

Annual Groundwater and Surface Water Monitoring Report 2018

Prepared for: Woodfab Timber Limited

Prepared by: AECOM Ireland Limited

Project number: PR-303113

28 February 2019

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	28/02/2019	Original	Y	David Mullan	Project Director

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1. Introduction

AECOM Ireland Limited (AECOM) is pleased to present Woodfab Timber Limited (Woodfab) with this report, which provides a summary of groundwater and surface water monitoring completed during 2018 at their facility located in Tinakilly Upper, Aughrim, Co. Wicklow (the site).

A site location plan is presented in Figure 1 and a site layout plan showing sampling locations is presented in Figure 2.

1.1 Project Contractual Basis and Personnel Involved

The works presented herein were completed in accordance with AECOM Proposal dated 16 March 2018, and authorised by Woodfab on 20 March 2018.

The AECOM team for groundwater monitoring comprised the following:

- Project Director: David Mullan
- Project Manager: Brian Duggan / Janette Simpson
- Field Scientists: Colin Fitzgerald / Clare Crossan

2. Background

The site operates under Industrial Emissions Licence P0358-01, issued by the Environmental Protection Agency (EPA) in 2015. It is understood that the EPA has requested that Woodfab undertake biannual groundwater and quarterly surface water monitoring at the site.

A detailed description of the environmental site setting and conceptual site model was presented in a Hydrogeological Assessment Report prepared for the site by AECOM and submitted to the EPA in September 2015¹. A summary of the site setting, history and potential source-pathway-receptor linkages is presented in this report.

A non-conformance with Condition 8.1.2 of the licence was identified by the EPA following a review of the Q2 2016 groundwater and surface water monitoring report² prepared for the site, specifically relating to the concentrations of metals reported in surface water. Due to the elevated metals concentrations reported in surface water, the EPA issued a request for further information (RFI) to Woodfab on 09 August 2016. The EPA RFI was addressed in a standalone report submitted to the Agency in October 2016³.

The assessment completed in response to the RFI indicated that the most likely source of elevated metal concentrations in surface water drains is via overland flow and runoff to surface water drains from naturally-elevated soil metal concentrations in shallow soils. On this basis, AECOM do not consider it appropriate to assess arsenic and manganese concentrations at the Woodfab site against surface water and groundwater water quality guidelines.

Following submission of the 2017 Annual Groundwater and Surface Water Report⁴, the EPA requested that all groundwater and surface water samples be analysed for propiconazole going forward. This was implemented from Q2 2018 onwards.

¹ AECOM, *Response to EPA RI004449*, 18 September 2015

² AECOM Letter Report, *Water Sampling – Q2 2016*, 29 June 2016, Project Ref. 60491426

³ AECOM, *Response to EPA RFI*, 24 October 2016, Project Ref. 60517627

⁴ AECOM, *Annual Groundwater and Surface Water Monitoring Report 2017*, 07 February 2018, Project Ref. 60542160

3. Objectives

The main objective of this report is to provide an assessment of groundwater and surface water quality at the site during 2018. This assessment was achieved by undertaking the following tasks:

- Biannual groundwater sampling at the site in May, October⁵ and December 2018;
- Collection of an annual surface water sample at monitoring point SW2 in March 2018⁶;
- Collection of quarterly surface water samples at monitoring point SW4 in March, May, October and December 2018⁷; and
- Upon receipt of the analytical results from Quarter 4 (Q4), preparation of this annual report compiling data collected during 2018.

4. Site Description

The site is located immediately east of Aughrim town in County Wicklow and has been an operating saw mill since 1974. The products manufactured on site include wooden fencing materials, pallet and decking timbers and the site employs circa 50 people. A proportion of the timber processed is treated on site with Tanalith E.

Site details are summarised below:

- Site ID – Woodfab Timber Limited;
- Site location – Tinakilly Upper, Aughrim, Co. Wicklow;
- National Grid Reference – 313300, 179500;
- Current operation – Manufacture of treated and non-treated timber products; and
- Site Area – The Woodfab site occupies an area of approximately 7 hectares.

4.1 Surrounding Land Use

<i>Site Boundary</i>	<i>Land Use</i>
North	Low density residential housing, beyond which lies agricultural and forested land. A primary school and church are also located to the northwest of the site.
South	The River Aughrim runs along the southern site boundary, beyond which lie a quarry, residential housing and agricultural land.
East	Agricultural land, a garden centre and a residential house.
West	Aughrim town, including commercial and residential properties.

4.2 Environmental Setting

<i>Physical Feature</i>	<i>Comments</i>
Surface of site	The ground surface is a mixture of concrete / tarmac (estimate 50%) and unsealed ground (estimate 50%).
Topography	Site topography slopes towards the southwest and the Aughrim River. The site ground elevation is estimated to be approximately 70 metres (m) above Ordnance Datum (Mean Sea Level - Malin Head, Co. Donegal).

⁵ Access to the CHP Well was not possible in May, so groundwater samples were collected at the CHP well in October and December 2018.

⁶ Monitoring Point SW1 has been excluded from the 2018 monitoring rounds given the difficulty in previous years in collecting a sample at SW1 and that the water sampled at SW2 is representative of water flowing across the yard on that portion of the site.

⁷ No flow was present at surface water location SW4 during Q2 (May) and Q3 (October) monitoring rounds in 2018 thus surface water samples could not be obtained from this location at these times.

Physical Feature Comments

	Generally, the site can be described as being located in a valley setting, with several low-lying hills in the surrounding area.
Soils	The subsoils consist of made ground, likely to be underlain by sandstone and shale till (glacial sediment derived from Lower Palaeozoic rocks or derived from sandstone and shale), (Geological Survey of Ireland (GSI) website (www.gsi.ie)). The GSI maps also indicate the presence of bedrock at surface on the eastern portion of the site. An investigation was completed on the site by GES Limited (Carlow) on behalf of Woodfab in 2007 ⁸ . This investigation comprised the drilling of four boreholes ranging in depth from 10 metres to 30 metres below ground level (m bgl) and the installation of groundwater monitoring wells (BH1 – BH4). This investigation encountered made ground at two locations (BH2 and BH3) at depths of up to 5m bgl. Natural soils were encountered at depths of up to 8m bgl and comprised clay and gravel horizons.
Regional Geology	Geology underlying the site is indicated to comprise dark grey, semi-pelitic, psammitic schist (metamorphic rock) of the Ballybeg Formation. A granite intrusion runs across the site, running in a northeast to southwest orientation (GSI website; (www.gsi.ie); National Draft Generalised Bedrock Map). The GES investigation indicates that depth to bedrock varies between 1.0 m bgl on the south-eastern portion of the site (BH3) and 9.1 m bgl in the central portion of the site. Granite bedrock was encountered at a depth of 7.5 m bgl at BH4 on the northern portion of the site. At boreholes BH1 – BH3 grey brown schist bedrock was encountered.
Regional Hydrogeology and Aquifer Classification	The site is underlain by the Wicklow South Groundwater Body, which has a 'good' status according to the Water Framework Directive Ireland website (www.wfdireland.ie). The schist bedrock underlying the site is classified by the GSI as a 'Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones'. The granite intrusion is classified as a 'Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones'. No gravel aquifer is indicated beneath the site. Groundwater vulnerability beneath the site ranges from moderate in the north-western portion of the site to high and extreme across the rest of the site. According to the GSI website there is no Source Protection Zone recorded within a 2 km radius of the site. GES reported that groundwater was encountered during drilling at depths ranging from 8.3m bgl (BH2) to 28m bgl (BH3) (within bedrock); average depths to groundwater recorded during the two groundwater monitoring events in 2015 was 6.05m bgl. All four monitoring wells are screened across both overburden and bedrock, therefore it is not possible to distinguish between shallow and deep groundwater bodies beneath the site.
Inferred Groundwater Flow	Based on the topography of the site and the surrounding area, groundwater is considered likely to flow towards the south-west towards the Aughrim River. At a site level, groundwater flow may be influenced by local abstraction of groundwater by Woodfab from a 'Combined Heat and Power' bedrock well located on the north-western portion of the site (known as the CHP Well). It is understood that this abstraction well is used to fill firewater tanks on the site. Installation details for the CHP are not available. Groundwater elevations across the site for 13 June 2016 are illustrated on Figure 3. The inferred groundwater flow is to the south west, towards the Aughrim River. A similar pattern of groundwater flow was recorded during all 2018 groundwater monitoring event and during previous monitoring events completed at the site.
Nearby Groundwater Abstraction Wells	In addition to the groundwater abstraction well located on the site, the GSI website indicates a number of groundwater wells within 1km of the site. The majority of these are located to the west, in the vicinity of Aughrim town, but there are also a number of wells indicated to the south and east. Information provided by the GSI indicates that a number of these wells are used for domestic supply. None of these wells are located between the site and the Aughrim River. It is noted that there is no requirement to register wells with the GSI, and, given the rural setting of the surrounding area, it is considered possible that non-registered groundwater supply wells are present.
Nearby Surface Water Bodies	A search of the EPA Envision GIS viewer on the EPA website (www.epa.ie) revealed the presence of the following streams and rivers in the area surrounding the site: <ul style="list-style-type: none"> · Ballycreeen and Three Wells Streams to the north of the site; and · Aughrim River bordering the site to the south.

⁸ GES Limited, *Groundwater Monitoring Report*, Report Ref. 07/56, 28 April 2008

Physical Feature Comments

	<p>The Ballycreen and Three Wells streams flow southwards into the Aughrim River approximately 150m west of the site. The Aughrim River flows towards the east and eventually meets the Avoca River approximately 7km east of the site.</p> <p>The river quality of the Ballycreen Stream to the north of the site is classified as having 'High Status' by the EPA at Tinnakilly Bridge immediately north of the site.</p> <p>The Aughrim River is classified by the EPA as having 'Good Status' at Coat's Bridge, approximately 2km east (downstream) of the site. (EPA website, (www.epa.ie); EPA Maps – Water Quality).</p>
Nearby Flood Risk Areas	According to the OPW flood risk website (www.floodmaps.ie) there are no recurring flood events within 1km of the site.
Environmentally Sensitive Areas	<p>Groundwater beneath the site is protected as a drinking water resource under the Water Framework Directive.</p> <p>According to the National Parks and Wildlife Service website (www.npws.ie), the closest designated environmentally sensitive area to the site is the Avoca River Valley located approximately 3km east of the site. The Avoca River Valley is a proposed Natural Heritage Area (pNHA).</p> <p>There are no designated environmentally sensitive areas within 1km of the site.</p>
Radon	As detailed in radon maps prepared by the EPA, the site is located in an area with greater than 20% of properties in a 10km grid square that are estimated to be above the 200Bq/m ³ reference level for radon. Grid squares in which the predicted percentage of properties is 10% or greater are called High Radon Areas.
Other	The Woodfab site excluded, there are no licenced industrial or waste facilities located within a 1km radius of the site.
Sensitive Receptors	<p>Sensitive receptors identified within 1km of the site include:</p> <p>Protected groundwater beneath the site;</p> <ul style="list-style-type: none"> · The groundwater abstraction well located on the site, which supplies water to the firewater tanks on the site; and · The Aughrim River, which runs eastwards along the southern site boundary.

4.3 Site History

The history of the site was assessed based on the following:

- Interview with Woodfab site representatives;
- Review of the following information available on the Ordnance Survey of Ireland (OSI) website (www.osi.ie):
 - Historical maps dating from 1829 to 1841 (6-inch);
 - Historical maps dating from 1897 to 1913 (25 inch); and
 - Aerial photographs from 1995, 2000 and 2005.

Year	Site Use	Comments
1829 to 1841	Undeveloped	The site is undeveloped. A flour mill is indicated to the east of the site and some buildings are marked along a roadway to the north. The current road bordering the site to the north (R753) is not present. The village of Aughrim is present approximately 600m east of the site.
1897 to 1913	Undeveloped	The site remains undeveloped and now appears to be forested. The flour mill to the east of the site has developed further, as has Aughrim village. A quarry is indicated beyond the Aughrim River to the south of the site.
1974	Saw Mill	It is understood that the site remained greenfield up until 1974, when a saw mill was established on the site. It is further understood that the Smurfit Group took ownership of the site in the 1980's and Woodfab re-acquired the site in 1998. Tanalith E is currently used on site and is stored in banded IBCs.

Year	Site Use	Comments
		Chromated Copper Arsenate (CCA) was historically used to treat timber on the site. CCA treated timber was stored in the vicinity of BH2 and the CHP well.
1995	Saw Mill	The 1995 aerial photograph indicates that the layout appears similar to current site layout. Low density residential housing is present to the north of the site.
2000	Saw Mill	The 2000 aerial photograph indicates that the layout appears similar to current site layout.
2005	Saw Mill	The 2005 aerial photograph indicates that the layout appears similar to current site layout.
2010	Saw Mill	A fire occurred on the site in August 2010, resulting in the cessation of production at the site.
2014	Saw Mill	Production resumed at the site.

A site layout plan showing a description of each building used on-site is presented in Figure 4 and a site layout plan showing locations of current and historic chemical storage is presented in Figure 5.

4.4 Process Description

The manufacturing process on the site is as follows:

- Logs are delivered to site by road, where they are graded and stripped of their bark.
- Stripped logs are loaded into the mill where they are cut and planed to the required specifications.
- Some of the timber may be dried in the kiln to obtain the required moisture content. It is understood that heat for the kiln is generated by an oil-fired boiler located adjacent to the kiln (Building D2 on Figure 4). This boiler is serviced by a 1,500 litre double skinned above ground storage tank (AST) located in the same building.
- A post and shaving plant is located on the south-eastern portion of the site (Building F on Figure 4). The shavings are dried using an oil-fired burner, which is serviced by a bunded 14,000 litre AST. Both the burner and storage tank are located adjacent to Building F.
- Timber requiring treatment is pressure treated using Tanalith E in two areas of the site (Buildings D3 and F1 on Figure 4). Approximately 48 tonnes of Tanalith E is used on site per annum.
- Other modification works for decking and fencing are also carried out on site.
- Equipment on site includes saws, bark peelers, chippers, drying kiln, vacuum preservative tank, planers, air compressors, fork lifts and front end loaders.
- Two underground fuel storage tanks (USTs) with capacities of 13,000 litres and 20,000 litres are located on the northern portion of the site (see Figure 5). These tanks service site vehicles.
- Lubricating oil and hydraulic oil is stored in the garage within a bunded area.
- Office buildings on site (Building H on Figure 4) are heated by an oil fired boiler serviced by a 1,000 litre double skinned AST.

4.5 Viable SPR Linkages

On the basis of the information presented above and in previous investigations, viable source-pathway-receptor (SPR) linkages are considered to be present for controlled waters and human health receptors at the site. A summary of the viable linkages is provided in the table below.

Potential Sources	Potential Pathways	Potential Receptors
Potential release of metals, pesticides and other constituents of timber preservatives, both current (Tanalith E) and historic (Protim and CCA). Potential release of fuel or oil.	Vertical migration through overburden (made ground and clayey sandy gravel, if present), into bedrock and down to groundwater.	Workers on site may have dermal contact with soil contaminated with metals, pesticides and hydrocarbons. Workers on site may inhale/ingest soil dust contaminated with metals, pesticides and hydrocarbons; or may inhale hydrocarbon vapours.
	Metals, pesticides and hydrocarbons could potentially sorb onto suspended solids and may get into surface water drains on site. There are no direct surface water discharges from the site to the River Aughrim as surface water collected in the chamber at SW2 is recycled on site and surface water from SW4 discharges to a soak away.	River Aughrim and associated aquatic species.
	Metals and pesticides are unlikely to spread much laterally with groundwater flow due to their strong tendency to sorb. Dissolved hydrocarbons would be expected to migrate with groundwater flow down-gradient of the site.	Groundwater is not used for potable supply, either on-site or down-gradient of the site, prior to discharge to the River Aughrim. Groundwater abstraction from the CHP well will reduce the volume of groundwater from site that discharges to the River Aughrim.

5. Scope of Work

5.1 Field Work

Groundwater monitoring rounds were completed on 17 May 2018, 15 October 2018⁹ and 17 December 2017. A surface water sample was collected from monitoring point SW4 on 28 March 2018, and 17 December 2018¹⁰. A surface water sample was collected from surface water monitoring point SW2 on 28 March 2018.

The following tasks were completed as part of the monitoring works:

- Inspection of five monitoring wells (BH1, BH2, BH3, BH4 and the CHP well);
- Gauging each well for groundwater elevation;
- Purging of up to three well volumes to remove stagnant water;
- Measurement of in-situ water quality parameters (temperature, pH, electrical conductivity, redox-potential and dissolved oxygen), as well as observations of colour, turbidity and odour;
- Collection of groundwater samples from each groundwater monitoring well (10 samples in total over two monitoring rounds); and
- Collection of a surface water sample from monitoring point SW4 (2 samples over 4 monitoring rounds, March, May, October and December 2018 as the sampling location was dry in Q2 & Q3), located on the southern corner of the treatment plant building.
- A sample was collected from surface monitoring point SW2 in March 2018.

⁹ Access to the CHP Well was not possible in May, so groundwater samples were collected at the CHP well in October and December 2018.

¹⁰ No flow was present at surface water location SW4 during Q2 (May) and Q3 (October) monitoring rounds in 2018 thus surface water samples could not be obtained from this location at these times.

Groundwater samples were collected by AECOM as per standard field procedure FP11 to obtain samples that were representative of in-situ groundwater conditions and to minimise changes in groundwater chemistry during sampling and handling.

An interface probe was used to measure the depth to groundwater prior to purging and sampling and to assess whether or not any separate phase dense or light non-aqueous phase liquids were present in the wells.

