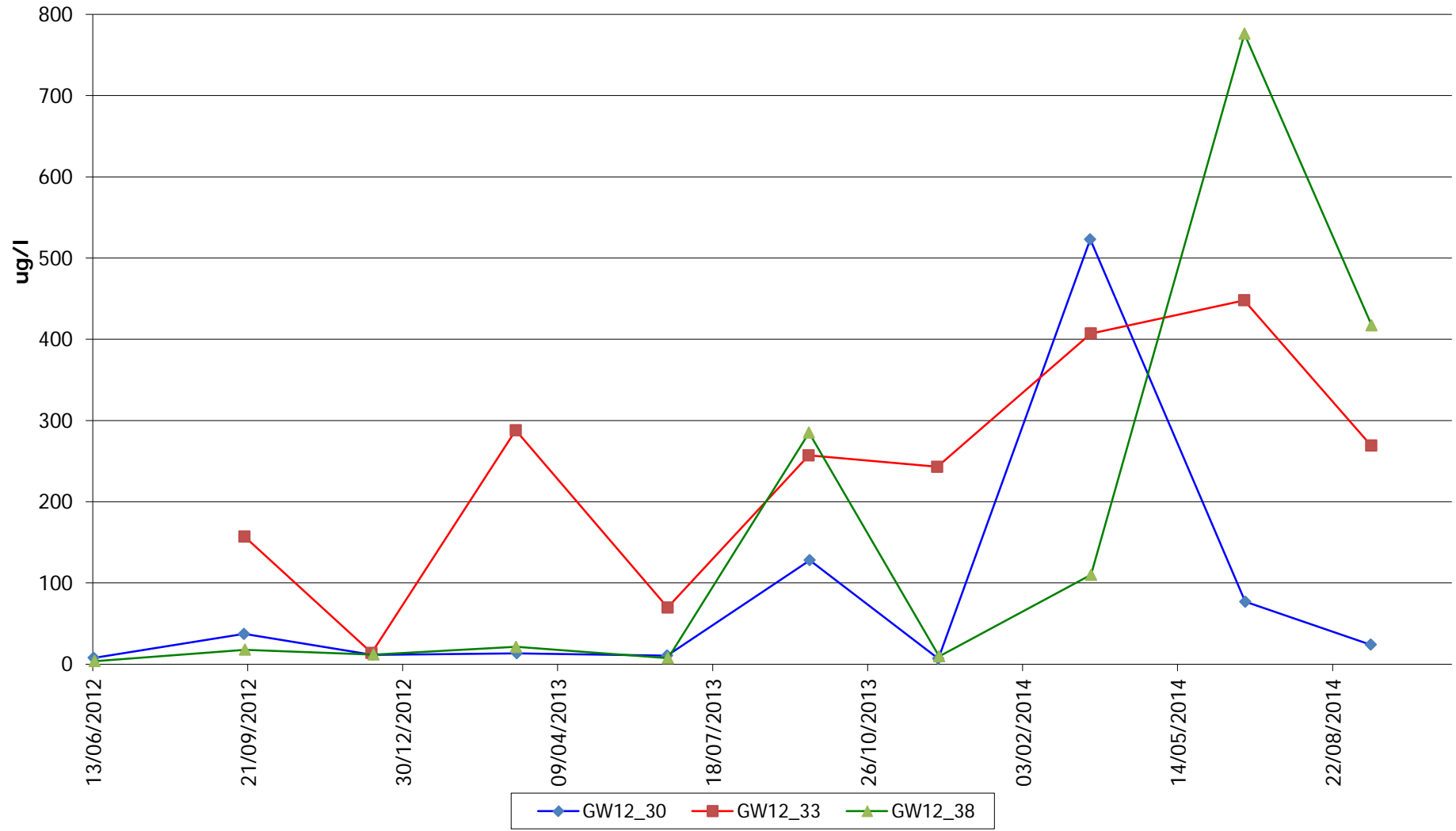
GW09_32 Compliance Limit

Docksway Disposal Site - Arsenic in Groundwater

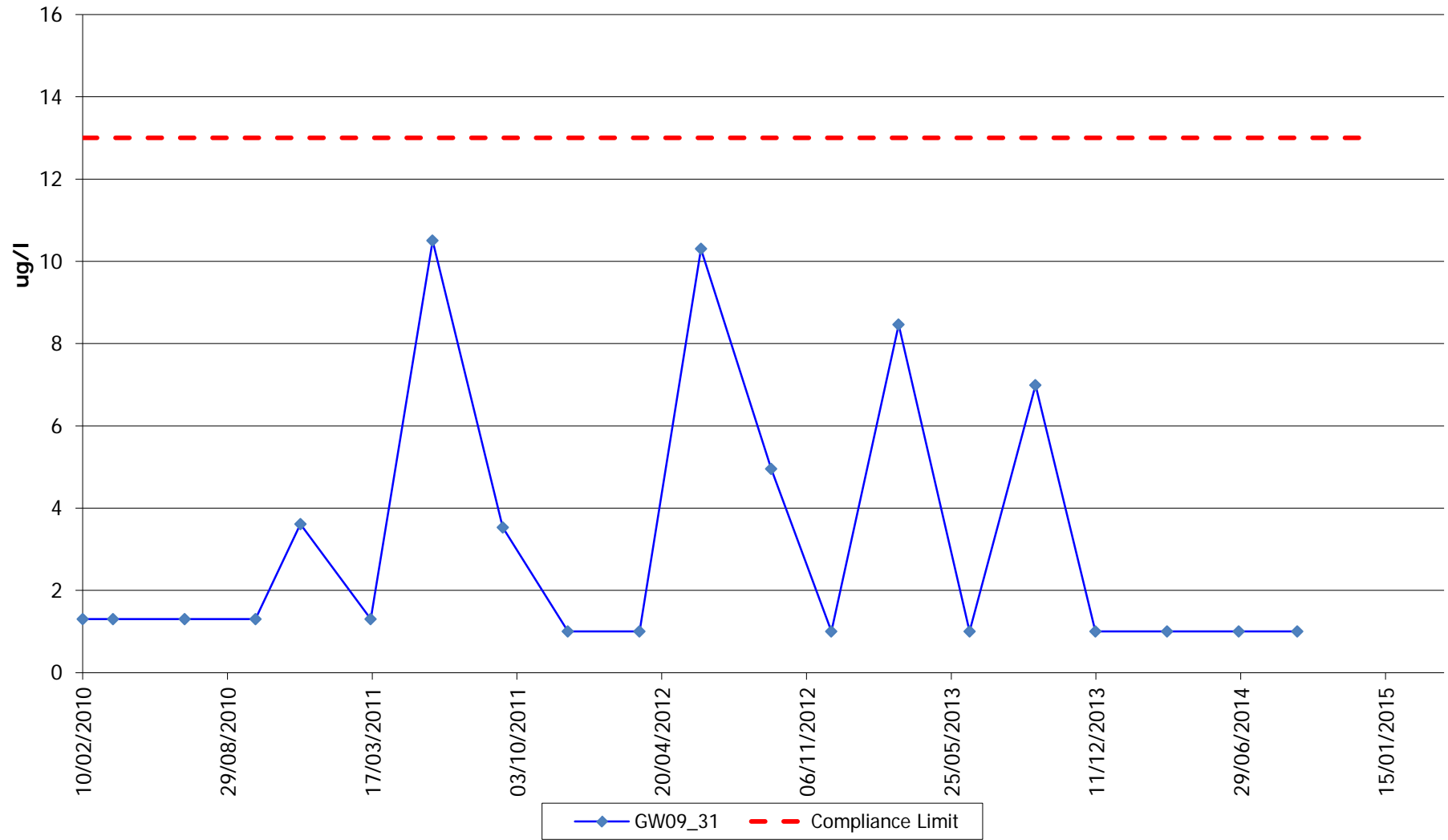


GW09_31 Compliance Limit

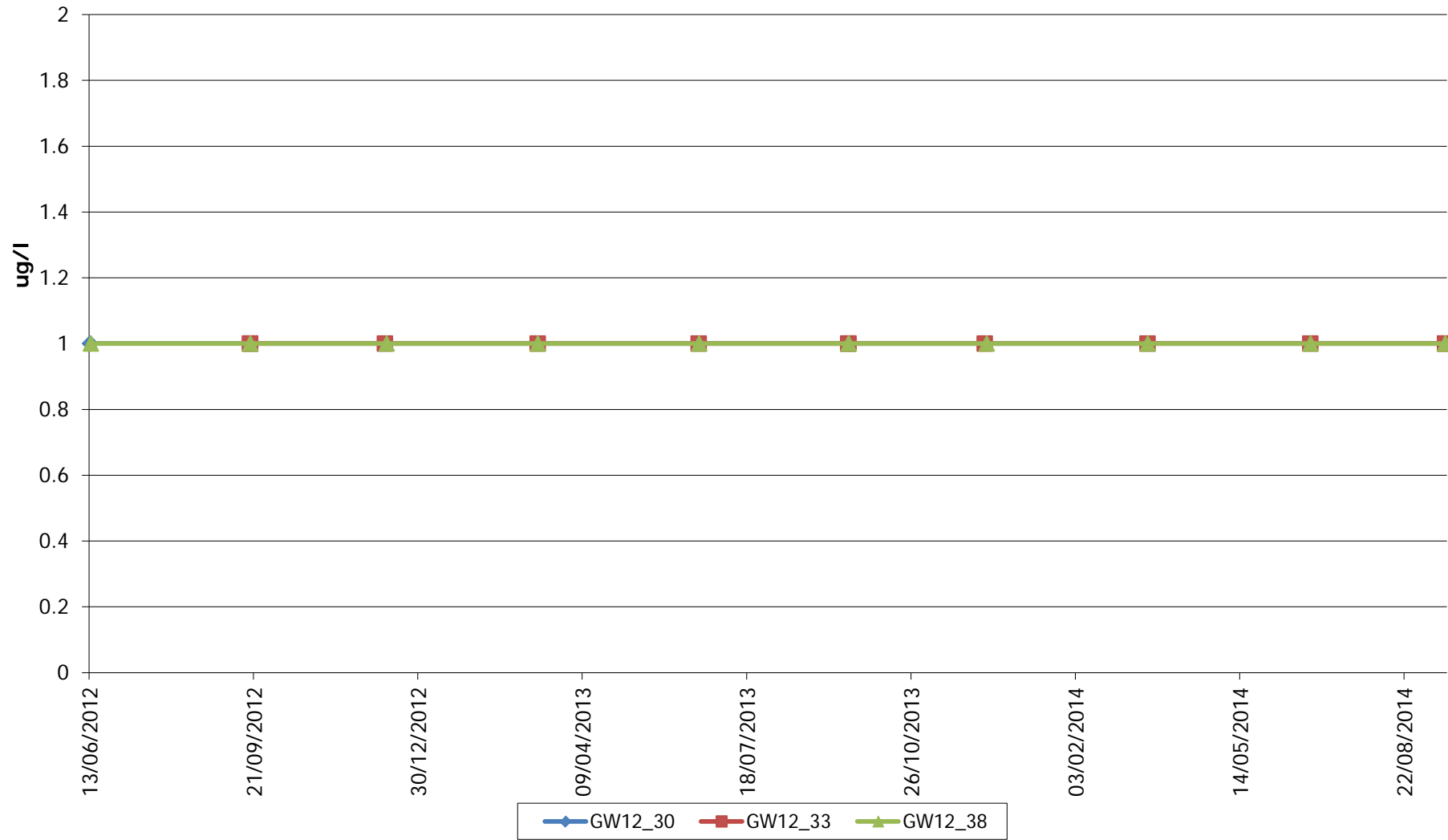
Docksway Disposal Site - Arsenic in Groundwater



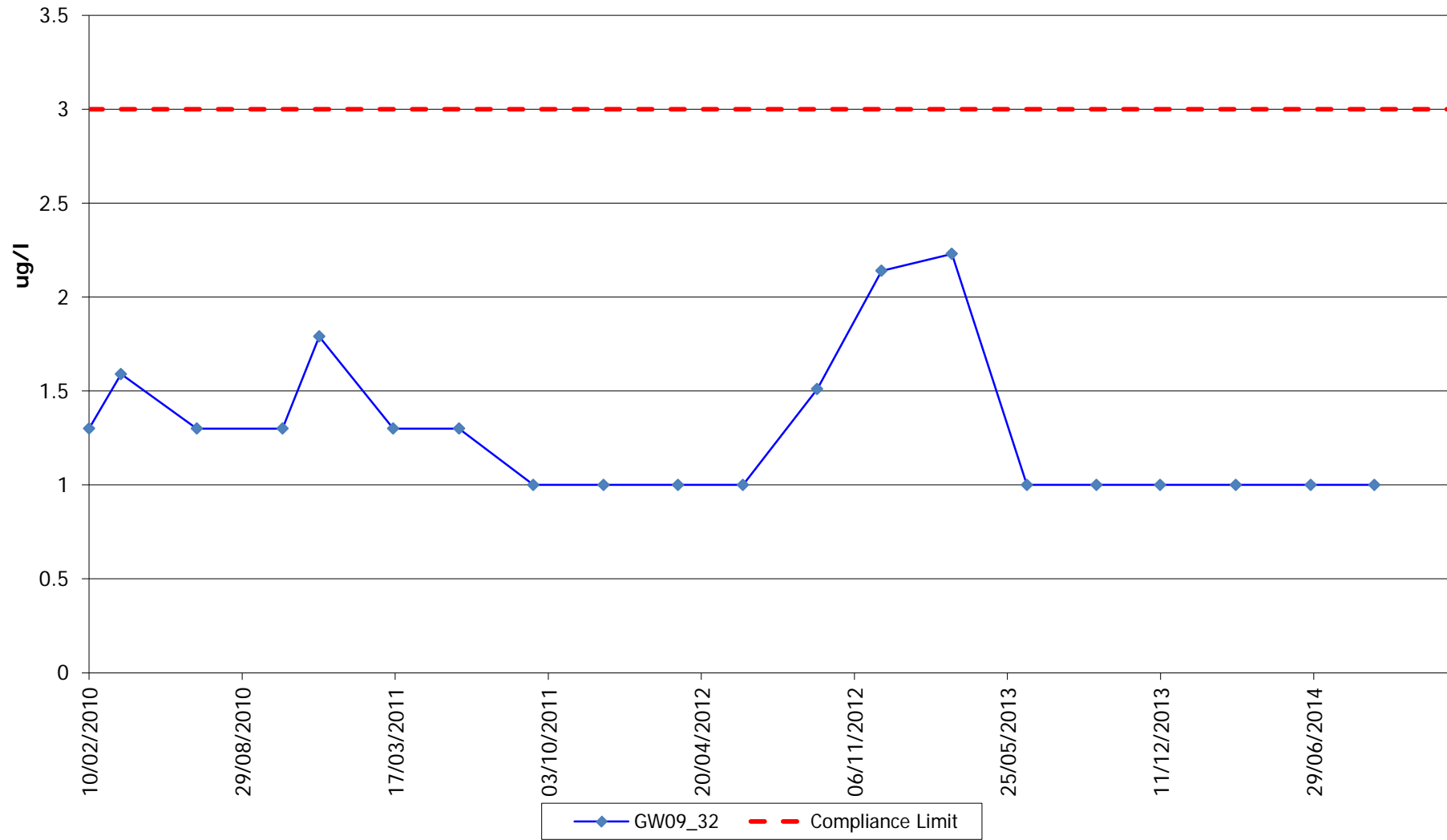
Docksway Disposal Site - Benzene in Groundwater



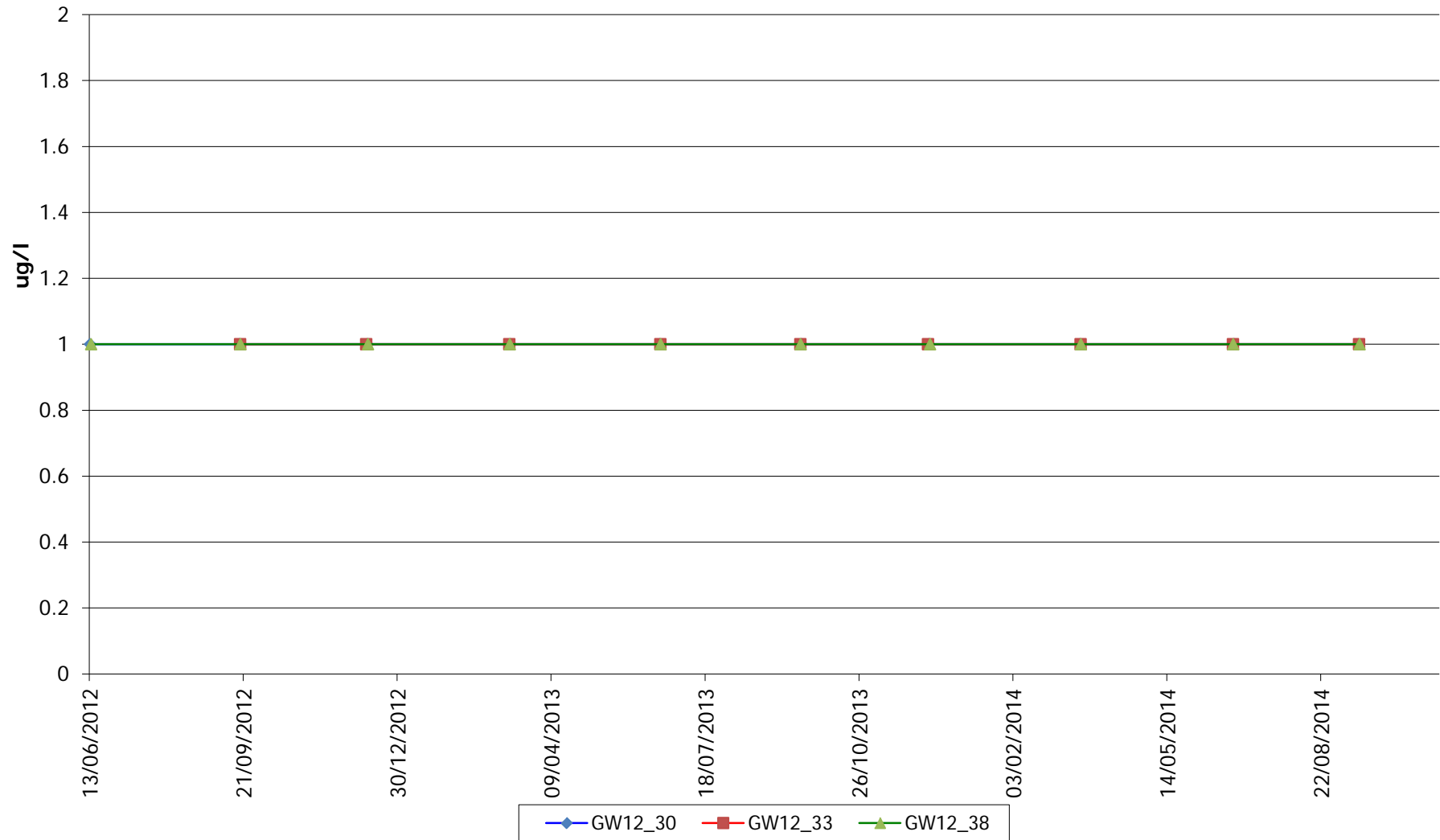
Docksway Disposal Site - Naphthalene in Groundwater



