# Dow Corning Ltd Site SPMP Report – 2015

The following items are included within the report:

1. H2 Infrastructure Monitoring Report
2. Spill Report
3. Landfill groundwater Sampling Programme and update on boreholes

# H2 INFRASTRUCTURE MONITORING REPORT Period: 2015

| Infrastructure Element | Monitoring Frequency | Scope of Monitoring | Summary of monitoring performed versus plan and key issues identified | Summary of Remediation Action Taken and/or planned |
|---|---|---|---|---|
| **Bunds and Interceptors** | (every 2-4 years depending on condition, volume & contents hazard) | A programmed visual engineering inspection and condition assessment will be undertaken for:<br>• Foundations<br>• Overall structure<br>• External walls<br>• Ground floor<br>• Stairs and access ladders<br>• Protective coatings<br>• Gratings and covers<br>• Joint sealants, and<br>• Other observations<br><br>The severity and extent of observed defects are assessed using a risk assessment matrix to establish a High, Medium or Low risk for the defect and determine the required response time for remedial attention.<br>• High Risk – Requires attention in the short term i.e. repairs must be done within the year following the inspection.<br>• Medium Risk – Will require attention in medium term, probably after next inspection.<br>• Low Risk – Not urgent; will eventually require attention in the long term. | **Number of inspections carried out:** 16 out of 21 planned.<br><br>**Outstanding Inspections:**<br>Interceptors **I08** (W809 Storm Sump); **I09** (W809 Chem Sump); **I14 (**400 Bays & W820 Washbay); **I15** (1307 Bays) not inspected, as in constant use throughout 2015, &/or limited Area 5 Coordinator resource to jet/prep.<br>Further delay caused due to Waste Water Treatment issues/limitations in QTR3/4 of 2015.<br>Will be inspected in QTR 1 2016.<br><br>Interceptor **I11** (W952 Chem Sump) not inspected, as in constant use throughout 2015, &/or limited Area 5 Coordinator resource to jet/prep.<br>Further delay caused due to compliance change with vac pumping flammable, solid materials from pits. Area 5 currently working on procedure to safely vac out solids to allow inspection to take place.<br>Will be inspected QTR 1 2016.<br><br>**2015 High risk findings = 8No.** | **'High Priority' Defects:**<br>Repair packages were prepared in QTR 1 of 2015 to address the 2014 'High Priority' defects.<br>Approx **£11.1K** has been spent to complete these.<br><br>All 'High Priority' defects recorded in 2015 inspections have been added to the ongoing repair list & will be quoted for & agreed by end QTR 2 2016.<br><br>**'Medium Priority' Defects:**<br>These assets will be reviewed at the next scheduled inspection unless otherwise highlighted as requiring immediate attention. (E.g. from Plant Operators, HONKS, Structural Inspections etc). |

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| | | | Bund **B01** (W802B) – Localised area of chemical pitting to slab & defective design joint material to wall.<br>Bund **B02** (W802A) – Defective design joint material to wall.<br><br>Bund **B07** (W705 200 Tank) – Localised defective mortar joint between acid tiling courses.<br><br>Bund **B16** (W804 E-Tanks) – Localised cracking to slab, damage to concrete wall & defective design joint material to wall.<br><br>Bund **B20** (W404) – Vegetation growth.<br><br>Bund **B25** (W810) – Vegetation growth & defective design joint material to slab.<br><br>Bund **B28** (W810 133 & 134 Tanks) – Vegetation growth & crack to wall.<br><br>Interceptor **I07** (W115) – Ground water infiltration through wall.<br><br>**2015 Low to Medium risk findings = 8No.**<br>**Typical Issues identified:**<br>Minor surface cracks to slabs/walls <5mm wide.<br>Minor chem pitting or condensate wear to slab.<br>Chipped acid tiles.<br>Minor joint sealant deterioration. | |

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| | | | Spalling to top course of brickwork.<br>(Note: to 1No non-compliant bund W404). | |

| Infrastructure Element | Monitoring Frequency | Scope of Monitoring | Summary of monitoring performed versus plan and key issues identified | Summary of Remediation Action Taken and/or planned |
|---|---|---|---|---|
| **Surfaced areas** | Inspection frequency determined by risk score for each hardstanding area. | Appearance of cracks and evidence of fluids ingress into the subsurface;<br><br>• Deterioration of sealed joints in concrete hardstanding;<br>• Vehicular damage to containment kerbs;<br>• Subsidence or movement;<br>• Discolouration/staining<br>• Evidence of surface spalling and/or chemical attack; and<br>• Ponding and/or run off to non hardstanding areas.<br><br>The severity and extent of observed defects will be assessed using the risk assessment matrix developed for the bund and interceptor inspection programme. This will establish a High, Medium or Low risk for the defect and determine the required response time for remedial attention.<br><br>• High Risk – Requires attention in the short term i.e. repairs | **Number of inspections carried out:** 15 out of 15 planned.<br><br>**2015 High risk findings = 9No.**<br>Hardstanding **H5** (W717) – Cracked acid tiles.<br><br>Hardstanding **H6** (W920) – Cracked acid tiles.<br><br>Hardstanding **H7** (W716) – Cracked acid tiles.<br><br>Hardstanding **H8** (W705) – Localised chemical pitting & defective design joint material to slab.<br><br>Hardstanding **H9** (W707) – Cracked acid tiles, localized condensate wear, deep drill holes left & defective design joint material to slab.<br><br>Hardstanding **H13** (W348) – Localised chem pitting & defective design joint material to slab. | **'High Priority' Defects:**<br>Repair packages were prepared in QTR 1 of 2015 to address the 2014 'High Priority' defects.<br>Approx **£4.8K** has been spent to complete these.<br><br>All 'High Priority' defects recorded in 2015 inspections have been added to the ongoing repair list & will be quoted for & agreed by end QTR 2 2016.<br><br>**'Medium Priority' Defects:**<br>These assets will be reviewed at the next scheduled inspection unless otherwise highlighted as requiring immediate attention. (E.g. from Plant Operators, HONKS, Structural Inspections etc). |

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| | | must be done within the year following the inspection.<br>• Medium Risk – Will require attention in medium term, probably after next inspection.<br>• Low Risk – Not urgent; will eventually require attention in the long term. | Hardstanding **H22** (W422) – Deep drill holes left.<br><br>Hardstanding **H28** (W309) – Cracked & crumbles concrete to channel edges.<br><br>Hardstanding **H29** (W953) – Vegetation growth & impact damage to low level containment wall.<br><br>**2015 Low to Medium risk findings = 6No.**<br>**Typical Issues identified:**<br>Minor surface cracks to slabs <5mm wide.<br>Minor chem pitting or condensate wear to slab.<br>Chipped acid tiles.<br>Minor joint sealant deterioration. | |

| Infrastructure Element | Monitoring Frequency | Scope of Monitoring | Summary of monitoring performed versus plan and key issues identified | Summary of Remediation Action Taken and/or planned |
|---|---|---|---|---|
| **Chemical Sewer Inspections** | BAT requirement for an inspection programme is every 3 years.<br><br>i). It was agreed that the **site chemical** | i). In line with EA requirements, **Atec Drainage LTD** were invited to site in 2010 to carry out condition surveys of the open chemical channel network as follows:<br>Finishing in 2010, Dragon in 2011 & Genesis in 2012.<br>**Atec Drainage LTD - Scope of works included:** | **i). Key issues identified to Open Chem Channel Network:**<br>Civils Group reviewed all open channel reports & photographs by QTR 4 of 2012, compiled a list of defects & a drawing showing each location.<br>Environmental resource helped to populate this defect list based on chemical risk & | **2016 Plan of Action:**<br>**i). Open Channel Surveys:** - 10No 'Medium Priority – 3s' were addressed in 2015.<br>Approx **£8K** has been spent to complete these.<br><br>Please note:<br>Further coating works required on W952 chemical channel. 2No vendor quotes currently being |

