HS2

COSTAIN SKANSKA

1EW02 Enabling Works – Area South

Document Title: Surface Water Quality Monitoring Interpretative Report

Document number: 1EW02-CSJ-EV-REP-S002-000159

Revision: C01
WP Reference: WP16
MDL Reference: TBA

Revision	Date	Author	Checked by	Approved by	Revision Details
C01	09.03.2021	[redacted]	[redacted]	[redacted]	Issued for Acceptance
Signature		[redacted]	[redacted]	[redacted]	

STAKEHOLDER REVIEW REQUIRED (SRR)
☐ COUNTY/DISTRICT/LONDON BOROUGH COUNCIL
☐ LOV
☐ LUL
☐ NRL
☐ TFL
☐ UTILTIES COMPANY
☐ OTHER

PURPOSE OF SRR
☐ ACCEPTANCE
☐ APPROVAL
☐ NO OBJECTION
☐ CONSENT

REVISION CHANGES, AUTHORISATION & ISSUE RECORD

Version	Date	Sections revised	Brief description of the revision	Prepared by	Checked by	Approved by	Reason for Issue	HS2 Acceptance Decal Code
C01	09.03.2021		Original version	[redacted]	[redacted]	[redacted]	For Acceptance	

CSjv Review and Acceptance Decal

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☐	Code A. Accepted. Work may proceed.		
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Reviewed/Accepted by:(signature) [redacted]	Print Name: [redacted]	Position: CSJV Water Resources Specialist	Date: 09.03.2021
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Executive Summary

AECOM were commissioned by Costain Skanska Joint Venture (CSJV) to produce an interpretative annual report upon completion of monthly surface water quality monitoring in the High Speed 2 (HS2) Area South, Sector 2 (S2 – Northolt Tunnels – Chainage 9+505 to 25+800). Pre-construction monthly monitoring over a 12-month period of 11 No. surface water sampling locations was carried out by AECOM between June 2019 and February 2020 and 8 No. locations between March 2020 and May 2020.

A preliminary conceptual site model was developed to identify potential sources of impact to surface water within the Site (receptors) and potential pathways linking sources and receptors.

Data collected during the monitoring rounds were screened against adopted Generic Assessment Criteria (GAC), potential sources of those contaminants exceeding GAC were identified and it was investigated whether they were likely to relate to the HS2 enabling works by reference to available records of potential legacies of contamination (e.g. Land Quality Desk Studies) and records of HS2 Enabling Works activities.

Field parameters and analytes identified to exceed the adopted GAC were: dissolved oxygen (% saturation) and temperature, ammoniacal nitrogen (as N), nitrate (as N), nitrite (as N), orthophosphate (as P), Aminomethyl phosphonic acid (AMPA), Extractable Petroleum Hydrocarbons (EPH) C8-C40 and chromium (trivalent) (filtered).

The above field parameters and analytes were found to exceed the adopted GAC in the watercourses depicted in Table E1 below.

Table E1: Analyte and parameter exceedances per Watercourse

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
Dissolved Oxygen	✓	✓	✓	✓
Temperature				✓
Ammoniacal Nitrogen (as N)	✓	✓	✓	
Nitrate (as N)	✓		✓	

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
Nitrite (as N)	✓			✓
Orthophosphate as P	✓	✓	✓	✓
AMPA	✓	✓	✓	✓
EPH C8-C40	✓	✓		
Chromium (Trivalent)		✓	✓	

The highest concentrations for the majority of analytes were recorded at the New Years Green Bourne locations and/or at the Ickenham Stream (Yeading Brook Catchment) location.

Plausible linkages have been identified in the updated CSM. For some watercourses a link between the source and the receptor was identified (e.g. New Years Green Bourne concentrations linked to the New Years Green Lane Landfill and potentially the surrounding landfills), however the sources for other watercourses (e.g. Ickenham Stream (Yeading Brook Catchment)) could not be identified based on the available data. Table E2 below summarises the potential concentration sources for each analyte per watercourse.

Table E2: Potential Sources of GAC exceedances per Watercourse

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
Dissolved Oxygen	New Years Green Lane Landfill	Unknown source	Unknown source, potentially upstream of Sector 2 inputs	Unknown source
Temperature				Unknown source
Ammoniacal Nitrogen (as N)	New Years Green Lane Landfill	Unknown source, potentially upstream of Sector 2 inputs	Unknown source, potentially upstream of Sector 2 inputs	

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
Nitrate (as N)	New Years Green Lane Landfill and potential fertiliser use on adjacent fields		Unknown source, potentially upstream of Sector 2 inputs	
Nitrite (as N)	Unknown source, seasonal variation			Marginal exceedance on one round. Communal gardens, golf course
Orthohosphate as P	New Years Green Lane Landfill	Unknown source	Unknown source, potentially upstream of Sector 2 inputs	Unknown source, potentially upstream of Sector 2 inputs
AMPA	New Years Green Lane Landfill and potential glyphosate use in adjacent fields	Potential glyphosate use in railway lines and residential gardens	Potential glyphosate use in railway lines and adjacent fields. Potentially upstream of Sector 2 inputs	Potential glyphosate use in adjacent fields and railway lines
EPH C8-C40	New Years Green Lane Landfill	Railway lines		
Chromium (Trivalent) (Filtered)		Railway lines	Railway lines, MSD, RBR Services	

Nitrate, orthophosphate, nitrite, AMPA and dissolved oxygen concentrations varied seasonally. A correlation between reduced precipitation, low flow and higher concentrations was identified for a number of analytes.

Dissolved oxygen (%) was checked against TOC, nitrate and ammoniacal nitrogen to investigate if there was any correlation between low dissolved oxygen levels and carbon loading / nutrients. A correlation did not seem to be present.

Following the analysis of the exceedances, it was investigated whether the HS2 enabling activities could have affected the concentrations of the field parameters and/or identified chemicals in the surface watercourses. No link was established between the HS2 enabling activities and the surface water concentrations as in many occasions high concentrations were recorded before the enabling works or concentrations above GAC were also recorded at locations upstream of the enabling works.

1 Introduction

1.1 Project Background

AECOM were commissioned by Costain Skanska Joint Venture (CSJV) in accordance with subcontract number E1 order 332/SWPO-023 2020 to produce an interpretative annual report upon completion of monthly surface water quality monitoring in the High Speed 2 (HS2) Area South, Sector 2 (S2 – Northolt Tunnels – Chainage 9+505 to 25+800) (the Site).

AECOM completed the pre-construction monthly monitoring of 11No. surface water sampling locations between June 2019 and May 2020 (12 months). The monitoring locations were determined by CSJV and confirmed by AECOM during an initial site walkover on 1st May 2019. The original specification comprised 15No.locations, however following the initial site walkover visit CSJV instructed AECOM to reduce the sampling locations to a total of 11No. locations either because the water features were dry or because they were deemed unnecessary. The scope of work was further amended during a technical call with CSJV on the 26th February 2020, in which CSJV decided to withdraw monitoring points ML023-SW200, ML024-SW201 and ML024-SW202 from the monthly sampling schedule, starting from the March 2020 monitoring round. Therefore, the sampling locations visited between March 2020 and May 2020 comprised 8No. locations. The data collected were presented to CSJV in monthly factual reports. The baseline surface water quality monitoring was required to gather representative baseline data prior to the commencement of any construction activities related to HS2.

This interpretative annual report was produced to present the data collected over the year of monitoring and provide an overview of baseline water quality for each watercourse. The report will be issued to both HS2 and the Environment Agency (EA). This report will form part of the pre-construction environmental evidence base for the HS2 Route and will be publicly available.

1.2 Objective and Scope

The objective of this report is to:

1. Provide the project background;
2. Detail of works completed;
3. Generate a conceptual site model; and
4. Screening of the data collected against Generic Assessment Criteria (GAC) and the likely sources of contaminants above GAC (if any) and whether they are likely to be attributed to enabling works related to HS2

2 Summary of Works

2.1 Safety, Health & Environment

At the start of the project, a Site-specific Health, Safety & Environment (HSEP) Plan (including risk assessments and method statements) was produced detailing the scope of work (SoW). The HSEP detailed any health and safety issues related to the completion of the scope of work, provided the locations of the 11 No. sampling locations and the location of emergency services (i.e., hospital, fire station) in proximity to the sampling location. The HSEP was treated as a 'live' document and revisions were made during the project in response to changes to the project scope, the Site conditions and government guidance (Covid -19 outbreak).

2.2 Surface Water Sampling

Surface water monitoring and sampling was undertaken monthly between June 2019 and May 2020. Surface water sampling was undertaken at 11 No. locations according to the CSJV SoW:

- 6 No. surface water locations on the River Pinn and a tributary;
- 3 No. surface water locations on Ickenham Stream and ditches on West Ruislip Golf Course; and
- 2 No. surface water locations on Newyears Green Bourne.

At each of the 11 No. locations, one surface water sample was collected per monitoring round. Following CSJV's request the sampled locations were reduced to 8No. from the March 2020 monitoring round (monitoring points ML023-SW200, ML024-SW201 and ML024-SW202 were withdrawn). The locations of the sampling points are provided in the table below and shown in Figure 1.

Table 1: Surface water monitoring location

Location ID	Watercourse	Catchment	Easting	Northing	Included in rounds
ML023-SW200	River Pinn	Pinn	508334.64	187779.39	1 to 9
ML023-SW201	River Pinn	Pinn	508052.7	187448.71	1 to 12
ML023-SW202	Ickenham Stream	Pinn	508019.77	187416.23	1 to 12
ML023-SW203	Ickenham Stream	Pinn	508032.33	187134.76	1 to 12
ML023-SW204	Ickenham Stream	Crane Rivers and Lakes[1]	508015.29	186891.0	1 to 12
ML024-SW200	River Pinn	Pinn	507351.38	187120.87	1 to 9
ML024-SW201	River Pinn	Pinn	507277.39	186641.99	1 to 9
ML024-SW202	River Pinn Tributary	Pinn	508001.85	187887.02	1 to 12
ML024-SW203	River Pinn	Pinn	507366.27	187207.83	1 to 12
ML025-SW200	Newyears Green Bourne	Colne (Confluence with Chess to River Thames)	506363.45	188065.96	1 to 12
ML025-SW201	Newyears Green Bourne	Colne (Confluence with Chess to River Thames)	506178.19	187815.38	1 to 12

Access to the watercourses was via banks/bridges. The following procedure was followed to undertake the sampling:

[1] Also referred to as Ickenham Stream (Yeading Brook Catchment) in this report with the Yeading Brook Catchment forming part of the Crane Rivers and Lakes operational catchment

- Sampling was carried out from a safe location on the riverbank or footbridge adjacent to the sampling location using a low-flow peristaltic pump and flow cell;

- Pump tubing attached to a rod was lowered into the water from the riverbank and was extended up to approximately 1 metre (m) below the surface of the water depending on the depth of the watercourse and water was pumped through the flow cell until the in-situ measurements of dissolved oxygen (mg/L and or %saturation), pH, temperature (°C), electrical conductivity (µS/cm) and oxidation reduction potential (mV) had stabilised. A multi-parameter water quality meter with electronic data logging was used to record these parameters. The stabilised values of these parameters were recorded manually prior to sampling;

- A Monitoring Record Sheet, agreed with CSJV prior to the first sampling visit, was used to record the weather conditions on the sampling day as well as a description of the appearance of the sample (covering colour, opaqueness/transparency, any cloudiness, presence of suspended sediment or other material, smell if there is a smell, and any other environmental observations that were relevant). As access to the water bodies was not possible, flow, depth and width were not measured;

- One duplicate surface water sample and one field blank sample were collected per monthly monitoring round for QA/QC purposes (representing approximately 10% of the samples) ; and

- Samples were stored in cool-boxes containing ice blocks to keep the samples at approximately 4°C. Samples were transferred to the subcontract laboratory under chain of custody conditions at the end of each day.

2.3 Field Analysis

The physico-chemical parameters measured on-site using a hand-held multi-meter for the following:

- Temperature (°C, accurate to 0.1°C);

- pH (accurate to 0.1pH units);
- Electrical Conductivity (accurate to 10µS/cm);
- Oxidation Redox Potential (mV, accurate to 5mV); and
- Dissolved Oxygen (mg/L and or %saturation, accuracy to within 2%sat or 0.1mg/L).

The data can be found in Appendix 2.

2.4 Laboratory Analysis

Surface water samples were sent to Exova - Jones Environmental Laboratories (Exova), a UKAS and Mcerts accredited laboratory that is on AECOM's approved supplier list and is regularly audited by AECOM to confirm compliance with quality assurance procedures.

Sample scheduling requirements were in accordance with the provided CSJV scope of works detailed in Table 2 below.

Table 2: Surface water laboratory chemical analysis

Analyte	Number of Samples Total per Round	Rounds
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)	11[x]	1 to 12
Total Petroleum Hydrocarbons (Criteria Working Group)	11(EPH 8-40)[x] 5 (GRO >C4-C10) 11(GRO >C4-C12)[x] 7 (GRO >C4-C8) 5 (GRO >C8-C10) 7 (GRO >C8-C12)	1 to 12 8 to 12* 1 to 12 1 to 7 * 8 to 12* 1 to 7*
Phenol (total)	11[x]	1 to 12
Aluminium (dissolved)	11[x]	1 to 12**
Arsenic (dissolved)	11[x]	1 to 12
Barium (dissolved)	11[x]	1 to 12
Beryllium (dissolved)	11[x]	1 to 12
Boron (dissolved)	11[x]	1 to 12
Cadmium (dissolved)	11[x]	1 to 12

Analyte	Number of Samples Total per Round	Rounds
Chromium III (dissolved)	11[x]	1 to 12
Chromium VI (dissolved)	11[x]	1 to 12
Copper (dissolved)	11[x]	1 to 12
Cyanide (total)	11[x]	1 to 12
Lead (dissolved)	11[x]	1 to 12
Mercury (dissolved)	11[x]	1 to 12
Nickel (dissolved)	11[x]	1 to 12
Selenium (dissolved)	11[x]	1 to 12
Vanadium (dissolved)	11[x]	1 to 12
Zinc (dissolved)	11[x]	1 to 12
pH	11[x]	1 to 12
Electrical Conductivity	11[x]	1 to 12
Total dissolved solids	11[x]	1 to 12
Total suspended solids	11[x]	1 to 12
Total organic carbon	11[x]	1 to 12
Dissolved Oxygen	11[x]	1 to 7 and 10 *
Hardness	11[x]	1 to 12
Major ions (Ca, Mg, Na, K, Cl, SO_4, bicarbonate, carbonate)	11[x]	1 to 12
Nutrients (Total N, NO_3N, NO_2-N, NH_4-N, total P, orthophosphate PO_4-P)	11[x]	1 to 12
Iron (total)	11[x]	1 to 12
Manganese (total)	11[x]	1 to 12
Glyphosate	11[x]	3 to 5 and 10 to 12*
Aminomethyl phosphonic Acid (AMPA)	11[x]	11***

[x] Reduced to 8 in the last 3 rounds

*Following agreement with CSJV

**Backdated aluminium data included in this report

***Not scheduled by AECOM for the last round

Dissolved Organic Carbon (DOC) was not included in the proposal by CSJV and therefore was not scheduled for analysis.

2.5 Laboratory QA/QC

Three main quality control procedures were undertaken and described below:

- Split duplicate samples
- Field blanks
- Ionic balance

One split duplicate surface water sample was taken during each monitoring round, from a monitoring point selected randomly. The purpose of this was to demonstrate the degree of precision delivered by the laboratory analyses for all parameters at a given location. Upon receipt of the laboratory results, Relative Percentage Difference (RPD) was used by AECOM to assess the repeatability of the duplicate extraction and analysis procedure.

The RPD is defined as:

$$RPD = 200\frac{(x_1 - x_2)}{(x_1 + x_2)}$$

where X1 and X2 are the values of the concentration obtained for an analyte X in duplicate samples, and (X1-X2) is the absolute difference of X1 and X2.

The RPD values for all the analytes and sampling rounds can be found in the individual factual reports (see in References).

Table 3 details the RPD acceptability criteria that have been considered (Ref. 1 and 2):

Table 3: Relative Percentage Difference Acceptability Criteria

Sample concentration	RPD Acceptability Criteria
If sample concentration <10x Laboratory Method Detection Limit (MDL)	RPD not critical
If sample concentration >10x <20x Laboratory MDL	RPD <50%
If sample concentration >20x Laboratory MDL	RPD <30%

In general duplicate analysis has returned good reproducibility for most parameters and the samples were generally found to be within acceptable RPD limits, with the exception of alkalinity (Carbonate as CaCO3) during the July 2019 round which was calculated to have an RPD of 184% compared to the primary sample and aluminium(filtered) during the April 2020 round which was calculated to have an RPD of 173% compared to the primary sample.

One laboratory field blank (FB) sample was submitted to the laboratory per monthly monitoring round using laboratory grade deionised water provided by the laboratory to demonstrate that no sampling contamination occurred on each monitoring round. Between June and October 2019 detections have been reported at varying concentrations within the field blank samples for a number of analytes (phosphorus, total nitrogen, sodium, calcium, total alkalinity as CaCO3 and copper). Following instruction from CSJV AECOM undertook an investigation and submitted a report (Surface Water Quality Monitoring – Sector S002 – Field Blank QA Report, Ref. 1EW02-CSJ-GL-REP-S002-000070) to provide a concise account of how AECOM managed the Quality Control (QC) event. Following the investigation findings it was agreed that future detections within the FB sample that were over an order of magnitude lower than the concentrations reported in the baseline sampling would be considered acceptable (or where they were within the range of known detections for deionised water analysed in the laboratory tests reported in this study), but concentrations outside this range would be reported as exceeding a QC limit. The field blank analysis tables can be found in the individual factual reports (see references).

Following the revised approach from November 2019 all field blanks passed the QA/QC check except the April and May 2020 field blanks where aluminium failed. For both cases the laboratory has advised that the aluminium detections may have been related to the low pH of the field blank water resulting in dissolution of aluminium from sample containers or labware. It was concluded that aluminium at low concentrations of typically <20 µg/l could be present within the deionised water.

As part of the QA/QC process ionic balance was calculated for every sample on a monthly basis to assess the level of precision and confidence in the major ion analyses. The assessment was based on a 10% acceptable limit for the difference between the sum of the cations and the anions. Results were recorded above the 10% QC threshold in one round as listed below:

- May 2020: ML025-SW200 and ML025-SW201 where results of -11.22% and -13.43% were reported respectively. These results have been queried with the laboratory who did not identify any issues with the analysis. These samples are the only two locations in Newyears Green Bourne. It therefore appears likely that the results are representative of different site conditions in that stream. It was concluded that it is possible that positively charged ions are present which are not within the analytical suite and therefore the calculation returns a negative excess. The two locations record the maximum ammonium concentrations. Ammonium was not included by the lab in the calculation for the ionic balance. Aecom calculated that if it has been included the cation excess for ML025-SW200 would have been -2% and for ML025-SW201 -4%. Both below the 10% adopted criteria.

2.6 Monthly Reporting

Twelve sets of compiled monthly surface water quality data were prepared by AECOM and submitted to CSJV Water Resources and Flood Risk Specialist for review. The laboratory analytical data were submitted together with the scans of the field monitoring record sheets containing stabilised in-situ surface water parameters, any pertinent field observations and a discussion of surface water quality data. A monthly teleconference meeting was set up between AECOM and CSJV to identify any quality control problems and observations. References for the monthly factual reports can be found in the References section.

3 Preliminary Conceptual Site Model

A preliminary conceptual site model (CSM) has been developed to assess the potential risks of contamination to the three watercourses.

The risk assessment process for contaminants of concern is based on the development of a CSM, which comprises source-pathway-receptor analysis. These terms can be defined as follows:

- Source: Substance that has the potential to cause adverse impacts.
- Pathway: Route whereby a substance (the Source) may come into contact with the receptor. Examples include leaching of contaminants from soil into watercourses or migration of contaminants from the aquifer to the surface waters.
- Receptor: Target that may be affected by contamination. Examples include main rivers, ordinary watercourses and groundwater.

For a risk to be present, there must be a viable pollutant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway.

The CSM identifies the potential historical or existing sources (prior to CSJV/HS2 works) and potential sources due to enabling activities undertaken by CSJV/HS2, potential receptors and potential pathways connecting the sources and the receptors. The following sections detail the preliminary CSM, which has been developed for the site prior to the start of the main construction works.

The Environment Agency Catchment Data Explorer indicates that the three watercourses are part of three different catchment areas as indicated in the Table 4 below.

Table 4: Catchment areas

River Pinn Catchment		Colne (confluence with Chess to River Thames) Catchment	Crane Rivers and Lakes Catchment
River Pinn and tributary	Ickenham Stream	Newyears Green Bourne	Ickenham Stream (Yeading Brook Catchment)
ML023-SW200	ML023-SW202	ML025-SW200	ML023-SW204
ML023-SW201	ML023-SW203	ML025-SW201	
ML024-SW200			
ML024-SW201			
ML024-SW203			
ML024-SW202			

The boundaries of the catchment areas in proximity to the monitoring locations are shown in Figure 2.

The water for each watercourse was last classified under the Water Framework Directive (transposed via The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017) in 2019 as having 'Moderate' ecological classification and 'Fail' Chemical classification. The 'Fail' Chemical classification refers to the waterbody failing to achieve good chemical status. The chemical classification for each one of the watercourses was attributed to:

- Colne (Confluence with Chess to River Thames) failed status for Polybrominated diphenyl ethers (PBDE) and Perfluorooctane sulphonate (PFOS);
- Pinn failed status for PFOS and Benzo(g-h-i)perylene; and
- Crane Rivers and Lakes failed status for PBDE and PFOS.

The sources of information reviewed within the following sections to provide information on potential sources of contamination, type of contaminants and pathways are listed in Table 5 below.

Table 5: Sources of information

Document Name	Document number
MSD - Land Quality Site Investigation and tank removal works factual report	1EW02-CSJ-EV-REP-SS05_SL07-000030
MSD - Land Quality Desk Study	1EW02-CSJ-EV-REP-SS05_SL07-000014
Ground investigation scoping report – MSD, Regents Park Vehicle holding area, Mandeville Road, Canterbury Road, Atlas Road	1EW02-CSJ-EV-REP-S000-000067
4RAIL – Soil Sampling & Factual Report – Oak Farm, UB9	1EW02-CSJ-GL-REP-SS05_SL07-000032
West Ruislip Golf Club, Rifle Range – Site investigation	1EW02-CSJ-GL-REP-SS05-000032
AECOM Buried Utility Survey at West Ruislip Portal	1EW02-CSJ-GL-REP-SS05-000013
WP16 AECOM - Ground Investigation Scoping Report - Rifle Range, West Ruislip Golf Course (WRGC), HA4	1EW02-CSJ-GL-REP-SS05_SL07-000037
Newyears Green Farm – Land Quality Desk Study	1EW02-CSJ-EV-REP-S002-000101
Newyears Green (Webbs land) Site Investigation Factual Report	1EW02-CSJ-EV-REP-SS05_SL07-000033
Newyears Green (Webbs land) Site Investigation Interpretative Report	1EW02-CSJ-EV-REP-SS05_SL07-000034
AECOM – Design Risk assessment – Newyears Green Site Investigation, UB9	1EW02-CSJ-DS-RIA-S000-000015
Land at New Years Green Farm – Land Quality Desk Study	1EW02-CSJ-EV-REP-S002-000101
Record of the Determination that the Land known as 'New Years Green Lane Landfill Site' is Contaminated Land. London Borough of Hillingdon. 26 May 2011	London Borough of Hillingdon, Record of Land Determination, 2011
CSJV List of activities per work package. November 2020	WP's and Types of Works

The information review and the creation of the conceptual site model (sources, receptors and pathways) for the purpose of this report are split below per catchment area. Figure 4 illustrates the sampling locations and the potential sources of contamination and Figure 3 the HS2 enabling works activities that took place in the vicinity of the sampling locations.

3.1 Colne – confluence with Chess to River Thames Catchment (Newyears Green Bourne)

Potential Sources of Contamination- historical, existing and non-HS2

- Historical Landfill - Park Lodge Farm/New Years Green Lane. The Bourne runs in a culvert below this landfill. The site was operated by Greater London Council for the disposal of commercial and household waste. The landfill site is reported to have been in operation between 1944 and 1974. It is understood that this landfill site was determined as contaminated land under Part 2A. A summary of the site investigation that gave the basis on which the determination has been made is reported in Report Reference 'London Borough of Hillingdon, Record of Land Determination, 2011'. No solid soil samples were tested for contamination, but only leachate, groundwater and surface water. The site investigation indicated that contaminants from the landfill leachate entered into the culverted Bourne and the low flow conditions of the stream produced a high ammonia concentration in the Bourne with a peak of 170 mg/L in 1995. The surface water and groundwater contamination resulted in the closure of the Affinity Water's Ickenham Water Public Supply (PWS) Borehole. When the flow of the stream was high there appeared to be no impact. A list of contaminants confirmed in the leachate is reported in the contaminants list below.
- Former landfill site named New Years Farm (Webbs Land). The site is recorded to have been present approximately 200m east of the Bourne and to have been operated by Mr R E Webb. The last operating date was reported to be 31 December 1989. The type of waste accepted at the landfill site is not recorded. A site investigation was carried out in this area and the results were reported in the report Ref.1EW02-CSJ-EV-REP-SS05_SL07-000034. One round of groundwater sampling was undertaken indicating elevated concentrations of contaminants within groundwater beneath the site. The exceedances detected are consistent with contaminants known in the Part 2A site located 55m northwest (Park Lodge Farm/New Years Green Lane Landfill). A comparison of groundwater and leachate results indicates a disparity in concentrations with leachate

concentrations generally being lower than groundwater concentrations suggesting an off-site source. Elevated concentrations of copper, zinc and PAH and TPH were recorded in soil samples predominantly at depths greater than 1m.
- Historical landfill site located at Dews Farm approximately 200m north of the stream. The type of waste deposited and the period of operation of this landfill site is not recorded.
- West London Composting Ltd, 'Composting', 800m east of the Bourne. The facility is an in-vessel bulk composting facility and can process 50,000 tonnes of organic waste each year, from which a variety of soil conditioners are manufactured for agricultural and commercial uses.
- BFA Recycling Ltd, a metal recycling site, approx. 100m east of the stream.