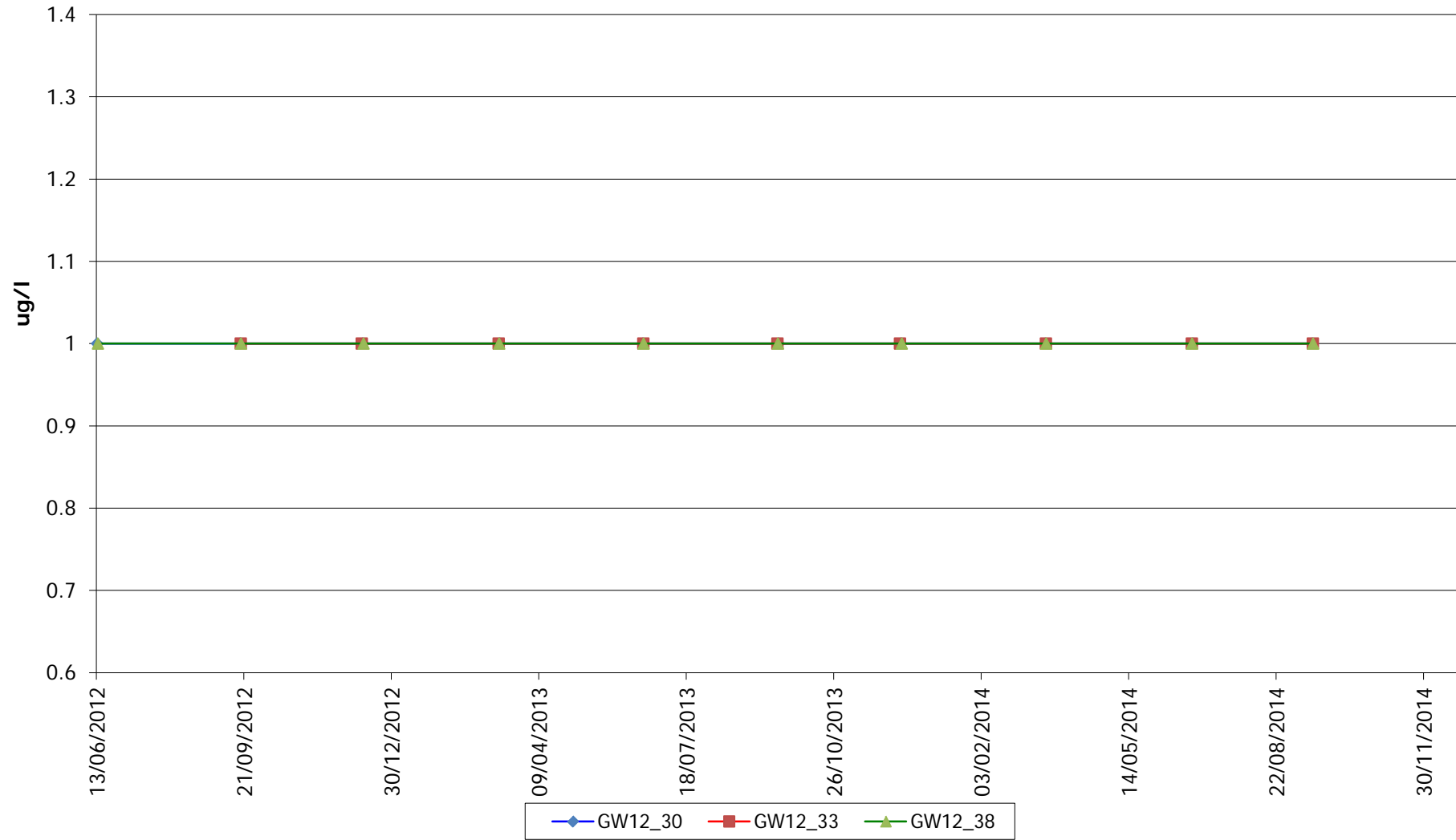
Docksway Disposal Site - Benzene in Groundwater



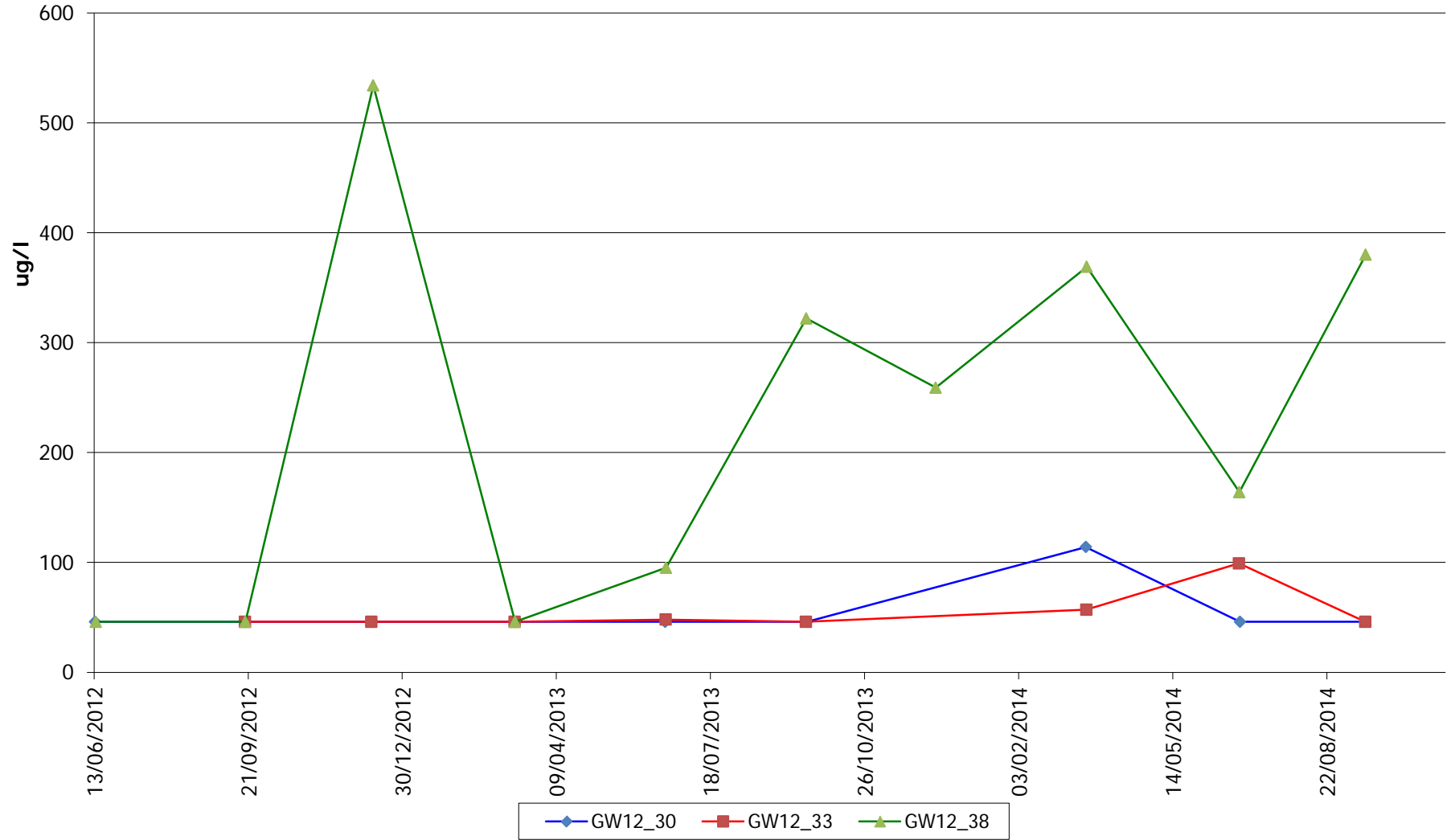
Docksway Disposal Site - O-Xylene in Groundwater



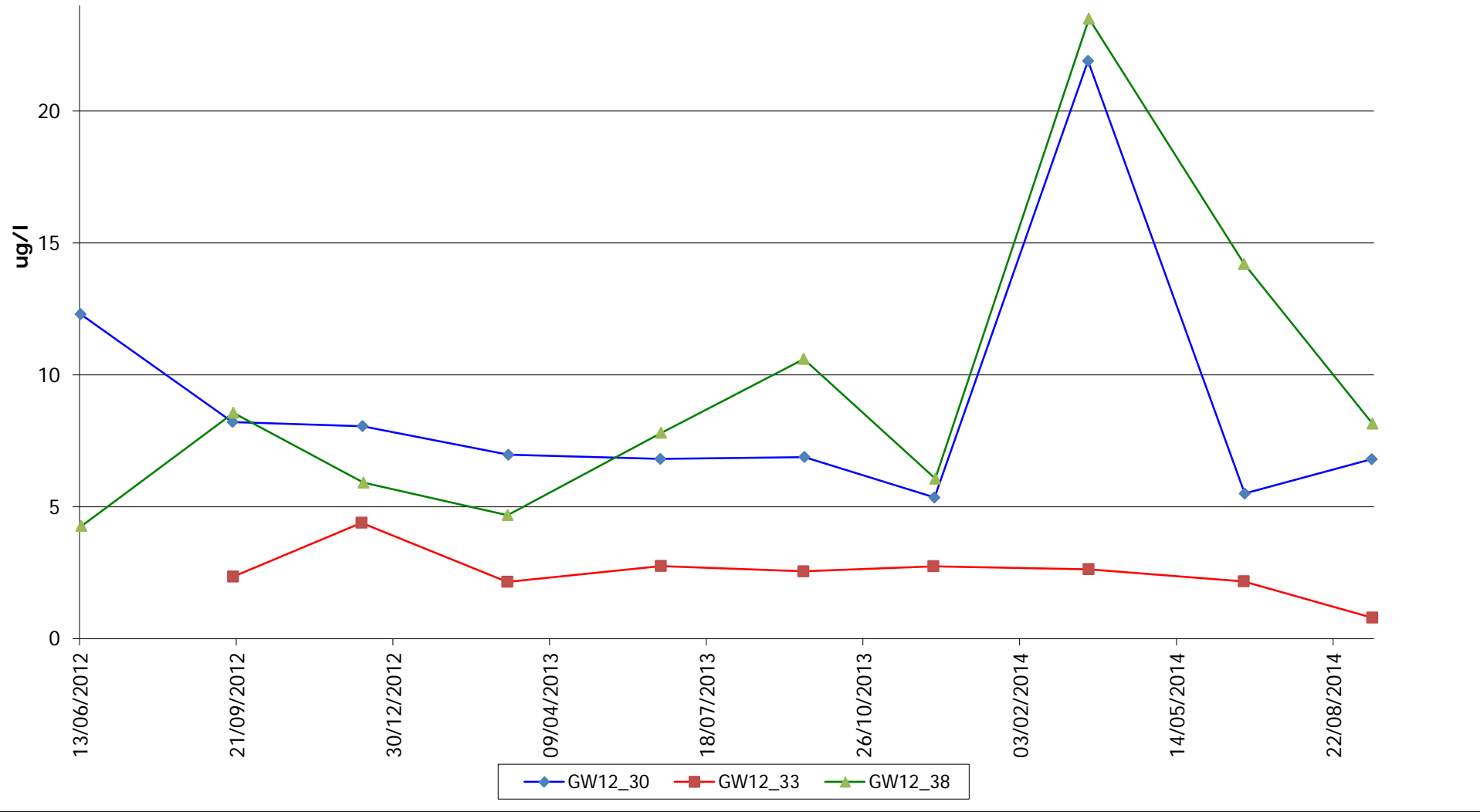
Docksway Disposal Site - Benzene in Groundwater



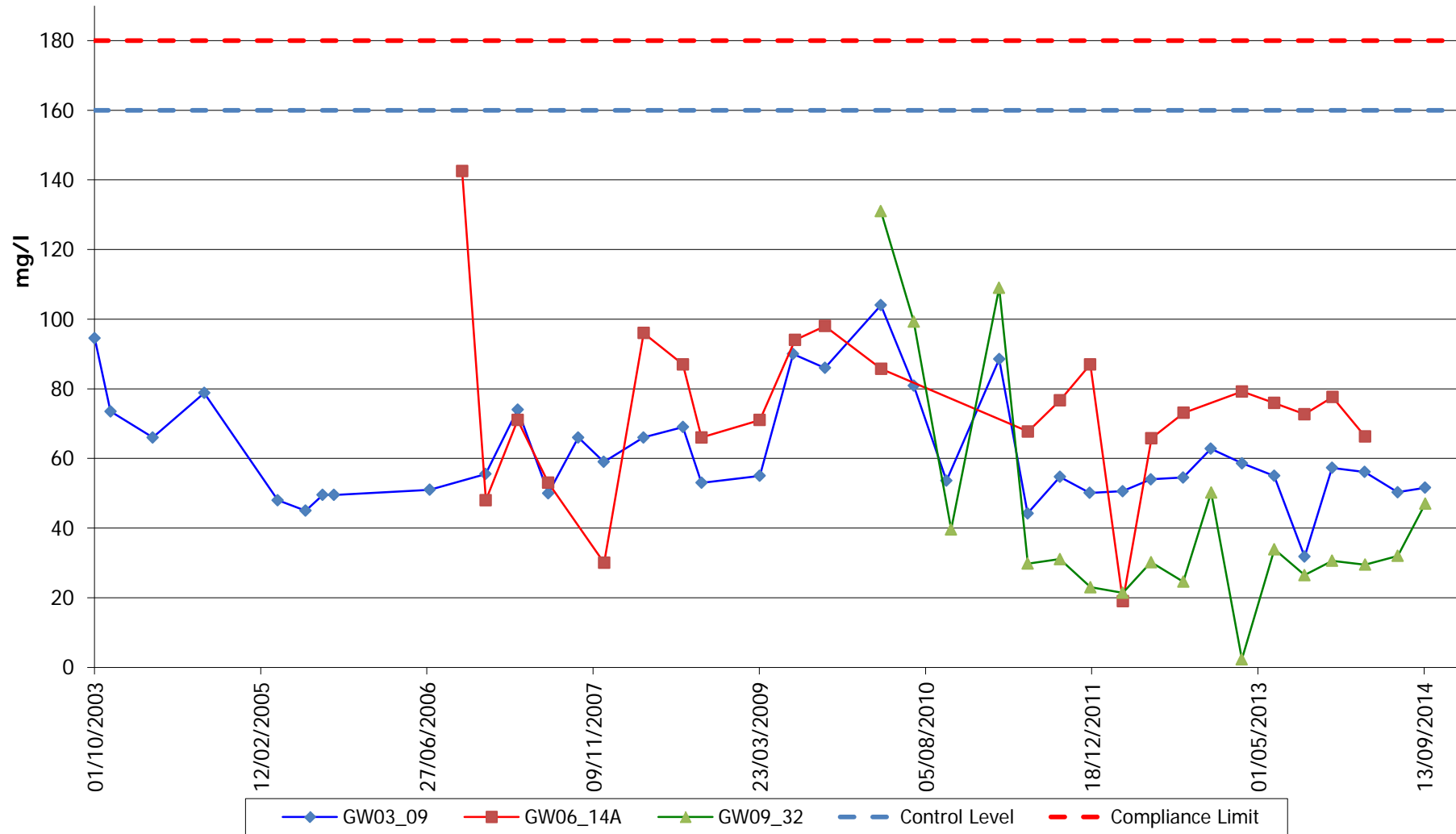
Docksway Disposal Site - EPH in Groundwater