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| | **open channel system** would be split into 3 zones (Finishing, Dragon & Genesis), & inspected under a 3 year rolling programme.<br><br>ii). Similarly, it was agreed under IP12 that **underground chemical sewers** would be split into 3 zones (new basics, old basics and finishing) and that each zone would be inspected every 6 years under a rolling programme. | • Lifting grating covers & cleansing open channel runs, prior to surveying.<br>• Provision of survey reports with photographs in standard format<br><br>ii). In line with EA requirements, **Atec Drainage LTD** were awarded the tender at start of QTR 3 in 2012, to carry out condition surveys of the underground chemical site sewer network (approx 12Kms) as follows: Genesis in 2012, Dragon in 2013, & Finishing in 2014.<br><br>**<u>Scope of works includes:</u>**<br>• Cleansing sewer runs and interconnecting chambers prior to surveying.<br>• Upto 100% surveys of underground chemical sewer network.<br>• CCTV surveys carried out of each sewer run.<br>• Surveys & water testing of interconnecting chambers & manholes. | continuous flow data, to prioritise repairs as follows:<br><br>'5s' High – repair in 2013<br>'4s' High/Medium – repair in 2014<br>'3s' Medium – repair in 2015<br>'2s' Medium/Low – repair in 2016<br>'1s' Low – repair in 2017<br><br>**<u>ii). Key issues identified to Underground Chem Sewer Network:</u>**<br>Civils Group reviewed all CCTV reports & MH surveys by QTR 2 2014, compiled a list of defects & a drawing showing each location.<br>Environmental resource helped to populate this defect list based on chemical risk & continuous flow data, to prioritise repairs as follows:<br><br>'1s' – High to '9s' – Low. | reviewed for suitability & order to be placed in QTR 1 2016.<br><br>W941 chem channel not completed (Approx £2.5k), as in constant use throughout 2015, & plant could not be released for repair.<br>Will be repaired in QTR 1 2016.<br><br>W707 chem channel requires further investigation work as extents of defect appears larger than originally found at surface. Work order raised for QTR 1 2016.<br><br>14No 'Medium/Low Priority – 2s' will be quoted for & agreed by end QTR 2 2016.<br><br>**<u>ii). Underground Chem Sewer Surveys:</u>** -<br>**<u>2015 Works:</u>**<br>49No CCTV footage surveys showed dubious pipe or joint defects, which from past experience could simply be formed excess adhesive material, when the pipes were 'push-fitted' together. In order to discount any potential containment issues, air tests were carried out in QTR 1 & 2 2015 to check the integrity of these pipes in question.<br>These air tests were addressed via a Revenue work order for the quoted amount **£14.7K:** |

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| | | • Provision of survey reports in standard format.<br><br>The severity and extent of observed defects will be assessed using the risk assessment matrix developed for the bund and interceptor inspection programme. This will establish a High, Medium or Low risk for the defect and determine the required response time for remedial attention.<br><br>• High Risk – Requires attention in the year after the inspection (at the latest).<br>• Medium Risk – Will require attention in medium term, probably after next inspection.<br>• Low Risk – Not urgent; will eventually require attention in the long term. | | **30No air tests passed** proving no containment issues & therefore no further action required.<br>**19No air tests failed** indicating containment issues. These pipes were input back into the defect register & scored accordingly based on chemical risk & continuous flow data.<br><br>A **Capital budget of £250K** was secured for the chem sewer repairs in 2015. As the year progressed, limited Area 5 resource was available to assist with the temporary overpumping set up/management, due to other site Waste Water Treatment issues/limitations. A more stringent overpumping procedure was also enforced, further causing delays to carry out the repairs to the sewers.<br>As a result, it was evident that the total £250k couldn't be spent, & £200k was re-allocated to other site projects.<br><br>**<u>Completed 2015 works – Approx £50k:</u>**<br>• 9No MH Invert Caps (Note; 1No outstanding)<br>• 11No patch repairs to pipes.<br>• 2No Manhole repairs or replacements (Note: 6No outstanding) |

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| | | | | A **Capital budget of £250K** has been secured for the chem sewer repairs in 2016.<br>Civils Group has presented a programme, with the aim of spending as much of the £250K as possible. Any outstanding from 2015 is now added to this 2016 programme.<br><br>**<u>2016 Repairs will aim to include:</u>**<br>• 1No MH Invert cap (2015 outstanding).<br>• 16No Patch repairs to pipes<br>• 1No Liner repair to pipe (where a patch repair is not suitable)<br>• 17No Manhole repairs or replacements (includes the 6No outstanding from 2015) |
| **Spillways** | (every 2-4 years depending on condition & contents hazard) | A programmed visual engineering inspection and condition assessment will be undertaken for the spillways:<br>• Foundations<br>• Overall structure<br>• Spillway walls<br>• Ground floor<br>• Gratings and covers<br>• Joint sealants<br>• Evidence of surface spalling and/or chemical attack<br>• Ponding<br>• Other observations | 100% visual Inspection completed by QTR 4 2014<br><br>**<u>Key issues identified:</u>**<br>• **<u>High Priorities:</u>**<br>Exposed re-bar.<br>Surface damage/pitting.<br>Spalling concrete/holes.<br>Condensate wear. | **<u>'High Priority' Defects:</u>**<br>All 'High Priority' defects recorded in 2014 Spillway inspections were quoted for in QTR 2 2015 – **approx £1.5k.**<br><br>Repairs not completed as plant could not be released for repair. Will be repaired in QTR 1 2016.<br><br><u>Please note:</u><br><u>Low Spots/Pockets of Water:</u><br>Flagged up as part of the Jan 2014 COMAH Audit.<br>Response by Neil Roberts (Email dated: 07/05/14, Titled: COMAH Process Safety Inspection – |

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| | | The severity and extent of observed defects are assessed using a risk assessment matrix to establish a High, Medium or Low risk for the defect and determine the required response time for remedial attention.<br>• High Risk – Requires attention in the short term i.e. repairs must be done within the year following the inspection.<br>• Medium Risk – Will require attention in medium term, probably after next inspection.<br>• Low Risk – Not urgent; will eventually require attention in the long term. | | follow up response 2), stated the following:<br>'In view of Process Safety, low spots/pockets of water do not pose a significant additional hazard as:<br>a) We have demonstrated adequate spillway capacity for credible worst case scenarios.<br>b) Inevitably there will be a low level of water present in W809 spillpond, into which the spillways will drain.<br>c) We intend to install spillway foam pourers to help maximize Emergency Response Mitigation Management Capability (primarily for fire but also to minimize HCl fumes).<br>d) We will set-up a cleaning schedule via Workplace Inspections/Housekeeping Programme, to ensure the spillways are clean & clear from debris & rubbish.' |

Additional Operator Comments.
The inspection and repair programme for spillways was completed, there were a small number of delays with the bunds and interceptor programme due to emerging work taking priority but majority of works were completed. The chemical sewer repair programme did not meet plan. This was identified during quarter three and remedial actions were taken to progress with were proving successful. Towards the end of the year however, there were a number of safety concerns identified with the overpumping systems which caused further ongoing delays (see spills report). To address this in 2016 a project team has been formed, led by environmental team leader which is focused on executing these repairs in a safe manner, regular updates will be given to onsite stakeholders so they can help drive success of this programme.

# SPILLS REPORT YEAR END, 2015

Dow Corning has a reporting mechanism 'HONK's to easily capture any incidents or near misses on the Barry site which includes spills or emissions. All on-site personnel, both Dow Corning and Contractors raise HONK notifications on the detection of a spill. These are then added to our safety management system – GIMS.

There were 89 reported spill incidents in total from January 2015 to December 2015;
44 of these were <5kg, the remaining 45 were > 5kg.

All incidents were assessed for the potential to contaminate the ground. Most of the reported incidents had little or no potential to contaminate the ground. There were immediate Engineering mitigation measures in place or they were cleaned up immediately thereby reducing the possibility of contamination.

In addition a search was done within the safety management system to look for incidents of other abnormal ground events e.g. subsidence. Another 6 incidents were reviewed.

The following have been included as they either had the potential to contaminate the ground or worthy of note for environmental reporting.

| Incident Ref | Incident Summary | Actions taken including any remediation |
|---|---|---|
| 20842 | Acidic effluent leak into excavation<br><br>The site civil contractors were excavating between two chemical sewer sumps local to W410 process plant when effluent from one of the sumps started to flow into the excavation.<br><br>It was quickly established that this effluent was from the nearly plant chemical sewer which contained aqueous HCl from the hydrolysis unit. The unit was shutdown to prevent acid contamination into the ground.<br><br>Material lost to the excavation was pumped out to a nearby chemical sewer where it was processed via the onsite waste water treatment plant.<br>It would appear that there was originally another pipeline off this sewer but had previously been blocked off. The line had been blocked off with cement which was not able to withstand the strong acid being into down the sewer. | The process generating aqueous HCl was shutdown whilst a repair was made. The repair was made using materials suitable to withstand acidic effluent. It is believed this is a very old repair prior to standards being in place. All sewer repairs on site are completed to corporate risk control procedures which defines suitable materials of construction for the types of effluent being transported.<br><br>Minimal ground contamination |
| 21549 | Contaminated Chippings<br>Contaminated chippings were reported next to an interceptor pit on W922 | Minimal contamination. Contaminated chippings were removed and disposed of.<br>Area will be monitored as part of ongoing active monitoring programme. |