Other potential sources that exist in the vicinity of the Bourne but are not considered to impact on surface water quality at the monitoring locations are detailed below:

- Historical landfill site approximately 200m south of the stream. The site was operated by Pioneer Willment Limited from 1967 to 1973. The type of waste is not recorded. The historical landfill is located downgradient of monitoring locations.
- Discharge Consent for Uxbridge Skip Hire Ltd. The discharge type was trade effluent discharge – site drainage. Discharge to the stream downgradient of monitoring locations.

The West London Composting Ltd was discounted as a source from further assessment based on the geology below the site (London Clay with no superficial deposits) and the distance from the watercourse which is more than 750m away. The historical landfill site approximately 200m south of the stream and the discharge consent were discounted as sources as downgradient from the monitoring locations.

Potential Contaminants include:

- Polyaromatic hydrocarbons (PAHs);
- Total Petroleum Hydrocarbons (TPHs);
- Benzene, toluene, ethylbenzene and xylene (BTEX);
- Heavy metals including lead, cadmium, zinc, copper, iron and mercury;

- Fuel oils, heavy oils and grease;
- Acids and alkalis;
- Volatile organic compounds (VOCs);
- Semi-volatile organic compounds (SVOCs);
- Ammonia;
- Chloride;
- Sulphates and phenols; and
- Pesticides and herbicides.

The Park Lodge Farm/New Years Green Lane landfill leachate contained the following chemicals: Organohalogens: dichloroethane, dichlorobenzene, chlorobenzene and Mecoprop, Mercury, Cadmium, Mineral oils and hydrocarbons: TPH in the C6 to C40 range, benzene, xylene, acenaphthene, naphthalene, phenanthrene, dibenzofuran, fluorene, isopropylbenzene, methylnaphthalene and trimethylbenzene, nitrosodiphenylamine, dimethylphenol and ammoniacal nitrogen. It also confirmed unacceptable concentrations of the following substances: iron, calcium, magnesium, sodium, sulphate, chloride.

Potential Sources – HS2 Enabling Works Activities

CSJV provided a list of activities relevant to the HS2 enabling works in the vicinity to the site. The list of activities and an assessment of the potential to be a source/pathway as provided by CSJV can be found in Table 6 below Figure 3 indicates the location of each of the activities.

Table 6: List of activities relevant to the HS2 enabling works

Work Package	Name	Main work	Activities undertaken	Sector Number	Part of Sector 2?	Is the activity a Source	Is there a pathway?	Is there a receptor?	WFDA needed?	Justification
P001b	Habitat Creation	Vegetation clearance - Vegetation clearance and shallow seasonal MSD pond construction into London Clay for GCN	Construction of replacement Great Crested Newt Ponds in London Clay north west of MSD site. Potential source of silty runoff. No pathway or watercourses nearby.	1,2,3,4	yes	Yes	No	No	No	Possible source of silty runoff, but no pathway or surface water receptor nearby.
P001c	Habitat Creation & ecology clearance	Vegetation clearance - Vegetation clearance & top soil strip in copthal area	Tree and vegetation clearance using mostly physical clearance methods, but also some use of Glyphosate herbicide >5m away from watercourses (approach agreed with the Environment Agency).	2,4	yes	No	N/A	N/A	N/A	Activities do not represent a source
P011	Archaeology	Archaeology surveys - Trenches in WRGC, NYG Bourne area and Northern and Southern Sustainable Placement areas, and 3d surveys (OOC)	Exploratory trenches dug to check for archaeological artefacts. Standoff from watercourses of at least 8m. Dewatered following rainfall by pumping onto adjacent land under consent/exemption from the Environment Agency.	2,4	yes	No	N/A	N/A	No	Activities do not represent a source
P012	Surveys	Ecology Surveys - Early Ecology Surveys	Ecology surveys only - no intrusive works.	1,2,3,4	yes	No	N/A	N/A	No	Activities do not represent a source

Work Package	Name	Main work	Activities undertaken	Sector Number	Part of Sector 2?	Is the activity a Source	Is there a pathway?	Is there a receptor?	WFDA needed?	Justification
P015	Surveys Tranche 2	Surveys + monitoring	Surveys only - no intrusive works.			No	N/A	N/A	No	Activities do not represent a source
P016	Surveys Tranche 3	Surveys + monitoring	Surveys only - no intrusive works.			No	N/A	N/A	No	Activities do not represent a source
P020	Watercourse Activities	Hydraulic models - Fluvial hydraulic modelling, fluvial surveys and flood risk assessments	Fluvial hydraulic surveys of watercourses (channel dimensions/soffit levels of structures only), development of baseline fluvial hydraulic models for the HS2 project and interface with MWCC/HS2/EA/LLFA.	2	yes	N/A	N/A	N/A	N/A	Outside of enabling works scope and not considered in WFDA
P049b	S2 Demolitions	West Ruislip golf course - demolitions and compound set up	Minor demolition of small buildings on West Ruislip Golf Course (WRGC) and set up of the CSJV compound for WRGC.	2	yes	No	N/A	N/A	No	Activities do not represent a source

Work Package	Name	Main work	Activities undertaken	Sector Number	Part of Sector 2?	Is the activity a Source	Is there a pathway?	Is there a receptor?	WFDA needed?	Justification
P053	MSD Demo & access road	Demolition of 12 buildings and warehouses including soft strip and asbestos removal, and utility diversions and removal of underground utilities.	(1) Demolition of all buildings within LLAU/HS2 Route through the MSD site - not within vicinity of any watercourse. (2) Construction of new access road into MSD site - in proximity of Breakspear Road South (BRS) ordinary watercourses. Undertaken according to the HS2 CoCP/best practice. (3) Installation of surface water drainage pipe from MSD site to pre-cast discharge headwall in River Pinn under Schedule 33 consent from the Environment Agency for work in the flood plain (including pollution mitigation measures). (4) Dredging of BRS ordinary watercourse under dry conditions and installation of connection to River Pinn headwall to provide additional surface water flood capacity under Schedule 33 consent from Hillingdon Borough Council (Lead Local Flood Authority).	2	yes	Yes	Yes	Yes	Yes	Activities represent a potential source for contamination to the Ordinary Watercourses on Breakspear Road South and to the River Pinn. However, work in Breakspear Road was undertaken in dry weather/under consent and the ordinary watercourses (infiltration only - no onward flow connection) were dry for the whole time. Work in the flood plain and bank of the River Pinn was undertaken in dry/low flow conditions and included the use of a cofferdam for the headwall installation. Work was short duration and undertaken under Schedule 33 consent. Minor concrete dust sediment incident was reported on 28/03/2019, believed to originate from the MSD headwall drainage line investigated and dredged from the River Pinn under Schedule 33 consent from the Environment Agency on 27/09/2020.

Work Package	Name	Main work	Activities undertaken	Sector Number	Part of Sector 2?	Is the activity a Source	Is there a pathway?	Is there a receptor?	WFDA needed?	Justification
P085	Advanced Planting	habitat creation & maintenance - Creation of land north of Copthall Cutting and NYG advanced tree planting sites; Maintenance of MSD pond and advanced woodland planting site and WRGC.	No heavy machinery, only hand tools and rotorvators for ground preparation. The majority of the maintenance works involved the cutting of grass across the fairways of the former golf course. Additionally, some minor tree and brush clearance has taken place as has some work to rebuild hibernacula and pond enhancement. Minor drainage ditch clearance has been limited to removal of debris at outfall to mitigate flooding.	2	yes	No	N/A	N/A	No	Activities do not represent a source

The activities relevant to the location of Newyears Green Bourne are:

- Excavation of trenches for archaeological surveys;
- Vegetation clearance and topsoil strip; and
- Watercourse activities.

Information provided by CSJV indicate that the water management for the archaeological trenches included pumping of the rainwater that was collected in the trenches and discharging to ground to infiltrate into the soil (under a Schedule 33 consent or exemption), as agreed with the Environment Agency/HS2. CSJV state that the excavation works took place at least 8m away from the Newyears Green Bourne as an extra measure to minimise risk from surface water run-off. Therefore, CSJV conclude that the activity can be discounted as a potential source as there were mitigation measures in place to reduce any potential risk of contamination.

According to CSJV tree and vegetation clearance was undertaken using mostly physical clearance methods. Some use of Glyphosate herbicide was recorded more than 5m away from watercourses. The approach was agreed with the Environment Agency.

The watercourse activities comprise non-intrusive fluvial surveys and flood risk assessments and therefore are discounted from further assessment.

Potential Receptors

The receptor is the surface water feature of Newyears Green Bourne. The National River Flow Archive (https://nrfa.ceh.ac.uk/data/station/meanflow/39010) states that the Colne at Denham (monitoring station 39010) immediately upgradient of the confluence with the New Years Green Bourne has a base flow index of 0.87, indicating that a significant proportion of the water is derived from groundwater discharge. A similar base flow index should be expected for the New Years Green Bourne where it is located on the chalk however a significantly lower baseflow index will be expected where the New Years Green Bourne is located on the Lambeth Group. Field observations are that flow in New Years Green Bourne is very reactive to rainfall events.

Potential Pathways

- Direct entry of leachate through pathways within the culvert structure (e.g. cracks, displaced joints etc.) where the Bourne is culverted below the Park Lodge Farm/New Years Green Lane landfill;
- The northern part of the Bourne is located within the Lambeth Formation which is a Secondary A aquifer. There is potential for hydraulic connectivity between the aquifer and the Bourne. Furthermore, the British Geological Society (BGS) flood maps indicate that the northern part of the Bourne falls within an area with potential for groundwater flooding to occur at surface. The southern part of the Newyears Green Bourne is within the Seaford Chalk Formation which is a principal aquifer. The groundwater is expected to act as a pathway to the Bourne for any potential contamination.
- Lateral migration via surface runoff and direct discharge to the Bourne (dissolved phase or particulate).

There are no current discharge consents (one lapsed 400m west relevant to a soakaway).

The CSM summary Table 7 in Section 3.4 lists all the sources, receptors and pathways for each catchment.

3.2 River Pinn Catchment (River Pinn, tributary and Ickenham Stream north of the railway line and associated golf course ditches)

Potential Sources of Contamination- historical, existing and non-HS2

- Former MSD site (southern area). Located approximately 200m west of the River Pinn. Former underground tanks were used to hold trade effluent generated by pharmaceutical production (the tanks were removed during the intrusive works in 2019). On-site a generator (assumed diesel powered), incinerator, chemical storage and use and possible fuel storage were noted. During the 2019 site investigation the groundwater table was not encountered at the site. Eight trial pits were excavated to a depth maximum depth of 2m throughout the site and soil sampling was undertaken. No visual or olfactory evidence of contamination was observed at any location apart from an organic odour at one location. Assessment of the chemical data against waste classification criteria indicated that all samples collected would be classified as Non-Hazardous waste.

- MSD site (northern area). Located approximately 200m west of the River Pinn. This part of the site will be retained by MSD for continued use and is expected to have similar potential contaminants to the southern area as both areas were part of the historically called 'Research Farm' A site walkover was not carried out by AECOM in this part of the site.
- Intervet UK Ltd. Laboratories related to animal healthcare (inactive) formerly located on MSD site.
- Gatemead Farm and Oak Farm. Located approximately 70m west of the River Pinn. Current and historical use of the site for agricultural/farming purposes (including fuel/chemical storage, underground slurry pit, possible buried waste and use of pesticides/herbicides and fertilisers).
- West London Composting Ltd, 'Composting', 750m north of the River Pinn. The facility is an in-vessel bulk composting facility and can process 50,000 tonnes of organic waste each year, from which a variety of soil conditioners are manufactured for agricultural and commercial uses.
- Former West Ruislip Rifle Range. Located approximately 500m east of the Ickenham Stream (Pinn Catchment). A soil sample collected during the 2019 AECOM intrusive investigation of the site, reported a concentration of lead of 13,170mg/kg.
- Former Golf Course. East adjacent to River Pinn. Potential contaminants are fertilisers and herbicides.
- Railway line - Pesticides and herbicides used in the railway line
- Former discharge consent for 'Sewage Discharges – Final/Treated Effluent – Not water company', listed as for a domestic property (including farmhouse). Receiving water listed as the London Clay. Located approximately 200m west from a tributary of the River Pinn and 600m north from River Pinn. The discharge consent is placed 300m west of ML024-SW202, status revoked 2017.
- Historical discharge consent in relation to trade discharges of process water at the Ickenham Pumping Station to a tributary of the River Pinn. This consent was surrendered under the Environmental Permitting (England and Wales) Regulations (EPR) 2010. Located approximately 100m east of the River Pinn.

- Former RBR Services LTD (motors and repair of motors) adjacent to the South of Oak farm.
- Allotment gardens 400m north of ML023-SW023. Potential for use of herbicides and pesticides.
- Allotment gardens 50m south of ML023-SW024. Potential for use of herbicides and pesticides. Located downgradient of the sampling locations.

The West London Composting Ltd was discounted as a source from further assessment based on the geology below the site (London Clay with no superficial deposits) and the distance from the watercourse which is more than 750m away. The allotment gardens 50m south of ML023-SW024 were also discounted as a source from further assessment since they are located downgradient of the sampling locations.

Potential Sources – HS2 Enabling Works Activities

The list of activities as provided by CSJV can be found in Table 6 Figure 3 indicates the location of each of the activities. The activities relevant to the Pinn catchment are:

- Excavation of trenches for archaeological surveys;
- Vegetation clearance and topsoil strip;
- MSD demolition works and construction of a new access road; and
- Watercourse activities.

Information provided by CSJV indicate that the water management for the archaeological trenches included pumping of the rainwater that was collected in the trenches and discharging to ground to infiltrate into the soil (under a Schedule 33 consent or exemption), as agreed with the Environment Agency/HS2. The excavation works took place at least 8m away from the River Pinn or the Ickenham Stream (Pinn Catchment) as an extra measure to minimise risk from surface water run-off. Therefore, CSJV conclude that the activity can be discounted as a potential source as there were mitigation measures in place to reduce any potential risk of contamination.

According to CSJV tree and vegetation clearance was undertaken using mostly physical clearance methods. Some use of Glyphosate herbicide was recorded more than 5m away from watercourses. The approach was agreed with the Environment Agency.

The MSD demolition works comprised the demolition of 12 buildings and warehouses including soft strip and asbestos removal, utility diversions and removal of underground utilities. Based on information provided by CSJV appropriate risk mitigation measures were in place to protect the surface water feature (Table 6).

The watercourse activities comprise non-intrusive fluvial surveys and flood risk assessments and therefore are discounted from further assessment.

Potential Contaminants

- polycyclic aromatic hydrocarbons (PAHs);
- heavy metals;
- phenols;
- petroleum hydrocarbons;
- benzene, toluene, ethylbenzene and xylene (BTEX);
- sulphates;
- Organochlorine pesticides/herbicides, fertilizers;
- inorganic compounds (including cyanides, sodium salts, sulphuric and hydrochloric acids and sodium hydroxide);
- organic solvents, including volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs);
- pharmaceutical products;
- organic waste (including animal waste);
- radiological contaminants associated with former licence to use and dispose of radioactive waste;
- Polychlorinated biphenyls (PCBs); and
- Rifle and ammunition components and associated oils, solvents and lubricants such as nitro powder solvent, barrel cleaning solvent and lead.

Potential Receptors

The potential receptors are the surface water features of River Pinn and Ickenham Stream (Pinn Catchment). The National River Flow Archive (https://nrfa.ceh.ac.uk/data/station/meanflow/39098) states that the River Pinn at Uxbridge (monitoring station 39098, approximately 4.7km south of the Chiltern Railway Lines) downgradient of the monitoring locations has a base flow index of 0.21, indicating that only a limited proportion of the water is derived from groundwater discharge.

Potential Pathways

- Leaching and downward vertical migration of contaminants from potential made ground into the underlying Secondary A (Lambeth Group) aquifer and potentially subsequent lateral migration and discharge to surface water. Although it is unknown whether the River Pinn is hydraulically connected to the underlying Secondary A aquifer or whether it is a losing (water infiltration to groundwater) or gaining (water intake from groundwater) stream at this location.
- Direct connection via MSD site drainage. Information provided by CSJV indicate that the MSD site, the new MSD access road and one highway ditch (ordinary watercourse) are drained to the River Pinn at a right bank discharge headwall just upstream of the River Pinn pedestrian bridge.
- the Environment Agency Flood Maps indicate that the working area of the Oak Farm is classified as both Flood Zone 2 and Flood Zone 3. During flooding, potential contamination can be mobilised to the River Pinn.
- Surface water run-off (dissolved phase or particulate).
- Discharge from the drainage streams 70m north west of the former Rifle site.

3.3 Crane Rivers and Lakes Catchment (Ickenham Stream)

Potential Sources of Contamination- historical, existing and non-HS2

- Railway line – Heavy metal related to the railway lines and herbicides used to keep the railway line clear of weeds.

Potential Sources – HS2 Enabling Works Activities

The list of enabling activities as provided by CSJV can be found in Table 6. Figure 3 indicates the location of each of the activities. The activities relevant to the Crane Rivers and Lakes catchment are:

- Excavation of trenches for archaeological surveys;
- Vegetation clearance and topsoil strip; and
- Watercourse activities

Information provided by CSJV indicate that the water management for the archaeological trenches included pumping of the rainwater that was collected in the trenches and discharging to ground to infiltrate into the soil (under a Schedule 33 consent or exemption), as agreed with the Environment Agency/HS2. The excavation works took place at least 8m away from the section of Ickenham stream (Yeading Brook Catchment) south of the railway lines as an extra measure to minimise risk from surface water run-off. Therefore, CSJV have concluded that the activity can be discounted as a potential source as there were mitigation measures in place to reduce any potential risk of contamination.

According to CSJV tree and vegetation clearance was undertaken using mostly physical clearance methods. Some use of Glyphosate herbicide was recorded more than 5m away from watercourses. The approach was agreed with the Environment Agency.

The watercourse activities comprise non-intrusive fluvial surveys and flood risk assessments and therefore are discounted from further assessment.

Potential contaminants

The potential contaminants below are relevant to the railway lines and the enabling works.

- PCBs;
- PAHs;
- TPH;
- Herbicides; and
- Phenols.

Potential Receptors

The Ickenham Stream (Yeading Brook Catchment) south of the railway lines is identified as a potential receptor. The National River Flow Archive (https://nrfa.ceh.ac.uk/data/station/info/39055) states that the Ickenham Stream (Yeading Brook Catchment) West at North Hillingdon (monitoring station 39055) downgradient of the monitoring locations has a base flow index of 0.39, indicating that a proportion of the water is derived from groundwater discharge.

Potential Pathways

The section of the Ickenham that is south of the railway lines is within the London Clay Formation which is a non- productive aquifer. The Environment Agency surface Flood Maps indicate that the area around the Stream is classified as both Flood Zone 2 and Flood Zone 3. During flood events, potential contamination may be mobilised to the Stream. Potential surface water run-off (dissolved phase or particulate).

3.4 CSM Summary Table

An assessment of the potential significance of the source-pathway-receptor linkages identified in sections 3.1, 3.2 and 3.3 is presented below in Table 7 (according to baseline conditions). The CSM evaluation matrix can be found in Appendix 3.

The HS2 watercourse enabling activities comprise non-intrusive fluvial surveys and flood risk assessments and therefore are discounted from further assessment.

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Table 7: Conceptual Site Model

Potential Sources	Potential Pathways	Receptors	Baseline Conditions		Comments
			Severity/Likelihood	Risk Category	
New Years Green Lane Landfill (PAH, TPH, BTEX, heavy metals, VOCs, SVOCs, ammonia, chloride, sulphates, phenols, nitrogen and phosphorus species)	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne	New Years Green Bourne	Medium/High	High	Impact to groundwater confirmed and public water supply shut as a result
	Lateral migration via surface water runoff (dissolved phase or particulate)		Medium/Likely	Moderate	During floods or excessive rainfall
	Direct entry of leachate through pathways within the culvert structure (e.g. cracks, displaced joints etc.) where the Bourne is culverted below the New Years Green Lane landfill		Medium/High	High	The Bourne is culverted north of New Years Green Lane. Impact detected within the Bourne attributed to entry of landfill leachate.
New Years Green Lane Farm former landfill (Webbs Land) (metals, PAH, TPH, nitrogen and phosphorus species)	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne		Medium/Likely	Moderate	Leachate test results yielded lower concentrations than those detected in groundwater.
Dews Lane Landfill (PAH, TPH, BTEX, heavy metals, VOCs, SVOCs, ammonia, chloride, sulphates, phenols,	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne		Medium/Likely	Moderate	Limited information available

Potential Sources	Potential Pathways	Receptors	Baseline Conditions		Comments
			Severity/Likelihood	Risk Category	
nitrogen and phosphorus species)	Lateral migration via surface runoff		Medium/Likely	Moderate	During floods or excessive rainfall
Metal recycling site (heavy metals, PAH, TPH)	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne		Medium/Likely	Moderate	Risk dependent on site condition and operational practises which are unknown
	Lateral migration via surface runoff		Medium/Low	Moderate/Low Risk	Low likelihood on basis of distance to watercourse
HS2 enabling works (glyphosate used in vegetation clearance, archaeological trenching)	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne		Medium/Low	Moderate/Low Risk	Mitigation measures in place for the enabling works and use of glyphosate following measures agreed by the EA.
	Lateral migration via surface runoff		Medium/Low	Moderate/Low Risk	Mitigation measures in place for the enabling works and use of glyphosate following measures agreed by the EA.
MSD site, Intervet Laboratories (PAH, TPH, BTEX, phenols, sulphates, inorganic compounds, pharmaceutical products, organic waste, radiological contaminants, PCBs, heavy metals)	Leaching and lateral migration via the perched water in potential made ground and via the Secondary A aquifer to the River Pinn	River Pinn (Ickenham Stream (Pinn Catchment) discounted as upgradient)	Medium/Likely	Moderate	The MSD site is located on the London Clay unproductive strata and its eastern part on a Secondary A aquifer. Perched water in potential made ground cannot be discounted. There is potential for hydraulic connectivity between the

Potential Sources	Potential Pathways	Receptors	Baseline Conditions		Comments
			Severity/Likelihood	Risk Category	
					perched water and the Secondary A aquifer
	Direct connection via site drainage		Medium/Likely	Moderate	Direct connection
	Lateral migration via surface runoff		Medium/Low	Moderate	During excessive rainfall but low likelihood on basis of distance to watercourse
Gatemead Farm and Oak Farm (historical agricultural and farming land)	Leaching to groundwater and lateral migration within the Secondary A aquifer to River Pinn	River Pinn	Medium/Likely	Moderate	Leaching of fertilisers and pesticides applied to agricultural land likely
	Lateral migration via surface runoff		Medium/Low	Moderate	During excessive rainfall but low likelihood on basis of distance to watercourse
Former RBR Services LTD (heavy metals, PAH, TPH)	Leaching to groundwater and lateral migration within the Secondary A to the River	River Pinn	Medium/Likely	Moderate	Risk dependent on historical site condition and historical operational practises which are unknown
	Lateral migration via surface runoff		Medium/Low	Moderate/Low Risk	During floods or excessive rainfall but low likelihood on basis of distance to watercourse
Former West Ruislip Rifle Range (rifle and ammunition components and associated	Lateral migration via perched water in potential made ground		Medium/Low	Moderate/Low Risk	River Pinn discounted as a receptor due to the London Clay un-productive strata

Potential Sources	Potential Pathways	Receptors	Baseline Conditions		Comments
			Severity/Likelihood	Risk Category	
oils, solvents, lubricants, nitrogen and phosphorus species)	and potential subsequent lateral migration	Ickenham Stream (Pinn Catchment)			bedrock and the distance from the source.
	Lateral migration via the site runoff into the drainage streams 70m north west of the former Rifle site potentially connected to the River		Medium/Likely	Moderate	Likely on basis of proximity of drainage streams to source
West Ruislip Golf Course (herbicides, fertilisers, nitrogen and phosphorus species and enabling works - demolitions)	Lateral migration via perched water in potential made ground and potential subsequent lateral migration	Ickenham Stream (Pinn Catchment) and River Pinn	Medium/Likely	Moderate	Leaching of fertilisers and pesticides applied to the golf course
	Lateral migration via the site runoff (dissolved phase or particulate)		Medium/Likely	Moderate	Tributary of Ickenham Stream (Pinn Catchment) located in the golf course and the north-western golf course boundary is adjacent to River Pinn
Railway line (heavy metals, herbicides and TPH)	Lateral migration within the Secondary A aquifer to the Stream and River		Medium/Likely	Moderate	Stream is located below the railway line
	Lateral migration via surface runoff (dissolved and particulate)		Medium/Likely	Moderate	During floods or excessive rainfall

Potential Sources	Potential Pathways	Receptors	Baseline Conditions		Comments
			Severity/Likelihood	Risk Category	
Allotment/communal gardens (herbicides and pesticides, nitrogen and phosphorus species)	Leaching to groundwater and lateral migration within the Secondary A to the River	Ickenham Stream (Pinn Catchment)	Medium/Likely	Moderate	Adjacent to Ickenham Stream (Pinn Catchment).
	Lateral migration via surface runoff		Medium/Likely	Moderate	During floods or excessive rainfall
HS2 enabling works (glyphosate used in vegetation clearance, archaeological trenching)	Lateral migration via potential perched water of the un-productive strata and the Secondary A aquifer	River Pinn and Ickenham Stream (Pinn Catchment)	Medium/Low	Moderate/Low Risk	Mitigation measures in place for the enabling works and use of glyphosate following measures agreed by the EA.
	Lateral migration via surface runoff		Medium/Low	Moderate/Low Risk	Mitigation measures in place for the enabling works and use of glyphosate following measures agreed by the EA.