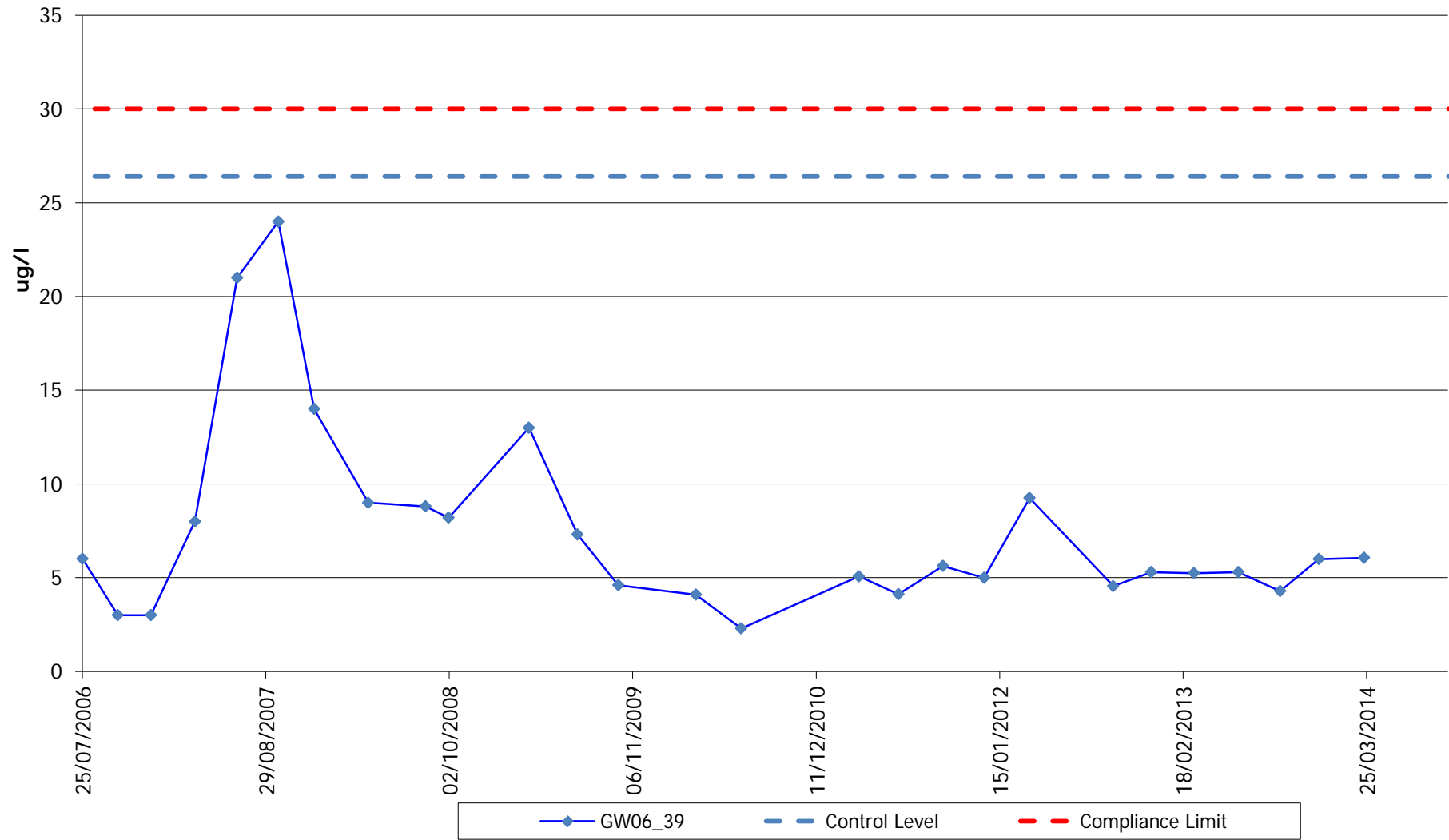
Docksway Disposal Site - Nickel in Groundwater



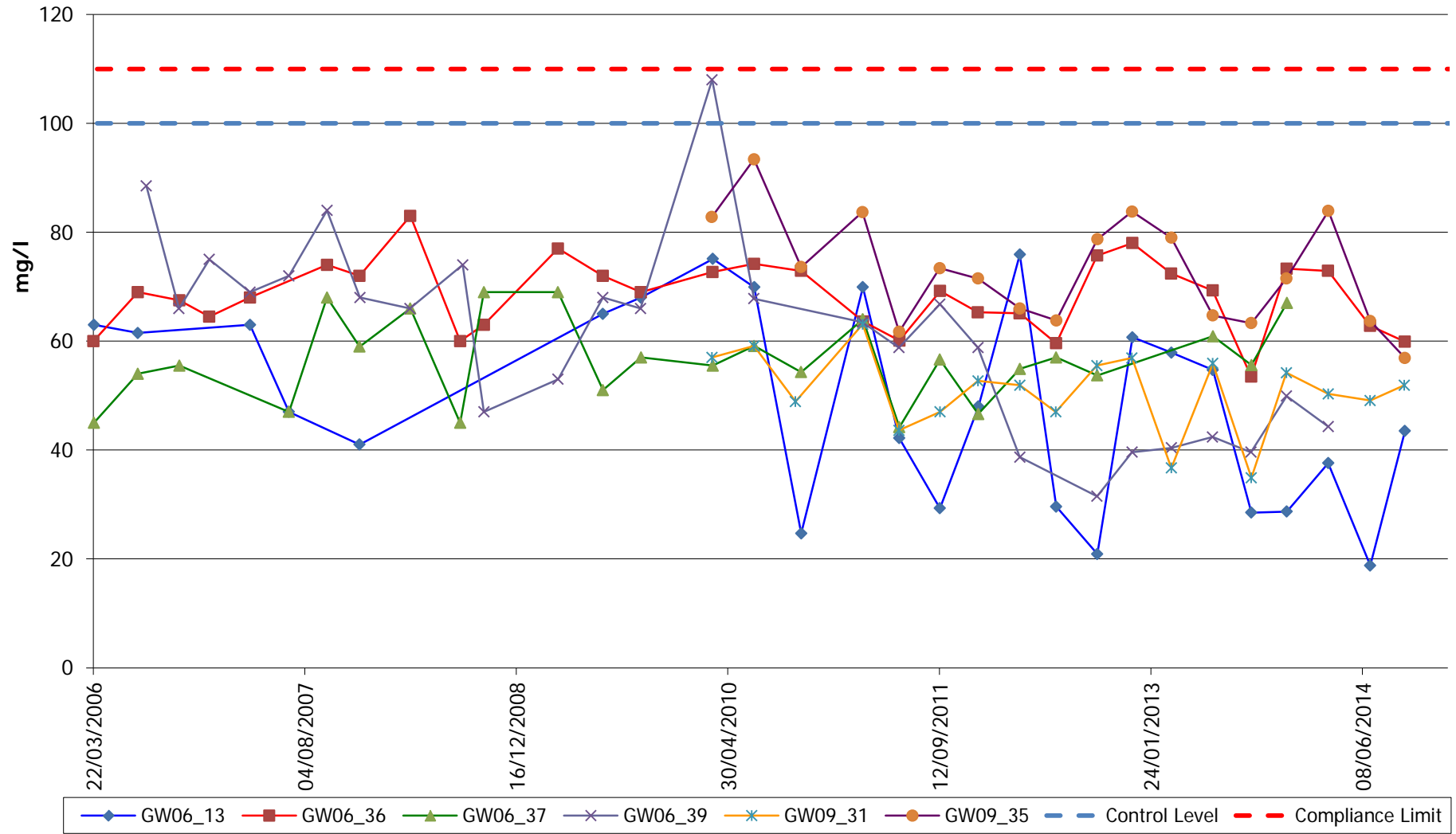
Docksway Disposal Site - Potassium in Groundwater



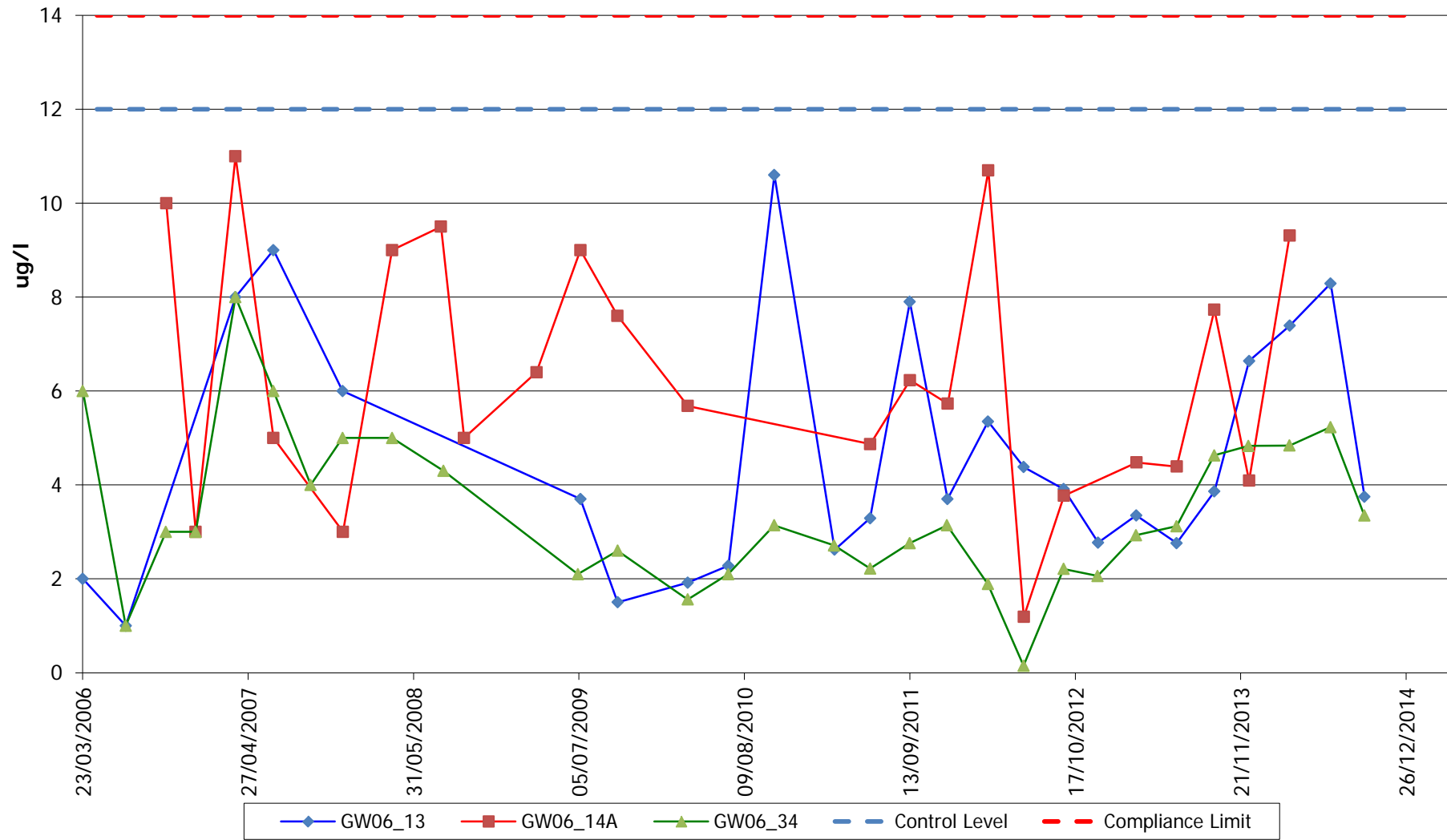
Docksway Disposal Site - Nickel in Groundwater



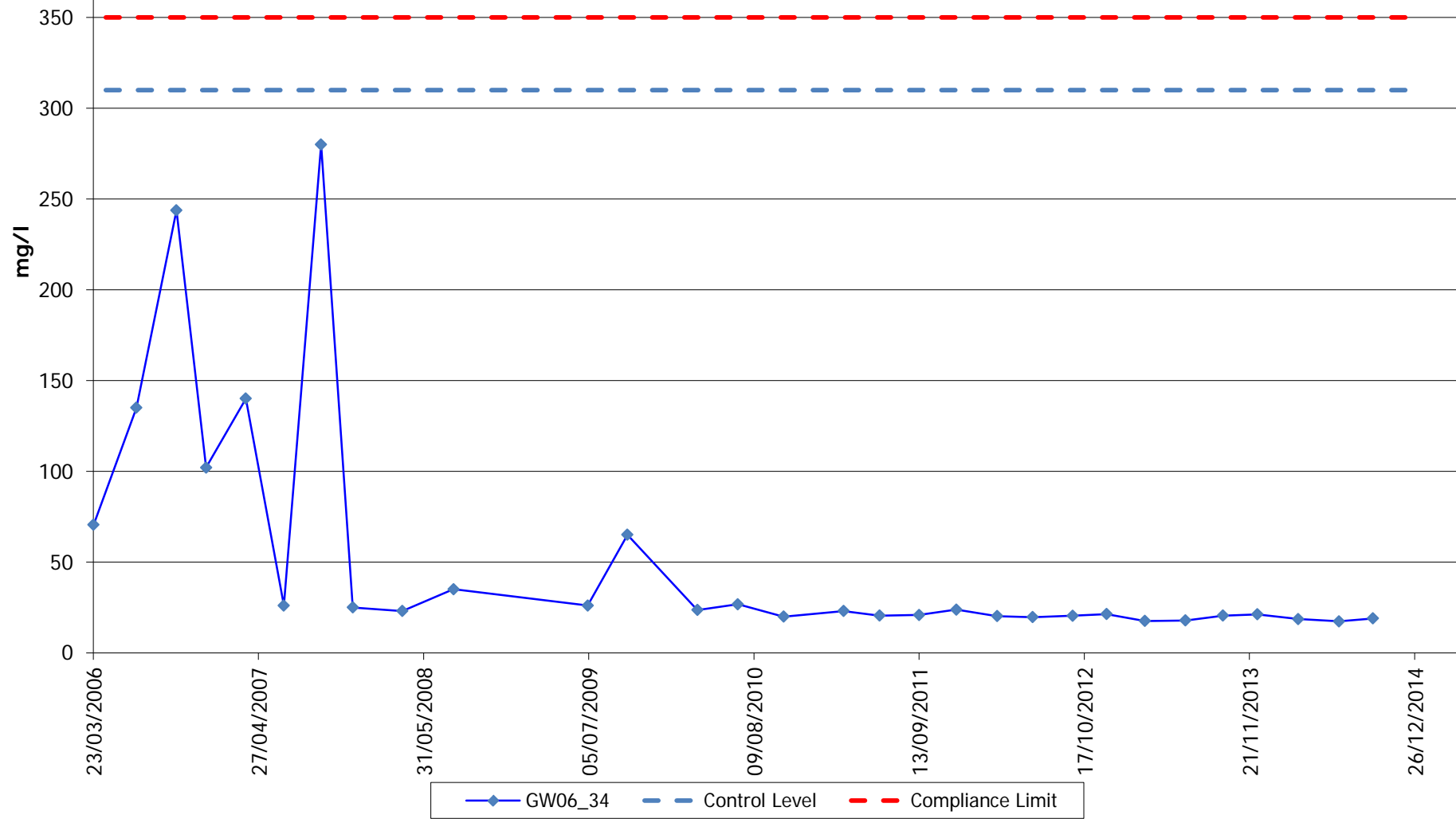
Docksway Disposal Site - Potassium in Groundwater



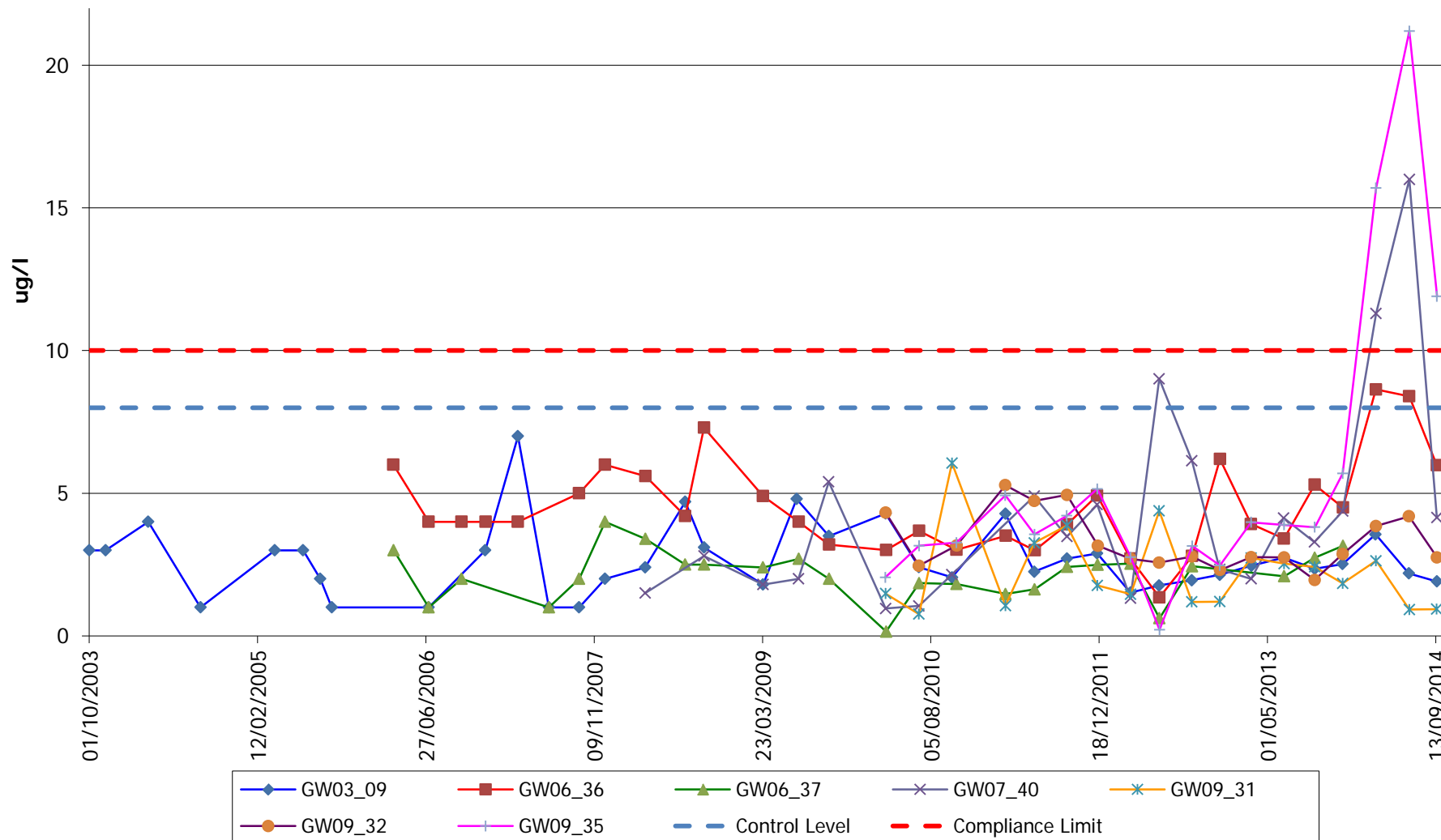
Docksway Disposal Site - Nickel in Groundwater