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| | It is believed this contamination was from where a drum was overfilled in the area. This would have been siloxane contamination. | Action to review drum filling procedures in area to be completed |
| 22497 | <u>Leak from hose</u><br>A field operator noticed a leak of acidic effluent from a temporary hose onto the chippings area on the West Side of 100 sphere at W810 (Road E). T<br>The hose was being supplied from a Sykes pump being used to divert effluent from a chemical sewer during construction works being carried out on the road and sewer system in this Area.<br><br>The quantity of material spilled to the chippings is unknown but believed to be less than 25kg.<br>The effluent was pH tested and found to have a pH of around 1. | The failed hose length was then changed out by the operator and SiOX shift leader.<br><br>To complete repairs to the sewer system on site, the plants need to pump the waste streams via an alternative route using temporary hoses. During 2015 a number of incidents occurred where there were leaks from hoses onto road or chippings or leaks of diesel from the pumps used. As there were a repeat number of incident a full Root cause investigation was completed and an action plan captured in GIMS.<br>As there will always be a need to carry out repair work a robust risk control procedure will be developed for the worst case scenario.<br><br>This has caused a delay to our sewer repair program. |
| 22514 | small spill of diesel on chippings | See 22497 above |
| 22518 | small spill of acidic effluent onto chippings | See 22497 above |
| 21713 | <u>Overflowing scrubber</u><br>Field operator noted that the secondary scrubber bath was overflowing onto the floor and out onto Road 9 at W805 and into the storm sewer. The water overflowing the scrubber bath was tested with pH paper and found to have a pH of 1 and was flowing in to the storm sewers on the road. This would subsequently flow to W809 spill pond and then be pumped to the E-Tanks. It is estimated that the amount of acidic material spilled to the sewer was in excess of 5te.<br>At the time the primary scrubber was blocked and had been sipped and prepared for jetting. The CRU was offline due to a systems issue that had been handed over from the dayshift.<br>Immediate fix was to slow rates and prevent vents being sent to the scrubber, the primary scrubber was cleaned and put back on line and the CRU was also put back online. | For interest only<br>Minimal ground contamination as spilled material was on to road and flowed to the storm sewers which were directed to waste water treatment.<br><br>A full Root Cause Investigation was completed with many short, medium and long term actions identified. These are captured in an action plan in the safety management system. This primarily focus is on better system controls and procedures around vent management.<br>In addition the W805 scrubber system is being upgraded in 2016/7, this project had started prior to this incident but will provide better contingency. |
| 22338 | <u>Solids waste quench overfill</u><br>Whilst doing plant checks a field operator noticed chlorosilane solids gels waste had backed up into the chute and gels had poured over the quench bay walls into the plant areas. Water run off from the gels has a pH of 1<br><br>All waste gel overspill was onto concrete areas leading to chemical sewers ~ 5-6Te of material was spilt. | For interest only. No ground contamination.<br>Actions are mainly to improve control and trip protection of 1307 and 200 quenchers and provider operators with improved monitoring support. |

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| 20556 | Subsidence on road 3, by chemical manhole 11 was reported. Chemical drains were checked and everything ok. Repairs were completed but no obvious signs of a cause were identified. Ongoing monitoring and new issues have not been detected. | For information only.<br>No ground contamination.<br>Ongoing monitoring and inspection |

# Landfill groundwater Sampling Programme and update on boreholes

## 1. Dow Corning Groundwater Sampling Programme (2010 onwards)

Q1 and Q3 Landfill Groundwater sampling reports were submitted to NRW during the course of the year.

### Sampling Plan

The following quarterly sampling plan was implemented in 2009 to satisfy both SPMP (Site Protection and Monitoring Programme) and Landfill licence requirements (ref URS design of a site monitoring programme, 44382681, July 2006 and Dow Corning landfill CMS review, 49310733, October 2008). The only change for 2010 is the deletion of borehole 170 which has been lost for a long time now. No other changes are proposed for 2010.

**Table 1 Quarterly Borehole and Surface Water Sampling programme**

| Q1 (LANDFILL) | Q2 (SITE) | Q3 (LANDFILL) | Q4 (SITE) |
|---|---|---|---|
| LF1 | 155 | LF1 | 157 |
| LF4 | 156 | LF4 | 160 |
| LF6 | 165 | LF6 | 161 |
| LF7 | 174 | LF7 | 168 |
| 210 | 175 | 210 | 203 |
| 312 | 201 | 312 | 206 |
| 412 | 202 | 412 | 311 |
| A2d | 215 | A2d | 311a |
| E1s | B1 | E1s | 411 |
| E1m | C2d | E1m | A1s |
| E1d | C3s | E1d | A1d |
| E2s | C3d | E2s | B2s |
| E2d | D1 | E2d | B2d |
| E4s | D2s | E4s | |
| E4d | D2d | E4d | |
| Timber Pond | D3d | Timber Pond | |
| Cadoxton Pond | | Cadoxton Pond | |
| Freshwater Pond | | Freshwater Pond | |
| Cadoxton River SW2 | | Cadoxton River SW2 | |
| Cadoxton River SW3 | | Cadoxton River SW3 | |
| LF1,4,6.7 Gas | | LF1,4,6.7 Gas | |
| Visual Stability | | Visual Stability | |
| LF2 (**if not waterlogged**) | | LF2 (**if not waterlogged**) | |
| LF3(**if not waterlogged**) | | LF3(**if not waterlogged**) | |

The above sampling programme is designed to satisfy the requirements for 6 monthly sampling of boreholes associated with the landfill area and annual sampling for other site boreholes for SPMP purposes.

The location of boreholes is shown in the borehole location plan (Appendix 2), which is now on the main site MUDS drawing for control purposes.

## Table 2 Borehole status Jan 2016

| **Q1 (LANDFILL)** | **Jan'15 status** |
|---|---|
| LF1 (if not waterlogged) | Unable to sample – borehole lost, collar destroyed. |
| LF4 | Limited access |
| LF6 (if not waterlogged) | ? |
| LF7 | Difficulty in removing bung. Soil and silt filling bore hole cover |
| 210 | ok |
| 312 | ok |
| 412 | ok |
| A2d | ok |
| E1s | ok |
| E1m | ok |
| E1d | ok |
| E2s (if not waterlogged) | Unable to sample – borehole lost to reeds/timber pond |
| E2d (if not waterlogged) | Unable to sample – bore hole lost to reeds/timber pond |
| E4s | ok |
| E4d | ok |
| Timber Pond | Limited access |
| Cadoxton Pond | ok |
| Freshwater Pond | ok |
| Cadoxton River SW2 | ok |
| Cadoxton River SW3 | ok |
| LF1,4,6.7 Gas | Removed as a requirement in 2010 |
| Visual Stability | |
| LF2 (**if not waterlogged**) | Unable to sample – bore hole collar full of solid waste, needs to be dug out, access to bore hole is restricted due to unstable ground surrounding bore hole. |
| LF3(**if not waterlogged**) | Unable to sample – bore hole lost. |
| 170 - obsolete | Removed in 2010 |

| Q2 (SITE) | January 2016 status | Q4 (SITE) | Jan'16 status |
|---|---|---|---|
| 155 | No Bung in bore hole, top of shaft is shattered. Shaft is full of mud/silt. Unable to sample | 157 | Silty at bottom |
| 156 | ok | 160 | ok |
| 165 | ok | 161 | ok |
| 174 | ok | 168 | Insufficient water for sampling |
| 175 | ok | 203 | ok |
| 201 | ok | 206 | ok |
| 202 | ok | 311 | ok |
| 215 | ok | 311a | ok |
| B1 | ok | 411 | ok |
| C2d | ok | A1s | ok |
| C3s | ok | A1d | ok |
| C3d | ok | B2s | ok |
| D1 | ok | B2d | ok |
| D2s | ok | | |
| D2d | ok | | |
| D3d | lost | | |

The above table highlights the condition of the existing boreholes. A number of the boreholes are difficult to sample or have been lost. A project was initiated in 2014 to review the data and determine if there were any gaps in the data gathering. - It was determined that additional bore holes should be established in the old landfill area and in the habitat nature. Seven new boreholes were installed in November 2015 by an external Environmental Consultancy company, AECOM. Cost to install was ~ £100,000. Baseline sampling data has been taken but results have not been processed yet. These boreholes will be added to the quarterly sampling plan and reported in subsequent SPMP reports.

## Monitoring Plan

Each sample in Table 1 will be monitored for the following determinants:

### Table 3 Groundwater Monitoring Programme

| Determinants | Comments |
|---|---|
| Hardness | **Only for Landfill samples** (for use in Cu/Zn EQS setting by EA) |
| COD | All |
| BOD | **Only for Site samples** (not required for landfill samples) |
| pH | All |
| Chloride | All |
| Alkalinity | All |
| Sulphates | All |

| | |
|---|---|
| Metals | All (Al,As,Cd,Cr,Cu,Fe,Hg,Mn,Ni,Pb,Se,Si,Sn,Zn) plus Ca,Mg |
| Ethyl benzene | All |
| Xylene | All (Ortha, Meta & Para) |
| Toluene | All |
| Cyclic siloxanes | All (D3,D4,D5,D6 and HMDS siloxanes) |
| Trimethylsilanol | All |
| Methanol | All |

## Other Monitoring Parameters

The following parameters will be monitored in addition to the requirements laid out in Tables 3.