Each well (with the exception of the CHP well which has an abstraction pump) was purged using dedicated Waterra™ tubing and foot valves. In-situ water quality parameters (temperature, pH, dissolved oxygen, electrical conductivity and redox potential) were recorded using a system consisting of Waterra™ PP1 pump, Waterra™ tubing, flow-through cell and water quality meter at each monitoring well immediately prior to sampling. The CHP well is an active abstraction well (intermittent pumping), therefore samples were collected from a tap drawing water from the well following a period when the well pump was active.

Surface water samples were collected at monitoring points SW2 and SW4 when there was a flow into the drains at these monitoring points. There are no direct surface water discharges from the site to the River Aughrim as surface water collected in the chamber at SW2 is recycled on site and surface water from SW4 discharges to a soak away. Samples were collected directly into laboratory-supplied sample containers.

All samples were transported to Exova Jones Environmental Laboratories (JEL) in the UK (an AECOM-approved subcontractor) in cooler boxes with appropriate chain-of-custody documentation. Samples were transported by overnight courier to the laboratory.

5.2 Analysis

The following table outlines the groundwater and surface water analysis completed by JEL during 2018¹¹.

<i>Analyte</i>	<i>No. of Groundwater Samples</i>	<i>No. of Surface Water Samples</i>	<i>No. of Duplicate Samples</i>
Metals (As, Cd, Cr III, Cr VI, Cu, Fe, Mn, Ni, Pb, Zn)	10	-	2
Total Petroleum Hydrocarbons (TPH) Criteria Working Group (CWG) Analysis	10	-	2
Total Hardness	10	-	-
Alkalinity	10	-	-
Sulphate	10	-	-
Chemical Oxygen Demand (COD)	10	3	-
Propiconazole	10	3	-
Metals (As, B, Cr III, Cr VI, Cu, Mn, P)	-	3	-
Nitrate	-	3	-

6. Groundwater & Surface Water Results 2018

Groundwater level measurements, purge volumes, field observations and groundwater quality parameters measured during field works in 2018 are presented in Table 1. Groundwater analytical results screened against relevant water quality guidelines are presented in Table 2. Surface water

¹¹ Selected analysis based on information provided by Woodfab, not specified in IEL Licence

field readings and analytical results screened against relevant assessment criteria are presented in Tables 3 and 4, respectively.

The JEL laboratory reports are also attached (Appendix B).

6.1 Water Quality Screening Criteria

Groundwater and surface water quality was assessed by comparing analytical results to the most relevant of the following water quality guidelines:

- European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016. S.I. No. 366 of 2016;
- European Communities Environmental Objectives (Groundwater) Regulations, 2010. Statutory Instrument No. 9 of 2010;
- European Union (Drinking Water) Regulations 2014. Statutory Instrument No. 122 of 2014;
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009. Statutory Instrument No. 272 of 2009;
- Environmental Protection Agency, Towards Setting Guideline Values for the Protection of Groundwater in Ireland, (Interim Guideline Values (IGVs), 2003); and,
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015. S.I. No. 386 of 2015.

6.2 Field Observations

The following was noted during water sampling at the site:

<i>Sampling Location</i>	<i>Field observations</i>
BH1	Brown with high turbidity during both 2018 monitoring events
BH2	Cloudy and brown during Q2, brown with low turbidity during Q4
BH3	Pale grey with moderate turbidity during Q2, pale brown with moderate turbidity during Q4
BH4	Cloudy and brown during Q2, pale brown with black suspended solids and low turbidity during Q4
CHP Well	No sample during Q2. Clear during Q3, pale orange / clear during Q4
SW2	Brown with moderate turbidity during Q1
SW4	Brown with moderate turbidity during Q1, grey with high turbidity during Q4. No sample during Q2 and Q3.

Groundwater field measurements of water quality parameters are presented in Table 1 and are summarised below:

- pH values ranged from 6.14 (BH2, May 2018) to 7.43 (BH3, Dec 2018). Similar to previous monitoring rounds the reported pH values are occasionally less than the lower IGV value of 6.5 in wells BH1, BH2, BH3 and BH4. The slightly acidic pH readings are likely to be naturally-occurring and related to the non-carbonate schist bedrock in the area and the granite intrusion beneath the site.
- Electrical conductivity values ranged from 152.7 $\mu\text{S}/\text{cm}$ (BH4, Dec 18) to 368.4 $\mu\text{S}/\text{cm}$ (BH1, May 2018) and were all below the groundwater threshold value (GTV) of 1,875 $\mu\text{S}/\text{cm}$.
- Groundwater temperatures ranged from 9.0°C (CHP, Dec 2018) to 12.0°C (BH4 May 2018), with lower temperatures recorded during the December monitoring round, with the exception of BH1 where December temperatures (11.6°C) were marginally higher than May temperatures (11.2°C).

Temperatures are close to the normal range for groundwater in Ireland (10.0°C to 12.0°C) and show seasonal variability.

- Field oxidation reduction potential (ORP) readings were compensated, as recommended by the instrument manufacturer. The adjusted redox (Eh) readings ranged between 206.8 mV (BH3, Dec 2018) and 323.1 mV (BH2, May 2018). The recorded redox values indicate oxidising conditions in groundwater beneath the site, consistent with the conditions encountered during previous monitoring rounds.
- Dissolved oxygen ranged from 0.7 mg/L (BH2, Dec 2018) to 7.0 mg/L (BH3, Dec 2018).

Surface water field measurements of water quality parameters at monitoring points SW2 and SW4 are presented in Table 3 and are summarised below:

- pH values ranged from 6.55 to 7.0, which was within the environmental quality standard (EQS) range of 6 to 9 for "Hard" waters (wider range of 4.5 to 9 applicable to "Soft" waters, as likely to be present at the Woodfab site).
- Electrical conductivity values ranged from 176 µS/cm to 408 µS/cm.
- Surface water temperature was only recorded at SW4 during Q4 (Dec 18) and was measured at 8.5°C.

6.3 Groundwater Flow Direction

Based on the site setting, groundwater flow direction is expected to be generally towards the southwest and the River Aughrim.

Gauging information collected on 13 June 2016 was used to calculate groundwater elevations and contours, which are illustrated on Figure 3. Based on this data, it is inferred that groundwater flow direction is to the southwest, towards the Aughrim River. A similar pattern of groundwater elevations was recorded during all 2018 groundwater monitoring events and during previous monitoring events completed at the site.

6.4 QA/QC

Water samples were subject to sampling, sample custody and laboratory protocols to ensure traceability and reliability of analytical results. These included:

- Record of all works and sampling in site field notes;
- Transport of samples with chain of custody documents; and
- Confirming receipt of all samples and correct analytical instructions against laboratory supplied test schedules.

The analytical techniques employed by the laboratories are regarded as acceptable by regulatory authorities in Republic of Ireland.

As part of AECOM's quality control procedure, two groundwater field duplicates (DUP01 and DUP02) of samples from BH2 were taken in May and December 2018, respectively.

Duplicate sampling allows calculation of the relative percentage differences (RPD) between the groundwater primary and duplicate samples. An RPD is not acceptable where:

1. The sample or the duplicate result is less than or equal to 10 times the Method Detection Limit (MDL), RPD is not considered suitable.
2. Where the sample concentration is between 10 times and 20 times the reporting limit, the RPD should be less than 50%.
3. Where the sample concentration is greater than 20 times the reporting limit, the RPD should be less than 30%.

Relative percentage differences (RPDs) between the primary and duplicate samples are presented in Table 5.

Iron and Manganese are the only applicable RPDs, with values of 5.06% and 1.67% in May 2018 and 7.31% and 1.20% in December 2018. All calculated RPDs are within the acceptable limit of 30% or 50% RPD as applicable. As such, analytical results are considered acceptable for interpretive use.

6.5 2018 Analytical Results

6.5.1 Groundwater

Reported concentrations of cadmium, chromium III and VI, copper, lead, and nickel in groundwater were reported to be below the respective assessment criteria for both monitoring rounds completed in 2018.

Arsenic was reported at concentrations of up to 19.2 µg/L, exceeding the GTV of 7.5 µg/L in BH2, BH3 and the CHP Well. Arsenic concentrations in BH1 and BH4 were either below the laboratory MDL of 2.5 µg/L or below the GTV for both monitoring rounds.

A maximum iron concentration of 709 µg/L was reported at BH2 in Q2, which exceeded the IGV of 200 µg/L. Iron concentrations at BH2 also exceeded the IGV in Q4. Iron concentrations in all other groundwater samples were either below the MDL of 20 µg/L or below the IGV.

Manganese concentrations of 773 and 334 µg/L (Q2 and Q4) were reported in BH2. Concentrations of 311 µg/L (Q2) and 666 µg/L (Q4) were reported in monitoring well BH3; these concentrations are similar to previous monitoring rounds but exceeded the IGV of 50 µg/L. Concentrations in the other locations sampled were close to or below the laboratory MDL of 2 µg/L and also below the IGV for manganese.

Zinc concentrations were below the GTV's for all monitoring periods, with the exception of 468 µg/l in Q4 at the CHP well, which exceeded the IGV of 100 µg/l.

A marginal exceedance of the total hardness (as calcium carbonate) IGV of 200 mg/L was reported at BH1 during Q2, where a concentration of 207 mg/L was reported.

Concentrations of other analytes were below their respective screening values (where present) and are considered to be representative of normal groundwater conditions. Propiconazole was reported below the laboratory limit of detection at all groundwater monitoring wells during 2018.

6.5.2 Surface Water

Reported concentrations of arsenic, boron, chromium III and VI and nitrate in surface water were below the respective assessment criteria (where present) for all monitoring rounds completed in 2018.

A copper concentration of 99.0 µg/L was reported at SW2 in Q1 2018 above the EQS of 5 µg/L. Copper concentrations during Q1 and Q4 for SW4 were below the laboratory MDL.

Manganese was reported at concentrations of 553 µg/l at SW2 in Q1 2018 and at concentrations of 2001 µg/L and 918 µg/L at SW4 during Q1 and Q4 2018.

Reported COD values ranged from 226 mg/L (SW2 Q1) to 676 mg/L (SW4 Q1).

7. Historical Water Quality Trends

Tabulated historic groundwater and surface water data obtained from annual environmental reports (AER) reports (2008 – 2013) combined with 2014, 2015, 2016, 2017 and 2018 data are presented in Tables 6 and 7 respectively. Graphed data is also presented in Appendix A.

Screening of this data indicates that there have been exceedances of certain assessment criteria at all monitoring points over the past eight years. The following summarises historical data in terms of the respective assessment criteria:

7.1 Groundwater

- Cadmium, copper and sulphate concentrations in groundwater have not been reported above their respective assessment criteria.
- Hardness (as CaCO₃) have been below the IGTV values of 200 mg/L for all monitoring periods, with the exception of 207mg/L measured for BH1 during Q2 2018.
- Since Q4 2009 and prior to Q4 2016 reported arsenic concentrations in groundwater were consistently low and generally below the GTV in all wells except the CHP well, in which concentrations approximately twice the GTV are typically detected. Exceedances of the GAC have also been consistently reported at BH2 since Q4 2016 and an exceedance of 15.6 µg/L was reported at BH3 in Q4 2018. While arsenic concentrations for the CHP well in Q3 2018 were similar to previous concentrations and exceeded the IGTV of 7.5 µg/L, arsenic concentrations of 3.7 µg/L measured for the Q4 period of 2018 were below the IGTV. The arsenic concentrations in BH1 and BH4 are similar to those detected in 2014, 2015, 2016 and 2017.
- Chromium has not been detected at a concentration exceeding the GTV (37.5 µg/L) at any location since September 2010.
- Concentrations of iron have historically been substantially below the IGTV; however, a concentration of 402 µg/L was reported in BH2 in Q4 2017. Subsequently, concentrations for Q2 and Q4 of 2018 were 709 and 356 µg/L, exceeding the IGTV of 200 µg/L. Iron concentrations in all other wells remained below the IGTV in 2018.
- Lead has not been detected at a concentration exceeding the GTV since September 2010. It should be noted that the GTV for lead was reduced in 2016 from 18.75 µg/l to 7.5 µg/l.
- Elevated manganese concentrations have not been detected at the CHP well since monitoring commenced at this location. Prior to 2010, elevated manganese concentrations were detected sporadically at BH1, BH2, BH3 and BH4. Manganese concentrations at BH1 and BH4 have remained below the IGTV (50 µg/L) since September 2010 and in BH2 since July 2014, however a significant exceedance of 2592 µg/L was reported at BH2 in Q4 2017. Q2 and Q4 2018 again exceeded the IGTV with concentrations of 773 µg/L and 334 µg/L respectively. Elevated manganese concentrations are consistently detected in BH3 and concentrations of 311 µg/L and 666 µg/L were reported at BH3 in Q2 and Q4 2018 respectively which are similar to those detected in 2017.
- Nickel has not been detected at a concentration exceeding the GTV (15 µg/L) at any location since September 2010.
- Zinc was not analysed prior to 2014. Zinc concentrations detected at BH1 – BH4 have been below the IGTV (100 µg/L) in all 2014 –2018 monitoring rounds. Zinc concentrations in the CHP well were below the IGTV from Q4 2016 to Q3 2018. However, in 2018 Q4, a concentration of 468 µg/L was reported, significantly higher than previously reported concentrations at this well and exceeding the IGTV.
- Hydrocarbon concentrations have historically been below the laboratory MDL since they were first analysed in 2015. The concentrations of all hydrocarbons were below the laboratory limit of detection throughout 2018.

Similar to previous monitoring rounds, the reported pH values were less than the lower IGV value of 6.5 in wells BH1, BH2, BH3 and BH4. pH values for the CHP well in Q4 were within the recommended IGV. The slightly acidic pH readings are likely to be naturally-occurring and related to the non-carbonate schist bedrock in the area and the granite intrusion beneath the site.

7.2 Surface Water

- Prior to September 2009, arsenic was sporadically elevated at both SW2 and SW4. Since then, concentrations at both locations have been typically lower, with the exception of June 2016 when a concentration of 46.3 µg/l in SW4 was reported.
- Boron has not been detected at a concentration exceeding the GTV (750 µg/L) at any location since July 2008.
- There was an exceedance of the EQS for chromium at SW2 (79 µg/L) and SW4 (33 µg/L) in September 2009. All reported chromium concentrations at SW2 and SW4 have been below the EQS since 2009.
- Reported copper concentrations in surface water sampling point SW2 have been above the EQS value of 5 µg/l in all but one monitoring event since 2008 and remain above the EQS in 2018. Reported copper concentrations at SW4 have been historically above the EQS of 5 µg/L, however have been at or below the laboratory MDL of 7 µg/l since November 2014, with the exception of Q4 2017, when a concentration of 18 µg/l was reported.
- Manganese was sampled for the first time at SW4 in 2014 and at SW2 in 2015. Since then reported concentrations in SW2 and SW4 in all sampling events have been variable, ranging between 320 µg/l and 757 µg/l at SW2 and 354 µg/l and 2001µg/l (Q1 2018) at SW4.
- There was a single exceedance (at 86.1 µg/l) of the EQS for nitrate (37.5 µg/L) at SW4 in June 2011. All reported nitrate concentrations at SW2 and SW4 since 2011 have been below the EQS.
- There are no screening values available for phosphorus, propiconazole or COD. Propiconazole was detected at SW2 in Q1 2017 for the first time since January 2008 and was not detected in 2018. COD and phosphorus concentrations fluctuate but do not show an upward trend in concentrations.

8. Discussion and Conclusions

8.1 Groundwater

During 2018 there were exceedances of the groundwater assessment criteria for pH, arsenic, manganese, iron and zinc. Concentrations of pH, arsenic and manganese followed a similar pattern to 2017 results. However exceedances of iron and zinc were not reported prior to Q4 2017 (iron) and between Q2 2016 and Q4 2018 (zinc).

In relation to the elevated arsenic concentrations, which are consistently reported in the CHP well and also present in BH2 since Q4 2016 and BH3 in Q4 2018, it is understood that CCA was historically used to treat timber on the site, and that CCA treated timber was stored in the vicinity of the CHP well. However, given that elevated concentrations of copper and chromium were not detected at this location, it is not considered likely that the source of the elevated arsenic concentration was related to current site operations. Reference to the Teagasc and EPA Soil Geochemical Atlas¹² indicates that arsenic concentrations in soil are naturally elevated in the Aughrim area, and it is considered likely that the elevated arsenic concentration is therefore due to the surrounding natural soil and bedrock conditions and the extensive base metal mineralisation in the bedrock in this area.

In relation to the elevated manganese concentrations and acidic pH values reported, the Soil Geochemical Atlas also indicates manganese is naturally elevated in soils in the Aughrim area and with natural soil pH in the area ranging from 5.0-5.5. The source of these exceedances is therefore thought to relate to naturally-occurring conditions rather than activities on the site.

The source of the iron exceedance at BH2 during Q2 and Q4 is unknown. As with arsenic and manganese, the elevated iron concentration may be related to naturally occurring soil conditions in the area which according to the Soil Geochemical Atlas, contain moderate to high concentrations of iron.

The presence of underground fuel storage tanks on the site was identified as a potential risk to groundwater during an assessment of the site in 2014 and it was recommended that groundwater samples be analysed for hydrocarbons. Following this recommendation, samples from all five groundwater monitoring wells were analysed for hydrocarbons in all monitoring events in 2015, 2016, 2017 and 2018. Hydrocarbon concentrations were below the laboratory MDL in all samples. The concentrations of all hydrocarbons were below the laboratory limit of detection in 2018.

8.2 Surface Water

Elevated concentrations of copper and manganese were reported at surface water monitoring point SW2 and SW4 during 2018, similar to previous monitoring events.

The Soil Geochemical Atlas indicates that manganese concentrations in soil are naturally elevated in the Aughrim area, and it is considered likely that the elevated manganese concentrations detected may be related to the surrounding natural soil and bedrock conditions.

