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Report Number 3276/R/015/01

Nant Newydd Landfill Site

Environmental Monitoring Review

Prepared for:

Clive Hurt (Plant Hire) Ltd.



Nant Newydd Landfill Site

Environmental Monitoring Review

November 2020

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1. INTRODUCTION

1.1 Scope

- 1.1.1 This Environmental Monitoring Review has been compiled on behalf of Clive Hurt (Plant Hire) Ltd (Clive Hurt), for Nant Newydd Quarry Landfill Site (permit reference (EPR/RP3337SE). Environmental monitoring at the site is currently undertaken in accordance with the Environmental Permit (EPR/RP3337SE/V003) and is regulated by Natural Resources Wales (NRW).
- 1.1.2 The monitoring review fulfils the requirements of Improvement Conditions 1.3.2, 1.3.6 and 1.3.9 (Table S1.3 of the Permit referenced RP3337SE) as follows:
- Ref 1.3.2) acquire 12 months of groundwater monitoring data and submit a written report for approval to fully characterise the groundwater regime, review and revise post-interim Control Levels and Trigger Limits, recommendations for any additional groundwater monitoring points, revise and update Site Conceptual Model and revise numerical modelling to demonstrate compliance with the Groundwater Regulations (Sections 2 to 3).
 - (Ref 1.3.9) acquire 12 months of surface water monitoring data and submit a written report for approval to review and revise post-interim Control Levels and Compliance Limits (Section 4) ; and
 - (Ref 1.3.6) acquire 12 months of monthly gas monitoring data and submit a written report for approval to review and revise post-interim Control Levels and Compliance Limits (Section 5);
- 1.1.3 This report has collated information relating to the Site's history, layout, underlying geology and hydrogeology to confirm the Conceptual Site Model (CSM). Environmental monitoring and other site investigation data have been reviewed to establish the likely risk associated with the Site. This includes data for the period October 2018 – June 2020 (sections 2, 4 and 5).

1.2 Site Background

- 1.2.1 Nant Newydd Quarry Landfill Site is an inert landfill in Brynteg, Anglesey, North Wales located to the north of the B5110 road. Site access is via the B5110.
- 1.2.2 The site occupies the quarry void that previously extracted limestone. The site is currently being restored with inert waste in accordance with the site's planning consent and environmental permit.
- 1.2.3 New perimeter gas and groundwater monitoring points were installed between 27th June 2018 and 6th July 2018. The works comprised of the drilling and installation of:
- 2 gas monitoring boreholes (BH1S and BH2S) and;
 - 4 combined groundwater and gas monitoring boreholes (BH2D, BH3DA, BH4D and BH5D).
- 1.2.4 Gas monitoring boreholes (BH1S and BH2S) are located in the north and north east of the site. Combined gas and groundwater monitoring borehole, BH2D is located in the north east area of the site, BH4D in the south of the site, BH3DA in the south west and BH5D in the

northwest area of the site. The locations of the monitoring points are detailed on Drawing Ref: 3276/4/006 Rev A.

- 1.2.5 Surface water monitoring locations have been identified for the site and are referenced, SW1, SW2a, SW2b and SW3 (as shown in Drawing Ref: 3276/4/006 Rev A). These locations replace previous surface water monitoring locations: W1, W1a, W2 and W3 and W4 which could not be located or identified.
- 1.2.6 Due to the inert nature of the waste to be accepted at Nant Newydd Quarry Landfill Site, there will be no generation of leachate and no requirement to collect or monitor leachate.

2. Groundwater

2.1 Overview

2.1.1 As required by the improvement programme requirements for the site, the Operator is required to submit the following to Natural Resources Wales (NRW) to satisfy improvement programme reference 1.3.2:

- acquire 12 months of groundwater monitoring data and submit a written report for approval to fully characterise the groundwater regime
- review and revise post-interim Control Levels and Trigger Limits in accordance with current guidance,
- recommend any additional groundwater monitoring points
- revise and update Site Conceptual Model
- revise numerical modelling to demonstrate compliance with the Groundwater Regulations

2.1.2 Nant Newydd Quarry Landfill Site accepts inert waste that will comply with the definition of inert waste provided in the LFD. There is no leachate monitoring, management or collection at the site since the inert waste deposited at the site is not expected to produce leachate with high concentrations of hazardous or non-hazardous substances pollutants. A quantitative assessment was not considered necessary for the site.

2.2 Bedrock Regional Geology

2.2.1 The following sections 2.2 to 3.2 have been extracted from TerraConsult document referenced 3276/R/012 which was submitted as part of a planning application for the site. The following sections provide an updates site conceptual model as required as part of the improvement condition 1.3.2.

2.2.2 The regional geology of the area can be interpreted from British Geological Survey GeoIndex (BGS)¹ 1:50,000, BGS (1980)² 1:50,000 and BGS (1982)³ 1:250,000.

2.2.3 The most recent geological map for the area by BGS (2019) indicates that the solid geology within the vicinity of the site comprises bedrock strata of Carboniferous Clwyd Limestone group estimated by Waters et al. (2009)⁴ to be within Chadian and Brigantian substage (345-325 Ma). The Clwyd Limestone group is described by the BGS as a range of limestone facies with minor sandstone and mudstone units, and local dolomitisation. It is the Clwyd Limestone that has been extracted at the quarry.

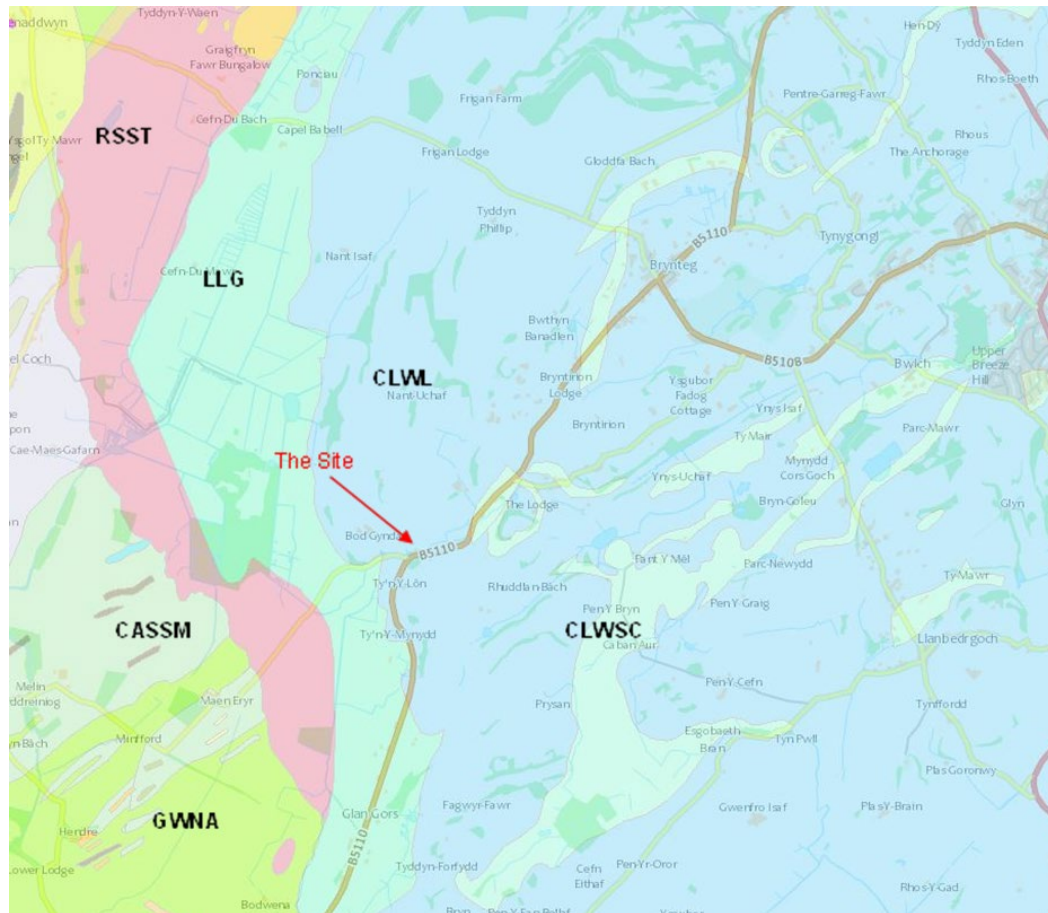
¹ British Geological Survey Geoindex <<http://mapapps2.bgs.ac.uk/geoindex/home.html>>

² BGS (1980) Map of Anglesey, Sheet 92 & 93, 1:50,000- Solid Geology, Available at <<http://www.largeimages.bgs.ac.uk/iip/mapsportal.html?id=1001841>>

³ BGS (1982) Map of Anglesey, Sheet 53° N-06° W, 1:250 000 Series – Solid Geology, Available at<<http://www.largeimages.bgs.ac.uk/iip/mapsportal.html?id=1003731>>

⁴ Waters, C N, Waters, R A, Barclay, W J, and Davies, J R. (2009). A lithostratigraphical framework for the Carboniferous successions of southern Great Britain (Onshore). British Geological Survey Research Report, RR/09/01. Welsh Government (2004) Technical

Figure 1. Bedrock Geology of Area



(RSST– Old Red Sandstone Supergroup, Sandstone) (LLG–Lligwy Sandstone Fm) (CLWL–Clywd Limestone Group, Limestone) (CLWSC–Clywd Limestone Group, Sandstone and Conglomerate) (GWNA–GWNA Group, Schist) (CASSM– Central Anglesey Shear Zone and Berw Shear Zone, Schist and Mica) (ORDMS–Ordovician Rocks, Mudstone and Sandstone)

- 2.2.4 The limestone sequence in the regional area is recorded to be younging towards the north east near Red Wharf. The following limestone sequence occurs towards the north east; Clwyd Limestone Group (329 to 347 Ma); Cefn Mawr Limestone Formation (329 to 337 Ma); and the Wharf Limestone Formation (329 to 331 Ma).
- 2.2.5 The 1:50,000 BGS map (1980) shows in the vicinity of the site, a prevalent dip of the Carboniferous limestone towards the south-east. The angle of dip in the region is generally between 5 and 15°, extending beyond Red Wharf Bay to the northeast under the Irish Sea.
- 2.2.6 The geology to the northwest and southeast is bounded by faults and comprises older and structurally complex schists, mudstones, and metamorphic basement. These rocks form a graben and overly the Coedana Granite, (G) Ordovician mudstones and Lligwy Sandstone Formation. The limestone unconformably overlies the Devonian Old Red Sandstone Group in places.
- 2.2.7 The overall structural fabric of the bedrock geology is northeast-southwest as can be seen in Figure 2. The stratigraphical relationships of the surrounding geology are extremely complex as depicted on the associated cross-section (Figure 3).

Figure 2. Map Showing Structure and Line of Section

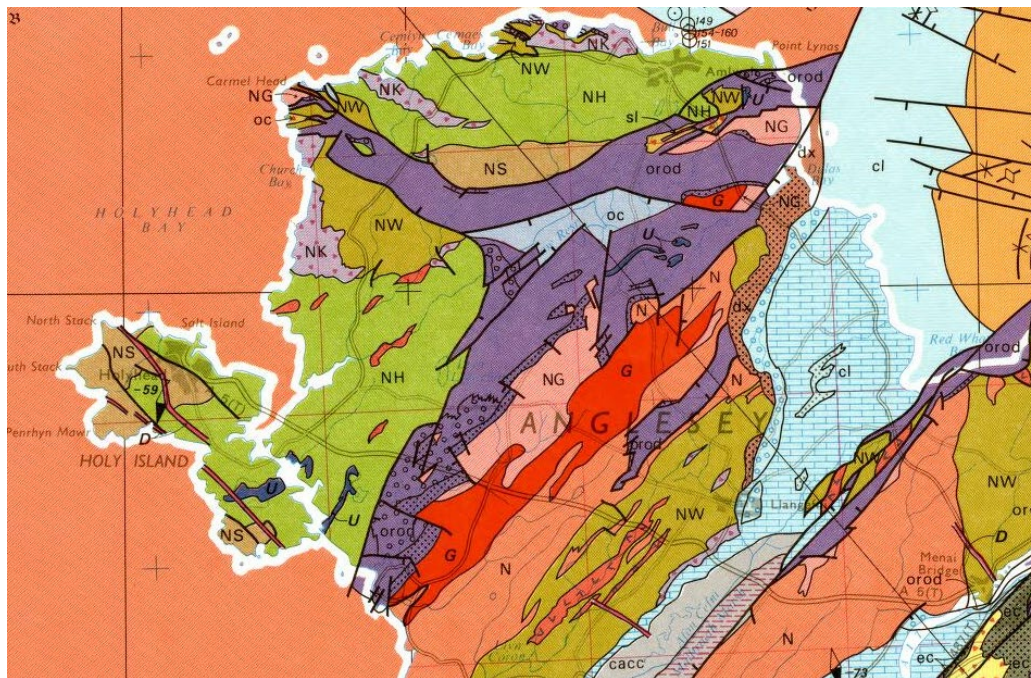
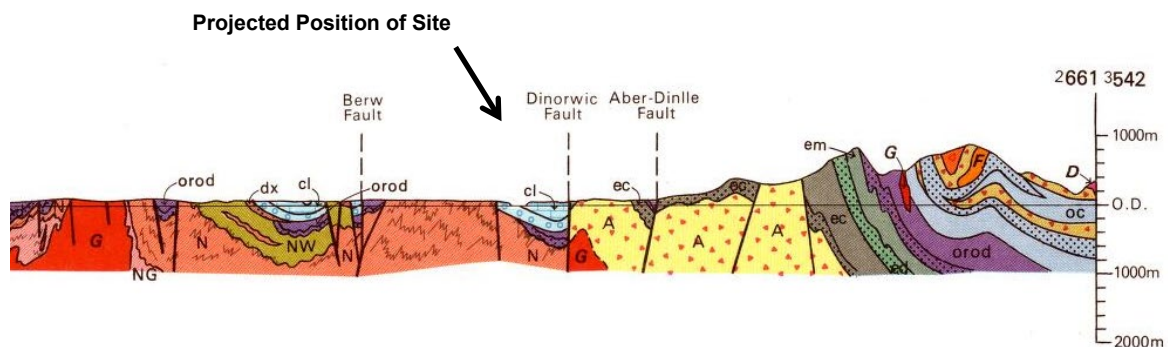


Figure 3. Cross Section



2.3 Superficial Regional Geology

2.3.1 The superficial deposits in the area comprise predominantly of Devensian till deposits and glaciofluvial sands and gravels with patches of Holocene fluvial alluvium. There is a lack of superficial deposits in the immediate vicinity of the site (Figure 4)

The map shows a rural landscape with various farms and settlements. Key locations include Tyddyn Y Waen, Ffrigan Fawr, Tyddyn Phillip, and Tyddyn Y Waen. A red arrow points to 'The Site' near Bod Cynda. The map also shows roads like B5110 and B5108, and geographical features like the Allu and TLL areas.

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- 2.5.2 The two gas boreholes were installed to the north and north east whereas the groundwater monitoring boreholes were located on the eastern and western boundaries as per drawing 3276/4/006 Rev A. The borehole logs can be found in Appendix B.
- 2.5.3 The borehole logs show the made ground at some locations on the western and southern areas of the quarry that range in thickness between 0.9m and 5.0m. The made ground includes quarry overburden and interburden and some imported fill materials.
- 2.5.4 The presence of superficial deposits comprising of clay and gravel was recorded at the most northerly section of the quarry (BH1S). Superficial deposits consisting of clay were also found in a thin package at BH4D to the south east of the site. At other locations they were absent.
- 2.5.5 There appears to be two distinct types of limestone underlying the site. The black limestone occurs in the northern section near BH1S of the site and occurs with a thickness of around 20.4m. The white limestone is present with a thickness of between 7.0 - 25.5m across the site. The mudstone band can also be observed in the northern quarry wall. Another mudstone can be found underneath the white limestone with an estimated thickness of 3.2m. From the assumptions made surrounding depths of strata in the prior section it is likely that only the Clwyd limestone group was encountered due depth of the boreholes drilled not being deep enough to intersect with the projected depth of the Lligwy sandstone.
- 2.5.6 The drilling of these boreholes confirmed the assumptions within the available literature which showed varying sequences of limestone and mudstone. According to the Robins & Davies (2015)⁵ the main sequence of white limestone can occur in thicknesses of up to 500m.

2.6 Regional Hydrology

- 2.6.1 The main surface water features within the area are ponds (both on site and external), wetlands and drainage networks.
- 2.6.2 Regional surface water drainage appears to follow the structural lineament of the bedrock geology to the north east of the site. This drainage of surface water can be seen draining in a north-easterly direction towards the coast (Figure 5).

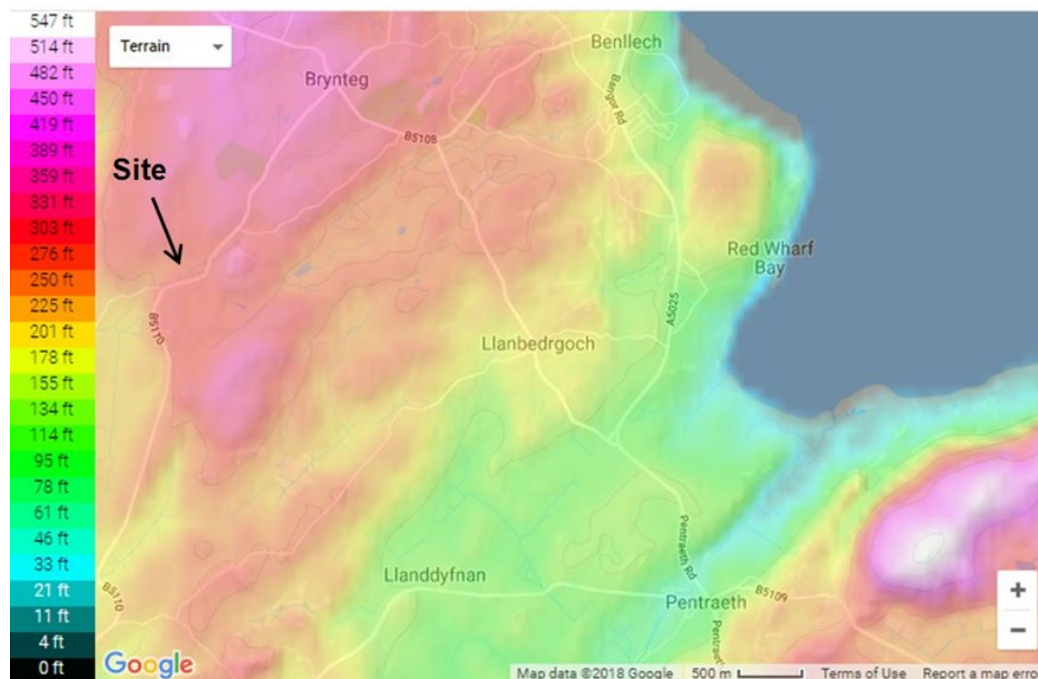
⁵ Robins, N.S., & Davies (2015) Hydrogeology of Wales: Carboniferous aquifers - the Carboniferous Limestone aquifer, British Geological Survey. Contributor(s): D A Jones, Natural Resources Wales and G Farr, British Geological Survey 2015 – accessed at <http://earthwise.bgs.ac.uk/index.php/Hydrogeology_of_Wales:_Carboniferous_aquifers_-_the_Carboniferous_Limestone_aquifer>

Figure 5. Surface Water Drainage of Wider Area



- 2.6.3 The topography of the wider area (Figure 6) demonstrates a pattern of high elevations with lower valleys orientated in a north-east south-west direction. This topography reduces towards Benllech, to the north of Red Wharf Bay and to the southwest of Llanddyfnan and Llanbedroch. These elevated areas result in water flowing to the lower valley floors. In the case of the site this surface water flow appears to be directed towards the south or south west where there is an existing surface water course.

Figure 6. Topography of Wider Area



2.7 Regional Hydrogeology

- 2.7.1 The site is located within an area dominated by Devensian glacial till which is expected to be of low permeability. This appears to be confirmed by the BGS hydrogeological map (1977)⁶ which does not detail any superficial aquifers within the area. Glacial Till is typically classified as “unproductive strata”.
- 2.7.2 The Defra Magic map⁷ classifies the bedrock geology (Carboniferous Limestone) as a Principal Aquifer (Figure 7).
- 2.7.3 The Carboniferous Limestone aquifers in North Wales are used for public and private supply. According to Robins & Davies (2015), the limestones are considered an important groundwater source and have high fracture permeability due to the well-developed joint and fracture system. Rapid solution of the limestone occurs mainly in the zone of active circulation which is in contact with the atmosphere, i.e. at the water table, or above the level of passages and caverns into which the phreatic water drains. Fossil karstic horizons, now submerged beneath the water table, may reflect past changes in base level.
- 2.7.4 As reported by Robins & Davies (2015), the Clwyd Limestone Group aquifer in is located in limestones that were deposited in faulted basins and have been extensively dolomitised and silicified. In the Clwyd limestone catchment, groundwater flow is mostly through faults, fractures and karst features towards the north-east and discharges to the sea. Robins & McKenzie (2005)⁸ highlighted that this groundwater flow can be inhibited by mudstone horizons.
- 2.7.5 Robins & Davies (2015) reported the groundwater quality from the limestone often being rich in Ca-HCO₃ with a smaller proportion of Mg, Cl and Na. The groundwater was described by

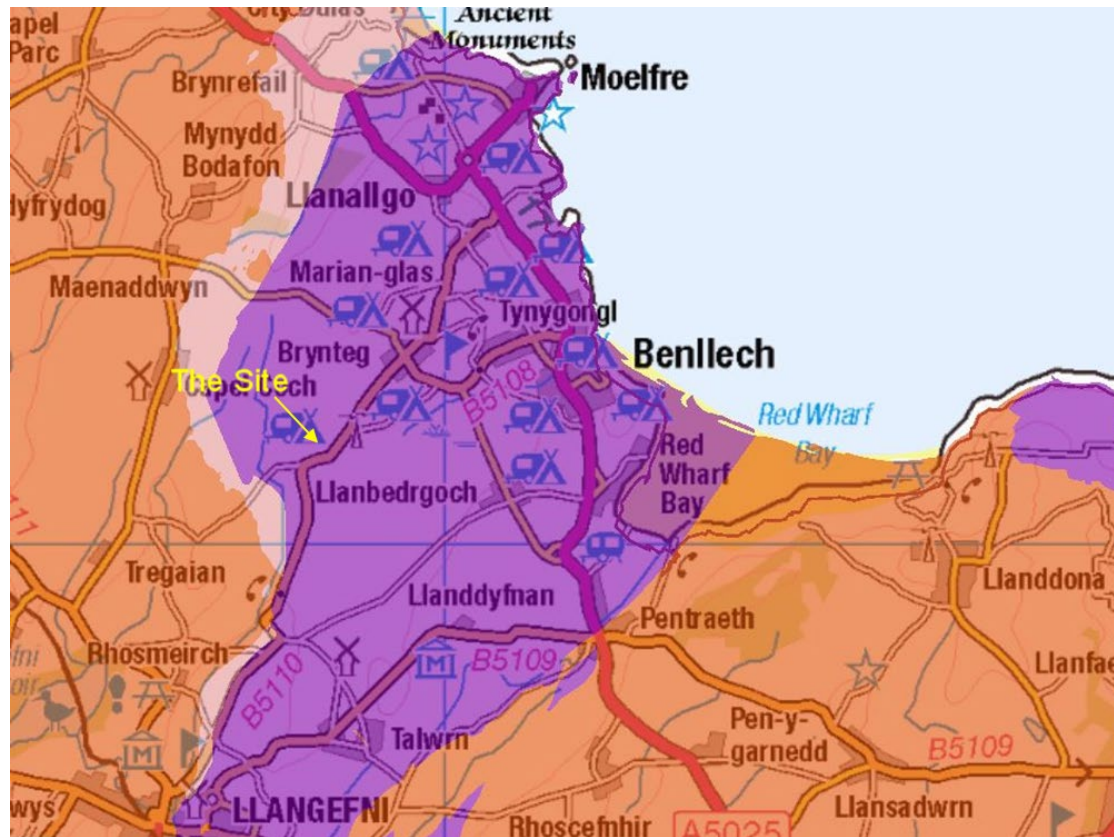
⁶ BGS (1977) Hydrogeological map of England and Wales, 1: 625,000, Available at <http://www.largeimages.bgs.ac.uk/iip/hydromaps.html?id=england-wales.jp2>

⁷ Magic Maps (2019) <https://magic.defra.gov.uk/magicmap.aspx>

⁸ N.S. Robins & A.A. McKenzie (2005). Groundwater occurrence and the distribution of wells and springs in Precambrian and Palaeozoic rocks, NW Anglesey Quarterly Journal of Engineering Geology and Hydrogeology, 38, 83–88

Banks et al. (2008)⁹ as having a neutral pH, nitrate in range of <25mg/l, Ca between 60-130mg/l and often being oxic in quality (>127mV).

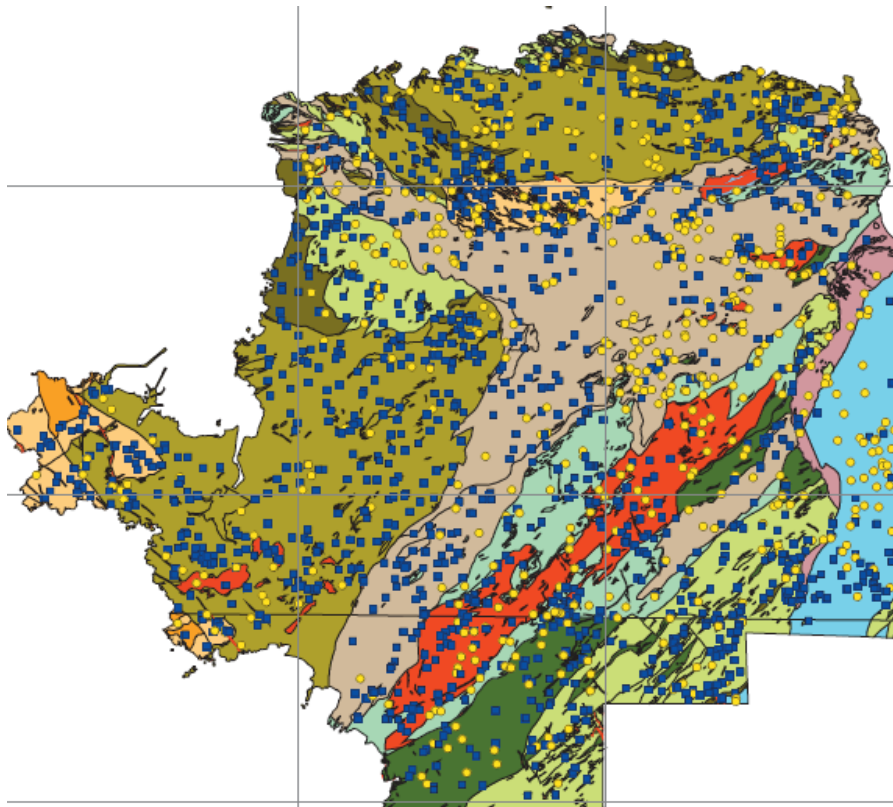
Figure 7. Bedrock Aquifer within Vicinity of the Site



- 2.7.6 Robins & McKenzie (2005) reported the following characteristics of the wells and springs in the Anglesey area. The density of wells and springs in the Clwyd Limestone group across Anglesey are reported as 1.3km² and 1.6km² respectively. Yields are typically small with many springs being little more than minor seepages. The abundance of wells and springs in the Carboniferous Limestones are depicted on Figure 9.
- 2.7.7 Springs across Anglesey are dictated by the topography and the geology. This is evident to the northeast of Llangefni where the fissured carboniferous limestone results in groundwater being discharged into the Afon Cefni valley. These springs occur frequently in the Coedana complex, Coedana granite, and the Ordovician and central Anglesey shear zone.