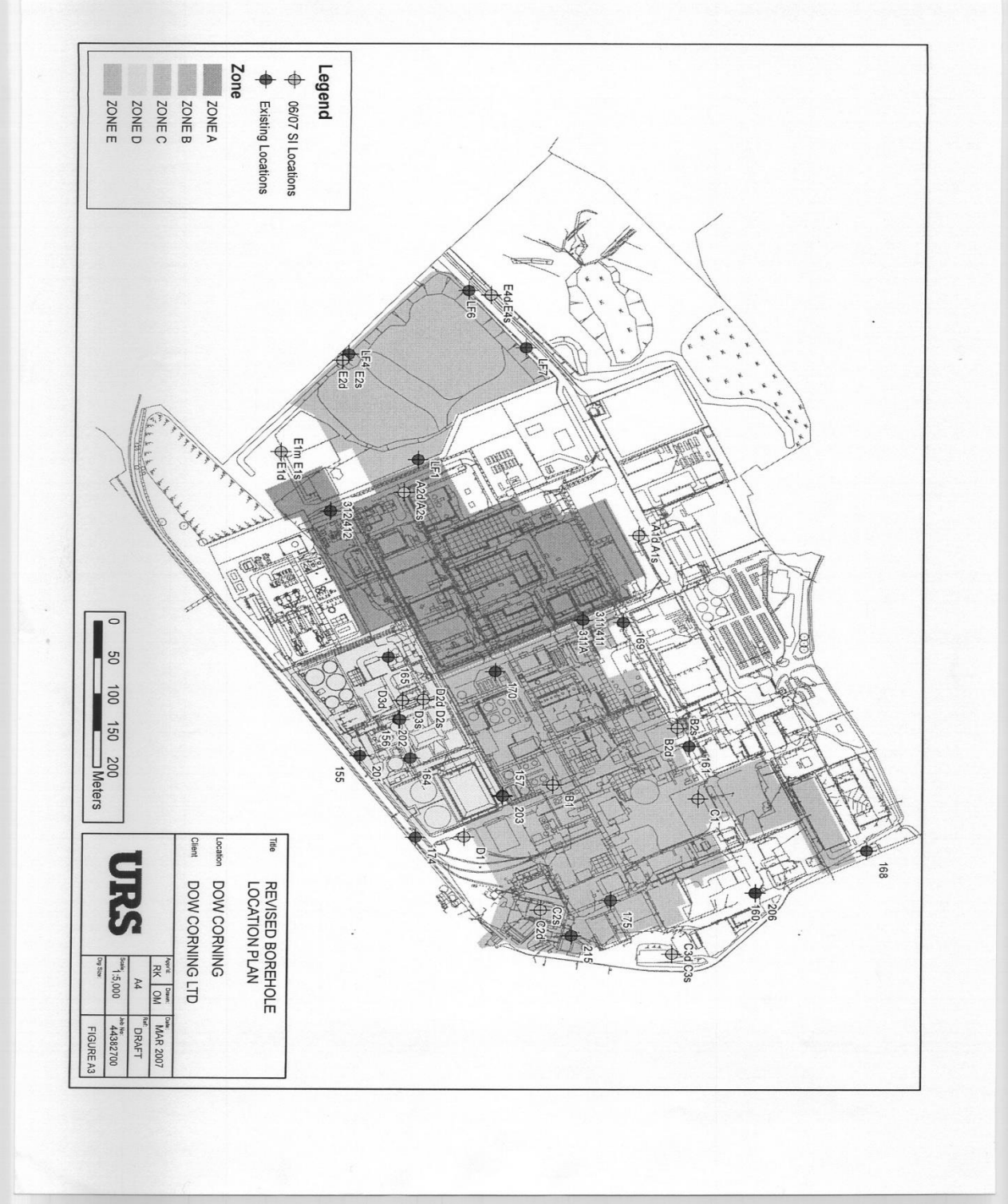
- **Gauge water levels**: these will be measured for all boreholes every sample.

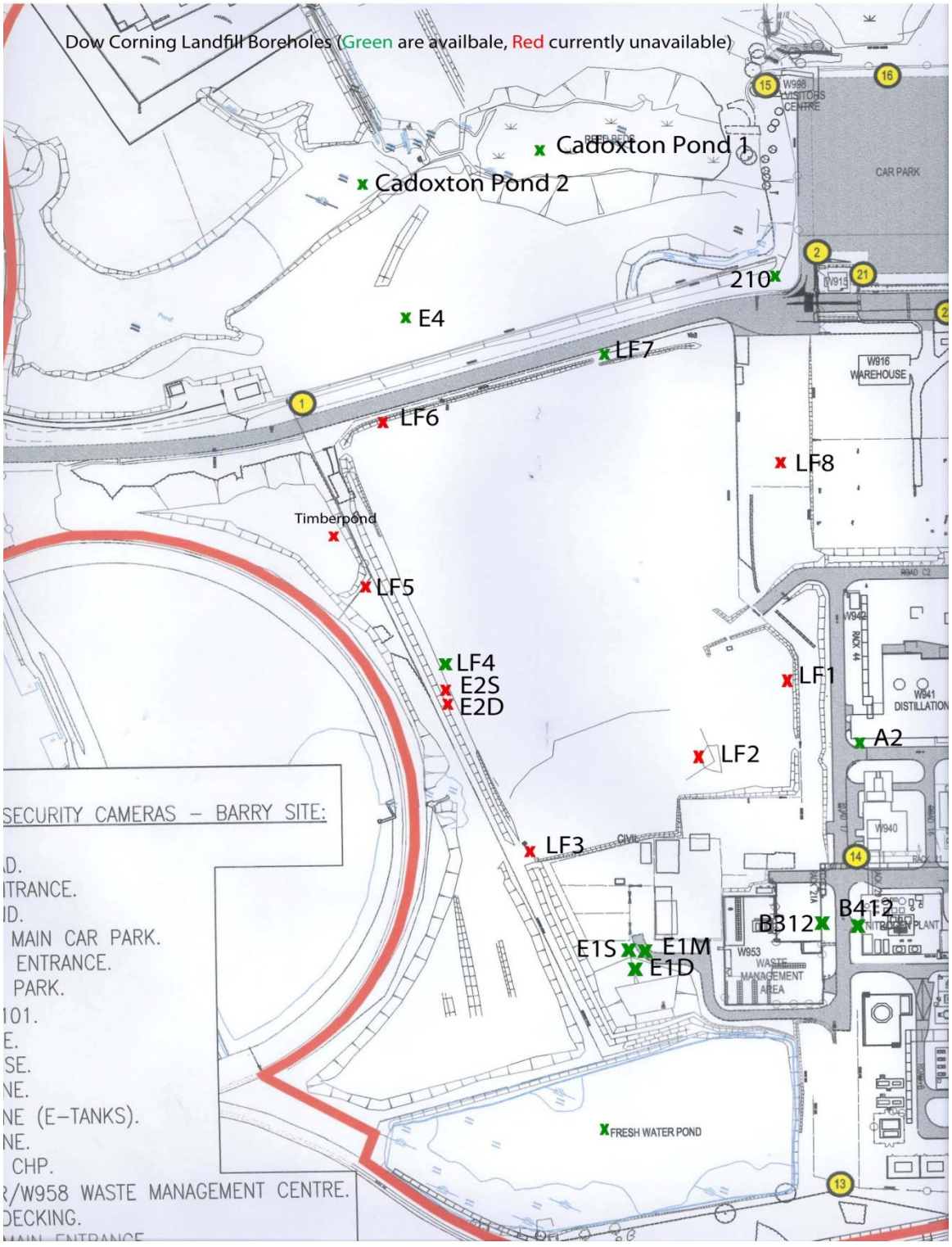
## Trend Analysis for Copper and TMS (Trimethyl Silanol)

All landfill related boreholes and surface water samples (i.e. Q1 and Q3) sample results for copper and TMS* will be graphically reported to clearly illustrate trends. Graphs are to be submitted to the Agency along with landfill reporting forms every 6 months. This was ongoing in 2010. The latest Q3 report is enclosed (see Appendix 3).

*Note that the current test method for TMS provides inaccurate results so caution should be taken when looking at graphical trends.

# APPENDIX 1 - Borehole Location Map On Landfill




Dow Corning Landfill Boreholes (Green are availbale, Red currently unavailable)
Cadoxton Pond 1
Cadoxton Pond 2
210
E4
LF7
LF6
LF8
Timberpond
LF5
LF4
E2S
E2D
LF1
LF2
A2
LF3
B312
B412
E1S
E1M
E1D
FRESH WATER POND
CAR PARK
W916 WAREHOUSE
W941 DISTILLATION
W940
W953 WASTE MANAGEMENT AREA
SECURITY CAMERAS – BARRY SITE:
MAIN CAR PARK.
ENTRANCE.
PARK.
(E–TANKS).
CHP.
/W958 WASTE MANAGEMENT CENTRE.
DECKING.