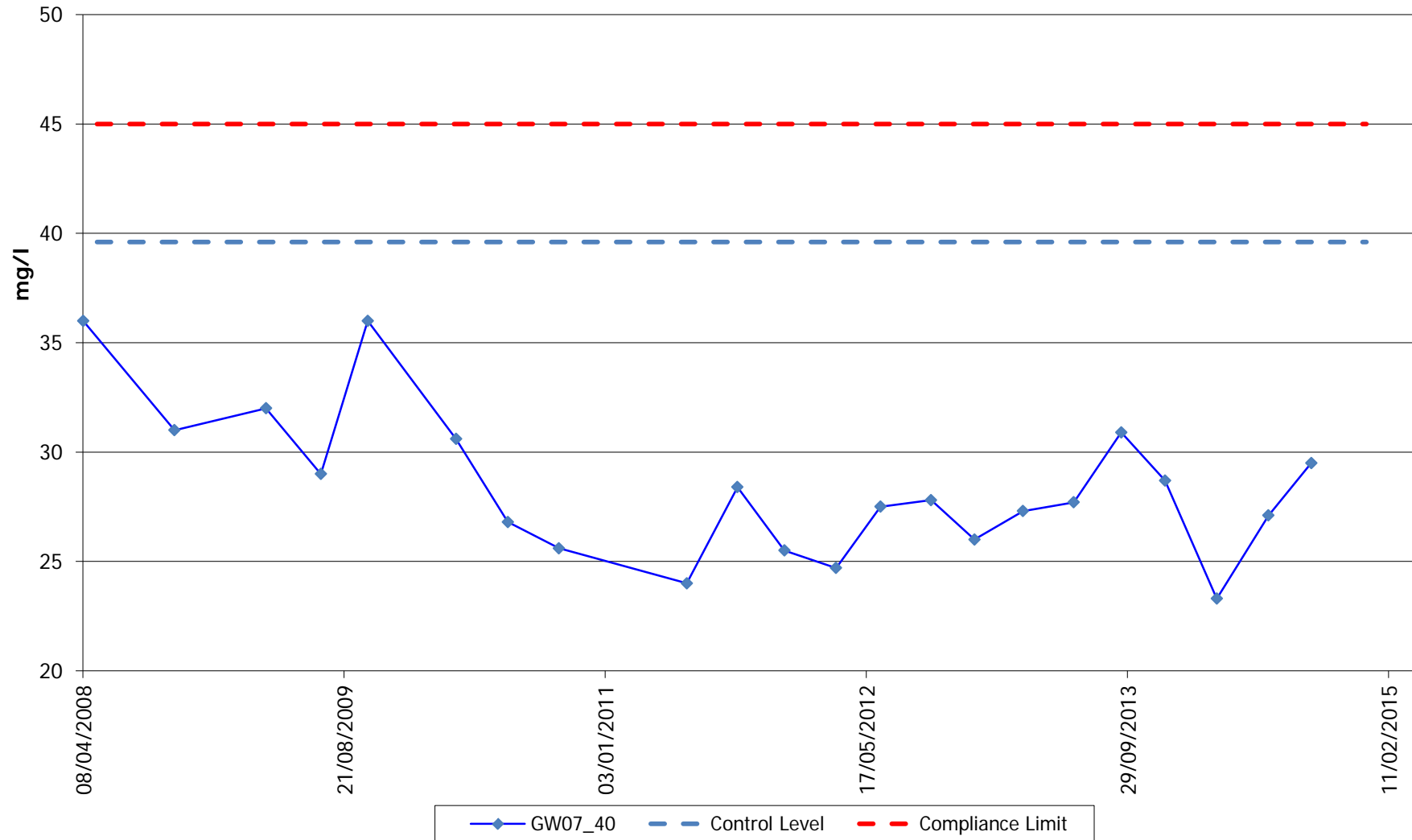
Docksway Disposal Site - Potassium in Groundwater



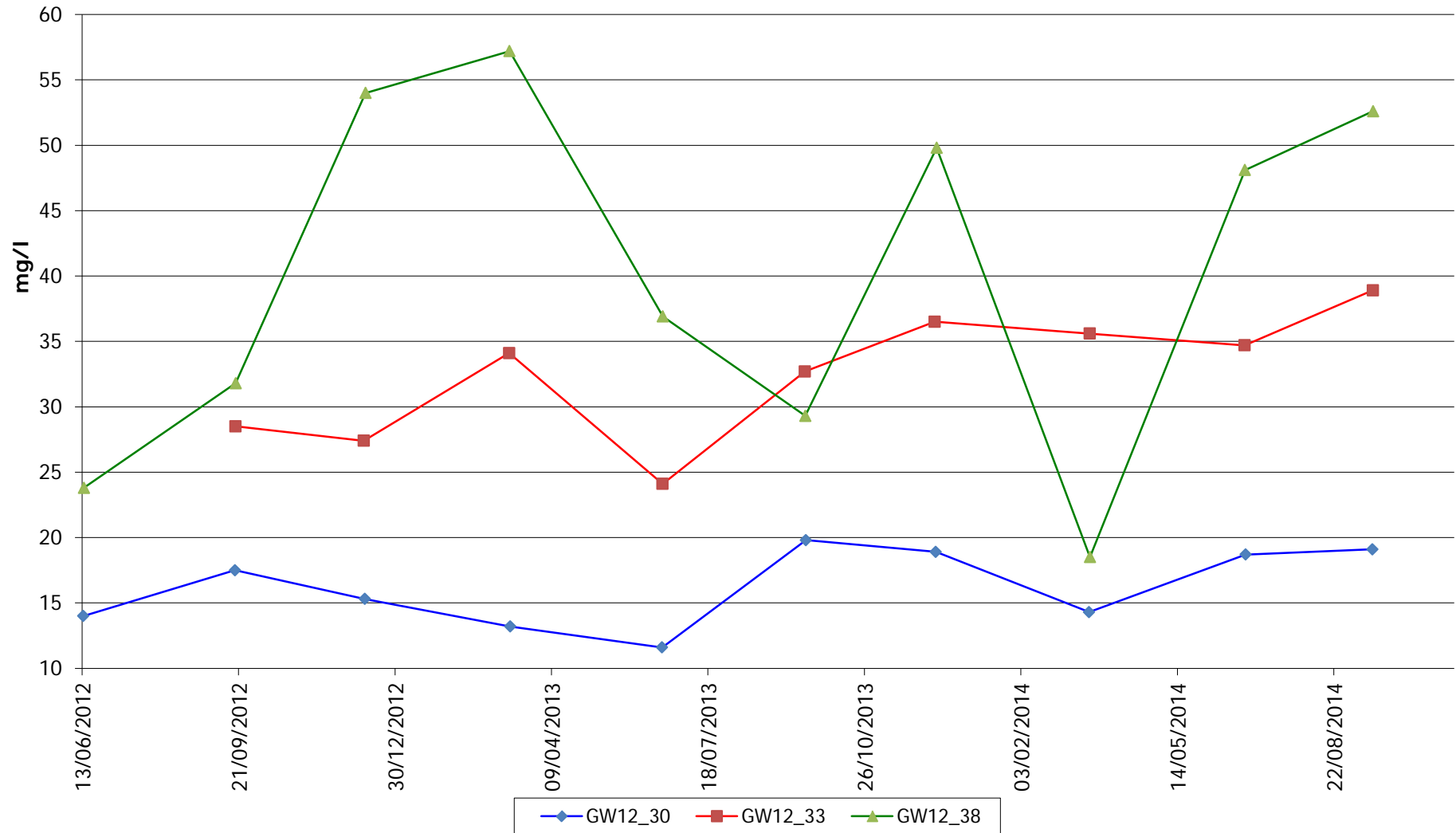
Docksway Disposal Site - Nickel in Groundwater



Docksway Disposal Site - Potassium in Groundwater

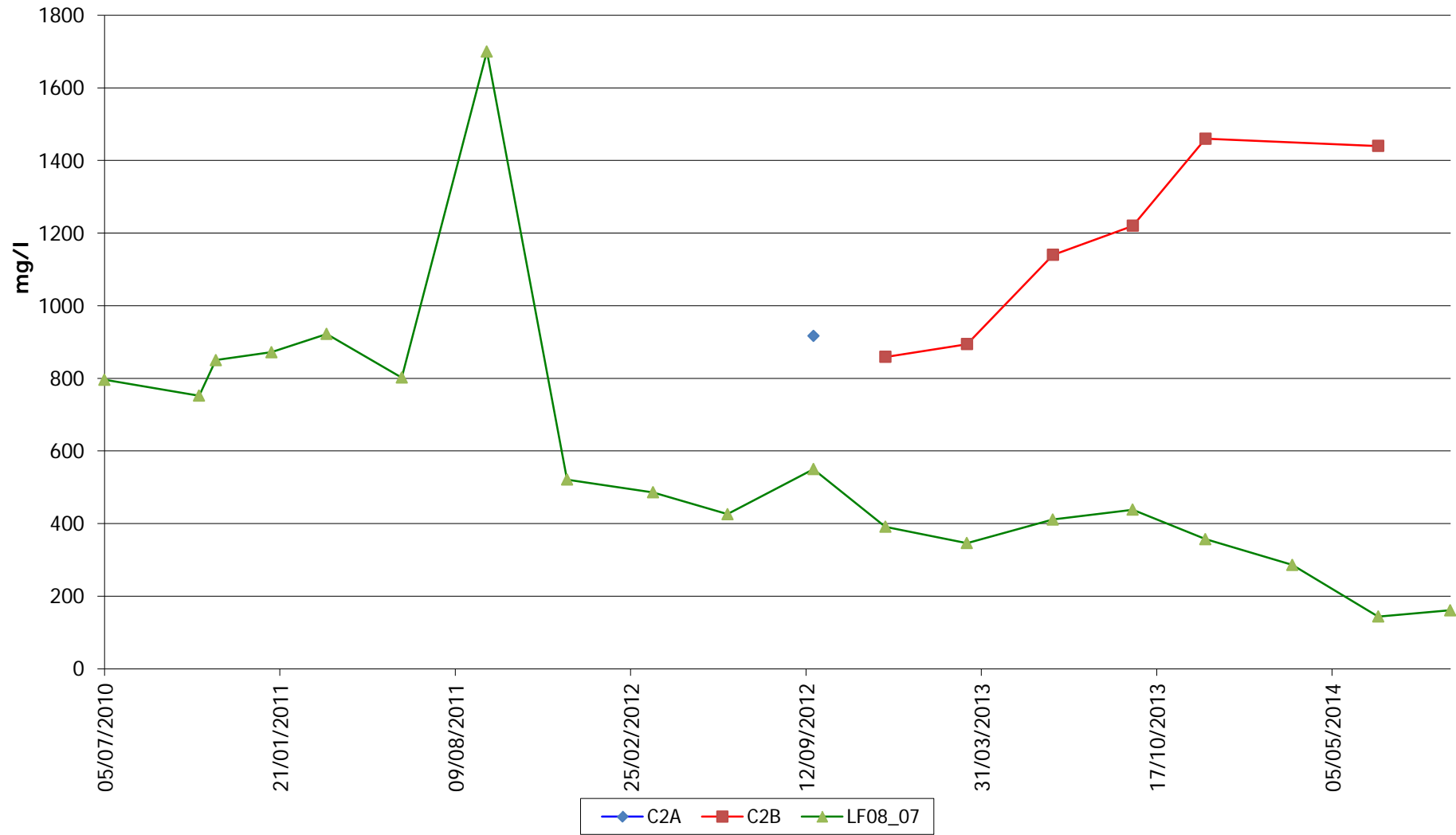


Docksway Disposal Site - Potassium in Groundwater

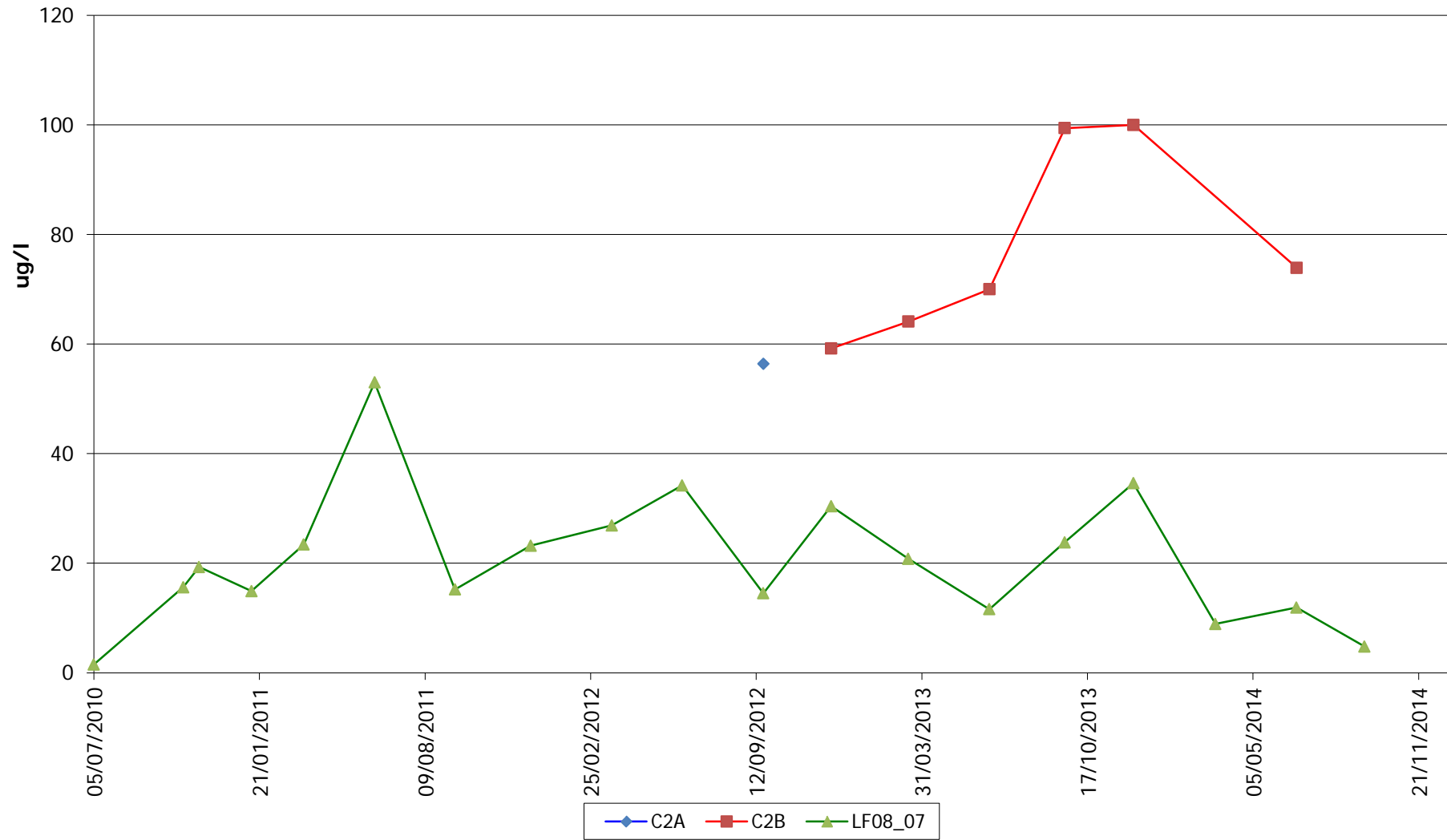


Appendix 3

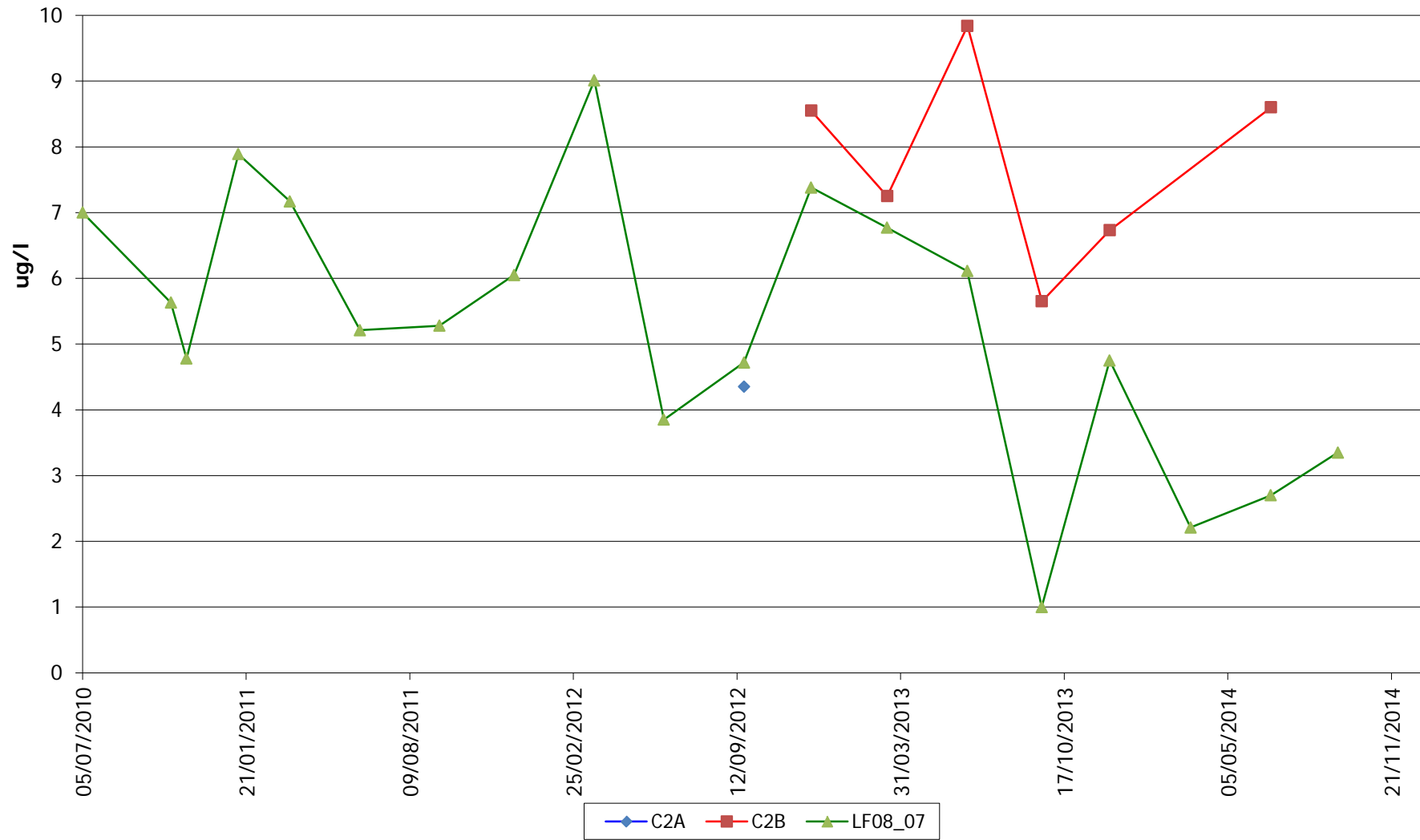
Docksway Disposal Site - Ammoniacal Nitrogen in Leachate