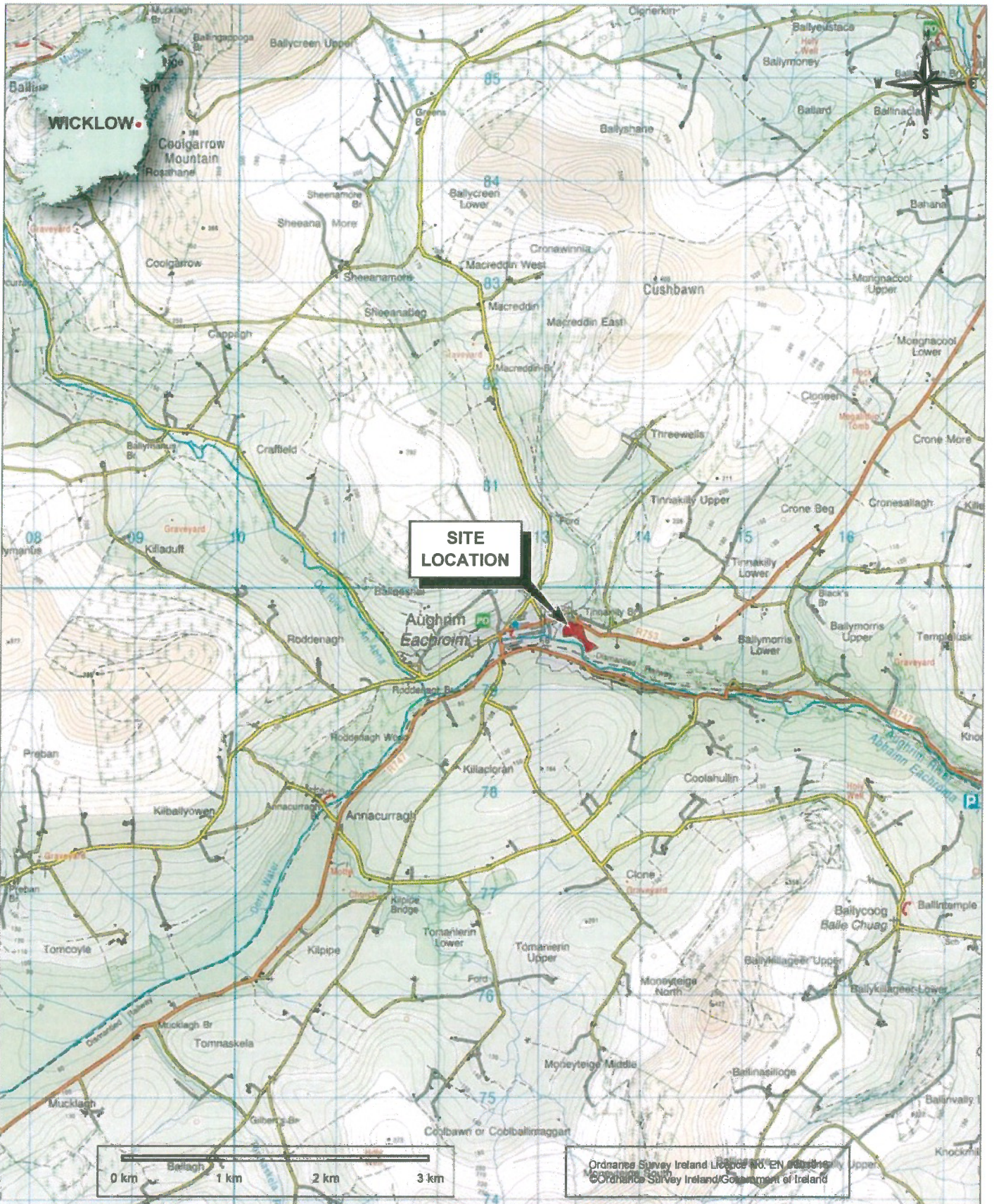
Prior to detection in 2017 no propiconazole had been previously detected since 2009. Following this, concentrations are below the laboratory limit of detection in 2018. Surface water at SW2 is recycled on site in a closed loop system, the water collected here is circulated back to the treatment tank in shed D3 and there is no direct surface water discharges from the site to the River Aughrim.

¹² Soil Geochemical Atlas of Ireland, Teagasc and the Environment Protection Agency, 2007

9. Recommendations

It is recommended that groundwater and surface water monitoring continues as agreed with the Environmental Protection Agency.

Figures



CLIENT
WOODFAB TIMBER LIMITED

PROJECT LOCATION
WATER QUALITY MONITORING



DRAWING TITLE
FIGURE 1 - SITE LOCATION PLAN



4TH FLOOR, ADELPHI PLAZA, ADELPHI CENTRE, GEORGE'S STREET UPPER, DUN LAOGHAIRE, Co. DUBLIN, IRELAND. T +353 (0)1 238 3100, F +353 (0)1 238 3199

DRAWN	ILLUSTRATED	CHECKED	APPROVED	DATE
SML		JS	DM	JAN 2019
SCALE	Job No. PR-303113			REV.
As Shown				0



- KEY
-  GROUNDWATER MONITORING WELL
 -  SURFACE WATER MONITORING POINT

CLIENT
WOODFAB TIMBER LIMITED

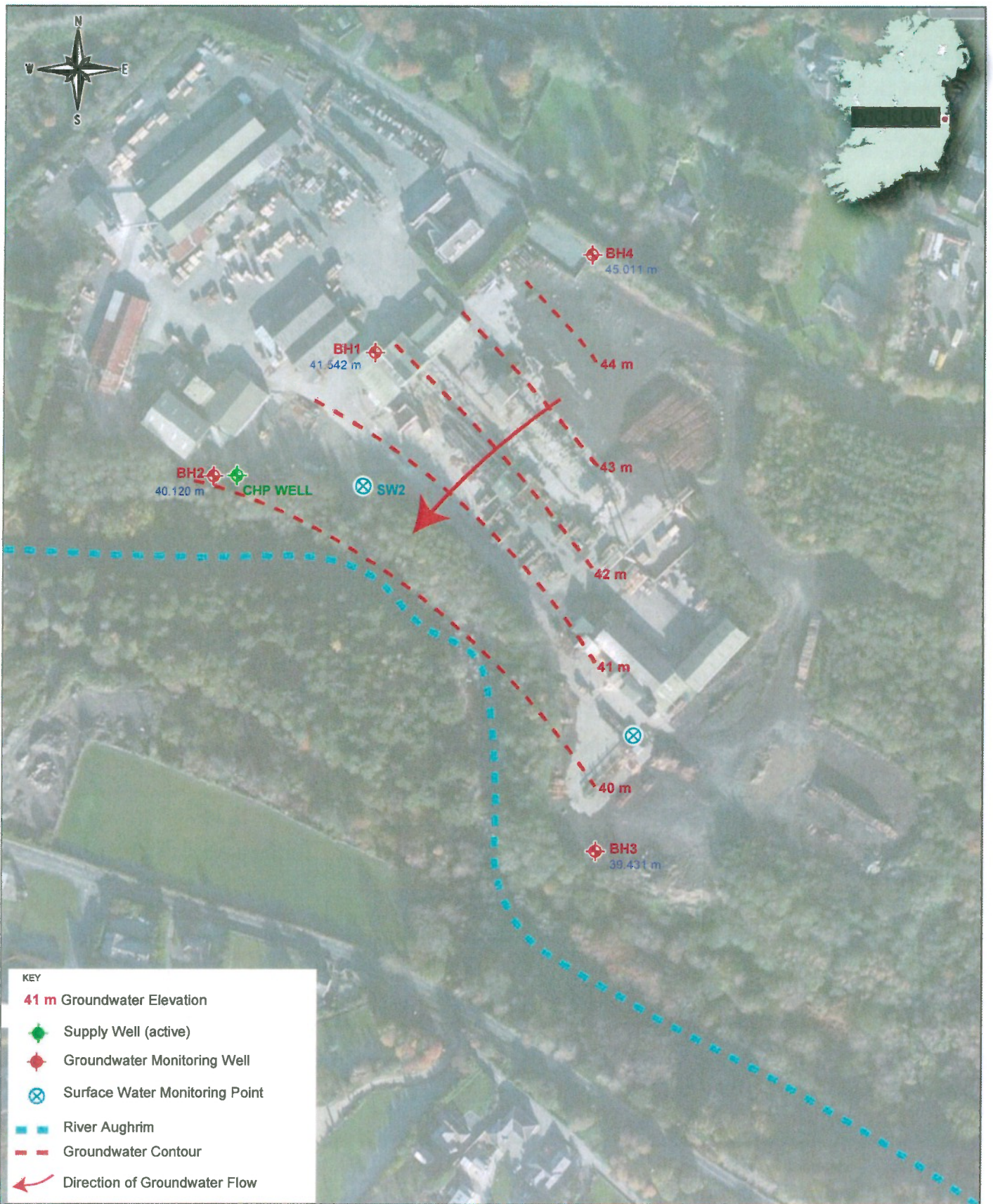
PROJECT LOCATION
WATER QUALITY MONITORING

DRAWING TITLE
**FIGURE 2 _ SITE AERIAL PHOTOGRAPH
SHOWING MONITORING LOCATIONS**

AECOM

4TH FLOOR, ADELPHI PLAZA, ADELPHI CENTRE, GEORGE'S STREET UPPER, DUN
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DRAWN	ILLUSTRATED	CHECKED	APPROVED	DATE
SML		JS	DM	JAN 2019
SCALE	Job No. PR-303113			REV.
As Shown				0



KEY

- 41 m Groundwater Elevation
- ◆ Supply Well (active)
- ◆ Groundwater Monitoring Well
- ⊗ Surface Water Monitoring Point
- River Aughrim
- Groundwater Contour
- ← Direction of Groundwater Flow

CLIENT
WOODFAB TIMBER LIMITED

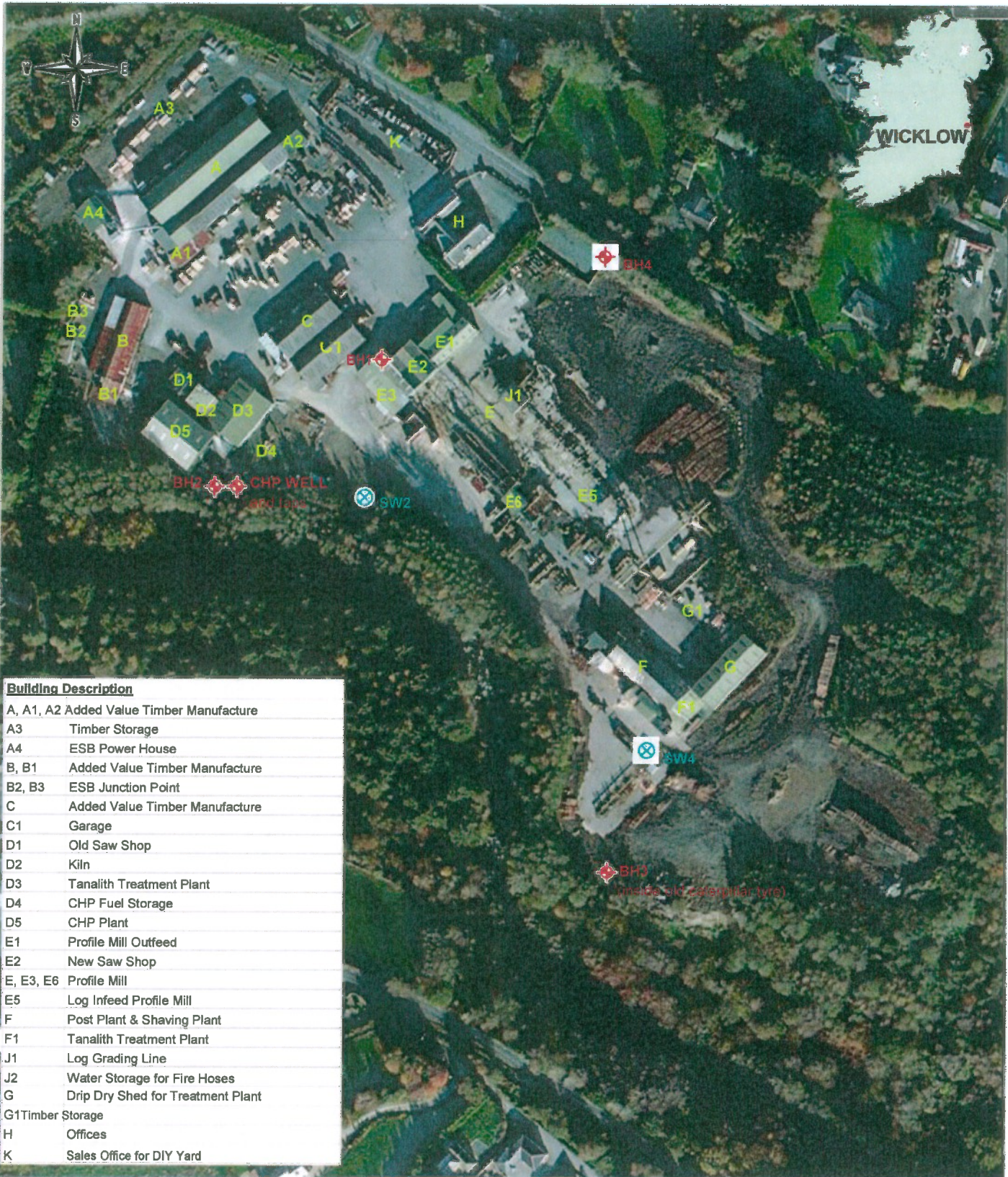
PROJECT LOCATION
WATER QUALITY MONITORING

DRAWING TITLE
**FIGURE 3 _ GROUNDWATER
CONTOUR MAP, JUNE 2016**



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As Shown				0



Building Description	
A, A1, A2	Added Value Timber Manufacture
A3	Timber Storage
A4	ESB Power House
B, B1	Added Value Timber Manufacture
B2, B3	ESB Junction Point
C	Added Value Timber Manufacture
C1	Garage
D1	Old Saw Shop
D2	Kiln
D3	Tanalith Treatment Plant
D4	CHP Fuel Storage
D5	CHP Plant
E1	Profile Mill Outfeed
E2	New Saw Shop
E, E3, E6	Profile Mill
E5	Log Infeed Profile Mill
F	Post Plant & Shaving Plant
F1	Tanalith Treatment Plant
J1	Log Grading Line
J2	Water Storage for Fire Hoses
G	Drip Dry Shed for Treatment Plant
G1	Timber Storage
H	Offices
K	Sales Office for DIY Yard

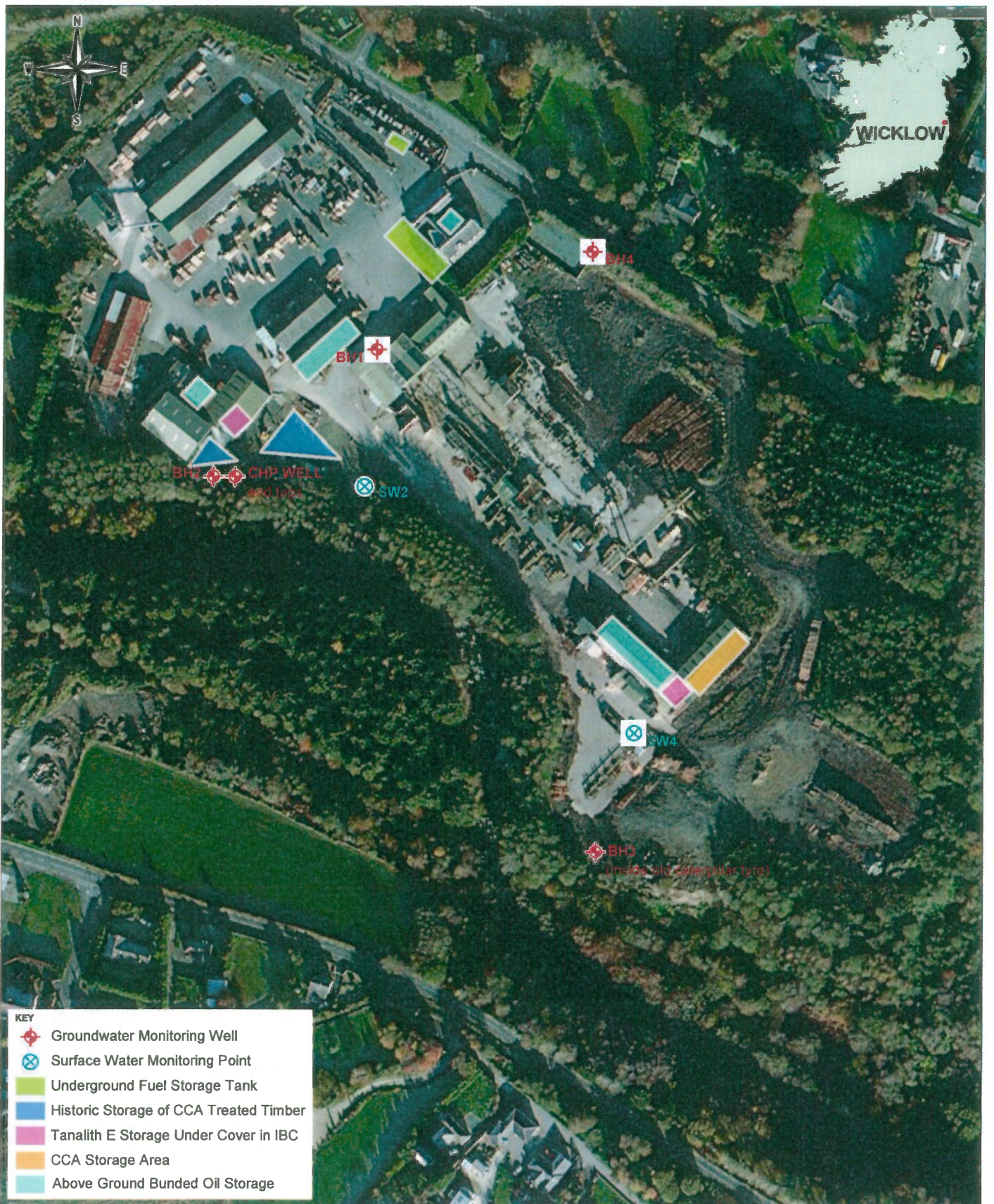
- KEY
- Groundwater Monitoring Well
 - Surface Water Monitoring Point