# APPENDIX 2 - 2015 Borehole Analytical Results

| Max of Result value | Column Labels | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Row Labels | Aluminium | Arsenic | Benzene | Biological Oxygen Demand (BOD) | Boron | Cadmium | Calcium | Chemical Oxygen Demand | Chloride |
| **Q1** | | | | | | | | | |
| A2D | 2.5 | 20.0 | 3.6 | | 509.0 | 1.8 | 3400.8 | 397.8 | 874.2 |
| BH_210 | 2.5 | 20.0 | 1.0 | | 276.4 | 0.6 | 96.3 | 30.5 | 105.4 |
| BH_312 | 2.5 | 20.0 | 9.0 | | 163.0 | 0.6 | 851.9 | 448.0 | 261.6 |
| BH_412 | 2.5 | 20.0 | 2.5 | | 467.1 | 0.6 | 649.7 | 154.0 | 363.9 |
| CAD_PND1 | 111.9 | 20.0 | 1.0 | | 145.4 | 0.6 | 200.4 | 30.3 | 483.4 |
| CAD_PND2 | 431.6 | 20.0 | 1.0 | | 197.1 | 0.6 | 109.4 | 22.3 | 211.1 |
| E1D | 2.5 | 20.0 | 1.0 | | 153.5 | 0.6 | 190.8 | 30.0 | 215.3 |
| E1M | 2.5 | 27.1 | 1.0 | | 1761.4 | 0.7 | 180.2 | 73.2 | 294.9 |
| E1S | 2.5 | 35.2 | 1.0 | | 1363.8 | 0.8 | 125.4 | 76.7 | 907.3 |
| E4D | 2.5 | 20.0 | 1.0 | | 1809.8 | 0.6 | 74.3 | 30.8 | 173.5 |
| E4S | 2.5 | 20.0 | 1.0 | | 1994.0 | 0.6 | 155.3 | 75.0 | 689.6 |
| FRESHW_PND | 12.2 | 20.0 | 1.0 | | 133.3 | 0.6 | 289.5 | 103.0 | 646.6 |
| LF_4 | 16.6 | 12.0 | 1.0 | | 194.9 | 108.0 | 679.9 | 214.0 | 126.2 |
| LF_7 | 3.1 | 47.3 | 1.0 | | 686.7 | 108.0 | 449.2 | 60.0 | 482.8 |
| SW2 | 437.4 | 20.0 | 1.0 | | 49.7 | 0.6 | 88.0 | 35.5 | 31.0 |
| SW3 | 361.2 | 20.0 | 1.0 | | 56.3 | 0.6 | 278.3 | 40.1 | 428.5 |
| TIMBER_PND | 9.253 | 10 | 1 | | 190.273 | 108 | 518.085 | 108 | 120.35 |
| **Q2** | | | | | | | | | |
| B1 | 10.9 | 29.5 | 1.0 | 1.0 | 1346.9 | 1.1 | | 92.6 | 10.7 |
| BH_156 | 2.5 | 11.9 | 1 | 1 | 595.64 | 2.73246 | | 1256 | 680.94 |
| BH_165 | 36.4 | 36.7 | 1.0 | 1.0 | 2569.4 | 1.6 | | 95.3 | 696.1 |
| BH_174 | 31.0 | 35.1 | 1.0 | 1.0 | 599.0 | 1.1 | | 27.9 | 41.5 |
| BH_175 | 2.5 | 11.9 | 1.0 | 2.0 | 453.1 | 1.1 | | 89.9 | 25.5 |
| BH_201 | 6.0 | 11.9 | 1.0 | 1.0 | 50.9 | 1.1 | | 238.0 | 141.5 |
| BH_202 | 264.0 | 11.9 | 1.0 | 1.0 | 12.8 | 1.1 | | 539.0 | 355.4 |
| BH_215 | 2.8 | 12.0 | 11.2 | 18.0 | 48.7 | 1.1 | | 78.6 | 40.3 |
| C2D | 2.5 | 16.8 | 1.0 | 1.0 | 769.4 | 1.1 | | 100.0 | 221.4 |
| C3D | 2.5 | 40.6 | 1.0 | 1.0 | 768.6 | 1.4 | | 100.0 | 206.8 |
| D1 | 2.5 | 36.4 | 1.0 | 1.0 | 742.0 | 1.4 | | 64.9 | 33.0 |
| D2D | 2.5 | 12.9 | 1.0 | 1.0 | 791.4 | 1.1 | | 94.4 | 30.2 |
| D2S | 2.5 | 65.2 | 1.0 | 1.0 | 4288.6 | 2.4 | | 30.7 | 18.9 |
| **Q3** | | | | | | | | | |
| A2D | 69.1 | 11.0 | 11.0 | | 475.9 | 2.3 | 3459.2 | 1488.0 | 902.0 |
| BH_210 | 69.1 | 11.0 | 1.0 | | 523.5 | 0.9 | 151.8 | 30.0 | 183.8 |
| BH_312 | 69.1 | 11.0 | 6.5 | | 151.9 | 0.9 | 779.9 | 499.0 | 206.3 |
| BH_412 | 69.1 | 11.0 | 2.8 | | 254.4 | 0.9 | 646.4 | 230.0 | 217.2 |
| CAD_PND1 | 69.1 | 11.0 | 1.0 | | 181.2 | 0.9 | 409.9 | 52.3 | 956.0 |
| CAD_PND2 | 69.1 | 11.0 | 1.0 | | 242.5 | 0.9 | 430.0 | 53.6 | 985.6 |
| E1D | 69.1 | 11.0 | 1.0 | | 201.8 | 0.9 | 197.9 | 30.0 | 204.0 |
| E1M | 142.3 | 51.8 | 1.0 | | 1521.9 | 1.5 | 125.5 | 102.0 | 75.5 |

| Row Labels | Aluminium | Arsenic | Benzene | Biological Oxygen Demand (BOD) | Boron | Cadmium | Calcium | Chemical Oxygen Demand | Chloride |
|---|---|---|---|---|---|---|---|---|---|
| E1S | 69.1 | 44.2 | 1.0 | | 1291.1 | 1.5 | 107.8 | 62.6 | 607.2 |
| FRESHW_PND | 69.1 | 11.0 | 1.0 | | 151.0 | 0.9 | 283.3 | 43.5 | 654.3 |
| LF_4 | 69.1 | 15.5 | 1.0 | | 257.0 | 1.4 | 1131.7 | 877.0 | 256.0 |
| LF_7 | 69.1 | 58.4 | 1.0 | | 660.9 | 1.5 | 409.1 | 50.4 | 351.5 |
| SW2 | 69.1 | 11.0 | 1.0 | | 52.7 | 0.9 | 91.9 | 52.0 | 27.3 |
| SW3 | 286.0 | 11.0 | 1.0 | | 92.8 | 0.9 | 1520.9 | 638.0 | 636.0 |
| TIMBER_PND | 69.1 | 11.0 | 1.0 | | 216.4 | 0.9 | 529.5 | 104.0 | 118.6 |
| **Q4** | | | | | | | | | |
| A1D | 20.1 | 12.8 | 1.0 | 1.0 | 377.1 | 2.4 | | 45.0 | 3032.6 |
| A1S | 20.1 | 12.8 | 1.0 | 5.0 | 331.2 | 2.4 | | 113.1 | 3430.8 |
| B2D | 20.1 | 22.1 | 1.0 | 1.0 | 545.7 | 2.4 | | 113.0 | 37.2 |
| B2S | 20.1 | 46.5 | 1.0 | 1.0 | 135.6 | 3.4 | | 98.7 | 24.8 |
| BH_157 | 20.1 | 12.8 | 1.0 | 1.0 | 3338.9 | 2.4 | | 23.4 | 276.6 |
| BH_160 | 20.1 | 23.8 | 564.4 | 1.0 | 1455.1 | 2.4 | | 53.1 | 877.0 |
| BH_161 | 20.1 | 12.8 | 1.0 | 1.0 | 312.0 | 2.4 | | 27.3 | 105.7 |
| BH_203 | 222.1 | 12.8 | 1.0 | 1.0 | 13.9 | 2.4 | | 25.3 | 24.2 |
| BH_206 | 20.1 | 12.8 | 1.6 | 1.0 | 244.2 | 2.4 | | 21.8 | 65.7 |
| BH_311 | 20.1 | 33.7 | 1.0 | 3.0 | 1045.4 | 2.4 | | 67.2 | 741.1 |
| BH_311A | 20.1 | 12.8 | 1.0 | 1.0 | 73.7 | 2.4 | | 16.8 | 52.8 |
| BH_411 | 20.1 | 181.2 | 1.0 | 1.0 | 1101.4 | 11.5 | | 65.1 | 780.9 |