⁹ Banks, D., Boland, M., Farr, G. Inman, P., & Low, R. (2008) Groundwater Quality and Supply Survey for the Carboniferous Limestone, Anglesey, Environment Agency, Bristol, Technical Report

Figure 8. Distribution of Wells and Springs in NW Anglesey Robins & McKenzie (2005)



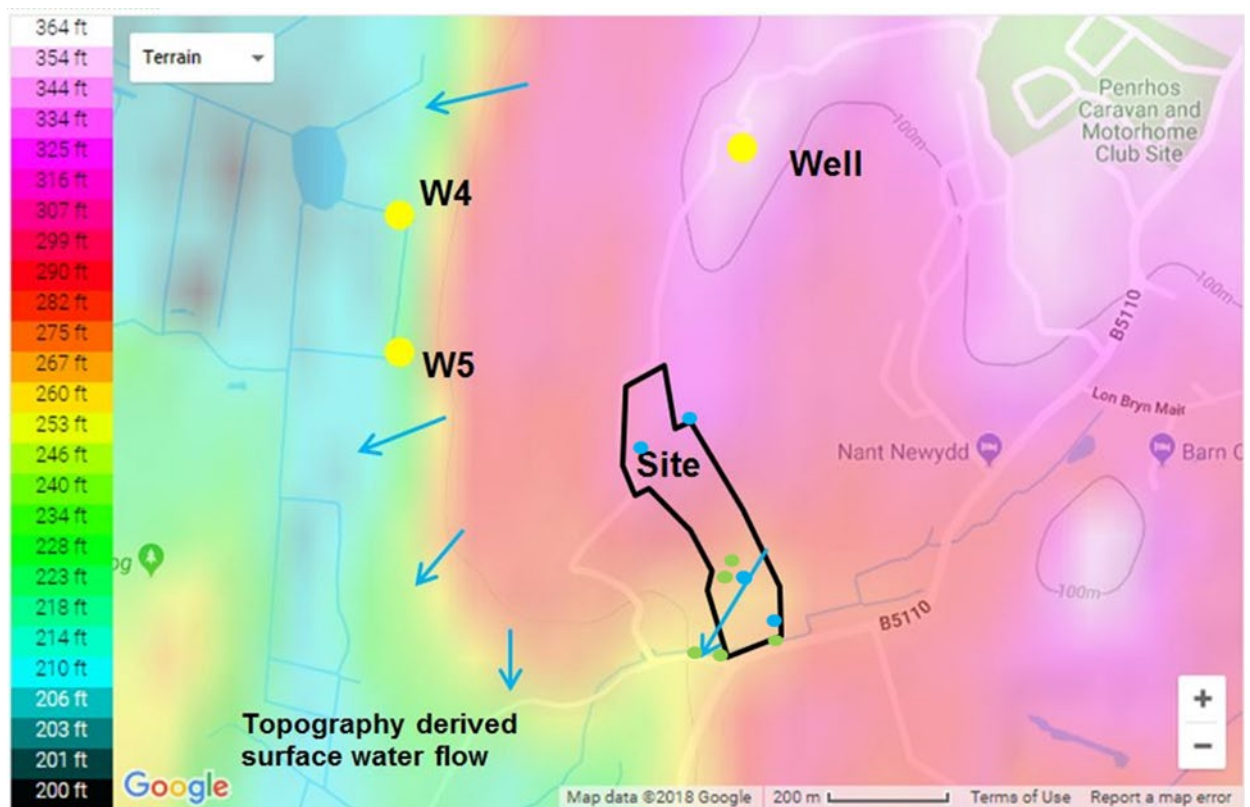
- 2.7.8 Test pumping at four different sites reported transmissivity values between 0.15-1.8m²/d and gave yield of 1l/s.
- 2.7.9 Yields obtained from boreholes are highly variable within the region, with larger yields occurring where there is an intersection of water-filled fractures within an area of recharge. For example, at Llanbedrgoch [SH 493 803] a borehole was drilled into a mixed sedimentary sequence in Carboniferous strata to a depth of 65 m and yielded only 2.5 l/s over a two-hour pumping day. Prior to this, two other boreholes had been drilled at Llanbedrgoch with no trace of water found.
- 2.7.10 Robins & Davies (2015) reported that there were a number of shallow wells in the Devensian Till which helps illustrate perched water within moderately permeable horizons. Springs frequently occur at the base of the unconsolidated till where it overlies the bedrock. The alluvium is normally fine grained and not very permeable and the blown sand deposits are often well drained and unsaturated.

2.8 Site Hydrology / Hydrogeology

- 2.8.1 Both hydrological and hydrogeological aspects are detailed in this section as they are interlinked, surface water drains to form groundwater, groundwater discharges as spring lines to form surface water features.
- 2.8.2 The main surface water features within the vicinity of the site are the drains, ponds and a watercourse called Afon Clai.

- 2.8.3 The topography of the site shows the local topography orientated towards the south west resulting in the surface water draining from the site towards the south/southwest where there is a network of drains and a watercourse. This drainage network flows to the southwest towards the wetland at Cors Erddreiniog. The drainage network originates from a small pond north east of the site at approximately 92mAOD.
- 2.8.4 The Nant Newydd Quarry Working Plan dated 1996 stated that a stream on the eastern boundary of site had been reinstated to its original course on the southern boundary.
- 2.8.5 The 1994 survey of the site shows prior to being diverted along the southern boundary. The stream enters the site at approximately 84.5mAOD, 20m to the north of the entrance, and exits the site in the south west at an elevation given at 76.7mAOD. Currently the stream flows along the southern boundary, but remnants of flow are still evident along the alignment of the old stream bed. This flow currently enters the site's surface water management system which collects water resulting from precipitation and the groundwater seepage along the northern quarry wall.

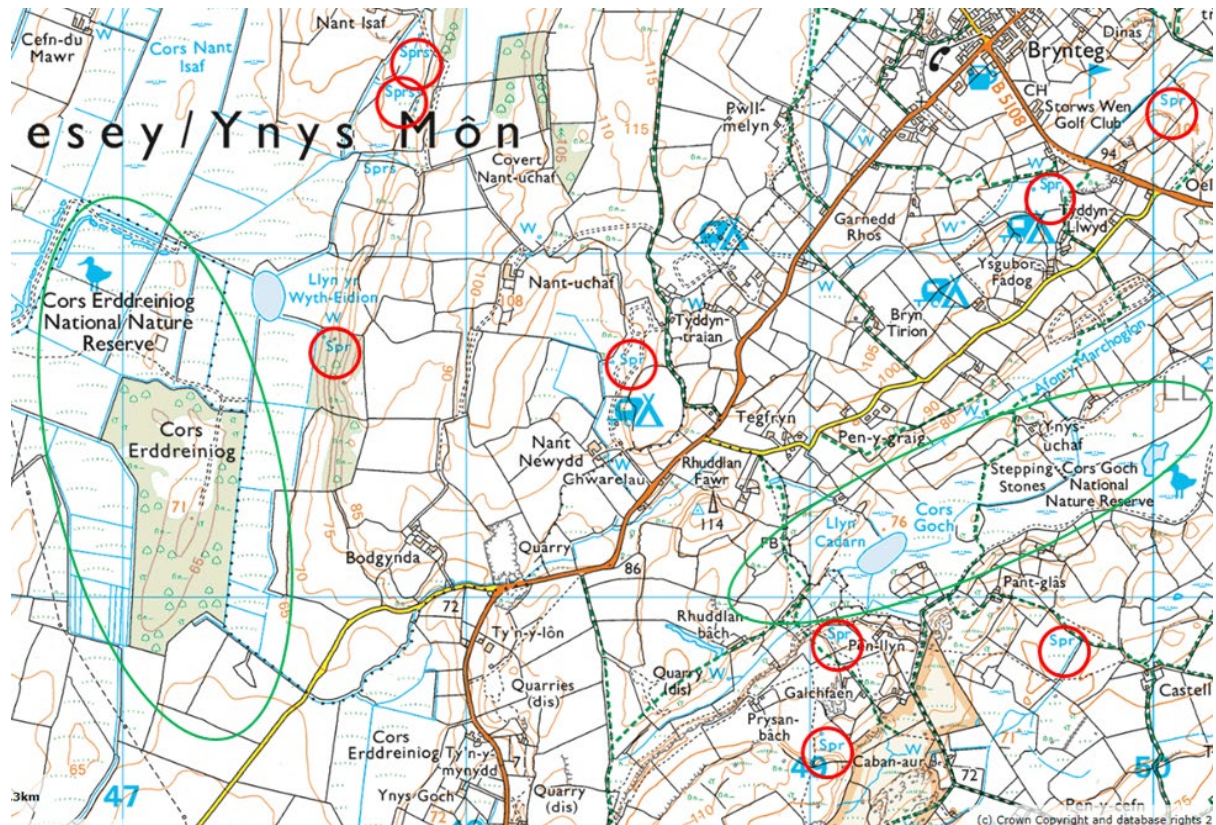
Figure 9. Local Topography and Monitoring Locations



- 2.8.6 All surface water within the quarry (standing water) either soaks away into the underlying geology or is channelled through the settlement ponds, discharged to the culvert and then the diverted stream. From the stream, the surface water eventually reaches the Cors Erddreiniog.
- 2.8.7 The northern quarry wall visibly shows signs of seepage of groundwater where there are bands of mudstone within the limestone. This seepage occurs at approximately 85-86mAOD.
- 2.8.8 The surface water percolates through the quarry strata (unsaturated zone) into the groundwater / water table which exits out of the natural topography in the area via the nearby spring lines (Figure 10). The majority of the springs exiting the lower scarp slopes to the west

of the site are estimated to be at an elevation around 75mAOD similar to the contact between the Clwyd limestone and Lligwy sandstone as noted on the geological maps. All of the springs around the Cors Goch are contained within the Clwyd Limestone. These springs are potentially contributing groundwater to Llyn yr Wyth-Eidon and Cors Erddreiniog wetlands.

Figure 10. Location of Springs on OS mapping



- 2.8.9 According to Natural Resources Wales (2019a & 2019b)^{10&11}, Nant Newydd is not situated near a source protection zone or a nitrate vulnerable zone. It was reported by Natural Resources Wales (2019a) that it is not situated in a drinking water safeguard zone for either river catchments or lakes.
- 2.8.10 There are a four water wells at varying depths that have been recorded from the BGS Geoindex site. The closest of which is 1.3km to the south east of the site. In addition to this there were a number of water wells noted within 750m of the site. However, it is not known if any of these water wells are for human consumption.
- 2.8.11 It is apparent from the BGS map of the superficial deposits that only the higher elevations will be directly recharged by precipitation as the lower lying valleys are covered in superficial deposits of low permeability (glacial clays). The cover of the limestone with bentonitic clay palaeosols and localised red clay, reduces the infiltration of surface water into the limestone

¹⁰ Natural Resources Wales (2019a) Source Protection Zones (SPZ) Available At <<https://lle.gov.wales/catalogue/item/SourceProtectionZonesSPZMerged/?lang=en>>

¹¹ Natural Resources Wales (2019b) Water Watch Wales, Available At <<https://waterwatchwales.naturalresourceswales.gov.uk/en/>>

aquifer. According to Davies (1991)¹² the combination of both the low permeability superficial deposits and the clay rich palaeosols reduces infiltration to a minimum.

2.8.12 It should be noted that groundwater flow through faults, fractures (potentially karstic areas) and the joints system within the limestone can locally modify flow directions.

¹² Davies (1991) Karstification and pedogenesis on a late Dinantian carbonate platform, Anglesey, North Wales, Proceedings of the Yorkshire Geological Society, VOL. 48, PART 3, PP.297-321

3. CONCEPTUALISATION

3.1 Location of Receptors

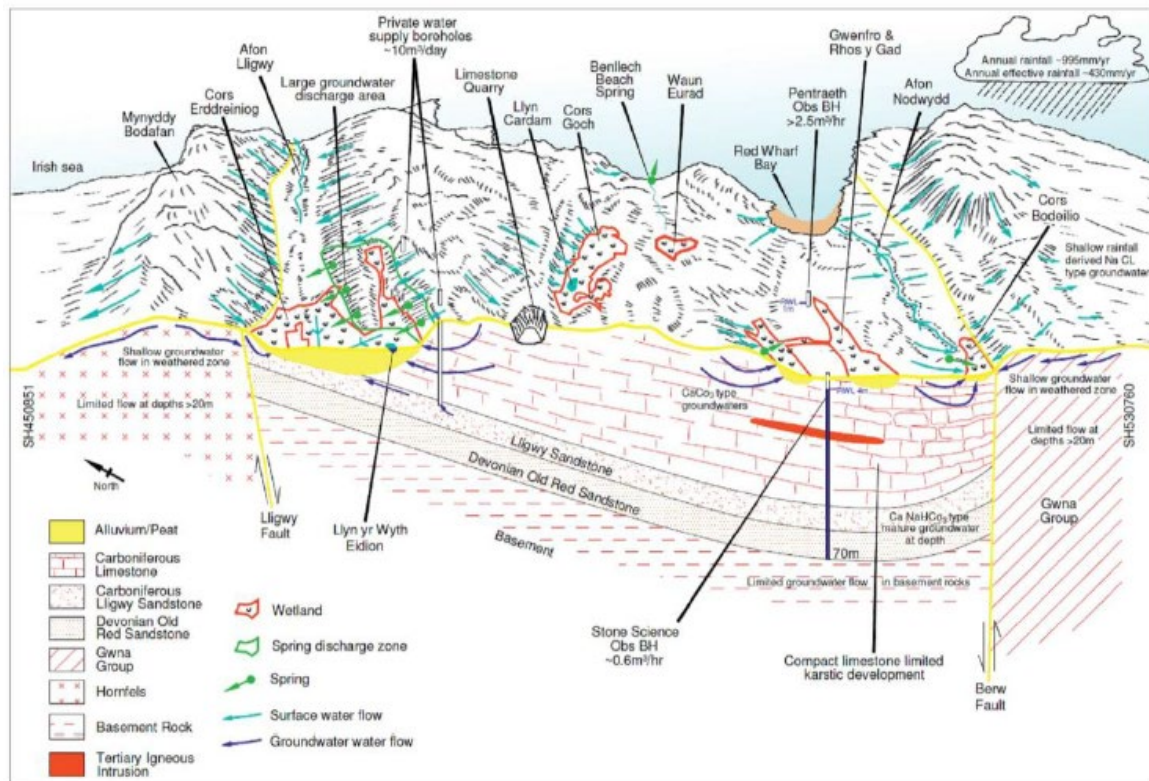
- 3.1.1 Through the recent Site Investigations (SI) and a desk study it has been established that the main receptors are the surrounding surface watercourse (Afon Clai), the underlying groundwater and therefore potentially the protected habitats (Cors Erddreiniog and Llyn yr Wyth-Eidion). Cors Goch is not considered to be a receptor based on relative elevations between site and this location.

3.2 Geology and Hydrogeology – context

- 3.2.1 The site has been subject to detailed desk study that has allowed an understanding of the surrounding geological and hydrogeological regimes which form the conceptual understanding of the site. This has been proven by the installation of 4 monitoring boreholes to establish the depth of the unsaturated zone (see section 2).
- 3.2.2 Any standing water / surface water run-off that infiltrates the limestone, joins the water table below the base of the quarry (in the local vicinity to the quarry) and exits to the north and North West as discrete spring lines.
- 3.2.3 A report by Beamish and Farr (2013)¹³ suggested that the Limestone is an important water supply to the surrounding wetlands. Beamish and Farr claimed their electrical conductivity data was capable of mapping the lateral extent of clay accumulations which can act as a confining layer to the limestone.
- 3.2.4 Beamish and Farr state that the Anglesey Fens (Special Area of Conservation or SAC) represent one of the most important wetland areas in Europe. In the area of Nant Newydd quarry they comprise of Cors Erddreiniog (their main study area) located to the west / southwest from site and Cors Goch located to the east. The report states that the wetlands hydrological functioning and specialist plant assemblages are reliant, to an extent, on the quality and quantity of groundwater. Calcareous and alkaline fens found within these wetlands that are reliant on the groundwater input from the carboniferous limestone are classed as groundwater dependent terrestrial ecosystems (GWDTE). However, it is not clear if the groundwater feeding these wetlands is an upward diffuse input or direct lateral input.
- 3.2.5 Within this research, a conceptual model was derived; this is reproduced as Figure 11.

¹³ Beamish, D. & Farr, G., (2013). Airborne geophysics: a novel approach to assist hydrogeological investigations at groundwater dependent wetlands. Quarterly Journal of Engineering Geology, 46, 53-62

Figure 11. Conceptual model of the Anglesey Carboniferous Limestone (from Beamish and Farr, 2013)



- 3.2.6 It is noted that the ground level of Cors Erddreiniog is at circa 60mAOD (below the base level of Nant Newydd Quarry) whereas Cors Goch is at 76mAOD (potentially at a similar elevation to the base of Nant Newydd Quarry), see Figure 10.
- 3.2.7 The model suggests contribution of groundwater derived springs on scarp slopes (in addition to lateral input of groundwater) to the alluvium / peat dominated low lying areas. Cross referencing the location of Cors Erddreiniog and Cors Goch with the solid Geology (Figure 2) and Superficial Geology Figure 4 indicates the former overlies the subcrop of the Red Sandstone Supergroup and Lligwy Sandstone whereas the latter overlies the Clwyd Limestone. This would imply that the underlying bedrock strata are not the controlling factor on the location of the GWDTE's.
- 3.2.8 There are abundant springs exiting at the lower scarp slopes in the area (Figure 11). Those to the west of site, potentially contributing groundwater to Cors Erddreiniog are close to the basal contact between the Clwyd Limestone and Lligwy Sandstone at a level of circa 75mAOD. Those springs surrounding Cors Goch are exiting at various levels, all of which are contained within the Clwyd Limestone.
- 3.2.9 Geological structure and lithology are well constrained, both locally and regionally.
- 3.2.10 There are no surface watercourses that cross the area of the quarry with the closest being located on the southern boundary of the site. On site, surface water is directed to the surface water management ponds towards the access to the quarry.

3.3 Groundwater Level and Flow

- 3.3.1 There 4 on site boreholes (BH2D, BH3DA, BH4D and BH5D) have been installed that monitor groundwater level on a monthly basis. Groundwater flow within the quarry appears to flow

northwest in the summer months from BH4D and 3DA towards BH2D and BH5D (Figure 12). However, this pattern appears to effectively reverse and flow direction can be perceived as being towards the southeast during periods of high rainfall in the winter months. Time series data indicating the increase in water levels at boreholes 2D and 5D are provided at Figure 13.

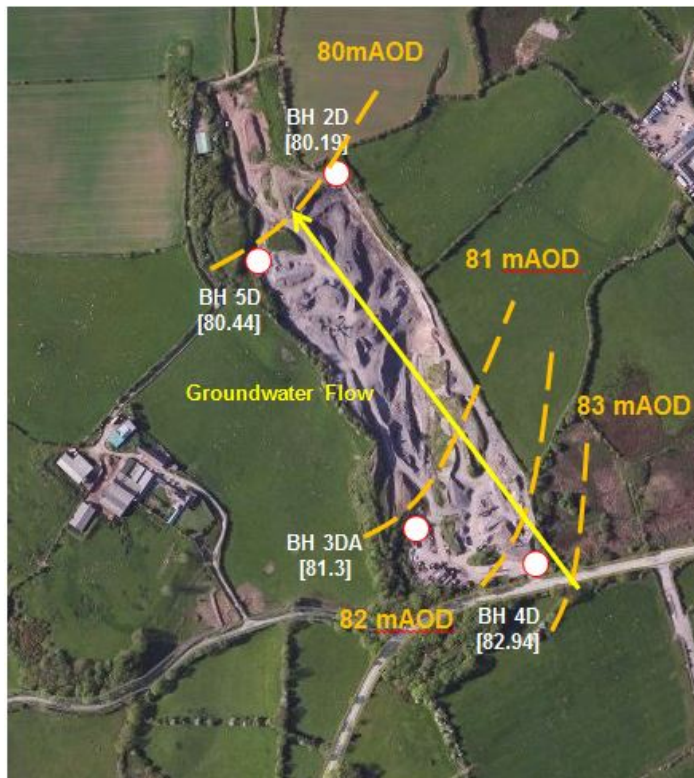
- 3.3.2 Groundwater boreholes were positioned across the site to monitor the groundwater in the east and west perimeter of the site. A brief summary of the statistics for groundwater level can be seen in Table 1 and a full summary of the data appended to the back of this report.

Table 1. Groundwater Level (mAOD) Statistics October 2018 – June 2020

	BH1S	BH2D	BH2S	BH3DA	BH4D	BH5D
Max	89.87	87.46	Dry	82.44	83.38	86.71
Average	89.86	82.73		81.63	82.97	82.30
Min	89.83	77.04		80.86	82.49	77.44

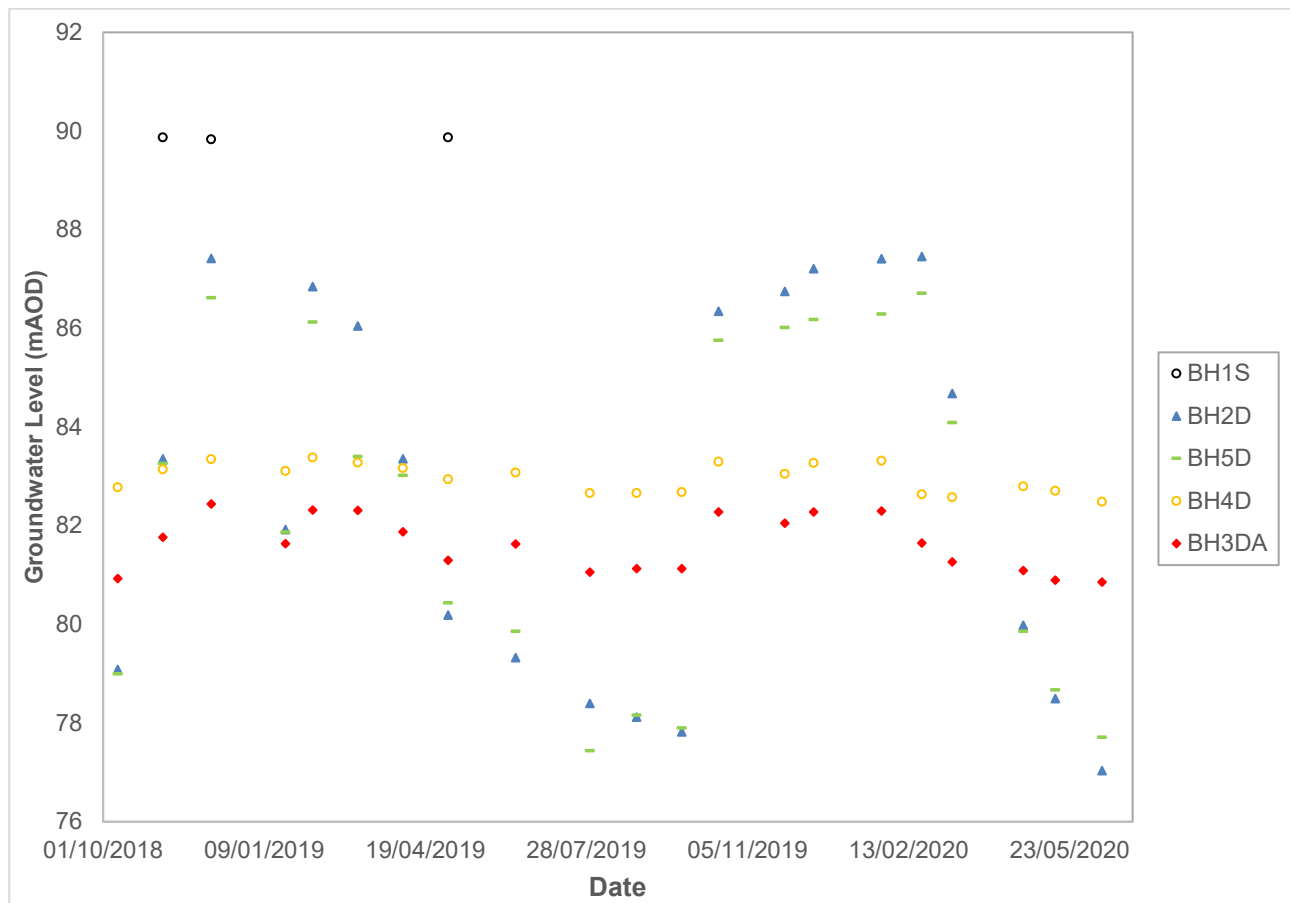
- 3.3.3 BH1S is frequently dry and is above the elevation of the seepages noted on the northern quarry wall. For this reason, the water level data has been disregarded. BH2S was dry for the entirety of the review period.
- 3.3.4 The direction of the summer groundwater flow is consistent with the location of the springs to the north/north west of the site which contribute in providing water to the wetlands to the west of the site.
- 3.3.5 The high rainfall events in the winter months cause an apparent reversal of the hydraulic flow. However, it is conceptualised that these high rainfall events fill the fracture network locally, and drainage through the rock mass is inhibited resulting in a higher head measured at the boreholes.

Figure 12. Inferred Groundwater Flow Direction May 2019



- 3.3.6 During the majority of the summer groundwater flow underneath the site is towards the northwest and Cors Erddreiniog SSSI. The groundwater flow towards the northwest has been illustrated above as SSSI is a potential sensitive receptor. The groundwater regime at the site reverses twice a year evenly according to season. The groundwater boreholes have therefore not been classified as down-gradient or upgradient. Groundwater quality and trends are discussed further in section 3.4. Compliance limits have therefore been set for all groundwater boreholes at the site (section 3.5)
- 3.3.7 The local groundwater flow direction in the vicinity of the site appears to be towards the northwest (excluding the high rainfall months) based on the groundwater level data. The estimated unsaturated zone thickness at the site was estimated to be approximately 2-20m.

Figure 13. Groundwater level October 2018 – June 2020



3.4 Groundwater Quality

3.4.1 Monitoring has been undertaken at the locations detailed in drawing ref 3276/4/006 Rev A. The Environmental Permit (RP3337SE/V003) is regulated by Natural Resources Wales (NRW) and imposes compliance limits for groundwater quality. Monitoring data would suggest that the site operations are not having an impact on the groundwater. Table 2 below contains a summary of the compliance substances for groundwater. A full summary of groundwater data is appended in Appendix C.

Table 2. Summary of Groundwater Compliance Substances

Location		NH4 (mg/l)	Cl (mg/l)	SO4 (mg/l)	Cd (µg/l)	Ni (µg/l)	Zn (µg/l)	MTBE (µg/l)	TPH mg/l	PAH (Total) (µg/l)
Permit Limit		0.39	15.1	18.09	0.1	20	130.5	10	0.01	0.1
BH2D	Max	0.11	40	200	0.07	5	16	5	0.12	0.21
	Ave	0.04	32	72	0.02	1.0	6.7	1.1	0.03	0.10
BH3DA	Max	0.2	29	37	0.1	5	56	5	0.15	0.13
	Ave	0.07	26	33	0.02	1.2	9.6	1.1	0.04	0.08
BH4D	Max	0.5	51	81	0.08	15	27	5	0.18	0.21
	Ave	0.19	44	40	0.03	7.7	5.3	1.1	0.07	0.08
BH5D	Max	0.12	50	590	0.05	9	37	5	0.22	0.08
	Ave	0.04	38	253	0.02	2.5	7.6	1.1	0.08	0.06

Note: Shaded cells correspond to a value higher than the permit limits (this has occurred up and down-hydraulic gradient of the site). The following outliers have been visually excluded: NH4 0.4mg/l for BH5D; Cd 0.34µg/l, 0.31µg/l, 0.31µg/l, 0.31µg/l, 0.29µg/l; Cl 68mg/l; Zn 290µg/l and 150µg/l; TPH 0.35mg/l; and PAH 0.6µg/l. Please note <LOD have been divided by 2.

- 3.4.2 Groundwater quality concentrations of ammoniacal-nitrogen are less than the permit limit of 0.39 mg/l with the exception of at BH4D (see section 3.5). Chloride concentrations within the groundwater are below the DWS for chloride 250mg/l but are frequently above the permit limit of 15.1 mg/l. It is proposed to revise the compliance limit for chloride due to the frequent exceedances due to likely background concentrations. Chloride concentrations for all boreholes are typically less than 51mg/l (Table 2).
- 3.4.3 Sulphate concentrations are continuously above the permit limit for all locations. Both chloride and sulphate had background concentrations exceeding the permit limit prior to the operation of the site as a landfill as previously reported in 2018 data review by TerraConsult¹⁴.
- 3.4.4 Calcium is typically greater in concentration than the matrix ions magnesium, sodium and potassium in addition to chloride.
- 3.4.5 The BH5D data indicates a greater concentration of sodium and sulphate than the other boreholes (both exceeding the DWS concentration of 200mg/l¹⁵ and 250mg/l¹⁶ respectively). Alkalinity concentrations at BH5D is similar to the concentrations recorded at BH2D and BH3D. BH4D has considerably higher concentrations of alkalinity than the remaining boreholes.
- 3.4.6 Variable but low concentrations of metals have been detected within the groundwater samples. Analysis of both lead and chromium were below the limit of detection. The majority of the substances are below the DWS with the exception of manganese, iron and aluminium. Manganese concentration varies between 3 - 550µg/l. The boreholes which exceed these substances are located both up and down gradient of the site and therefore cannot be attributed to the quarry operations. Iron and aluminium concentrations are mostly below the DWS with one exception each.
- 3.4.7 BH4D has the highest concentration of iron as well as manganese, suggesting that this boreholes is under redox conditions.
- 3.4.8 MTBE has not been detected above the laboratory limit of detection since monitoring commenced in October 2018.
- 3.4.9 TPH has frequently exceeded the permit limit since January 2019. However, pre-operational concentrations at the site in October 2018 were also above the compliance limit. There are no clear similar trends exhibited in the key leachate indicator substances such as chloride or ammoniacal nitrogen. A new UKAS accredited laboratory was instructed in September 2019 to analyse the data which corresponded with a decrease in recorded concentrations of TPH, most likely attributable to differing analytical techniques. It is proposed to discount mineral oil (and TPH) as a compliance substance due to elevated concentrations detected in the pre-operational background data.
- 3.4.10 The chart in Appendix C illustrates that when the hydraulic gradient at the site reverses (April or September) this generally coincides with an increase in concentration for TPH at all locations.
- 3.4.11 PAH has been recorded on a number of occasions above the permit limit. However, this substance was also detected in background concentrations above the permit limit. It does not appear to show a spatial variation with a clear trend (Appendix C). The recent data from October 2019 onwards shows a total concentration of <0.16µg/l plotted for all points with the

¹⁴ TerraConsult (2018) 2018 Data Review, Nant Newydd Landfill Site, Report referenced 3276/R/013/01

¹⁵ <http://dwi.defra.gov.uk/consumers/advice-leaflets/standards.pdf>

¹⁶ <http://dwi.defra.gov.uk/private-water-supply/local-auth/parameters.html>

majority of the speciated PAH $<0.01\mu\text{g/l}$. Therefore, it can be deduced that the lab methodology gives an elevated representation of the PAH.