CLIENT	WOODFAB TIMBER LIMITED
PROJECT LOCATION	WATER QUALITY MONITORING
DRAWING TITLE	FIGURE 4 _ SITE AERIAL PHOTOGRAPH SHOWING SITE MAP AND BUILDING LOCATIONS

AECOM

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DRAWN	ILLUSTRATED	CHECKED	APPROVED	DATE
SML		JS	DM	JAN 2019
SCALE	Job No. PR-303113			REV.
As Shown				0



KEY

- ⊕ Groundwater Monitoring Well
- ⊗ Surface Water Monitoring Point
- Underground Fuel Storage Tank
- Historic Storage of CCA Treated Timber
- Tanalith E Storage Under Cover in IBC
- CCA Storage Area
- Above Ground Bunded Oil Storage

CLIENT
WOODFAB TIMBER LIMITED

PROJECT LOCATION
WATER QUALITY MONITORING

DRAWING TITLE
FIGURE 5 _ SITE AERIAL PHOTOGRAPH SHOWING HISTORIC AND PRESENT LOCATIONS OF CHEMICAL STORAGE

AECOM

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DRAWN	ILLUSTRATED	CHECKED	APPROVED	DATE
SML		JS	DM	JAN 2019
SCALE	Job No. PR-303113			REV.
As Shown				0

Tables

Table 1: Field Observations, Groundwater Depths, Purge Volumes and Water Quality Measurements
 Client: Woodfab Timber Limited
 Project: 2018 Annual Water Quality Report
 Location: Aughrim, Co. Wicklow
 Job No: PR-303113

Sample ID	Date	Units	GAC	Source	BH1		BH2		BH3		BH4		GHP		
					17-May-18	17-Dec-18	17-May-18	17-Dec-18	17-May-18	17-Dec-18	17-May-18	17-Dec-18	17-May-18	18-Oct-18	17-Dec-18
Well Elevation	m aOD	na	na	na	48.72		46.33		45.88		49.87		Unknown		
SWL	m bTOC	na	na	na	6.340	5.916	5.867	5.671	5.685	5.112	3.476	2.151	nm	nm	nm
Groundwater Elevation	m aOD	na	na	na	42.38	42.81	40.67	40.66	40.19	40.77	46.19	47.514	na	na	na
Total Well depth	m bTOC	na	na	na	30.95		9.98		31.19		25.05				55.00
Purge Volume	L	na	na	na	145	148	28	28	125	155	127	135	nm	nm	nm
Conductivity	uS/cm	1875	GTV	368.4	239.0	343.5	281.6	244.6	216.3	258.9	152.7	nm	nm	nm	261.4
pH	-	6.5 < pH < 9.5	IGV	8.23	6.51	6.14	6.22	6.42	7.43	6.22	6.37	nm	nm	nm	6.92
Temperature	°C	25	IGV	11.2	11.6	11.9	11.7	11.0	10.8	12.0	10.8	nm	nm	nm	9.0
Redox Potential*	mV	nv	na	295.5	250.9	323.1	238.8	286.5	206.8	nm	265.7	nm	nm	nm	244.1
Dissolved Oxygen	mg/L	nv	na	4.2	4.0	0.9	0.7	2.3	7.0	nm	3.9	nm	nm	nm	6.68
Sample Description / Comments				Brown, high turbidity, NEC	Brown, high turbidity, NEC	Brown, cloudy, NEC	Brown, low turbidity, NEC	Pale grey, moderate turbidity, NEC	Pale brown, moderate turbidity, NEC	Brown, cloudy, NEC	Pale brown, black suspended solids, low turbidity, NEC	Pump was switched off during the monitoring round and the well was obstructed.	Clear, NEC	Pale orange, clear, NEC	

Legend

IGV	Exceeds Generic Assessment Criteria (GAC)
GTV	Groundwater Threshold Values (GTVs). Outlined in Groundwater Regulations (S.I. No. 9 of 2010 / S.I. No. 366 of 2018).
IGV	Interim Guideline Values (IGVs) presented by EPA in 2003
NEC	No Physical Evidence of Contamination
na	Not Available
m aOD	meters above Ordnance Datum
m bTOC	meters below Top of Casing
SWL	Static Water Level
L	Litres
uS/cm	microsiemens per centimeter
°C	degrees celsius
mV	millivolts
mg/L	milligram per litre
*	Note: redox potential readings compensated as recommended by instrument manufacturer
nm	Not monitored

Table 2: Groundwater Analytical Results
 Client: Woodfab Timber Limited
 Project: 2018 Annual Water Quality Report
 Location: Aughtlin, Co. Wicklow
 Job No: PR-303113

Sample ID Date	Parameter	Units	MDL	GAC	Source	BH1		BH2		BH3		BH4		CHP		
						17-May-18	17-Dec-18	17-May-18	17-Dec-18	17-May-18	17-Dec-18	17-May-18	17-Dec-18	17-May-18	16-Oct-18	17-Dec-18
Metals																
	Arsenic	ug/l	2.5	7.5	GTV	4.7	<2.5	18.8	8.4	4.3	18.8	<2.5	<2.5	nm	18.8	3.7
	Cadmium	ug/l	0.5	3.75	GTV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nm	<0.5	<0.5
	Total Chromium	ug/l	1.5	37.5	GTV	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	nm	<1.5	<1.5
	Chromium III	ug/l	6	37.5	GTV	<6	<6	<6	<6	<6	<6	<6	<6	nm	<6	<6
	Hexavalent Chromium	ug/l	6	7.5	GTV	<6	<6	<6	<6	<6	<6	<6	<6	nm	<6	<6
	Copper	ug/l	7	1500	GTV	<7	<7	<7	<7	<7	<7	<7	<7	nm	<7	<7
	Iron	ug/l	20	200	IGV	<20	<20	788	358	<20	68	<20	<20	nm	28	176
	Lead	ug/l	5	7.5	GTV	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	Manganese	ug/l	2	50	IGV	<2	<2	778	311	888	<2	<2	<2	nm	4	16
	Nickel	ug/l	2	15	GTV	<2	<2	<2	<2	<2	<2	<2	<2	nm	<2	<2
	Zinc	ug/l	3	100	IGV	<3	<3	3	7	<3	<3	<3	3	nm	56	688
Hydrocarbons																
TPH Aromatics by GC-FID																
	TPH (EC6-7) aromatic	ug/l	<10	0.75	GTV	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC6-8) aromatic	ug/l	<10	525	GTV	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC9-11) aromatic	ug/l	<10	300	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC10-12) aromatic	ug/l	<5	90	WHO	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	TPH (EC12-16) aromatic	ug/l	<10	90	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC15-23) aromatic	ug/l	<10	90	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC21-35) aromatic	ug/l	<10	90	WHO	<10	<10	<10	<10	370	<10	<10	<10	nm	<10	<10
	Total Aromatics (CS-C35)	ug/l	<10	nv	-	<10	<10	<10	<10	370	<10	<10	<10	nm	<10	<10
TPH Aliphatics by GC-FID																
	TPH (EC5-6) aliphatic	ug/l	<10	15000	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC6-8) aliphatic	ug/l	<10	15000	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC9-10) aliphatic	ug/l	<10	300	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC10-12) aliphatic	ug/l	<5	300	WHO	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	TPH (EC12-16) aliphatic	ug/l	<10	300	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC16-21) aliphatic	ug/l	<10	300	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (EC21-35) aliphatic	ug/l	<10	300	WHO	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	Total Aliphatics (CS-C35)	ug/l	<10	nv	-	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	TPH (CS-C35)	ug/l	10	10	IGV	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
BTEXs by GC-MS																
	Benzene	ug/l	5	0.75	GTV	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	Toluene (Methyl benzene)	ug/l	5	525	GTV	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	Ethylbenzene	ug/l	5	10	IGV	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	m,p-Xylene	ug/l	5	10	IGV	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	o-Xylene	ug/l	5	10	IGV	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
	Total Xylene	ug/l	10	10	IGV	<10	<10	<10	<10	<10	<10	<10	<10	nm	<10	<10
	Methyl tert butyl ether (MTBE)	ug/l	5	10	GTV	<5	<5	<5	<5	<5	<5	<5	<5	nm	<5	<5
Miscellaneous																
	Propiconazole	ug/l	0.1	nv	nv	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nm	<0.1	<0.1
	Total Hardness Dissolved (as CaCO3)	mg/l	1	200	IGV	287	141	131	128	98	108	83	83	nm	122	128
	Sulphate	mg/l	0.5	187.5	GTV	18.2	18.1	23.8	22.5	12.2	10.5	16.1	15.7	nm	22.4	21
	Total Alkalinity as CaCO3	mg/l	1	NAC	IGV	206	140	92	86	150	158	118	80	nm	86	92
	COD	mg/l	7	nv	nv	11	<7	<7	<7	10	12	<7	<7	nm	<7	<7

gtv	Exceeds Generic Assessment Criteria (GAC)
gtv	Groundwater Threshold Values (GTVs), Outlined in Groundwater Regulations (S.I. No. 9 of 2010 / S.I. No. 386 of 2016).
igv	Interim Guideline Values (IGVs) presented by EPA in 2003
who	World Health Organisation - Petrolsum in Drinking Water: 2008
mdl	Method Detection Limit
nac	No abnormal change
nv	No value
nm	Not monitored

Table 3: Surface Water Field Observations and Water Quality Measurements

Client: Woodfab Timber Limited
 Project: 2018 Annual Water Quality Report
 Location: Aughrim, Co. Wicklow
 Job No: PR-303113

Sample ID				SW2		SW4		
	Date			28-Mar-18	28-Mar-18	17-May-18	15-Oct-18	17-Dec-18
Parameter	Units	GAC	Source					
Conductivity	uS/cm	1825	GTV	211	408	nm	nm	175.78
pH	-	6 - 9	EQS	7	6.55	nm	nm	6.78
Temperature	°C	25	IGV	nm	nm	nm	nm	8.5
Sample Description / Comments				Brown, moderate turbidity, NEC	Brown, high turbidity, NEC	Sampling point was dry during Q2.	Sampling point was dry during Q3.	Grey, high turbidity, NEC

Legend

xx	Exceeds Generic Assessment Criteria (GAC)
EQS	Environmental Quality Standard (EQS). Outlined in Surface Water Regulations (S.I. No. 272 of 2009).
GTV	Groundwater Threshold Values (GTVs). Outlined in Groundwater Regulations (S.I. No. 9 of 2010 / S.I. No. 366 of 2016).
IGV	Interim Guideline Values (IGVs) presented by EPA in 2003
uS/cm	microsiemens per centimeter
°C	degrees celsius
nm	Not monitored
NEC	No Physical Evidence of Contamination

Table 4: Surface Water Analytical Results
 Client: Woodfab Timber Limited
 Project: 2018 Annual Water Quality Report
 Location: Aughrim, Co. Wicklow
 Job No: PR-303113

Sample ID	Date					SW2		SW4		
		Units	MDL	GAC	Source	28-Mar-18	28-Mar-18	17-May-18	15-Oct-18	17-Dec-18
Arsenic		ug/l	2.5	25	EQS	7.9	18.5	nm	nm	6.6
Boron		ug/l	12	750	GTV	31	27	nm	nm	19
Chromium		ug/l	1.5	32	EQS	<1.5	<1.5	nm	nm	<1.5
Chromium III		ug/l	6	32	EQS	<6	<6	nm	nm	<6
Hexavalent Chromium		ug/l	6	32	EQS	<6	<6	nm	nm	<6
Copper		ug/l	7	5	EQS	99	<7	nm	nm	<7
Manganese		ug/l	2	50	IGV	553	2001	nm	nm	918
Phosphorus		ug/l	5	nv	nv	72	67	nm	nm	45
Miscellaneous										
Propiconazole		ug/l	0.1	nv	nv	<0.1	<0.1	nm	nm	<0.1
COD		mg/l	7	nv	nv	436	676	nm	nm	226
Nitrate		mg/l	0.2	37.5	GTV	<0.2	<0.2	nm	nm	<0.2

Legend	
EQS	Exceeds Generic Assessment Criteria (GAC)
EQS	Environmental Quality Standard (EQS). Outlined in Surface Water Regulations (S.I. No. 272 of 2009).
GTV	Groundwater Threshold Values (GTVs). Outlined in Groundwater Regulations (S.I. No. 9 of 2010 / S.I. No. 368 of 2016).
IGV	Interim Guideline Values (IGVs) presented by EPA in 2003
MDL	Method Detection Limit
nm	Not monitored
nv	No value

Table 5: Relative Percentage Differences
 Client: Woodfish Timber Limited
 Project: 2016 Annual Water Quality Report
 Location: Aughrim, Co. Wexford
 Job No: PR-303113

Sample ID	Date	Parameter	MDL	Units	BHZ		%RPDs	BHZ		%RPDs
					17-May-18	DUP01		17-Dec-18	DUP02	
		Arsenic	2.5	ug/l	18.3	23.3	24.04	6.40	6.80	NC
		Cadmium	0.5	ug/l	<0.5	<0.5	NC	<0.5	<0.5	NC
		Total Chromium	1.5	ug/l	<1.5	<1.5	NC	<1.5	<1.5	NC
		Copper	7	ug/l	<7	<7	NC	<7	<7	NC
		Iron	20	ug/l	709	674	5.08	358	383	7.31
		Lead	5	ug/l	<5	<5	NC	<5	<5	NC
		Manganese	2	ug/l	773	788	1.87	334	330	1.20
		Nickel	2	ug/l	<2	<2	NC	<2	<2	NC
		Zinc	3	ug/l	3	4	NC	7	8	NC
		TPH (>EC5-7) aromatic	5	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC7-8) aromatic	5	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC8-10) aromatic	5	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC10-12) aromatic	5	ug/l	<5	<5	NC	<5	<5	NC
		TPH (>EC12-16) aromatic	10	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC16-21) aromatic	10	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC21-35) aromatic	10	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC5-8) aliphatic	5	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC8-10) aliphatic	5	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC10-12) aliphatic	5	ug/l	<5	<5	NC	<5	<5	NC
		TPH (>EC12-16) aliphatic	10	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC16-21) aliphatic	10	ug/l	<10	<10	NC	<10	<10	NC
		TPH (>EC21-35) aliphatic	10	ug/l	<10	<10	NC	<10	<10	NC
		Benzene	0.5	ug/l	<5	<5	NC	<5	<5	NC
		Toluene (Methyl benzene)	0.5	ug/l	<5	<5	NC	<5	<5	NC
		Ethylbenzene	0.5	ug/l	<5	<5	NC	<5	<5	NC
		m,p-Xylene	1	ug/l	<5	<5	NC	<5	<5	NC
		O-Xylene	0.5	ug/l	<5	<5	NC	<5	<5	NC
		Methyl tert butyl ether (MTBE)	0.1	ug/l	<5	<5	NC	<5	<5	NC

RPDs have only been considered where a concentration is greater than 10 times the MDL
 Value - % RPD > 50%, and concentration of primary and duplicate >10 times and <20 times the MDL
 Value - % RPD > 30%, and concentration of primary and duplicate >20 times the MDL

MDL Method Detection Limit
 NC Not Calculable as duplicate or primary concentration <10 times the MDL
 na not analysed

Table E:
 Client: Woodco Timber Limited
 Project: 2018 Annual Water Quality Report
 Location: Aughtin, Co. Wicklow
 Job No: FW-303113

Historic Groundwater Data

Sample ID	BH1																		
	31/07/2008	28/07/2008	14/07/2008	23/12/2008	08/05/2009	09/07/2011	01/01/2012	20/02/2013	08/07/2014	30/11/2014	20/06/2015	11/11/2015	03/06/2016	17/10/2016	13/03/2017	18/05/2017	10/08/2018	17/12/2018	
Sampled By	BT	BSA	BSA	BSV	BSV	BSV	BSA	BSV	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	
Sampled Depth	1	1	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
Parameters	Units	CAV	Source																
pH	unit	7.5	DTV	8.5	8.7	8.6	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Calcium	mg/l	34.8	DTV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Chlorine	mg/l	37.5	DTV	70	70	53	1	22	5	8	<1	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Total Chromium III	mg/l	3.5	DTV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese Chromium	mg/l	1.5	DTV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia	mg/l	1500	DTV	100	100	100	16	60	1	3	2	2	2	2	2	2	2	2	2
Total Iron	mg/l	200	DTV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/l	1.2	DTV	-	-	-	4	10	-	-	-	-	-	-	-	-	-	-	-
Mercurous	mg/l	10	DTV	-	-	-	1000	14100	271	10	41	2	<10	2	2	2	2	2	2
Nitrate	mg/l	10	DTV	-	-	-	171	141	-	-	-	<1.0	-	-	-	-	-	-	-
SDS	mg/l	100	DTV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH	BT/BSA	8.5 - 8.5	DTV	-	7.80	7.60	5.83	7.76	8.56	8.97	7.50	8.31	8.43	8.16	8.24	8.45	8.72	8.70	8.72
Total Hardness (as CaCO3)	mg/l	200	DTV	-	-	-	-	-	-	-	100	107	107	105	104	88	88	78	80
Hardness	mg/l	100	DTV	-	-	-	-	-	-	-	100	107	107	105	104	88	88	78	80
Total Alkalinity as CaCO3	mg/l	100	DTV	-	-	-	-	-	-	-	100	110	100	118	106	88	110	88	80
SDS	mg/l	100	DTV	-	-	-	-	-	-	-	10	11	11	11	11	11	11	11	11