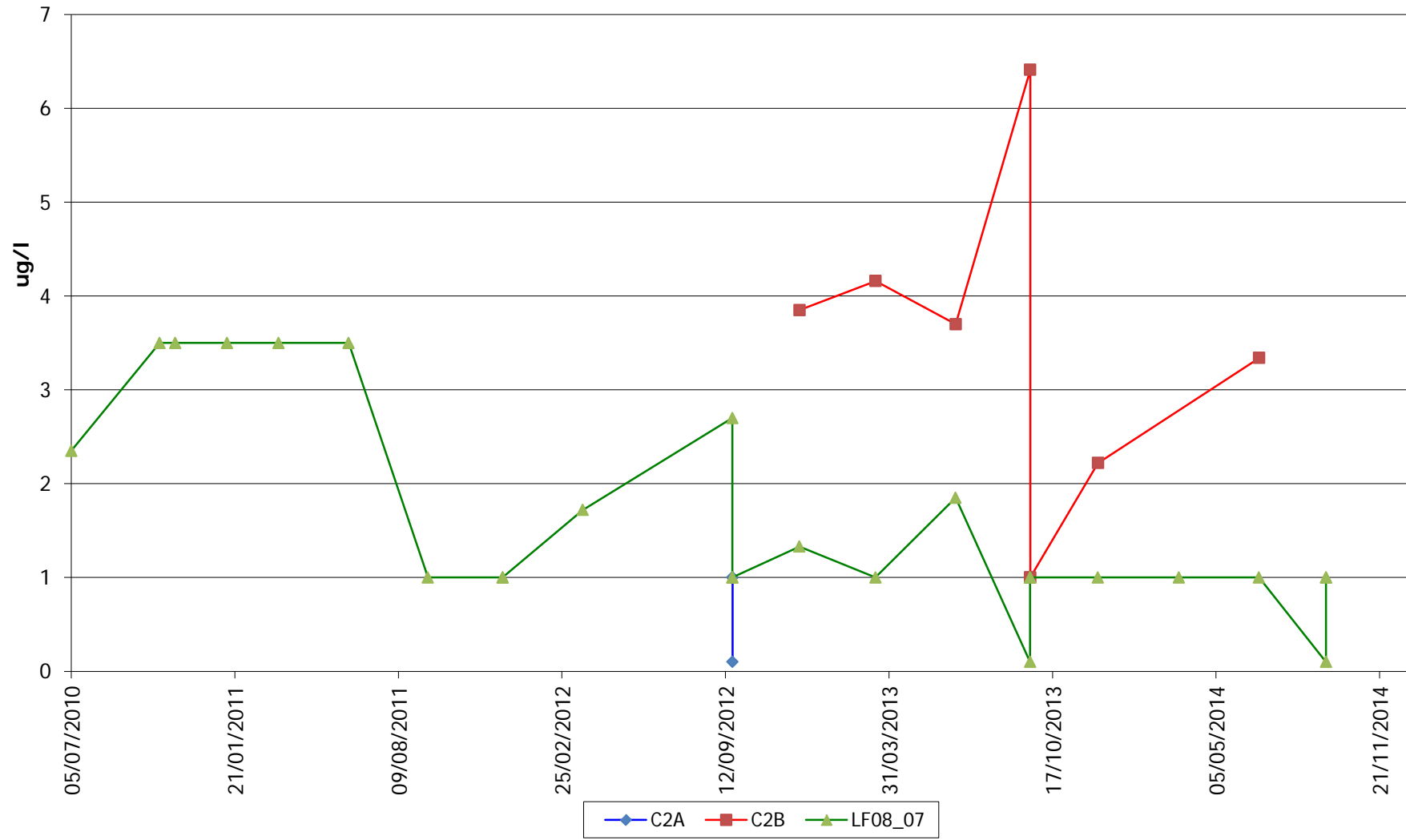
Docksway Disposal Site - Arsenic in Leachate



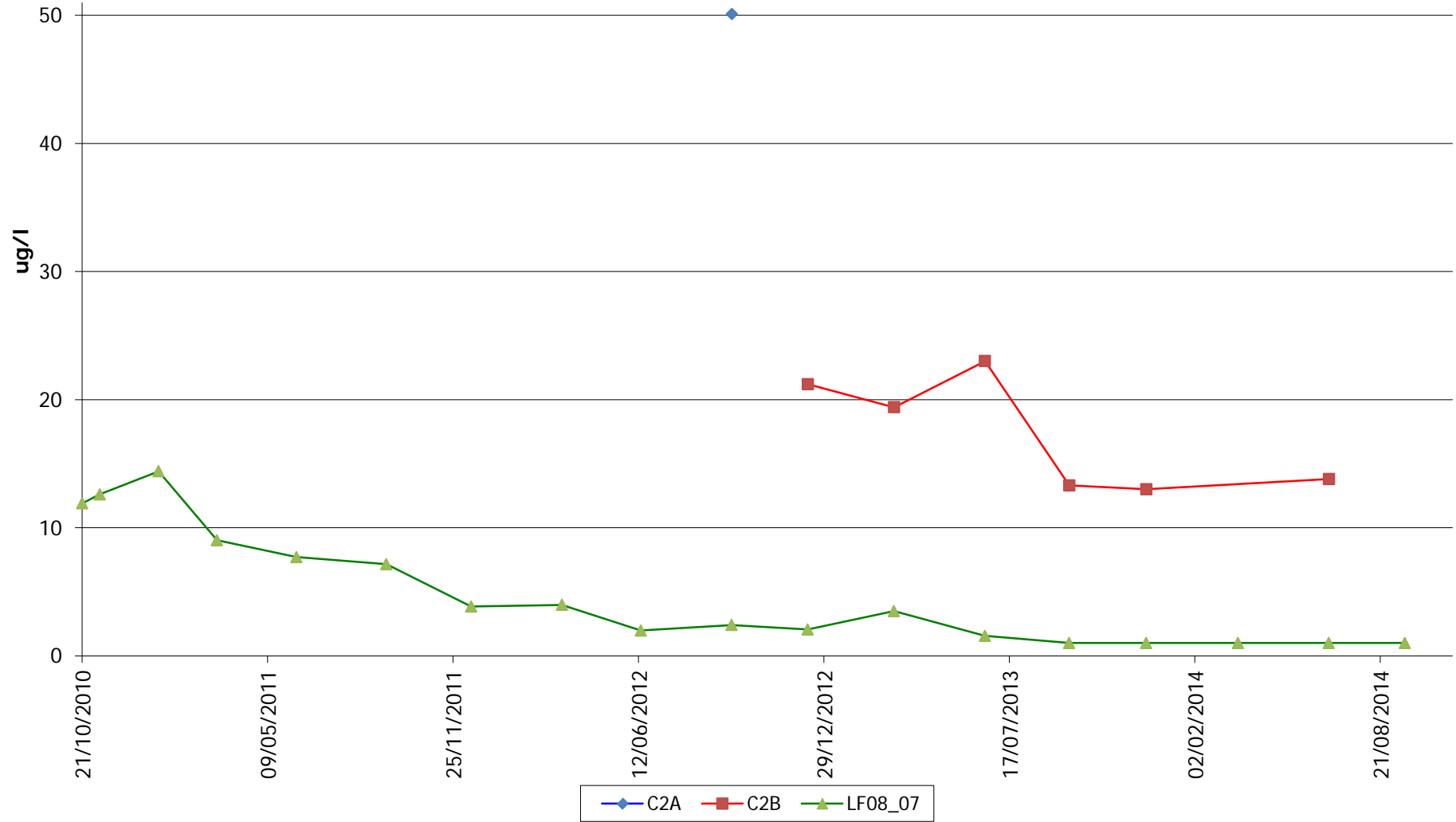
Docksway Disposal Site - Benzene in Leachate



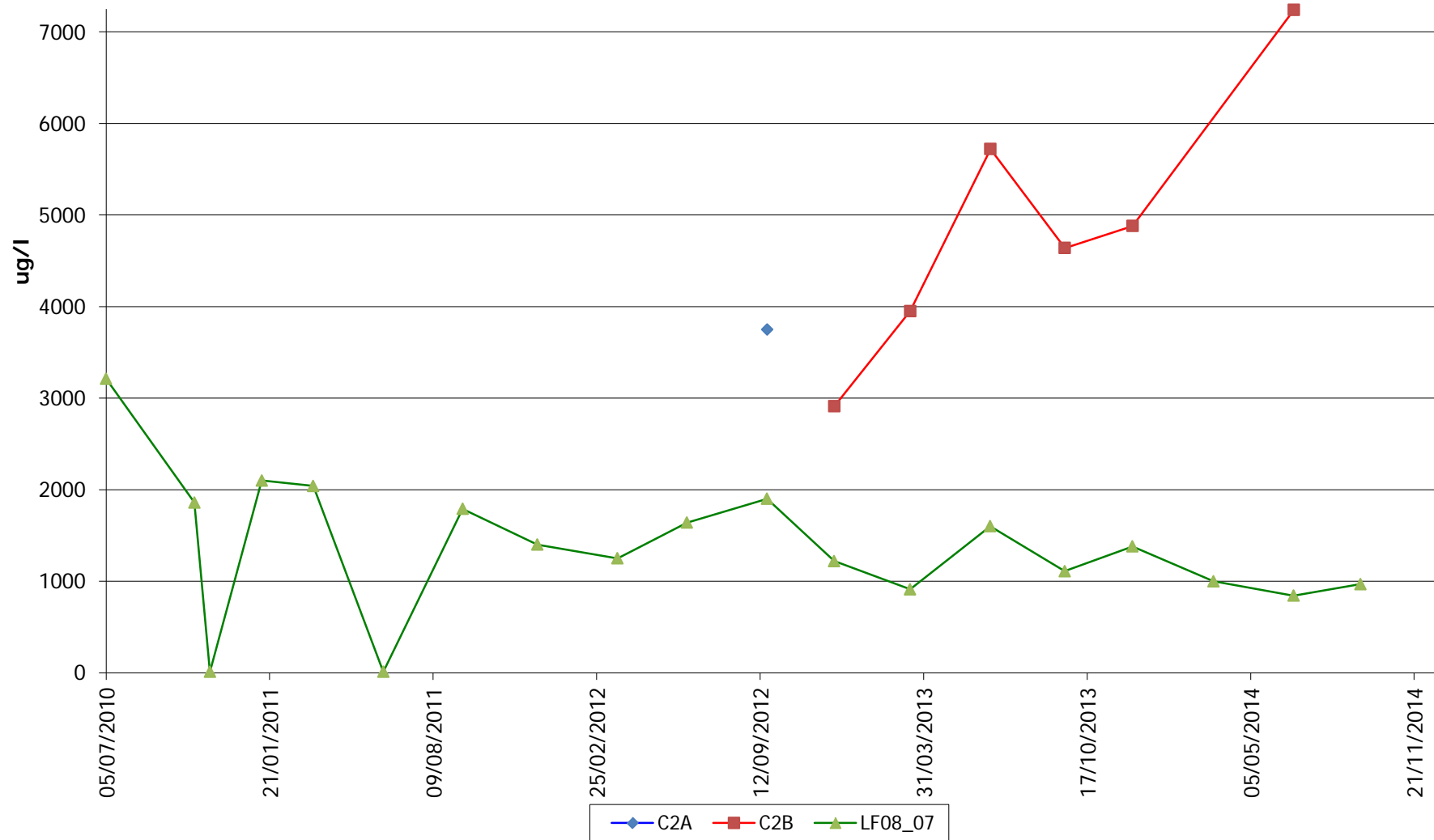
Docksway Disposal Site - Naphthalene in Leachate



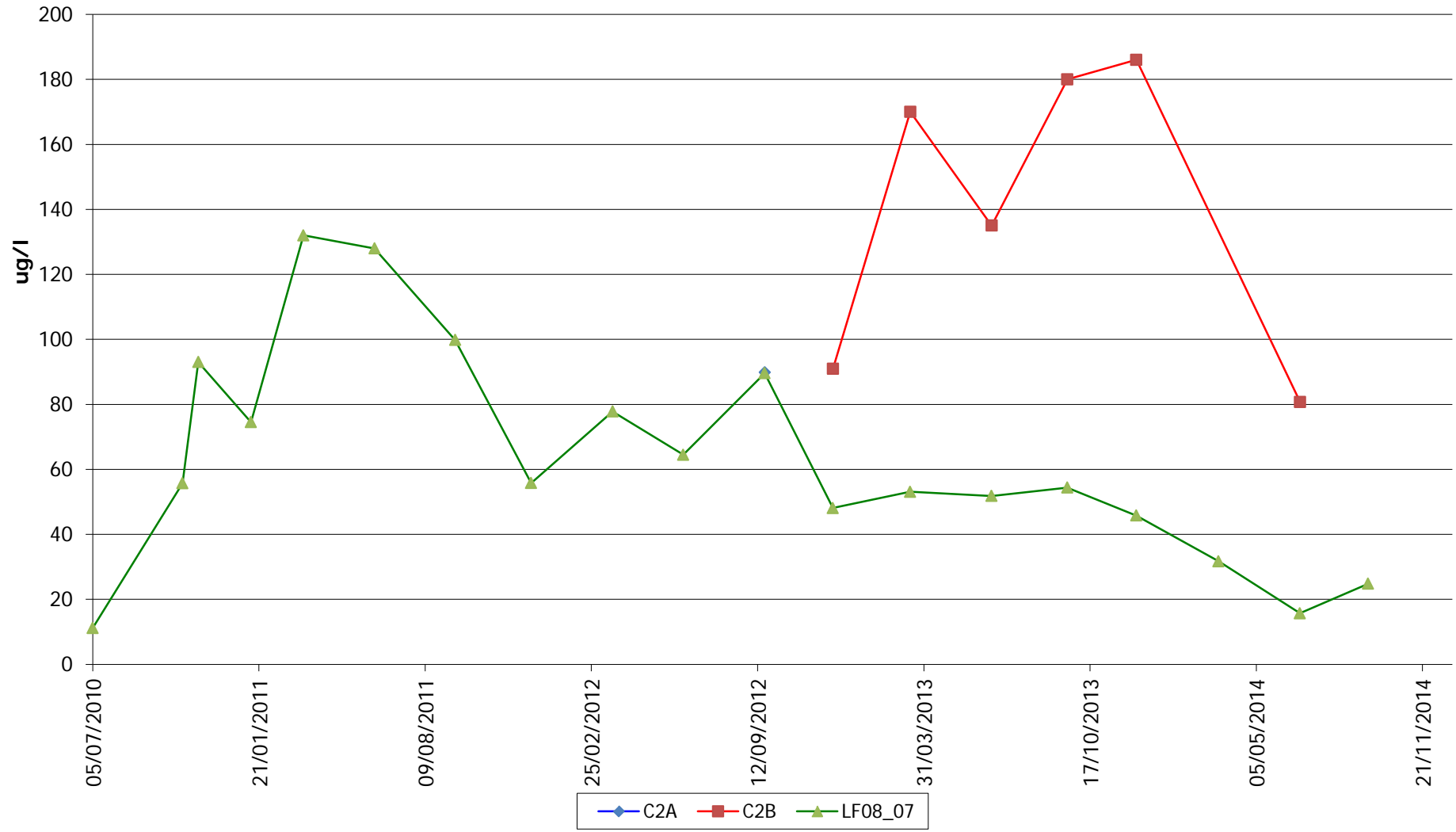
Docksway Disposal Site - O-Xylene in Leachate



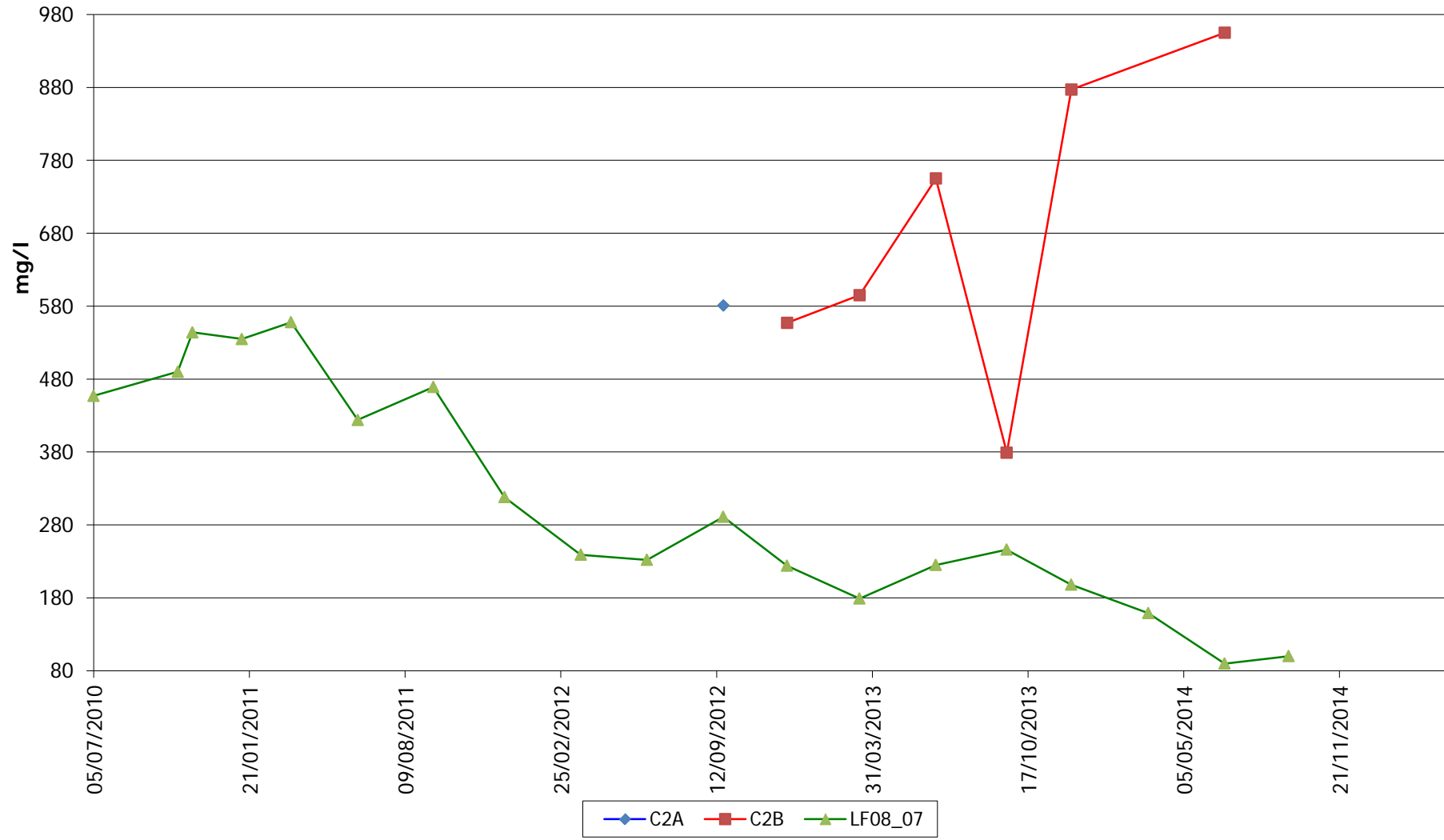
Docksway Disposal Site - EPH in Leachate