3.4.12 Phenol concentrations within the groundwater were all less than the laboratory limit of detection.

3.4.13 The annual hazardous screen in groundwater detected PAH, diazinon, arsenic, mercury, selenium, TPH and fluoride between October 2018 to June 2020 (Appendix C). However, mercury was only detected once above the laboratory limit of detection and that was prior to the placement of waste in October 2018. Arsenic was below both the MRV and DWS throughout the review period. Selenium had high background concentrations detected in October 2018 ($100\mu\text{g/l}$ and $22\mu\text{g/l}$) which has only had one exceedance of the DWS in April 2020. The pesticide concentrations do not exceed the DWS of $0.1\mu\text{g/l}$ on any one occasion. A number of hydrocarbons, chlorinated hydrocarbons, BTEX, esters, organic acids were identified in the additional SVOC analysis (Appendix C). However, this has only been carried on one occasion and therefore it is not certain how representative this data is. The additional SVOC analysis can be seen in the full summary of data.

3.4.14 Revised compliance limits are proposed in section 3.5 in accordance with the requirements of Improvement Condition 1.3.2.

3.5 Improvement Condition 1.3.2

3.5.1 Groundwater compliance limits were proposed in TerraConsult report referenced 3276/R/001/01¹⁷ for BH3DA and BH5D based on the concentrations of BH4D. However, the groundwater section of the report was not approved by NRW. Therefore, it is assumed that the original permit limits still apply.

3.5.2 TerraConsult report 3276/R/013/01 (2018 Annual review) carried out a review of the background monitoring data for the site prior to the commencement of landfilling operations in January 2019. The data review carried out in Section 4 details the site conditions over the 2018 to 2020 period. This information will be used to justify the reference locations used to establish background conditions, the proposed compliance substances and the compliance points.

Reference Data

3.5.3 All available groundwater data collected by TerraConsult to date will be used for the revision of the action levels and compliance limits. Section 2.8 above states that groundwater in the limestone beneath the site is likely via fracture flow, joins and faults. The hydraulic gradient at the site appears to reverse during winter months as has been described in section 3.3. Therefore, it is not possible to ascertain a downgradient groundwater monitoring point as a compliance point. It is proposed to keep all current groundwater boreholes except BH4D as compliance points. Data from all boreholes has been utilised, outliers visually excluded to indicate the maximum concentration for each substance.

3.5.4 The groundwater monitoring points are detailed on the monitoring plan referenced 3276/4/006 Rev A. Table 2 above summarises the compliance limits associated with the site groundwater respectively.

¹⁷ TerraConsult (2018) Environmental Monitoring Plan, Nant Newydd Landfill site, report referenced 3276/R/001/01

Compliance Substances

- 3.5.5 It is proposed to discount sulphate as a compliance substance as concentrations in the groundwater are evidently higher than the worst-case scenario for an inert landfill site (i.e. 1000mg/kg or 100mg/l in leachate).
- 3.5.6 Mineral oil is also proposed to be discounted as a compliance substance due to a lack of a discernible spatial relationship for it at the site and its lack of mobility within groundwater.
- 3.5.7 MTBE is also proposed to be discounted as a compliance substance as there is not an inert WAC limit for MTBE and therefore it is difficult to ascertain a worst-case scenario for MTBE at an inert landfill. Additionally, it has never been detected above the laboratory limit of detection since the commencement of monitoring.
- 3.5.8 The compliance limit for chloride has consistently been exceeded even prior to site operations. It is not considered appropriate to follow the Annex J3 method in this case due to difference between the DWS (250mg/l) and the Tmax (51mg/l). Therefore, it is proposed that this limit will be revised for an action level of 60mg/l and a compliance limit of 70mg/l.
- 3.5.9 The compliance limit for ammoniacal nitrogen has been breached by BH4D on three occasions. It should be noted that made ground is present at BH4D which is discussed more in section 2.5 and 5.3. It is proposed that due to the presence of ammoniacal nitrogen and elevated methane (discussed later in Section 5.2) within this borehole, that ammoniacal-nitrogen is removed as a compliance substance for BH4D. It is likely that another source unrelated to the landfill is the source of the elevated concentrations of this substance in this borehole. The other compliance substances do not appear to be elevated at BH4D and provide a useful point of reference for the landfill site, although consideration should still be given to other sources when reviewing the data going forward. With one exception concentrations of ammoniacal nitrogen in the remaining boreholes are below the current compliance limit.
- 3.5.10 The compliance limits for nickel and zinc have been deemed appropriate and are proposed to remain the same. The compliance limit for cadmium is proposed to be removed as the majority of concentrations recorded across the site are below the current limit and DWS. Nickel and zinc also fulfil the role of non-hazardous metal indicator species, of which cadmium is no longer classified according to JAGTAG¹⁸. It is proposed to replace cadmium with arsenic as a hazardous metal and the compliance limit for arsenic set at the MRV i.e. 5µg/l¹⁹.
- 3.5.11 The compliance limit for PAH is based on the total concentration of 16 PAH species. Total PAH concentrations in groundwater have however been recorded above the assigned limit prior to the operation of the site as a landfill. This is because the laboratory reporting limit for Total PAH is greater than the current compliance limit. It is proposed that the compliance limit should be set at 0.1µg/l for the 16 individually speciated PAHs (with reference to USEPA Method 3510C) in accordance with the drinking water standards²⁰.
- 3.5.12 The proposed compliance limits and control levels have been proposed based on the following methodology in the now withdrawn H1 Annex J3: hazardous substances have had compliance limits set at the MRV; and non-hazardous substances have compliance limits set at the EAL (DWS)/pre-existing limit. The exception to this is PAH where the elevated background concentrations and limitations of the laboratory reporting limit for total PAH have

¹⁸ <http://wfd.uk.org/resources/groundwater-hazardous-substances-standards>

¹⁹ http://wfd.uk.org/sites/default/files/Media/UKTAG_Technical%20report_GW_Haz-Subs_ForWebfinal.pdf

²⁰ <http://dwi.defra.gov.uk/consumers/advice-leaflets/standards.pdf>

meant that the DWS is the most appropriate standard to be applied to individual PAH substances.

- 3.5.13 Non-hazardous pollutant control levels have been set halfway between the compliance limit and maximum concentrations.

Table 3. Proposed Compliance Substances, Compliance Limits and Control Levels for Groundwater

Proposed Compliance Substances							
Location		Cl	Ni	Zn	As	NH4*	Individual PAH Species
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
BH2D	Compliance Limit	70	0.02	0.1305	0.005	0.39	0.0001
BH3DA	Control Level	60	0.018	0.09	n/a	0.3	n/a
BH4D	Max Concentration	51	0.015	0.056	0.0042	0.2	n/a
BH5D							

*BH4D proposed to have NH4-N removed as compliance substance due to presence of made ground

4. Surface Water Quality

4.1 Overview

- 4.1.1 A surface water management plan has been submitted and approved by NRW, the associated monitoring regime is regulated by the environmental permit which imposes quality limits at the point of discharge from the site. Monthly monitoring has been undertaken since the adoption of the surface water management plan in 2018. The surface water quality data has indicated no discernible detrimental impact from site on surface water quality.
- 4.1.2 As of October 2018, surface water quality was monitored at four locations: SW1, SW2a, SW2b and SW3. Monitoring at SW4 commenced in January 2019. SW1 and SW3 are off-site monitoring points located in the small brook that flows along the southern site boundary. SW1 is upstream (east) of the site and SW3 is downstream (west). SW2a and SW2b are sampled at the two settlement ponds located in the southern extent of the quarry void. SW4 is located at the discharge point of the culvert.
- 4.1.3 A summary of the surface water compliance substances applicable to SW4 only are detailed in Table 4. A full summary of the surface water quality data is in Appendix D.

Table 4. Summary Statistics of Compliance Substances in Surface Water

		PO4 (mg/l)	Suspended Solids (mg/l)	PAH (Total) (µg/l)	SO4 mg/l	TPH mg/l
SW1	Max	0.25	54	0.08	45	0.21
	Ave	0.14	10	0.04	23	0.05
SW2a	Max	0.25	91	0.08	140	0.24
	Ave	0.13	13	0.04	91	0.07
SW2b	Max	0.25	84	0.20	170	0.24
	Ave	0.13	23	0.07	116	0.08
SW3	Max	0.25	55	0.20	86	0.50
	Ave	0.14	13	0.07	38	0.11
SW4	Max	0.25	45	0.10	98	0.16
	Ave	0.12	12	0.06	35	0.03

Note: Shaded cells correspond to a value higher than the following permit limits for SW4: suspended solids 628mg/l; sulphate 327mg/l; phosphate 1.2mg/l; oil and grease (none visible); mineral oil 0.01mg/l; and PAH 0.0001mg/l. Outliers consisting of the following have been excluded from the statistics: SO4 240mg/l, 120mg/l; suspended solids 350 mg/l, 280 mg/l, 190 mg/l; TPH 1.31mg/l; PAH 0.43µg/l, 0.4µg/l and 0.35µg/l.

- 4.1.4 The only substance that is above the compliance limits set for SW4 is TPH which is consistently above the limit of 0.01mg/l. TPH exhibits a decreasing trend in concentration within the surface water over the review period. TPH concentrations are also recorded at lower concentrations downstream of the site relative to SW1. The remaining substances concentrations are compliant with the permit limits.
- 4.1.5 The surface water quality shown in Table 4 demonstrates that sulphate is below the EQS of 400mg/l. Ammoniacal-nitrogen concentrations at all the surface water monitoring points are below 0.33mg/l with the exception of one outlier of 0.69mg/l at SW4. Chloride concentrations at all points is below the EQS of 250mg/l.
- 4.1.6 The metal concentrations within the surface water are mostly below their relevant EQS with the exception of manganese. Manganese concentrations at SW2A and SW2B are considerably higher than the other surface monitoring points.
- 4.1.7 The same issue with laboratory reporting limits for Total PAH in groundwater has been identified in the surface water quality data for the review period.

4.1.8 The annual hazardous screen in October 2018 and October 2019 identified cyanide, PAH, mecoprop, mevinphos, lead, PCBs and TPH. PCBs, lead, mevinphos and cyanide were only recorded positively in October 2018 and have not been identified since. Mevinphos was detected below the MRV of 0.016µg/l. Mecoprop was detected at positive concentrations in October 2019 at SW1 and SW2b both below the EQS of 18µg/l. Phenol concentrations where tested were below the laboratory limit of detection.

4.1.9 Additional SVOC analysis identified the following: hydrocarbons; BTEX; organic acids; esters; chlorinated hydrocarbons and phenol. However, these were only identified on one occasion for each location and therefore it is not certain how representative these are. The additional SVOC analysis can be seen in the full summary of data.

4.2 Revised Surface Water Compliance Limits (Improvement Condition 1.3.9)

4.2.1 Surface water compliance limits were proposed in TerraConsult report referenced 3276/R/001/01²¹ for SW2. However, it is not clear if these were ever approved by NRW. Therefore, the permit limits provided in V003 have been utilised.

4.2.2 As required by the improvement programme requirements for the site, the Operator is required to submit the following to NRW to satisfy improvement programme reference 9:

- acquire 12 months of surface water monitoring data and submit a written report for approval to review and revise post-interim Control Levels and Compliance Limits; and

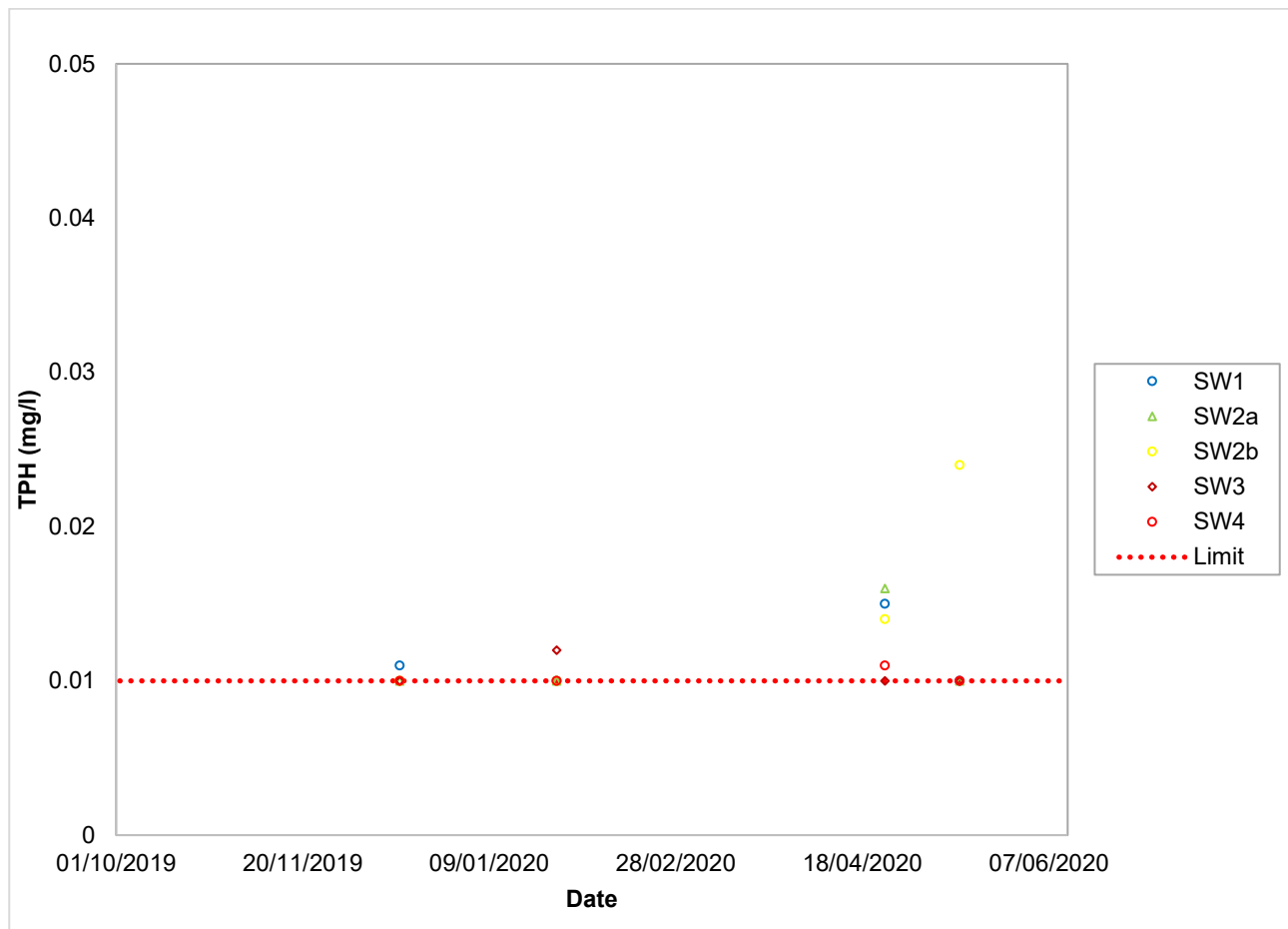
4.2.3 It is proposed that the current compliance limits are appropriate for SW4 with the exception of TPH. It is evident from Figure 14 that the concentrations up stream at SW1 are frequently elevated in comparison to the downstream concentrations. The most recent concentrations of TPH plot at or just above the current compliance limit showing that there are reduced concentrations exhibited downstream. Therefore, it is proposed that the compliance limit for Mineral Oil is removed.

4.2.4 It is also proposed that sulphate remains part of the monitoring regime but is removed as a compliance substance.

4.2.5 The other proposed amendment to the surface water compliance limits is for PAH to have a limit for the individual speciated substances of 0.1µg/l.

²¹ TerraConsult (2018) Environmental Monitoring Plan, Nant Newydd Landfill site, report referenced 3276/R/001/01

Figure 14. 2019-2020 TPH Concentrations in Surface Water



4.2.6 The proposed compliance limits and control levels have been proposed in Table 5 based on the following methodology in the now withdrawn H1 Annex J3: hazardous substances have had compliance limits set at the MRV; and non-hazardous substances have has compliance limits set at the EAL (DWS)/pre-existing limit. The exception to this is PAH where the elevated background concentrations and laboratory method have meant that the DWS is the most appropriate standard.

4.2.7 Non-hazardous pollutant control levels have been set halfway between the compliance limit and maximum concentrations.

Table 5. Revised Compliance Limits for SW4

Proposed Compliance Substances				
	Suspended Solids	PO4	Oil & Grease	Speciated PAH
	mg/l	mg/l	-	mg/l
Limit Max	628	1.2	None Visible	0.0001 mg/l
Limit Other	50 (on any 2 consecutive occasions)	0.1 (on any 2 consecutive occasions)	-	-

5. Landfill Gas Data Review

5.1 Introduction

5.1.1 As required by the improvement programme requirements for the site, the Operator is required to submit the following to Natural Resources Wales (NRW) to satisfy improvement programme reference 1.3.6:

- a review of the Control Levels and Compliance Limits in the Permit (EPR/ RP3337SE/V003);
- where justified, revised post-interim Control Levels and Compliance Limits for Agency approval.

5.1.2 The limits will be derived in accordance with the methodology identified in guidance document 'Perimeter Soil Gas Emissions Criteria and Management Industry Guidance, Version 1.01 dated January 2011'.

5.1.3 The permit refers to gas monitoring points G1 and G2 which no longer exist at the site. The compliance limits proposed in Table S4.3 for the site were based on 0% background concentrations at the site with the following limits:

- Methane 1% above agreed background concentrations
- Carbon Dioxide 1.5% above agreed background concentrations

5.1.4 Interim compliance limits proposed in the Environmental Monitoring Plan (ref. 3276/R/001/01) were the same as those provided in the Permit. The EMP proposed that based on the inert properties of the waste to be accepted that it was highly unlikely to generate any landfill gas. The proposed limits within the EMP were never approved by NRW.

5.2 Current Landfill Gas Monitoring Regime

5.2.1 As of October 2018, ground gas monitoring was conducted monthly at 6 perimeter gas monitoring points in accordance with Tables S4.3 and S4.4 of the permit. The installation details for the boreholes can be seen in Table 6. Monitoring points BH2D, BH3DA, BH4D and BH5D were installed primarily as groundwater monitoring boreholes with BH1S and BH2S installed to monitor shallow ground gas. Gas data was not obtained for BH2D as the slotted pipe is too deep (35mbgl to 41mbgl) to measure shallow ground gas data. A full summary of the landfill gas data is provided in Appendix E.

5.2.2 BH4D has frequently exceeded the limit for methane (1%v/v) throughout the review period with a maximum concentration of 20.9%v/v. The limit for carbon dioxide has been exceeded at all gas monitoring boreholes with the largest exceedance occurring at BH5D of 6%v/v.

5.2.3 It is considered that the elevated methane concentrations detected at BH4D indicate that the ground gas regime in the vicinity is being influenced by potential gas generation in the made ground it is installed into. Methane was detected at this location prior to landfilling activities commencing under the current permit.

5.3 Borehole Review

5.3.1 The installation details for the gas boreholes across the site were compared against the groundwater levels. The groundwater levels have been reviewed in section 3.3

Table 6. Comparison of installation details with groundwater levels

BH	GL (mAOD)	Top of Slotted pipe (mbgl)	Top of Slotted Pipe (mAOD)	Min Groundwater Level (mAOD)	Max Groundwater Level (mAOD)	GW Level above Top of Slotted Pipe? (Y/N)
BH1S	95	1.5	93.5	89.83	89.87	N
BH2S	98	1.5	96.5	Dry	Dry	N
BH2D	98	35	63	77.04	87.46	Y
BH3DA	83	4	79	80.86	82.44	Y
BH4D	85	1.5	83.5	82.49	83.38	N
BH5D	93	28.7	64.3	77.44	86.71	Y

5.3.2 The groundwater levels were recorded as above continuously above the top of the slotted pipe in BH2D, BH3DA, BH5D. There is also a restricted pathway available for gas migration at BH4D. Boreholes BH2D and BH5D are considered to be appropriate groundwater monitoring points but not appropriate for monitoring shallow ground gas due to the depth of the slotted pipe. Additionally, the groundwater level has consistently been above the installed slotted pipe in BH3DA throughout the review period. Gas data has not been monitored at BH2D for the review period as stated in section 5.2.1.

5.3.3 Additionally, made ground was encountered in BH3DA, BH4D and BH5D as described in section 2.5.

5.4 ICOP Methodology

5.4.1 Action levels and compliance limits are to be set for methane in external landfill gas monitoring boreholes at Nant Newydd Quarry Landfill Site. In accordance with the Industry Code of Practice on Perimeter Soil Gas²², there will not be any compliance limits set for carbon dioxide at the site. Action levels will be proposed based on the ICOP²³.

5.4.2 Consistent with the Industry Code of Practice (ICoP₁) on perimeter soil gas emissions criteria these should be set at a level at which the operator should take action to remain compliant and form an early warning and/or may instigate additional monitoring or emergency procedures. These should be concentrations between background and the compliance limits. Action levels were determined through a review of all available background data taken at the site between October 2018 and July 2020.

5.4.3 The methodology detailed in the Agency P1-471 guidance²⁴ is to be used to establish the maximum background level of carbon dioxide. The P1-471 multiple outlier test is a screening tool which 'cleans up' data to estimate baseline statistics. The method standardises and ranks the data (n - mean / standard deviation) and compares the maximum value (T_{Max}) to a Critical

²² Environment Agency (2014) Industry Code of Practice on Perimeter Soil Gas, Available at <<https://www.gov.uk/government/publications/position-statement-industry-code-of-practice-on-perimeter-soil-gas>>

²³ Industry Code of Practice (ICoP): Perimeter Soil Gas Emissions Criteria and Associated Management. January 2011.

²⁴ J.C. Ellis, J.A. Turrell and K.M. Blackmore (2002). Techniques for the Interpretation of Landfill Monitoring Data. Final R&D Technical Report P1-471. Environment Agency.

Value at $P = 1\%$. If the T_{Max} is greater than the critical value, then the probability that a value as extreme as this could have arisen by chance from a normal population (of data) is less than 1 in 100.

- 5.4.4 The Action Levels for carbon dioxide will be augmented where applicable by a Factor of Safety (FoS) to make a clear distinction between background and other sources of gas. The application of a FoS is dependent on the stability of the wider historical data set. An unstable data set is suggested to occur when '*...the range in concentration values (between high and low data) is > 8%, but this will be decided on a site-by-site basis*'. A stable data set can therefore be presumed when for example the majority of data points are located within the range 0 – 5 % v/v, 5 - 10 % v/v and so on.
- 5.4.5 The multiple outlier test identifies and 'removes' data points assumed to be erroneous to the wider data set (be they high or low) leaving a statistically significant distribution of data. An unstable data set will be reflected by the majority of values appearing to be randomly distributed between the maximum and minimum values which may be at least > 8 % v/v apart. An objective assessment of the data set must therefore be made (informed by the statistical analysis) to justify whether a T_{Max} / FoS based action level is appropriate.

Table 7. T_{Max} and FoS Derived Carbon Dioxide Action Levels

T_{Max} Background Carbon Dioxide Concentration	FoS derived Carbon Dioxide Action Level
T_{Max} carbon dioxide concentration in range 0 - 5%	$T_{Max} + 1\%$
T_{Max} carbon dioxide concentration in range 5 – 10%	$T_{Max} + 2\%$
T_{Max} carbon dioxide concentration in range 10 – 20%	$T_{Max} + 3\%$
T_{Max} carbon dioxide concentration in range 20 – 25%	$T_{Max} + 4\%$
T_{Max} carbon dioxide concentration in range >25%	None

- 5.4.6 The FoS value of between 1 and 5 % v/v will be added to the T_{Max} subject to the distribution and variability of the data set. For example, if data fluctuates in the range 0 to 5 % v/v, 1 % v/v FoS will be added to the T_{Max} e.g. 5 % v/v, then the Action Level will be 6 % v/v. This will allow for future fluctuations above the current T_{Max} or rising trends without the need for immediate further statistical analysis. Table 5 details the FoS applicable to stable data sets according to the T_{Max} background carbon dioxide level.
- 5.4.7 T_{Max} values for methane will have a 0.5% FoS added to provide the action level as specified in the ICoP as the appropriate FoS to determine the methane action level. The external monitoring boreholes, the compliance level for methane are 1% above T_{Max} background concentrations as referenced in Table 8.2 of LFTGN03²⁵.
- 5.4.8 The data was standardised and the T_{Max} values determined. The T_{Max} values were compared to the table of 'critical values' in the Technical Report P1-471. If the T_{Max} value was higher than the corresponding critical value, based on the number of data values in the dataset, the T_{Max} value can be concluded as an outlier. Any outliers will be subsequently 'removed' from the analysis dataset. High readings of methane were recorded on October 2018, September 2019 and June 2020 at BH4D. An elevated concentration of carbon dioxide was detected at BH5D in October 2018. These were removed as outliers to avoid skewing the results.

²⁵ Environment Agency (2014), LFTGN03: Guidance on the management of landfill gas, Available at <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/321606/LFTGN03.pdf>

5.5 Determining Action Levels and Compliance Limits

5.5.1 The landfill gas data for all external gas monitoring points is attached at Appendix A. It is proposed that gas is not monitored at BH2D, BH3DA and BH5D as Table 6 indicates they are appropriate for groundwater monitoring at the site only. BH1S and BH2S will continue to be sampled for ground gas. No additional monitoring points are proposed due to the low gas generation risk associated with the permitted inert waste deposits.

Carbon dioxide

5.5.2 Table 8 summarises the proposed carbon dioxide action levels and compliance limits to be implemented on site. The spread sheet with the statistical analysis data is attached in Appendix F.

Methane

5.5.3 Only BH4D reported methane at a concentration greater than the instrument detection limit. This is likely due to the made ground that was encountered at this borehole. As there are no significant sources of methane associated with the permitted landfilled waste in the immediate vicinity of the borehole, it is proposed that BH4D is monitored for reference only with the action limits detailed in Table 9. A methane action level of 0.6% and a compliance limit of 1.1 % v/v has been proposed for all other monitoring locations as shown below in Table 9.

Table 8. Proposed Action Level for Carbon Dioxide

Monitoring Point	Maximum Background CO ₂ Concentration (% v/v)	CO ₂ Action Levels (%v/v)
BH1S	2.4	3.4
BH2S	0.8	1.8
BH4D	13.3	16.3

Table 9. Proposed Compliance and Action Levels for Methane

Monitoring Point	Maximum Background CH ₄ Concentration (including units)	CH ₄ Action Levels (including units)	CH ₄ Compliance Limit (including units)
BH1S	0.1	0.6	1.1
BH2S	0.1	0.6	1.1
BH4D	8.9	9.4	N/A

6. Requisite Surveillance

6.1 Overview

6.1.1 The following monitoring schedules for groundwater, surface water and landfill gas are proposed for the site environmental monitoring programme in Table 10, Table 11 and Table 12.

6.1.2 It is proposed to reduce the frequency for groundwater, surface water and landfill gas from monthly to quarterly monitoring. Table 10 and Table 11 below propose the removal of MTBE from the groundwater and surface water monitoring schedule. It is proposed to remove sulphate as a compliance substance for both surface water and groundwater. Mineral oil is proposed to remain part of the monitoring suite but not as a compliance substance. It is proposed to add arsenic to the surface water monitoring schedule.

Table 10. Revised Groundwater Monitoring Schedule

Monitoring Borehole	Parameter	Frequency
BH2D BH3DA BH4D BH5D	Water level, Field Temperature, pH, Electrical Conductivity, Dissolved Oxygen, Ammoniacal Nitrogen, Chloride, Zinc, Nickel, Cadmium,	Quarterly
	Nitrate (for TON), COD, Alkalinity, Arsenic, Calcium, Chromium, Copper, Iron, Magnesium, Manganese, Lead, Mercury, Phosphate, Sodium, Selenium, Sodium, TOC, Nitrite, Phenols, Potassium, TPH (including mineral oil range), PAH's	Annually

Table 11. Revised Surface Water Monitoring Schedule

Monitoring Point	Parameter	Frequency
SW1 SW2a SW2b SW3	Field Temperature, pH, Oil & Grease, Electrical Conductivity, Ammoniacal Nitrogen, Chloride, Dissolved Oxygen, BOD, COD, Total Suspended Solids, TOC, Nitrate (for TON) and Nitrite (for TON), Iron, Chromium, Manganese, Lead, Mercury, Nickel, Arsenic, Phosphate, Sulphate	Quarterly
	TON, Calcium, Cadmium, Mercury, Magnesium, Sodium, Potassium, Alkalinity, Copper, Zinc, TPH (including mineral oil range) PAH,	Annually

6.1.3 The amended landfill gas monitoring schedule in Table 12 below reflects the proposed reduced frequency of monitoring to quarterly.