Potential Sources	Potential Pathways	Receptors	Baseline Conditions		Comments
			Severity/Likelihood	Risk Category	
Railway line (heavy metals, herbicides and TPH)	Lateral migration via potential perched water in made ground	Ickenham Stream (Yeading Brook Catchment)	Medium/Low	Moderate/Low Risk	Located within the London Clay unproductive strata
	Lateral migration via surface runoff		Medium/Likely	Moderate	During floods or excessive rainfall
HS2 enabling works (glyphosate used in vegetation clearance, archaeological trenching)	Lateral migration via potential perched water of the un-productive strata and the Secondary A aquifer	Ickenham Stream (Yeading Brook Catchment)	Medium/Low	Moderate/Low Risk	Mitigation measures in place for the enabling works and use of glyphosate following measures agreed by the EA.
	Lateral migration via surface runoff		Medium/Low	Moderate/Low Risk	Mitigation measures in place for the enabling works and use of glyphosate following measures agreed by the EA.

4 Data Screening

The CSM identifies potential source-pathway-receptor pollutant linkages that, consistent with the staged approach advocated by Land Contamination: Risk Management (which has replaced CLR11), require further assessment.

A Generic Quantitative Risk Assessment (GQRA) has been completed of the existing surface water quality data (receptors) to assess the significance of potential linkages identified within the CSM. The GQRA has used the following hierarchy of criteria defaulting to the next tier where no screening value was available.

- Tier 1
  - The Water Framework Directive (WFD) (Standards and Classification) Directions (England and Wales) 2015 – Freshwater Environmental Quality Standards (EQS);
  - SEPA - Supporting Guidance (WAT-SG-53) Environmental Quality Standards for Discharges to Surface Waters. v6. Dec 2015. Freshwater EQS.

- Tier 2
  - European Chemicals Agency (ECHA) Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Predicted No Effect Concentrations (PNEC) - Freshwater.

- Tier 3
  - Water, England & Wales - Water Supply (Water Quality) Regulations, 2016 No. 614;
  - World Health Organisation (WHO) Guidelines for Drinking Water Quality (4th edition), 2017, incorporating the 1st addendum;
  - World Health Organisation (WHO), 2008. Petroleum Products in Drinking Water. Background document for development of WHO Guidelines for Drinking-water Quality; and
  - United States Environmental Protection Agency (USEPA) Regional Screening Levels (tap water), May 2020.

The first Tier of screening standards for the following analytes vary according to the catchment classification and the Environment Agency (EA) waterbody quality status:

- Temperature;
- Dissolved Oxygen (% saturation); and
- Ammonia as NH_3.

The water quality classification (poor, moderate, good and high and salmonid or cyprinid river classification) for temperature, dissolved oxygen and ammonia for each catchment (Pinn, Colne (Confluence with Chess to River Thames) and Crane River and Lakes) was derived from the EA Catchment Data Explorer website. Table 6 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 – Freshwater Standards document details the parameters to determine the temperature standard, Table 7 the parameters for ammonia and Table 1 the parameters to determine the dissolved oxygen standard.

The Environment Agency Metal Bioavailability Assessment Tool (M-BAT) (version 30 created 20th November 2013) was used to derive site-specific PNEC for copper, zinc, manganese and nickel. Alkalinity as $CaCO_3$ and pH concentration averages for each location were used within the M-BAT tool along with a third parameter Dissolved Organic Carbon (DOC) to calculate the site-specific PNEC. As mentioned in Section 2, site-specific DOC concentrations were not available therefore the published 25th-percentile DOC for the surface water body (SWB) Colne (Confluence with Chess to River Thames) catchment was used from the WFD - United Kingdom Technical Advisory Group (UKTAG), May 2012 document. The input and output for the site-specific PNEC for copper, zinc, manganese and nickel can be found in Appendix 1.

Lead site-specific PNEC was calculated using the Environment Agency Pb Screening Tool (version 1.0 created 5th March 2015). DOC was the input parameter needed for the calculation of the site-specific Lead PNEC. As in the M-BAT tool (details above) the DOC (which is the 25th-percentile value) for the Colne (Confluence with Chess to River Thames) catchment was used. The input and output for the site-specific PNEC for lead can be found in Appendix 1.

Phosphorus site-specific PNEC was calculated using the UKTAG WFD River Phosphorus Standard Calculator (September 2014). The input parameters were the altitude for each location and the average total alkalinity as $CaCO_3$ for each location. The input and output for the site-specific PNEC for phosphorus can be found in Appendix 1.

The per location screening tables including basic statistics can be found in Appendix 2.

Following the screening of individual concentrations against selected criteria, where individual concentrations exceeded the adopted EQS GAC, then the following were checked:

- If the EQS GAC was referring to an annual average (AA) of concentrations, then the annual average of the concentrations was screened against the EQS GAC; and
- If there was a short-term/Maximum Allowable Concentration (MAC) EQS, then this EQS was screened against the individual values.

Where GAC are derived from PNEC, these also refer to an annual average of concentration therefore if the individual concentrations exceeded the PNEC, then the annual average was screened against the PNEC.

Where the GAC are derived from EQS or PNECs, only those chemicals where the average concentration exceeds the AA-EQS or PNEC or the individual concentrations per round exceed the short term/MAC-EQS have been taken forward for further assessment.

The analyte concentrations that exceeded GAC derived from drinking water standards have been taken forward for further assessment, along with the analyte concentrations that failed all the above criteria.

Based on the results of the data screening (Appendix 2) the analytes and field parameters that failed and therefore will be discussed further in the following sections are:

- Dissolved Oxygen (% saturation);
- Temperature;
- Ammoniacal Nitrogen as N;
- Nitrate (as N);
- Nitrite (as N);

- Orthophosphate as P;
- Aminomethyl phosphonic acid (degradation product of Glyphosate);
- EPH C8-C40; and
- Chromium (Trivalent) (Filtered).

5 Exceedances of Adopted Criteria

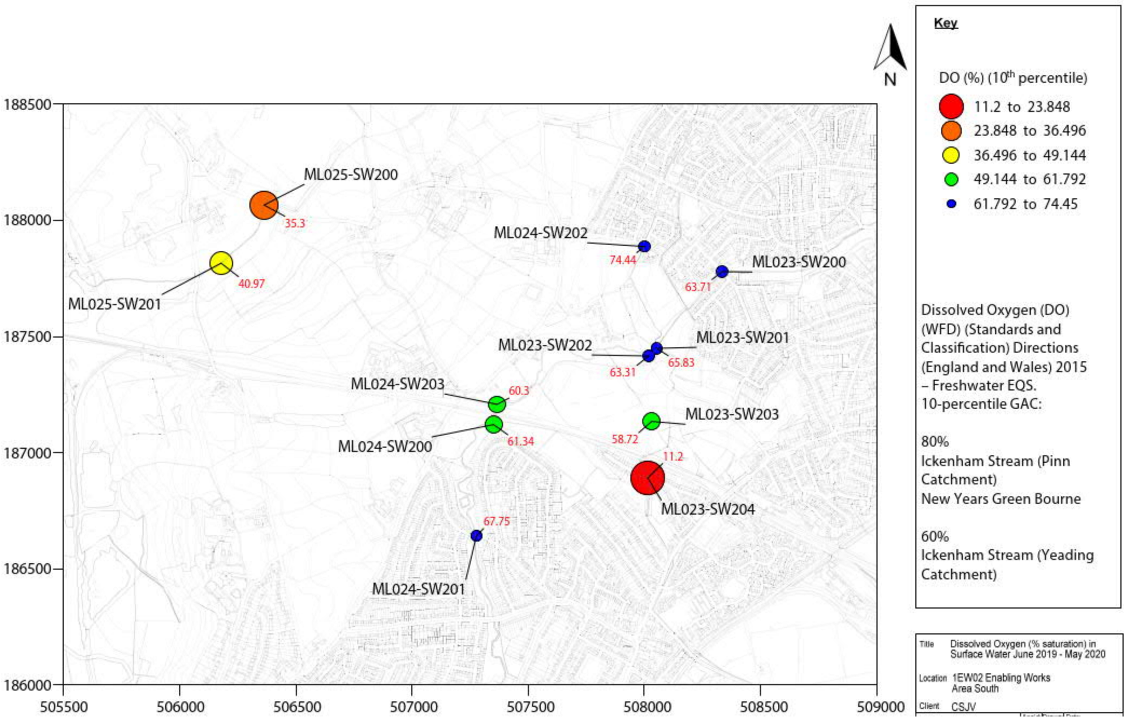
In the following subsections the exceedances of the analytes as listed in section 4 are discussed in terms of magnitude and temporal and spatial variation in concentration in relation to sources. Graphs are presented of chemical concentrations over time for different sampling points within the watercourse and surface water concentration plots for the analytes that recorded exceedances across multiple locations in all the watercourses.

5.1 Dissolved Oxygen (% saturation)

To derive the GAC for dissolved oxygen the Water Framework Directive (WFD) (Standards and Classification) Directions (England and Wales) 2015 – Freshwater Environmental Quality Standards (EQS) was used. The dissolved oxygen screening standards vary according to the catchment classification and the Environment Agency (EA) waterbody quality status. Details are provided in section 4. The 10th percentile concentration per location was screened against the adopted GAC.

Dissolved oxygen (DO) 10th percentile saturations were recorded to be below the adopted GAC (60% Ickenham Stream (Yeading Brook Catchment); 80% all other locations) triggering exceedances at all locations. The lowest DO saturations were recorded at Ickenham Stream (Yeading Brook Catchment) and New Years Green Bourne. A surface water saturation plot for dissolved oxygen was prepared and can be found as Plate 1 below and in Appendix 4.

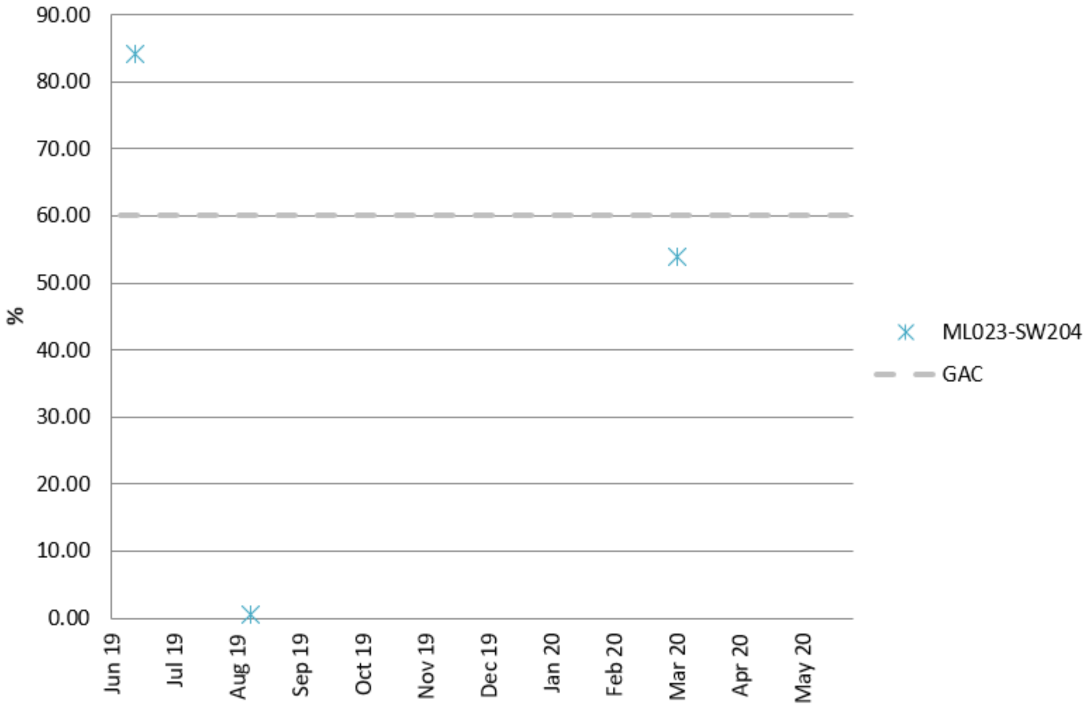
Plate 1: Dissolved oxygen surface water 10-percentile saturation plot



The 10th percentile DO saturation at Ickenham Stream (Yeading Brook Catchment) (ML023-SW204, data for three monitoring rounds available) was recorded as 11.2%, a factor of 5.4 times lower than the 60% GAC.

The DO saturation/time series graph for ML023-SW204 is presented below as Graph 1.

Graph 1: Dissolved oxygen (% saturation) in Ickenham Stream (Yeading Brook Catchment)

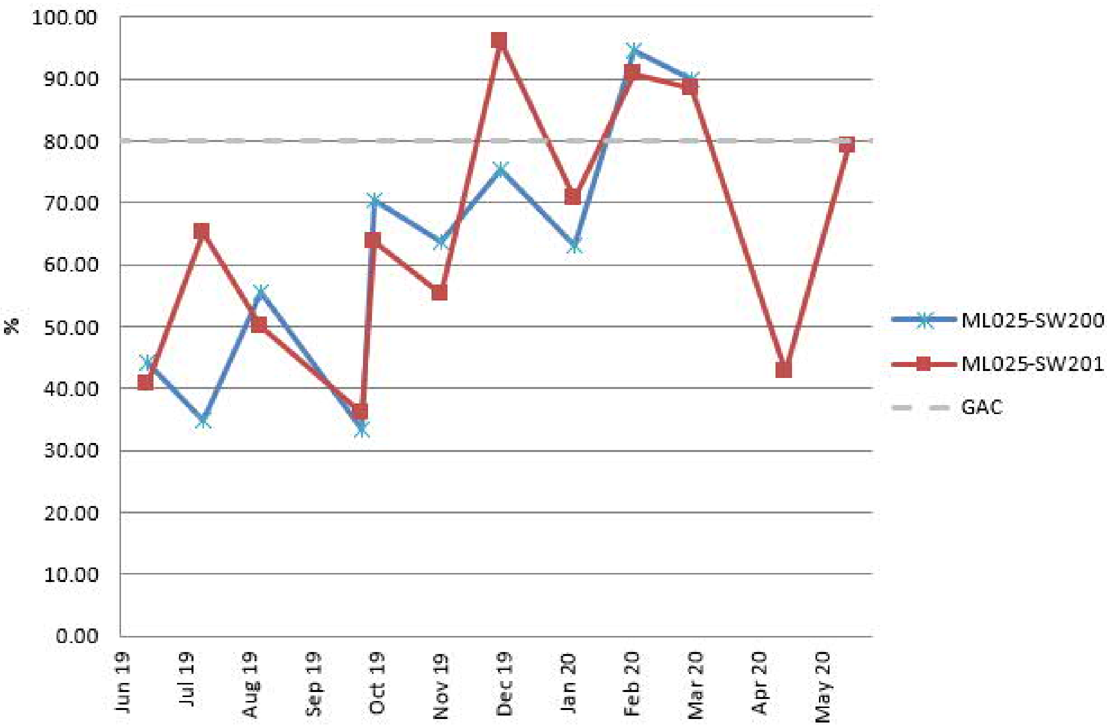


The lowest percent DO was recorded in August as 0.55% and was associated with an order of magnitude increase in total organic carbon (TOC) (75 mg/l, compared to 4-8 mg/l on other rounds). It is possible that the low DO reading is related to this increase in organic carbon loading in the Brook and potential consumption of available DO.

The 10^{th} percentile DO saturation at New Years Green Bourne were recorded as 35.3% at ML025-SW200 and 40.9% at ML025-SW201 both significantly below the 80% GAC. The 10^{th} percentile saturation in ML025-SW200 was approximately 5% higher compared to ML025-SW201, potentially relating to proximity of ML025-SW200 to the New Years Green Lane landfill.

The DO saturation/time series graph for New Years Green Bourne is presented below as Graph 2.

Graph 2: Dissolved oxygen (% saturation) in New Years Green Bourne



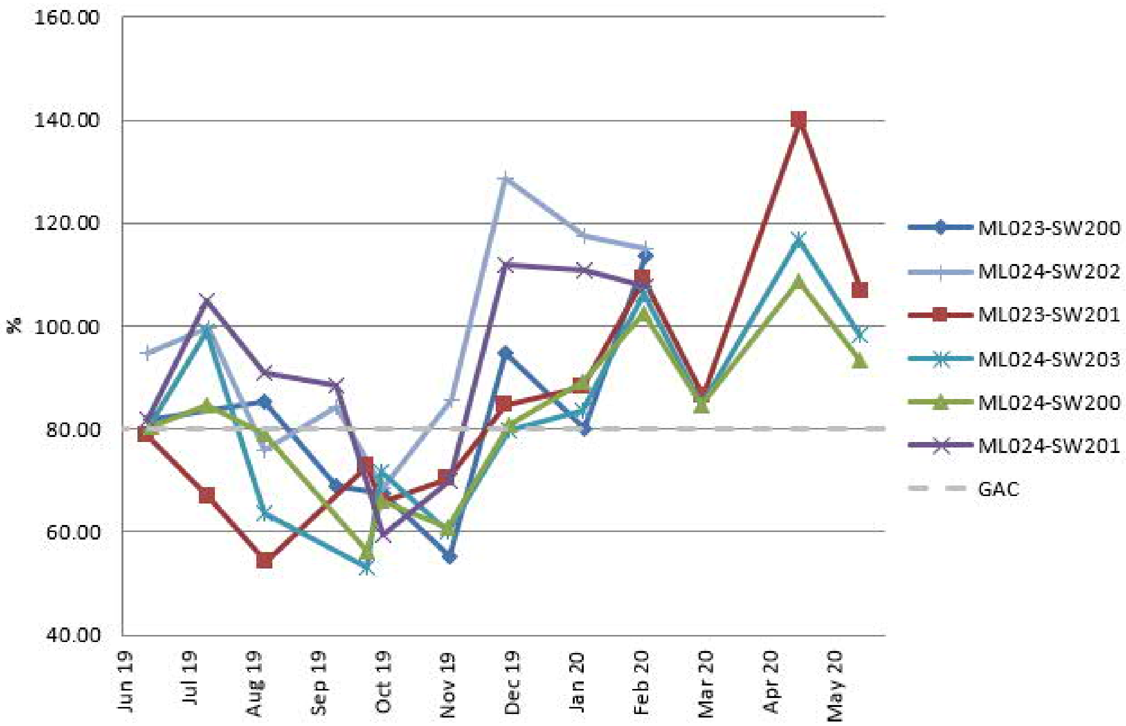
Based on the individual DO saturation per month there appears to be a seasonal variation with lower saturations during the summer months and higher during the winter months. No clear correlation with TOC was noted.

The 10th percentile DO saturations at the River Pinn (including the River Pinn tributary, ML024-SW202) were recorded in the range 60.3% (ML024-SW203) to 74.44% (ML024-SW202), all identified as below the 80% GAC.

The 10th DO saturations at ML024-SW203 and ML024-SW200 (locations north and south of the railway lines) were recorded to be slightly lower than the rest of the locations.

The DO saturation/time series graph for the River Pinn is presented below as Graph 3.

Graph 3: Dissolved oxygen (% saturation) in the River Pinn



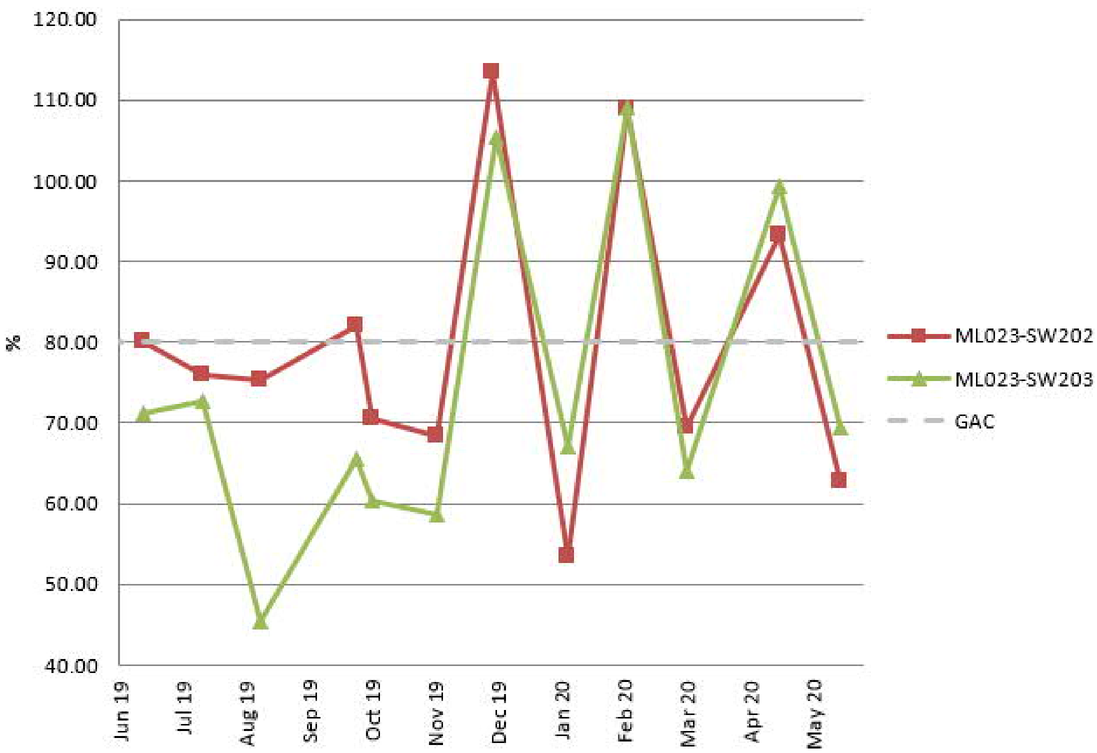
River Pinn tributary ML024-SW202 included in River Pinn graphs and discussion throughout the report.

Based on the individual saturations per month dissolved oxygen seems to decrease between July and November 2019 and increase again during the rest of the months. No clear correlation with TOC was noted.

The 10th percentile DO saturations at the Ickenham Stream (Pinn Catchment) were recorded in the range of 58.7% (ML023-SW203) to 63.31% (ML023-SW202), all identified as below the 80% GAC. The lowest 10th percentile saturation was recorded at ML023-SW203, north of the railway line.

The DO saturation/time series graph for the Ickenham Stream (Pinn Catchment) is presented below as Graph 4.

Graph 4: Dissolved oxygen (% saturation) in Ickenham Stream (Pinn Catchment)



Significant fluctuations in DO saturation are noted for ML023-SW202 and ML023-SW203 from November 2019 until May 2020.

Dissolved oxygen (%) was checked against TOC, nitrate and ammoniacal nitrogen to investigate if there is any correlation between low dissolved oxygen levels and carbon loading / nutrients. Only in one location a potential correlation was identified (ML023-SW204). This is the Ickenham Stream (Yeading Brook catchment) location, where the lowest levels of dissolved oxygen were recorded during August 2019 when the highest TOC concentration was detected. However, for this location there are only data for three sampling rounds, therefore there is not enough data to demonstrate a strong correlation.

Vegetation clearance enabling activities initiated in June 2017 and were completed in November 2020. Based on information provided by CSJV no glyphosate was used prior to the monitoring rounds, glyphosate was only used for spot treatment (no spraying) mostly after the monitoring was completed. Data for dissolved oxygen are not available before 2017 or after November 2020 to make a direct comparison. However, 10^{th} percentile DO saturations around 60% were noted at locations that are upstream to the vegetation clearance area of works.

The archaeological survey activities (trenching) that were undertaken in proximity to the New Years Green Bourne were recorded by CSJV to have been undertaken between May and August 2019. The lowest levels of dissolved oxygen at New Years Green Bourne were recorded in September 2019 and then again in May 2020 therefore it is unlikely that the trenching affected the levels of dissolved oxygen in New Years Green Bourne.

The archaeological survey activities (trenching) are considered to have low likelihood to have created pathways to the Ickenham Stream (Pinn Catchment) and affected the surface water quality for dissolved oxygen as the fluctuation in the saturations does not relate to the trenching activities dates.

The archaeological survey activities (trenching) that were undertaken in proximity to the River Pinn are unlike to have affected the dissolved oxygen levels as DO saturations of similar levels were recorded both upstream of the works locations and downstream.

The archaeological survey activities (trenching) that were undertaken in proximity to the Ickenham Stream (Yeading Brook Catchment) were recorded by CSJV to have been undertaken between May and July 2019 and then mid-September 2019. The lowest levels of dissolved oxygen were recorded in August 2019, between the two phases of the trenching activities.