Docksway Disposal Site - Nickel in Leachate

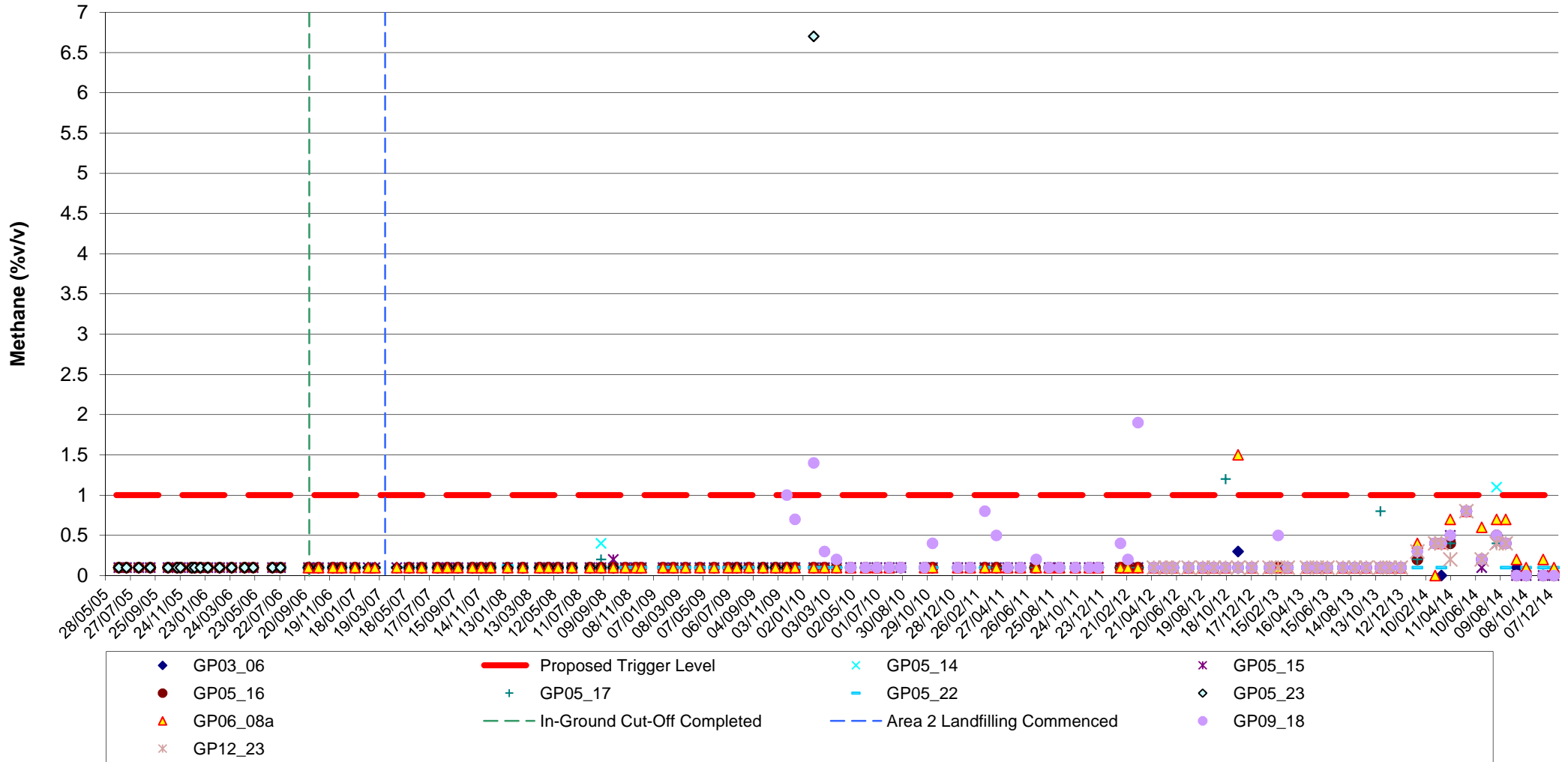


Docksway Disposal Site - Potassium in Leachate

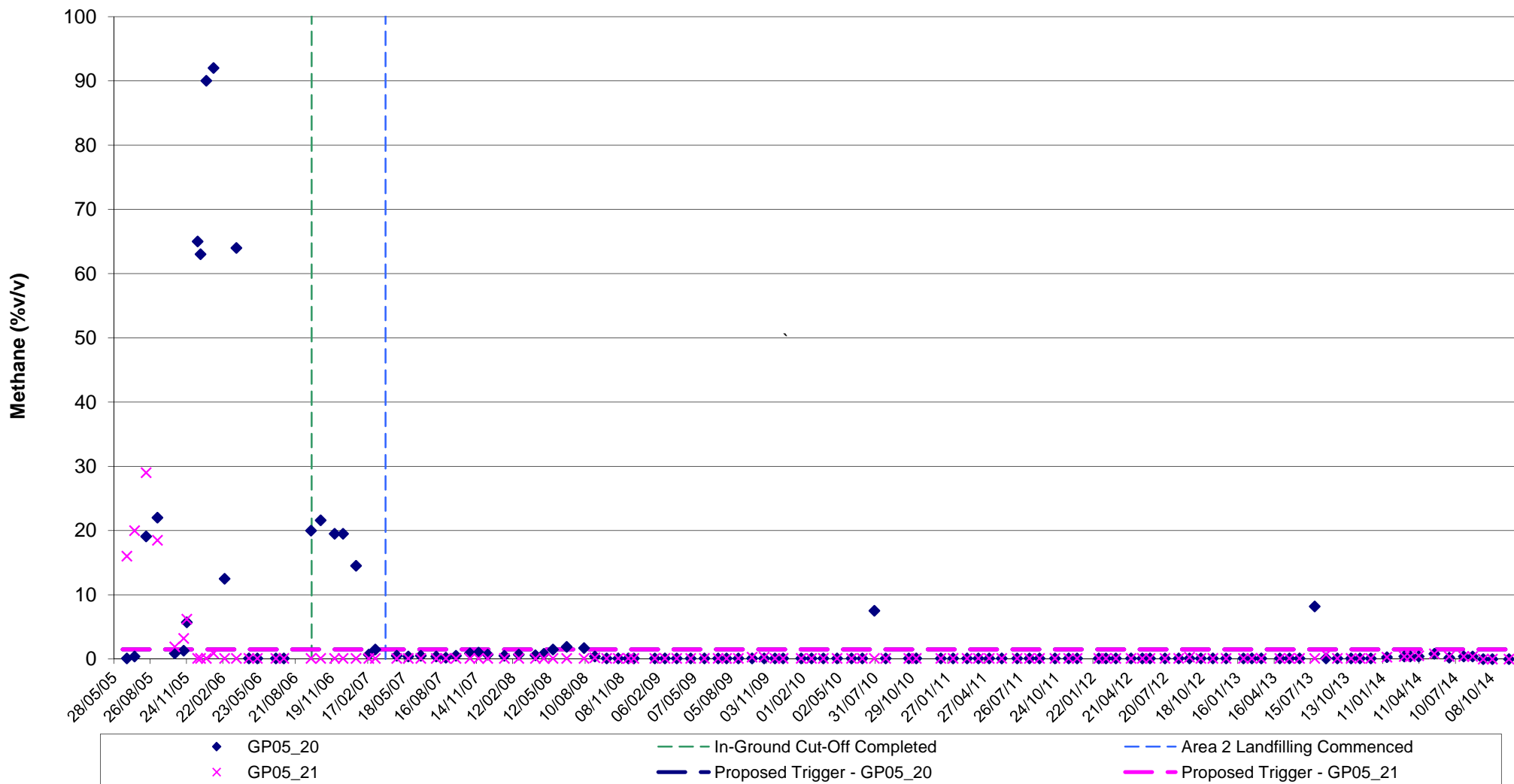


Appendix 4

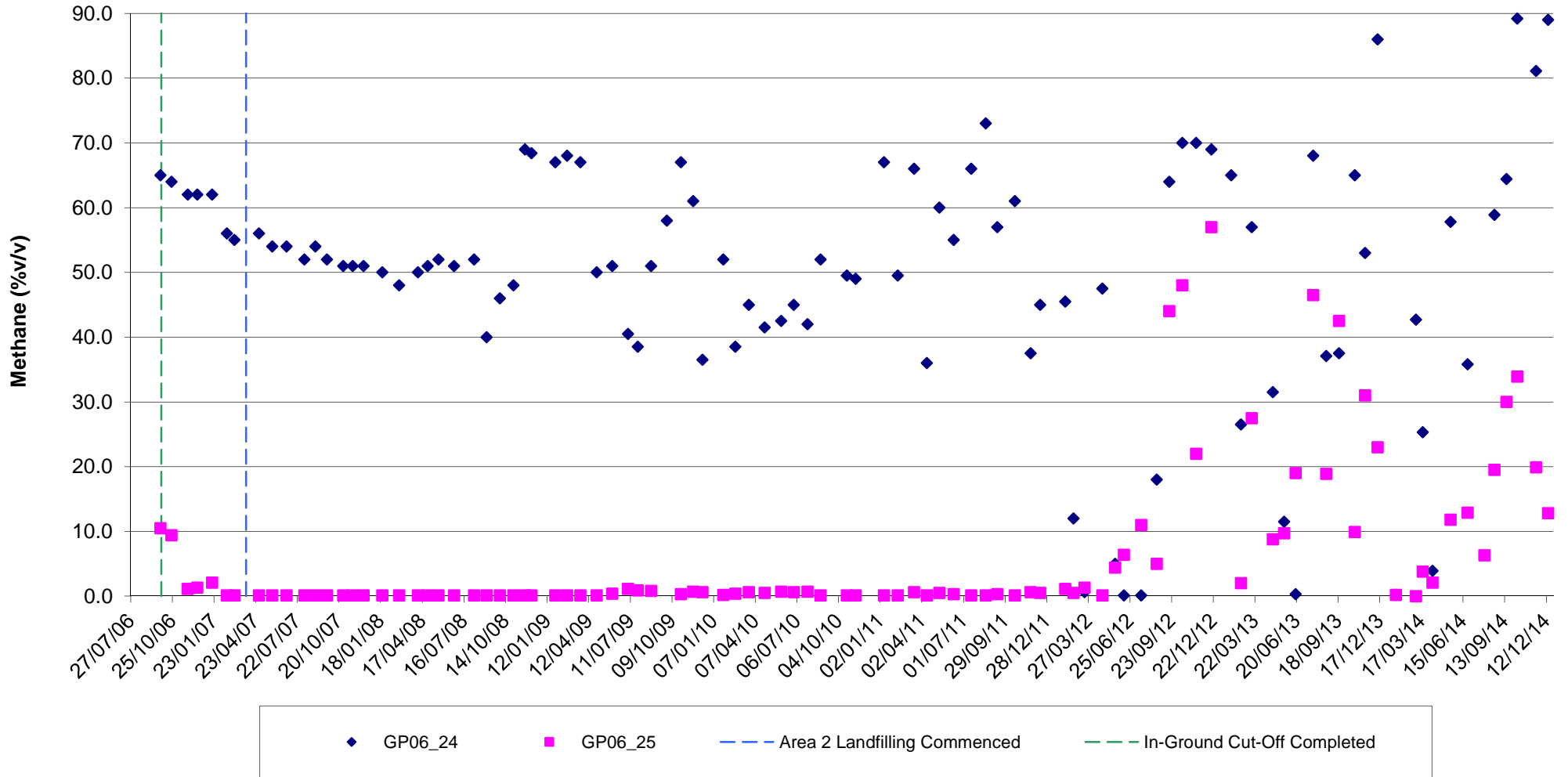
Docksway Disposal Site Methane Concentrations in Area 2 Gas Monitoring Wells (Excluding GP05_20, GP05_21, GP06_24, GP06_25)



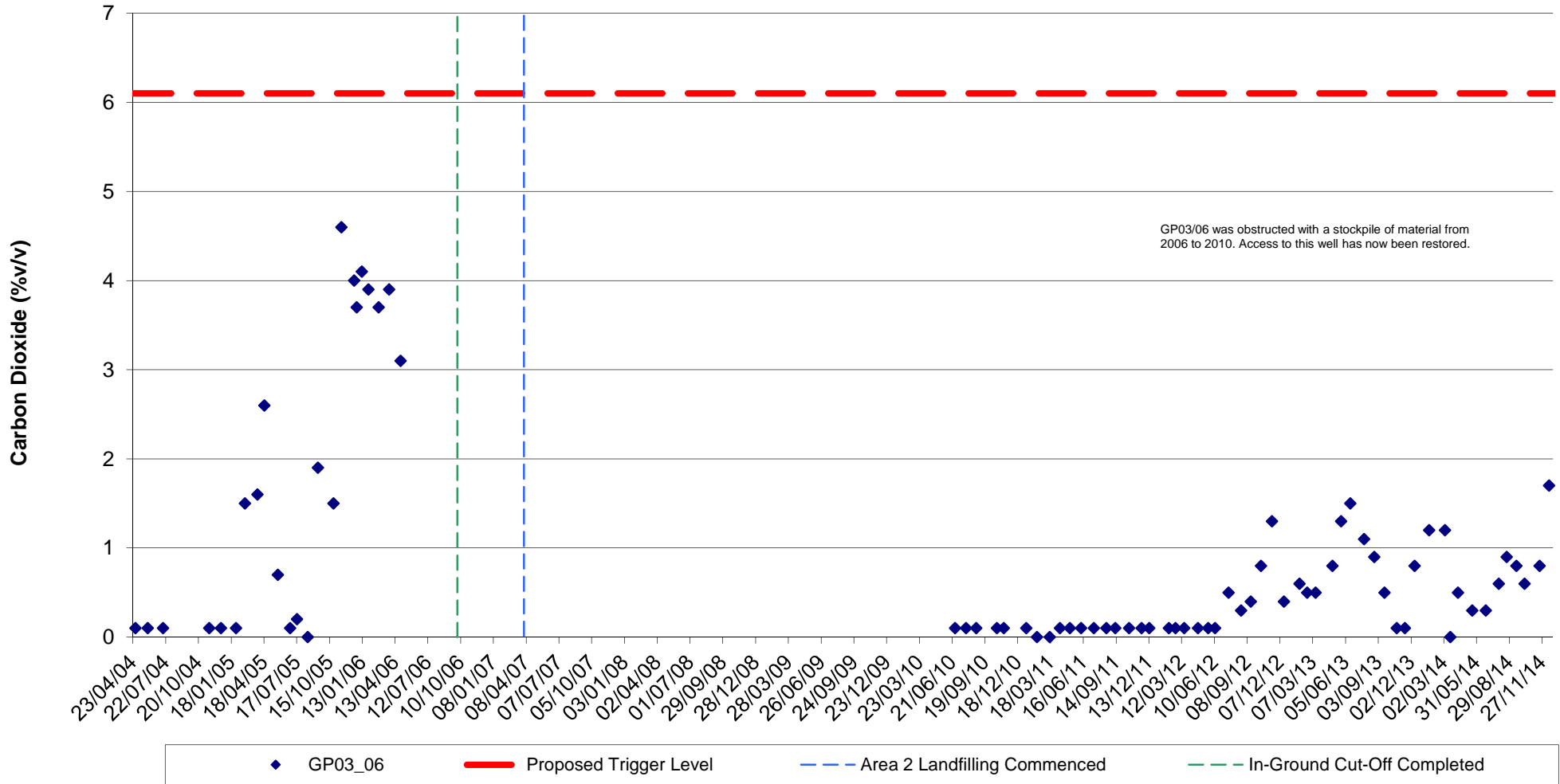
Docksway Disposal Site Recorded Methane Concentrations in GP05_20 and GP05_21



