Your Ref: EAWML30058
Our Ref: 49428/3501/CBH/VKR/NC/AREA1GW

19th October 2020

PPC Team
Natural Resources Wales
Rivers House
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**Attn: Tyrone Ward**

Dear Tyrone,

**Re: EAWML30058 - DOCKSWAY DISPOSAL SITE. AREA 1 GROUNDWATER & LEACHATE MONITORING REPORT, ANNUAL SCREEN – SEPTEMBER 2020**

Please find enclosed a summary of the results for the groundwater and leachate quality annual screen 2020, carried out at Area 1 of Docksway Disposal Site, in accordance with the aftercare plan, following definitive closure of Area 1 in October 2014. The monitoring was undertaken during September 2020.

We enclose with this letter report, a plan showing the locations of the primary groundwater monitoring points, (Figure A) and the results of the laboratory testing carried out on the three groundwater compliance wells (GW03_05, GW07_07 and GW03_02), and the eight leachate sampling locations.

**Field Observations**

Details of the field testing results obtained during the 2020 annual screen are presented in Table 1.

**Table 1** Field Testing Observations

| Monitoring Point | Groundwater/Leachate Level (mbgl) | pH | Electrical Conductivity (µS/cm) | Temperature (°C) | Dissolved Oxygen (%) |
|---|---|---|---|---|---|
| GW07_07 | 5.41 | 8.69 | 2494 | 14.12 | 36.40 |
| GW03_02 | 10.07 | 8.36 | 2074 | 15.20 | 40.90 |
| GW03_05 | 6.84 | 8.32 | 2430 | 15.93 | 48.30 |
| LF03_01 | 3.97 | 8.79 | 19460 | 28.75 | 15.25 |
| LF11_01 | 1.69 | 8.01 | 2796 | 13.24 | 60.70 |
| LF11_02 | 12.89 | 8.18 | 6948 | 15.10 | 37.10 |
| LF11_03 | 1.63 | 8.37 | 9609 | 16.63 | 30.70 |
| LF11_04 | 12.06 | 8.80 | 26610 | 19.89 | 27.40 |
| LF11_05 | 25.78 | 8.87 | 17.05 | 17.14 | 31.14 |
| LF11_06 | 2.55 | 8.36 | 7014 | 16.27 | 27.80 |
| LF11_07 | 26.62 | 8.66 | 20200 | 29.50 | 10.60 |

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The monitoring undertaken was an annual screen which comprises the following determinands (* denotes groundwater only):

**Table 2** Testing Determinands

| | | | |
|---|---|---|---|
| Total Alkalinity* | Chromium* | Total Oxidised Nitrogen* | Total Organic Carbon* |
| Ammoniacal Nitrogen | Copper* | Calcium* | VOCs |
| COD* | Lead* | Magnesium* | SVOCs |
| Conductivity* | Manganese* | Potassium | Organochlorine and Organophosphorous Pesticides |
| EPH | Nickel | Sodium* | |
| Mercury | Zinc* | pH* | Cyanide Total |
| Arsenic | Chloride* | Organotins* | Cyanide Free |
| Cadmium* | Sulphate* | Phenols | |

**Groundwater**

Control Levels and Compliance Limits

The Hydrogeological Risk Assessment (HRA) for Area 1 was revised and issued in October 2011, and contains the Control Levels and Compliance Limits that were set and used to assess the groundwater quality across the Area 1 site, prior to formal closure. The annual screen results for the Area 1 groundwater have been assessed against the well specific Compliance Limits contained in the HRA.

The current laboratory limit of detection (LDL) has been used as the Control level and Compliance limit for Benzene, Naphthalene, Xylene, Phenols and Mercury. This may however be subject to change as the laboratory limit of detection changes.

Hazardous Substances (formerly List I substances)

All the priority contaminants specified as 'hazardous substances' in the Area 1 Hydrogeological Risk Assessment (EPH, Arsenic, Benzene, Naphthalene, Xylene and Mercury) were monitored at the compliance wells in September 2020 and all were recorded below the well specific Compliance Limits. The exception to this is for EPH at GW03_02, with a recorded concentration of 442ug/l which exceeds the Compliance Limit of 142.5ug/l, and GW03_05 where the recorded concentration of 278ug/l exceeds the Compliance Limit for this location of 161.3ug/l. Both of these concentrations are higher than the previous years results but are within the range of the overall dataset.

Other Hazardous Substances

The results of the testing for hazardous substances other than the priority contaminants undertaken during September 2020 are presented in the enclosed analytical certificates and are summarised below.