5.2 Temperature

To derive the GAC for dissolved oxygen the Water Framework Directive (WFD) (Standards and Classification) Directions (England and Wales) 2015 – Freshwater Environmental Quality Standards (EQS) was used. The temperature screening standards vary according to the catchment classification and the Environment Agency (EA) waterbody quality status. Details are provided in section 4. The 98th percentile concentration per location was screened against the adopted GAC.

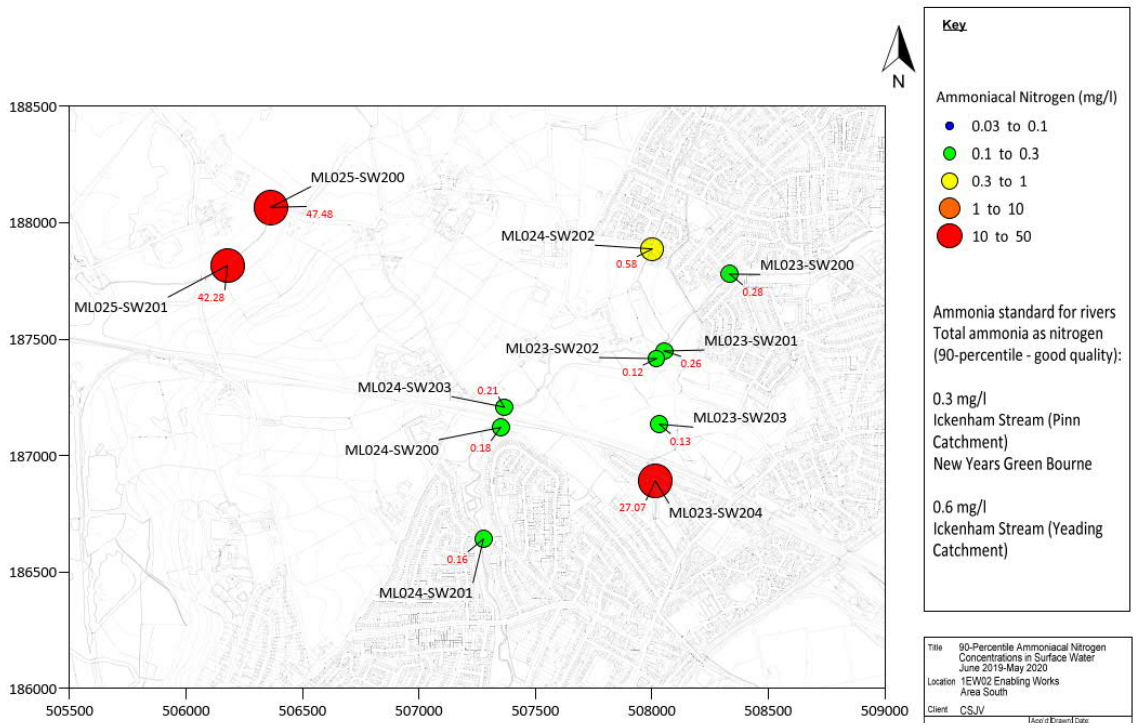
At only one location the 98th percentile marginally exceeded the adopted GAC (20°C) with a temperature of 20.8°C (ML024-SW202). The highest temperature (21.4°C) was noted in July 2019 and was notably higher than temperature in the preceding and following months (the temperature in June was recorded as 14.8°C and the temperature in August 17.6°C). This location is upstream of HS2 enabling activities and therefore it could not have been affected by the activities detailed within this report.

5.3 Ammoniacal Nitrogen as N

The GAC used for ammoniacal nitrogen was based on the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 – Freshwater Standards and the 90th percentile concentration for each location was screened against the GAC. The GAC varies according to the catchment classification and the Environment Agency (EA) waterbody quality status.

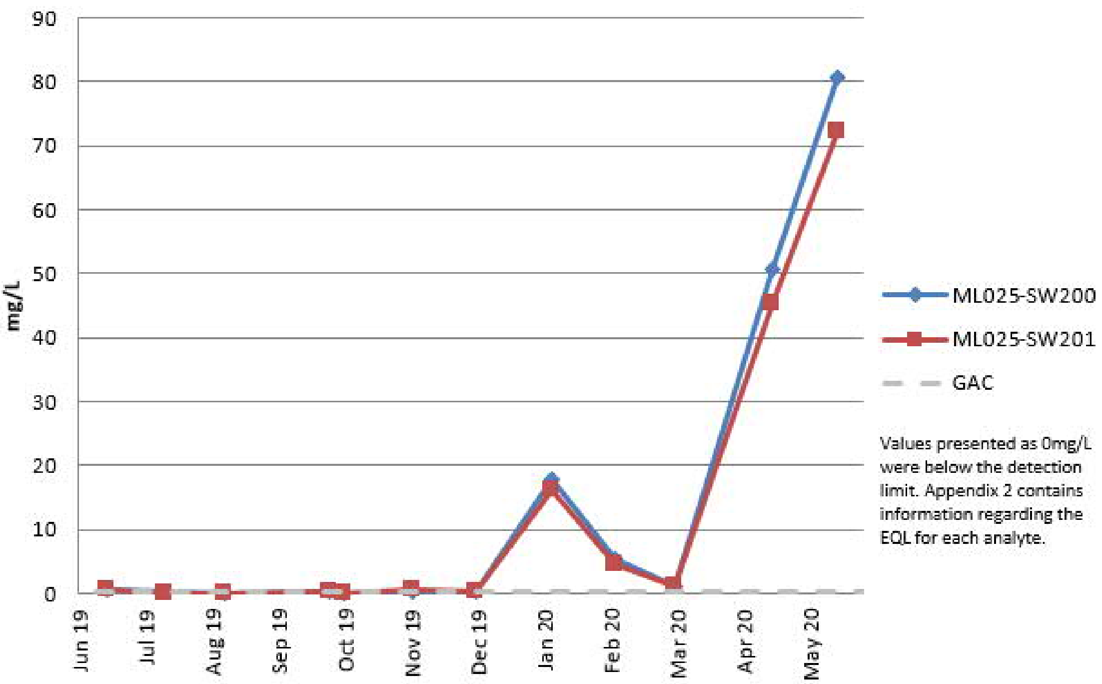
The highest GAC exceedances were noted at the New Years Green Bourne locations and at the Ickenham Stream (Yeading catchment). Exceedances were noted also at one location in the River Pinn (River Pinn tributary, ML024-SW202). The surface water concentrations plot for ammoniacal nitrogen (as N) is illustrated as Plate 2 below and in Appendix 4.

Plate 2: Ammoniacal Nitrogen surface water 90-percentile concentrations plot



The concentration/time series graph for New Years Green Bourne is presented below as Graph 5.

Graph 5: Ammoniacal Nitrogen concentrations in New Years Green Bourne



The 90th percentile concentrations of ammoniacal nitrogen (as N) exceeded the adopted GAC of 0.3 mg/L in seven out of twelve monitoring rounds at ML025-SW200 and in six out of twelve monitoring rounds at ML025-SW201.

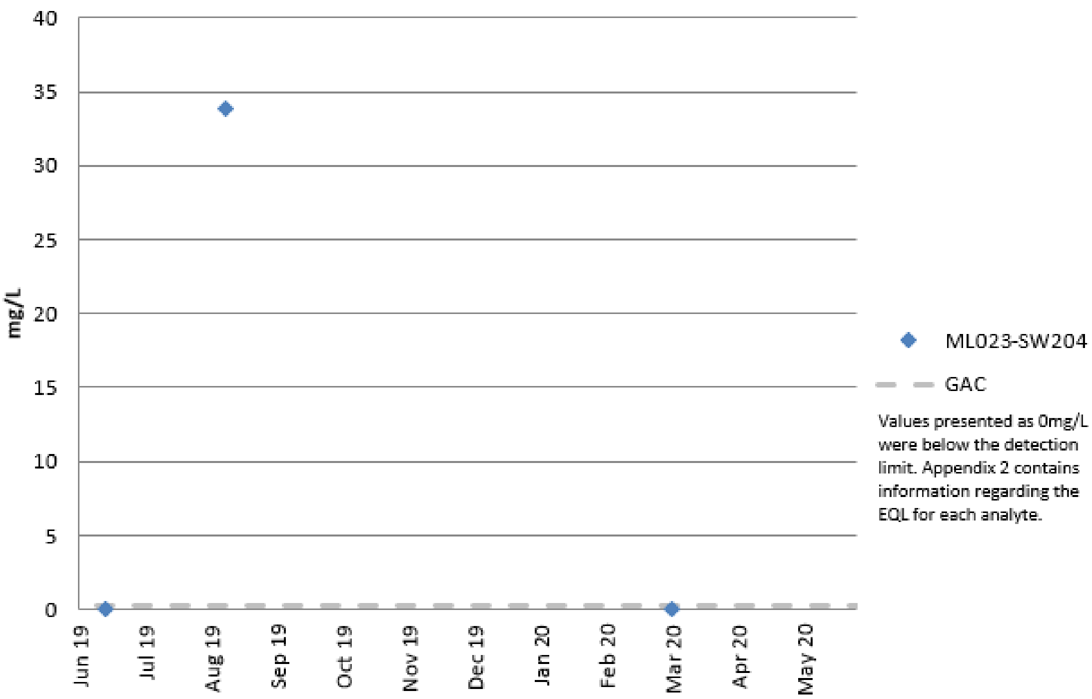
The 90th percentile concentration at ML025-SW200 was recorded as 47.4 mg/L, over two orders of magnitude above the GAC. The highest concentration was recorded in May 2020. The 90th percentile concentration at ML025-SW200 was slightly higher than the 42.2 mg/L concentration recorded in ML025-SW201 down-stream. The source of the ammoniacal nitrogen is likely to be the New Years Green Lane Landfill as the record of determination of the landfill as contaminated land (Ref. 4) notes that the landfill has been identified as a source of ammoniacal nitrogen.

There is considerable variability of ammoniacal nitrogen within the Bourne with the highest concentrations noted in April, May and Jan 2020 recorded as one order of magnitude higher than those observed the rest of the year. There does not appear to be a clear correlation with rainfall, albeit it is noted that the lowest months for rainfall are April and May 2020 when the highest concentrations of ammoniacal nitrogen were observed.

The 90th percentile concentration at ML023-SW204 in the Ickenham Stream (Yeading Brook catchment) was recorded as 27 mg/L (0.6 mg/L adopted criteria), albeit with a high degree of uncertainty on the basis of three monitoring rounds. The highest individual concentration was noted during the August 2019 monitoring round. It is possible that the high concentration in August 2019 was related to low dilution of upstream inputs due to low flow. The 90th percentile is higher in relation to the Ickenham Stream (Pinn Catchment) locations to the north and the River Pinn locations to the east.

The concentration/time series graph for Ickenham Stream (Yeading Brook Catchment) is presented below as Graph 6.

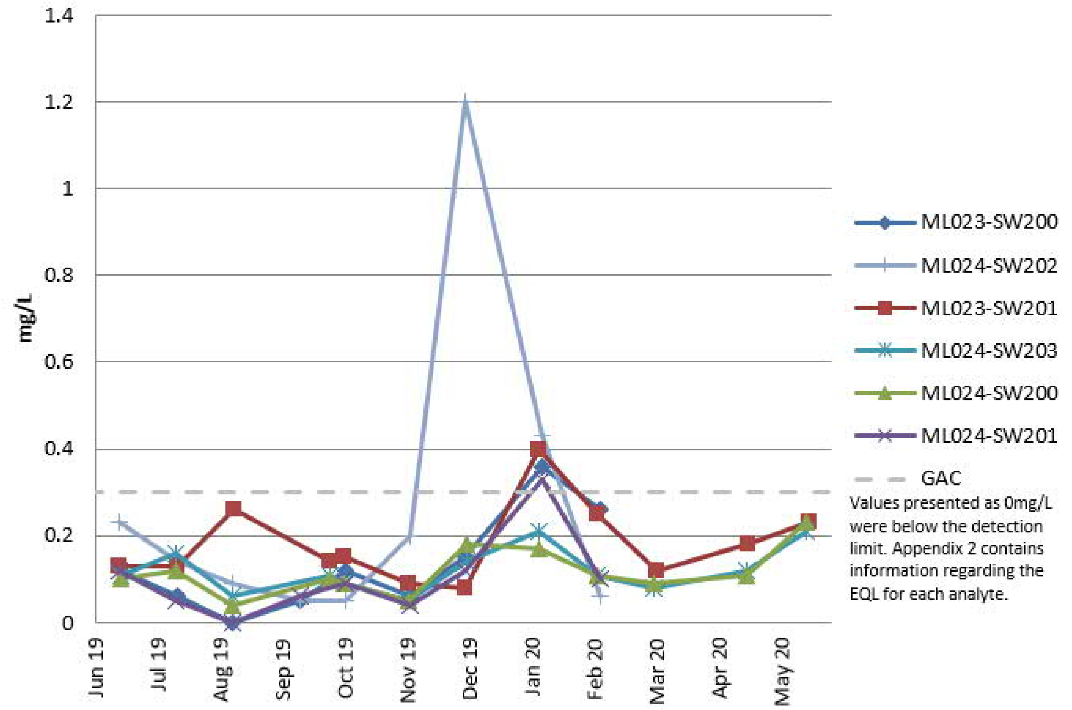
Graph 6: Ammoniacal Nitrogen concentrations in Ickenham Stream (Yeading Brook Catchment)



The 90th percentile concentrations at River Pinn ranged between 0.16 mg/L (ML024-SW201) and 0.58 mg/L (ML024-SW202). The 90th percentile concentration at ML024-SW202 exceeded the adopted GAC by a factor of 1.9, the concentrations at the rest of the River Pinn locations were recorded below the adopted GAC. The locations along the River Pinn indicated similar individual concentrations with the exception of upstream location ML024-SW202 during November and December 2019 and January 2020 where concentrations were between 1.1 and 15 times higher than the rest of the River Pinn locations. A potential upstream ammoniacal nitrogen source is possible (e.g. sewage misconnection/leaking sewer).

The concentration/time series graph concentrations in the River Pinn is presented below as Graph 7.

Graph 7: Ammoniacal Nitrogen concentrations in River Pinn



With the exception of the winter spike in concentration at the upstream location, there does not seem to be any clear seasonality concentration pattern at the other locations.

The 90th percentile concentrations at the Ickenham Stream (Pinn Catchment) ranged between 0.13 mg/L (ML023-SW203) and 0.26 mg/L (ML023-SW201). No exceedances of the 0.3 mg/L adopted GAC were reported.

The 90^{th} percentile ammoniacal nitrogen concentrations in the River Pinn were recorded to be higher upstream and generally improved downstream, indicating that ammoniacal nitrogen loading in this watercourse was dominated by impacts upstream of the monitoring locations.

Vegetation clearance activities (June 2017-November 2020) are unlikely to have affected the concentrations of ammoniacal nitrogen at New Years Green Bourne, Ickenham Stream (Yeading Brook Catchment) and River Pinn.

The archaeological survey activities (trenching) that were undertaken in proximity to the New Years Green Bourne were recorded by CSJV to have been undertaken between May and August 2019. The highest concentrations of ammoniacal nitrogen at New Years Green Bourne were recorded in May 2020. Additionally, ammoniacal nitrogen concentrations from the New Years Green Lane landfill groundwater samples during past investigations (Ref. 4) were recorded to have similar concentrations to the surface water data from the 2019 – 2020 annual monitoring rounds.

The archaeological survey activities (trenching) are unlikely to have affected the River Pinn surface water quality as the only location that failed the adopted GAC was ML024-SW202 which is upstream of the trenching works area.

The archaeological survey activities (trenching) that were undertaken in proximity to the Ickenham Stream (Yeading Brook Catchment) were recorded by CSJV to have been undertaken between May and July 2019 and during mid-September 2019. The ammoniacal nitrogen concentration recorded during the works in June 2019 was noted as below the MRL. The highest concentration of ammoniacal nitrogen was recorded in August 2019, after the first round of the trenching activities. The rest of the sampling rounds recorded concentrations below the adopted GAC. It is unlikely that the trenching activities affected the ammoniacal nitrogen concentrations in the Ickenham Stream (Yeading Brook Catchment).

5.4 Nitrate (as N)

The adopted GAC for nitrate as N were based on the DWS (Water, England & Wales - Water Supply (Water Quality) Regulations, 2016 No. 614).

The concentrations of nitrate (as N) exceeded the adopted WS Regulations GAC at locations in New Years Green Bourne and the River Pinn.

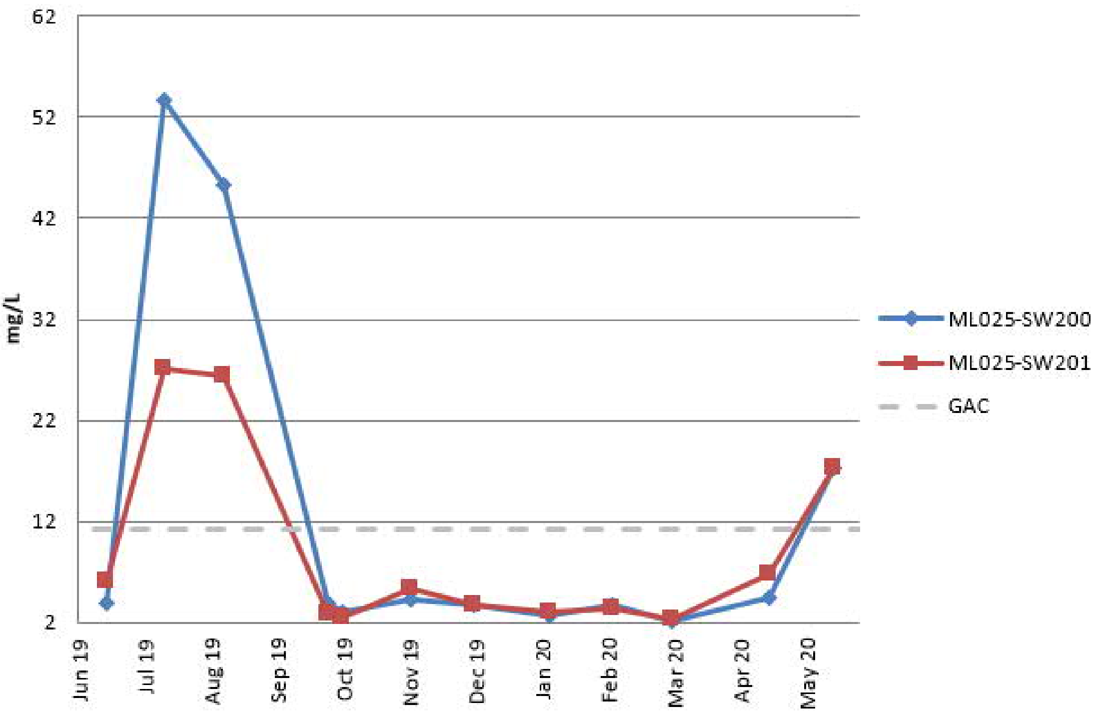
The concentrations of nitrate (as N) exceeded the adopted WS Regulations GAC of 11.3 mg/L (converted from the DWS GAC of 50 mg/L as nitrate) in the two sampling locations at New Years Green Bourne (ML025-SW200 and ML025-SW201).

The exceeding concentrations at ML025-SW200 ranged between 17.2 and 53.7 mg/L and were recorded during July and August 2019 and May 2020. The highest concentration was recorded in July 2019 and exceeded the adopted GAC by a factor of 4.7 times.

The exceeding concentrations at ML025-SW201 (downstream) ranged between 17.3 and 27.1 mg/L and were recorded during the same months as the upstream location. The highest concentration was recorded in July 2019 and exceeded the adopted GAC by a factor of 2.4 times.

The concentration/time series graph for New Years Green Bourne is presented below as Graph 8.

Graph 8: Nitrate (as N) concentrations in New Years Green Bourne.



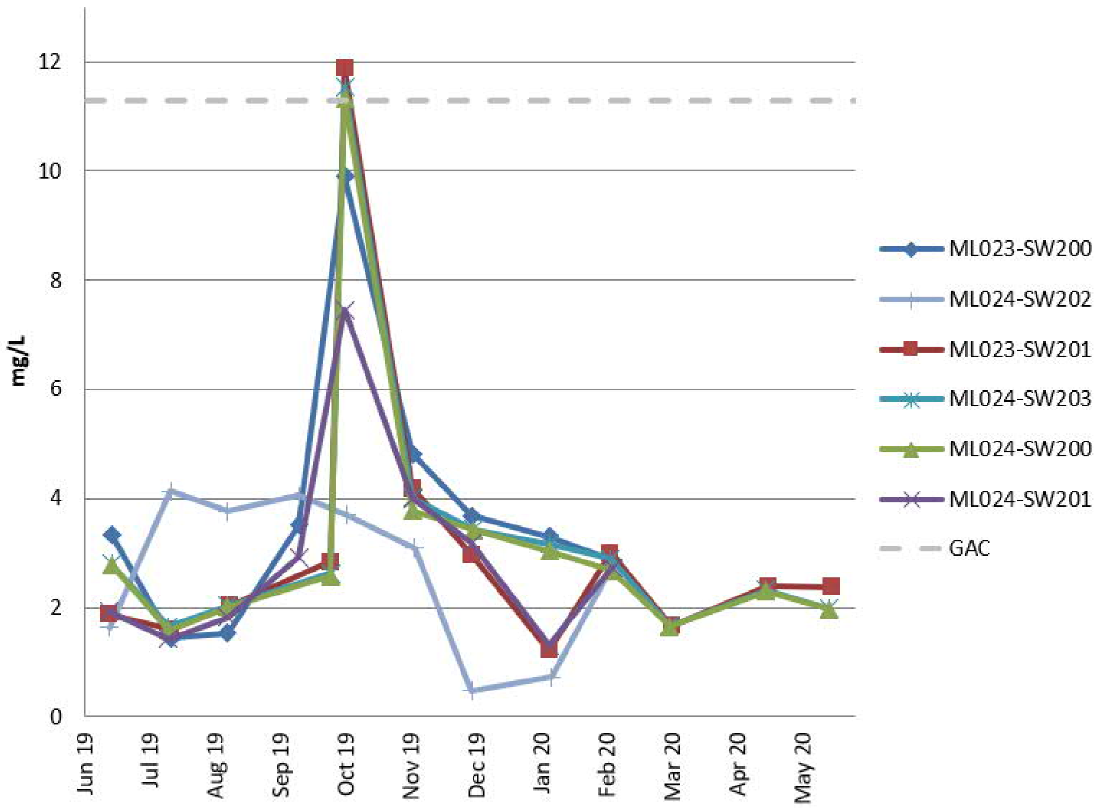
The elevated concentrations at ML025-SW200 could be linked to its proximity to the New Years Green Lane Landfill. The record of determination of the New Years Green Lane Landfill as contaminated land (Ref. 4) notes that the landfill has been identified as a source of ammoniacal nitrogen and hence the nitrate could result from nitrification of ammoniacal nitrogen during transport to, or within, the Bourne. Lower downstream nitrate concentrations (ML025-SW201) were primarily observed in July and August 2019, with very similar nitrate concentrations observed on all other sampling rounds.

The nitrate concentrations indicate a seasonal variation with higher concentrations during spring and summer months and lower during the winter months. This could be related to lower dilution of leachate impact from the New Years Green Landfill during the summer months, or alternatively could relate to the timing of any fertiliser application to adjacent agricultural fields.

Nitrate concentrations exceeded the adopted GAC at three locations in the River Pinn. The exceedances at ML023-SW201, ML024-SW203 and ML024-SW200 were marginal with the exceedance magnitude recorded as 1.05, 1.02 and 1 times above the adopted GAC respectively.

The concentration/time series graph for nitrate within the River Pinn is presented below as Graph 9.

Graph 9: Nitrate (as N) concentrations in River Pinn



The concentrations at all three locations that marginally exceed the adopted GAC are similar and were all detected in October 2019. Nitrate concentrations were below the GAC during all other monitoring rounds.

The highest nitrate as N concentration (11.88 mg/l) was detected at ML023-SW201, which is located 120 m west of the allotments / communal gardens, with similar but lower concentrations detected at the following two down-stream locations. A similar increase in nitrate concentrations (albeit below criteria) was noted at the furthest upstream location (ML023-SW200) on the River Pinn, indicating that this sudden increase in nitrate concentrations affected the entire monitored length of the water course and hence may be associated with impact from activities further upstream of the Area South, Sector 2.

With respect to HS2 enabling activities vegetation clearance activities (June 2017-November 2020) are unlikely to have affected the concentrations of nitrate at New Years Green Bourne and River Pinn (the two watercourses where nitrate exceedances were detected) as these activities are not expected to have contributed to nitrate concentrations.

The archaeological survey activities (trenching) that were undertaken in proximity to the New Years Green Bourne were recorded by CSJV to have been undertaken between May 2019 and August 2019. The concentrations recorded during June 2019 (during the works) were recorded as below the adopted GAC. The highest concentrations of nitrate at New Years Green Bourne were recorded on 11 July 2019, during the trenching works, however the increase in concentrations are likely to relate to seasonal factors such as low flow within the Bourne as discussed previously. Run-off impacted by trenching activities would be expected to be associated with increased total suspended solids (TSS) load. The maximum TSS concentrations were recorded in October 2019 as 171 mg/L. TSS concentrations in the watercourse during trenching activities ranged between 11 mg/L and 68 mg/L, a minimum factor of 2.5 lower than the maximum observed, indicating that the trenching works were unlikely to be responsible for the peak nitrate concentrations.