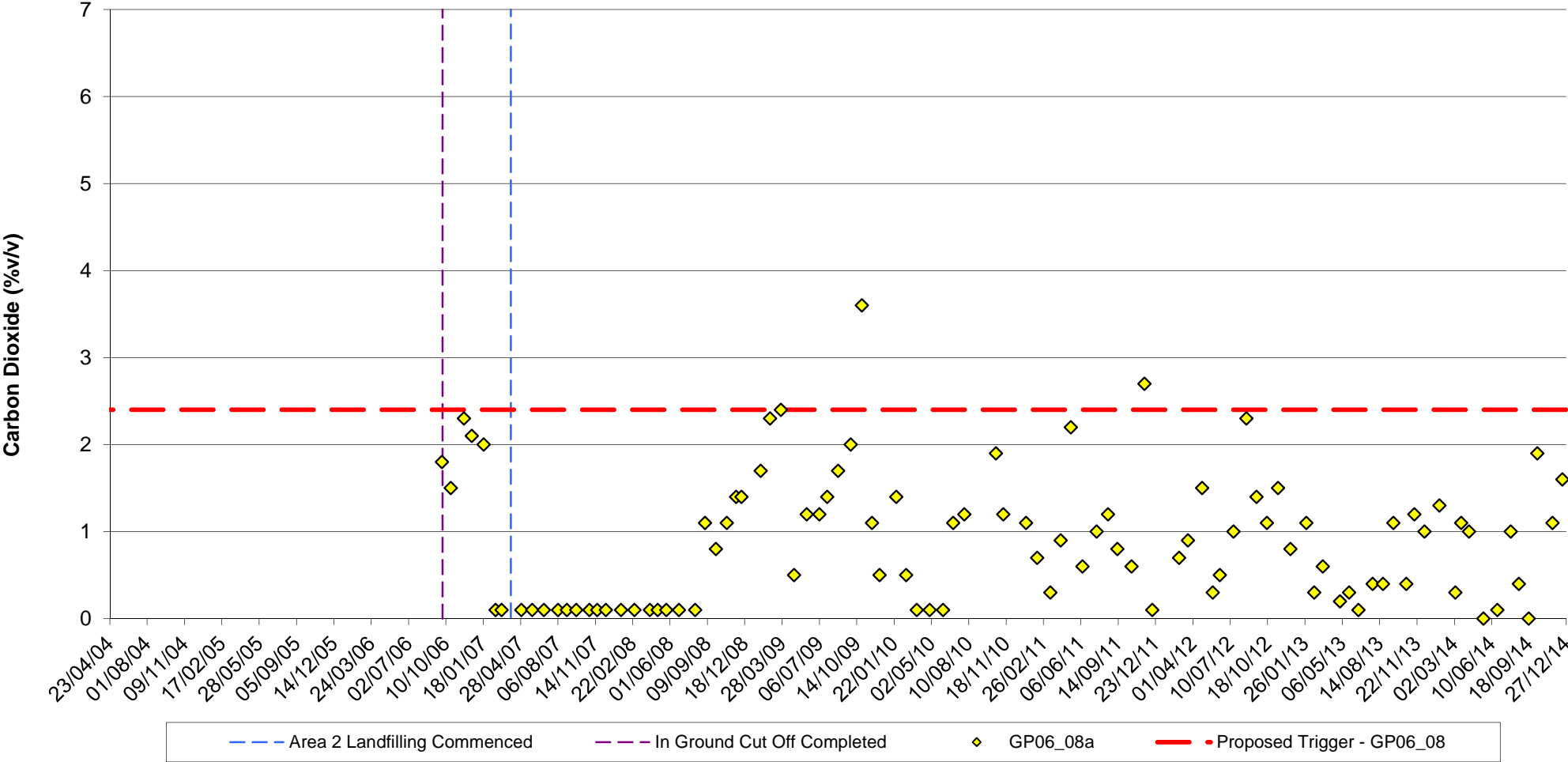
Docksway Disposal Site Recorded Methane Concentrations for GP06_24 and GP06_25



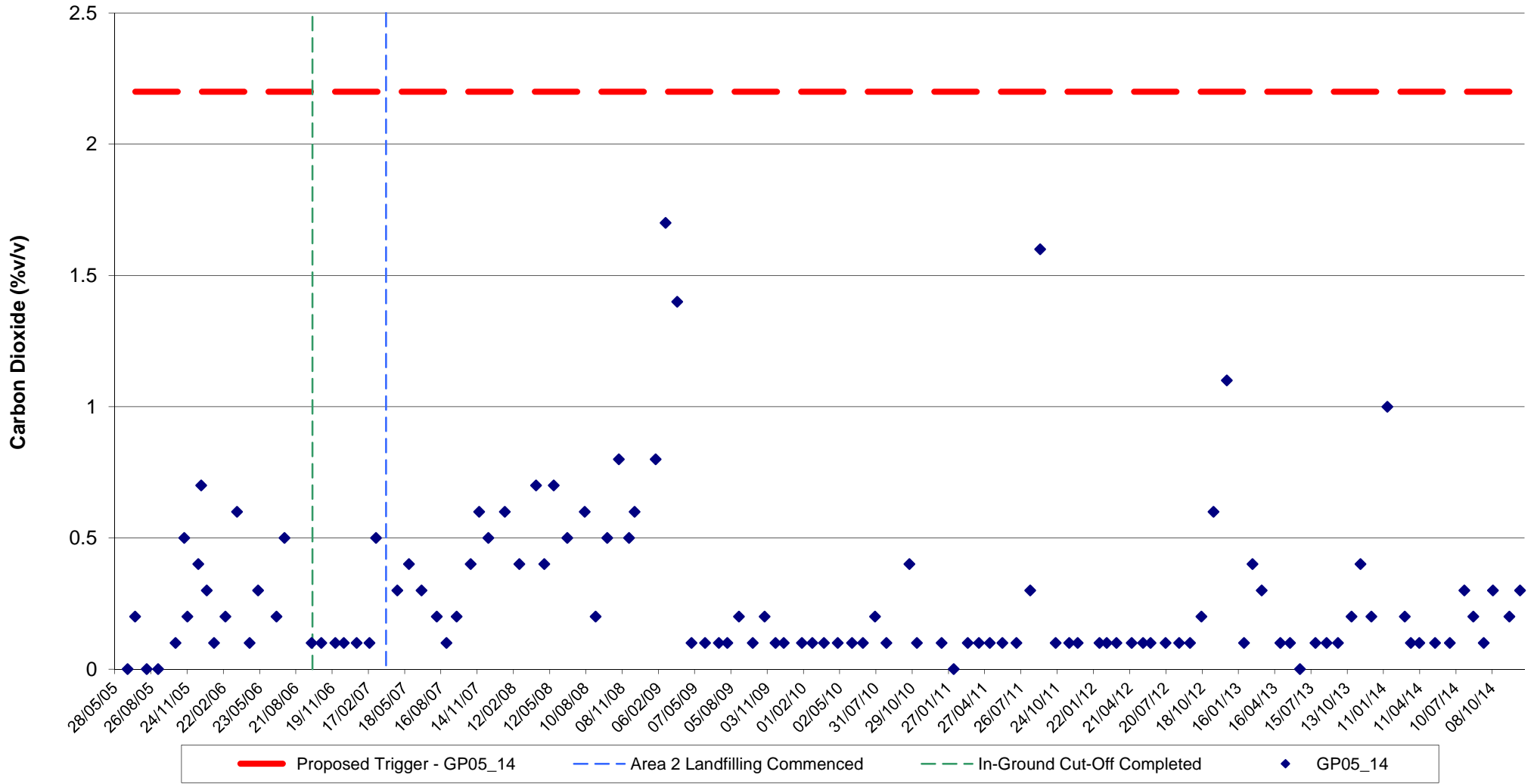
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP03_06



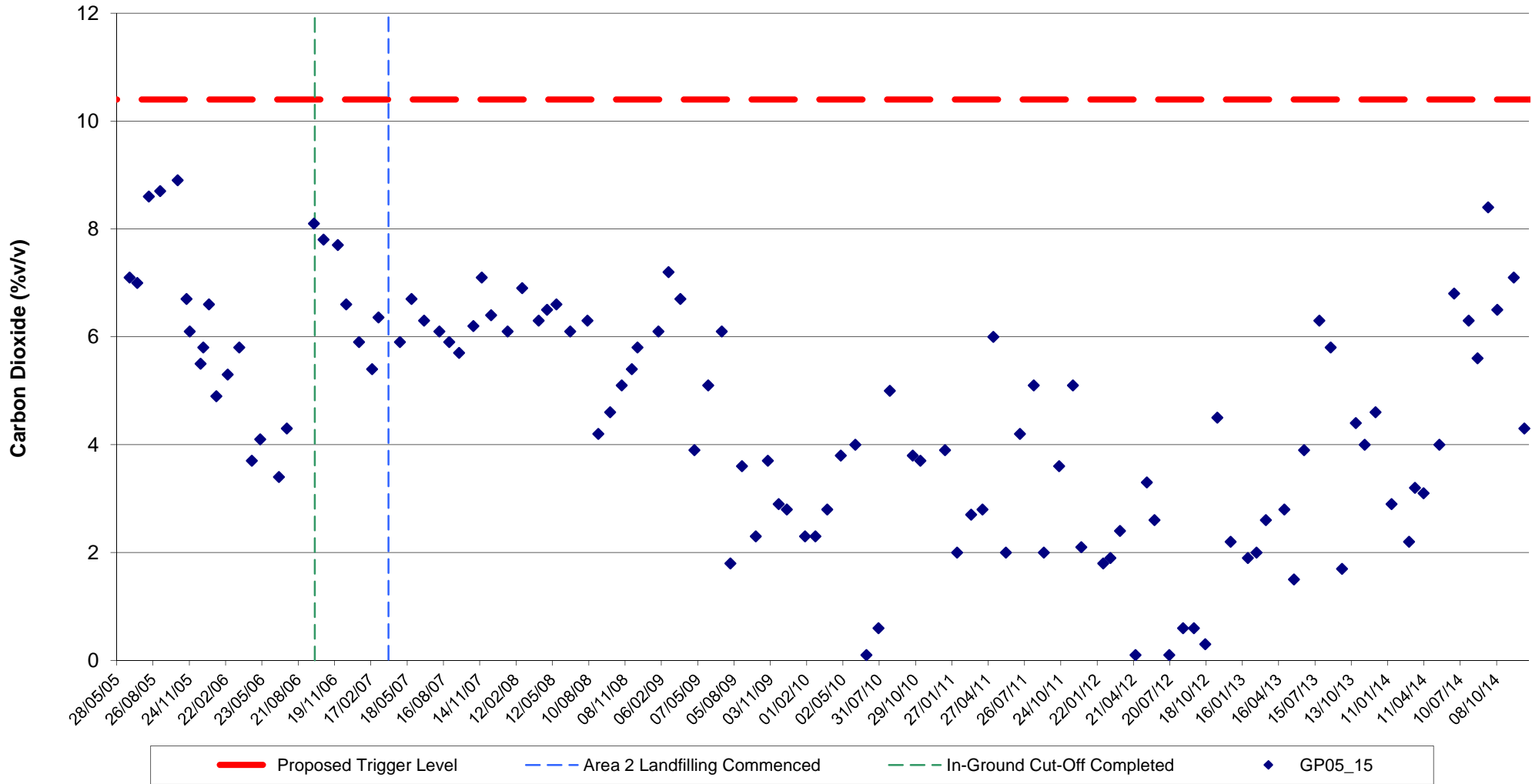
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP06_08a



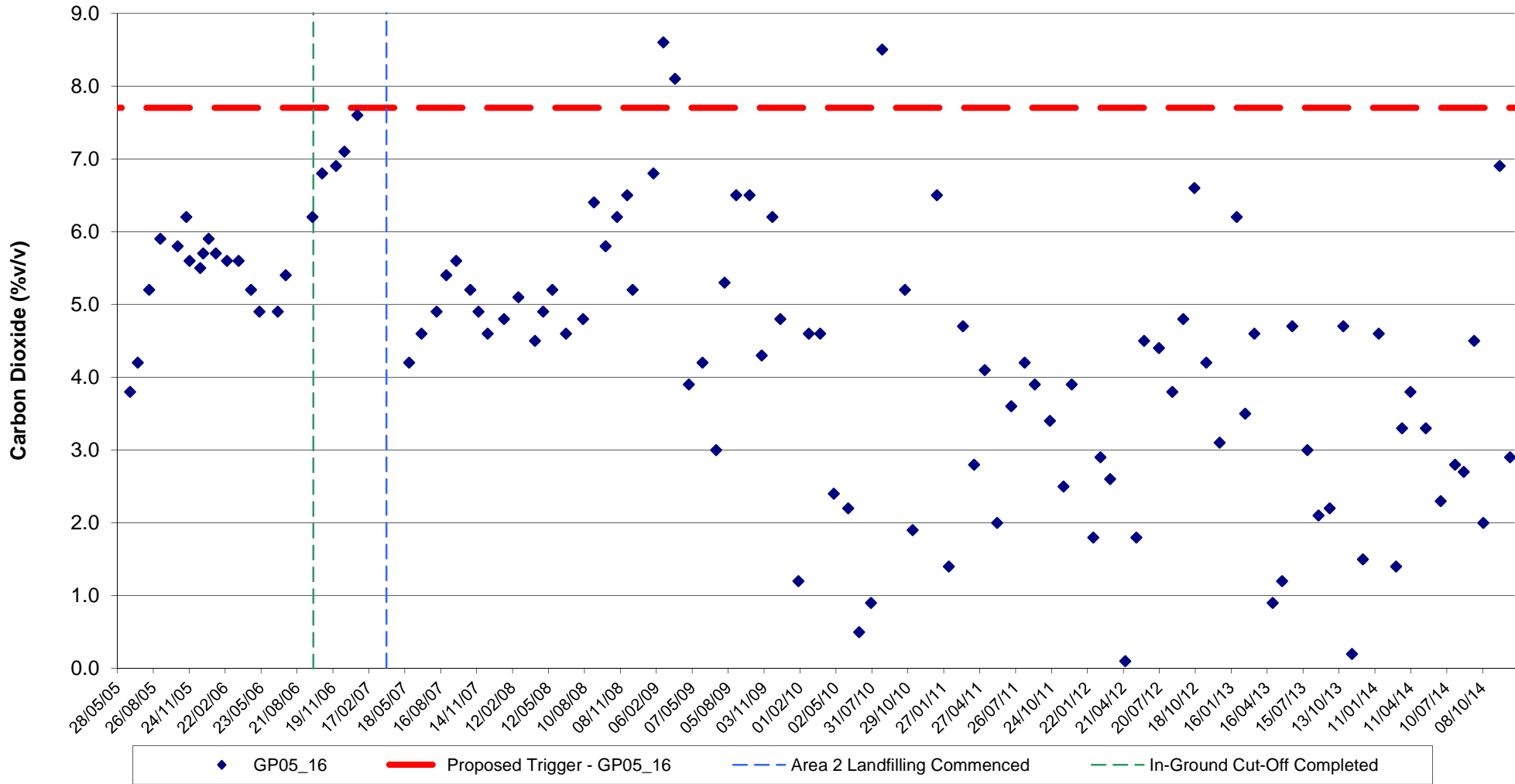
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_14



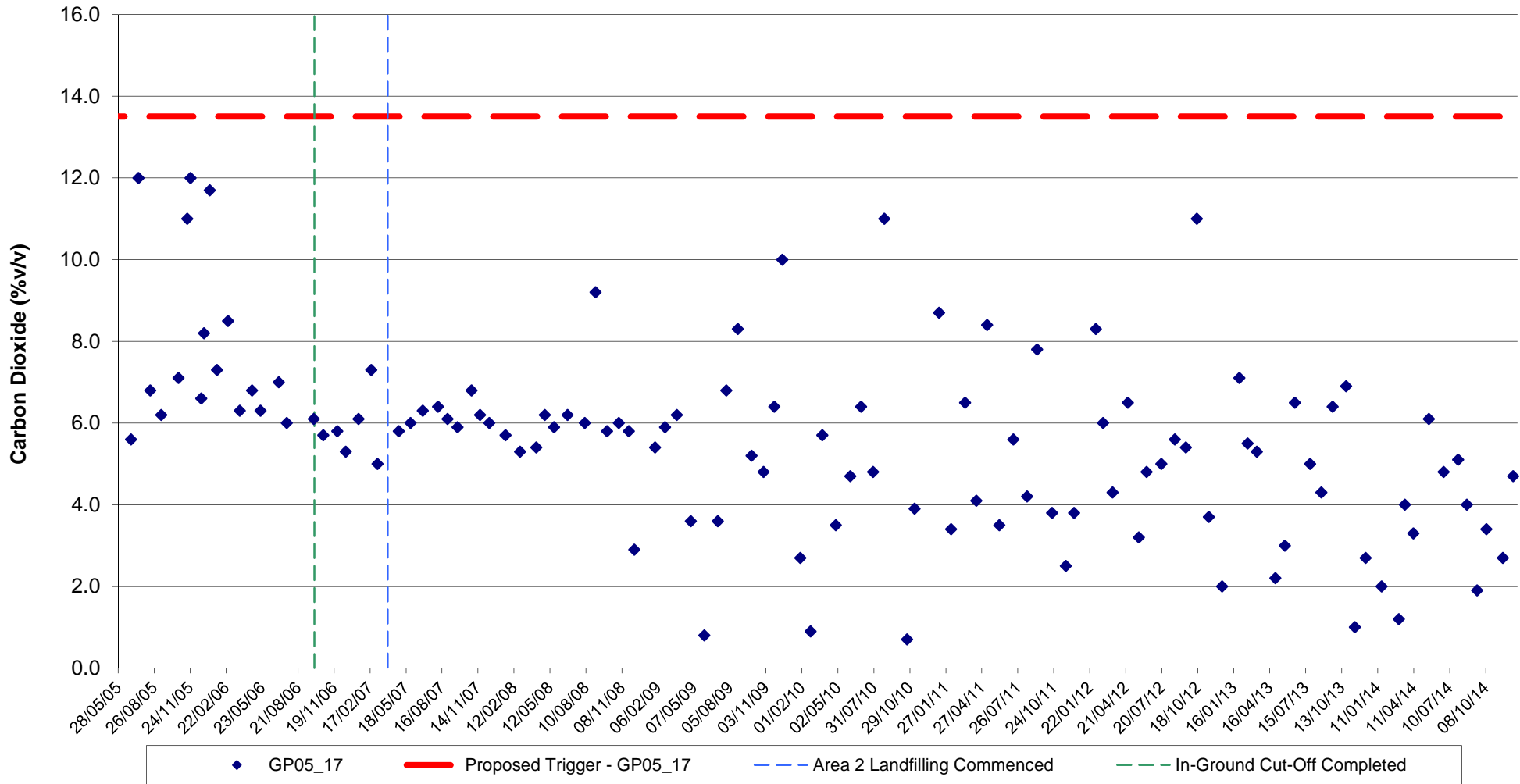
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_15