Legend
 xx Exceeds Overall Assessment Criteria (OAC)
 DTV Groundwater Threshold Values (DTV), Outlined in Groundwater Regulations (S.I. No. 9 of 2010 / S.I. No. 368 of 2010)
 BSV Interim Guideline Values (IGV) presented by EPA in 2003
 - Not analysed

Table 6: **Water Quality Data**
 Client: **Woodlab Timber Limited**
 Project: **2018 Annual Water Quality Report**
 Location: **Anglin, Co. Wicklow**
 Job No: **PR-202113**

Sample ID	Units	GAC	Source	B44																	
				20/07/2008	26/07/2008	14/01/2009	20/07/2008	05/02/2009	27/07/2011	02/07/2012	20/02/2013	02/07/2014	20/11/2014	02/02/2015	11/11/2015	13/02/2016	11/12/2016	15/02/2017	10/02/2017	11/02/2017	17/02/2017
Sample Name				B11	EPA	EPA	B20	B20	B20	B4	B20	B20	ABCOM	ABCOM	ABCOM	ABCOM	ABCOM	ABCOM	ABCOM	ABCOM	
				Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	Concentration	
Parameters																					
ODC	mg	0.5	SD	4	3	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
Conductivity	µS	7.5	GV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Chlorine	mg	0.5	GV	<0.5	3	14	2	19	3	7	7	7	7	7	7	7	7	7	7	7	
Total Chlorine	mg	0.5	GV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Iron	mg	1.0	GV	-	-	-	0.10	0.1	-	-	0.30	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Copper	mg	1500	GV	<5	2	25	25	44	11	1.1	55	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Total Iron	mg	200	GV	-	-	-	-	-	-	-	-	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Lead	mg	1.0	GV	-	-	-	0.1	0.1	-	-	0.10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Nitrate	mg	15	GV	-	-	11	20	11	10	2	1	1	1	1	1	1	1	1	1	1	
Nitrate	mg	150	GV	-	-	-	-	-	-	-	12	3	0.5	2	0.5	0.5	0.5	0.5	0.5	0.5	
pH																					
Total Hardness (as CaCO3)	mg	500	GV	-	120	63	63	120	120	120	120	120	120	120	120	120	120	120	120	120	
Alkalinity	mg	50.0	GV	-	-	-	-	-	-	-	-	15.20	14.50	13.40	13.7	13.20	13.3	13.1	13.1	13.1	
Total Phosphorus as PO4	mg	0.05	GV	-	-	-	-	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
CO2	mg	0.5	GV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	mg	0.5	GV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Legend
 GV Green: General Assessment Criteria (GAC)
 QTV Green: Quality Threshold Values (QTV) Q
 QTV Green: Quality Threshold Values (QTV) Q
 QTV Green: Quality Threshold Values (QTV) Q
 - Not analysed

Table E.
 Owner: Historic Brundage State
 Project: Wooded Timber Land
 Location: 2018 Annual Water Quality Report
 Aughton, Co. Wisconsin
 Job No: PR-202113

Parameter ID	Units	CAC	Source	CSP											
				08/07/2014	08/12/2014	10/06/2015	11/11/2015	13/06/2016	1/11/2016	13/06/2017	10/12/2017	17/05/2018	10/09/2018	1/11/2018	
Method				AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM
Sample ID				08/07/2014	08/12/2014	10/06/2015	11/11/2015	13/06/2016	1/11/2016	13/06/2017	10/12/2017	17/05/2018	10/09/2018	1/11/2018	
Chromium	mg/L	0.1	OTV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Total Chromium	mg/L	0.1	OTV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Total Chromium III	mg/L	0.02	OTV	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Hexavalent Chromium	mg/L	0.08	OTV	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	
Copper	mg/L	0.05	OTV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Total Iron	mg/L	0.3	OTV	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	
Lead	mg/L	0.05	OTV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Manganese	mg/L	0.05	OTV	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Nitrate	mg/L	10	OTV	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
NO ₃ -N	mg/L	10	OTV	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
SD	mg/L	1.0	OTV	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Total Hardness (as CaCO ₃)	mg/L	200	OTV	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	
Residual Chlorine	mg/L	0.5	OTV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Total Phosphorus as PO ₄ -P	mg/L	0.1	OTV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
DO ₂₀₀	mg/L	0.5	OTV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	

Legend
 OTV - Occurrence Threshold Values (OTV)
 GW - Groundwater Values (GW)
 - Not analyzed

Table 7: Historic Surface Water Data
 Client: Woodfibre Timber Limited
 Project: 2018 Annual Water Quality Report
 Location: Aughtin, Co. Wicklow
 Job No: PR-303113

Sample ID	Date	Sampled By	Sample Matrix	#W2													
				22/01/2008	21/07/2008	03/05/2009	13/07/2010	23/03/2010	02/03/2011	16/07/2012	22/02/2013	26/05/2014	15/03/2015	14/03/2016	31/03/2017	26/03/2018	
				STC	EPA	BHP	BSP	BSP	BSP	BSP	BSP	BSP	BSP	BSP	AS-2H	AS-2H	AS-2H
				Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Parameters	Units	GAC	Source														
Total Arsenic	ug/l	25	EGS	34	88	1.5	<0.9	<0.9	<0.98	<0.9	<1	<0.01	14.7	5.1	8.3	7.9	
Total Boron	ug/l	750	GTV	273	215	36	8	3	<1	<1	<1	<0.005	5	19	31	31	
Total Chromium	ug/l	32	EGS	25	19	78	2	3	<1	<1	<1	<0.001	415	<1.5	1.3	<1.5	
Total Copper	ug/l	5	EGS	240	39	33	44	87	81	82	87	<0.001	39	88	81	88	
Total Manganese	ug/l	300	IGV	-	-	-	-	-	-	-	-	-	797	344	389	393	
Total Phosphorus	ug/l	nv	nv	200	-	79	0.22	0.04	0.09	0.09	0.01	0.28	65	71	48	72	
Miscellaneous																	
Propiconazole	ug/l	nv	nv	2.93	-	<0.01	<0.01	<0.01	<0.01	<0.02	-	-	<0.1	<0.1	26.4	<0.1	
ODD	mg/l	nv	nv	1750	-	30	20	400	18	105	184	31	170	204	117	436	
Nitrate	mg/l	37.5	GTV	<0.3	-	1.81	5.18	3.14	8.12	18.6	3.25	1.712	4.9	0.5	<0.2	<0.2	

Legend

xxx	Exceeds Generic Assessment Criteria (GAC)
EGS	Environmental Quality Standard (EQS), Outlined in Surface Water Regulations (S.I. No. 272 of 2009)
GTV	Groundwater Threshold Value (GTV), Outlined in Groundwater Regulations (S.I. No. 9 of 2010 / S.I. No. 369 of 2016)
IGV	Interim Guideline Values (IGV) presented by EPA in 2003
-	Not analysed

Table 7: Historic Surface Water Data
Client: Woodfin Timber Limited
Project: 2018 Annual Water Quality Report
Location: Aughtim, Co. Wicklow
Job No: PR-202113

Sample ID	BW4															
	22/11/2008	28/07/2008	05/02/2008	12/11/2008	22/04/2009	08/07/2009	28/08/2009	04/02/2009	23/11/2009	23/03/2010	01/06/2010	01/09/2010	01/01/2011			
Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water			
Parameters	Units	GAC	Source													
Total Arsenic	µg/l	25	EQS	31	21	22	18	22	<1	-	21	14	<0.1	<0.18	<0.18	<0.18
Total Boron	µg/l	750	GTV	273	111	38.2	87.1	31	1	<50	47	5	8	2	5	4
Total Chlorides	mg/l	32	EQS	28	<5	8	<1	18	3	13	27	4	4	2	25	1
Total Copper	µg/l	5	EQS	208	28	21	12	138	28	75	28	25	<1	<0.1	<0.1	<0.1
Total Manganese	µg/l	300	GTV	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorus	µg/l	nv	nv	300	300	400	387	503	2300	-	100	510	10	10	100	230
Miscellaneous																
Propiconazole	µg/l	nv	nv	2.33	2.04	0.083	<0.1	1.29	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
COD	mg/l	nv	nv	1750	53	108	107	69	300	380	88	130	510	280	37	20
Nitrate	mg/l	37.5	GTV	<0.3	<0.3	<0.3	<0.3	<0.3	2.78	-	1.18	8.99	28.77	4.22	18.2	31.1

Legend

KE	Exceeds Generic Assessment Criteria (GAC)
EQS	Environmental Quality Standard (EQS), 0
GTV	Groundwater Threshold Values (GTVs)
KV	Interim Guideline Values (IGVs) presented
-	Not analysed

Table 7: Historic Surface Water Data
 Client: Woodfab Timber Limited
 Project: 2018 Annual Water Quality Report
 Location: Aughtlin, Co. Wicklow
 Job No: PR-303113

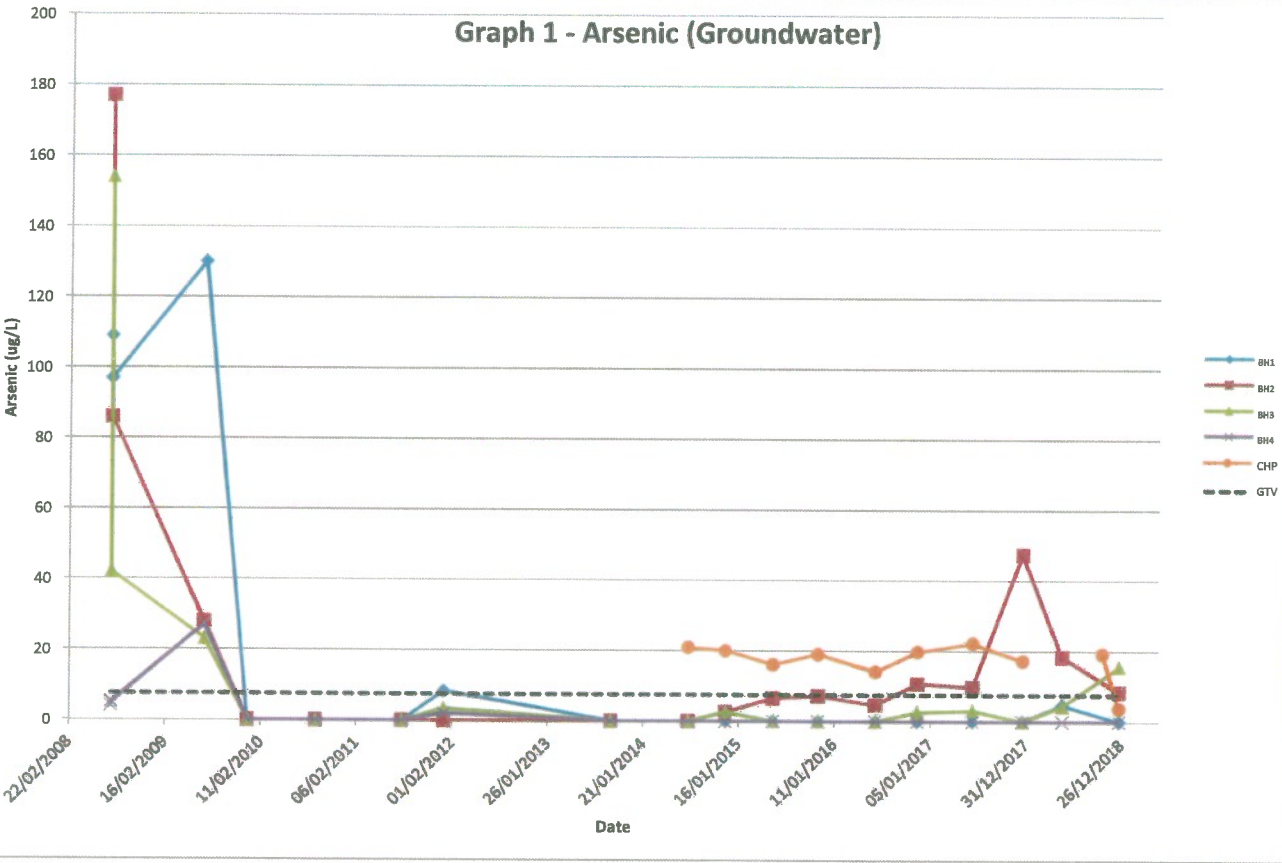
Sample ID	BWH																	
Date	28/11/2014	13/03/2015	26/05/2015	21/09/2015	11/11/2015	14/03/2016	13/06/2016	25/08/2016	17/11/2016	31/03/2017	13/05/2017	20/10/2017	18/12/2017	28/03/2018	17/05/2018	15/10/2018	17/12/2018	
Sampled By	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	AECOM	
Sample Matrix	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	
Parameters	Units	GAC	Source															
Total Azoic	ug/l	25	EQS	171	133	23	24	33	283	13	218	243	61	25	18.9	-	-	18
Total Boreon	ug/l	170	GTV	212	25	18	22	31	19	30	44	15	44	48	29	<1.2	-	19
Total Chromium	ug/l	32	EQS	15	<1.5	<1.5	<1.5	1.6	<1.5	<1.5	<1.5	<1.5	<1.5	2.6	<1.5	<1.5	-	<1.5
Total Cadmium	ug/l	5	EQS	62	<7	<7	7	<7	<7	<7	<7	<7	<7	<7	19	<7	-	<7
Total Manganese	ug/l	205	EQS	185	177	179	88	188	188	188	188	188	188	188	188	188	188	188
Total Phosphorus	ug/l	nv	nv	843	132	10	63	92	30	161	25	100	426	22	571	55	-	45
Miscellaneous																		
Propiconazole	ug/l	nv	nv	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
CO2	mg/l	nv	nv	368	614	-	18	-	417	76	88	651	391	123	350	281	676	-
Nitrate	mg/l	37.2	GTV	0.2	2.2	<0.2	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Legend

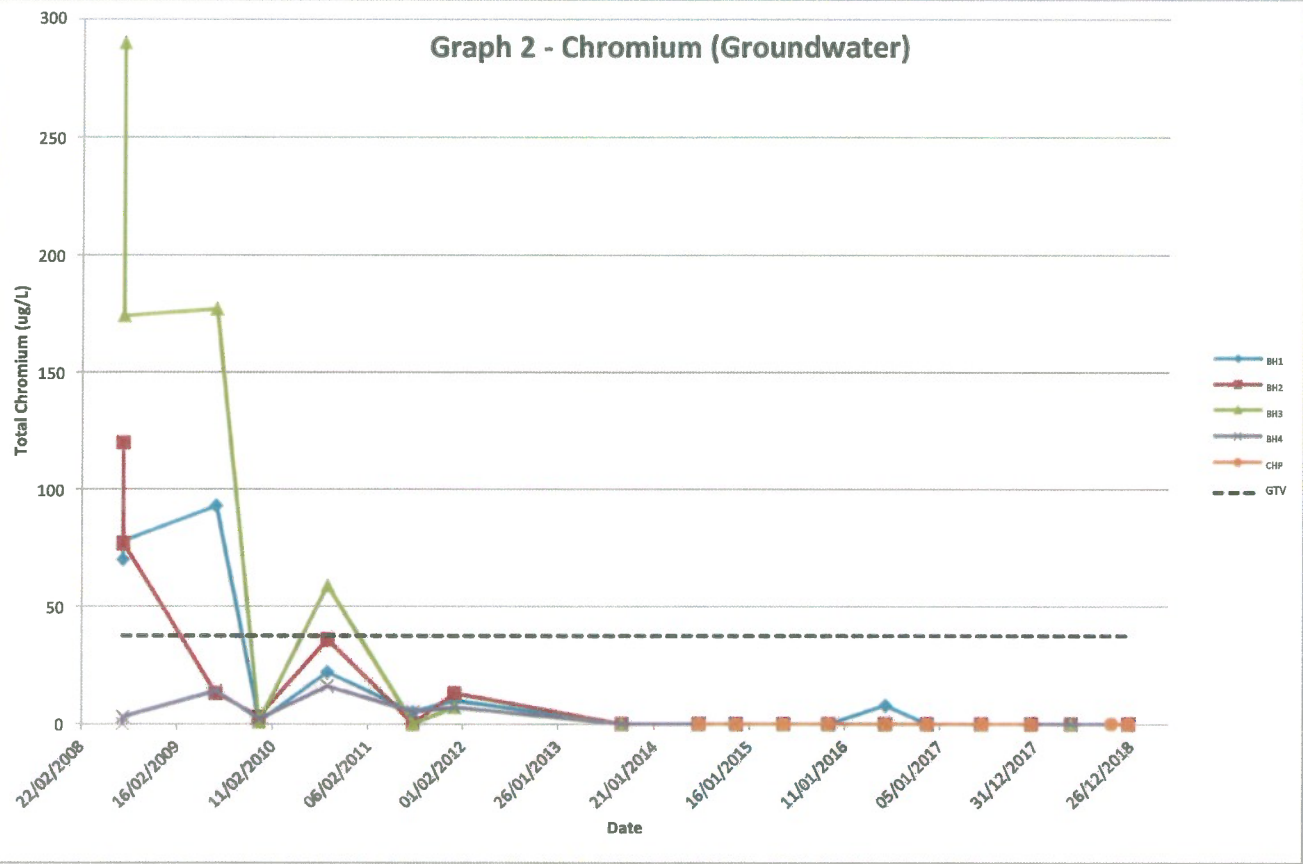
EQS	Exceeds Generic Assessment Criteria (GAC)
EQS	Environmental Quality Standard (EQS), O
GTV	Groundwater Threshold Values (GTVs)
GVV	Water Quality Values (GVV) presented
-	Not analysed