With respect to the River Pinn, the MSD activities (demolitions and access road creation) are ongoing and started in April 2018. The only nitrate exceedances in River Pinn were noted in October 2019 and one of the locations which recorded the highest exceedance of the GAC (ML023-SW201) is located upstream of the works area. Following October 2019, nitrate concentrations were significantly below the GAC. If the MSD activities affected the surface water chemistry of the River Pinn higher concentrations would have been expected downstream and around the works area with similar concentrations expected across the entire monitoring period based on the duration of the MSD activities.

The archaeological surveys activities (trenching) that were undertaken in proximity to the River Pinn were recorded by CSJV to have been undertaken between 11 and 27 September 2019. The highest concentrations of nitrate at River Pinn were recorded on 3 October 2019. The highest concentration was recorded at ML023-SW201 which is located upgradient of any activities therefore the trenching is unlikely to have affected the River Pinn water chemistry.

5.5 Nitrite (as N)

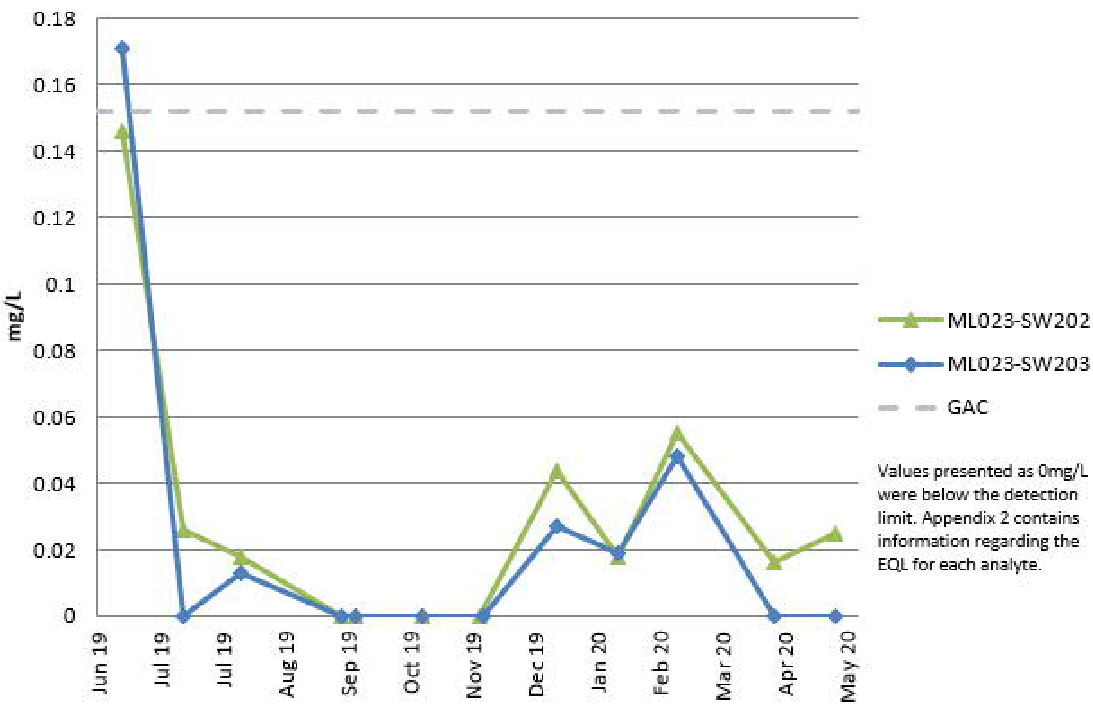
The adopted GAC for nitrite (as N) were based on the DWS (Water, England & Wales - Water Supply (Water Quality) Regulations, 2016 No. 614).

The concentrations of nitrite (as N) exceeded the adopted WS Regulations GAC at locations in New Years Green Bourne and Ickenham Stream (Pinn Catchment).

The concentration at Ickenham Stream (Pinn Catchment) marginally exceeded in June 2019 the 0.15 mg/L adopted WS Regs GAC (converted from the DWS GAC of 0.5 mg/L as nitrite), with a maximum concentration of 0.17 mg/L.

The concentration/time series graph for Ickenham Stream (Pinn Catchment) is presented below as Graph 10.

Graph 10: Nitrite (as N) for Ickenham Stream (Pinn Catchment)



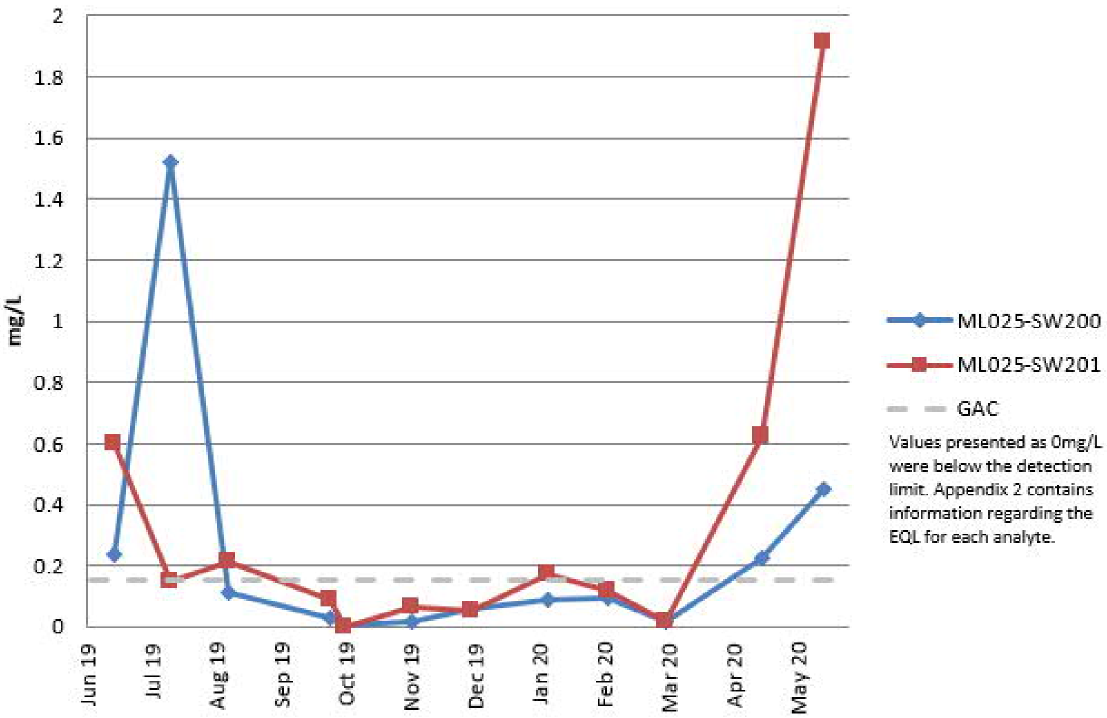
The nitrite concentrations at ML023-SW202 were recorded either as below the MRL or below the adopted GAC.

The concentrations recorded in June 2019 in ML023-SW203 and ML023-SW202 seem to be a one-off result and could relate to decreased dilution of upstream nitrite inputs in comparison to the winter months.

The maximum nitrite concentrations were recorded at New Years Green Bourne (ML025-SW201).

The concentration/time series graph for New Years Green Bourne is presented below as Graph 11.

Graph 11: Nitrite (as N) concentrations in New Years Green Bourne



Nitrite (as N) exceeded the adopted GAC in both ML025-SW200 and ML025-SW201. The exceeding concentrations at ML025-SW200 ranged between 0.224 and 1.518 mg/L and were recorded during June and July 2019 and April and May 2020. The highest concentration at this location was recorded in July 2019 and exceeded the adopted GAC by a factor of 9.9 times. The annual average concentration at this location exceeded the adopted criteria.

The exceeding concentrations at ML025-SW201 ranged between 0.171 and 1.91 mg/L and were recorded during June and August 2019 and January, April and May 2020. The highest concentration for this location was recorded in May 2020. The annual average concentration at this location exceeded the adopted criteria. The highest exceedance and the highest number of monitoring rounds that nitrite concentrations exceeded the adopted GAC were recorded at ML025-SW201, downstream from ML025-SW200.

At both locations seasonal variation is observed with higher nitrite concentrations during spring and summer months and lower during the winter months. The peak nitrite concentrations in New Years Green Bourne are recorded at the same time as the peak in ammoniacal nitrogen in April and May 2020. The exceeding concentrations recorded during the summer months could relate to decreased dilution in comparison to the winter months.

Vegetation clearance activities (June 2017-November 2020) are unlikely to have affected the concentrations of nitrite at New Years Green Bourne and Ickenham Stream (Pinn Catchment) because nitrite is normally associated with pollution from agriculture or sewage.

The archaeological survey activities (trenching) that were undertaken in proximity to the New Years Green Bourne were recorded by CSJV to have been undertaken between May and August 2019. The highest concentration of nitrite at New Years Green Bourne was recorded in May 2020 nine months after the completion of trenching activities and hence does not appear to be related to trenching. The trenching activities are unlikely to have affected the New Years Green Bourne surface water concentrations for nitrite, with the variation in concentration more likely to be due to seasonal variation.

The archaeological surveys activities (trenching) are unlikely to have affected the Ickenham Stream (Pinn Catchment) surface water quality as the only exceedance at the watercourse was noted in June 2019 and is likely related to seasonal variation in concentrations.

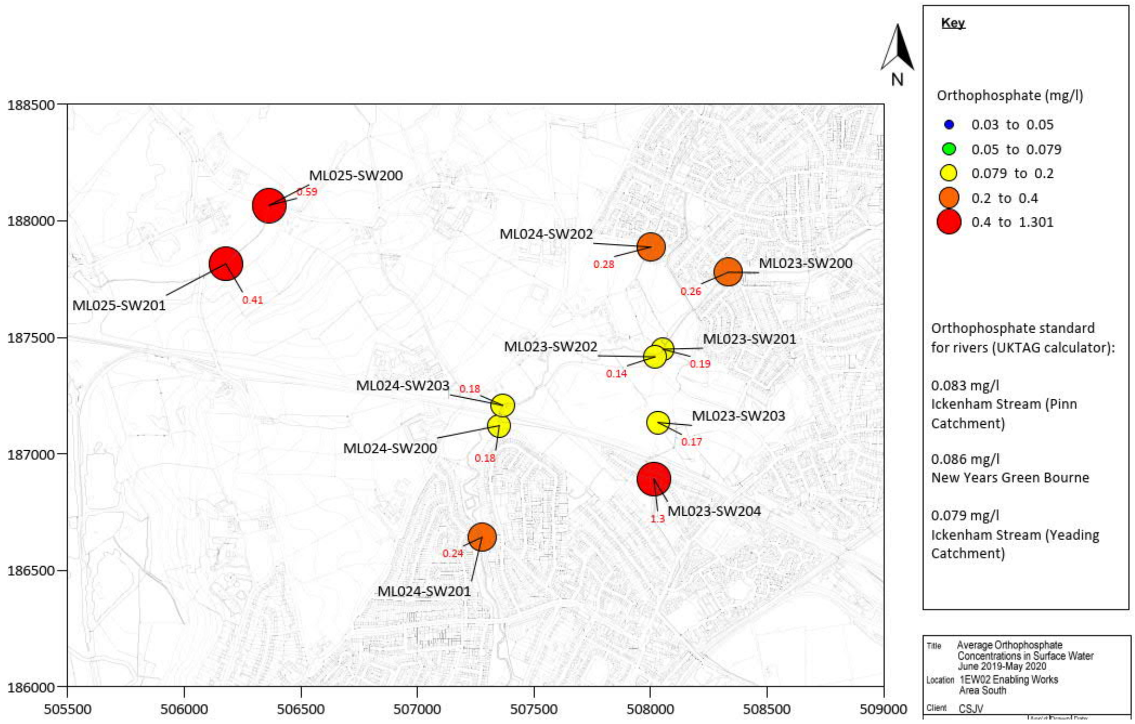
5.6 Orthophosphate as P

The orthophosphate GAC was derived from the WFD river phosphorus calculator based on the UKTAG 2015 and including the 2 µg/L background concentration for the River Thames. The GAC represents the long term (mean) and was compared to annual averages per location.

The GAC varies between locations since the inputs to the calculator are alkalinity, altitude and the chemical classification of the catchment. The lowest GAC values per watercourse were used for the discussion below.

The surface water concentration plot for orthophosphate is presented below as Plate 3 and in Appendix 4.

Plate 3: Orthophosphate annual average surface water concentrations plot

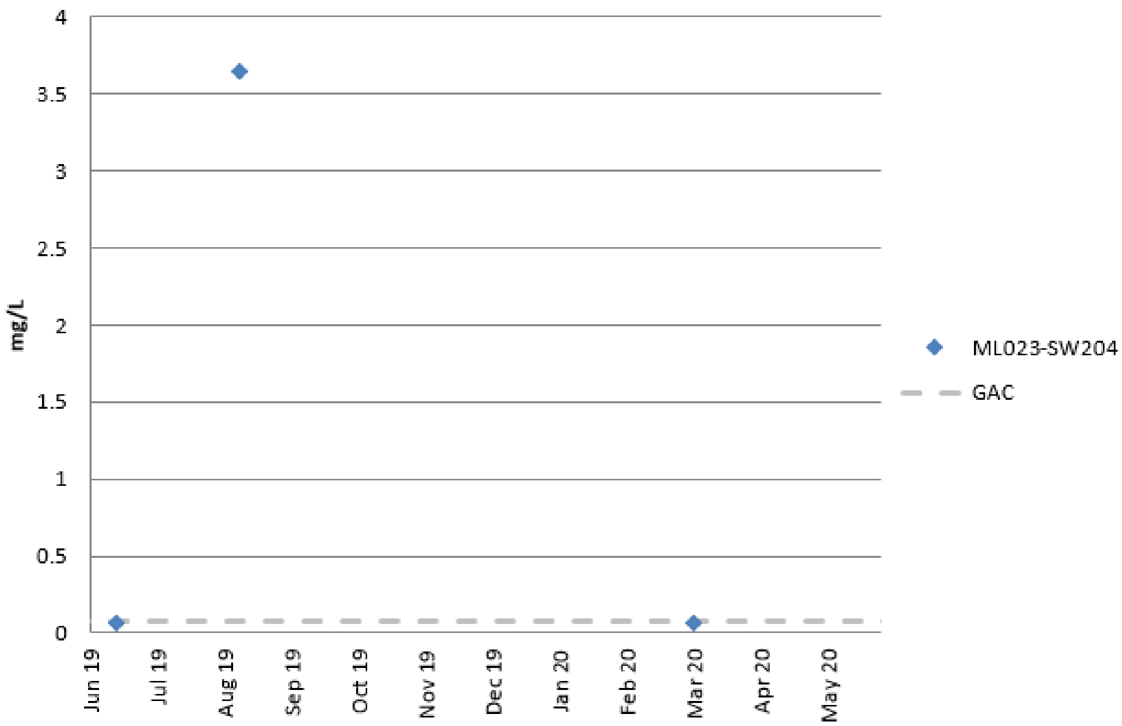


The average annual orthophosphate as P concentration (1.26 mg/L) at Ickenham Stream (Yeading Brook Catchment) exceeded the long term (mean) GAC of 0.079 mg/L. The maximum concentration (3.65 mg/L) was recorded in August 2019. The August 2019 concentration of orthophosphate at Ickenham Stream (Yeading Brook Catchment) was the highest concentration recorded across the different watercourses. The Ickenham Stream (Yeading Brook Catchment) sampling point is located north adjacent to communal gardens/allotments. Fertilisers used on these communal gardens and surrounding residential gardens could contribute to the concentrations recorded, albeit the sampling location would be expected to be upstream of the communal gardens. The lower flow expected within the watercourse during summer months (less dilution) and phosphorus inputs such as sewage discharges [2] could also contribute to the concentrations recorded.

[2] Current orthophosphate dosing for drinking waters in the UK typically achieves final P concentrations between 0.7 and 1.9 mg/L (Ref. 30)

The concentration/time series graph for ML023-SW204 is presented below as Graph 12.

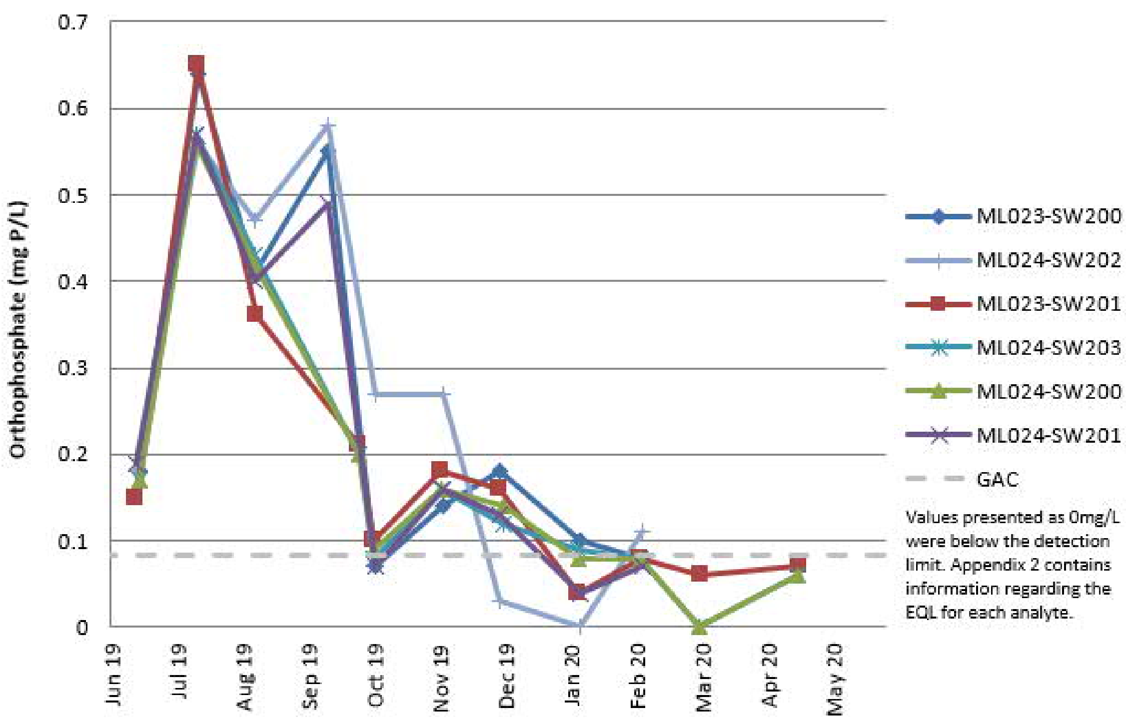
Graph 12: Orthophosphate concentrations in Ickenham Stream (Yeading Brook Catchment)



The average annual concentrations at the River Pinn exceeded the long term (mean) GAC of 0.083 mg/L at all monitoring locations.

The concentration/time series graph for orthophosphate in the River Pinn is presented below as Graph 13.

Graph 13: Orthophosphate concentrations in the River Pinn



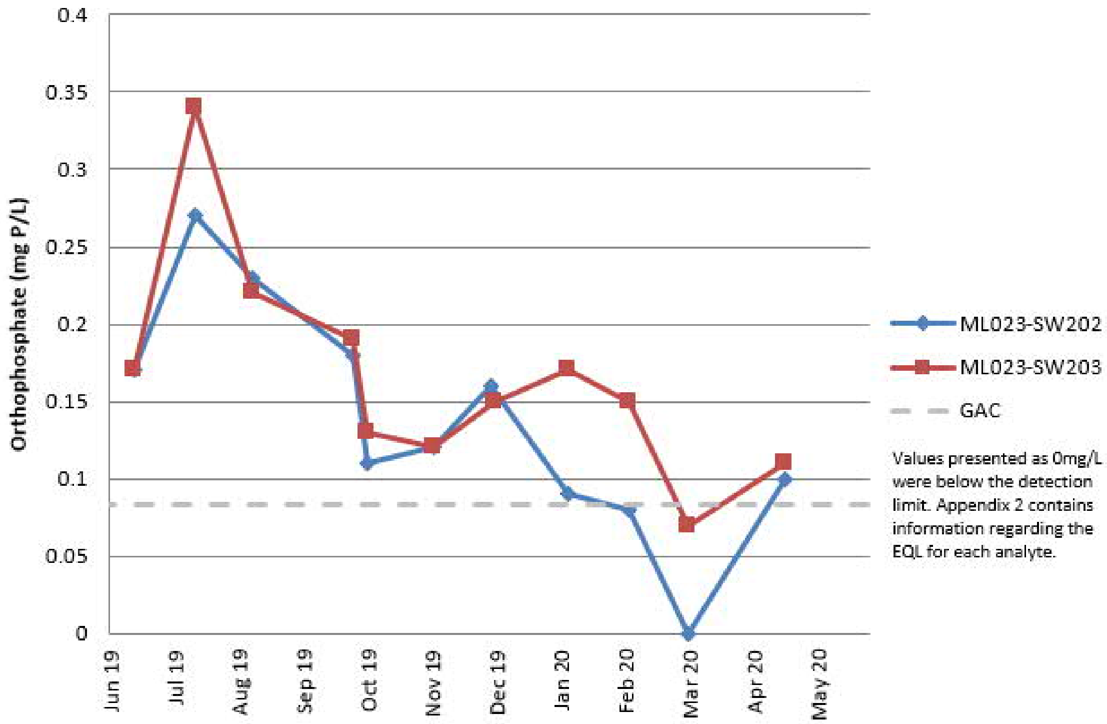
The average concentrations ranged between 0.18 mg/L (at ML024-SW200 and ML024-SW203) and 0.28 mg/L (at ML024-SW202). The highest average concentration (ML024-SW202) was detected at the upgradient tributary of the River Pinn indicating that the impact is likely to be related to activities further upstream of the Area South, Sector 2. There seems to be a seasonal variation with higher concentrations during the summer months and lower during the winter months. The seasonal variation might be related to the lower flow expected within the River during summer months (and hence decreased dilution of upstream phosphorus inputs such as sewage discharges[3]).

The average annual concentrations at Ickenham Stream (Pinn Catchment) exceeded the long term (mean) GAC of 0.083 mg/L at both sampling locations.

[3] Current orthophosphate dosing for drinking waters in the UK typically achieves final P concentrations between 0.7 and 1.9 mg/L (Ref. 30)

The concentration/time series graph for Ickenham Stream (Pinn Catchment) is presented below as Graph 14.

Graph 14: Orthophosphate concentrations in Ickenham Stream (Pinn Catchment)



The annual average concentrations ranged between 0.14 mg/L (at ML023-SW202) and 0.17 mg/L (at ML023-SW200). The annual average concentrations are similar to the ones recorded at the River Pinn. Similarly, the highest concentrations were recorded at the upstream location of the Ickenham Stream (Pinn Catchment) (ML023-SW203.

There seems to be a seasonal variation with higher concentrations during the summer months and lower during the winter months. The seasonal variation might be related to the lower flow expected within the Stream during summer months (and hence decreased dilution of upstream phosphorus inputs such as any sewage discharges[4]).

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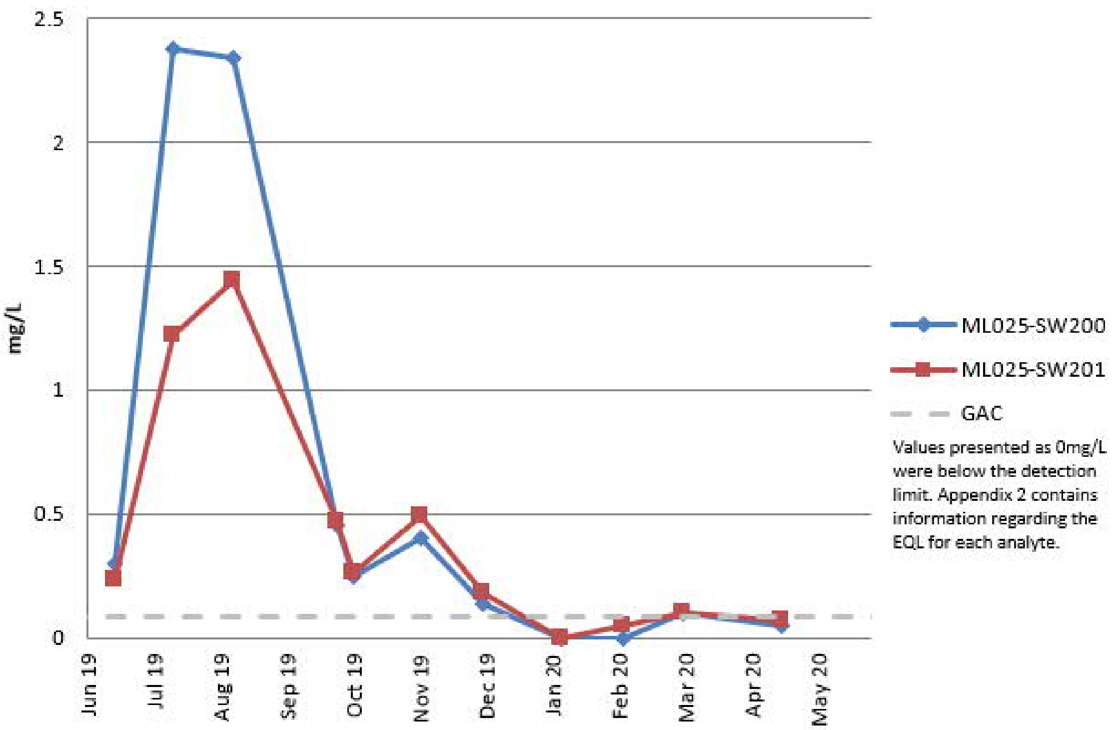
[4] Current orthophosphate dosing for drinking waters in the UK typically achieves final P concentrations between 0.7 and 1.9 mg/L (Ref. 30)

The average annual concentrations at New Years Green Bourne exceeded the long term (mean) GAC of 0.085 mg/L at both locations.