Table 12. Revised Landfill Gas Monitoring Schedule

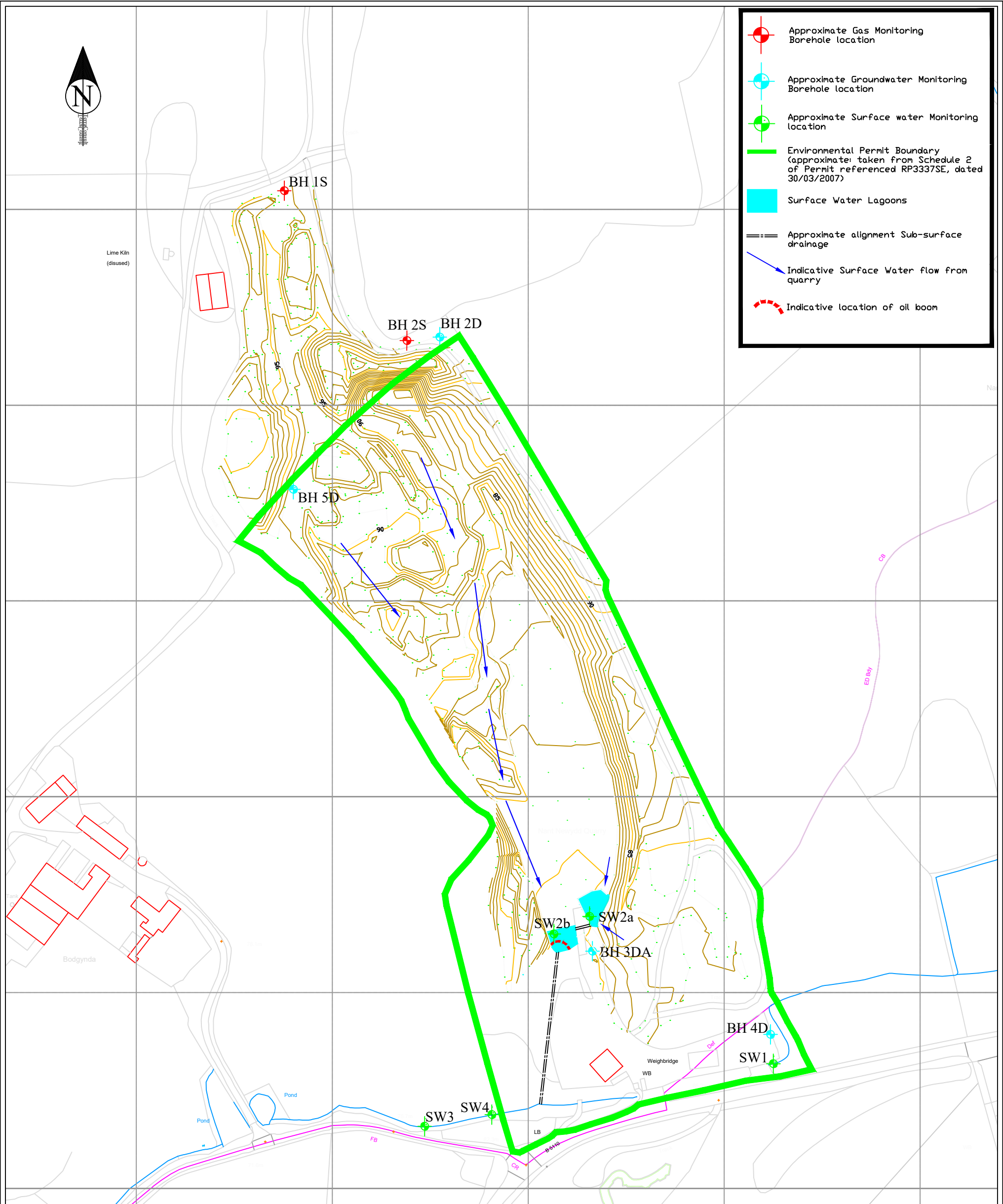
Borehole	Parameter	Frequency
BH4D BH1S BH2S	Methane, Carbon Dioxide, Oxygen, Atmospheric Pressure, Differential Pressure, Flow Rate, Temperature, Metrological Data	Quarterly

7. Conclusion

7.1 Overview

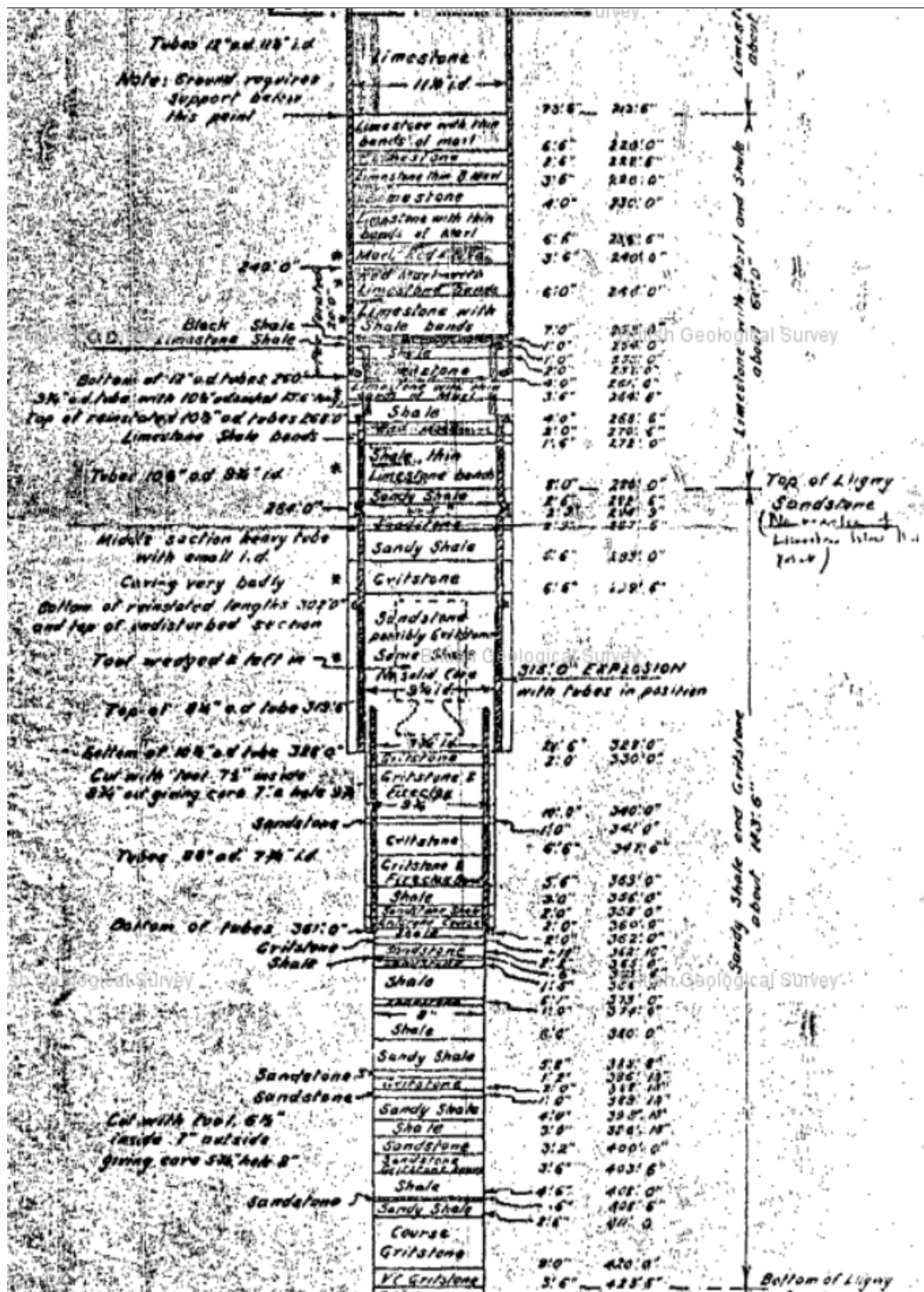
- 7.1.1 A review of the monitoring data from Nant Newydd inert landfill site has been undertaken. The data indicates that there is no discernible impact of the landfill site on the groundwater and surface water.
- 7.1.2 The landfill gas data indicates that the gas boreholes are most likely not being impacted by gas generation from the inert waste. The high methane detected in BH4D is indicative of a different source.
- 7.1.3 Variations to the current compliance limits and monitoring schedule have been proposed for groundwater, surface water and landfill gas.

DRAWINGS



TerraConsult Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX Client Clive Hurt (Plant Hire) Ltd	Site:	Nant Newydd Quarry	Scale		NTS	@ A4
	Title: Monitoring Point Location Plan (approximate locations)		Drawing No.		3276/4/006 Rev A	
Rev		Date	Description			
A		01/19	Addition of permit boundary and SW4			
File		3276/4/006 Monitoring Point Location.dwg				
Date		01/19	Engineer	SB		
Drawn	KMB	Checked	FINAL			

APPENDIX A



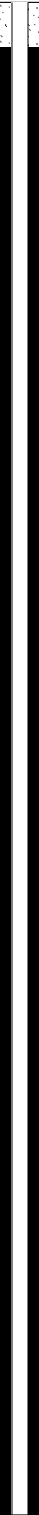
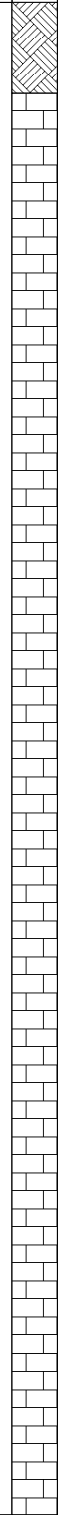
APPENDIX B

TerraConsult

TerraConsult

Borehole Log

TerraConsult

Borehole formation details:												Location details:	
Type: RO	From: 0.00	To: 41.00	Start date: 27-06-18	End date: 28-06-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 28-06-18	Remarks:	mAOD: 98.00 Grid: OSGB	
Backfill/ Instal'n	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing							
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples		
				(0.60)	Soft brown slightly gravelly slightly sandy CLAY with frequent rootlets. Gravel is subangular to subrounded fine to coarse of mudstone and limestone. (TOPSOIL)								
			97.40	0.60	Black LIMESTONE								
				(10.40)									
	Inst					Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks		
Groundwater entries:			Diameter & casing:			Depth related remarks:			Flush details:				
Struck: Rose to: Casing: Sealed:			Dia (mm): Depth: Casing: 120 41.00 1.50			From to: Remarks:			Depth: Type: Return: Colour:				
 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in meters.			Project: Nant Newydd Quarry Project No: 3276 Client: Clive Hurt						Exploratory position reference: BH2D				
Log issue: FINAL Scale: 1:50									Sheet 1 of 5				

Borehole Log

TerraConsult

Borehole formation details:

Location details:

Type: RO	From: 0.00	To: 41.00	Start date: 27-06-18	End date: 28-06-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 28-06-18	Remarks:	mAOD: 98.00 Grid: OSGB
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Backfill/ Instaln	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing					
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples
			87.00	11.00	Black LIMESTONE with MUDSTONE bands						
				(10.00)							
	Inst					Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
18.80	11.70		

Diameter & casing:	
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Dia (mm):	Depth:	Casing:
120	41.00	1.50

Depth related remarks:

From	to:	Remarks:
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Flush details:

Depth:	Type:	Return:	Colour:
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Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in meters.

Log issue: FINAL
Scale: 1:50

Project:	Nant Newydd Quarry
Project No:	3276
Client:	Clive Hurt

Exploratory position reference:	
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BH2D

Borehole Log

TerraConsult

Borehole formation details:

Location details:

Type: RO	From: 0.00	To: 41.00	Start date: 27-06-18	End date: 28-06-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 28-06-18	Remarks:	Location: OSGB
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[illegible]

Groundwater entries:

Struck:	Rose to:	Casing:	Sealed:
27.70	15.55		

Diameter & casing:

Dia (mm):	Depth:	Casing:
120	41.00	1.50

Depth related remarks:

From	to:	Remarks:
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Flush details:

Depth:	Type:	Return:	Colour:
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Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in meters.

Log issue: FINAL
Scale: 1:50

Project: Nant Newydd Quarry
Project No: 3276
Client: Clive Hurt

Exploratory position reference:	
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BH2D

Borehole Log

TerraConsult

Borehole formation details:													Location details:		
Type: RO	From: 0.00	To: 41.00	Start date: 27-06-18	End date: 28-06-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 28-06-18	Remarks:		mAOD: 98.00	Grid: OSGB	
Backfill/ Instal'n	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing									
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples				
				(13.30)											
	Inst					Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks				
Groundwater entries: Struck: Rose to: Casing: Sealed:					Diameter & casing: Dia (mm): Depth: Casing: 120 41.00 1.50			Depth related remarks: From to: Remarks:			Flush details: Depth: Type: Return: Colour:				
 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in meters. Log issue: FINAL Scale: 1:50					Project: Nant Newydd Quarry Project No: 3276 Client: Clive Hurt						Exploratory position reference: BH2D				
Sheet 4 of 5															

Borehole Log

TerraConsult

[illegible]

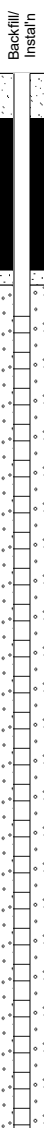
Borehole Log

TerraConsult

Borehole formation details:

Location details:

Type: RO	From: 0.00	To: 7.00	Start date: 29-06-18	End date: 29-06-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 29-06-18	Remarks:	mAOD: 98.00 Grid: OSGB
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Backfill/ Instal'n	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing					
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples
					White LIMESTONE with black MUDSTONE bands						
				(7.00)							
	SP		91.00	7.00	Borehole ends at 7.00 m (Termination reason: Complete)						
	Inst					Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks

Groundwater entries:

Struck: Rose to: Casing: Sealed:

Diameter & casing:	
-------------------------------	--

Dia (mm):	Depth:	Casing:
120	7.00	

Depth related remarks:

From	to:	Remarks:
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Flush details:

Depth:	Type:	Return:	Colour:
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Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in meters.

Log issue: FINAL
Scale: 1:50

Project:	Nant Newydd Quarry
Project No:	3276
Client:	Clive Hurt

Exploratory position reference:	
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BH2S

TerraConsult

Sheet 1 of 1

Borehole Log

TerraConsult

Borehole formation details:												Location details:	
Type: RO	From: 0.00	To: 15.00	Start date: 04-07-18	End date: 05-07-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 05-07-18	Remarks:	mAOD: 83.00 Grid: OSGB	
Backfill/ Instal'n	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing							
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples		
				(5.00)	Black gravelly slightly clayey coarse SAND. Gravel is angular to subrounded fine to coarse of limestone, mudstone, concrete, brick and macadam. (MADE GROUND)								
				78.00 5.00	White LIMESTONE with black MUDSTONE bands								
				(10.00)									
	Inst					Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks		
Groundwater entries:			Diameter & casing:			Depth related remarks:			Flush details:				
Struck: 9.60 Rose to: 3.33 Casing: Sealed:			Dia (mm): 120 Depth: 15.00 Casing: 4.50			From to: Remarks:			Depth: Type: Return: Colour:				
Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in meters.			Project: Nant Newydd Quarry Project No: 3276 Client: Clive Hurt			Exploratory position reference: BH3DA			Sheet 1 of 2				
Log issue: FINAL Scale: 1:50													

Borehole Log

TerraConsult[illegible]

Borehole Log

TerraConsult

Borehole formation details:												Location details:	
Type: RO	From: 0.00	To: 9.60	Start date: 02-07-18	End date: 03-07-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 03-07-18	Remarks:	mAOD: 85.00 Grid: OSGB	

Backfill/ Instal'n	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing					
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples
					Grey slightly sandy angular fine to coarse GRAVEL of limestone (Hardcore) (MADE GROUND)						
			(0.90)								
			84.10 0.90		Firm brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of limestone and mudstone						
			84.00 1.00		Firm grey slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of limestone and mudstone.						
			83.50 1.50		Black MUDSTONE with weathered clay bands						
			(0.50)								
			83.00 2.00		Weathered LIMESTONE						
			(0.50)								
			82.50 2.50		White LIMESTONE with black MUDSTONE bands						
			(7.00)								
		75.50 9.50		Borehole ends at 9.60 m (Termination reason: Complete)							

Inst						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks
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Groundwater entries:				Diameter & casing:			Depth related remarks:			Flush details:			
Struck: 6.50	Rose to: 2.80	Casing:	Sealed:	Dia (mm): 120	Depth: 9.60	Casing: 4.50	From	to:	Remarks:	Depth:	Type:	Return:	Colour:

	Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in meters.					Project: Nant Newydd Quarry Project No: 3276 Client: Clive Hurt					Exploratory position reference: BH4D			
Log issue: FINAL														
Scale: 1:50														

Sheet 1 of 1

Borehole Log

TerraConsult

Borehole formation details:												Location details:	
Type: RO	From: 0.00	To: 34.70	Start date: 05-07-18	End date: 06-07-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 06-07-18	Remarks:	mAOD: 93.00 Grid: OSGB	

Backfill/ Instal'n	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing						
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples	
				(4.80)	Firm brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of limestone and mudstone (MADE GROUND)							
			88.20	4.80	Grey MUDSTONE							
				(1.20)								
			87.00	6.00	White LIMESTONE with black MUDSTONE bands							

	Inst											
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Groundwater entries:				Diameter & casing:		Depth related remarks:				Flush details:			
Struck:	Rose to:	Casing:	Sealed:	Dia (mm): 120	Depth: 34.70	Casing: 4.50	From	to:	Remarks:	Depth:	Type:	Return:	Colour:

 Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in meters. Log issue: FINAL Scale: 1:50	Project: Nant Newydd Quarry Project No: 3276 Client: Clive Hurt	Exploratory position reference: BH5D
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Borehole Log

TerraConsult[illegible]

Borehole Log

TerraConsult

Borehole formation details:

	Location details:
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Type: RO	From: 0.00	To: 34.70	Start date: 05-07-18	End date: 06-07-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 06-07-18	Remarks:	mAOD: 93.00 Grid: OSGB
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[illegible]

Groundwater entries:

Struck: 28.70 Rose to: 25.70 Casing: Sealed:

Diameter & casing:

Dia (mm):	Depth:	Casing:
120	34.70	4.50

Depth related remarks:

From	to:	Remarks:
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Flush details:

Depth:	Type:	Return:	Colour:
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Notes: For explanation of symbols and abbreviations see Key Sheet.
All depths and reduced levels are in meters.

Log issue: FINAL
Scale: 1:50

Project: Nant Newydd Quarry
Project No: 3276
Client: Clive Hurt

Exploratory position reference:	
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BH5D

Borehole Log

TerraConsult

Borehole formation details:													Location details:	
Type: RO	From: 0.00	To: 34.70	Start date: 05-07-18	End date: 06-07-18	Crew: IB	Plant: Beretta T46	Barrel type:	Drill bit:	Logger: HP	Logged: 06-07-18	Remarks:		mAOD: 93.00 Grid: OSGB	
Backfill/ Instal'n	Water- strike	Legend	Level	Depth (thick- ness)	Stratum Description	Samples & In Situ Testing								
						Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks/ samples			
			61.50	31.50	Black MUDSTONE									
			(3.20)											
	SP		58.30	34.70	Borehole ends at 34.70 m (Termination reason: Complete)									
	Inst					Water	Casing	Depth/Core Run	TCR SCR RQD	If	Results/remarks			
Groundwater entries: Struck: Rose to: Casing: Sealed:					Diameter & casing: Dia (mm): Depth: Casing: 120 34.70 4.50			Depth related remarks: From to: Remarks:			Flush details: Depth: Type: Return: Colour:			
Notes: For explanation of symbols and abbreviations see Key Sheet. All depths and reduced levels are in meters. Log issue: FINAL Scale: 1:50					Project: Nant Newydd Quarry Project No: 3276 Client: Clive Hurt						Exploratory position reference: BH5D			
												Sheet 4 of 4		

APPENDIX C

Date	Location	Depth to Base (m bgl)	Water Depth (m bgl)	Ground level (mAOD)	Groundwater Level (mAOD)
10/10/2018	BH1S	5.15	DAMP	95	
07/11/2018	BH1S	5.15	5.13	95	89.87
07/12/2018	BH1S	5.18	5.17	95	89.83
22/01/2019	BH1S	15.13	Dry	95	
08/02/2019	BH1S	5.13	Dry	95	
08/03/2019	BH1S	5.14	Dry	95	
05/04/2019	BH1S	5.15	Dry	95	
03/05/2019	BH1S	5.15	5.13	95	89.87
14/06/2019	BH1S	5.15	Dry	95	
30/07/2019	BH1S	5.13	Dry	95	
28/08/2019	BH1S	5.12	Dry	95	
25/09/2019	BH1S	5.12	Dry	95	
18/10/2019	BH1S	5.12	Dry	95	
28/11/2019	BH1S	5.12	Dry	95	
16/12/2019	BH1S	5.12	Dry	95	
27/01/2020	BH1S	5.12	Dry	95	
21/02/2020	BH1S	5.12	Dry	95	
11/03/2020	BH1S	-	Dry	95	
24/04/2020	BH1S	-	Dry	95	
14/05/2020	BH1S	-	Dry	95	
12/06/2020	BH1S	5.16	Dry	95	
10/10/2018	BH2D	41.06	18.91	98	79.09
07/11/2018	BH2D	41.06	14.64	98	83.36
07/12/2018	BH2D	41.15	10.58	98	87.42
22/01/2019	BH2D	41.15	16.08	98	81.92
08/02/2019	BH2D	41.15	11.15	98	86.85
08/03/2019	BH2D	41.15	11.95	98	86.05
05/04/2019	BH2D	41.15	14.64	98	83.36
03/05/2019	BH2D	41.15	17.81	98	80.19
14/06/2019	BH2D	41.15	18.67	98	79.33
30/07/2019	BH2D	41.15	19.60	98	78.40
28/08/2019	BH2D	41.15	19.88	98	78.12
25/09/2019	BH2D	41.15	20.18	98	77.82
18/10/2019	BH2D	41.65	11.65	98	86.35
28/11/2019	BH2D	41.65	11.25	98	86.75
16/12/2019	BH2D	41.65	10.79	98	87.21
27/01/2020	BH2D	41.65	10.59	98	87.41
21/02/2020	BH2D	41.65	10.54	98	87.46
11/03/2020	BH2D	-	13.32	98	84.68
24/04/2020	BH2D	-	18.02	98	79.98
14/05/2020	BH2D	-	19.50	98	78.50
12/06/2020	BH2D	-	20.96	98	77.04
10/10/2018	BH2S	6.99	DRY	98	
07/11/2018	BH2S	7	DRY	98	
07/12/2018	BH2S	6.98	DRY	98	
22/01/2019	BH2S	6.98	Dry	98	
08/02/2019	BH2S	6.98	Dry	98	
08/03/2019	BH2S	6.98	Dry	98	

Date	Location	Depth to Base (m bgl)	Water Depth (m bgl)	Ground level (mAOD)	Groundwater Level (mAOD)
05/04/2019	BH2S	6.98	Dry	98	
03/05/2019	BH2S	6.98	Dry	98	
14/06/2019	BH2S	6.98	Dry	98	
30/07/2019	BH2S	6.99	Dry	98	
28/08/2019	BH2S	6.99	Dry	98	
25/09/2019	BH2S	7.00	Dry	98	
18/10/2019	BH2S	6.99	Dry	98	
28/11/2019	BH2S	6.99	Dry	98	
16/12/2019	BH2S	6.99	Dry	98	
27/01/2020	BH2S	6.99	Dry	98	
21/02/2020	BH2S	6.99	Dry	98	
11/03/2020	BH2S	6.99	Dry	98	
24/04/2020	BH2S	-	Dry	98	
14/05/2020	BH2S	-	Dry	98	
12/06/2020	BH2S	7.02	Dry	98	
10/10/2018	BH3DA	15.08	2.07	83	80.93
07/11/2018	BH3DA	15.07	1.23	83	81.77
07/12/2018	BH3DA	15.06	0.56	83	82.44
22/01/2019	BH3DA	15.06	1.36	83	81.64
08/02/2019	BH3DA	15.06	0.68	83	82.32
08/03/2019	BH3DA	15.06	0.69	83	82.31
05/04/2019	BH3DA	15.06	1.12	83	81.88
03/05/2019	BH3DA	15.06	1.70	83	81.30
14/06/2019	BH3DA	15.06	1.37	83	81.63
30/07/2019	BH3DA	15.06	1.94	83	81.06
28/08/2019	BH3DA	15.06	1.87	83	81.13
25/09/2019	BH3DA	15.06	1.87	83	81.13
18/10/2019	BH3DA	15.07	0.72	83	82.28
28/11/2019	BH3DA	15.07	0.95	83	82.05
16/12/2019	BH3DA	15.07	0.72	83	82.28
27/01/2020	BH3DA	15.07	0.70	83	82.30
21/02/2020	BH3DA	15.07	1.35	83	81.65
11/03/2020	BH3DA	-	1.73	83	81.27
24/04/2020	BH3DA	-	1.91	83	81.09
14/05/2020	BH3DA	-	2.10	83	80.90
12/06/2020	BH3DA	-	2.14	83	80.86
10/10/2018	BH4D	9.29	2.22	85	82.78
07/11/2018	BH4D	9.27	1.86	85	83.14
07/12/2018	BH4D	9.26	1.65	85	83.35
22/01/2019	BH4D	9.26	1.89	85	83.11
08/02/2019	BH4D	9.26	1.62	85	83.38
08/03/2019	BH4D	9.26	1.72	85	83.28
05/04/2019	BH4D	9.26	1.83	85	83.17
03/05/2019	BH4D	9.26	2.06	85	82.94
14/06/2019	BH4D	9.26	1.92	85	83.08
30/07/2019	BH4D	9.26	2.34	85	82.66
28/08/2019	BH4D	9.26	2.34	85	82.66
25/09/2019	BH4D	9.26	2.32	85	82.68

Date	Location	Depth to Base (m bgl)	Water Depth (m bgl)	Ground level (mAOD)	Groundwater Level (mAOD)
18/10/2019	BH4D	8.70	1.70	85	83.30
28/11/2019	BH4D	8.70	1.95	85	83.05
16/12/2019	BH4D	8.70	1.73	85	83.27
27/01/2020	BH4D	8.70	1.68	85	83.32
21/02/2020	BH4D	8.70	2.36	85	82.64
11/03/2020	BH4D	-	2.42	85	82.58
24/04/2020	BH4D	-	2.20	85	82.80
14/05/2020	BH4D	-	2.29	85	82.71
12/06/2020	BH4D	-	2.51	85	82.49
10/10/2018	BH5D	34.55	14	93	79.00
07/11/2018	BH5D	34.56	9.74	93	83.26
07/12/2018	BH5D	34.55	6.38	93	86.62
22/01/2019	BH5D	34.55	11.13	93	81.87
08/02/2019	BH5D	34.55	6.87	93	86.13
08/03/2019	BH5D	34.55	9.60	93	83.40
05/04/2019	BH5D	34.55	9.98	93	83.02
03/05/2019	BH5D	34.55	12.56	93	80.44
14/06/2019	BH5D	34.55	13.14	93	79.86
30/07/2019	BH5D	34.55	15.56	93	77.44
28/08/2019	BH5D	34.55	14.84	93	78.16
25/09/2019	BH5D	34.55	15.10	93	77.90
18/10/2019	BH5D	34.60	7.24	93	85.76
28/11/2019	BH5D	34.60	6.98	93	86.02
16/12/2019	BH5D	34.6	6.82	93	86.18
27/01/2020	BH5D	34.6	6.71	93	86.29
21/02/2020	BH5D	34.6	6.29	93	86.71
11/03/2020	BH5D	-	8.91	93	84.09
24/04/2020	BH5D	-	13.14	93	79.86
14/05/2020	BH5D	-	14.33	93	78.67
12/06/2020	BH5D	-	15.29	93	77.71