Appendix A – Historical Data Graphs

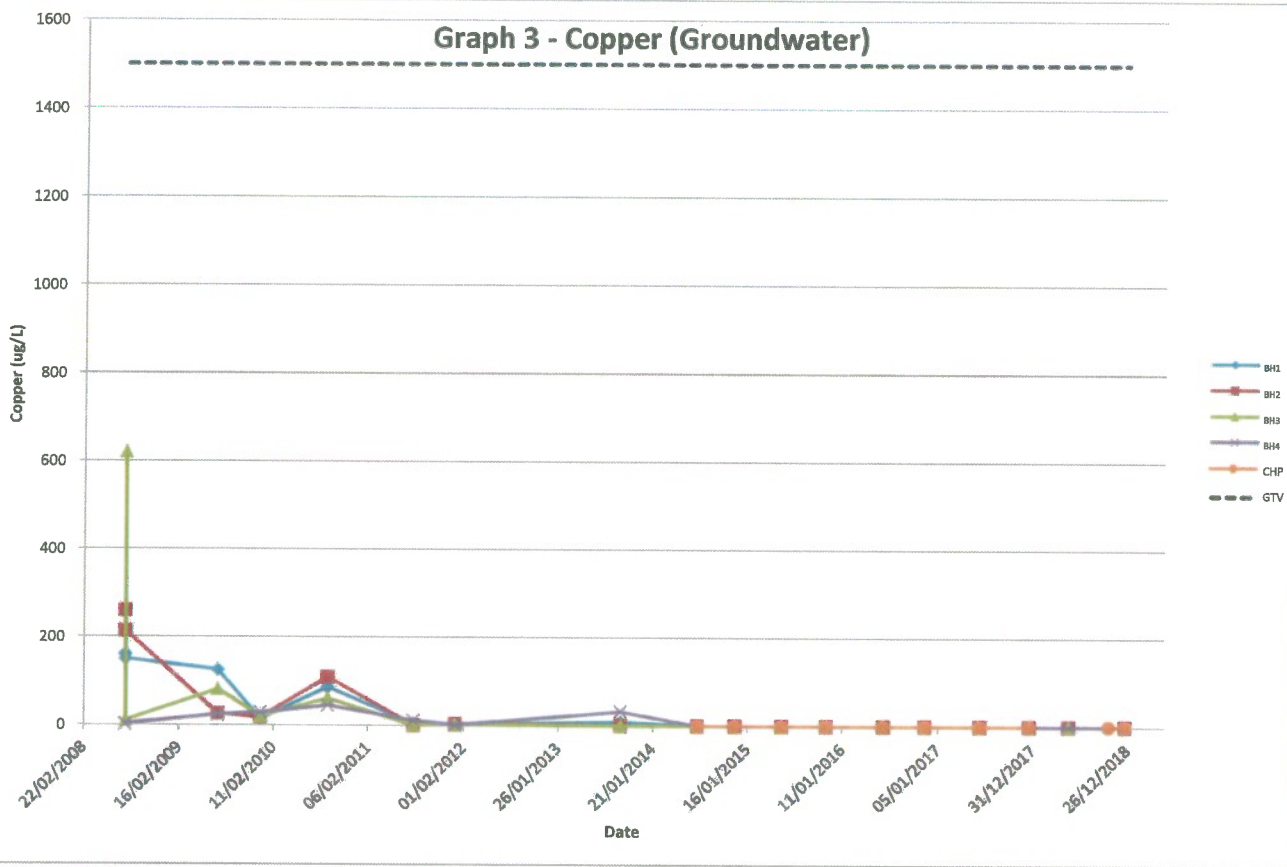
Graph 1 - Arsenic (Groundwater)



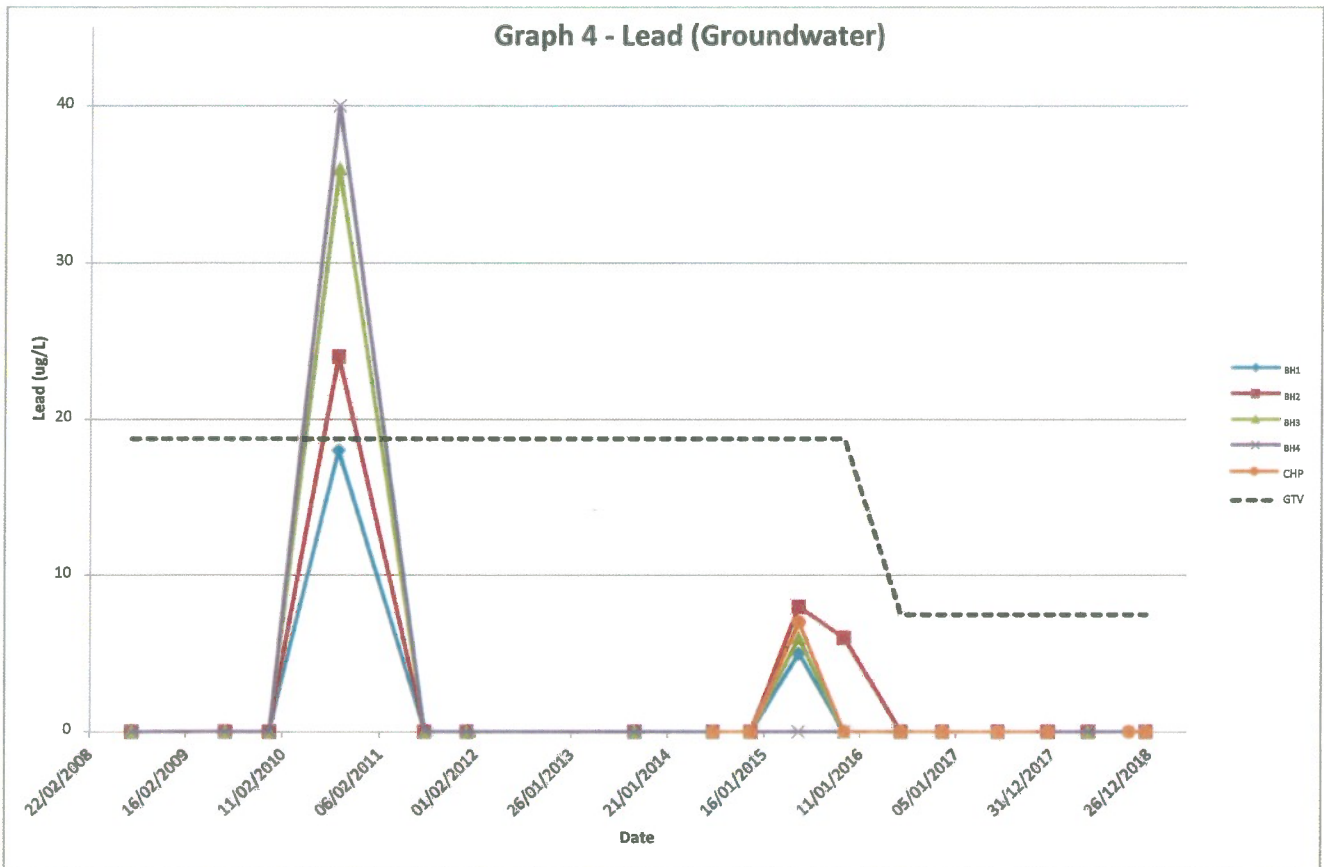
Graph 2 - Chromium (Groundwater)



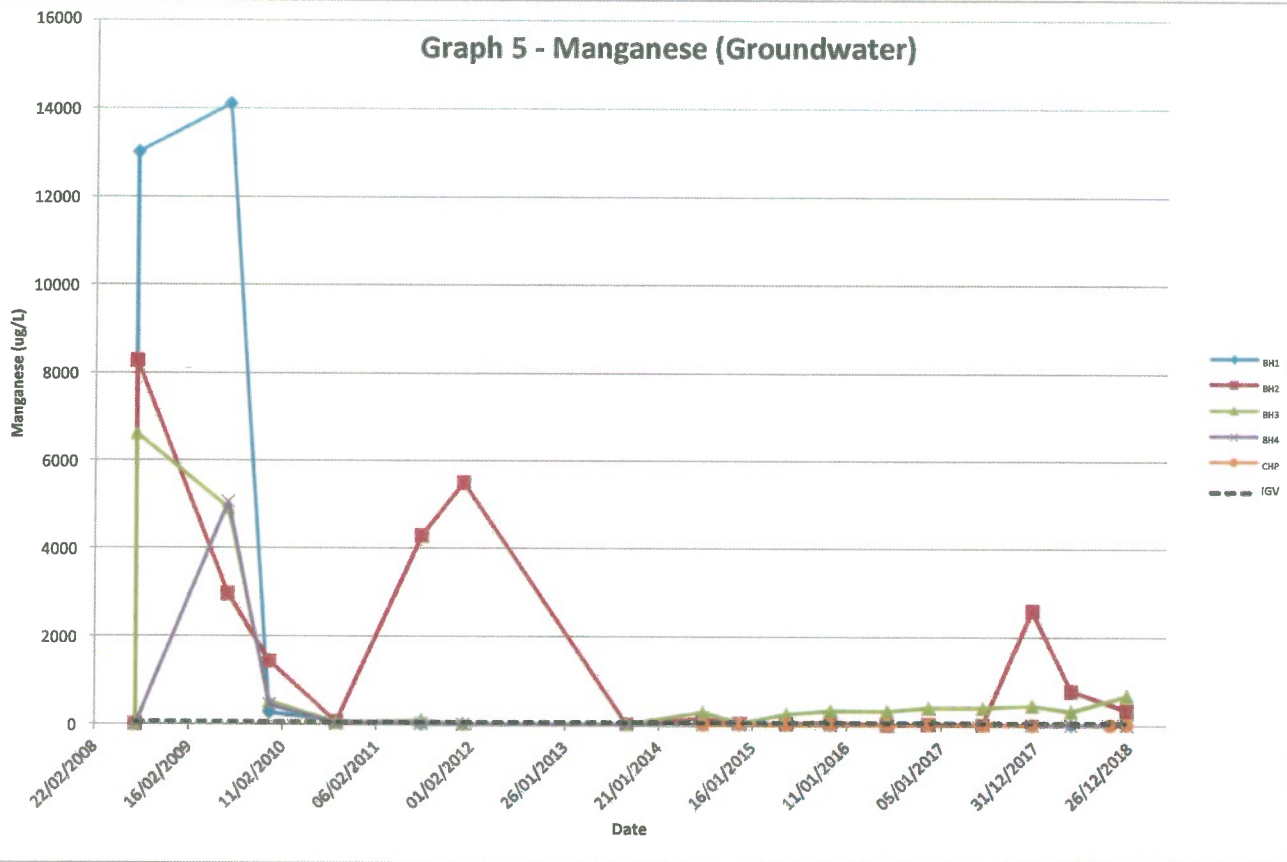
Graph 3 - Copper (Groundwater)



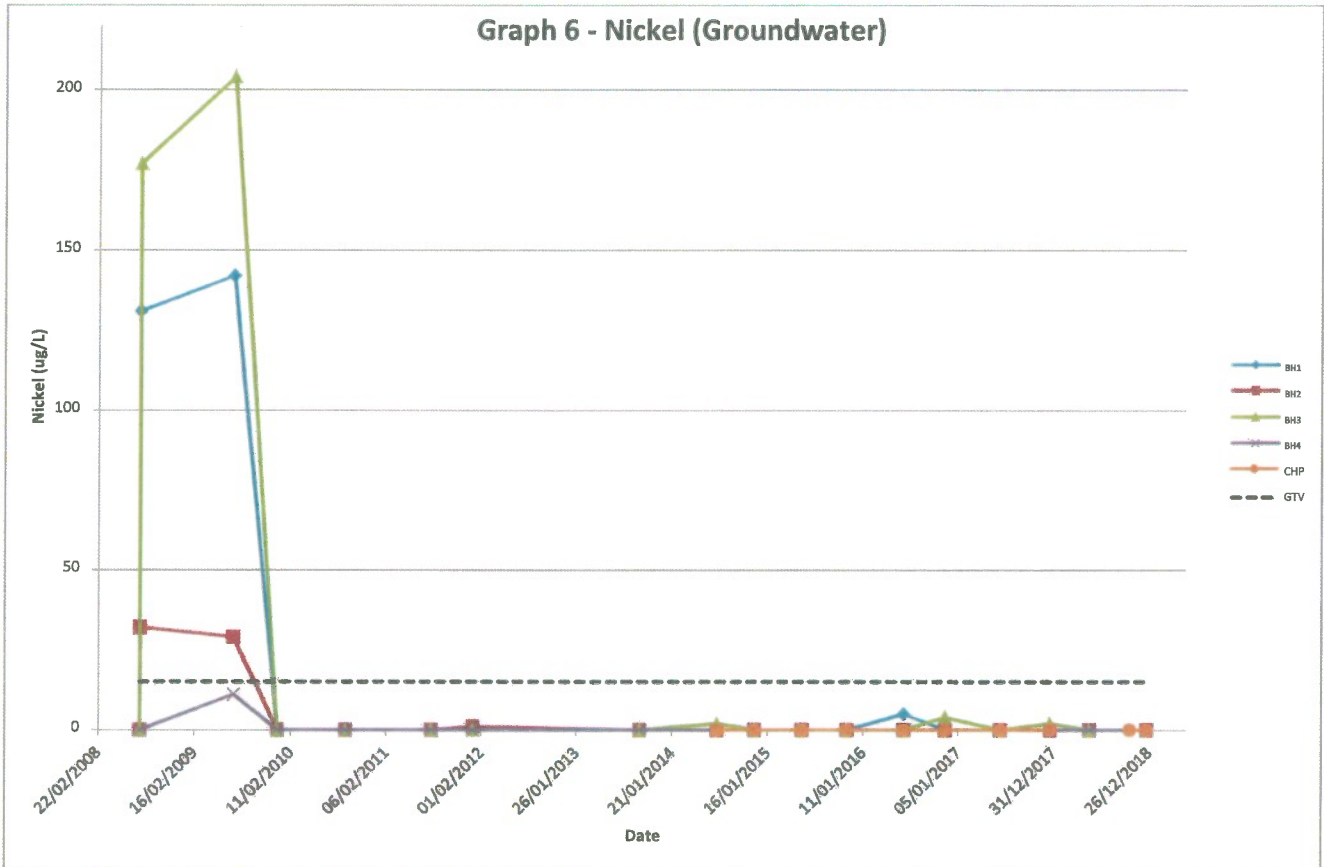
Graph 4 - Lead (Groundwater)



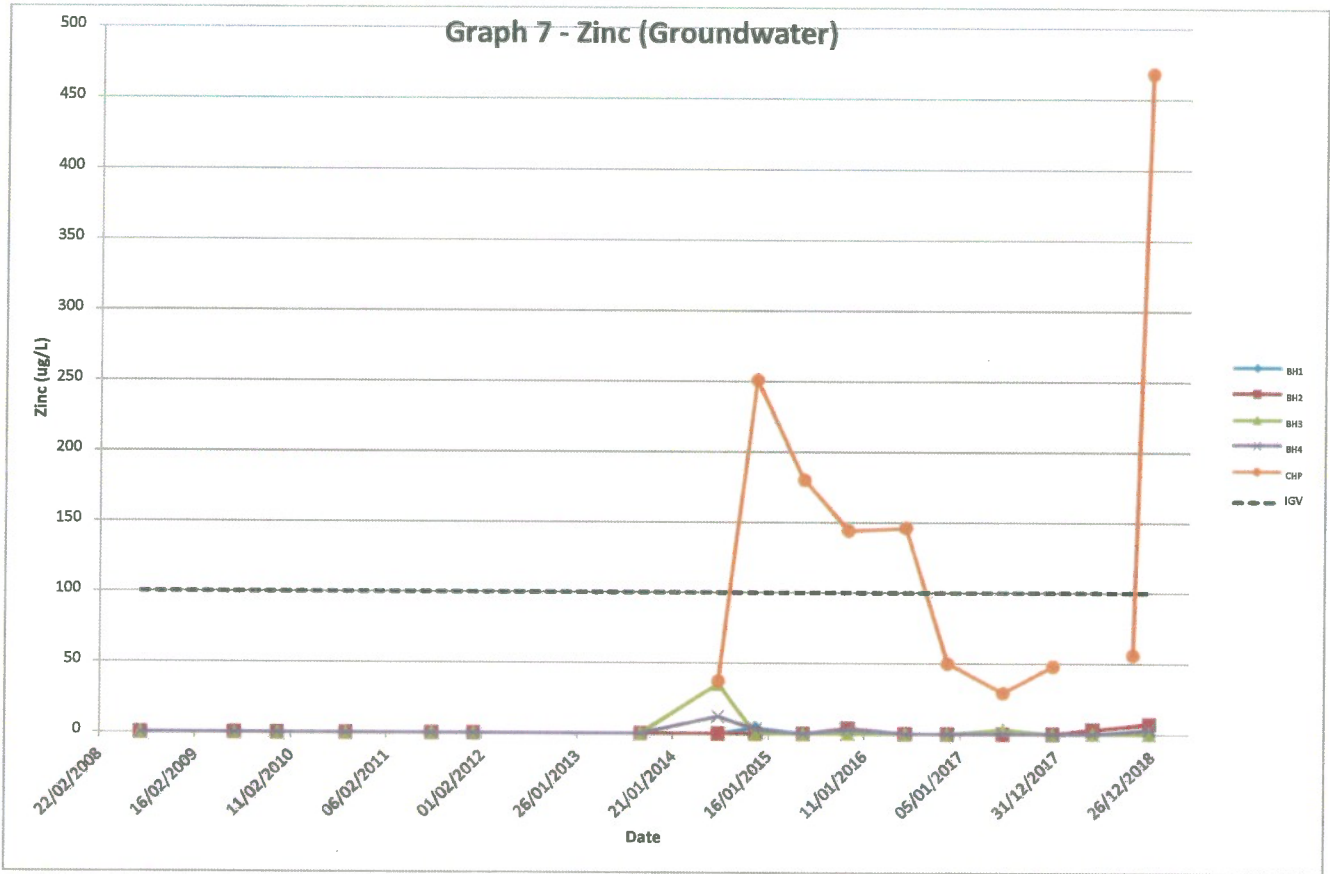
Graph 5 - Manganese (Groundwater)