| Max of Result value | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Row Labels | Chromium | Copper | D4 | D5 | D6 | Ethylbenzene | Hardness (mg equ. CaCO3/L) | HMDS | Iron | Lead | M Alkalinity (Total Alkalinity) |
| **Q1** | | | | | | | | | | | |
| A2D | 1.9 | 13872.4 | 1.0 | 1.0 | 1.0 | 1.0 | 8649.5 | 1.0 | 913.6 | 38.1 | 83.3 |
| BH_210 | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 397.3 | 300.0 | 7.3 | 5.0 | 41.6 |
| BH_312 | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 18.6 | 2167.8 | 300.0 | 4693.5 | 15.7 | 97.1 |
| BH_412 | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 2112.7 | 300.0 | 2088.3 | 7.5 | 291.4 |
| CAD_PND1 | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 604.6 | 300.0 | 336.7 | 5.0 | 208.1 |
| CAD_PND2 | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 369.7 | 300.0 | 421.8 | 5.0 | 257.7 |
| E1D | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 1009.9 | 300.0 | 28.6 | 5.0 | 327.1 |
| E1M | 6.0 | 2.7 | 1.0 | 1.0 | 1.0 | 1.0 | 1233.7 | 1.0 | 23219.6 | 5.0 | 905.9 |
| E1S | 4.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 687.1 | 300.0 | 15638.5 | 5.0 | 773.1 |
| E4D | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 722.6 | 300.0 | 2997.2 | 5.0 | 608.6 |
| E4S | 1.9 | 2.7 | 300.0 | 300.0 | 300.0 | 1.0 | 1542.4 | 300.0 | 2.8 | 5.0 | 608.6 |
| FRESHW_PND | 1.9 | 5.2 | 300.0 | 300.0 | 300.0 | 1.0 | 792.3 | 300.0 | 177.0 | 5.0 | 95.2 |
| LF_4 | 3.0 | 2.9 | 300.0 | 300.0 | 300.0 | 1.0 | 1756.2 | 300.0 | 3390.9 | 7.5 | 174.0 |
| LF_7 | 11.4 | 2.5 | 300.0 | 300.0 | 300.0 | 1.0 | 2084.6 | 300.0 | 41838.0 | 27.5 | 680.0 |
| SW2 | 1.9 | 3.0 | 300.0 | 300.0 | 300.0 | 1.0 | 298.1 | 300.0 | 369.6 | 5.0 | 271.6 |
| SW3 | 1.9 | 16.0 | 300.0 | 300.0 | 300.0 | 1.0 | 781.1 | 300.0 | 351.7 | 5.0 | 271.6 |
| TIMBER_PND | 3 | 10.916 | 300 | 300 | 300 | 1 | 1368.26 | 300 | 146.623 | 7.5 | 82 |
| **Q2** | | | | | | | | | | | |
| B1 | 2.8 | 3.5 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 4361.7 | 6.3 | 1613.5 |
| BH_156 | 5.28 | 23611.9 | 300 | 300 | 300 | 4.467 | | 300 | 32739.1 | 62.4907 | 7.584 |
| BH_165 | 3.8 | 101.2 | 300.0 | 300.0 | 300.0 | 1.2 | | 300.0 | 12825.5 | 7.3 | 716.7 |
| BH_174 | 1.3 | 4.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 152.9 | 4.1 | 669.3 |
| BH_175 | 1.3 | 2.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 2129.6 | 7.3 | 428.5 |
| BH_201 | 1.3 | 130.4 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 1.7 | 8.6 | 102.4 |
| BH_202 | 1.3 | 57.3 | 300.0 | 300.0 | 300.0 | 4.6 | | 300.0 | 3.0 | 8.2 | 146.0 |
| BH_215 | 1.3 | 2.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 172.7 | 4.1 | 202.9 |
| C2D | 1.3 | 2.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 2945.5 | 4.1 | 1048.5 |
| C3D | 1.3 | 2.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 765.5 | 4.1 | 724.3 |
| D1 | 1.5 | 2.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 1861.8 | 3.9 | 925.2 |
| D2D | 1.6 | 237.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 8263.5 | 4.1 | 1103.5 |
| D2S | 2.8 | 11.6 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 13796.0 | 4.7 | 460.7 |
| **Q3** | | | | | | | | | | | |
| A2D | 2.5 | 15722.9 | 0.0 | 0.1 | 3.0 | 3.7 | 8795.0 | 3.0 | 860.2 | 57.1 | 224.3 |
| BH_210 | 2.5 | 2.3 | 3.0 | 3.0 | 3.0 | 1.0 | 711.8 | 3.0 | 16.0 | 4.9 | 54.6 |
| BH_312 | 3.6 | 9.6 | 3.0 | 0.1 | 3.0 | 10.5 | 1973.0 | 3.0 | 2713.3 | 23.2 | 66.3 |
| BH_412 | 2.5 | 2.3 | 3.0 | 0.1 | 3.0 | 1.0 | 1728.0 | 3.0 | 108.7 | 19.2 | 117.0 |
| CAD_PND1 | 2.5 | 2.3 | 3.0 | 3.0 | 3.0 | 1.0 | 1128.5 | 3.0 | 319.2 | 5.1 | 119.0 |
| CAD_PND2 | 2.5 | 2.3 | 3.0 | 3.0 | 3.0 | 1.0 | 1194.3 | 3.0 | 291.8 | 6.4 | 138.5 |
| E1D | 2.5 | 2.3 | 3.0 | 3.0 | 3.0 | 1.0 | 1037.7 | 3.0 | 171.5 | 4.9 | 333.5 |
| E1M | 3.9 | 39.3 | 3.0 | 3.0 | 3.0 | 1.0 | 701.3 | 3.0 | 10859.4 | 8.6 | 797.6 |

| Row Labels | Chromium | Copper | D4 | D5 | D6 | Ethylbenzene | Hardness (mg equ. CaCO3/L) | HMDS | Iron | Lead | M Alkalinity (Total Alkalinity) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E1S | 3.4 | 17.9 | 3.0 | 3.0 | 3.0 | 1.0 | 590.5 | 3.0 | 9448.8 | 4.9 | 676.7 |
| FRESHW_PND | 2.5 | 2.4 | 3.0 | 3.0 | 3.0 | 1.0 | 781.4 | 3.0 | 538.7 | 4.9 | 89.7 |
| LF_4 | 2.5 | 30.9 | 3.0 | 3.0 | 3.0 | 1.0 | 2959.6 | 3.0 | 8100.2 | 24.0 | 195.0 |
| LF_7 | 8.7 | 2.5 | 3.0 | 3.0 | 3.0 | 1.0 | 1877.2 | 3.0 | 37298.8 | 4.9 | 598.7 |
| SW2 | 2.5 | 2.7 | 3.0 | 3.0 | 3.0 | 1.0 | 325.1 | 3.0 | 122.6 | 4.9 | 300.3 |
| SW3 | 2.5 | 33.7 | 3.0 | 3.0 | 3.0 | 1.0 | 3906.9 | 3.0 | 609.4 | 17.5 | 197.0 |
| TIMBER_PND | 2.5 | 7.6 | 3.0 | 3.0 | 3.0 | 1.0 | 1402.5 | 3.0 | 141.4 | 6.9 | 85.8 |
| **Q4** | | | | | | | | | | | |
| A1D | 5.6 | 2.5 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 17704.4 | 15.5 | 203.0 |
| A1S | 4.7 | 2.5 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 15113.1 | 15.1 | 170.5 |
| B2D | 1.2 | 4.0 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 423.9 | 15.0 | 330.9 |
| B2S | 1.7 | 2.5 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 4523.4 | 13.6 | 227.4 |
| BH_157 | 1.2 | 6.4 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 13.7 | 6.1 | 438.5 |
| BH_160 | 1.2 | 2.5 | 300.0 | 300.0 | 300.0 | 1.8 | | 300.0 | 602.9 | 4.6 | 677.0 |
| BH_161 | 1.2 | 7.6 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 23.0 | 5.1 | 276.1 |
| BH_203 | 1.2 | 412.8 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 263.3 | 7.1 | 40.6 |
| BH_206 | 1.2 | 5.2 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 32.8 | 4.6 | 217.2 |
| BH_311 | 1.2 | 2.5 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 237.6 | 10.1 | 653.7 |
| BH_311A | 1.2 | 20.3 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 309.9 | 4.6 | 182.7 |
| BH_411 | 2.4 | 2.5 | 300.0 | 300.0 | 300.0 | 1.0 | | 300.0 | 6641.1 | 10.3 | 637.4 |