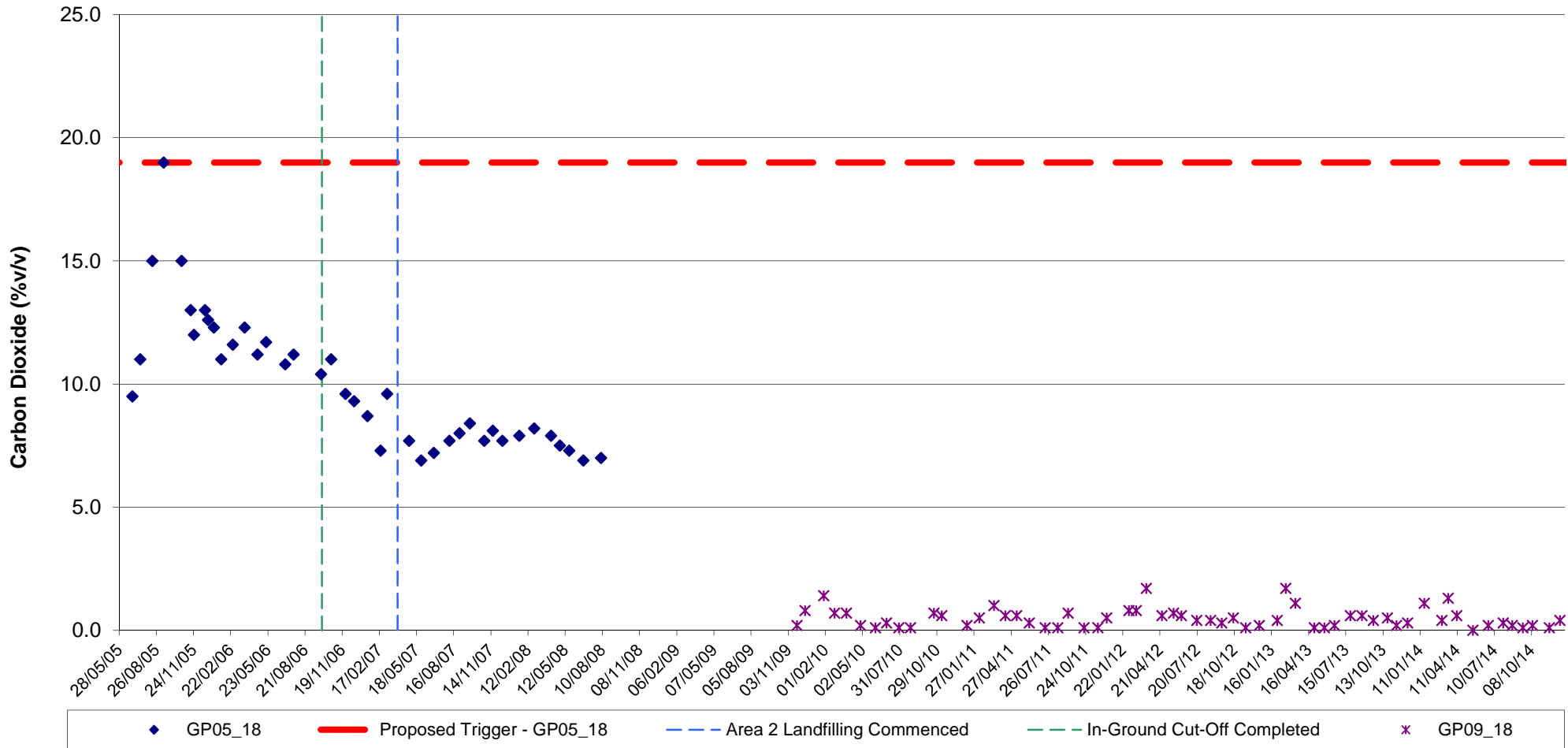
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_16



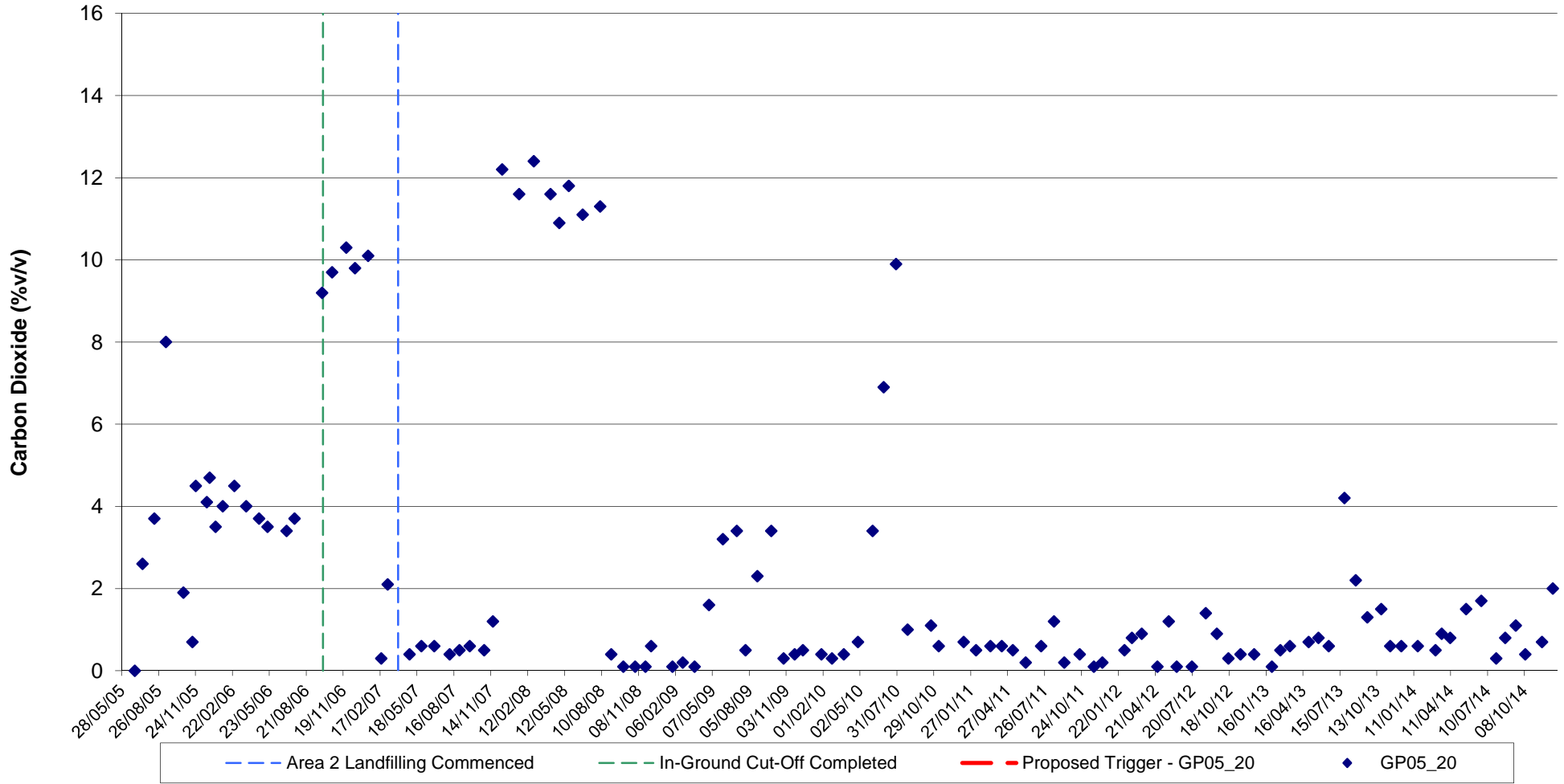
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_17



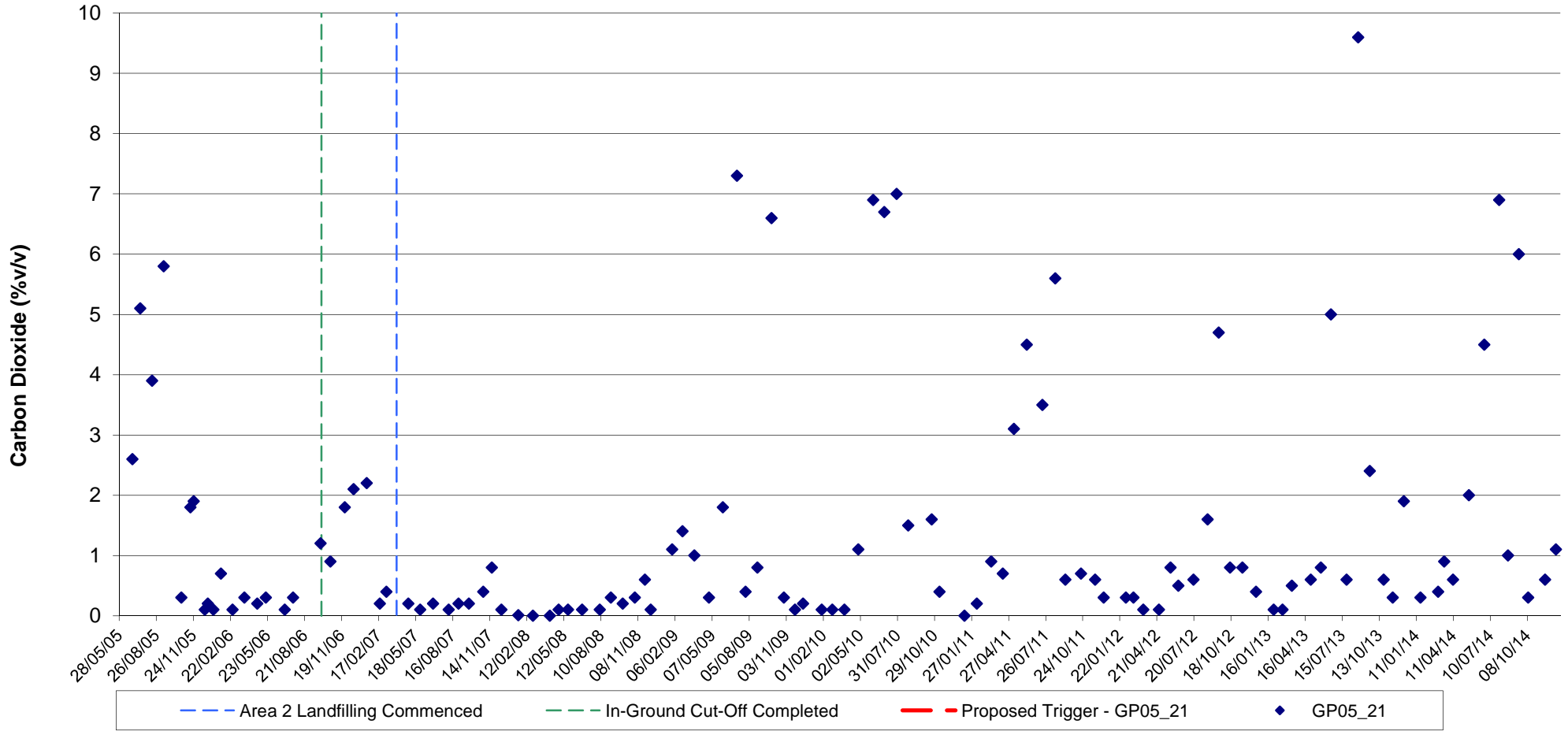
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_18 and GP09_18



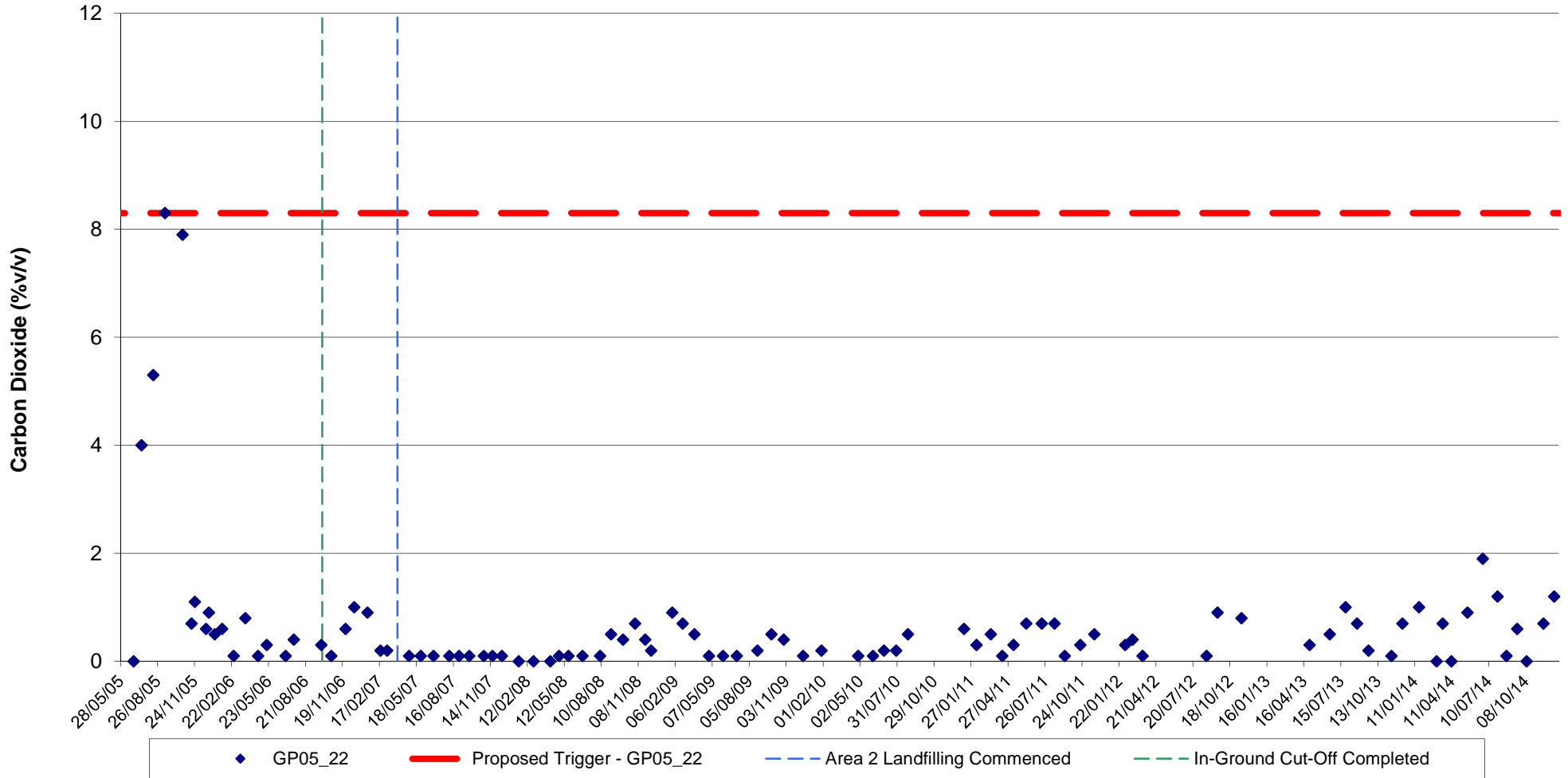
Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_20



Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_21

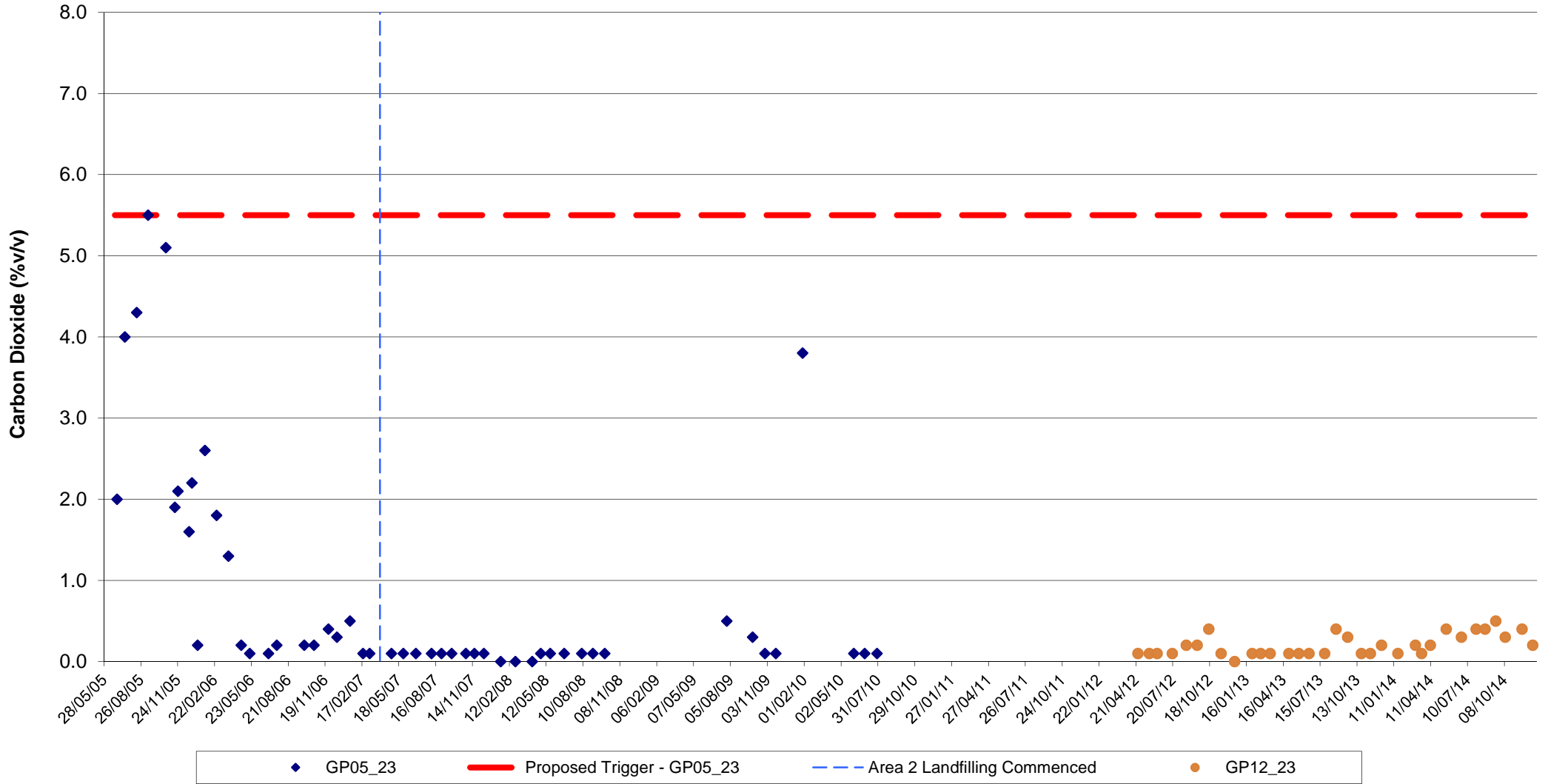


Docksway Disposal Site Recorded Carbon Dioxide Concentrations in GP05_22



Docksway Disposal Site

Recorded Carbon Dioxide Concentrations in GP05_23 and GP12_23



Docksway Disposal Site

Recorded Carbon Dioxide Concentrations for GP06_24 and GP06_25