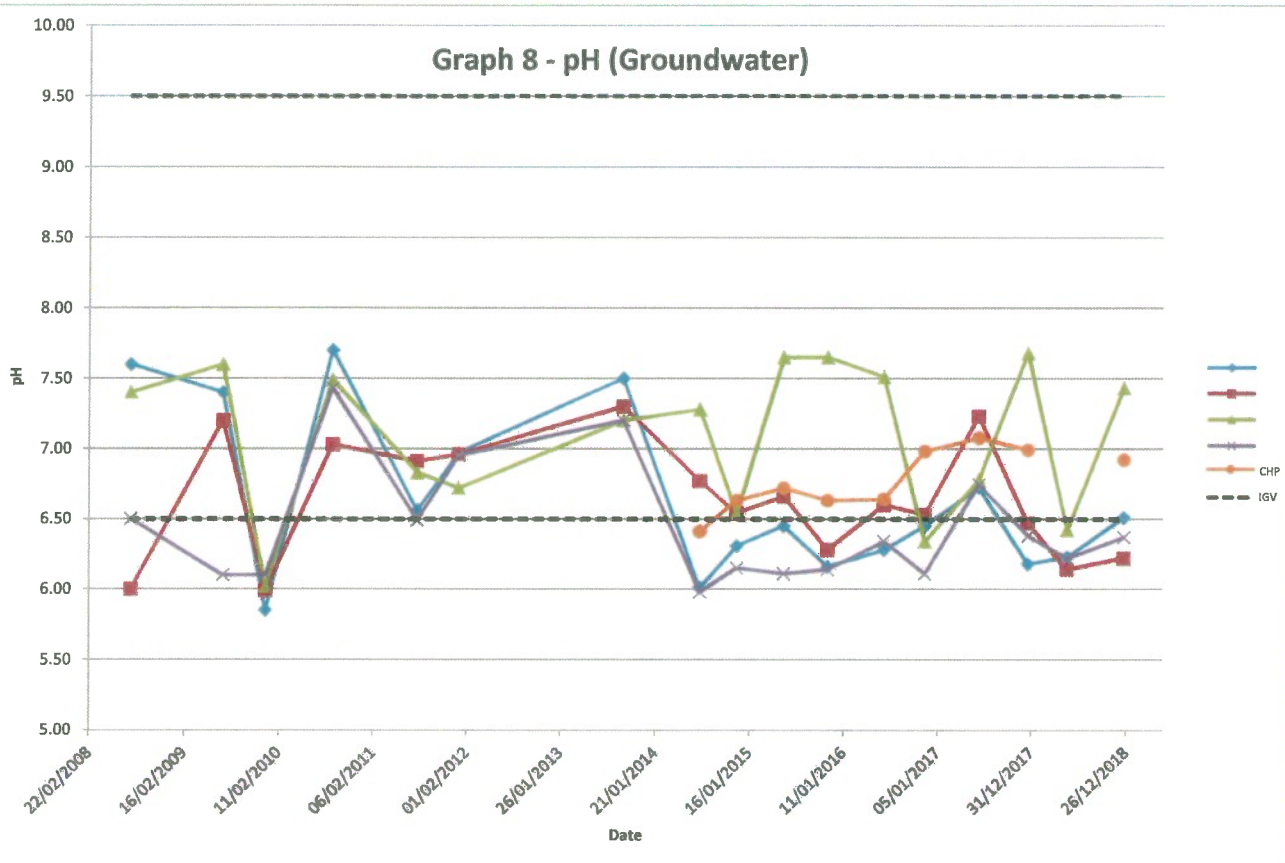
Graph 6 - Nickel (Groundwater)



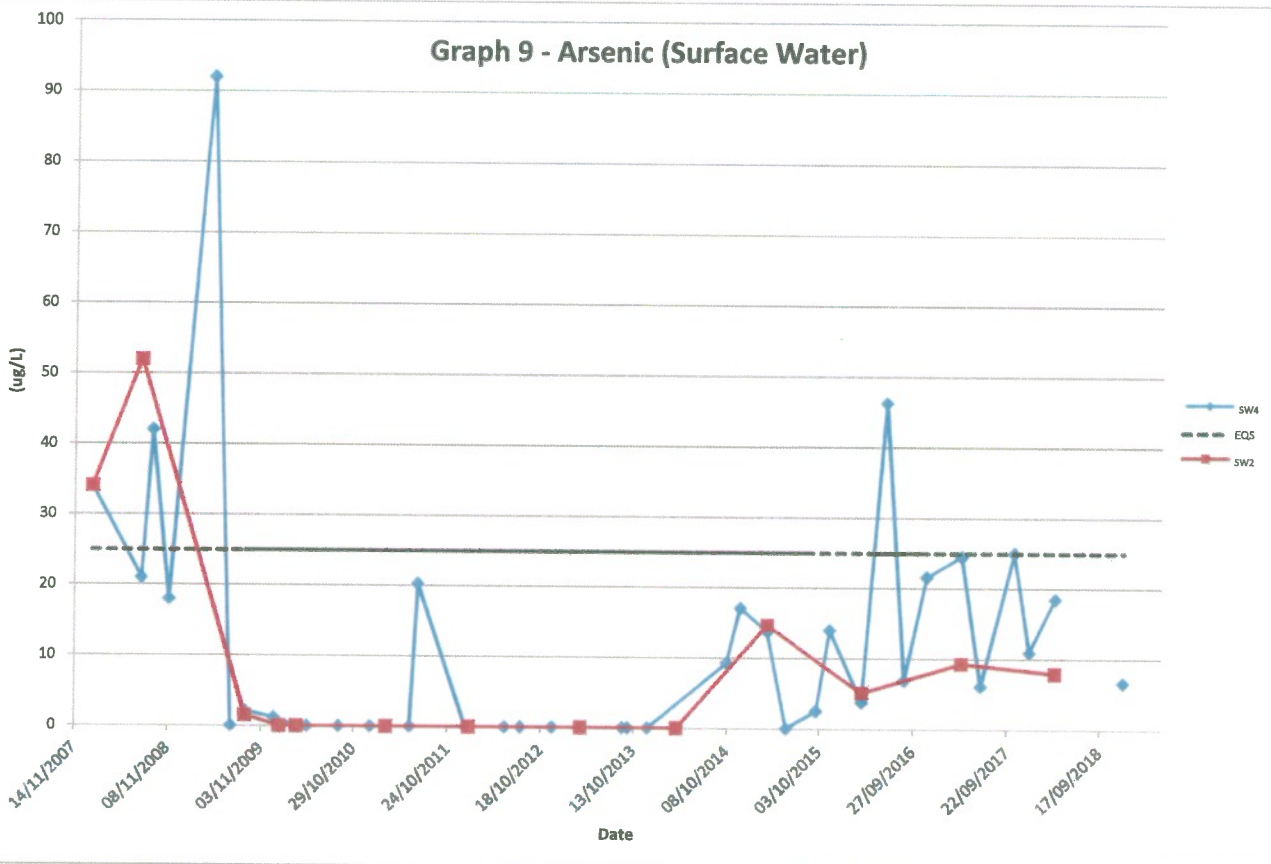
Graph 7 - Zinc (Groundwater)



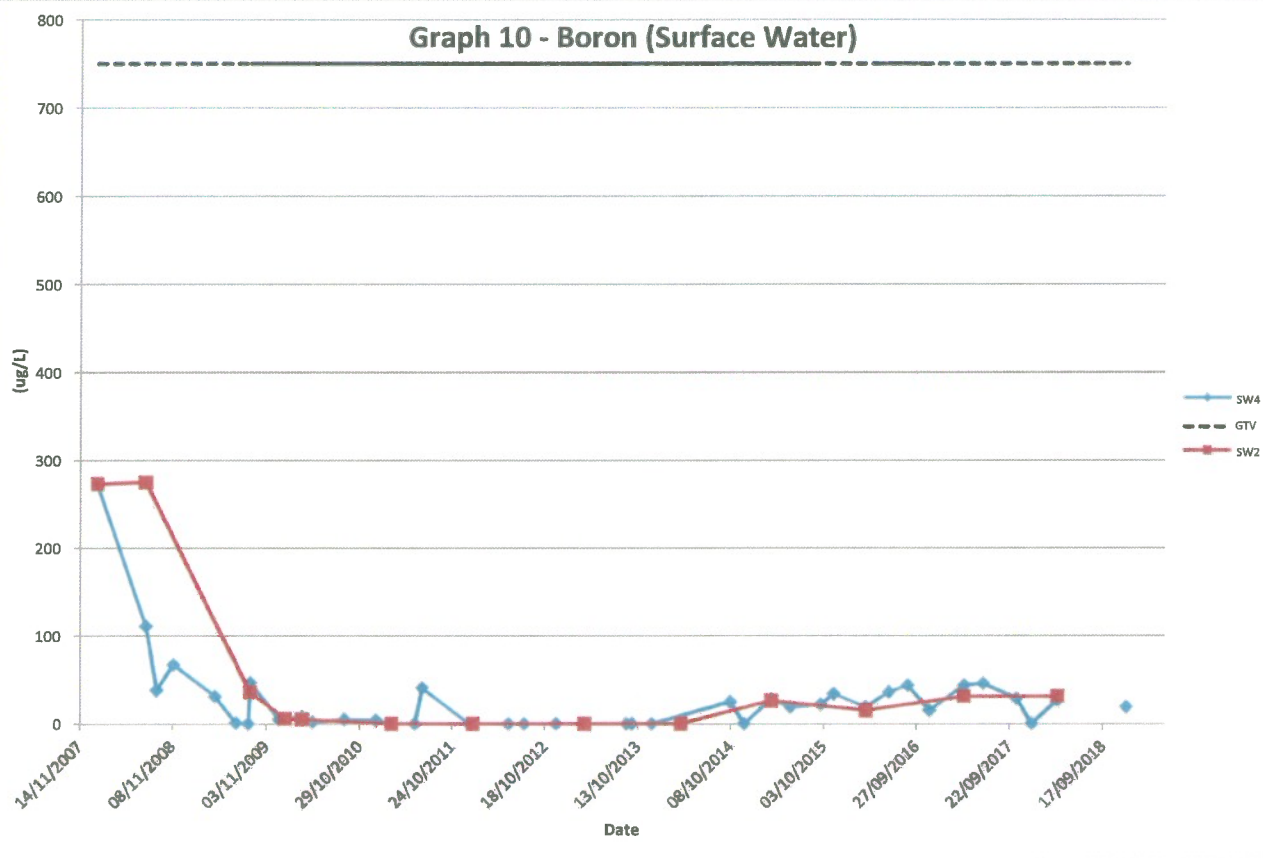
Graph 8 - pH (Groundwater)



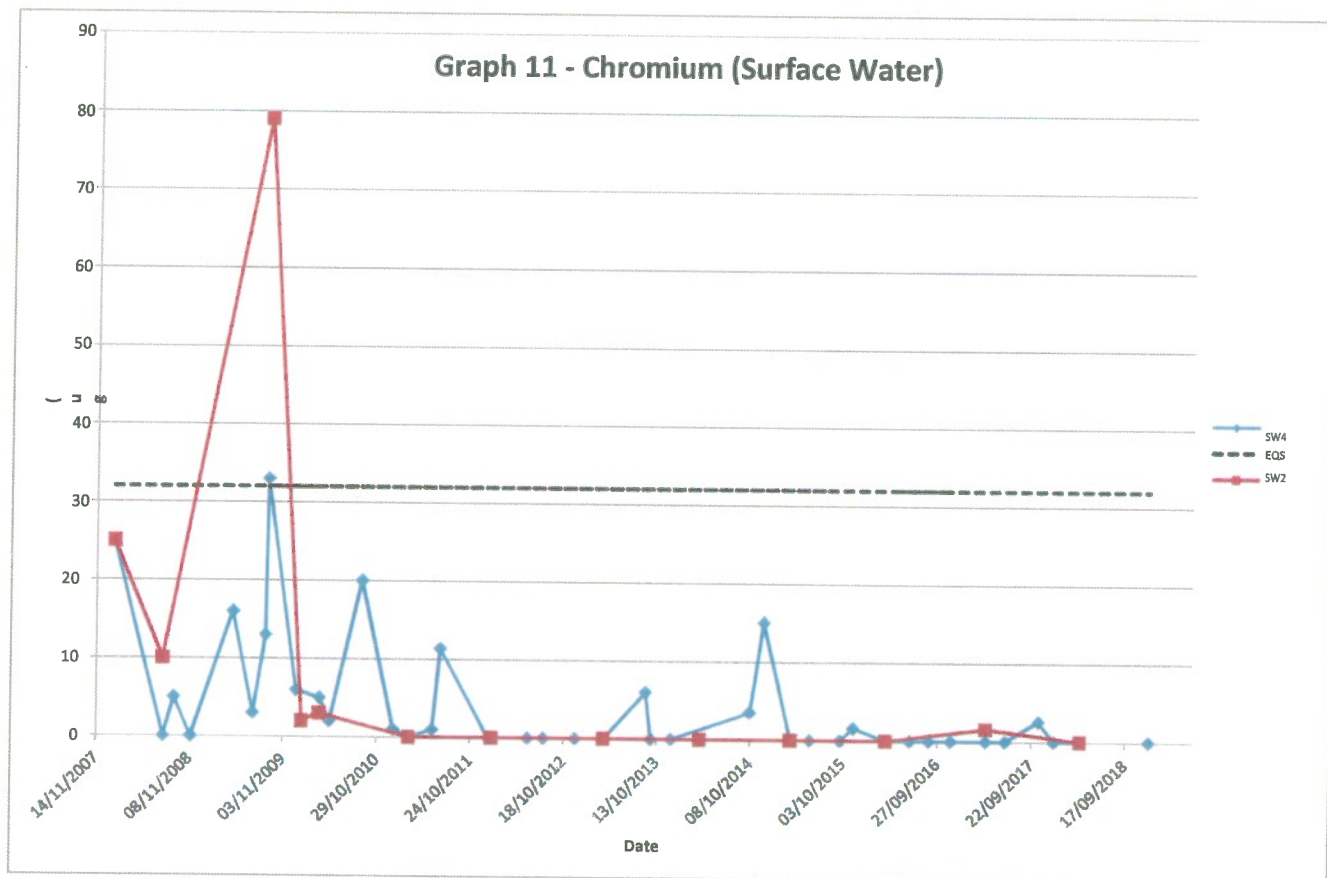
Graph 9 - Arsenic (Surface Water)



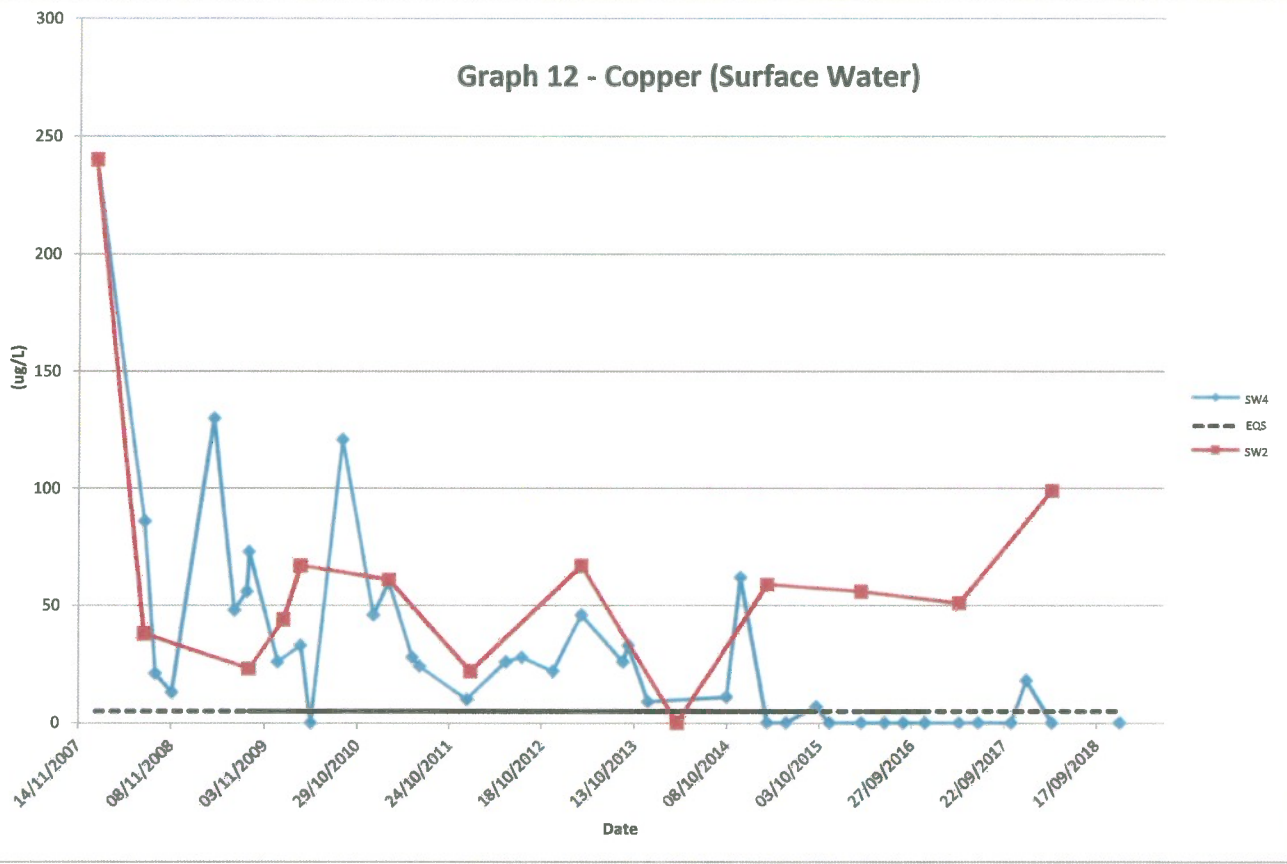
Graph 10 - Boron (Surface Water)