| Max of Result value | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Row Labels | Magnesium | Manganese | Mercury | Methanol | m-Xylene | Nickel | o-Xylene | P Alkalinity (As Carbonates) | pH | p-Xylene | Selenium |
| **Q1** | | | | | | | | | | | |
| A2D | 38.3 | 1002.8 | 1.5 | 4.9 | 1.0 | 115.2 | 23.1 | 0.0 | 7.0 | 36.3 | 12.5 |
| BH_210 | 38.1 | 6.3 | 1.5 | 3.0 | 1.0 | 5.2 | 1.0 | 0.0 | 7.8 | 1.0 | 12.5 |
| BH_312 | 9.9 | 211.0 | 1.5 | 3.0 | 38.3 | 7.3 | 31.2 | 0.0 | 7.2 | 82.5 | 12.5 |
| BH_412 | 119.1 | 671.0 | 1.5 | 3.0 | 1.0 | 2.0 | 9.1 | 0.0 | 7.4 | 29.1 | 12.5 |
| CAD_PND1 | 25.3 | 433.9 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 8.1 | 1.0 | 12.5 |
| CAD_PND2 | 23.4 | 129.9 | 2.0 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 8.1 | 1.0 | 12.5 |
| E1D | 129.6 | 6.0 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 7.8 | 1.0 | 12.5 |
| E1M | 190.3 | 1697.0 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 7.0 | 1.0 | 12.5 |
| E1S | 90.8 | 961.4 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 7.3 | 1.0 | 12.5 |
| E4D | 130.4 | 274.3 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 7.9 | 1.0 | 12.5 |
| E4S | 280.4 | 986.3 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 7.7 | 1.0 | 12.5 |
| FRESHW_PND | 16.9 | 182.1 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 7.7 | 1.0 | 12.5 |
| LF_4 | 14.2 | 5677.4 | 1.5 | 3.0 | 1.0 | 2.0 | 1.3 | 0.0 | 7.8 | 3.4 | 17.0 |
| LF_7 | 233.8 | 1802.2 | 55.5 | 3.0 | 1.0 | 2.7 | 1.0 | 0.0 | 6.8 | 1.0 | 17.0 |
| SW2 | 19.0 | 33.5 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 8.0 | 1.0 | 12.5 |
| SW3 | 20.9 | 38.5 | 1.5 | 3.0 | 1.0 | 2.0 | 1.0 | 0.0 | 8.0 | 1.0 | 12.5 |
| TIMBER_PND | 18.116 | 206.756 | 6.504 | 3 | 1 | 2 | 1 | 0 | 7.8 | 1 | 17 |
| **Q2** | | | | | | | | | | | |
| B1 | | 267.2 | 3.1 | 3.0 | 1.0 | 3.3 | 1.0 | 110.0 | 8.5 | 1.0 | 12.1 |
| BH_156 | | 4026.2 | 13.8939 | 3 | 1 | 62.394 | 4.926 | 0 | 4.91 | 1.784 | 12.1 |
| BH_165 | | 1172.1 | 6.5 | 3.0 | 1.0 | 1.3 | 1.0 | 0.0 | 7.6 | 1.0 | 12.1 |
| BH_174 | | 56.7 | 5.3 | 6.2 | 1.0 | 1.8 | 1.0 | 43.6 | 8.7 | 1.0 | 12.1 |
| BH_175 | | 1128.4 | 1.8 | 182.5 | 1.0 | 1.3 | 1.0 | 19.0 | 8.4 | 1.0 | 12.1 |
| BH_201 | | 84.2 | 1.4 | 3.1 | 1.0 | 1.3 | 1.0 | 0.0 | 8.0 | 1.0 | 12.1 |
| BH_202 | | 1.7 | 1.4 | 3.0 | 1.0 | 1.3 | 1.6 | 106.2 | 11.1 | 1.0 | 12.1 |
| BH_215 | | 135.1 | 5.5 | 290.5 | 1.0 | 1.3 | 1.0 | 0.0 | 8.0 | 1.0 | 12.1 |
| C2D | | 547.3 | 2.4 | 3.0 | 1.0 | 1.3 | 1.0 | 30.3 | 8.1 | 1.0 | 12.1 |
| C3D | | 122.1 | 1.4 | 3.0 | 1.0 | 4.0 | 1.0 | 70.2 | 8.7 | 1.0 | 12.1 |
| D1 | | 804.7 | 1.4 | 3.0 | 1.0 | 9.9 | 1.0 | 73.9 | 8.4 | 1.0 | 12.1 |
| D2D | | 182.7 | 7.8 | 3.0 | 1.0 | 3.4 | 1.0 | 56.9 | 8.4 | 1.0 | 12.1 |
| D2S | | 6625.1 | 1.8 | 3.0 | 1.0 | 2.1 | 1.0 | 0.0 | 7.2 | 1.0 | 12.1 |
| **Q3** | | | | | | | | | | | |
| A2D | 38.2 | 722.0 | 0.6 | 3.0 | 4.0 | 107.6 | 6.7 | 0.0 | 6.9 | 1.0 | 5.5 |
| BH_210 | 80.8 | 7.9 | 11.5 | 3.0 | 1.0 | 4.5 | 1.0 | 35.1 | 10.0 | 1.0 | 5.5 |
| BH_312 | 6.2 | 159.4 | 0.6 | 3.5 | 19.1 | 4.4 | 6.6 | 0.0 | 7.5 | 1.0 | 5.5 |
| BH_412 | 27.6 | 395.2 | 0.6 | 3.0 | 1.0 | 0.4 | 2.2 | 0.0 | 7.0 | 1.0 | 5.5 |
| CAD_PND1 | 25.5 | 462.9 | 2.4 | 3.0 | 1.0 | 0.8 | 1.0 | 0.0 | 7.5 | 1.0 | 5.5 |
| CAD_PND2 | 29.3 | 328.6 | 0.8 | 3.0 | 1.0 | 1.2 | 1.0 | 0.0 | 7.9 | 1.0 | 5.5 |
| E1D | 132.0 | 43.5 | 3.5 | 3.0 | 1.0 | 0.9 | 1.0 | 0.0 | 7.3 | 1.0 | 5.5 |
| E1M | 94.2 | 882.8 | 6.8 | 3.0 | 1.0 | 3.8 | 1.0 | 0.0 | 7.2 | 1.0 | 5.5 |

| Row Labels | Magnesium | Manganese | Mercury | Methanol | m-Xylene | Nickel | o-Xylene | P Alkalinity (As Carbonates) | pH | p-Xylene | Selenium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E1S | 78.0 | 743.8 | 41.5 | 3.0 | 1.0 | 2.2 | 1.0 | 0.0 | 7.9 | 1.0 | 5.5 |
| FRESHW_PND | 18.0 | 378.2 | 3.6 | 3.0 | 1.0 | 0.4 | 1.0 | 0.0 | 7.5 | 1.0 | 5.5 |
| LF_4 | 32.5 | 11947.7 | 0.6 | 3.0 | 1.0 | 0.4 | 1.0 | 0.0 | 7.2 | 1.0 | 5.5 |
| LF_7 | 207.8 | 1909.3 | 4.8 | 3.0 | 1.0 | 1.5 | 1.0 | 0.0 | 6.7 | 1.0 | 5.5 |
| SW2 | 23.2 | 37.9 | 5.5 | 3.0 | 1.0 | 0.8 | 1.0 | 0.0 | 7.6 | 1.0 | 5.5 |
| SW3 | 26.5 | 72.0 | 2.2 | 3.0 | 1.0 | 0.4 | 1.0 | 0.0 | 7.2 | 1.0 | 5.5 |
| TIMBER_PND | 19.5 | 179.0 | 0.6 | 3.0 | 1.0 | 0.4 | 1.0 | 0.0 | 7.9 | 1.0 | 5.5 |
| **Q4** | | | | | | | | | | | |
| A1D | | 7087.8 | 1.4 | 3.0 | 1.0 | 3.7 | 1.0 | 0.0 | 6.9 | 4.6 | 25.3 |
| A1S | | 4246.6 | 3.2 | 3.0 | 1.0 | 3.7 | 1.0 | 0.0 | 6.6 | 3.7 | 25.3 |
| B2D | | 716.1 | 1.4 | 3.0 | 1.0 | 3.7 | 1.0 | 0.0 | 8.1 | 1.0 | 25.3 |
| B2S | | 1795.6 | 1.4 | 3.0 | 1.0 | 3.7 | 1.0 | 20.3 | 7.7 | 1.0 | 25.3 |
| BH_157 | | 110.4 | 19.5 | 3.0 | 1.0 | 3.7 | 1.0 | 30.5 | 8.0 | 1.0 | 25.3 |
| BH_160 | | 496.3 | 2.6 | 300.0 | 1.0 | 6.6 | 3.8 | 0.0 | 7.4 | 1.0 | 25.3 |
| BH_161 | | 14.3 | 1.4 | 3.0 | 1.0 | 3.7 | 1.0 | 16.2 | 7.8 | 1.0 | 25.3 |
| BH_203 | | 20.3 | 1.4 | 3.0 | 1.0 | 3.7 | 1.0 | 0.0 | 7.7 | 1.0 | 25.3 |
| BH_206 | | 14.7 | 4.6 | 3.0 | 1.0 | 3.7 | 1.0 | 0.0 | 7.5 | 1.0 | 25.3 |
| BH_311 | | 634.4 | 1.8 | 3.0 | 1.0 | 3.7 | 1.0 | 46.7 | 8.1 | 1.0 | 25.3 |
| BH_311A | | 69.8 | 1.4 | 3.0 | 1.0 | 3.7 | 1.0 | 0.0 | 7.1 | 1.0 | 25.3 |
| BH_411 | | 1741.6 | 1.4 | 3.0 | 1.0 | 3.7 | 1.0 | 0.0 | 7.9 | 1.0 | 25.3 |