In general, volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs), pesticides and organotins were not detected above the LDL in the majority of the Area 1 groundwater samples tested with the exception of the following.

**Table 3** Additional Exceedances of the LDL

| Monitoring Point | Contaminant | Lab Detection Limit | Recorded Value |
|---|---|---|---|
| GW03_02 | Dichlobenil (pesticide/herbicide) | <0.01 ug/l | >1.38 ug/l |
| GW03_05 | Dichlobenil (pesticide/herbicide) | <0.01 ug/l | 0.573 ug/l |
| GW07-07 | Dichlobenil (pesticide/herbicide) | <0.01 ug/l | 0.118 ug/l |

Dichlobenil was also recorded marginally above the LDL at GW03_02 during the previous five annual monitoring rounds, however the concentration recorded in 2020 is the highest. Given the general groundwater flow direction at the site (towards the south / south east), it is considered that the presence of these parameters in GW03_02 (up hydraulic gradient of the landfills) indicates that the source of these specific parameters is off site.

The SVOC testing also identified additional compounds in the sample from GW07_07 that the laboratory have tentatively identified as follows.

**Table 4** Tentatively Identified Compounds in GW07_07

| Contaminant | Recorded Value |
|---|---|
| Cyclic Octaatomic Sulfur | 755 ug/l |
| Unknown sulfur containing compound | 40.4 ug/l |

Non-Hazardous Substances

All of the "priority contaminants" specified as non-hazardous substances in the Area 1 Hydrogeological Risk Assessment (Ammoniacal Nitrogen, Nickel, Potassium and Phenols) were monitored at the compliance wells as part of the annual screen and were recorded below the well specific Compliance limits.

Chloride and Chemical Oxygen Demand (COD)

Chloride concentrations at GW03_02, GW03_05 and GW07_07 were recorded at 108mg/l, 295mg/l and 354mg/l respectively during this round and these are within the range of data recorded for these monitoring wells.

COD concentrations of 55.6mg/l, 152.0mg/l and 67.2mg/l were recorded at GW03_02, GW03_05 and GW07_07 respectively during this round. The concentrations recorded are within the range of results that have been recorded at these locations.

**Leachate Dip Measurements and Laboratory Test Results**

The level of leachate across Area 1 was monitored in LF03_01 and LF11_01 to LF11_07 in September 2020 and was recorded at levels of between about 6.65m AOD and 15.89 m AOD.

An annual hazardous substance screen was carried out during September 2020 in accordance with the aftercare plan (EAWML 30058). Samples of leachate were obtained and submitted for laboratory testing, from LF03_01, and LF11_01 to LF11_07. There are no Compliance Limits for the leachate at Area 1, and the results of the testing undertaken during September 2020 are presented in the enclosed analytical certificates and are summarised below.

Free Cyanide was not detected at concentrations above the LDL in the leachate wells sampled during this round. However, Phenols were detected at all locations above the LDL with a maximum concentration detected at LF11_05 of 0.79 mg/l.

Pesticides were not detected above the laboratory method detection limit (MDL) in any of the Area 1 leachate samples tested.

A number of results were recorded above the lab limit of detection for volatile organic compounds (VOCs) and semi volatile organic compounds (SVOCs) at each of the monitoring locations, as shown in the table below.