Location	Date	pH	Electrical Conductivity (µS/cm)	Ammoniacal nitrogen (mg/l)	COD (mg/l)	TOC (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Chloride (mg/l)	Sulphate (mg/l)	Alkalinity	TON (mg/l)	Nitrate (mg/l)	Nitrite (mg/l)	Diss Oxygen (mg/l)	Ionic Balance (%)	Phosphate (mg/l)	Cd (Dissolved)(µg/l)	Ni (Dissolved) (µg/l)	Zn (Dissolved) (µg/l)
BH2D	10/10/2018	8.06	1000	<0.05	33	2	94	12	120	3.3	31	99	410	1.8	7.8	<0.1	10		<0.5	0.02	2	14
BH2D	07/11/2018	7.49	1300	<0.05							29	200					5.1			<0.02	2	290
BH2D	07/12/2018	7.45	1000	<0.05							29	120					8.8			<0.02	1	6
BH2D	22/01/2019	7.09	790	<0.05	6	2	120	15	29	6.6	40	55	320	4.5	20	<0.1	9.1	-2	<0.5	0.07	<1	9
BH2D	08/02/2019	7.77	750	<0.05							34	54					9.5			<0.02	<1	6
BH2D	08/03/2019	7.15	750	<0.05							36	47					9.6			0.34	<1	10
BH2D	04/04/2019	7.32	810	0.07	130	2	130	14	20	6.5	38	43	300	5.3	24	<0.1	9.4	1.4	<0.5	<0.02	<1	7
BH2D	03/05/2019	7.26	700	<0.05							30	53					9.2			<0.02	<1	<2
BH2D	14/06/2019	7.27	720	0.07							29	56					9.2			<0.02	1	2
BH2D	30/07/2019	7.49	760	0.11	20	2	98	15	23	2.9	31	61	320	<0.1	<0.5	<0.1	9.2	6	<0.5	0.31	<10	<20
BH2D	28/08/2019	7.35	740	<0.05							34	51					9.8			<0.02	<1	<2
BH2D	25/09/19		703	0.07							28						5			<0.1	<1	
BH2D	18/10/19	7.5	731	0.02	<5	0.36	130	15	20	3	28	61	276	<0.2	<0.2	<0.01	5.7	6.8	0.02	<0.02	<1	4
BH2D	28/11/19	7.3	734	0.02							32	47					9.7			0.03	<1	16
BH2D	16/12/19	7.3	731	0.01							34	37					10.7			<0.02	<1	7
BH2D	27/01/20	7.5	669	0.03	<5	0.85	128	14	13	3	25	34	289	<0.2	<0.2	<0.01	8.2	6.5	<0.01	<0.02	<1	3
BH2D	21/02/20	7.6	645	<0.01							27	85					10.2			<0.02	<1	9
BH2D	11/03/20	7.6	737	0.06							32	110					8.8			<0.02	1	13
BH2D	24/04/20	7.7	795	0.03	8	1.8	93	3	71	13	35	125	204	6.5	6.5	<0.01	8	1.1	<0.01	<0.02	1	2
BH2D	14/05/20	7.4	710	<0.01							30	48					6.8			<0.02	<1	3
BH2D	12/06/20	7.5	718	0.08							31	50					4.4			<0.02	<1	5
BH3DA	10/10/2018	7.74	660	0.11	8	2	120	14	12	2.1	26	36	320	<0.1	<0.5	<0.1	10		<0.5	<0.02	1	11
BH3DA	07/11/2018	7.33	700	0.09							26	31					9			<0.02	1	56
BH3DA	07/12/2018	7.19	700	0.07							25	32					9.1			<0.02	2	3
BH3DA	22/01/2019	7.12	710	<0.05	8	2	120	14	19	1.9	26	36	330	<0.1	<0.5	<0.1	9.4	-0.22	<0.5	<0.02	1	7
BH3DA	08/02/2019	7.72	690	<0.05							26	34					9.5			0.02	1	4
BH3DA	08/03/2019	7.18	700	<0.05							29	37					9.5			0.1	1	10
BH3DA	04/04/2019	7.28	710	0.1	39	2	130	14	11	4.3	26	34	300	<0.1	<0.5	<0.1	9.6	4.5	<0.5	<0.02	1	5
BH3DA	03/05/2019	7.22	690	0.08							26	34					9.6			<0.02	<1	<2
BH3DA	14/06/2019	7.25	690	0.2							25	32					9.8			<0.02	1	2
BH3DA	30/07/2019	7.48	700	0.16	16	2	130	15	15	3.3	26	33	320	<0.1	<0.5	<0.1	9.5	5.7	<0.5	0.29	<10	<20
BH3DA	28/08/2019	7.3	710	0.14							26	32					9.9			<0.02	<1	<2
BH3DA	25/09/19	7.4	690	0.1							24	31					8.5			<0.1	1	4
BH3DA	18/10/19	7.5	701	0.05	<5	0.44	128	15	13	3	25	32	299	<0.2	<0.2	<0.01	11.1	5.9	<0.01	<0.02	1	5
BH3DA	28/11/19	7.4	691	<0.01							25	33					10.7			0.03	<1	31
BH3DA	16/12/19	7.4	684	0.03							26	31					10.2			<0.02	<1	20
BH3DA	27/01/20	7.5	678	0.02	<5	0.83	116	14	12	3	25	34	295	<0.2	<0.2	<0.01	8.3	1.6	<0.01	<0.02	2	<2
BH3DA	21/02/20	7.3	689	0.01							25	32					6.5			<0.02	<1	9
BH3DA	11/03/20	7.3	704	0.08							29	32					8.2			<0.02	2	10
BH3DA	24/04/20	7.5	685	0.03	<5	0.55	125	14	12	3	23	32	287	<0.2	<0.2	<0.01	6.6	6.3	<0.01	<0.02	<1	4
BH3DA	14/05/20	7.5	698	0.05							27	32					6.2			<0.02	1	4
BH3DA	12/06/20	7.4	690	0.05							25	33					4.7			<0.02	1	3
BH4D	10/10/2018	7.29	910	0.07	94	3	190	9.7	25	1	51	40	720	<0.1	<0.5	<0.1	9.6		<0.5	<0.02	8	8
BH4D	07/11/2018	6.92	900	<0.05							44	35					7.9			<0.02	8	27
BH4D	07/12/2018	6.85	920	0.07							45	33					8.2			0.03	7	6
BH4D	22/01/2019	6.64	1000	0.16	160	5	190	14	29	<0.1	45	34	560	0.1	<0.5	0.1	8.1	-4.8	<0.5	<0.02	6	3
BH4D	08/02/2019	7.22	920	0.06							40	33					8.9			<0.02	4	<2
BH4D	08/03/2019	6.74	970	0.1							44	31					9.5			0.08	7	<2
BH4D	04/04/2019	6.83	980	0.22	420	4	180	13	23	2	42	31	4700	0.2	1	<0.1	6.8	-79	<0.5	0.02	9	<2
BH4D	03/05/2019	6.89	960	0.09							39	32					8.1			0.05	12	<2
BH4D	14/06/2019	6.73	1200	0.38							45	55					9			0.03	9	<2
BH4D	30/07/2019	6.96	1000	0.16	350	5	180	12	25	1	44	28	750	<0.1	<0.5	<0.1	8.7	30	<0.5	0.31	15	<20
BH4D	28/08/2019	6.92	930	0.07							46	31					9.7			0.05	12	<2
BH4D	25/09/19	6.9	984	0.14							46	47					2.6			<0.1	6	3
BH4D	18/10/19	6.8	994	0.16	12	3.7	196	13	26	5	42	43	427	0.2	<0.2	<0.01	3.1	6.7	0.01	<0.02	7	3
BH4D	28/11/19	6.7	1070	0.3							43	32					7.9			0.04	4	22
BH4D	16/12/19	6.7	1080	0.5							45	33					8.1			<0.02	3	8
BH4D	27/01/20	7	1030	0.5	11	6.2	201	15	32	3	48	81	424	<0.2	<0.2	<0.01	6.2	5.2	<0.01	<0.02	4	3
BH4D	21/02/20	6.9	982	0.4							40	70					1.9			<0.02	5	3
BH4D	11/03/20	6.8	1120	0.3							46	55					6.4			<0.02	7	<2
BH4D	24/04/20	7.2	907	0.08	8	2.7	187	12	21	1	35	28	379	0.5	0.5	<0.01	5.7	10.2	<0.01	0.03	13	2
BH4D	14/05/20	7.1	875	0.05							40	26					5.2			0.03	4	<2
BH4D	12/06/20	7.1	858	0.05							45	34					1.6			0.04	11	150
BH5D	10/10/2018	7.87	2200	0.08	50	6	75	16	400	9.7	68	590	470	6.4	28	1	9.8		<0.5	0.04	9	21
BH5D	07/11/2018	7.34	1800	<0.05							50	450					6.9			<0.10	<5	37
BH5D	07/12/2018	7.41	1600	<0.05							47	360					8.5			<0.02	3	7
BH5D	22/01/2019	7.2	1300	<0.05	11	3	98	16	190	3.7	39	280	370	<0.1	<0.5	<0.1	9.2	0.86	<0.5	<0.02	3	5
BH5D	08/02/2019	7.69	1300	<0.05							38	270					8.9			<0.02	2	6
BH5D	08/03/2019	7.35	1200	<0.05							40	270					10			0.02	2	6
BH5D	04/04/2019	7.39	1200	0.06	41	3	100	16	160	6.3	36	220	390	<0.1	<0.5	<0.1	9.5	-0.17	<0.5	<0.02	2	4
BH5D	03/05/2019	7.47	1300	<0.05							37	270					9.4			<0.02	3	<2
BH5D	14/06/2019	7.43	1200	0.12							35	230					9.9			<0.02	2	3
BH5D	30/07/2019	7.6	1200	0.12	120	2	110	17	170	5.1	36	230	390	<0.1	<0.5	<0.1	9.5	3.8	<0.5	0.31	<10	<20
BH5D	28/08/2019	7.44	1200	<0.05							35	220					9.					

Location	Date	As (Dissolved) (µg/l)	Cr (Dissolved) (µg/l)	Cu (Dissolved) (µg/l)	Fe (Dissolved) (mg/l)	Hg (Dissolved) (µg/l)	Mn (Dissolved) (µg/l)	Pb (Dissolved) (µg/l)	Methyl tert- Butyl Ether (µg/l)	Phenols (Mono) (mg/l)	Se (Dissolved) (µg/l)	Combined TPH mg/l	TPH (C35-C40) (mg/l)	TPH (C8 - C40) (mg/l)	TPH (C8- C35)(Total) (mg/l)	TPH Band (>C21-C35) mg/l	TPH Band >C10- C12 mg/l	TPH Band >C12- C16 mg/l	TPH Band >C16- C21 mg/l	TPH Band >C8- C10 mg/l	TPH GC mg/l	TPH FTIRPER. mg/l
BH2D	10/10/2018	1	<1	3.4	<0.01	<0.05	16	<0.3	<1	<0.1	22	0.03	<0.02	0.03	0.03							
BH2D	07/11/2018																					
BH2D	07/12/2018																					
BH2D	22/01/2019	0.3	<1	<0.5	<0.01	<0.05	7	<0.3	<1	<0.1	5.4	0.12	<0.10	0.12	0.12							
BH2D	08/02/2019																					
BH2D	08/03/2019																					
BH2D	04/04/2019	0.2	<1	<0.5	<0.01	<0.05	3	<0.3	<1	<0.1	4	0.35	0.05	0.35	0.3							
BH2D	03/05/2019																					
BH2D	14/06/2019																					
BH2D	30/07/2019	<2.0	<10	<5.0	0.01	<0.50	<10	<3.0	<1	<0.1	3.7	0.02	<0.01	0.02	0.02							
BH2D	28/08/2019																					
BH2D	25/09/19																					
BH2D	18/10/19	<1	<1	<1	0.17	<0.03	4	<1	< 10.0	<0.0005	2											<0.3
BH2D	28/11/19																					
BH2D	16/12/19											0.01				< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	
BH2D	27/01/20	<1	<1	<1	<0.01	<0.03	<2	<1	<1	<0.0005	<1	0.01				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
BH2D	21/02/20																					
BH2D	11/03/20																					
BH2D	24/04/20	<1	<1	<1	<0.01	<0.03	<2	<1	<1	<0.0005	15	0.014				0.01	< 0.010	< 0.010	< 0.010	< 0.010	0.014	
BH2D	14/05/20																					
BH2D	12/06/20																					
BH3DA	10/10/2018	2	<1	<0.5	<0.01	<0.05	130	<0.3	<1	<0.1	<0.5	0.03	<0.02	0.03	0.03							
BH3DA	07/11/2018																					
BH3DA	07/12/2018																					
BH3DA	22/01/2019	1.5	<1	<0.5	<0.01	<0.05	110	<0.3	<1	<0.1	<0.5	0.1	<0.10	<0.10	<0.10							
BH3DA	08/02/2019																					
BH3DA	08/03/2019																					
BH3DA	04/04/2019	0.5	<1	<0.5	<0.01	<0.05	91	<0.3	<1	<0.1	<0.5	0.15	<0.02	0.15	0.15							
BH3DA	03/05/2019																					
BH3DA	14/06/2019																					
BH3DA	30/07/2019	<2.0	<10	6.3	<0.01	<0.50	39	<3.0	<1	<0.1	<3.0	0.01	<0.01	<0.01	<0.01							
BH3DA	28/08/2019																					
BH3DA	25/09/19	1																				
BH3DA	18/10/19	<1	<1	2	0.18	<0.03	44	<1	< 10.0	<0.0005	<1											<0.3
BH3DA	28/11/19																					
BH3DA	16/12/19											0.032				0.027	< 0.010	< 0.010	< 0.010	< 0.010	0.032	
BH3DA	27/01/20	<1	<1	<1	<0.01	<0.03	<2	<1	<1	<0.0005	<1	0.01				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
BH3DA	21/02/20																					
BH3DA	11/03/20																					
BH3DA	24/04/20	<1	<1	<1	<0.01	<0.03	<2	<1	<1	<0.0005	<1	0.013				< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.013	
BH3DA	14/05/20																					
BH3DA	12/06/20																					
BH4D	10/10/2018	1.1	<1	<0.5	<0.01	<0.05	300	<0.3	<1	<0.1	<0.5	0.13	0.02	0.13	0.11							
BH4D	07/11/2018																					
BH4D	07/12/2018																					
BH4D	22/01/2019	0.8	<1	<0.5	0.01	<0.05	550	<0.3	<1	<0.1	<0.5	0.18	<0.10	0.18	0.18							
BH4D	08/02/2019																					
BH4D	08/03/2019																					
BH4D	04/04/2019	0.8	<1	0.7	0.04	<0.05	420	<0.3	<1	<0.1	<0.5	0.14	<0.02	0.14	0.14							
BH4D	03/05/2019																					
BH4D	14/06/2019																					
BH4D	30/07/2019	<2.0	<10	<5.0	0.03	<0.50	160	<3.0	<1	<0.1	<3.0	0.02	<0.01	0.02	0.02							
BH4D	28/08/2019																					
BH4D	25/09/19	<1																				
BH4D	18/10/19	<1	<1	2	0.22	<0.03	256	<1	< 10.0	<0.0005	<1											<0.3
BH4D	28/11/19																					
BH4D	16/12/19											0.01				< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	
BH4D	27/01/20	<1	<1	1	<0.01	<0.03	359	<1	<1	<0.0005	<1	0.01				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
BH4D	21/02/20																					
BH4D	11/03/20																					
BH4D	24/04/20	<1	<1	1	<0.01	<0.03	156	<1	<1	<0.0005	<1	0.01				< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.01	
BH4D	14/05/20																					
BH4D	12/06/20																					
BH5D	10/10/2018	4.2	<1	7.8	0.02	0.42	22	<0.3	<1	<0.1	100	0.02	<0.02	<0.02	<0.02							
BH5D	07/11/2018																					
BH5D	07/12/2018																					
BH5D	22/01/2019	1.8	<1	0.5	<0.01	<0.05	78	<0.3	<1	<0.1	1.8	0.11	<0.10	0.11	0.11							
BH5D	08/02/2019																					
BH5D	08/03/2019																					
BH5D	04/04/2019	1.7	<1	<0.5	<0.01	<0.05	9	<0.3	<1	<0.1	1.6	0.22	0.02	0.22	0.2							
BH5D	03/05/2019																					
BH5D	14/06/2019																					
BH5D	30/07/2019	<2.0	<10	<5.0	<0.01	<0.50	<10	<3.0	<1	<0.1	3.3	0.01	<0.01	0.01	0.01							
BH5D	28/08/2019																					
BH5D	25/09/19	<1																				
BH5D	18/10/19	<1	<1	<1	0.16	<0.03	23	<1	< 10.0	<0.0005	<1											<0.3
BH5D	28/11/19																					
BH5D	16/12/19											0.166				0.159	< 0.010	< 0.010	< 0.010	< 0.010	0.166	
BH5D	27/01/20	<1	<1	3	<0.01	<0.03	156	<1	<1	<0.0005	<1	0.01				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
BH5D	21/02/20																					
BH5D	11/03/20																					
BH5D	24/04/20	1	<1	<1	<0.01	<0.03	<2	<1	<1	<0.0005	1	0.022				0.017	< 0.010	< 0.010	< 0.010	< 0.010	0.022	
BH5D	14/05/20																					
BH5D	12/06/20																					

Location	Date	Aluminium (mg/l)	Silicon (mg/l)	Bromide (mg/l)	Fluoride (mg/l)	Carbonate (mg/l)	Bicarbonate (mg/l)	PAH (Total) (ug/l)	Naphthalene (ug/l)	Acenaphthylene (ug/l)	Acenaphthene (ug/l)	Fluorene (ug/l)	Phenanthrene (ug/l)	Anthracene (ug/l)	Fluoranthene (ug/l)	Pyrene (ug/l)	Benzo(a)Anthracene (ug/l)	Chrysene (ug/l)	Benzo(b)fluoranthene (ug/l)	Benzo(k)fluoranthene (ug/l)	Benzo(a)Pyrene (ug/l)	Indeno(123-cd)Pyrene (ug/l)
BH2D	10/10/2018	0.05	<5	<0.50	0.4		<10	0.21	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.04	0.01	0.03	0.02	0.02	0.01	0.02
BH2D	07/11/2018																					
BH2D	07/12/2018																					
BH2D	22/01/2019	<0.02	<5	<0.50	0.34	<10	390	0.15	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01
BH2D	08/02/2019																					
BH2D	08/03/2019																					
BH2D	04/04/2019	<0.02	<5	<0.50	0.35	<10	370	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BH2D	03/05/2019																					
BH2D	14/06/2019																					
BH2D	30/07/2019	0.02	<5	<0.05	0.46	<10	390	0.11	<0.01	<0.01	0.01	0.01	0.01	<0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	<0.01
BH2D	28/08/2019																					
BH2D	25/09/19																					
BH2D	18/10/19							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH2D	28/11/19																					
BH2D	16/12/19																					
BH2D	27/01/20							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH2D	21/02/20																					
BH2D	11/03/20																					
BH2D	24/04/20							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH2D	14/05/20																					
BH2D	12/06/20																					
BH3DA	10/10/2018	<0.02	<5	<0.50	0.38		<10	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.02
BH3DA	07/11/2018																					
BH3DA	07/12/2018																					
BH3DA	22/01/2019	0.02	<5	<0.50	0.34	<10	400	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
BH3DA	08/02/2019																					
BH3DA	08/03/2019																					
BH3DA	04/04/2019	<0.02	<5	<0.50	0.38	<10	370	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BH3DA	03/05/2019																					
BH3DA	14/06/2019																					
BH3DA	30/07/2019	<0.02	<5	<0.05	0.33	<10	390	0.12	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
BH3DA	28/08/2019																					
BH3DA	25/09/19																					
BH3DA	18/10/19							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH3DA	28/11/19																					
BH3DA	16/12/19																					
BH3DA	27/01/20							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH3DA	21/02/20																					
BH3DA	11/03/20																					
BH3DA	24/04/20							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH3DA	14/05/20																					
BH3DA	12/06/20																					
BH4D	10/10/2018	0.37	<5	<0.50	0.08		<10	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BH4D	07/11/2018																					
BH4D	07/12/2018																					
BH4D	22/01/2019	<0.02	<5	<0.50	0.09	<10	680	0.21	<0.01	0.01	0.01	0.01	0.03	0.01	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01
BH4D	08/02/2019																					
BH4D	08/03/2019																					
BH4D	04/04/2019	0.04	<5	<0.50	0.11	<10	5700	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BH4D	03/05/2019																					
BH4D	14/06/2019																					
BH4D	30/07/2019	0.04	<5	<0.05	0.11	<10	920	0.09	0.01	<0.01	<0.01	0.01	0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01
BH4D	28/08/2019																					
BH4D	25/09/19																					
BH4D	18/10/19							< 0.16	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH4D	28/11/19																					
BH4D	16/12/19																					
BH4D	27/01/20							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH4D	21/02/20																					
BH4D	11/03/20																					
BH4D	24/04/20							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH4D	14/05/20																					
BH4D	12/06/20																					
BH5D	10/10/2018	0.04	<5	<0.50	0.15		<10	0.6	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.1	0.1	0.04	0.05	0.06	0.05	0.05	0.06
BH5D	07/11/2018																					
BH5D	07/12/2018																					
BH5D	22/01/2019	<0.02	<5	<0.50	0.22	<10	450	0.05	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01
BH5D	08/02/2019																					
BH5D	08/03/2019																					
BH5D	04/04/2019	<0.02	<5	<0.50	0.23	<10	480	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BH5D	03/05/2019																					
BH5D	14/06/2019																					
BH5D	30/07/2019	<0.02	<5	<0.05	0.19	<10	480	0.05	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01
BH5D	28/08/2019																					
BH5D	25/09/19																					
BH5D	18/10/19							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH5D	28/11/19																					
BH5D	16/12/19																					
BH5D	27/01/20							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
BH5D	21/02/20					</																

Location	Date	Dibenzo(ah)Anthracene (ug/l)	Benzo(ghi)Perylene (ug/l)
BH2D	10/10/2018	<0.01	0.02
BH2D	07/11/2018		
BH2D	07/12/2018		
BH2D	22/01/2019	<0.01	0.01
BH2D	08/02/2019		
BH2D	08/03/2019		
BH2D	04/04/2019	<0.01	<0.01
BH2D	03/05/2019		
BH2D	14/06/2019		
BH2D	30/07/2019	<0.01	<0.01
BH2D	28/08/2019		
BH2D	25/09/19		
BH2D	18/10/19	< 0.01	< 0.01
BH2D	28/11/19		
BH2D	16/12/19		
BH2D	27/01/20	< 0.01	< 0.01
BH2D	21/02/20		
BH2D	11/03/20		
BH2D	24/04/20	< 0.01	< 0.01
BH2D	14/05/20		
BH2D	12/06/20		
BH3DA	10/10/2018	<0.01	0.02
BH3DA	07/11/2018		
BH3DA	07/12/2018		
BH3DA	22/01/2019	<0.01	<0.01
BH3DA	08/02/2019		
BH3DA	08/03/2019		
BH3DA	04/04/2019	<0.01	<0.01
BH3DA	03/05/2019		
BH3DA	14/06/2019		
BH3DA	30/07/2019	<0.01	0.01
BH3DA	28/08/2019		
BH3DA	25/09/19		
BH3DA	18/10/19	< 0.01	< 0.01
BH3DA	28/11/19		
BH3DA	16/12/19		
BH3DA	27/01/20	< 0.01	< 0.01
BH3DA	21/02/20		
BH3DA	11/03/20		
BH3DA	24/04/20	< 0.01	< 0.01
BH3DA	14/05/20		
BH3DA	12/06/20		
BH4D	10/10/2018	<0.01	<0.01
BH4D	07/11/2018		
BH4D	07/12/2018		
BH4D	22/01/2019	<0.01	0.01
BH4D	08/02/2019		
BH4D	08/03/2019		
BH4D	04/04/2019	<0.01	<0.01
BH4D	03/05/2019		
BH4D	14/06/2019		
BH4D	30/07/2019	<0.01	<0.01
BH4D	28/08/2019		
BH4D	25/09/19		
BH4D	18/10/19	< 0.01	< 0.01
BH4D	28/11/19		
BH4D	16/12/19		
BH4D	27/01/20	< 0.01	< 0.01
BH4D	21/02/20		
BH4D	11/03/20		
BH4D	24/04/20	< 0.01	< 0.01
BH4D	14/05/20		
BH4D	12/06/20		
BH5D	10/10/2018	0.01	0.05
BH5D	07/11/2018		
BH5D	07/12/2018		
BH5D	22/01/2019	<0.01	<0.01
BH5D	08/02/2019		
BH5D	08/03/2019		
BH5D	04/04/2019	<0.01	<0.01
BH5D	03/05/2019		
BH5D	14/06/2019		
BH5D	30/07/2019	<0.01	<0.01
BH5D	28/08/2019		
BH5D	25/09/19		
BH5D	18/10/19	< 0.01	< 0.01
BH5D	28/11/19		
BH5D	16/12/19		
BH5D	27/01/20	< 0.01	< 0.01
BH5D	21/02/20		
BH5D	11/03/20		
BH5D	24/04/20	< 0.01	< 0.01
BH5D	14/05/20		
BH5D	12/06/20		

Location	BH2D	BH2D	BH3DA	BH3DA	BH4D	BH4D	BH5D	BH5D
Date	10/10/2018	18/10/19	10/10/2018	18/10/19	10/10/2018	18/10/19	10/10/2018	18/10/19
Hexachlorocyclohexane (sum of alpha, beta and gamma) ug/l	<0.01		<0.01		<0.01		<0.01	
Hexachlorobenzene ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01
Heptachlor ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01
Aldrin ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01
Heptachlor epoxide ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01
Chlordane ug/l	<0.01		<0.01		<0.01		<0.01	
Endosulphan ug/l	<0.01		<0.01		<0.01		<0.01	
DDE ug/l	<0.01		<0.01		<0.01		<0.01	
Dieldrin ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01
Endrin ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01
DDD ug/l	<0.01		<0.01		<0.01		<0.01	
DDT ug/l	<0.01		<0.01		<0.01		<0.01	
Dichlorvos ug/l	<0.01	< 0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Mevinphos ug/l	<0.01	< 0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Dimethoate ug/l	<0.01	< 0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Diazinon ug/l	<0.01	0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Pirimiphos methyl ug/l	<0.01	< 0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Malathion ug/l	<0.01	< 0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Fenitrothion ug/l	<0.01	< 0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Parathion ug/l	<0.01		<0.01		<0.01		<0.01	
Azinphos methyl ug/l	<0.01	< 0.01	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02
Tributyl tin ug/l	<0.01	<0.02	<0.01	<0.02	<0.01	<0.02	<0.01	<0.02
Triphenyl Tin ug/l	<0.01	<0.05	<0.01	<0.05	<0.01	<0.05	<0.01	<0.05
PCB BZ#28 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	
PCB BZ#52 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	
PCB BZ#101 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	
PCB BZ#118 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	
PCB BZ#153 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	
PCB BZ#138 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	
PCB BZ#180 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	
Phenol ug/l	<10		<10		<10		<10	
Bis (2-chloroethyl) ether ug/l	<10		<10		<10		<10	
2-Chlorophenol ug/l	<10		<10		<10		<10	
1,3-Dichlorobenzene ug/l	<10	< 1.0	<10	< 1.0	<10	< 1.0	<10	< 1.0
1,4-Dichlorobenzene ug/l	<10	< 1.0	<10	< 1.0	<10	< 1.0	<10	< 1.0
1,2-Dichlorobenzene ug/l	<10	< 5.0	<10	< 5.0	<10	< 5.0	<10	< 5.0
Bis (2-chloroisopropyl) ether ug/l	<10		<10		<10		<10	
2-methyl phenol ug/l	<10		<10		<10		<10	
3/4-Methylphenol ug/l	<10		<10		<10		<10	
Hexachloroethane ug/l	<10		<10		<10		<10	
Nitrobenzene ug/l	<10		<10		<10		<10	
Isophorone ug/l	<10		<10		<10		<10	
2-Nitrophenol ug/l	<10		<10		<10		<10	
2,4-Dimethylphenol ug/l	<10		<10		<10		<10	
Bis (2-chloroethoxy) methane ug/l	<10		<10		<10		<10	
2,4-Dichlorophenol ug/l	<10		<10		<10		<10	
1,2,4-Trichlorobenzene ug/l	<10	< 5.0	<10	< 5.0	<10	< 5.0	<10	< 5.0
4-Chloroaniline ug/l	<10		<10		<10		<10	
Hexachlorobutadiene ug/l	<10	< 5.0	<10	< 5.0	<10	< 5.0	<10	< 5.0
4-Chloro-3-methylphenol ug/l	<10		<10		<10		<10	
2-Methylnaphthalene ug/l	<10		<10		<10		<10	
2,4,6-Trichlorophenol ug/l	<10		<10		<10		<10	
2,4,5-Trichlorophenol ug/l	<10		<10		<10		<10	
2-Chloronaphthalene ug/l	<10		<10		<10		<10	
2-Nitroaniline ug/l	<10		<10		<10		<10	
Dimethyl phthalate ug/l	<10		<10		<10		<10	
2,6-Dinitrotoluene ug/l	<10		<10		<10		<10	
3-Nitroaniline ug/l	<10		<10		<10		<10	
Dibenzofuran ug/l	<10		<10		<10		<10	
2,4-Dinitrotoluene ug/l	<10		<10		<10		<10	
Diethyl phthalate ug/l	<10		<10		<10		<10	
4-Chlorophenyl phenylether ug/l	<10		<10		<10		<10	
4-Nitroaniline ug/l	<10		<10		<10		<10	
Azobenzene ug/l	<10		<10		<10		<10	
4-Bromophenyl phenylether ug/l	<10		<10		<10		<10	
Hexachlorobenzene ug/l	<10		<10		<10		<10	
Carbazole ug/l	<10		<10		<10		<10	
Di-n-butylphthalate ug/l	<10		<10		<10		<10	
Butyl benzylphthalate ug/l	<10		<10		<10		<10	
Bis (2-ethylhexyl)phthalate ug/l	<10		<10		<10		<10	
Di-n-octylphthalate ug/l	<10		<10		<10		<10	
2,4-Dinitrophenol ug/l	<10		<10		<10		<10	
Hexachlorocyclopentadiene ug/l	<10		<10		<10		<10	
Pentachlorophenol ug/l	<10	< 0.02	<10	< 0.02	<10	< 0.02	<10	< 0.02
SVOC screen (extra peaks) ug/l	<10		<10		<10		<10	
Dichlorodifluoromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Chloromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Vinyl chloride ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Bromomethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Chloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Trichlorofluoromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1-Dichloroethylene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Dichloromethane ug/l	<50		<50		<50		<50	
Trans-1,2-Dichloroethene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1-Dichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Cis-1,2-Dichloroethylene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
2,2-Dichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Chloroform ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Bromochloromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1,1-Trichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1-Dichloropropene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Carbon tetrachloride ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,2-Dichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Benzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,2-Dichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1,2-Trichloroethylene ug/l	<1		<1		<1		<1	
Bromodichloromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Dibromomethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0