The concentration/time series graph for New Years Green Bourne is presented below as Graph 15.

Graph 15: Orthophosphate concentrations in New Years Green Bourne



The annual average concentrations ranged between 0.41 mg/L (at ML025-SW201) and 0.59 mg/L (at ML025-SW200). The annual average concentrations are higher in comparison to River Pinn and Ickenham Stream (Pinn catchment) and may reflect a contribution from landfill leachate.

Similar to the other water courses there seems to be a seasonal variation with higher concentrations during the summer months and lower during the winter months. The trend towards lower summer baseflow reduces the capacity for dilution of upstream potential phosphorus inputs such as leachate from the New Years Green Lane Landfill resulting in elevated P concentrations.

The annual average orthophosphate concentrations were recorded higher in urban locations indicating a potential effect on concentrations from diffuse urban pollution (e.g. leaking sewers, potential sewage misconnections and leaking water mains). Orthophosphate concentrations in the locations near the HS2 enabling activities were generally lower.

Vegetation clearance activities (June 2017-November 2020) are unlikely to have affected the concentrations of orthophosphate at Yeading Brook, New Years Green Bourne, Ickenham Stream (Yeading Brook Catchment) and River Pinn as phosphate sources are normally associated with pollution from agriculture or sewage.

The archaeological survey activities (trenching) that were undertaken in proximity to the Ickenham Stream (Yeading Brook Catchment) were recorded by CSJV to have been undertaken between May and July 2019 and mid-September 2019. The concentration recorded in June (during the works) was below the detection. The highest concentration of orthophosphate was recorded in August 2019. Run-off impacted by trenching activities would be expected to be associated with increased TSS load. The maximum TSS concentration was recorded in August 2019 as 71 mg/L. TSS concentrations in the watercourse during trenching activities were <10 mg/L (June 2019). On the basis of limited data (three samples available) there is no clear connection between the trenching works and the surface water quality in the Ickenham Stream (Yeading Brook Catchment).

The archaeological survey activities (trenching) that were undertaken in proximity to the New Years Green Bourne were recorded by CSJV to have been undertaken between May and August 2019. The highest concentrations of orthophosphate at New Years Green Bourne were recorded in July and August 2019, however the increase in concentration is likely to be due to contamination from the New Years Green Lane landfill and seasonal factors (low flow) based on observations at the other water courses rather than attributable to the trenching.

The archaeological survey activities (trenching) that were undertaken in proximity to the River Pinn were recorded by CSJV to have been undertaken between 11 September 2019 and 27 September 2019. The highest concentrations of orthophosphate were recorded in July and August 2019 before the trenching activities and significantly decreased during the following months. Additionally, the highest annual mean concentration was noted at ML024-SW202 on the tributary of the River Pinn which is upstream from the trenching activities area.

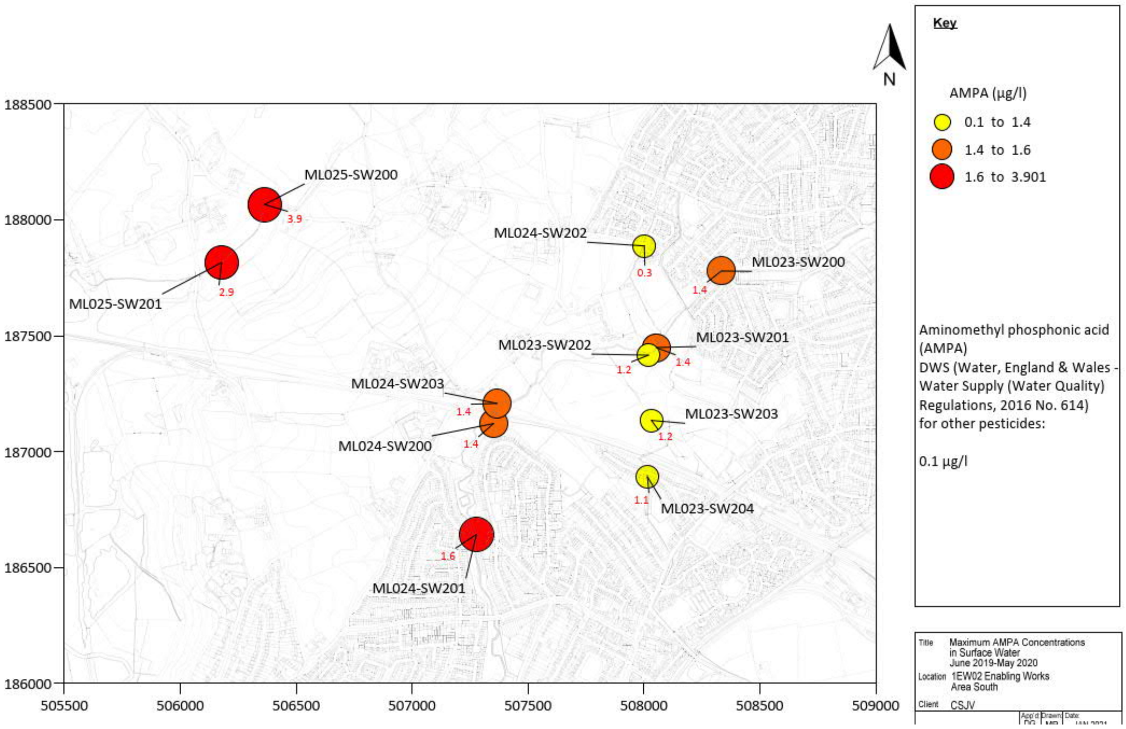
The archaeological survey activities (trenching) are unlikely to have affected the Ickenham Stream (Pinn Catchment) surface water quality as higher annual mean concentrations were noted at locations both upstream and downstream of the works.

5.7 Aminomethyl phosphonic acid (AMPA)

The GAC used for AMPA was based on the DWS (Water, England & Wales - Water Supply (Water Quality) Regulations, 2016 No. 614) for other pesticides, where pesticides include relevant metabolites, degradation and reaction products (such as AMPA which is a degradation product of glyphosate). The adopted GAC is very conservative as no EQS or PNEC was available therefore the derivation of the GAC defaulted to the very conservative DWS (WS Regs) GAC of 0.1 μg/L.

The surface water concentrations plot for AMPA is presented below as Plate 4 and in Appendix 4.

Plate 4: AMPA surface water maximum concentrations plot

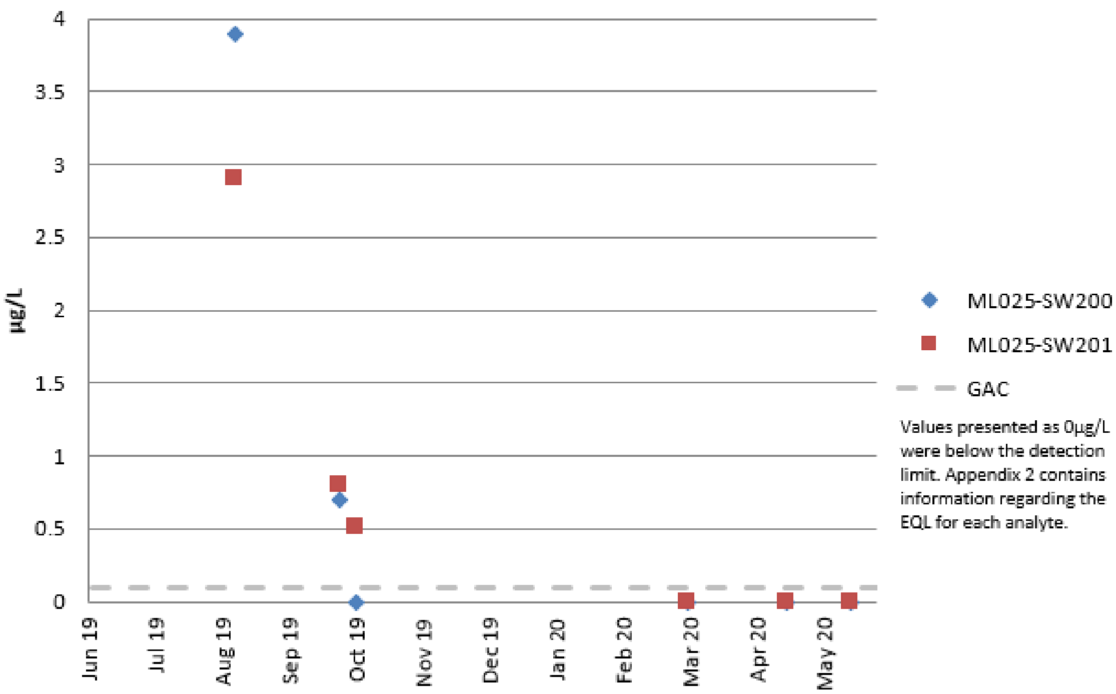


Exceedances of the adopted GAC were recorded at all the watercourses. The highest exceedances were recorded at New Years Green Bourne.

The highest concentration recorded in New Years Green Bourne was recorded in August 2019 at ML025 -SW200 as 3.9 µg/L. The concentration at ML025 -SW201 for the same month was 2.9 µg/L. This was also the highest concentration recorded in ML025 -SW201. During August and September, glyphosate concentrations above the MDL were noted at the New Years Green Bourne sampling locations ranging between 0.4 and 3.1 µg/L. In general the AMPA concentrations recorded in ML025 -SW200 were higher than the concentrations recorded at ML025 -SW201 downstream and potentially linked to the proximity of ML025 -SW200 to the New Years Green Lane Landfill. The record of determination of the New Years Green Lane Landfill as contaminated land (Ref. 4) notes that the landfill has been identified as a potential source of herbicides.

The concentration/time series graph for AMPA concentrations in New Years Green Bourne is presented below as Graph 16.

Graph 16: AMPA concentrations in New Years Green Bourne

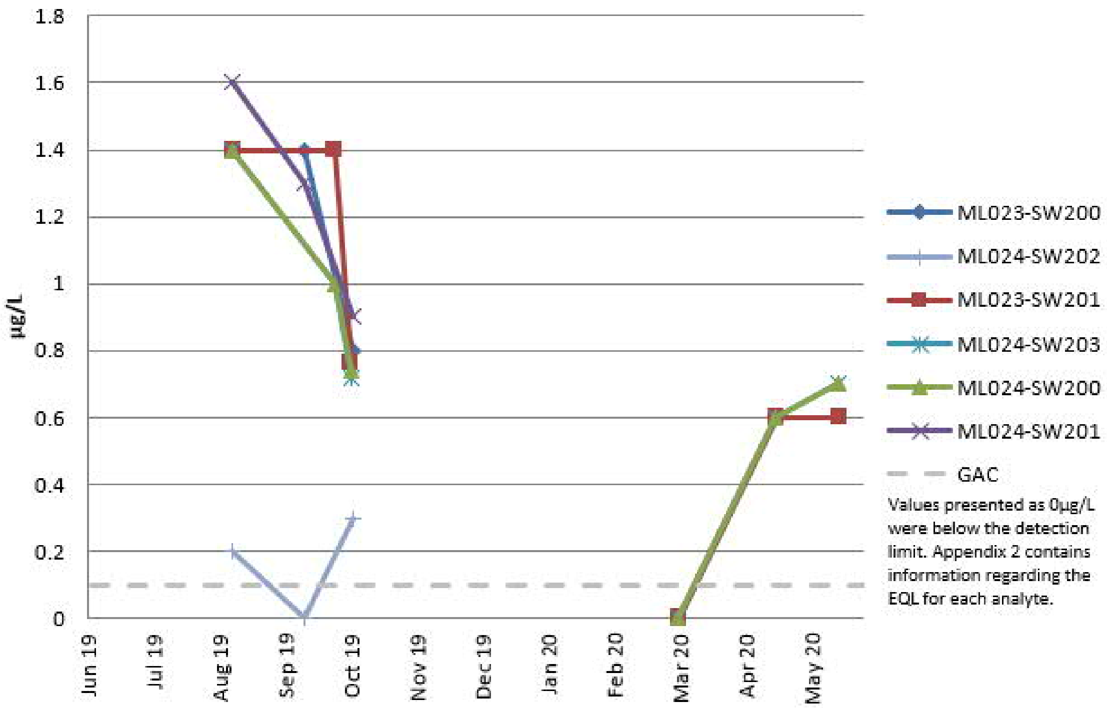


The exceedances in both locations were noted during August and September 2019. The high concentrations during these months might be a result of the use of glyphosate during the summer months along with the lower concentration dilution during the same period.

The concentrations recorded at the River Pinn exceeded the adopted GAC during the majority of the months where data were available. The highest concentration was located at the downstream location ML024-SW201 and was recorded as 1.6 µg/L. The highest concentration across all the other locations within the River Pinn was 1.4 µg/l.

The concentration/time series graph for AMPA in the River Pinn is presented below as Graph 17.

Graph 17: AMPA concentrations in the River Pinn

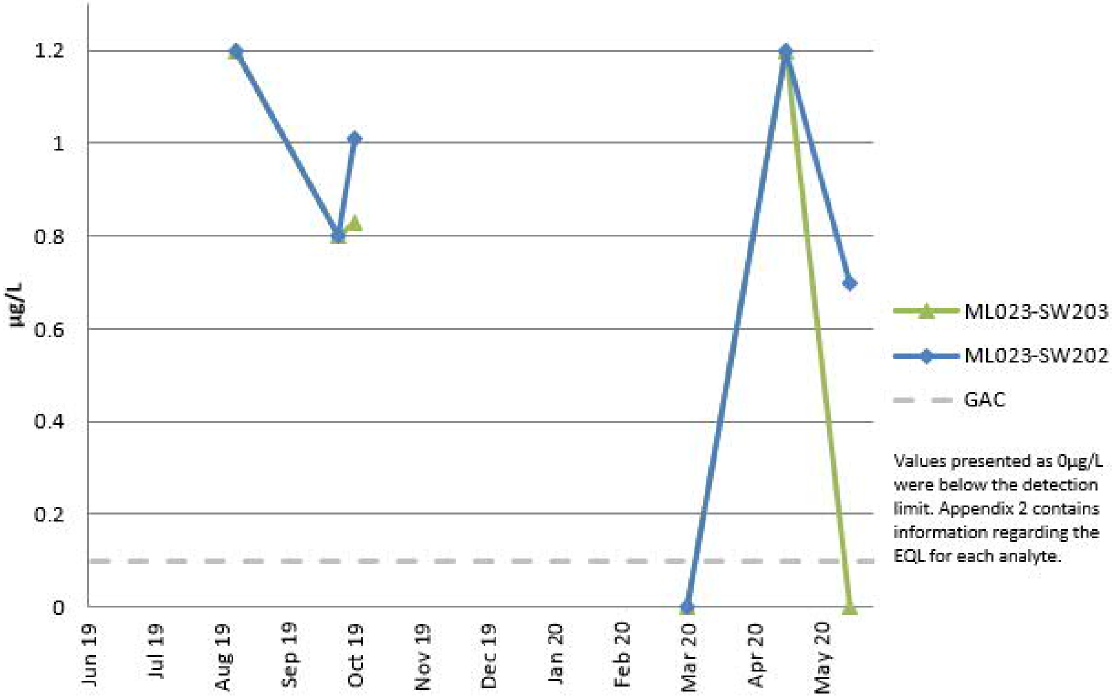


High concentrations are noted during the summer months and lower during the winter months, however there is a limited set of data during the winter months. The higher concentrations during these months might be a result of the use of glyphosate during the spring and summer months along with reduced dilution during the summer months period.

Concentrations at the Ickenham Stream (Pinn Catchment) were lower than the concentration recorded at New Years Green Bourne and the River Pinn. The maximum concentrations at both locations were recorded as 1.2 µg/L (ML023-SW202 and ML023-SW203, downstream).

The concentration/time series graph concentrations in Ickenham Stream (Pinn Catchment) is presented below as Graph 18.

Graph 18: AMPA concentrations in Ickenham Stream (Pinn Catchment)

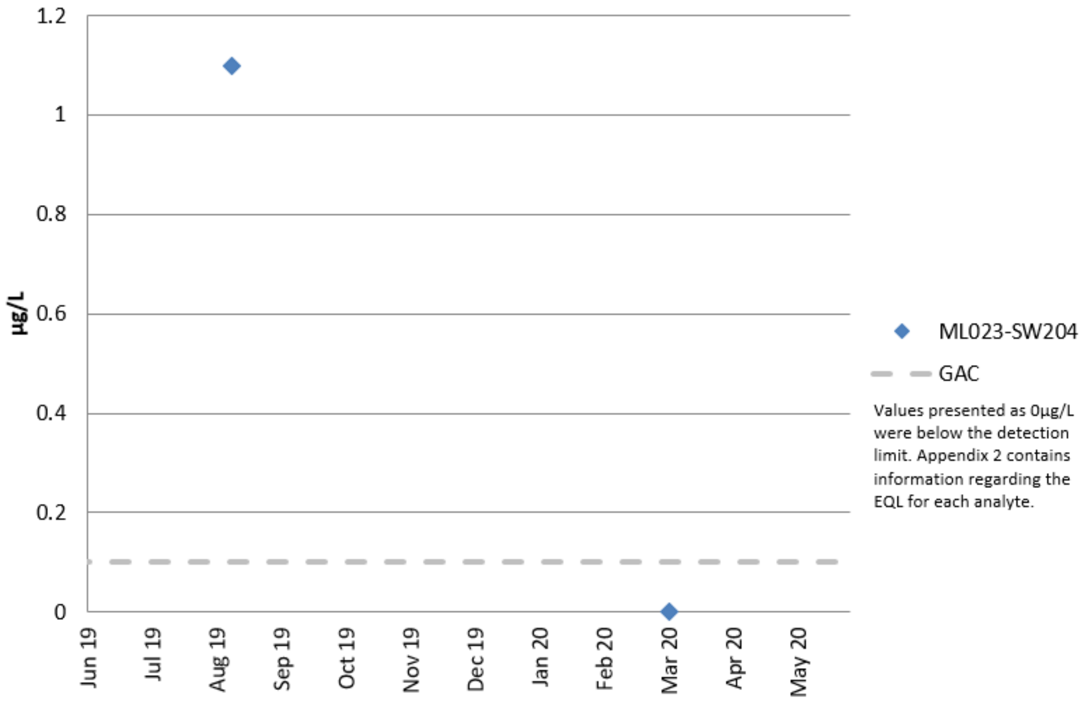


Similar to the other locations possibly higher concentrations are noted during the spring and summer months and lower during the winter ones, however the dataset was limited.

Ickenham Stream (Yeading Brook Catchment) maximum concentrations were recorded to be at similar levels to the ones recorded at Ickenham Stream (Pinn Catchment) with the highest concentration recorded as 1.1 µg/L in August 2019.

The concentration/time series graph concentrations in Ickenham Stream (Yeading Brook Catchment) is presented below as Graph 19.

Graph 19: AMPA concentrations in Ickenham Stream (Yeading Brook Catchment)



Similar to the other locations higher concentrations are noted during the summer months and lower during the winter ones, however in this case the dataset was limited.

Vegetation clearance enabling works were initiated in June 2017 and were completed in November 2020. Monitoring for glyphosate and AMPA was undertaken over two periods (August-October 2019 and March-May 2020) during which glyphosate spraying was proposed by CSJV to manage vegetation. However, in the end glyphosate spraying was not undertaken during the monitoring period. Vegetation management was undertaken using physical methods only. The use of glyphosate during the enabling works was limited to the spot treatment of Japanese Knotweed. Data for AMPA are not available before 2017 or after November 2020 to compare before or after the monitoring period.

The archaeological survey activities (trenching) that were undertaken in proximity to the New Years Green Bourne were recorded by CSJV to have been undertaken between May and August 2019. The highest concentrations of AMPA at New Years Green Bourne were recorded in August 2019, however these are likely linked to the seasonal variation noted for AMPA.

The archaeological survey activities (trenching) are considered to have low likelihood to have created pathways to the Ickenham Stream (Yeading Brook Catchment) and the Ickenham

Stream (Pinn Catchment) and affected the surface water quality for AMPA as sampling locations upgradient to the enabling works have similar concentrations.

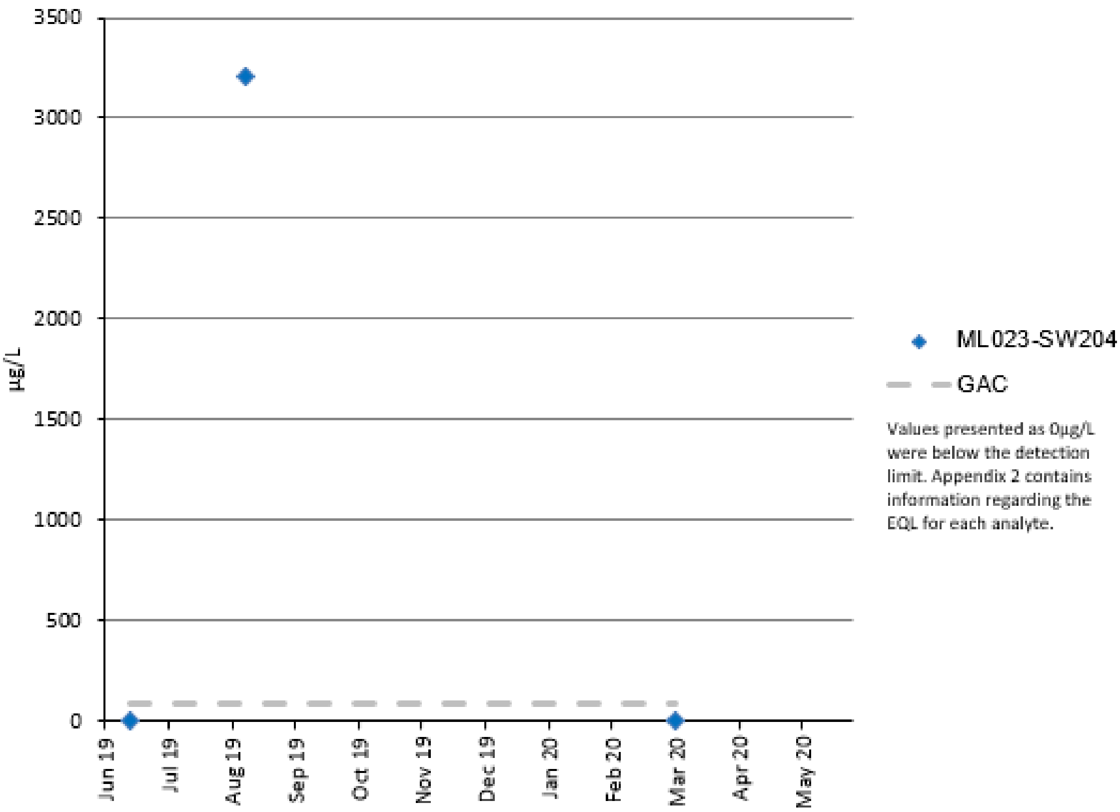
5.8 EPH C8-C40

The adopted GAC used were based on the WHO petroleum products in drinking water (2015) assessments of toxicity-based equivalent drinking water guidelines for TPH fractions. The selected fraction was the C16 – C35 aromatic fraction based on a conservative approach as this is the lowest criteria calculated by the WHO for any TPH fraction within the C8-C40 range.

EPH C8-C40 concentrations were found to exceed the adopted GAC in three locations. Four exceedances were noted at the two New Years Green Bourne locations (ML025 – SW200, ML025 – SW201) and one at Ickenham Stream (Yeading Brook Catchment) (ML023-SW204).

The maximum EPH C8-C40 concentration was recorded at Ickenham Stream (Yeading Brook Catchment) (3,210 µg/L). The concentration at ML023-SW204 exceeded the 90 µg/L adopted GAC by a factor of 35.6. The EPH C8-C40 concentration/time series graph for ML023-SW204 is presented below as Graph 20.