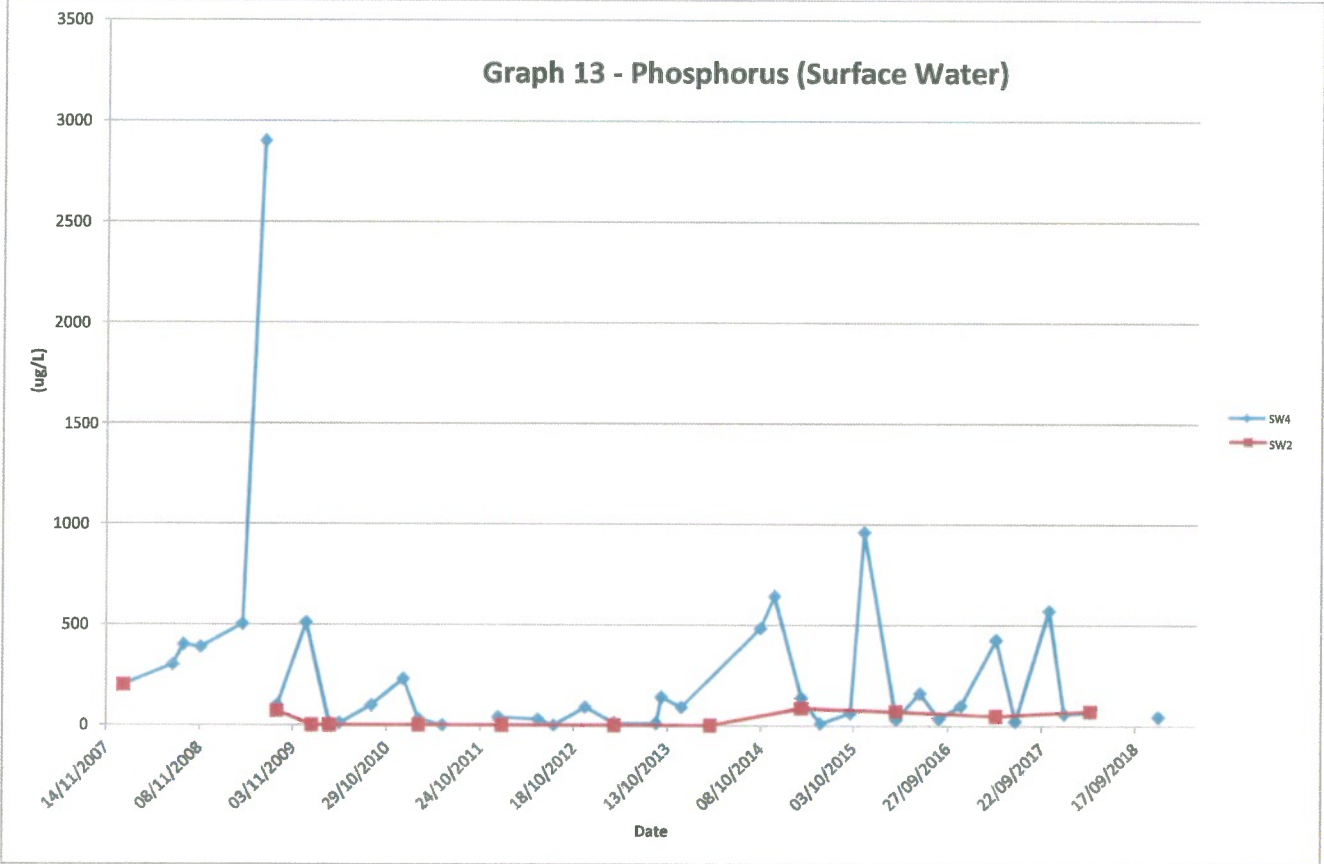
Graph 11 - Chromium (Surface Water)



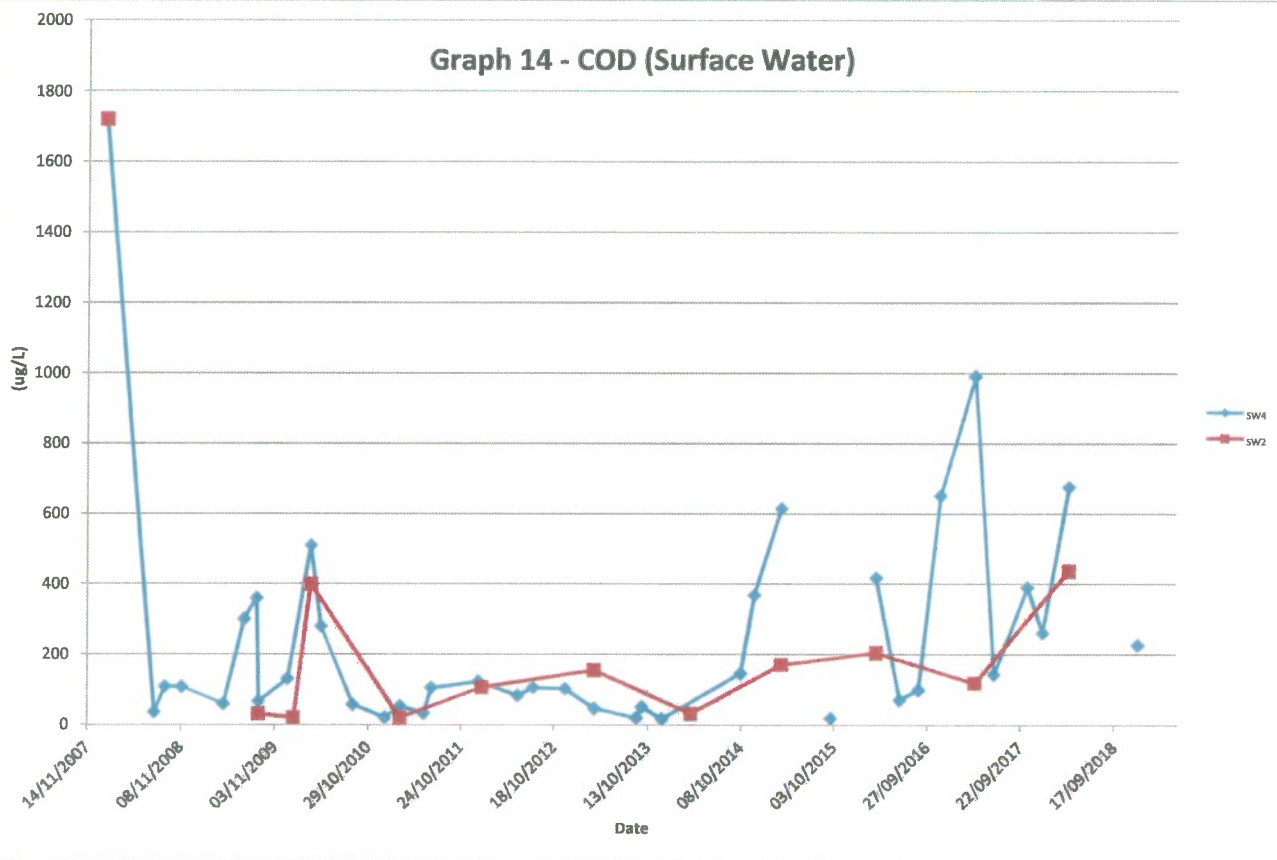
Graph 12 - Copper (Surface Water)



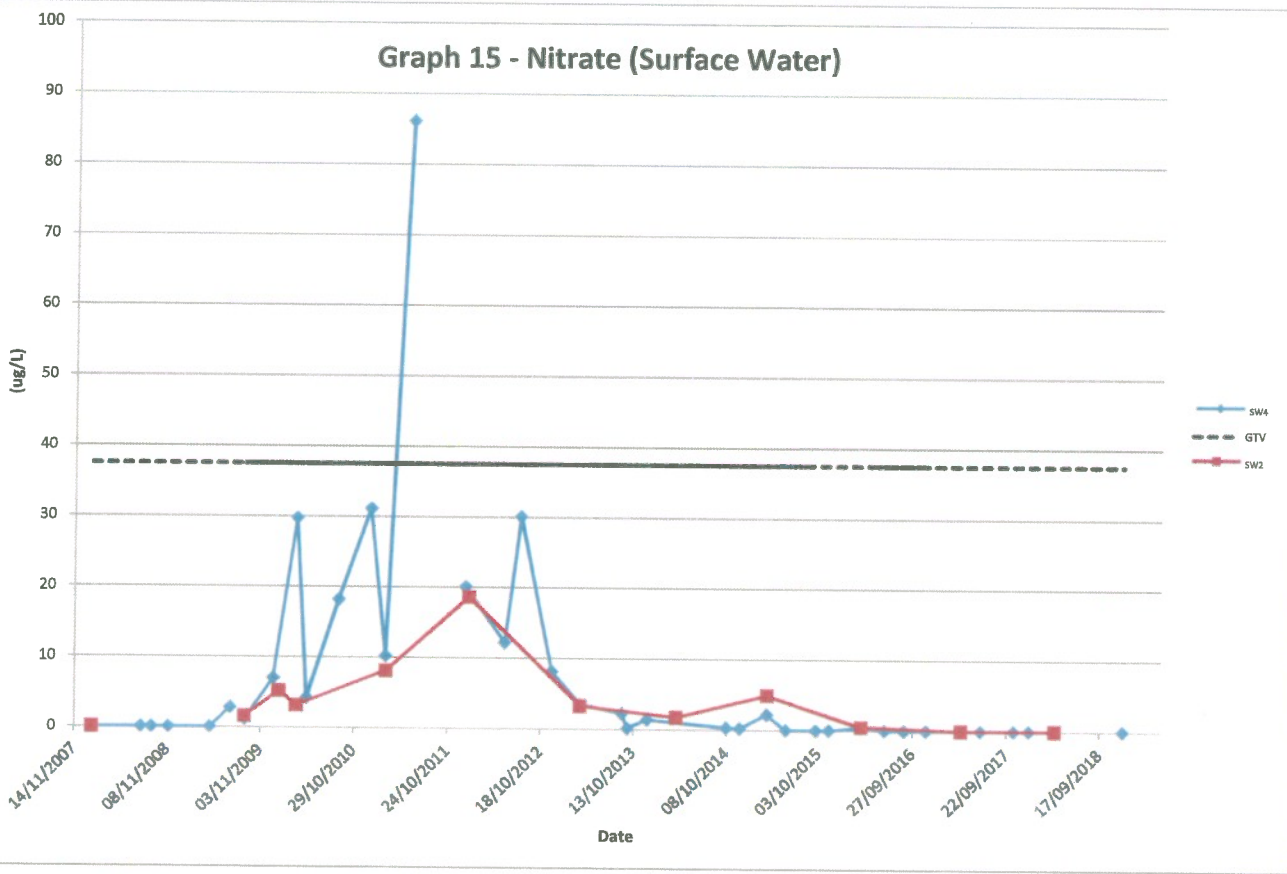
Graph 13 - Phosphorus (Surface Water)



Graph 14 - COD (Surface Water)



Graph 15 - Nitrate (Surface Water)



Appendix B – JEL Laboratory Reports



Exova Jones Environmental

Registered Address: Exova UK Ltd, Lechend Industrial Estate, Newbridge, Airdrie, EH18 2PL

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Deeside Industrial Park
Deeside
CH5 2UA

AECOM
4th Floor Adelphi Plaza
Adelphi Centre
Georges Street Upper

Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



Attention : Brian Duggan
Date : 10th April, 2018
Your reference :
Our reference : Test Report 18/4878 Batch 1
Location : Woodfab
Date samples received : 3rd April, 2018
Status : Final report
Issue : 1

Two samples were received for analysis on 3rd April, 2018 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Boden BSc
Project Manager

Client Name: AECOM
Reference:
Location: Woodfab
Contact: Brian Duggan

Job	Batch	Sample ID	Depth	No.	Analysis	Reason
No deviating sample report results for job 18/4878						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/4878

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x20 Dilution

JE Job No: 18/4878

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometrically.	PM0	No preparation is required.	Yes			
TM72	Redox Potential is measured by HI98120 redox meter.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
NONE	No Method Code	NONE	No Method Code				



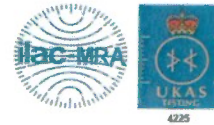
Exova Jones Environmental

Registered Address: Exova (UK) Ltd, LCC/10/01 Industrial Estate, Newbridge, Bedfordham, FK22 9FL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

AECOM
4th Floor Adelphi Plaza
Adelphi Centre
Georges Street Upper

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781



Attention : Brian Duggan
Date : 31st May, 2018
Your reference : PR-303113
Our reference : Test Report 16/7795 Batch 1
Location : Woodfab
Date samples received : 22nd May, 2018
Status : Final report
Issue : 1

Five samples were received for analysis on 22nd May, 2018 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Boden BSc
Project Manager

Client Name: AECOM
 Reference: PR-303113
 Location: Woodfab
 Contact: Brian Duggan

Matrix : Liquid

Job	Batch	Sample ID	Depth	No.	Analysis	Reason
18/7795	1	-	-	-	Samples : 1-7,8-14,15-21,22-28,29-35	Liquid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
 Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/7795

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/7795

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry), Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry), Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			



Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower, Leadenhall Place, London, SW1W 0UR, Reg. No. 11371619

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Adelphi Centre
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Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



Attention : Janette Simpson
Date : 22nd October, 2018
Your reference : PR 303113
Our reference : Test Report 18/16613 Batch 1
Location : Woodfab
Date samples received : 16th October, 2018
Status : Final report
Issue : 1

One sample were received for analysis on 16th October, 2018 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Simon Gomery BSc
Project Manager

Client Name: AECOM
 Reference: PR 303113
 Location: Woodfab
 Contact: Janette Simpson.
 JE Job No.: 18/16613

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

J E Sample No.									Please see attached notes for all abbreviations and acronyms		
Sample ID	CHP WELL										
Depth											
COC No / misc											
Containers	VHN P G										
Sample Date	15/10/2018 10:00										
Sample Type	Ground Water										
Batch Number	1										
Date of Receipt	16/10/2018								LOD/LOR	Units	Method No.
Dissolved Arsenic #	19.2								<2.5	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5								<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5								<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7								<7	ug/l	TM30/PM14
Total Dissolved Iron #	29								<20	ug/l	TM30/PM14
Dissolved Lead #	<5								<5	ug/l	TM30/PM14
Dissolved Manganese #	4								<2	ug/l	TM30/PM14
Dissolved Nickel #	<2								<2	ug/l	TM30/PM14
Dissolved Zinc #	56								<3	ug/l	TM30/PM14
Total Hardness Dissolved (as CaCO ₃)	122								<1	mg/l	TM30/PM14
Propiconazole	<0.1								<0.1	ug/l	TM16/PM30
Aliphatics											
>C5-C6 #	<10								<10	ug/l	TM36/PM12
>C6-C8 #	<10								<10	ug/l	TM36/PM12
>C8-C10 #	<10								<10	ug/l	TM36/PM12
>C10-C12 #	<5								<5	ug/l	TM5/PM18/PM30
>C12-C16 #	<10								<10	ug/l	TM5/PM18/PM30
>C16-C21 #	<10								<10	ug/l	TM5/PM18/PM30
>C21-C35 #	<10								<10	ug/l	TM5/PM18/PM30
Total aliphatics C5-35 #	<10								<10	ug/l	TM5/PM18/PM30
Aromatics											
>C5-EC7 #	<10								<10	ug/l	TM36/PM12
>EC7-EC8 #	<10								<10	ug/l	TM36/PM12
>EC8-EC10 #	<10								<10	ug/l	TM36/PM12
>EC10-EC12 #	<5								<5	ug/l	TM5/PM18/PM30
>EC12-EC16 #	<10								<10	ug/l	TM5/PM18/PM30
>EC16-EC21 #	<10								<10	ug/l	TM5/PM18/PM30
>EC21-EC35 #	<10								<10	ug/l	TM5/PM18/PM30
Total aromatics C5-35 #	<10								<10	ug/l	TM5/PM18/PM30
Total aliphatics and aromatics(C5-35) #	<10								<10	ug/l	TM5/PM18/PM30
MTBE #	<5								<5	ug/l	TM31/PM12
Benzene #	<5								<5	ug/l	TM31/PM12
Toluene #	<5								<5	ug/l	TM31/PM12
Ethylbenzene #	<5								<5	ug/l	TM31/PM12
m/p-Xylene #	<5								<5	ug/l	TM31/PM12
o-Xylene #	<5								<5	ug/l	TM31/PM12
Sulphate as SO ₄ #	22.4								<0.5	mg/l	TM38/PM0
Hexavalent Chromium	<6								<6	ug/l	TM38/PM0

Client Name: AECOM
 Reference: PR 303113
 Location: Woodfab
 Contact: Janette Simpson

Job	Batch	Sample ID	Depth	No.	Analysis	Reason
No deviating sample report results for job 18/16613						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/16613

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/16613

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 8010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 8010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes			



Exova Jones Environmental

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Attention : Janette Simpson
Date : 4th January, 2019
Your reference : PR 303113
Our reference : Test Report 18/20659 Batch 1
Location : Woodfab
Date samples received : 19th December, 2018
Status : Final report
Issue : 1

Seven samples were received for analysis on 19th December, 2018 of which seven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Simon Gomery BSc
Project Manager

Client Name: AECOM
Reference: PR 303113
Location: Woodfab
Contact: Janette Simpson

Job	Batch	Sample ID	Depth	No.	Analysis	Reason
No deviating sample report results for job 18/20659						

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JE Job No.: 18/20659

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JE Job No: 18/20659

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TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
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