Location	BH2D	BH2D	BH3DA	BH3DA	BH4D	BH4D	BH5D	BH5D
Date	10/10/2018	18/10/19	10/10/2018	18/10/19	10/10/2018	18/10/19	10/10/2018	18/10/19
Cis-1,3-Dichloropropene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Toluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Trans-1,3-Dichloropropene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1,2-Trichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,3-Dichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Tetrachloroethene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Chlorodibromomethane ug/l	<1		<1		<1		<1	
1,2-dibromoethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Chlorobenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1,1,2-Tetrachloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
EthylBenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
M/P Xylene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
O Xylene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Styrene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Bromoform ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
Isopropyl benzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,1,2,2-Tetrachloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,2,3-Trichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
n-Propylbenzene ug/l	<1		<1		<1		<1	
Bromobenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,3,5-Trimethylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
T-Butylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,2,4-Trimethylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
S-Butylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
p-Isopropyltoluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
2-Chlorotoluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
4-Chlorotoluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0
1,3-Dichlorobenzene ug/l	<1		<1		<1		<1	
1,4-Dichlorobenzene ug/l	<1		<1		<1		<1	
1,2-Dichlorobenzene ug/l	<1		<1		<1		<1	
VOC Screen (Extra Peaks) ug/l	<10		<10		<10		<10	
Naphthalene ug/l		< 5.0		< 5.0		< 5.0		< 5.0
Endosulfan I ug/l		< 0.02		< 0.02		< 0.02		< 0.01
Endosulfan ug/l		< 0.02		< 0.02		< 0.02		< 0.01
Endosulfan Sulfate ug/l		< 0.02		< 0.02		< 0.02		< 0.01
o,p-DDE ug/l		< 0.02		< 0.02		< 0.02		< 0.01
P,P'-DDE ug/l		< 0.02		< 0.02		< 0.02		< 0.01
O,P'-DDD µg/l		< 0.02		< 0.02		< 0.02		< 0.01
P,P'-DDD µg/l		< 0.02		< 0.02		< 0.02		< 0.01
O,P'-DDT µg/l		< 0.02		< 0.02		< 0.02		< 0.01
P,P'-DDT µg/l		< 0.02		< 0.02		< 0.02		< 0.01
m/p Xylenes µg/l		< 10.0		< 10.0		< 10.0		< 10.0
o Xylene µg/l		< 5.0		< 5.0		< 5.0		< 5.0
Xylenes µg/l		<15		<15		<15		<15
Toluene µg/l		< 5.0		< 5.0		< 5.0		< 5.0
Benzene µg/l		< 5.0		< 5.0		< 5.0		< 5.0
Ethyl Benzene µg/l		< 5.0		< 5.0		< 5.0		< 5.0
n-Butylbenzene µg/l		< 1.0		< 1.0		< 1.0		< 1.0
HCH-alpha µg/l		< 0.02		< 0.02		< 0.02		< 0.01
HCH-beta µg/l		< 0.02		< 0.02		< 0.02		< 0.01
HCH-gamma µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Delta-HCH µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Benazolin µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Bentazon µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Parathion ethyl µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Parathion-methyl µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Endrin Ketone µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Ethion µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Etrimphos µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Fenthion µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Fluroxypyr µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Ioxynil µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Isodrin µg/l		< 0.02		< 0.02		< 0.02		< 0.01
MCPA µg/l		< 0.02		< 0.02		< 0.02		< 0.02
MCPB µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Mecoprop µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Methacrifos µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Methoxychlor µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Pendimethalin µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Pentachlorobenzene µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Phosalone µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Phosphamidon µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Picloram µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Pirimiphos-Ethyl µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Propetamphos µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Propylbenzene µg/l		< 1.0		< 1.0		< 1.0		< 1.0
Propyzamide µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Silvex µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Tecnazene µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Total Anions meq c		7.6		7.3		10.6		12
Total Cations meq c		8.7		8.3		12.1		12.5
Bromoxynil µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Carbofenthion µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Chlorfenvinphos µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Chlorpyrifos µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Chlorpyriphos-Methyl µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Chlorthalonil µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Cis-Chlordan µg/le		< 0.02		< 0.02		< 0.02		< 0.01
Cis-Permethrin µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Clopyralid µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Cresols mg/l		<0.0005		<0.0005		<0.0005		<0.0005
Cyanide (Total) as CN mg/l		<0.02		<0.02		<0.02		<0.02
Dibromochloromethane µg/l		< 1.0		< 1.0		< 1.0		< 1.0
Dibutyl Tin as Sn ng/l		<20		<20		<20		<20
Dicamba µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Dichloroprop µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Dimethylphenols mg/l		<0.0005		<0.0005		<0.0005		<0.0005
1,2,3,4-Tetrachlorobenzene µg/l		< 0.02		< 0.02		< 0.02		< 0.01

Location	BH2D	BH2D	BH3DA	BH3DA	BH4D	BH4D	BH5D	BH5D
Date	10/10/2018	18/10/19	10/10/2018	18/10/19	10/10/2018	18/10/19	10/10/2018	18/10/19
1,2,3-Trichlorobenzene µg/l		< 0.02		< 0.02		< 0.02		< 0.01
1,2,3-Trichlorobenzene µg/l		< 1.0		< 1.0		< 1.0		< 1.0
1,2-Dibromo-3-chloropropane µg/l		< 5.0		< 5.0		< 5.0		< 5.0
1,3,5-Trichlorobenzene µg/l		< 0.02		< 0.02		< 0.02		< 0.01
2,3,6-TBA µg/l		< 0.02		< 0.02		< 0.02		< 0.02
2,4,5-T µg/l		< 0.02		< 0.02		< 0.02		< 0.02
2,4-D µg/l		< 0.02		< 0.02		< 0.02		< 0.02
2,4-DB µg/l		< 0.02		< 0.02		< 0.02		< 0.02
2,6-Dichlorobenzonitrile µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Azinphos-Ethyl µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Trans-Chlordane µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Trans-Permethrin µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Triadimefon µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Triallate µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Triazophos µg/l		< 0.01		< 0.02		< 0.02		< 0.02
Trichloroethene µg/l		< 1.0		< 1.0		< 1.0		< 1.0
Triclopyr µg/l		< 0.02		< 0.02		< 0.02		< 0.02
Trifluralin µg/l		< 0.02		< 0.02		< 0.02		< 0.01
Trimethylphenols mg/l		<0.0005		<0.0005		<0.0005		<0.0005
SVOC_TICS_01 mg/l		[Octane=0.046]		[Octane=0.050]		[Cyclotrisiloxane , hexamethyl-=0.596]		[Octane=0.028]
SVOC_TICS_02 mg/l		[Ethene, tetrachloro-=0.013]		[Ethene, tetrachloro-=0.014]				[2-Hexene, 2,5,5-trimethyl-=0.010]
SVOC_TICS_03 mg/l		[2-Hexene, 2,5,5-trimethyl-=0.017]		[2-Hexene, 2,5,5-trimethyl-=0.017]				[Pentane, 2,2,3-trimethyl-=0.010]
SVOC_TICS_04 mg/l		[2-Hexene, 3,5,5-trimethyl-=0.004]		[Pentane, 2,2,4-trimethyl-=0.146]				[Tetrachloroethyl ene=0.013]
SVOC_TICS_05 mg/l		[Hexane, 2,2-dimethyl-=0.255]						[2-Hexene, 2,5,5-trimethyl-=0.018]
SVOC_TICS_06 mg/l		[Aniline, N-methyl-=0.012]						[Aniline, N-methyl-=0.013]
SVOC_TICS_07 mg/l		[1,1'-Biphenyl, 2-fluoro-=0.037]						[Benzenamine, N,N-dimethyl-=2.644]
SVOC_TICS_08 mg/l		[Benzene, 1,3,5-tribromo-2-methoxy-=0.021]						[Hexadecanoic acid, methyl ester=0.014]
SVOC_TICS_09 mg/l		[Hexadecanoic acid, methyl ester=0.019]						[Octadecanoic acid, methyl ester=0.021]
SVOC_TICS_10 mg/l		[Octadecanoic acid, methyl ester=0.020]						
SVOC_TICS_11 mg/l								
SVOC_TICS_12 mg/l								
SVOC_TICS_13 mg/l								

Table C.1 Hazardous Groundwater Screen (µg/l)

Location	Count	25th Percentile	Median	85th Percentile	95th Percentile	Max
BTEX and Substituted PAH						
PAH (Total) (µg/l)	13	0.05	0.110	0.21	0.366	0.6
Naphthalene (µg/l)	7	0.01	0.010	0.021	0.027	0.0
Acenaphthylene (µg/l)	3	0.01	0.010	0.01	0.01	0.0
Acenaphthene (µg/l)	3	0.01	0.010	0.01	0.01	0.0
Fluorene (µg/l)	5	0.01	0.010	0.01	0.01	0.0
Phenanthrene (µg/l)	5	0.01	0.010	0.018	0.026	0.0
Anthracene (µg/l)	1	0.01	0.010	0.01	0.01	0.0
Fluoranthene (µg/l)	10	0.01	0.010	0.0365	0.073	0.1
Pyrene (µg/l)	11	0.01	0.020	0.035	0.07	0.1
Benzo(a)Anthracene (µg/l)	14	0.01	0.010	0.01	0.0205	0.0
Chrysene (µg/l)	11	0.01	0.010	0.025	0.04	0.1
Benzo(b)fluoranthene (µg/l)	9	0.01	0.010	0.018	0.044	0.1
Benzo(k)fluoranthene (µg/l)	8	0.01	0.010	0.0195	0.0395	0.1
Benzo(a)Pyrene (µg/l)	7	0.01	0.010	0.014	0.038	0.1
Indeno(123-cd)Pyrene (µg/l)	6	0.01	0.015	0.03	0.05	0.1
Dibenzo(ah)Anthracene (µg/l)	1	0.01	0.010	0.01	0.01	0.0
Benzo(ghi)Perylene (µg/l)	6	0.01	0.015	0.0275	0.0425	0.1
Herbicides and Pesticides						
Diazinon µg/l	1	0.01	0.010	0.01	0.01	0.01
Other						
As (Dissolved) (µg/l)	14	0.8	1.000	1.81	2.77	4.2
Hg (Dissolved) (µg/l)	1	0.42	0.420	0.42	0.42	0.42
Se (Dissolved) (µg/l)	11	1.9	3.700	18.5	61	100.0

	>10 counts
	10 - 50 µg/l
	50 - 250 µg/l
	>250 µg/l

Please note this does not contain additional SVOC analysis

Table C.2 Groundwater Hazardous Screen (mg/l)

Location	Count	25th Percentile	Median	85th Percentile	95th Percentile	Max
Other						
TPH (C35-C40) (mg/l)	3	0.02	0.020	0.041	0.047	0.1
TPH (C8 - C40) (mg/l)	13	0.03	0.120	0.188	0.272	0.4
TPH (C8-C35)(Total) (mg/l)	13	0.03	0.110	0.184	0.24	0.3
Fluoride (mg/l)	16	0.14	0.280	0.38	0.415	0.5
TPH Band (>C21-C35) mg/l	4	0.01525	0.022	0.0996	0.1392	0.2
TPH GC mg/l	6	0.01325	0.018	0.0655	0.1325	0.2

	>10 counts
	0.01 - 0.05 mg/l
	0.05 - 0.25 mg/l
	>0.25 mg/l

Please note this does not contain additional SVOC analysis

APPENDIX D

Location	Date	pH	Electrical Conductivity (µS/cm)	Ammoniacal nitrogen (mg/l)	BOD (mg/l)	COD (mg/l)	TOC (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Chloride (mg/l)	Sulphate (mg/l)	Total Sulphur (mg/l)	Combined Sulphate mg/l	Alkalinity (mg/l)	TON (mg/l)	Nitrate (mg/l)	Nitrite (mg/l)	Diss Oxygen (mg/l)	Suspended Solids (mg/l)	Phosphate (mg/l)	Cadmium (Dissolved) (µg/l)	Nickel (Dissolved) (µg/l)	Zinc (Dissolved) (µg/l)	Chromium (Dissolved) (µg/l)
SW1	10/10/2018	7.91	690	0.06	<3	19	4	140	5.5	17	2	36	45		45	280	2.3	10	<0.1	10	<10	<0.5	<0.02	<1	6	<1
SW1	07/11/2018	7.54	620	<0.05	<3	15	5					31	40		40		3.1	<0.3	<0.1	9.3	<10	<0.5		1		<1
SW1	07/12/2018	7.38	470	<0.05	<3	20	5					26	19		19		3.7	16	<0.1	9.2	<10	<0.5		<1		<1
SW1	22/01/2019	7.62	690	<0.05	<3	17	5	110	4.1	38	<0.1	65	31		31	240	3.1	14	<0.1	11	17	<0.5	<0.02	<1	6	<1
SW1	08/02/2019	7.55	450	<0.05	<3	18	5					30	17		17		3.5	16	<0.1	10	<10	<0.5		<1		<1
SW1	08/03/2019	7.56	540	<0.05	<3	13	4					31	18		18		3.8	17	<0.1	11	12	<0.5		<1		<1
SW1	04/04/2019	7.71	560	0.08	<3	25	5	110	3.6	11	2.4	<1	23		23	200	2.5	11	<0.1	10	<10	<0.5	<0.02	<1	3	38
SW1	03/05/2019	7.77	610	<0.05	<3	9	4					31	25		25		2.4	11	<0.1	10	<10	<0.5		<1		<1
SW1	30/07/2019	7.82	680	0.09	<3	14	3	140	4.7	17	2.1	29	25		25	300	2.9	13	<0.1	9.3	<10	<0.5	2.8	<10	<20	<10
SW1	28/08/2019	7.76	670	0.06	<3	17	4					33	24		24		2.7	12	<0.1	9.5	26	<0.5		1		<1
SW1	14/09/2019	7.69	590	0.1	<3	6	18					23	26		26		1.9	8.6	<0.1	10	<10	<0.5		<1		<1
SW1	25/09/2019	7.9	655	0.06	<1.0	8						29	24		24		1.9	1.9	<0.01		6	0.02		<1		<1
SW1	18/10/2019	7.6	526	0.04	1.4	19	7.2	102	5	20	4	21		21	21	213	2.1	2.1	<0.01		8	0.03	<0.02	<1	3	<1
SW1	28/11/2019	7.7	572	0.03	<1.0	10	4.2					20		21	21		1.6	1.6	<0.01		6	<0.01		<1		<1
SW1	16/12/2019	7.6	575	0.03	<1.0	8	3.1					22		18	18		2.7	2.7	<0.01		<5	<0.01		<1		<1
SW1	27/01/2020	7.8	577	0.02	<1.0	<5	3.3	119	4	13	1	25		20	20	243	2.4	2.4	<0.01		9	<0.01	<0.02	<1	2	<1
SW1	21/02/2020	7.6	523	<0.01	<1.0	<5	2.9					24		15	15		2.5	2.5	<0.01		7	0.02		<1		<1
SW1	11/03/2020	7.9	568	0.02	<1.0	7	2.5					26		15	15		2.4	2.4	<0.01		8	<0.01		<1		<1
SW1	24/04/2020	7.9	587	0.05	1	6	1.8	118	4	11	1	23		17	17	256	1.2	1.2	<0.01		54	<0.01	<0.02	<1	<2	<1
SW1	14/05/2020	7.9	617	0.08	<1.0	<5	1.3					24		19	19		1.1	1.1	<0.01		5	<0.01		<1		<1
SW2a	10/10/2018	7.83	940	0.2	<3	9	4	200	8.7	16	3	34	92		92	370	0.7	3.1	<0.1	10	<10	<0.5	0.04	6	16	<1
SW2a	07/11/2018	7.25	800	0.24	<3	22	5					29	92		92		1.7	7.6	<0.1	9.5	66	<0.5		5		<1
SW2a	07/12/2018	7.28	910	0.33	<3	19	5					29	140		140		1.7	7.4	<0.1	9.4	17	<0.5		5		<1
SW2a	22/01/2019	7.29	470	0.14	<3	18	3	86	5.2	11	0.9	19	77		77	150	1.1	5.1	<0.1	10	91	<0.5	<0.02	2	4	<1
SW2a	08/02/2019	7.52	620	0.13	<3	32	4					24	100		100		1.8	7.7	0.1	9.2	350	<0.5		2		<1
SW2a	08/03/2019	7.21	830	0.3	<3	12	5					29	100		100		4.2	19	<0.1	9.6	<10	<0.5		2		<1
SW2a	04/04/2019	7.46	800	0.22	<3	27	5	150	7.5	13	4.4	<1	99		99	260	1.9	8.3	<0.1	9.4	12	<0.5	<0.02	2	3	30
SW2a	03/05/2019	7.38	770	0.08	<3	16	4					30	87		87		1.9	8.2	<0.1	10	<10	<0.5		3		<1
SW2a	30/07/2019	7.43	810	0.14	<3	21	4	150	8	20	4.3	33	86		86	310	<0.1	<0.5	<0.1	9.4	11	<0.5	0.58	<10	54	<10
SW2a	28/08/2019	7.24	880	0.17	<3	19	4					33	86		86		0.2	0.8	0.1	10	<10	<0.5		2		<1
SW2a	14/09/2019	7.4	820	0.2	<3	14	14					27	94		94		1	4.6	<0.1	10	<10	<0.5		3		<1
SW2a	25/09/2019	7.2	882	0.3	1.1	9						32	81		81		0.5	0.4	0.05		<5	<0.01		3		<1
SW2a	18/10/2019	7.4	891	0.2	<2.0	9	4.6	189	9	18	5	25		123	123	308	0.6	0.6	<0.01		7	0.02	<0.02	3	10	<1
SW2a	28/11/2019	7.4	798	0.3	<1.0	9	4					23		89	89		0.8	0.8	<0.01		<5	<0.01		3		<1
SW2a	16/12/2019	7.3	793	0.3	<1.0	10	4					24		85	85		1.4	1.4	<0.01		7	<0.01		2		<1
SW2a	27/01/2020	7.5	773	0.3	<1.0	<5	3.6	164	7	15	3	25		92	92	294	1.5	1.5	<0.01		7	<0.01	<0.02	2	<2	<1
SW2a	21/02/2020	7.3	803	0.3	<1.0	7	3.9					24		107	107		1.2	1.2	0.01		7	<0.01		4		<1
SW2a	11/03/2020	7.4	747	0.2	<1.0	10	3.3					24		81	81		1.1	1.1	0.01		6	<0.01		2		<1
SW2a	24/04/2020	7.8	753	0.03	1.4	10	3.3	152	7	15	3	25		82	82	270	<0.2	<0.2	<0.01		<5	<0.01	<0.02	1	<2	<1
SW2a	14/05/2020	7.7	757	0.1	1.1	6	2.6					28		63	63		0.6	0.6	<0.01		<5	<0.01		1		<1
SW2a	12/06/2020	7.7	679	0.02	1.2	8	3.2					33		59	59		0.2	0.2	<0.01		<5	0.01		<1		<1
SW2b	10/10/2018	7.8	920	0.15	<3	16	5	200	9	16	3	33	120		120	340	0.7	3.1	<0.1	10	<10	<0.5	0.02	7	11	<1
SW2b	07/11/2018	7.29	830	0.2	<3	25	5					27	130		130		1.3	5.6	<0.1	9.7	84	<0.5		5		<1
SW2b	07/12/2018	7.38	1000	0.15	<3	16	4					24	240		240		3.7	17	<0.1	10	21	<0.5		7		<1
SW2b	22/01/2019	7.35	560	0.14	<3	17	3	110	6.1	15	<0.1	24	88		88	170	1.4	6.2	<0.1	10	65	<0.5	<0.02	2	5	<1
SW2b	08/02/2019	7.53	510	0.11	<3	33	3					22	98		98		1.2	5.1	0.1	9	280	<0.5		1		<1
SW2b	08/03/2019	7.28	870	0.18	<3	13	5					29	140		140		2.9	13	<0.1	10	<10	<0.5		2		<1
SW2b	04/04/2019	7.47	830	0.16	<3	27	5	160	8.6	14	4	<1	140		140	200	2.9	13	<0.1	10	33	<0.5	<0.02	4	2	27
SW2b	03/05/2019	7.35	790	0.13	<3	17	4					30	85		85		1.4	6.2	<0.1	10	<10	<0.5		3		<1
SW2b	30/07/2019	7.51	980	0.17	<3	29	5	200	11	23	4.6	35	140		140	320	<0.1	<0.5	<0.1	9.3	<10	<0.5	0.22	<10	1900	<10
SW2b	28/08/2019	7.38	770	<0.05	<3	51	7					28	130		130		0.2	0.6	<0.1	9.7	68	<0.5		2		<1
SW2b	14/09/2019	7.37	860	0.19	<3	12	13					26	170		170		3.3	15	<0.1	10	<10	<0.5		3		<1
SW2b	25/09/2019	7.4	882	0.09	1.1	12						31	102		102		0.3	0.3	0.02		6	<0.01		3		<1
SW2b	18/10/2019	7.4	842	0.2	<1.0	12	4.1					24		161	161		1.4	1.4	<0.01		26	0.02		4		<1
SW2b	28/11/2019	7.4	790	0.2	<1.0	12	4.6	162	8	20	3	26		112	112	256	0.6	0.6	<0.01		16	<0.01	0.03	3	5	<1
SW2b	16/12/2019	7.4	840	0.3	<1.0	11	4.1					26		116	116		1.5	1.4	<0.01		11	<0.01		3		<1
SW2b	27/01/2020	7.5	796	0.23	<1.0	7	3.8	166	8	16	3	27		107	107	280	1.6	1.6	0.01		13	<0.01	<0.02	2	2	<1
SW2b	21/02/2020	7.4	877	0.18	<1.0	9	4.7					28		153	153		1.4	1.3	0.02		9	0.01		4		<1
SW2b	11/03/2020	7.4	775	0.15	<1.0	10	3.9					25		99	99		1	1	0.01		35	<0.01		2		<1
SW2b	24/04/2020	7.8	719	0.02	1.3	9	3.1	142	7	14	3	24														

Location	Date	Copper (Dissolved) (µg/l)	Iron (Dissolved) (mg/l)	Mercury (Dissolved) (µg/l)	Manganese (Dissolved) (µg/l)	Lead (Dissolved) (µg/l)	Methyl tert-Butyl Ether (µg/l)	Phenol ug/l	Total TPH mg/l	TPH (C35-C40) (mg/l)	TPH (C8 - C40) (mg/l)	TPH (C8- C35)(Total) (mg/l)	TPH Filtered mg/l	TPH Band (>C21- C35) mg/l	TPH Band >C10- C12 mg/l	TPH Band >C12- C16 mg/l	TPH Band >C16- C21 mg/l	TPH Band >C8- C10 mg/l	TPH GC mg/l	PAH (Total) (µg/l)	Naphthalene (ug/l)	Acenaphthylene (ug/l)	Acenaphthene (ug/l)	Fluorene (ug/l)	Phenanthrene (ug/l)
SW1	10/10/2018	0.5	0.03	<0.05	10	<0.3	<1	<10	0.07	<0.03	0.07	0.07								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW1	07/11/2018		<0.01		5	<0.3																			
SW1	07/12/2018		0.05		3	<0.3																			
SW1	22/01/2019	1	0.02	<0.05	12	<0.3	<1		1.31	0.11	1.31	1.2								0.04	<0.02	<0.02	<0.02	<0.02	<0.02
SW1	08/02/2019		0.03		2	<0.3																			
SW1	08/03/2019		0.01		2	<0.3																			
SW1	04/04/2019	0.8	0.03	<0.05	3	<0.3	<1		0.1	<0.02	0.1	0.1								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW1	03/05/2019		0.03		13	<0.3			0.21	0.03	0.21	0.18													
SW1	30/07/2019	6.5	<0.01	<0.50	<10	<3.0	<1		0.01	<0.01	<0.01	<0.01								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW1	28/08/2019		0.02		<1	<0.3														<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW1	14/09/2019		0.05		3	<0.3																			
SW1	25/09/2019		0.08		<2	<1																			
SW1	18/10/2019	1	0.18	<0.03	<2	<1	< 10.0						<0.3							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW1	28/11/2019		0.01		<2	<1																			
SW1	16/12/2019		0.01		5	<1			0.011					< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.011						
SW1	27/01/2020	<1	0.01	<0.03	<2	<1	<1		0.01					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW1	21/02/2020		0.01		<2	<1																			
SW1	11/03/2020		0.01		<2	<1																			
SW1	24/04/2020	<1	0.01	<0.03	<2	<1	<1		0.015				0.011	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW1	14/05/2020		0.03		7	<1			0.01										< 0.010						
SW2a	10/10/2018	1.8	0.04	<0.05	1200	<0.3	<1	<10	0.03	<0.03	<0.03	<0.03								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2a	07/11/2018		<0.01		1000	<0.3																			
SW2a	07/12/2018		0.02		1200	<0.3																			
SW2a	22/01/2019	1.9	<0.01	<0.05	390	<0.3	<1		0.22	<0.10	0.22	0.22								0.43	0.23	<0.02	<0.02	<0.02	0.03
SW2a	08/02/2019		0.01		360	<0.3																			
SW2a	08/03/2019		<0.01		870	<0.3																			
SW2a	04/04/2019	1.4	<0.01	<0.05	580	<0.3	<1		0.12	<0.02	0.12	0.12								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2a	03/05/2019		0.02		400	<0.3			0.24	<0.02	0.24	0.24													
SW2a	30/07/2019	<5.0	0.03	<0.50	<10	7.5	<1		0.04	<0.01	0.04	0.04								0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2a	28/08/2019		0.01		2	<0.3																			
SW2a	14/09/2019		0.02		590	<0.3																			
SW2a	25/09/2019		0.11		484	<1																			
SW2a	18/10/2019	2	0.22	<0.03	744	<1	< 10.0						<0.3							< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2a	28/11/2019		<0.01		742	<1																			
SW2a	16/12/2019		0.01		840	<1			0.01					< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010						
SW2a	27/01/2020	1	0.01	<0.03	655	<1	<1		0.01					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2a	21/02/2020		<0.01		680	<1																			
SW2a	11/03/2020		0.01		503	<1																			
SW2a	24/04/2020	1	0.07	<0.03	27	<1	<1		0.016				0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2a	14/05/2020		0.03		35	<1			0.01										< 0.010						
SW2a	12/06/2020		0.05		<2	<1																			
SW2b	10/10/2018	11	0.02	<0.05	1000	<0.3	<1	<10	0.03	<0.03	<0.03	<0.03								0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2b	07/11/2018		<0.01		880	<0.3																			
SW2b	07/12/2018		0.01		610	<0.3																			
SW2b	22/01/2019	1.2	0.01	<0.05	490	<0.3	<1		0.24	<0.10	0.24	0.24								0.35	<0.02	<0.02	<0.02	<0.02	0.03
SW2b	08/02/2019		0.01		150	<0.3																			
SW2b	08/03/2019		<0.01		540	<0.3																			
SW2b	04/04/2019	1.3	0.01	<0.05	470	<0.3	<1		0.24	0.04	0.24	0.2								0.01	<0.01	<0.01	0.01	<0.01	<0.01
SW2b	03/05/2019		0.02		530	<0.3			0.08	<0.02	0.08	0.08													
SW2b	30/07/2019	12	0.02	<0.50	14	<3.0	<1		0.09	<0.01	0.09	0.09								0.03	0.01	<0.01	<0.01	<0.01	<0.01
SW2b	28/08/2019		<0.01		2	<0.3																			
SW2b	14/09/2019		0.01		390	<0.3																			
SW2b	25/09/2019		0.15		251	<1																			
SW2b	18/10/2019		0.21		562	<1																			
SW2b	28/11/2019	2	<0.01	<0.03	658	<1	< 10.0						<0.3							< 0.4	< 0.01	< 0.01	< 0.01	< 0.01	0.02
SW2b	16/12/2019		<0.01		748	<1			0.01					< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010						
SW2b	27/01/2020	1	<0.01	<0.03	651	<1	<1		0.01					< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2b	21/02/2020		<0.01		568	<1																			
SW2b	11/03/2020		0.01		379	<1																			
SW2b	24/04/2020	1	0.05	<0.03	44	<1	<1		0.014				< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.014	< 0.16	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2b	14/05/2020		0.04		<2	<1			0.024											0.024					
SW2b	12/06/2020		0.04		<2	<1																			
SW3	10/10/2018	1	0.01	<0.05	5	<0.3	<1	<10	0.03	<0.03	0.03	0.03								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW3	07/11/2018		<0.01		72	<0.3																			
SW3	07/12/2018		0.05		28	<0.3																			
SW3	22/01/2019	1.4	0.02	<0.05	14	<0.3	<1		0.5	<0.10	0.5	0.5								0.2	<0.10	<0.10	<0.10	<0.10	<0.10
SW3	08/02/2019		<0.01		2	<0.3																			
SW3	08/03/2019		0.01		5	<0.3																			
SW3	04/04/2019	1.4	0.01	<0.05	430	<0.3	<1		0.26	0.04	0.26	0.22								<0.01	<0.01	<0.01	<0.01		