Graph 20: EPH C8-C40 concentrations in Yeading Brook

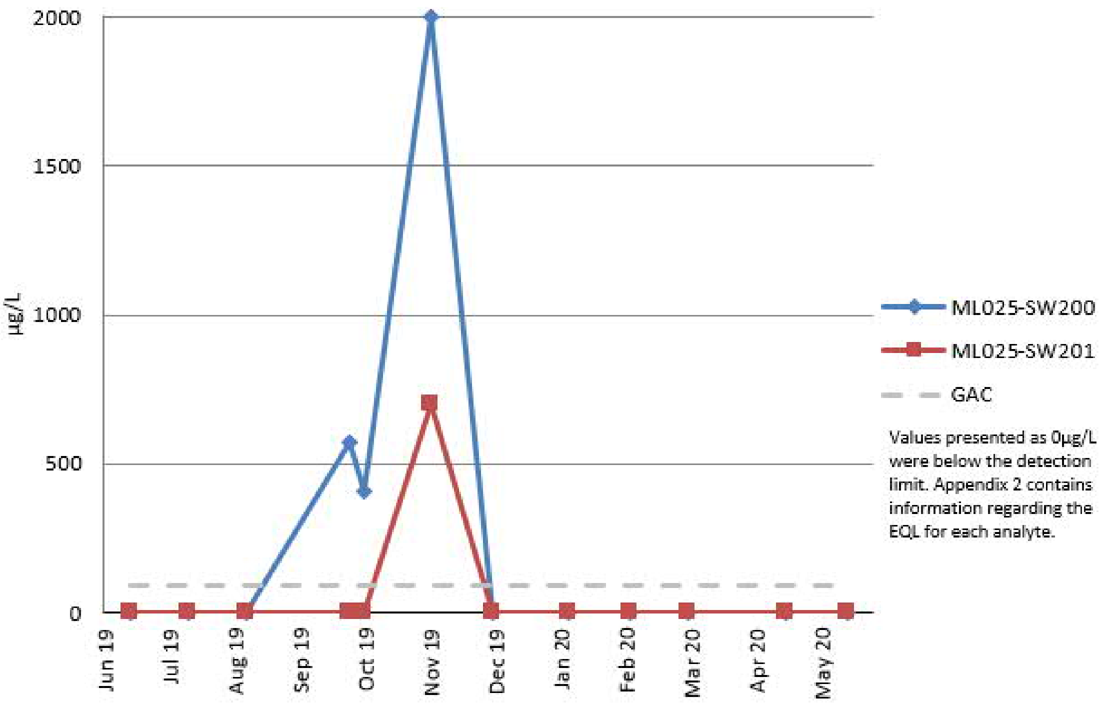


The railway lines are located between ML023-SW203 and ML023-SW204. ML023-SW203 is located north of the railway lines with detected EPH concentrations below the method reporting limit (MRL). ML023-SW204 is located 60m south of the railway lines. It is possible that the source of the EPH concentrations at ML023-SW204 is associated with the railway lines.

The maximum EPH concentration was recorded in August 2019, for the other two months where data is available (June 2019 and February 2020) concentrations were below the MRL. Based on precipitation data for August 2019, the precipitation level was low in comparison to the precipitation during the autumn and/or winter months therefore there is a possibility that reduced precipitation resulted in low flow conditions (for the surface water). The potential low flow may have resulted in lower dilution and higher concentrations.

The highest exceedance at New Years Green Bourne was recorded at ML025 – SW200 in November 2019. The recorded concentration (2,000 µg/L) exceeded the adopted GAC (90 µg/L) by a factor of 22 times. The maximum concentration at ML025 – SW201 (downstream) was recorded as 700 µg/L during the same round. The relevant concentration/time series graph for EPH concentrations in New Years Green Bourne is presented below as Graph 21.

Graph 21: EPH C8-C40 concentrations in New Years Green Bourne



It is likely that the higher concentrations at ML025 – SW200 in comparison to ML025 – SW201 are related to the proximity of ML025 – SW200 to the New Years Green Lane Landfill and possibly also hydrocarbons from the New Years Green Lane highway, which may discharge highway runoff into the watercourse via gullies. The record of determination of the New Years Green Lane Landfill as contaminated land (Ref. 4) notes that the landfill has been identified as a source of TPH in the C6 to C40 fraction range. The exceedances were noted between September and November 2019 with maximum values recorded for both locations in November. Concentrations below the MRL were noted for the rest of the monitoring rounds. The increase in EPH concentrations during the autumn of 2019 may be associated with seasonal changes in precipitation and runoff (e.g. New Years Green Lane) with an increase in rainfall in autumn leading to greater contributions from runoff.

Based on downstream monitoring, the extent of the impact decreases with distance from the New Years Green Landfill, with EPH concentrations detected above GAC on only one occasion at ML025-SW201 downstream and at concentrations 35-percent of those upstream.

With respect to HS2 enabling works, the vegetation clearance activities (June 2017-November 2020) and the archaeological survey activities (May to August 2019) that were undertaken in proximity to the New Years Green Bourne are unlikely to have affected the chemistry of the surface water course with respect to EPH.

Vegetation clearance activities (June 2017-November 2020) are also considered unlikely to have affected the concentrations of EPH at Yeading Brook.

The archaeological survey activities (trenching) that were undertaken in proximity to the Ickenham Stream (Yeading Brook Catchment) were recorded by CSJV to have been undertaken between May and July 2019 and during mid-September 2019. The only concentration exceeding the adopted GAC for EPH C8 to C40 at Ickenham Stream (Yeading Brook Catchment) was recorded in August 2019 (3,210 µg/L), however EPH was not detected in June 2019 during the trenching activities and hence it is unlikely that the EPH concentrations at Ickenham Stream (Yeading Brook Catchment) were affected by the HS2 enabling activities.

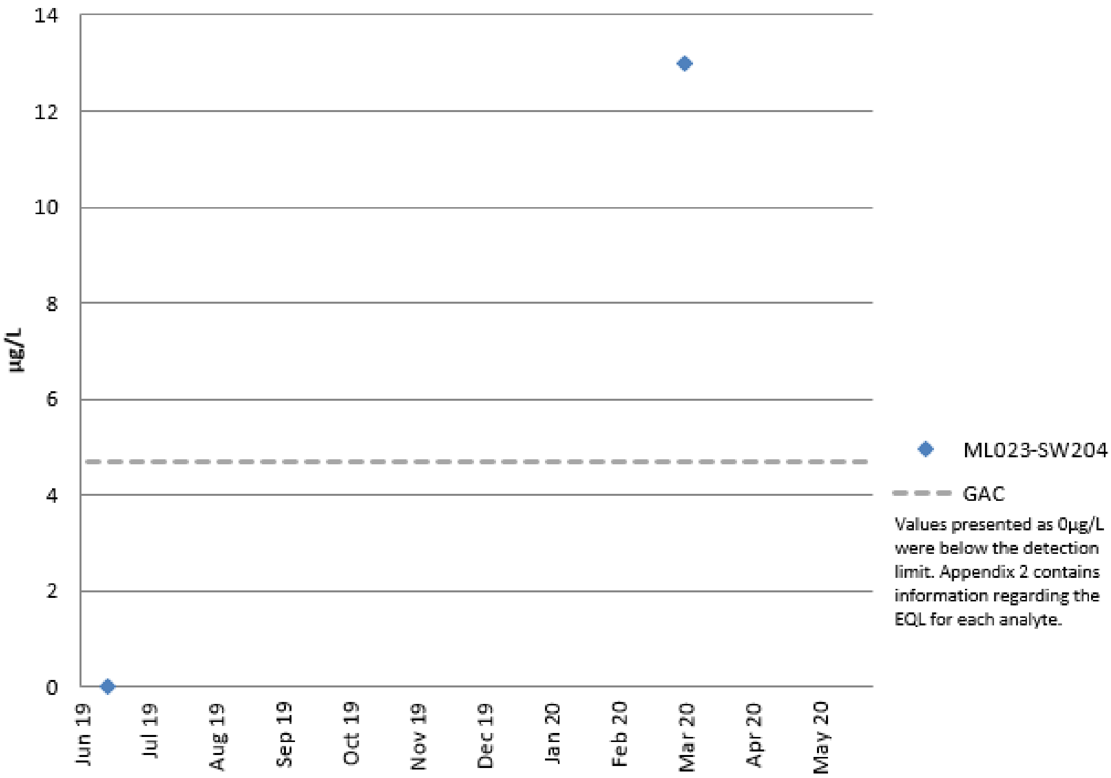
5.9 Chromium (Trivalent) (Filtered)

The annual average concentrations and/or the maximum concentration of trivalent chromium exceeded the adopted WFD England/Wales 2015 Freshwater Standards long term (mean) freshwater EQS of 4.7 µg/L and/or the short-term freshwater EQS (95-percentile) of 32 µg/l in some sampling locations at two watercourses.

The long term (mean) freshwater EQS adopted GACof 4.7 µg/L was exceeded in ML023-SW204 (Ickenham Stream (Yeading Brook Catchment)). The concentration/time series graph for ML023-SW204 is presented below as Graph 22.

Graph 22: Chromium Trivalent (filtered) concentrations in Ickenham Stream (Yeading Brook

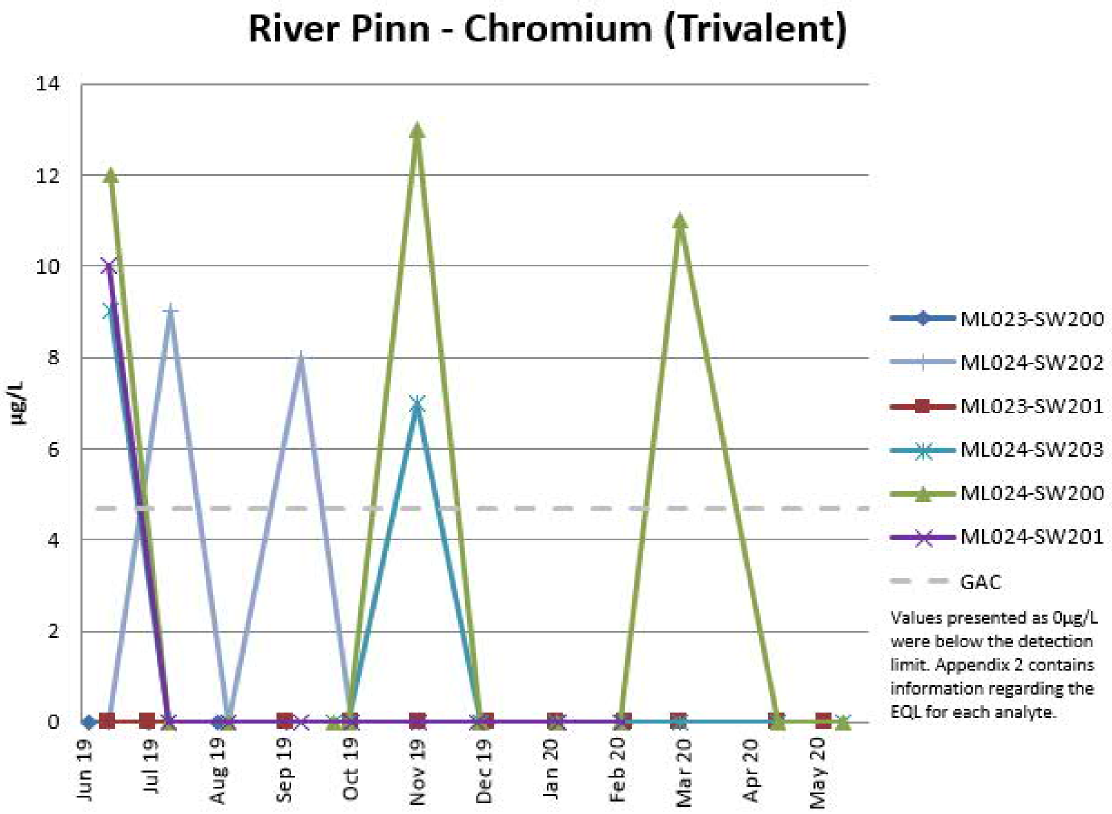
Catchment)



The railway lines are located between ML023-SW203 and ML023-SW204. ML023-SW203 is located north of the railway lines with detected chromium trivalent concentrations below the detection limit. ML023-SW204 is located 60m south of the railway lines. The source of the chromium concentrations at ML023-SW204 could be associated with the railway lines.

Exceedance of the long term (mean) freshwater EQS adopted GAC of 4.7 µg/L was also noted at ML024-SW200 (River Pinn) south of the railway lines. The calculated annual average concentration (5.30 µg/L) exceeded the adopted GAC by a factor of 1.1. The concentration/time series graph for trivalent chromium concentrations in the River Pinn is presented below as Graph 23.

Graph 23: Chromium Trivalent (filtered) concentrations in River Pinn



In terms of seasonality it is noted that concentrations are recorded above MRL in June, July, September and November 2019 and March 2020.

Concentrations above the detection limit were also recorded at ML024-SW203 (60m north to the railway line) and at ML024-SW201 (870m south of the railway line). However, the only location where the adopted long term (mean) freshwater EQS was exceeded was ML024-SW200 (60m south of the railway lines). Similarly, to the Ickenham Stream (Yeading Brook Catchment), the railway lines may constitute a source of the trivalent chromium.

With respect to HS2 enabling works and vegetation clearance activities (June 2017-November 2020) are unlikely to have affected the concentrations of chromium (trivalent) at Ickenham Stream (Yeading Brook Catchment) and River Pinn (the two watercourses where chromium exceedances were detected).

The archaeological survey activities (trenching) that were undertaken in proximity to the Ickenham Stream (Yeading Brook Catchment) were recorded by CSJV to have been undertaken between May and June 2019 and during mid-September 2019. The highest concentration of chromium (trivalent) recorded at Ickenham Stream (Yeading Brook Catchment) was recorded in March 2020, six months after the trenching activities, while the June 2019 concentration which would coincide with the works was recorded below the MRL. It is unlikely that the HS2 enabling activities influenced the chromium concentrations in Ickenham Stream (Yeading Brook Catchment).

The archaeological survey activities (trenching) that were undertaken in proximity to the River Pinn were recorded by CSJV to have been undertaken between 11 September 2019 and 27 September 2019.The concentrations recorded in June 2019, prior to the works, are of similar level to the highest concentrations recorded following the works therefore it is unlikely that the concentrations were influenced by the HS2 enabling works.

6 Updated CSM

An update to the preliminary assessment of the potential significance of the source-pathway-receptor linkages identified in sections 3.4 is presented below in Table 8. The revision of the CSM focused only at the chemicals recorded to exceed the adopted GAC: Dissolved Oxygen (% saturation), temperature, AMPA, EPH C8-C40, chromium (trivalent) (filtered), nitrate (as N), orthophosphate as P, nitrite (as N) and ammoniacal nitrogen as N.

Table 8: Updated Conceptual Site Model

Receptors	Parameters exceeding the Adopted Criteria	Potential Sources	Potential Pathways	Baseline Conditions		Comments
				Severity/Likelihood	Risk Category	
New Years Green Bourne	Dissolved oxygen, ammoniacal nitrogen, nitrate, nitrite, orthophosphate, AMPA, EPH	New Years Green Lane Landfill	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne	Medium/High	High	Similarity of impacts identified in groundwater below the landfill and the New Years Green Bourne indicates high likelihood of linkage (e.g. ammoniacal nitrogen, EPH)
			Lateral migration via surface water runoff (dissolved phase or particulate)	Medium/Likely	Moderate	During floods or excessive rainfall.
			Direct entry of leachate through pathways	Medium/High	High	The Bourne is culverted north of New Years Green

Receptors	Parameters exceeding the Adopted Criteria	Potential Sources	Potential Pathways	Baseline Conditions		Comments
				Severity/Likelihood	Risk Category	
			within the culvert structure (e.g. cracks, displaced joints etc.) where the Bourne is culverted below the New Years Green Lane landfill			Lane. Impact detected within the Bourne attributed to entry of landfill leachate.
		New Years Green Lane Farm former landfill (Webbs Land)	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne	Medium/Likely	Moderate	Based on impact observed at ML025-SW200, the most probable off-site source is the New Years Green Lane Landfill, not the Webbs Land landfill.
		Dews Lane Landfill	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne	Medium/Likely	Moderate	Limited information available and no data available to compare to the surface water concentrations.
			Lateral migration via surface runoff	Medium/Likely	Moderate	During floods or excessive rainfall.
		Metal recycling site	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne	Medium/Likely	Moderate	Risk dependent on site condition and operational practises which are unknown. Based on site location, impact could be expected between ML025-

Receptors	Parameters exceeding the Adopted Criteria	Potential Sources	Potential Pathways	Baseline Conditions		Comments
				Severity/Likelihood	Risk Category	
						SW200 and SW201, however in general no further deterioration in surface water quality was observed between these two locations
			Lateral migration via surface runoff	Medium/Low	Moderate /Low Risk	Low likelihood on basis of distance to watercourse
		HS2 enabling works (glyphosate used in vegetation clearance, archaeological trenching)	Leaching to groundwater and lateral migration within the Secondary A and Principal aquifer to the Bourne	Medium/Unlikely	Low Risk	HS2 enabling activities are unlike to have affected the surface water quality.
			Lateral migration via surface runoff	Medium/Unlikely	Low Risk	
River Pinn	Dissolved oxygen, orthophosphate, AMPA, chromium (III)	MSD site, Intervet Laboratories	Leaching and lateral migration via the perched water in potential made ground and via the Secondary A aquifer to the River Pinn	Medium/Likely	Moderate	Unlikely the listed sources are responsible for orthophosphate and AMPA GAC exceedances. Orthophosphate and AMPA concentrations were found to be similar or higher in upstream locations (including the furthest upstream location ML023-SW200)
			Direct connection via site drainage	Medium/Likely	Moderate	
			Lateral migration via surface runoff	Medium/Low	Moderate	

Receptors	Parameters exceeding the Adopted Criteria	Potential Sources	Potential Pathways	Baseline Conditions		Comments
				Severity/Likelihood	Risk Category	
		Gatemead Farm and Oak Farm (historical agricultural and farming land)	Leaching to groundwater and lateral migration within the Secondary A aquifer to River Pinn	Medium/Likely	Moderate	Chromium concentrations detected sporadically above GAC in the vicinity and downstream of these sources indicating a potential connection to MSD, Intervet Laboratories and RBR Services sources.
			Lateral migration via surface runoff	Medium/Low	Moderate	
		Former RBR Services LTD (motors and repair of motors)	Leaching to groundwater and lateral migration within the Secondary A aquifer to the River	Medium/Likely	Moderate	
			Lateral migration via surface runoff	Medium/Low	Moderate /Low Risk	
Ickenham Stream (Pinn Catchment)	Dissolved oxygen, ammoniacal nitrogen, nitrite, orthophosphate, AMPA	Former West Ruislip Rifle Range	Lateral migration via perched water in potential made ground and potential subsequent lateral migration	Medium/Low	Moderate /Low Risk	Ammoniacal nitrogen and orthophosphate concentrations are higher upstream of these sources, AMPA concentrations are similar between ML023-SW202 and ML023-SW203 and therefore are unlikely to be related to these sources.
			Lateral migration via the site runoff into the drainage streams 70m	Medium/Likely	Moderate	

Receptors	Parameters exceeding the Adopted Criteria	Potential Sources	Potential Pathways	Baseline Conditions		Comments
				Severity/Likelihood	Risk Category	
			north west of the former Rifle site potentially connected to the River			The only exceedance for nitrite was noted at the downstream location in Ickenham Stream and hence could potentially be related to these sources.
		Allotment/communal gardens (fertilisers, herbicides and pesticides)	Leaching to groundwater and lateral migration within the Secondary A to the River	Medium/Likely	Moderate	
			Lateral migration via surface runoff	Medium/Likely	Moderate	
Ickenham Stream (Pinn Catchment) and River Pinn	Dissolved oxygen, ammoniacal nitrogen, nitrite (only Ickenham Stream), orthophosphate, AMPA, chromium (III) (only River Pinn)	West Ruislip Golf Course (herbicides, fertilisers and enabling works - demolitions)	Lateral migration via perched water in potential made ground and potential subsequent lateral migration	Medium/Likely	Moderate	Ammoniacal nitrogen, orthophosphate and AMPA concentrations are similar or higher upstream and therefore are unlikely to relate to the Golf Course. The only exceedance for nitrite was noted at the downstream location in Ickenham Stream and hence could potentially be related to this source.
			Lateral migration via the site runoff (dissolved phase or particulate)	Medium/Likely	Moderate	
		Railway line	Lateral migration within the Secondary A aquifer to the Stream and River	Medium/Likely	Moderate	Exceedances of chromium (trivalent) detected in the River Pinn at the locations

Receptors	Parameters exceeding the Adopted Criteria	Potential Sources	Potential Pathways	Baseline Conditions		Comments
				Severity/Likelihood	Risk Category	
			Lateral migration via surface runoff (dissolved and particulate)	Medium/Likely	Moderate	near and downgradient to the railway lines. The rest of the analytes seem to have higher or similar concentrations upgradient of the railway lines.
River Pinn and Ickenham Stream (Pinn Catchment)	Dissolved oxygen, ammoniacal nitrogen, nitrite (only Ickenham Stream), orthophosphate, AMPA, chromium (only River Pinn)	HS2 enabling works (glyphosate used in vegetation clearance, archaeological trenching)	Lateral migration via potential perched water of the un-productive strata and the Secondary A aquifer	Medium/Unlikely	Low Risk	HS2 enabling activities are unlike to have affected the surface water quality.
			Lateral migration via surface runoff	Medium/Unlikely	Low Risk	
Ickenham Stream (Yeading	Dissolved oxygen, ammoniacal	Railway line	Lateral migration via potential perched water in made ground	Medium/Low	Moderate /Low Risk	Chromium exceedances recorded.

Receptors	Parameters exceeding the Adopted Criteria	Potential Sources	Potential Pathways	Baseline Conditions		Comments
				Severity/Likelihood	Risk Category	
Brook Catchment)	nitrogen, nitrate, orthophosphate, AMPA, EPH, chromium		Lateral migration via surface runoff	Medium/Likely	Moderate	During floods or excessive rainfall. One of the highest concentrations of chromium (trivalent) was detected in Ickenham Stream (Yeading Brook Catchment) (ML023-SW204) just south of the railway lines.
		HS2 enabling works (glyphosate used in vegetation clearance, archaeological trenching)	Lateral migration via potential perched water of the un-productive strata and the Secondary A aquifer	Medium/Unlikely	Low Risk	HS2 enabling activities are unlike to have affected the surface water quality.
			Lateral migration via surface runoff	Medium/Unlikely	Low Risk	

7 Conclusions

AECOM were commissioned by CSJV to produce an interpretative annual report upon completion of monthly surface water quality monitoring in the HS2 Area South, Sector 2 (S2 – Northolt Tunnels – Chainage 9+505 to 25+800). Pre-construction monthly monitoring of 11 No. surface water sampling locations (8 No. between March and May 2020) was carried out by AECOM between June 2019 and May 2020 (12 months).

A preliminary conceptual site model was developed to identify potential sources of impact to surface water within the Site (receptors) and potential pathways linking sources and receptors.

Data collected during the monitoring rounds were screened against adopted GAC, potential sources of those contaminants exceeding GAC were identified and it was investigated whether they were likely to relate to the HS2 enabling works by reference to available records of potential legacies of contamination (e.g. Land Quality Desk Studies) and records of HS2 Enabling Works activities. The conceptual site model was then updated accordingly.

Field parameters and analytes identified to exceed the adopted GAC were: dissolved oxygen (% saturation), temperature, ammoniacal nitrogen (as N), nitrate (as N), nitrite (as N), orthophosphate (as P), AMPA and EPH C8-C40, chromium (trivalent) (filtered).

The above field parameters and analytes were found to exceed the adopted GAC in the watercourses depicted in Table 9 below.

Table 9: Analyte and parameter exceedances per Watercourse

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
Dissolved Oxygen	✓	✓	✓	✓
Temperature				✓
Ammoniacal Nitrogen (as N)	✓	✓	✓	

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
Nitrate (as N)	✓		✓	
Nitrite (as N)	✓			✓
OrthoPhosphate as P	✓	✓	✓	✓
AMPA	✓	✓	✓	✓
EPH C8-C40	✓	✓		
Chromium (Trivalent)		✓	✓	

The highest concentrations for the majority of analytes were recorded at the New Years Green Bourne locations and/or at the Ickenham Stream (Yeading Brook Catchment) location.

Plausible linkages have been identified in the updated CSM. For some watercourses a link between the source and the receptor was identified (e.g. New Years Green Bourne concentrations linked to the New Years Green Lane Landfill and potentially the surrounding landfills), however the sources for other watercourses (e.g. Ickenham Stream (Yeading Brook Catchement)) could not be identified based on the available data. Table 10 below summarises the potential concentration sources for each analyte per watercourse.

Table 10: Potential Sources of GAC exceedances per Watercourse

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
Dissolved Oxygen	New Years Green Lane Landfill	Unknown source	Unknown source, potentially upstream of Sector 2 inputs	Unknown source
Temperature				Unknown source
Ammoniacal Nitrogen (as N)	New Years Green Lane Landfill	Unknown source, potentially upstream of Sector 2 inputs	Unknown source, potentially upstream of Sector 2	

Analyte/Parameter	New Years Green Bourne	Ickenham Stream (Yeading Brook Catchment)	River Pinn	Ickenham Stream (Pinn Catchment)
			inputs	
Nitrate (as N)	New Years Green Lane Landfill and potential fertiliser		Unknown source, potentially upstream of Sector 2 inputs	
Nitrite (as N)	Unknown source, seasonal variation			Communal gardens, golf course
Orthophosphate as P	New Years Green Lane Landfill	Unknown source	Unknown source, potentially upstream of Sector 2 inputs	Unknown source, potentially upstream of Sector 2 inputs
AMPA	New Years Green Lane Landfill and potential glyphosate use in adjacent fields	Potential glyphosate use in railway lines and residential gardens	Potential glyphosate use in railway lines and adjacent fields. Potentially upstream of Sector 2 inputs	Potential glyphosate use in adjacent fields and railway lines
EPH C8-C40	New Years Green Lane Landfill	Railway lines		
Chromium (Trivalent) (Filtered)		Railway lines	Railway lines, MSD, RBR Services	

Nitrate, orthophosphate, nitrite, AMPA and dissolved oxygen concentrations were identified to present a seasonal variation. A correlation between reduced precipitation, low flow and higher concentrations was identified for a number of analytes.