**Table 5** Summary of Parameters Recorded above the MDL in Leachate Samples

| **Parameter** | **Concentrations (ug/l)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **(MDL <1ug/l)** | **LF03_01** | **LF11_01** | **LF11_02** | **LF11_03** | **LF11_04** | **LF11_05** | **LF11_06** | **LF11_07** |
| n-Dibutyl phthalate (SVOC) | <50 | 61.90 | 71.70 | 11.70 | <50 | <50 | 11.1 | <50 |
| Bis(2-Ethylhexyl)phthalate (SVOC) | <100 | <20 | <16 | <16 | <100 | 3960 | <20 | <100 |
| Methyl Tertiary Butyl Ether (VOC) | <1 | <1 | <1 | <1 | 1.14 | 1.41 | 1.51 | 2.79 |
| Cis-1,2-Dichloroethene (VOC) | <1 | <1 | <1 | <1 | <1 | 1.2 | <1 | 2.56 |
| Benzene (VOC) | 4.95 | <1 | 4.64 | 2.56 | 8.10 | 10.8 | 4.51 | 7.20 |
| Toluene (VOC) | 6.56 | <1 | 1.16 | <1 | 8.26 | 7.07 | 1.34 | 3.60 |
| Chlorobenzene (VOC) | 3.71 | <1 | 4.08 | 2.24 | <1 | 1.06 | 2.88 | 1.52 |
| Ethylbenzene (VOC) | 36.30 | <1 | <1 | <1 | 9.18 | 6.99 | <1 | 20.20 |
| m,p-xylene (VOC) | 79.60 | 1.69 | 11.60 | 3.24 | 15.30 | 15.90 | <1 | 10.10 |
| o-xylene (VOC) | 26.90 | <1 | 2.32 | 1.36 | 8.24 | 11.7 | <1 | 14.1 |
| Isopropylbenzene (VOC) | 2.22 | <1 | 1.31 | 1.37 | <1 | 1.37 | 2.81 | 2.77 |
| Propylbenzene | 2.24 | <1 | <1 | <1 | <1 | <1 | <1 | 1.52 |
| 1,3,5-Trimethylbenzene (VOC) | 5.80 | <1 | <1 | <1 | 2.49 | 2.54 | <1 | 3.59 |
| 1,2,4-Trimethylbenzene (VOC) | 26.70 | <1 | 3.69 | 1.27 | 8.26 | 8.43 | <1 | 11.70 |
| 4-iso-Propyltoluene (VOC) | 8.98 | <1 | <1 | <1 | 14.5 | 5.91 | <1 | 1.17 |
| 1,4-Dichlorobenzene (VOC) | 4.49 | <1 | 2.57 | 1.23 | 1.61 | <1 | 2.28 | 1.24 |
| 1,2-Dichlorobenzene (VOC) | <1 | <1 | 1.15 | <1 | <1 | <1 | <1 | <1 |
| Naphthalene (VOC) | 8.37 | <1 | 1.10 | 4.03 | 1.72 | 4.32 | 4.51 | 8.04 |
| Carbon disulphide | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 22.10 |

A number of tentively identified compounds were also detected within a number of the samples, as shown in the table below.

**Table 6** Summary of Tentively Indentified Compounds Detected within Leachate Samples

| Parameter | Concentrations (ug/l) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **LF03_01** | **LF11_01** | **LF11_02** | **LF11_03** | **LF11_04** | **LF11_05** | **LF11_06** | **LF11_07** |
| Total SVOC TIC | 5650 | <100 | 571 | 1550 | 2240 | 210000 | 1310 | 4870 |
| 2(3H)-Benzothiazolone (SVOC) | | | 165 | 138 | | | 101 | |
| 3,5,5-trimethyl hexonic acid (SVOC) | 2380 | | 167 | 758 | 2240 | 1400 | 987 | 4340 |
| p-tert butyle benzoic acid (SVOC) | | | | | | | 112 | |
| Sulphur (SVOC) | | | | | | | | 526 |
| 3,5-di,tert,Butyl-4-hydroxypheny Ipropionic acis | | | | | | 625 | | |
| n-butl Benzenesulfonamide (SVOC) | | | | 758 | | | | |
| Unknown (SVOC) | | | 239 | | | | 106 | |
| Unknown 1 (SVOC) | | | | | | 1100 | | |
| Unknown 2 (SVOC) | | | | | | 769 | | |
| Unresolved Complex Matric (SVOC) | | | | | | 192000 | | |

In previous reports (Sept 2015-2017), we reported an increasing trend in EPH concentrations in LF11_05. In 2018 and again in 2019 the samples indicated a reducing concentration of EPH. LF11_05 has been sampled during September 2020 and the laboratory result indicates an increase in the concentration of EPH from 2019. The table below shows the concentrations of EPH within LF11_05 during the last six years.

**Table 7** Summary of EPH Concentrations in LF11_05

| Monitoring Date | EPH Concentration ug/l |
|---|---|
| Sept 2015 | 460,000 |
| Sept 2016 | 45,700,000 |
| Sept 2017 | 1,160,000,000 |
| Sept 2018 | 3,700,000 |
| Sept 2019 | 137,000 |
| Sept 2020 | 1,420,000 |

During the field monitoring this location has also been noted to have an oily sheen on the water.

**Concluding Remarks**

NCC will continue to monitor the Area 1 groundwater quality in accordance with the aftercare plan and Stantec will comment on the general water quality within subsequent reports.

If you have any questions regarding the data, then please do not hesitate to contact us.

Yours sincerely

**Kate Riley**
**Associate**
on behalf of Stantec UK Ltd

CC: Robert Hughes – NCC (Docksway Disposal Site)
Silvia Gonzalez Lopez - NCC
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