Location	Date	Anthracene (ug/l)	Fluoranthene (ug/l)	Pyrene (ug/l)	Benzo(a)Anthracene (ug/l)	Chrysene (ug/l)	Benzo(b)fluoranthene (ug/l)	Benzo(k)fluoranthene (ug/l)	Benzo(a)Pyrene (ug/l)	Indeno(123-cd)Pyrene (ug/l)	Dibenzo(ah)Anthracene (ug/l)	Benzo(ghi)Perylene (ug/l)
SW1	10/10/2018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW1	07/11/2018											
SW1	07/12/2018											
SW1	22/01/2019	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
SW1	08/02/2019											
SW1	08/03/2019											
SW1	04/04/2019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW1	03/05/2019											
SW1	30/07/2019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW1	28/08/2019											
SW1	14/09/2019											
SW1	25/09/2019											
SW1	18/10/2019	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW1	28/11/2019											
SW1	16/12/2019											
SW1	27/01/2020	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW1	21/02/2020											
SW1	11/03/2020											
SW1	24/04/2020	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW1	14/05/2020											
SW2a	10/10/2018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2a	07/11/2018											
SW2a	07/12/2018											
SW2a	22/01/2019	<0.02	0.04	0.04	0.03	0.03	0.03	<0.02	<0.02	<0.02	<0.02	0.03
SW2a	08/02/2019											
SW2a	08/03/2019											
SW2a	04/04/2019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2a	03/05/2019											
SW2a	30/07/2019	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2a	28/08/2019											
SW2a	14/09/2019											
SW2a	25/09/2019											
SW2a	18/10/2019	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2a	28/11/2019											
SW2a	16/12/2019											
SW2a	27/01/2020	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2a	21/02/2020											
SW2a	11/03/2020											
SW2a	24/04/2020	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2a	14/05/2020											
SW2a	12/06/2020											
SW2b	10/10/2018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
SW2b	07/11/2018											
SW2b	07/12/2018											
SW2b	22/01/2019	<0.02	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	<0.02	0.04
SW2b	08/02/2019											
SW2b	08/03/2019											
SW2b	04/04/2019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2b	03/05/2019											
SW2b	30/07/2019	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW2b	28/08/2019											
SW2b	14/09/2019											
SW2b	25/09/2019											
SW2b	18/10/2019											
SW2b	28/11/2019	< 0.01	0.04	0.07	0.02	0.03	0.05	0.02	0.04	0.03	< 0.01	0.03
SW2b	16/12/2019											
SW2b	27/01/2020	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2b	21/02/2020											
SW2b	11/03/2020											
SW2b	24/04/2020	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW2b	14/05/2020											
SW2b	12/06/2020											
SW3	10/10/2018	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW3	07/11/2018											
SW3	07/12/2018											
SW3	22/01/2019	<0.10	0.1	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
SW3	08/02/2019											
SW3	08/03/2019											
SW3	04/04/2019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW3	03/05/2019											
SW3	30/07/2019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW3	28/08/2019											
SW3	14/09/2019											
SW3	25/09/2019											
SW3	18/10/2019											
SW3	28/11/2019	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW3	16/12/2019											
SW3	27/01/2020	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW3	21/02/2020											
SW3	11/03/2020											
SW3	24/04/2020	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW3	14/05/2020											
SW3	12/06/2020											
SW4	22/01/2019	<0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	0.01
SW4	08/02/2019											
SW4	08/03/2019											
SW4	04/04/2019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW4	03/05/2019											
SW4	30/07/2019	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW4	28/08/2019											
SW4	14/09/2019											
SW4	25/09/2019											
SW4	18/10/2019											
SW4	28/11/2019	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW4	16/12/2019											
SW4	27/01/2020	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW4	21/02/2020											
SW4	11/03/2020											
SW4	24/04/2020	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SW4	14/05/2020											
SW4	12/06/2020											

Location	SW1	SW1	SW2a	SW2a	SW2b	SW2b	SW3	SW3	SW4
Date	10/10/2018	#####	#####	#####	#####	#####	#####	#####	#####
Hexachlorocyclohexane (sum of alpha, beta and gamma) ug/l	<0.01		<0.01		<0.01		<0.01		
Hexachlorobenzene ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Heptachlor ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Aldrin ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Heptachlor epoxide ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Chlordane ug/l	<0.01		<0.01		<0.01		<0.01		
Endosulphan ug/l	<0.01		<0.01		<0.01		<0.01		
DDE ug/l	<0.01		<0.01		<0.01		<0.01		
Dieldrin ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Endrin ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
DDD ug/l	<0.01		<0.01		<0.01		<0.01		
DDT ug/l	<0.01		<0.01		<0.01		<0.01		
Dichlorvos ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Mevinphos ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	0.01	< 0.02
Dimethoate ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Diazinon ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Pirimiphos methyl ug/l	<0.01		<0.01		<0.01		<0.01		
Malathion ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Fenitrothion ug/l	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.02	<0.01	< 0.01	< 0.02
Parathion ug/l	<0.01		<0.01		<0.01		<0.01		
Azinphos methyl ug/l	<0.01		<0.01		<0.01		<0.01		
Tributyl tin ug/l	<0.01		<0.01		<0.01		<0.01		
Triphenyl Tin ug/l	<0.01		<0.01		<0.01		<0.01		
PCB BZ#28 ug/l	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	< 0.01
PCB BZ#52 ug/l	0.019	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	< 0.01
PCB BZ#101 ug/l	0.046	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	< 0.01
PCB BZ#118 ug/l	0.043	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	< 0.01
PCB BZ#153 ug/l	0.044	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	< 0.01
PCB BZ#138 ug/l	0.057	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	< 0.01
PCB BZ#180 ug/l	0.039	< 0.01	<0.005	< 0.01	<0.005	< 0.01	<0.005	< 0.01	< 0.01
Bis (2-chloroethyl) ether ug/l	<10		<10		<10		<10		
2-Chlorophenol ug/l	<10		<10		<10		<10		
1,3-Dichlorobenzene ug/l	<10	< 1.0	<10	< 1.0	<10	< 1.0	<10	< 1.0	< 1.0
1,4-Dichlorobenzene ug/l	<10	< 1.0	<10	< 1.0	<10	< 1.0	<10	< 1.0	< 1.0
1,2-Dichlorobenzene ug/l	<10	< 5.0	<10	< 5.0	<10	< 5.0	<10	< 5.0	< 5.0
Bis (2-chloroisopropyl) ether ug/l	<10		<10		<10		<10		
2-methyl phenol ug/l	<10		<10		<10		<10		
3/4-Methylphenol ug/l	<10		<10		<10		<10		
Hexachloroethane ug/l	<10		<10		<10		<10		
Nitrobenzene ug/l	<10		<10		<10		<10		
Isophorone ug/l	<10		<10		<10		<10		
2-Nitrophenol ug/l	<10		<10		<10		<10		
2,4-Dimethylphenol ug/l	<10		<10		<10		<10		
Bis (2-chloroethoxy) methane ug/l	<10		<10		<10		<10		
2,4-Dichlorophenol ug/l	<10		<10		<10		<10		
1,2,4-Trichlorobenzene ug/l	<10	< 5.0	<10	< 5.0	<10	< 5.0	<10	< 5.0	< 5.0
4-Chloroaniline ug/l	<10		<10		<10		<10		
Hexachlorobutadiene ug/l	<10	< 5.0	<10	< 5.0	<10	< 5.0	<10	< 5.0	< 5.0
4-Chloro-3-methylphenol ug/l	<10		<10		<10		<10		
2-Methylnaphthalene ug/l	<10		<10		<10		<10		
2,4,6-Trichlorophenol ug/l	<10		<10		<10		<10		
2,4,5-Trichlorophenol ug/l	<10		<10		<10		<10		
2-Chloronaphthalene ug/l	<10		<10		<10		<10		
2-Nitroaniline ug/l	<10		<10		<10		<10		
Dimethyl phthalate ug/l	<10		<10		<10		<10		
2,6-Dinitrotoluene ug/l	<10		<10		<10		<10		
3-Nitroaniline ug/l	<10		<10		<10		<10		
Dibenzofuran ug/l	<10		<10		<10		<10		
2,4-Dinitrotoluene ug/l	<10		<10		<10		<10		
Diethyl phthalate ug/l	<10		<10		<10		<10		
4-Chlorophenyl phenylether ug/l	<10		<10		<10		<10		
4-Nitroaniline ug/l	<10		<10		<10		<10		
Azobenzene ug/l	<10		<10		<10		<10		
4-Bromophenyl phenylether ug/l	<10		<10		<10		<10		
Hexachlorobenzene ug/l	<10		<10		<10		<10		
Carbazole ug/l	<10		<10		<10		<10		
Di-n-butylphthalate ug/l	<10		<10		<10		<10		
Butyl benzylphthalate ug/l	<10		<10		<10		<10		
Bis (2-ethylhexyl)phthalate ug/l	<10		<10		<10		<10		
Di-n-octylphthalate ug/l	<10		<10		<10		<10		
2,4-Dinitrophenol ug/l	<10		<10		<10	<0.05	<10	<0.05	<0.05
Hexachlorocyclopentadiene ug/l	<10		<10		<10		<10		
Pentachlorophenol ug/l	<10	< 0.02	<10	< 0.02	<10	<0.04	<10	<0.04	<0.04
Benzene ug/l		< 5.0		< 5.0					
Ethyl Benzene ug/l		< 5.0		< 5.0					
m/p Xylenes ug/l		< 10.0		< 10.0					
o Xylene ug/l		< 5.0		< 5.0					
Toluene ug/l		< 5.0		< 5.0					
Xylenes ug/l		<15		<15					
2,3,6-TBA ug/l		< 0.02		< 0.02		<0.02		<0.02	<0.02
2,4,5-T ug/l		< 0.02		< 0.02		<0.03		<0.03	<0.03
2,4-D ug/l		< 0.02		< 0.02		<0.03		<0.03	<0.03
2,4-DB ug/l		< 0.02		< 0.02		<0.04		<0.04	<0.04
Benazolin ug/l		< 0.02		< 0.02		<0.04		<0.04	<0.04
Bentazon ug/l		< 0.02		< 0.02		<0.02		<0.02	<0.02
Bromoxynil ug/l		< 0.02		< 0.02		<0.03		<0.03	<0.03
Clopyralid ug/l		< 0.02		< 0.02		<0.02		<0.02	<0.02
Dicamba ug/l		< 0.02		< 0.02		<0.04		<0.04	<0.04
Dichloroprop ug/l		< 0.02		< 0.02		<0.02		<0.02	<0.02

Location	SW1	SW1	SW2a	SW2a	SW2b	SW2b	SW3	SW3	SW4
Date	10/10/2018	#####	#####	#####	#####	#####	#####	#####	#####
Fluroxypyr ug/l		< 0.02		< 0.02		<0.03		<0.03	<0.03
loxylin ug/l		< 0.02		< 0.02		<0.04		<0.04	<0.04
MCPA ug/l		< 0.02		< 0.02		<0.02		<0.02	<0.02
MCPB ug/l		< 0.02		< 0.02		<0.02		<0.02	<0.02
Mecoprop ug/l		0.02		< 0.02		0.02		<0.02	<0.02
Picloram ug/l		< 0.02		< 0.02					
Silvex ug/l		< 0.02		< 0.02					
Triclopyr ug/l		< 0.02		< 0.02		<0.03		<0.03	<0.03
TPH FTIRPER. O mg/l		<0.3		<0.3					
1,2,3,4-Tetrachlorobenzene ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
1,2,3-Trichlorobenzene ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
1,3,5-Trichlorobenzene ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
2,6-Dichlorobenzonitrile ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Chlorthalonil ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Cis-Chlordane ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Cis-Permethrin ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Delta-HCH ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Endosulfan I ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Endosulfan II ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Endosulfan Sulfate ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Isodrin ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Methoxychlor ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
O,P'-DDD ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
o,p'-DDE ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
O,P'-DDT ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
P,P'-DDD ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
P,P'-DDE ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
P,P'-DDT ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Pendimethalin ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Pentachlorobenzene ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Propyzamide ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Tecnazene ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Trans-Chlordane ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Trans-Permethrin ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Triadimefon ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Triallate ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Trifluralin ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Dibutyl Tin as Sn ug/l		<0.02		<0.02		<0.02		<0.04	<0.02
Tributyl Tin as Sn ug/l		<0.02		<0.02		<0.02		<0.04	<0.02
Triphenyl Tin as Sn ug/l		<0.05		<0.05		<0.05		<0.1	<0.05
Azinphos-Ethyl ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Azinphos-Methyl ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Carbofenthion ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Chlorfenvinphos ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Chlorpyrifos ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Chlorpyrifos-Methyl ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Endrin Ketone ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
HCH-alpha ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
HCH-beta ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
HCH-gamma ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Ethion ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Etrimphos ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Fenthion ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Methacrifos ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Parathion ethyl ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Parathion-methyl ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Phosalone ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Phosphamidon ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Pirimiphos-Ethyl ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Pirimiphos-Methyl ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Propetamphos ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Triazophos ug/l		< 0.02		< 0.02		< 0.02		< 0.01	< 0.02
Cyanide (Total) as CN		<0.02		<0.02		<0.02		<0.02	0.02
1,1,1,2-Tetrachloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,1,1-Trichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,1,2-Trichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,1-Dichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,1-Dichloroethene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
1,1-Dichloropropene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,2,3-Trichlorobenzene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
1,2,3-Trichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,2,4-Trimethylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane ug/l		< 5.0		< 5.0		< 5.0		< 5.0	< 5.0
1,2-Dibromoethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,2-Dichloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,2-Dichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,3,5-Trimethylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
1,3-Dichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
2-Chlorotoluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
2,2-Dichloropropane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
4-Chlorotoluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Benzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Bromobenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Bromochloromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Bromodichloromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Bromoform ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Bromomethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Carbon Tetrachloride ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0

Location	SW1	SW1	SW2a	SW2a	SW2b	SW2b	SW3	SW3	SW4
Date	10/10/2018	#####	#####	#####	#####	#####	#####	#####	#####
Chlorobenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Chloroethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Chloroform ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Chloromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
cis 1,3-Dichloropropene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
Cis-1,2-dichloroethene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
Dibromochloromethane ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
Dibromomethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Dichlorodifluoromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Ethylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Isopropylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
m and p-Xylene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Naphthalene ug/l		< 5.0		< 5.0		< 5.0		< 5.0	< 5.0
n-Butylbenzene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
o-Xylene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
p-Isopropyltoluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Propylbenzene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
sec-Butylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Styrene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
tert-Butylbenzene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Tetrachloroethene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Toluene ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Trans 1,2 Dichloroethene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
trans 1,3-Dichloropropene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
Trichloroethene ug/l		< 1.0		< 1.0		< 1.0		< 1.0	< 1.0
Trichlorofluoromethane ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
Vinyl Chloride ug/l	<1	< 1.0	<1	< 1.0	<1	< 1.0	<1	< 1.0	< 1.0
DNOC ug/l						<0.04		<0.04	<0.04
Fenoprop ug/l						<0.02		<0.02	<0.02
SVOC screen (extra peaks) ug/l	<10		<10		<10		<10		
1,1-Dichloroethylene ug/l	<1		<1		<1		<1		
Dichloromethane ug/l	<50		<50		<50		<50		
Trans-1,2-Dichloroethene ug/l	<1		<1		<1		<1		
Cis-1,2-Dichloroethylene ug/l	<1		<1		<1		<1		
1,1,2-Trichloroethylene ug/l	<1		<1		<1		<1		
Cis-1,3-Dichloropropene ug/l	<1		<1		<1		<1		
Trans-1,3-Dichloropropene ug/l	<1		<1		<1		<1		
Chlorodibromomethane ug/l	<1		<1		<1		<1		
n-Propylbenzene ug/l	<1		<1		<1		<1		
1,3-Dichlorobenzene ug/l	<1		<1		<1		<1		
1,4-Dichlorobenzene ug/l	<1		<1		<1		<1		
1,2-Dichlorobenzene ug/l	<1		<1		<1		<1		
VOC Screen (Extra Peaks) ug/l	<10		<10		<10		<10		
SVOC_TICS_01 mg/l		[Pentane, 2,3,3-trimethyl=0.037]		[Butane, 2,2,3,3-tetramethyl=0.171]		[Cyclohexene, 1-methoxy=0.018]		[Benzene, 1-fluoro-2-methoxy=0.180]	[Hexane, 2,4-dimethyl=0.512]
SVOC_TICS_02 mg/l		[Octane=0.038]		[Pentane, 2,3,3-trimethyl=0.040]		[Octanoic acid, methyl ester=0.015]		[Hexanoic acid, methyl ester=0.225]	[3-Ethyl-2-methyl-1-heptene=0.240]
SVOC_TICS_03 mg/l		[Ethene, tetrachloro=0.013]		[Octane=0.039]					
SVOC_TICS_04 mg/l		[2-Hexene, 2,5,5-trimethyl=0.016]		[Ethene, tetrachloro=0.013]					
SVOC_TICS_05 mg/l		[Phenol, 2,3,5-tribromo=0.020]		[2-Hexene, 2,5,5-trimethyl=0.018]					
SVOC_TICS_06 mg/l		[Benzene, 1-fluoro-2-methoxy=0.032]		[Benzene, 1,3,5-tribromo-2-methoxy=0.019]					
SVOC_TICS_07 mg/l		[Benzene, 1,3,5-tribromo-2-methoxy=0.023]		[Hexadecanoic acid, methyl ester=0.012]					
SVOC_TICS_08 mg/l		[Hexadecanoic acid, methyl ester=0.020]		[OCTADECANOIC ACID, METHYLESTER=0.016]					

Location	SW1	SW1	SW2a	SW2a	SW2b	SW2b	SW3	SW3	SW4
Date	10/10/2018	#####	#####	#####	#####	#####	#####	#####	#####
SVOC_TICS_09		[Octadeca noic acid, methyl ester=0.0 26]							
SVOC_TICS_10 mg/l									
SVOC_TICS_11 mg/l									
SVOC_TICS_12 mg/l									
SVOC_TICS_13 mg/l									

Table E1. Surface Water Hazardous Screen (µg/l)

Location	Count	25th Percentile	Median	85th Percentile	95th Percentile	Max
BTEX and Substituted PAH						
PAH (Total) (µg/l)	10	0.0125	0.035	0.2975	0.394	0.43
Naphthalene (µg/l)	2	0.065	0.12	0.197	0.219	0.23
Acenaphthene (µg/l)	1	0.01	0.01	0.01	0.01	0.01
Phenanthrene (µg/l)	3	0.025	0.03	0.03	0.03	0.03
Anthracene (µg/l)	1	0.01	0.01	0.01	0.01	0.01
Fluoranthene (µg/l)	5	0.04	0.04	0.07	0.09	0.1
Pyrene (µg/l)	8	0.01	0.025	0.069	0.0895	0.1
Benzo(a)Anthracene (µg/l)	9	0.01	0.01	0.028	0.036	0.04
Chrysene (µg/l)	6	0.015	0.03	0.04	0.04	0.04
Benzo(b)fluoranthene (µg/l)	4	0.025	0.035	0.0455	0.0485	0.05
Benzo(k)fluoranthene (µg/l)	3	0.015	0.02	0.027	0.029	0.03
Benzo(a)Pyrene (µg/l)	3	0.02	0.03	0.037	0.039	0.04
Indeno(123-cd)Pyrene (µg/l)	4	0.01	0.02	0.03	0.03	0.03
Benzo(ghi)Perylene (µg/l)	4	0.025	0.03	0.0355	0.0385	0.04
Herbicides and Pesticides						
Mecoprop µg/l	2	0.02	0.02	0.02	0.02	0.02
Mevinphos µg/l	1	0.01	0.01	0.01	0.01	0.01
Other						
Pb (Dissolved) (µg/l)	1	7.5	7.5	7.5	7.5	7.5
PCB BZ#52 µg/l	1	0.019	0.019	0.019	0.019	0.019
PCB BZ#101 µg/l	1	0.046	0.046	0.046	0.046	0.046
PCB BZ#118 µg/l	1	0.043	0.043	0.043	0.043	0.043
PCB BZ#153 µg/l	1	0.044	0.044	0.044	0.044	0.044
PCB BZ#138 µg/l	1	0.057	0.057	0.057	0.057	0.057
PCB BZ#180 µg/l	1	0.039	0.039	0.039	0.039	0.039

	>10 counts
	10 - 50 µg/l
	50 - 250 µg/l
	>250 µg/l

Table E2. Surface Water Hazardous Screen (mg/)

Location	Count	25th Percentile	Median	85th Percentile	95th Percentile	Max
Date						
Other						
TPH (C35-C40) (mg/l)	6	0.0325	0.04	0.0575	0.0925	0.11
TPH (C8 - C40) (mg/l)	18	0.0825	0.185	0.249	0.6215	1.31
TPH (C8-C35)(Total) (mg/l)	18	0.0825	0.155	0.24	0.605	1.2
TPH Band (>C21-C35) mg/l	3	0.01	0.01	0.0107	0.0109	0.011
TPH GC mg/l	8	0.011	0.013	0.01595	0.0212	0.024
Cyanide (Total) as CN mg/l	1	0.02	0.02	0.02	0.02	0.02

	>10 counts
	0.01 - 0.05 mg/l
	0.05 - 0.25 mg/l
	>0.25 mg/l

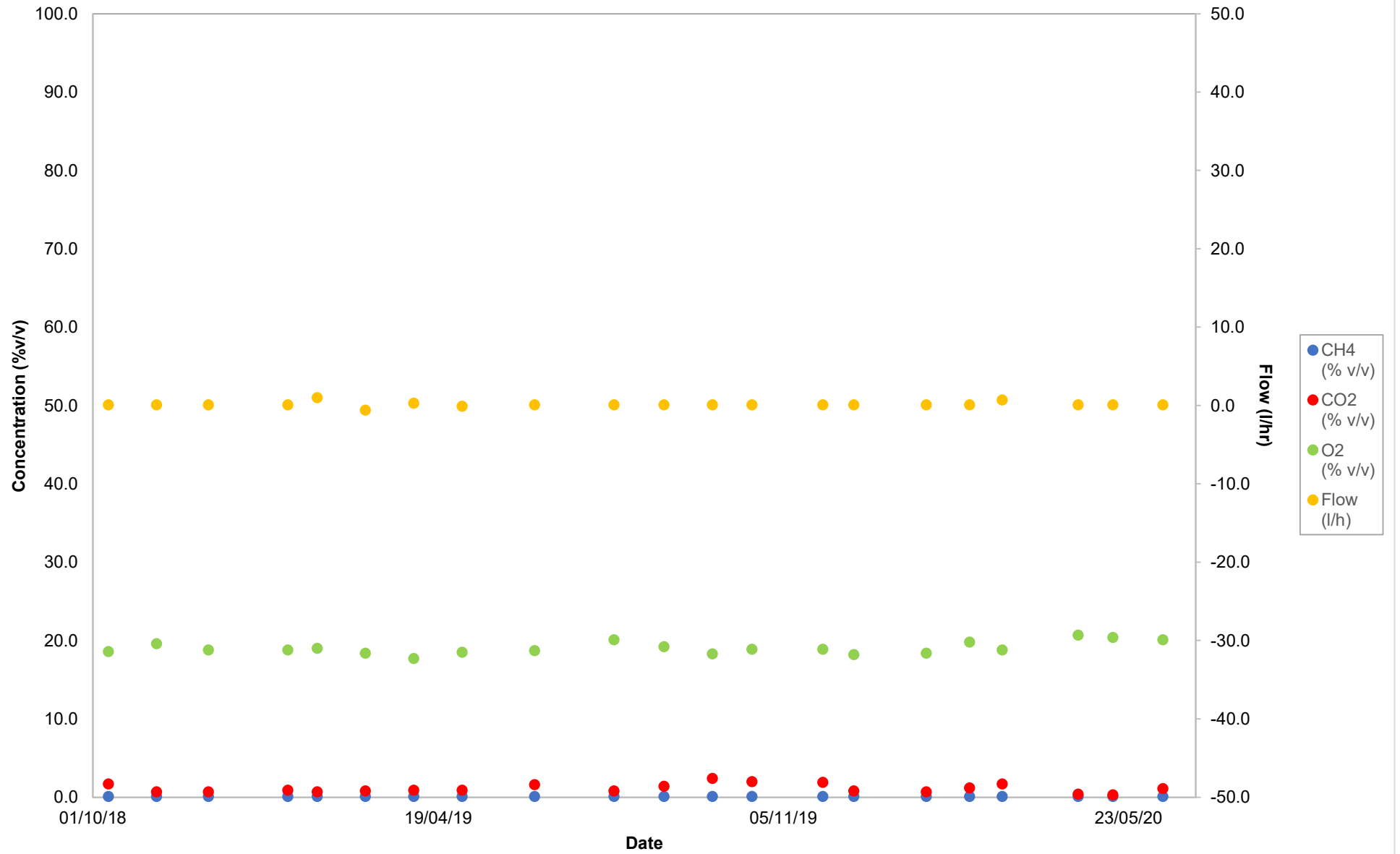
APPENDIX E

Location	Date	Monitored by	Atmospheric Pressure (mbar)	Atmospheric Pressure Comment	Relative Pressure (mb)	Flow (l/h)	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO (ppm)	H ₂ S (ppm)
BH1S	10/10/18	SC	1000	Steady	0.01	0.1	0.1	1.7	18.6	1	1
BH1S	07/11/18	SC	976	Rising	0.01	0.1	0.1	0.7	19.6	1	1
BH1S	07/12/18	SC / SW	987	Rising	0.01	0.1	0.1	0.7	18.8	1	1
BH1S	22/01/19	SC	991	Steady	0.01	0.1	0.1	0.9	18.8	1	1
BH1S	08/02/19	SC	975	Falling	0.08	1.0	0.1	0.7	19.0	1	1
BH1S	08/03/19	SC	998	Falling	-0.04	-0.6	0.1	0.8	18.4	1	1
BH1S	05/04/19	SC	981	Steady	0.02	0.3	0.1	0.9	17.7	1	1
BH1S	03/05/19	SC/JM	1010	Falling	0.01	-0.1	0.1	0.9	18.5	1	1
BH1S	14/06/19	SC	994	Falling	0.01	0.1	0.1	1.6	18.7	1	1
BH1S	30/07/19	SC	993	Steady	0.01	0.1	0.1	0.8	20.1	1	1
BH1S	28/08/19	SC	1001	Steady	0.01	0.1	0.1	1.4	19.2	1	1
BH1S	25/09/19	SC	987	Steady	0.01	0.1	0.1	2.4	18.3	1	1
BH1S	18/10/19	SC	983	Falling	0.01	0.1	0.1	2.0	18.9	1	1
BH1S	28/11/19	JM	985	Steady	0.01	0.1	0.1	1.9	18.9	1	1
BH1S	16/12/19	JM	990	Steady	0.01	0.1	0.1	0.8	18.2	1	1
BH1S	27/01/20	JM	986	Steady	0.01	0.1	0.1	0.7	18.4	1	1
BH1S	21/02/20	JM	1003	Steady	0.01	0.1	0.1	1.2	19.8	1	1
BH1S	11/03/20	MD	979	Steady	0.13	0.7	0.1	1.7	18.8	1	1
BH1S	24/04/20	AC	1002	Rising	0.01	0.1	0.1	0.4	20.7	1	1
BH1S	14/05/20	AC	989	Rising	0.01	0.1	0.1	0.3	20.4	1	1
BH1S	12/06/20	SC	999	Falling	0.01	0.1	0.1	1.1	20.1	1	1
BH2D	10/10/18	SC	Groundwater monitoring point only								
BH2D	07/11/18	SC									
BH2D	07/12/18	SC / SW									
BH2D	22/01/19	SC									
BH2D	08/02/19	SC									
BH2D	08/03/19	SC									
BH2D	05/04/19	SC									
BH2D	03/05/19	SC/JM									
BH2D	14/06/19	SC									
BH2D	30/07/19	SC									
BH2D	28/08/19	SC									
BH2D	25/09/19	SC									
BH2D	18/10/19	SC									
BH2D	28/11/19	JM									
BH2D	16/12/19	JM									
BH2D	27/01/20	JM									
BH2D	21/02/20	JM									
BH2D	11/03/20	MD									
BH2D	24/04/20	AC									
BH2D	14/05/20	AC									
BH2D	12/06/20	SC									
BH2S	10/10/18	SC	1000	Steady	0.01	0.1	0.1	0.8	19.7	1	1