| Max of Result value | | | | | |
|---|---|---|---|---|---|
| Row Labels | Sulphates | Tin | TMS | Toluene | Zinc |
| **Q1** | | | | | |
| A2D | 40.0 | 2.2 | 1.0 | 8.7 | 140.1 |
| BH_210 | 40.0 | 2.2 | 1.0 | 1.0 | 1.5 |
| BH_312 | 40.0 | 2.2 | 7.2 | 97.9 | 5.4 |
| BH_412 | 113.0 | 2.2 | 3.3 | 1.0 | 2.6 |
| CAD_PND1 | 40.0 | 2.2 | 1.0 | 1.0 | 3.4 |
| CAD_PND2 | 40.0 | 2.2 | 1.0 | 1.0 | 5.6 |
| E1D | 249.0 | 2.2 | 1.0 | 1.0 | 3.1 |
| E1M | 40.0 | 2.2 | 1.0 | 1.0 | 2.5 |
| E1S | 40.0 | 2.2 | 1.0 | 1.0 | 4.0 |
| E4D | 107.0 | 2.2 | 1.0 | 1.0 | 2.1 |
| E4S | 1140.0 | 2.2 | 1.0 | 1.0 | 1.5 |
| FRESHW_PND | 40.0 | 2.2 | 1.0 | 1.0 | 6.2 |
| LF_4 | 40.0 | 2.8 | 1.0 | 1.0 | 1.6 |
| LF_7 | 40.0 | 2.8 | 1.0 | 1.0 | 8.5 |
| SW2 | 40.0 | 2.2 | 1.0 | 1.0 | 10.0 |
| SW3 | 40.0 | 2.2 | 1.0 | 1.0 | 14.1 |
| TIMBER_PND | 40 | 2.8 | 1 | 1 | 2.159 |
| **Q2** | | | | | |
| B1 | 40.0 | 3.4 | 1.0 | 1.0 | 10.7 |
| BH_156 | 346 | 3.4 | 2.943 | 1 | 170.986 |
| BH_165 | 40.0 | 3.4 | 1.0 | 1.0 | 17.5 |
| BH_174 | 40.0 | 3.4 | 1.0 | 1.0 | 14.3 |
| BH_175 | 40.0 | 3.4 | 1.0 | 18.6 | 10.5 |
| BH_201 | 40.0 | 3.4 | 1.0 | 1.0 | 13.6 |
| BH_202 | 40.0 | 3.4 | 1.9 | 1.0 | 8.8 |
| BH_215 | 40.0 | 3.4 | 1.0 | 870.7 | 8.3 |
| C2D | 40.0 | 3.4 | 1.0 | 1.0 | 6.0 |
| C3D | 235.0 | 3.4 | 1.0 | 1.0 | 7.4 |
| D1 | 40.0 | 3.4 | 1.1 | 1.0 | 10.5 |
| D2D | 40.0 | 3.4 | 1.0 | 1.0 | 17.2 |
| D2S | 519.0 | 3.4 | 1.0 | 1.0 | 8.4 |
| **Q3** | | | | | |
| A2D | 40.0 | 5.6 | 5.3 | 35.8 | 146.1 |
| BH_210 | 40.0 | 5.6 | 0.1 | 1.0 | 7.8 |
| BH_312 | 40.0 | 5.6 | 6.7 | 67.3 | 10.2 |
| BH_412 | 40.0 | 5.6 | 5.1 | 1.0 | 11.1 |
| CAD_PND1 | 40.0 | 5.6 | 0.1 | 1.0 | 7.2 |
| CAD_PND2 | 40.0 | 5.6 | 0.1 | 1.0 | 6.0 |
| E1D | 296.0 | 5.6 | 0.1 | 1.0 | 4.5 |
| E1M | 40.0 | 5.6 | 0.1 | 1.0 | 34.8 |

| Row Labels | Sulphates | Tin | TMS | Toluene | Zinc |
|---|---|---|---|---|---|
| E1S | 40.0 | 5.6 | 0.1 | 1.0 | 34.1 |
| FRESHW_PND | 40.0 | 5.6 | 0.1 | 1.0 | 9.6 |
| LF_4 | 40.0 | 5.6 | 0.7 | 1.0 | 13.7 |
| LF_7 | 40.0 | 5.6 | 0.1 | 1.0 | 10.0 |
| SW2 | 40.0 | 5.6 | 0.1 | 1.0 | 10.4 |
| SW3 | 77.1 | 5.6 | 0.5 | 1.0 | 26.2 |
| TIMBER_PND | 40.0 | 5.6 | 0.1 | 1.0 | 8.3 |
| **Q4** | | | | | |
| A1D | 40.0 | 4.5 | 1.4 | 1.0 | 5.2 |
| A1S | 40.0 | 4.5 | 1.3 | 1.0 | 3.7 |
| B2D | 40.0 | 4.5 | 0.1 | 1.0 | 4.5 |
| B2S | 40.0 | 4.5 | 0.1 | 1.0 | 2.5 |
| BH_157 | 68.8 | 4.5 | 0.1 | 1.0 | 3.0 |
| BH_160 | 196.0 | 4.5 | 0.1 | 7.1 | 1.6 |
| BH_161 | 40.0 | 4.5 | 0.1 | 1.0 | 5.0 |
| BH_203 | 40.0 | 4.5 | 3.0 | 1.0 | 95.7 |
| BH_206 | 87.0 | 4.5 | 3.0 | 1.0 | 3.0 |
| BH_311 | 40.0 | 4.5 | 0.8 | 1.0 | 2.6 |
| BH_311A | 40.0 | 4.5 | 3.0 | 1.0 | 65.2 |
| BH_411 | 40.0 | 4.5 | 0.8 | 1.0 | 2.1 |

# APPENDIX 3 – Gauge depths

| Max of Result value | Column Labels | |
|---|---|---|
| Row Labels | Depth to Bottom | Depth to Water |
| **Q1** | | |
| A2D | 5.5 | 1.5 |
| BH_210 | 18.0 | 3.7 |
| BH_312 | 3.7 | 1.0 |
| BH_412 | 22.0 | 3.1 |
| E1D | 19.9 | 3.8 |
| E1M | 7.8 | 1.5 |
| E1S | 6.0 | 1.6 |
| E4D | 19.9 | 3.8 |
| E4S | 5.3 | 3.8 |
| LF_4 | 5.2 | 1.5 |
| LF_7 | 4.8 | 1.9 |
| **Q2** | | |
| B1 | 6.1 | 3.3 |
| BH_156 | 1.71 | 0.81 |
| BH_165 | 3.3 | 0.8 |
| BH_174 | 5.1 | 3.6 |
| BH_175 | 4.7 | 2.4 |
| BH_201 | 14.8 | 3.2 |
| BH_202 | 18.6 | 3.4 |
| BH_215 | 3.7 | 1.9 |
| C2D | 7.3 | 2.0 |
| C3D | 13.0 | 3.2 |
| C3S | 2.0 | 0.0 |
| D1 | 6.3 | 3.2 |
| D2D | 6.9 | 3.4 |
| D2S | 6.8 | 1.0 |
| D3D | 0 | 0 |
| **Q3** | | |
| A2D | 5.5 | 1.7 |
| BH_210 | 8.2 | 3.8 |
| BH_312 | 3.7 | 1.1 |
| BH_412 | 22.1 | 4.1 |
| E1D | 18.9 | 4.0 |
| E1M | 7.9 | 1.4 |
| E1S | 5.9 | 1.1 |
| LF_4 | 4.6 | 1.0 |
| LF_6 | 3.51 | 3.36 |
| LF_7 | 4.7 | 2.0 |
| **Q4** | | |
| A1D | 13.2 | 3.3 |
| A1S | 6.5 | 1.2 |
| B2D | 3.9 | 0.8 |
| B2S | 1.7 | 0.6 |
| BH_157 | 3.9 | 1.0 |
| BH_160 | 14.9 | 2.2 |

| Row Labels | Depth to Bottom | Depth to Water |
|---|---|---|
| BH_161 | 2.9 | 0.8 |
| BH_203 | 15.4 | 2.4 |
| BH_206 | 7.3 | 0.7 |
| BH_311 | 7.5 | 1.0 |
| BH_311A | 2.0 | 0.9 |
| BH_411 | 17.9 | 2.9 |