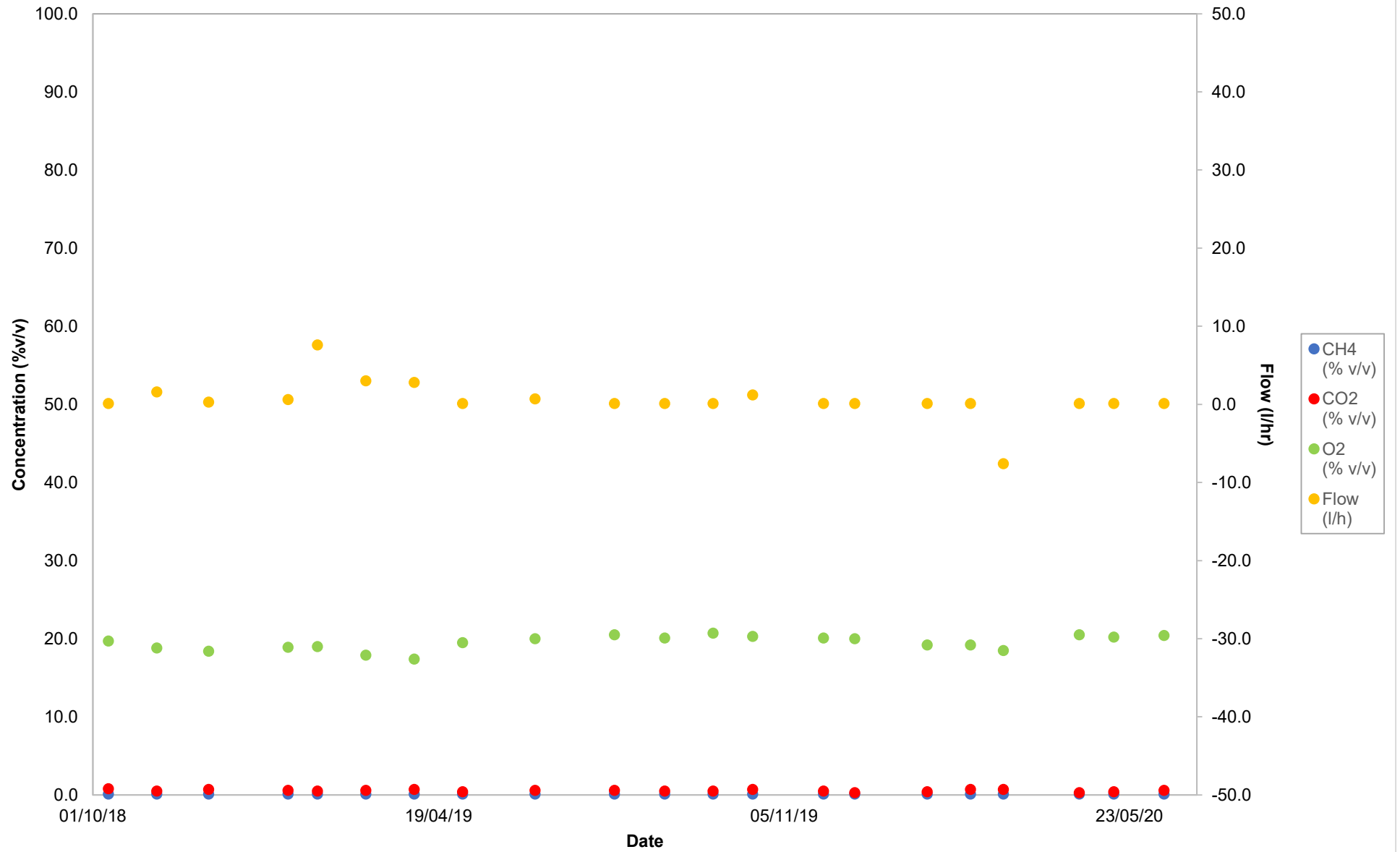
Location	Date	Monitored by	Atmospheric Pressure (mbar)	Atmospheric Pressure Comment	Relative Pressure (mb)	Flow (l/h)	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO (ppm)	H ₂ S (ppm)
BH2S	07/11/18	SC	976	Rising	0.1	1.6	0.1	0.5	18.8	1	1
BH2S	07/12/18	SC / SW	987	Rising	0.02	0.3	0.1	0.7	18.4	1	1
BH2S	22/01/19	SC	992	Steady	0.04	0.6	0.1	0.6	18.9	1	1
BH2S	08/02/19	SC	974	Falling	0.49	7.6	0.1	0.5	19.0	1	1
BH2S	08/03/19	SC	998	Falling	0.18	3.0	0.1	0.6	17.9	1	1
BH2S	05/04/19	SC	981	Steady	0.17	2.8	0.1	0.7	17.4	1	1
BH2S	03/05/19	SC/JM	1011	Falling	0.01	0.1	0.1	0.4	19.5	1	1
BH2S	14/06/19	SC	994	Falling	0.06	0.7	0.1	0.6	20.0	1	1
BH2S	30/07/19	SC	993	Steady	0.01	0.1	0.1	0.6	20.5	1	1
BH2S	28/08/19	SC	1001	Steady	0.01	0.1	0.1	0.5	20.1	1	1
BH2S	25/09/19	SC	987	Steady	0.01	0.1	0.1	0.5	20.7	1	1
BH2S	18/10/19	SC	983	Falling	0.09	1.2	0.1	0.7	20.3	1	1
BH2S	28/11/19	JM	985	Steady	0.01	0.1	0.1	0.5	20.1	1	1
BH2S	16/12/19	JM	990	Steady	0.01	0.1	0.1	0.3	20.0	1	1
BH2S	27/01/20	JM	986	Steady	0.01	0.1	0.1	0.4	19.2	1	1
BH2S	21/02/20	JM	1003	Steady	0.01	0.1	0.1	0.7	19.2	1	1
BH2S	11/03/20	MD	978	Steady	-1.04	-7.6	0.1	0.7	18.5	1	1
BH2S	24/04/20	AC	1002	Rising	0.01	0.1	0.1	0.3	20.5	1	1
BH2S	14/05/20	AC	989	Rising	0.01	0.1	0.1	0.4	20.2	1	1
BH2S	12/06/20	SC	998	Falling	0.01	0.1	0.1	0.6	20.4	1	1
BH3DA	10/10/18	SC	1000	Steady	0.01	0.1	0.5	0.7	17.8	1	1
BH3DA	07/11/18	SC	978	Rising	-1.82	-21.4	0.1	0.4	19	1	1
BH3DA	07/12/18	SC / SW	989	Rising	-10	-88.4	0.1	1.6	17.5	1	1
BH3DA	22/01/19	SC	992	Steady	-0.25	-2.7	0.1	0.1	18.4	1	1
BH3DA	08/02/19	SC	978	Falling	0.32	5.6	0.1	1.6	17.6	1	1
BH3DA	08/03/19	SC	1002	Falling	0.55	8.4	0.1	1.8	17.3	1	1
BH3DA	05/04/19	SC	983	Steady	0.01	0.1	0.1	0.8	18.1	1	1
BH3DA	03/05/19	SC/JM	1013	Falling	0.01	0.1	0.1	1.1	18.6	1	1
BH3DA	14/06/19	SC	996	Falling	0.08	1.2	0.1	0.8	19.7	1	1
BH3DA	30/07/19	SC	995	Steady	0.01	0.1	0.1	0.7	19.9	1	1
BH3DA	28/08/19	SC	1004	Steady	0.73	9.6	0.1	0.7	19.6	1	1
BH3DA	25/09/19	SC	990	Steady	-0.08	-1.1	0.1	0.7	19.9	1	1
BH3DA	18/10/19	SC	985	Falling	0.01	0.1	0.1	0.8	20.3	1	1
BH3DA	28/11/19	JM	986	Steady	0.01	0.1	0.1	0.7	20	1	1
BH3DA	16/12/19	JM	990	Steady	0.01	0.1	0.1	0.4	18.4	1	1
BH3DA	27/01/20	JM	986	Steady	0.01	0.1	0.1	0.8	17.9	1	1
BH3DA	21/02/20	JM	1006	Steady	-0.70	-0.9	0.1	1.5	19.2	1	1
BH3DA	11/03/20	MD	981	Steady	-2.81	-17.5	0.1	1.0	19.4	1	1
BH3DA	24/04/20	AC	1001	Rising	0.01	0.1	0.1	1.4	18.2	1	1
BH3DA	14/05/20	AC	989	Rising	0.01	0.1	0.1	0.8	19.7	1	1
BH3DA	12/06/20	SC	1001	Falling	0.05	0.7	0.2	0.7	19.8	1	1
BH4D	10/10/18	SC	1000	Steady	0.01	0.1	15.5	11.9	0.1	1	1
BH4D	07/11/18	SC	978	Rising	-4.36	-45.1	4.7	5.1	6.9	1	1

Location	Date	Monitored by	Atmospheric Pressure (mbar)	Atmospheric Pressure Comment	Relative Pressure (mb)	Flow (l/h)	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO (ppm)	H ₂ S (ppm)
BH4D	07/12/18	SC / SW	988	Rising	-8.83	-75.9	0.7	7	5.5	1	1
BH4D	22/01/19	SC	991	Steady	0.05	0.7	0.1	7.0	12.5	1	1
BH4D	08/02/19	SC	976	Falling	0.02	0.3	0.2	6.5	13.9	1	1
BH4D	08/03/19	SC	999	Falling	0.03	0.6	0.5	5.8	13.9	1	1
BH4D	05/04/19	SC	983	Steady	0.01	0.1	0.1	6.5	12.2	1	1
BH4D	03/05/19	SC/JM	1014	Falling	-0.02	-0.4	1.6	11.8	2.1	1	1
BH4D	14/06/19	SC	997	Falling	-0.02	-0.3	3.8	10.9	1.7	1	1
BH4D	30/07/19	SC	995	Steady	0.01	0.1	8.9	7.7	11.7	1	1
BH4D	28/08/19	SC	1004	Steady	0.01	0.1	3.3	10.5	6.4	1	1
BH4D	25/09/19	SC	989	Steady	-0.02	-0.2	20.9	11.3	20.2	1	1
BH4D	18/10/19	SC	998	Falling	0.01	0.1	0.1	0.9	19.2	1	1
BH4D	28/11/19	JM	986	steady	0.01	0.1	2.1	6.2	16.9	1	1
BH4D	16/12/19	JM	990	Steady	0.01	0.1	0.1	4.2	17.9	1	1
BH4D	27/01/20	JM	986	Steady	0.01	0.1	0.1	4.1	18.2	1	1
BH4D	21/02/20	JM	1006	Steady	-1.80	-2.5	2.1	4.1	13.7	1	1
BH4D	11/03/20	MD	979	Steady	-0.20	-1.1	0.9	2.1	12.9	1	1
BH4D	24/04/20	AC	999	Rising	0.01	0.1	0.1	10.3	5.7	1	1
BH4D	14/05/20	AC	989	Rising	0.01	0.1	0.1	7.8	7.8	1	1
BH4D	12/06/20	SC	1001	Falling	0.01	0.1	8	13.3	2.3	1	1
BH5D	10/10/18	SC	1000	Steady	0.01	0.1	0.1	6	5.9	1	1
BH5D	07/11/18	SC	976	Rising	0.01	0.1	0.1	0.7	17.2	1	1
BH5D	07/12/18	SC / SW	987	Rising	-0.07	-1	0.1	3.3	10.5	1	1
BH5D	22/01/19	SC	991	Steady	0.01	0.1	0.1	4.2	7.8	1	1
BH5D	08/02/19	SC	976	Falling	0.11	1.9	0.1	2.2	11.7	1	1
BH5D	08/03/19	SC	1000	Falling	0.01	0.1	0.1	0.9	15.9	1	1
BH5D	05/04/19	SC	981	Steady	0.12	1.9	0.1	0.6	17.4	1	1
BH5D	03/05/19	SC/JM	1012	Falling	0.01	0.1	0.1	0.4	19.6	1	1
BH5D	14/06/19	SC	995	Falling	0.01	0.1	0.1	0.8	19.6	1	1
BH5D	30/07/19	SC	993	Steady	0.01	0.1	0.1	0.2	20.9	1	1
BH5D	28/08/19	SC	1002	Steady	0.01	0.1	0.1	1.5	18.1	1	1
BH5D	25/09/19	SC	989	Steady	-0.02	-0.2	0.1	1.8	17.5	1	1
BH5D	18/10/19	SC	984	Falling	0.01	0.1	0.1	1.6	17.8	1	1
BH5D	28/11/19	JM	986	Steady	0.01	0.1	0.1	1.5	18.3	1	1
BH5D	16/12/19	JM	990	Steady	0.01	0.1	0.1	1.8	18.9	1	1
BH5D	27/01/20	JM	986	Steady	0.01	0.1	0.1	1.4	18.8	1	1
BH5D	21/02/20	JM	1004	Steady	-1.90	-2.4	0.1	1.4	18.8	1	1
BH5D	11/03/20	MD	979	Steady	0.15	0.8	0.1	2.0	18.1	1	1
BH5D	24/04/20	AC	1002	Rising	0.01	0.1	0.1	0.2	20.6	1	1
BH5D	14/05/20	AC	991	Rising	0.01	0.1	0.1	0.1	20.3	1	1
BH5D	12/06/20	SC	998	Falling	0.01	0.1	0.2	0.5	20.6	1	1

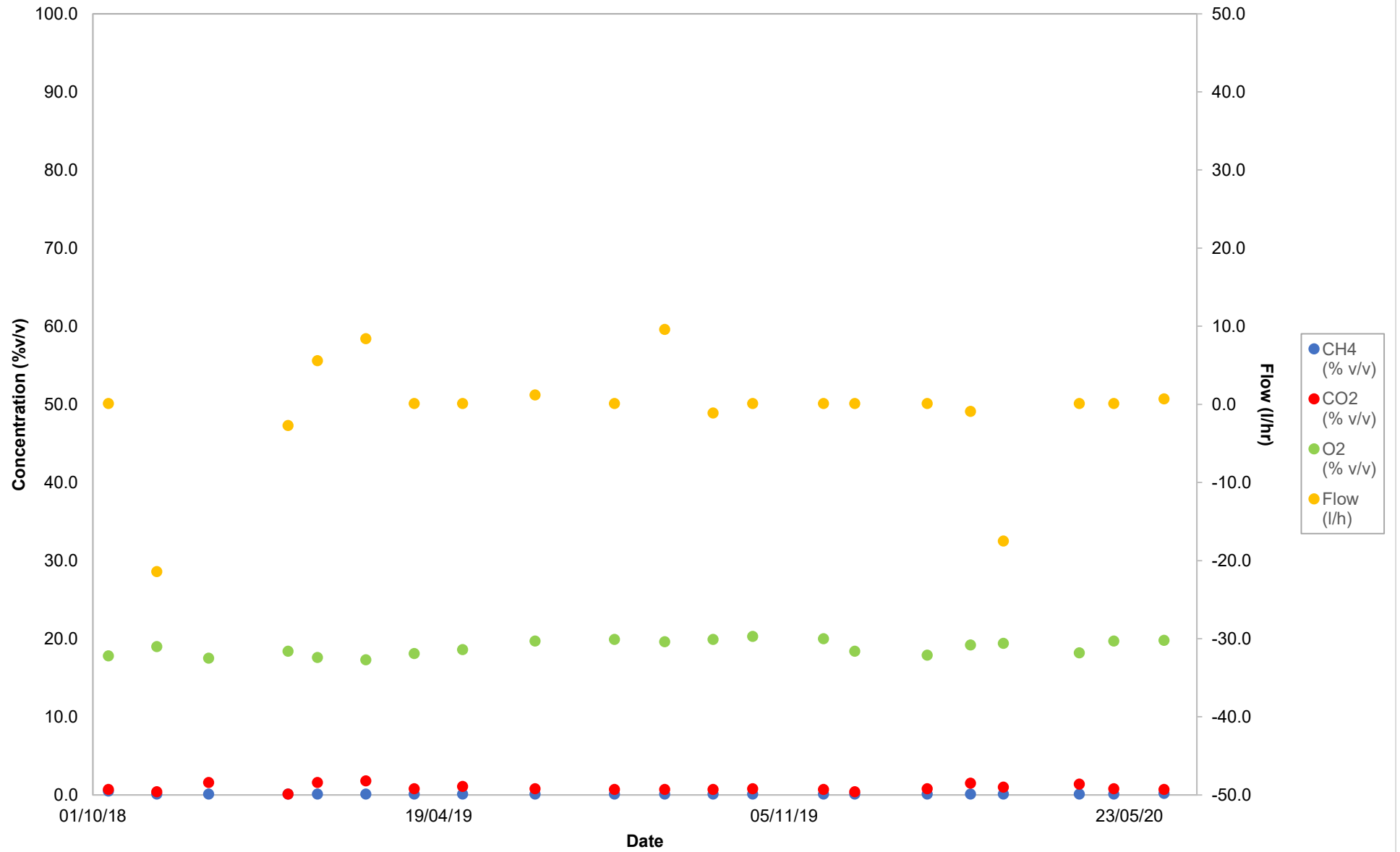
BH1S



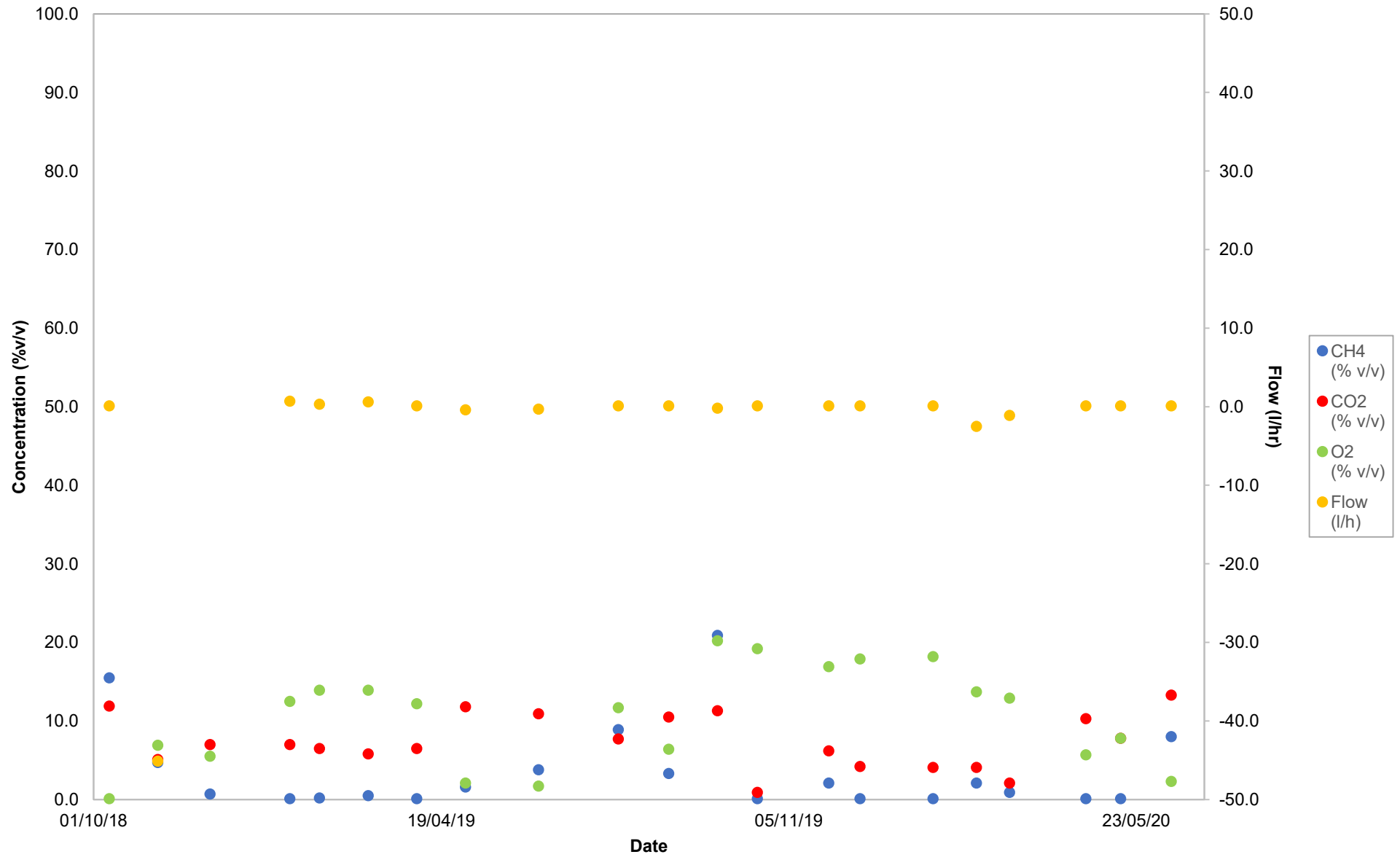
BH2S



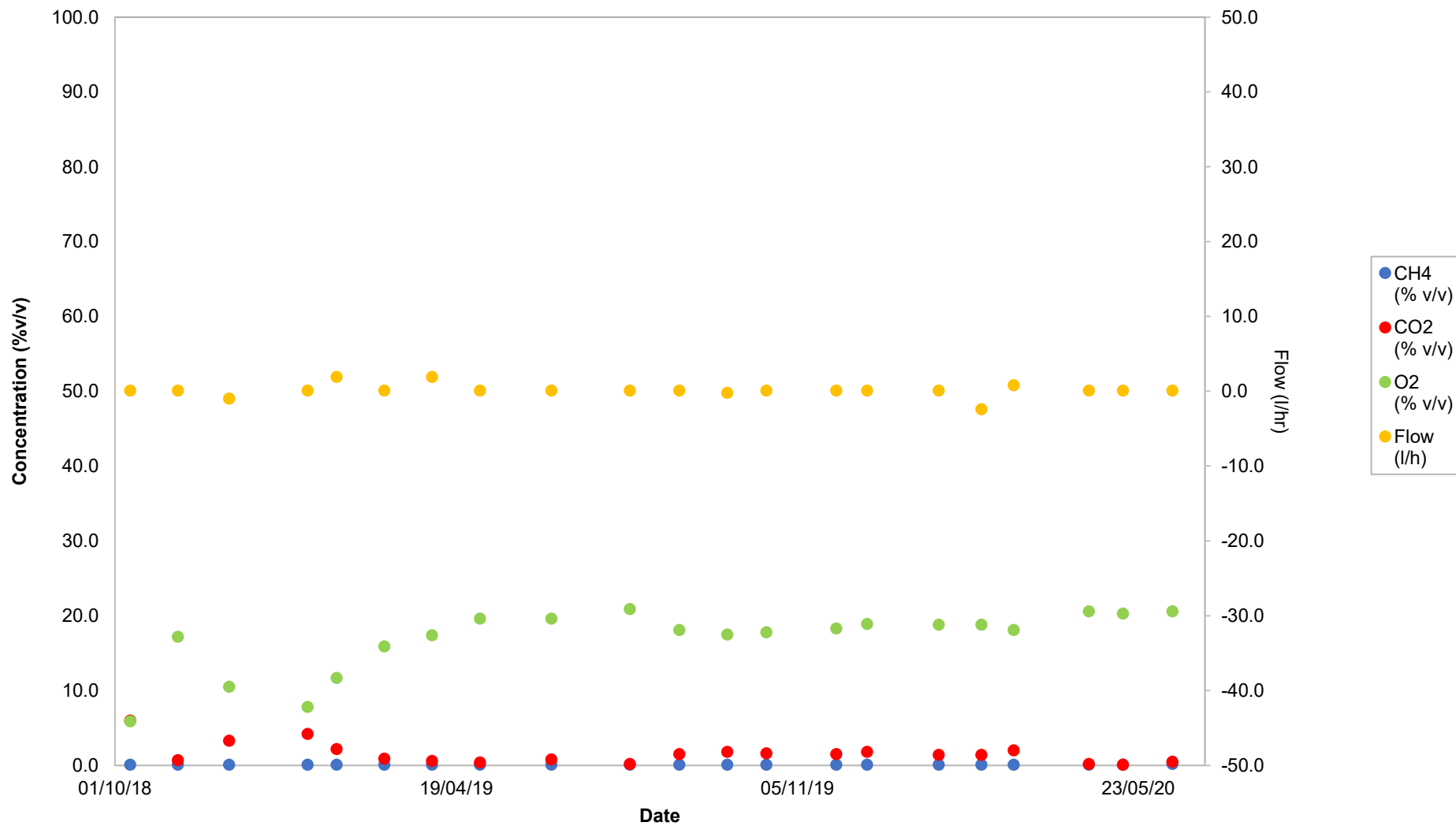
BH3DA



BH4D



BH5D



APPENDIX F

Industry Code of Practice (ICOP) Review of Methane and Carbon Dioxide in external monitoring boreholes at Nant Newydd Quarry

BH1S			
Date		%	Z values
10/10/18	CH4	0.1	-1.0
07/11/18	CH4	0.1	-1.0
07/12/18	CH4	0.1	-1.0
22/01/19	CH4	0.1	-1.0
08/02/19	CH4	0.1	-1.0
08/03/19	CH4	0.1	-1.0
05/04/19	CH4	0.1	-1.0
03/05/19	CH4	0.1	-1.0
14/06/19	CH4	0.1	-1.0
30/07/19	CH4	0.10	-1.0
28/08/19	CH4	0.1	-1.0
25/09/19	CH4	0.1	-1.0
18/10/19	CH4	0.1	-1.0
28/11/19	CH4	0.1	-1.0
16/12/19	CH4	0.1	-1.0
27/01/20	CH4	0.1	-1.0
21/02/20	CH4	0.1	-1.0
11/03/20	CH4	0.1	-1.0
24/04/20	CH4	0.1	-1.0
14/05/20	CH4	0.1	-1.0
12/06/20	CH4	0.1	-1.0
Mean			0.1
Standard Deviation			1.42205E-17
No of Samples			21
T max			0.1
Action Level (Tmax+0.5%)			0.6
Compliance Limit (T max + 1%)			1.1

BH2S			
Date		%	Z values
10/10/18	CH4	0.1	-1.0
07/11/18	CH4	0.1	-1.0
07/12/18	CH4	0.1	-1.0
22/01/19	CH4	0.1	-1.0
08/02/19	CH4	0.1	-1.0
08/03/19	CH4	0.1	-1.0
05/04/19	CH4	0.1	-1.0
03/05/19	CH4	0.1	-1.0
14/06/19	CH4	0.1	-1.0
30/07/19	CH4	0.10	-1.0
28/08/19	CH4	0.1	-1.0
25/09/19	CH4	0.1	-1.0
18/10/19	CH4	0.1	-1.0
28/11/19	CH4	0.1	-1.0
16/12/19	CH4	0.1	-1.0
27/01/20	CH4	0.1	-1.0
21/02/20	CH4	0.1	-1.0
11/03/20	CH4	0.1	-1.0
24/04/20	CH4	0.1	-1.0
14/05/20	CH4	0.1	-1.0
12/06/20	CH4	0.1	-1.0
Mean			0.1
Standard Deviation			1.42E-17
No of Samples			21
T max			0.1
Action Level (Tmax+0.5%)			0.6
Compliance Limit (T max + 1%)			1.1

BH4D				
Date		%	Z values	Outliers
22/01/19	CH4	0.1	-0.6981278	
05/04/19	CH4	0.1	-0.6981278	
18/10/19	CH4	0.1	-0.6981278	
16/12/19	CH4	0.1	-0.6981278	
27/01/20	CH4	0.1	-0.6981278	
24/04/20	CH4	0.1	-0.6981278	
14/05/20	CH4	0.1	-0.6981278	
08/02/19	CH4	0.2	-0.6608682	
08/03/19	CH4	0.5	-0.5490893	
07/12/18	CH4	0.7	-0.47457	
11/03/20	CH4	0.9	-0.4000508	
03/05/19	CH4	1.6	-0.1392334	
28/11/19	CH4	2.1	0.0470648	
21/02/20	CH4	2.1	0.0470648	
28/08/19	CH4	3.3	0.4941803	
14/06/19	CH4	3.8	0.6804785	
07/11/18	CH4	4.7	1.0158152	
12/06/20	CH4	8.0	2.2453829	
30/07/19	CH4	8.90	2.5807196	
10/10/18	CH4		5.0398552	15.5
25/09/19	CH4		7.0518752	20.9
Mean			1.973684	
Standard Deviation			2.68387	
No of Samples			19	
T max			8.9	
Action Level (Tmax+0.5%)			9.4	
Compliance Limit (T max + 1%)			N/A	

BH1S			
Date		%	Z values
14/05/20	CO2	0.3	-1.5
24/04/20	CO2	0.4	-1.3
07/11/18	CO2	0.7	-0.8
07/12/18	CO2	0.7	-0.8
08/02/19	CO2	0.7	-0.8
27/01/20	CO2	0.7	-0.8
08/03/19	CO2	0.8	-0.6
30/07/19	CO2	0.8	-0.6
16/12/19	CO2	0.8	-0.6
22/01/19	CO2	0.9	-0.4
05/04/19	CO2	0.9	-0.4
03/05/19	CO2	0.9	-0.4
12/06/20	CO2	1.1	0.0
21/02/20	CO2	1.2	0.1
28/08/19	CO2	1.4	0.5
14/06/19	CO2	1.6	0.8
10/10/18	CO2	1.7	1.0
11/03/20	CO2	1.7	1.0
28/11/19	CO2	1.9	1.4
18/10/19	CO2	2.00	1.6
25/09/19	CO2	2.4	2.3
Mean			1.1
Standard Deviation			0.56383
No of Samples			21
T max			2.4
Action Level (Tmax +1%)			3.4

0.1	0.6	1.1
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Industry Code of Practice (ICOP) Review of Methane and Carbon Dioxide in external monitoring boreholes at Nant Newydd Quarry

BH2S

Date		%	Z values
16/12/19	CO2	0.3	-1.8
24/04/20	CO2	0.3	-1.8
03/05/19	CO2	0.4	-1.1
27/01/20	CO2	0.40	-1.1
14/05/20	CO2	0.4	-1.1
07/11/18	CO2	0.5	-0.4
08/02/19	CO2	0.5	-0.4
28/08/19	CO2	0.5	-0.4
25/09/19	CO2	0.5	-0.4
28/11/19	CO2	0.5	-0.4
22/01/19	CO2	0.6	0.3
08/03/19	CO2	0.6	0.3
14/06/19	CO2	0.6	0.3
30/07/19	CO2	0.6	0.3
12/06/20	CO2	0.6	0.3
07/12/18	CO2	0.7	1.1
05/04/19	CO2	0.7	1.1
18/10/19	CO2	0.7	1.1
21/02/20	CO2	0.7	1.1
11/03/20	CO2	0.7	1.1
10/10/18	CO2	0.8	1.8
Mean			0.6
Standard Deviation			0.140068
No of Samples			21
T max			0.8
Action Level (Tmax +1%)			1.8

BH4D

Date		%	Z values
18/10/19	CO2	0.9	-1.89581
11/03/20	CO2	2.1	-1.54478
27/01/20	CO2	4.1	-0.95974
21/02/20	CO2	4.1	-0.95974
16/12/19	CO2	4.2	-0.93049
07/11/18	CO2	5.1	-0.66722
08/03/19	CO2	5.8	-0.46246
28/11/19	CO2	6.2	-0.34545
08/02/19	CO2	6.5	-0.2577
05/04/19	CO2	6.5	-0.2577
07/12/18	CO2	7	-0.11144
22/01/19	CO2	7.0	-0.11144
30/07/19	CO2	7.7	0.093328
14/05/20	CO2	7.8	0.12258
24/04/20	CO2	10.3	0.85388
28/08/19	CO2	10.5	0.912384
14/06/19	CO2	10.9	1.029392
25/09/19	CO2	11.3	1.1464
03/05/19	CO2	11.8	1.29266
10/10/18	CO2	11.9	1.321912
12/06/20	CO2	13.3	1.73144
Mean			7.4
Standard Deviation			3.41857
No of Samples			21
T max			13.3
Action Level (Tmax +3%)			16.3