Dissolved oxygen (%) was checked against TOC, nitrate and ammoniacal nitrogen to investigate if there was any correlation between low dissolved oxygen levels and carbon loading / nutrients. A correlation did not seem to be present.

Following the analysis of the exceedances, it was investigated whether the HS2 enabling activities could have affected the concentrations of the identified chemicals and/or field parameters in the surface watercourses. No link was established between the HS2 enabling activities and the surface water concentrations as in many occasions high concentrations were recorded before the enabling works or concentrations above GAC were also recorded at locations upstream of the enabling works.

The annual average orthophosphate concentrations were recorded higher in urban locations indicating a potential effect on concentrations from diffuse urban pollution (e.g. leaking sewers, potential sewage misconnections and leaking water mains). Orthophosphate concentrations in the locations near the HS2 enabling activities were generally lower. The 90^{th} percentile ammoniacal nitrogen concentrations in the River Pinn were recorded to be higher upstream and generally improved downstream, indicating that ammoniacal nitrogen loading in this watercourse was dominated by impacts upstream of the monitoring locations.

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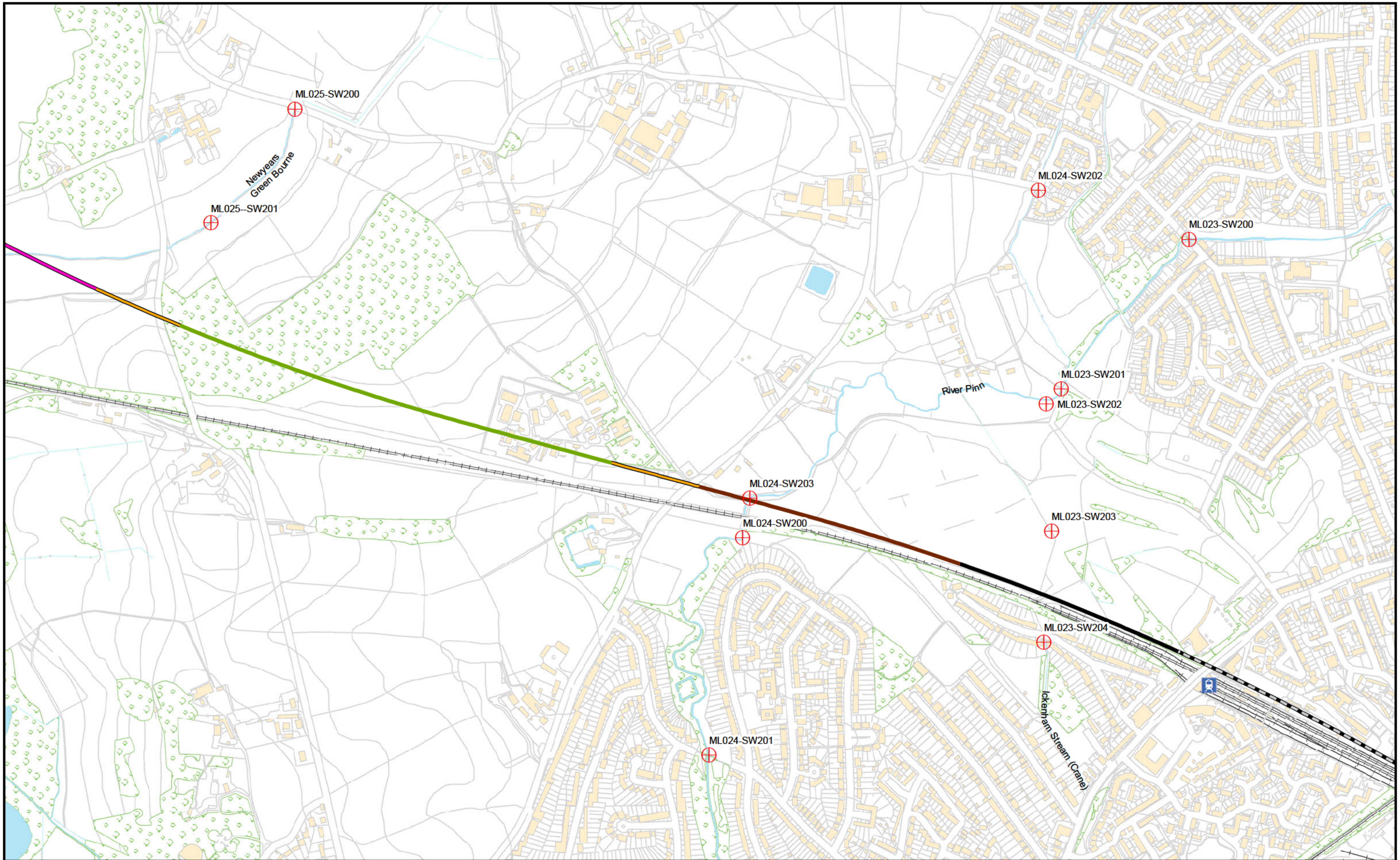
Figures

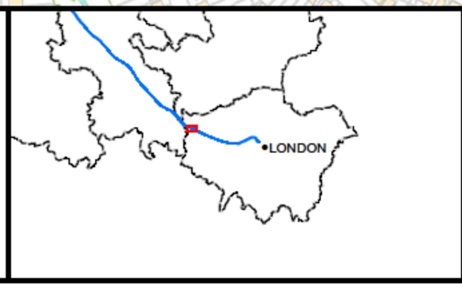


Legend

Phase One Final Preliminary Design alignment January 2017

- Bored Tunnel
- Cutting
- Embankment
- Retaining Wall
- Tunnel Portal
- Viaduct

Monitoring Point



High Speed Two
Figure 1: Surface Water Sampling Locations

Published

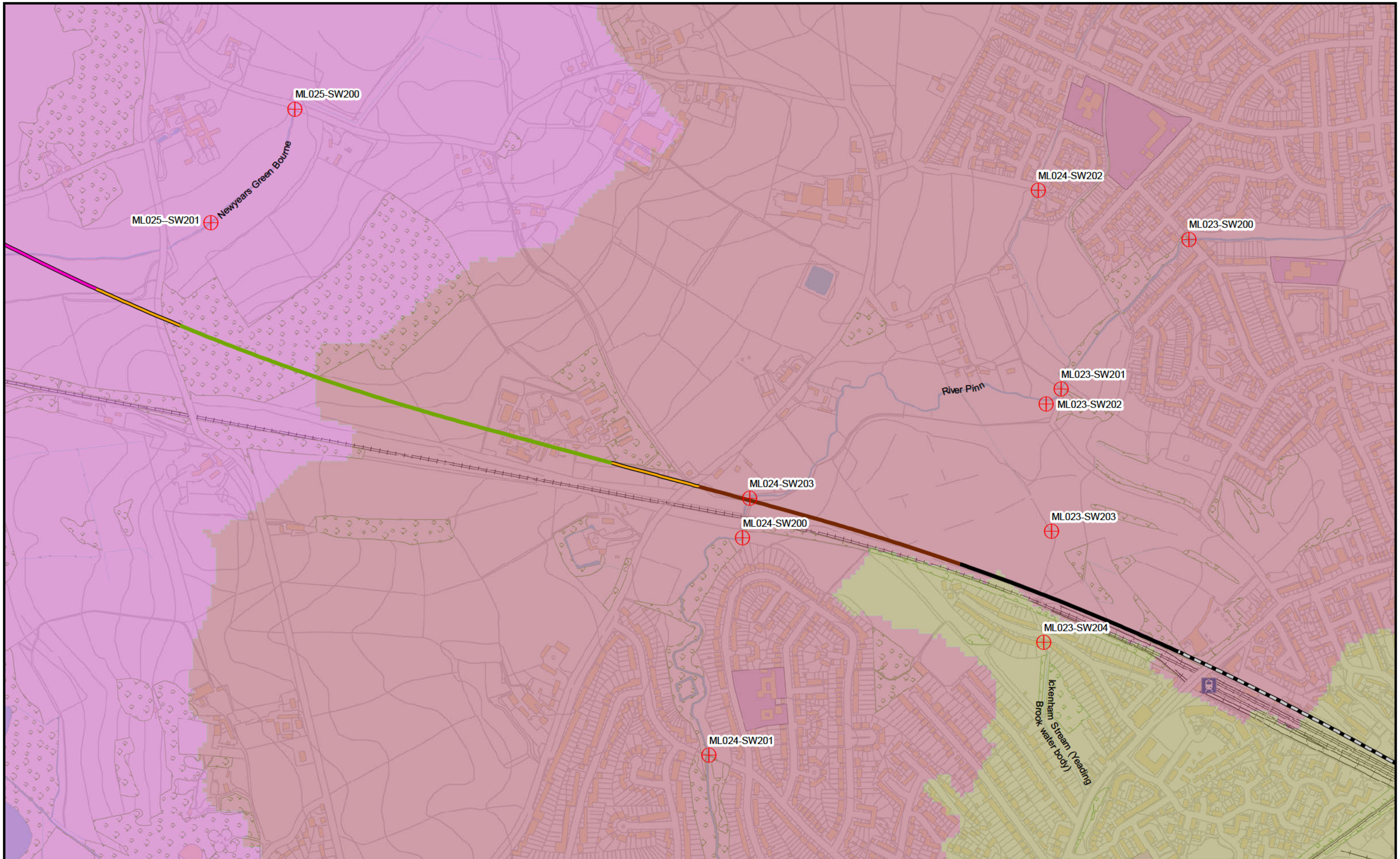
HS2

Registered in England. Registration number 06791686.
Registered office 2 Snowhill, Queensway, Birmingham B4 6GA.

Scale at A3: 1:7,500

0 0,3
Kilometres

Doc Number: 1EW02-CSJ-EV-REP-S002-000159 **Date:** 19/11/20



Legend

Phase One Final Preliminary Design alignment January 2017

- Bored Tunnel
- Cutting
- Embankment
- Retaining Wall
- Tunnel Portal
- Viaduct

Monitoring Point

Watercourse catchment / Water Framework Directive Water Body

- Newyears Green Bourne / Colne (Confluence with Chess to River Thames)
- River Pinn / Pinn
- Ickenham Stream / Yeading Brook water body

High Speed Two
Figure 2: Catchments and Surface Sampling Locations

Published

HS2

Registered in England. Registration number 06791686.
Registered office 2 Snowhill, Queensway, Birmingham B4 6GA.

Scale at A3: 1:7,500

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Kilometres

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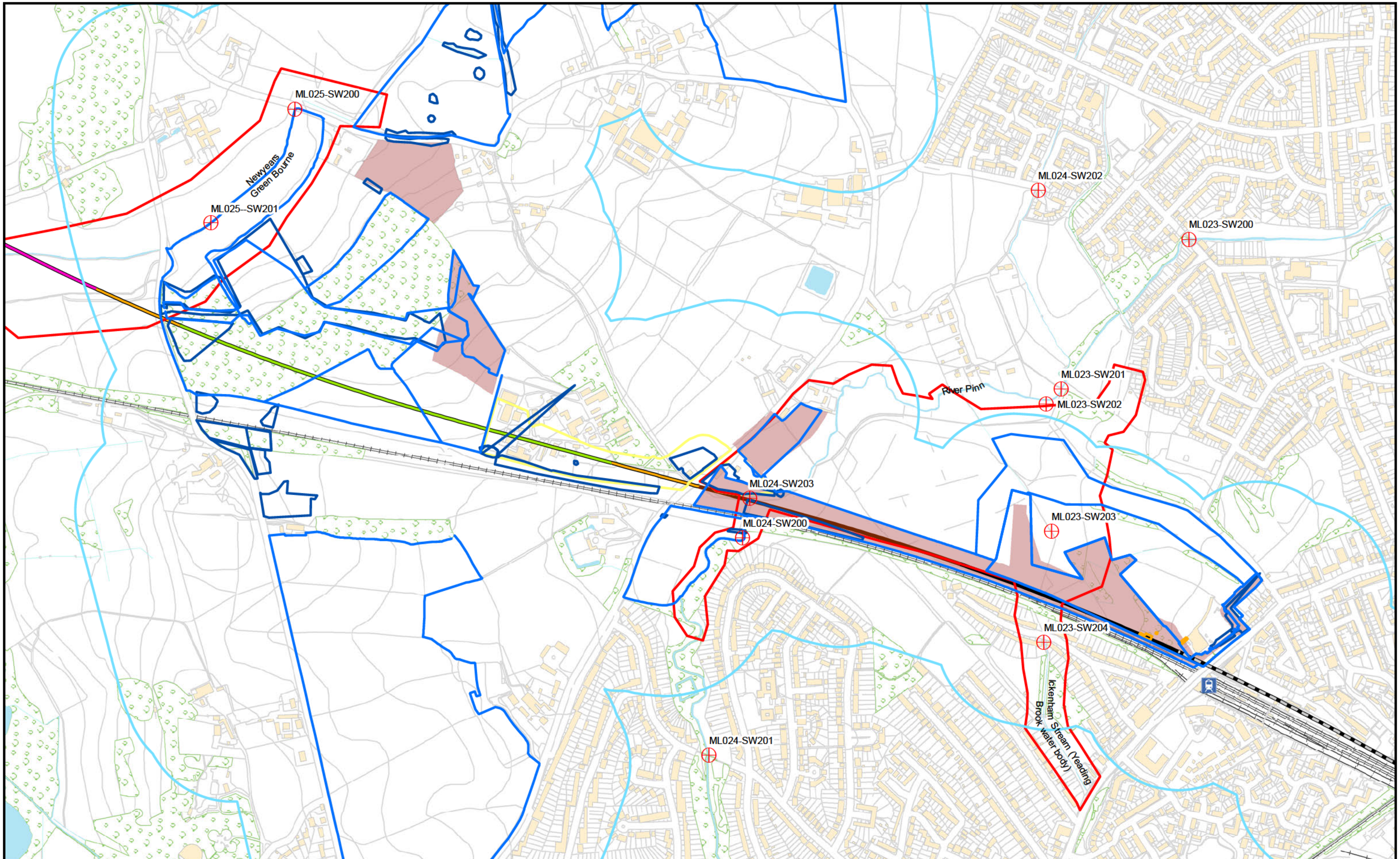
Doc Number: 1EW02-CSJ-EV-REP-S002-000159 **Date:** 24/11/20



Legend

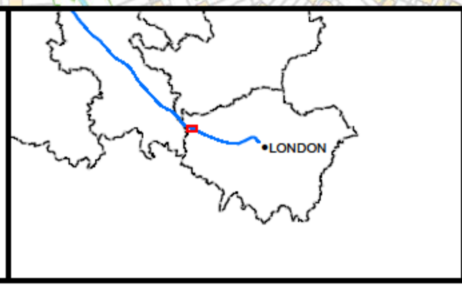
Phase One Final Preliminary Design alignment January 2017

- Bored Tunnel
- Cutting
- Embankment
- Retaining Wall
- Tunnel Portal
- Viaduct
- Monitoring Point
- WP85 Advanced Planting

- P001c_Vegetation_Clearance
- P011_Historic_Environment___Tranche_One
- P020_Watercourse_Activities
- P049b_S2_Demolitions__All__and_Site_Set_U...
- P053_MSD_Works_Package_inc_Utilities_Works

Other work packages

- P001b_Early_Ecology_Clearance_and_Habita...
- P012a_Environement_and_Ecological_Survey...
- P015_Surveys___Tranche_Two;
- P016_Surveys___Tranche_Three;
- P085_Habitat_Removal_and_Creation



High Speed Two
Figure 3: HS2 Enabling Works Activities

Published

HS2

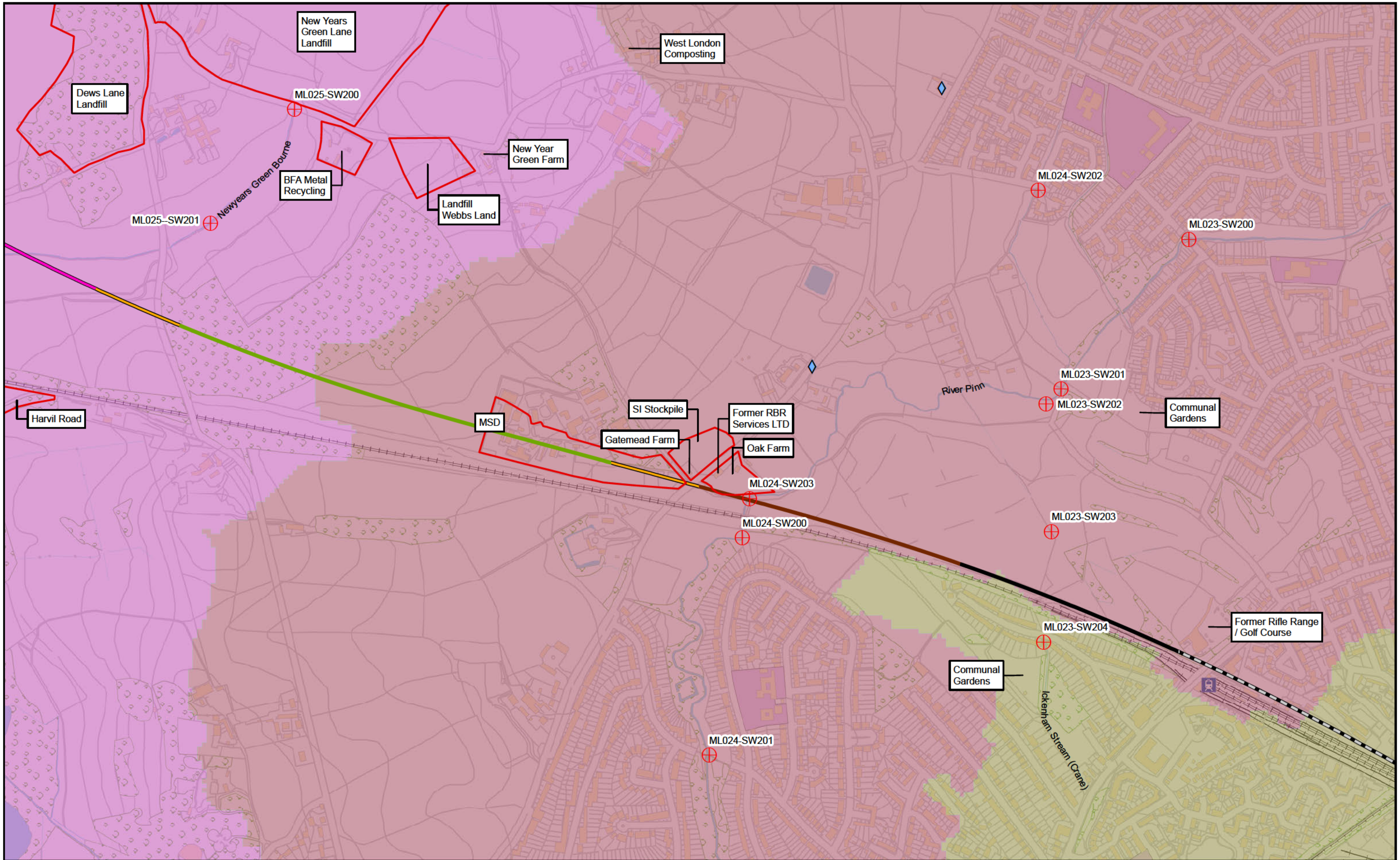
Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.

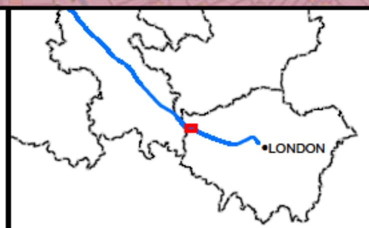
Scale at A3: 1:7,500

Kilometres

Doc Number: 1EW02-CSJ-EV-REP-S002-000159

Date: 01/02/21





Legend

Phase One Final Preliminary Design Alignment January 2017

- Bored Tunnel
- Cutting
- Embankment
- Retaining Wall
- Tunnel Portal
- Viaduct
- Discharge Consent (Inactive)
- Monitoring Point
- Potential Sources of Contamina ion

Watercourse Catchment / Water Framework Directive Water Body

- Newyears Green Bourne / Colne (Confluence with Chess to River Thames)
- River Pinn / Pinn
- Ickenham Stream / Crane Rivers and Lakes

High Speed Two
Figure 4: Potential Sources of Contamination

Published

HS2

Scale at A3: 1:7,500

0 — 0.3 Kilometres

N

Doc Number: 1EW02-CSJ-EV-REP-S002-000159 **Date:** 04/01/21

Appendix 1

Metal Bioavailability Assessment Tool Outputs

Baseline Surface Water Sampling
MBAT Tool Output for Cu, Zn, Mn, Ni

INPUT DATA											RESULTS (Copper)				RESULTS (Zinc)				RESULTS (Mn)				RESULTS (Ni)			
ID	Location	Waterbody	Date	Measured Cu Concentration (dissolved) (µg l^{-1})	Measured Zn Concentration (dissolved) (µg l^{-1})	Measured Mn Concentration (dissolved) (µg l^{-1})	Measured Ni Concentration (dissolved) (µg l^{-1})	pH	DOC	Ca	Site-specific PNEC Dissolved Copper (µg l^{-1})	BioF	Bioavailable Copper Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Zinc (µg l^{-1})	BioF	Bioavailable Zinc Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Manganese (µg l^{-1})	BioF	Bioavailable Manganese Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Nickel (µg l^{-1})	BioF	Bioavailable Nickel Concentration (µg l^{-1})	Risk Characterisation Ratio
1	ML023-SW200	River Pinn						7.94	3.45	214.6	10.42	0.10			24.59	0.44			246.59	0.50			9.39	0.43		
2	ML023-SW201	River Pinn						7.99	3.45	193.1	9.79	0.10			24.67	0.44			223.84	0.55			8.92	0.45		
3	ML023-SW202	Ickenham Stream						8.03	3.45	223.1	9.28	0.11			24.68	0.44			207.16	0.59			8.54	0.47		
4	ML023-SW203	Ickenham Stream						7.96	3.45	230.8	10.17	0.10			24.62	0.44			237.23	0.52			9.20	0.43		
5	ML023-SW204	Crane Rivers and Lakes						7.86	3.45	187.3	11.38	0.09			24.46	0.45			287.90	0.43			10.15	0.39		
6	ML024-SW200	River Pinn						7.92	3.45	209.1	10.66	0.09			24.56	0.44			256.33	0.48			9.58	0.42		
7	ML024-SW201	River Pinn						8.07	3.45	203.8	8.77	0.11			24.68	0.44			191.73	0.64			8.16	0.49		
8	ML024-SW202	River Pinn						8.12	3.45	187.1	8.14	0.12			24.68	0.44			174.04	0.71			7.69	0.52		
9	ML024-SW203	River Pinn						7.94	3.45	212.5	10.42	0.10			24.59	0.44			246.59	0.50			9.39	0.43		
10	ML025-SW200	New years green Bourne						7.87	3.45	396.41	11.27	0.09			24.48	0.45			282.38	0.44			10.06	0.40		
11	ML025-SW201	New years green Bourne						7.91	3.45	383.1	10.79	0.09			24.54	0.44			261.34	0.47			9.68	0.41		

Baseline Surface Water Sampling
Pb Screening Calculator Output

INPUT DATA						RESULTS (Pb)			
ID	Location	Waterbody	Date	Measured Pb Concentration (dissolved) (µg l^{-1})	DOC	Site Specific PNEC Dissolved Pb (µg l^{-1})	BioF	Available Pb (µg l^{-1})	Risk Characterisation Ratio
1	ML023-SW200	River Pinn			3.45	4.14	0.29	0.00	
2	ML023-SW201	River Pinn			3.45	4.14	0.29	0.00	
3	ML023-SW202	Ickenham Stream			3.45	4.14	0.29	0.00	
4	ML023-SW203	Ickenham Stream			3.45	4.14	0.29	0.00	
5	ML023-SW204	Crane Rivers and Lakes			3.45	4.14	0.29	0.00	
6	ML024-SW200	River Pinn			3.45	4.14	0.29	0.00	
7	ML024-SW201	River Pinn			3.45	4.14	0.29	0.00	
8	ML024-SW202	River Pinn			3.45	4.14	0.29	0.00	
9	ML024-SW203	River Pinn			3.45	4.14	0.29	0.00	
10	ML025-SW200	New years green Bourne			3.45	4.14	0.29	0.00	
11	ML025-SW201	New years green Bourne			3.45	4.14	0.29	0.00	

Baseline Surface Water Sampling
Phosphorus Screening Calculator

WBID	WB Name	Site Name	EA P Classification Used	Altitude	Mean Observed Alkalinity	Altitude used	Alkalinity used	Reference P	Reference P used	High	Good	Moderate	Poor	High	Good	Moderate	Poor
				m	$mgCaCO_3$ / l	m	$mgCaCO_3$ / L	ug/l		ug/l				mg/l			
1	ML023-SW200	River Pinn	Good	35	214.6	35	215	29.6	29.6	47	85	204	1075	0.047	0.085	0.204	1.075
2	ML023-SW201	River Pinn	Good	40	193.1	40	193	27.6	27.6	44	81	196	1056	0.044	0.081	0.196	1.056
3	ML023-SW202	Ickenham Stream	Good	41	223.1	41	223	29.4	29.4	46	85	204	1073	0.046	0.085	0.204	1.073
4	ML023-SW203	Ickenham Stream	Good	46	230.8	46	231	29.3	29.3	46	85	203	1072	0.046	0.085	0.203	1.072
5	ML023-SW204	Crane Rivers and Lakes	Good	45	187.3	45	187	26.7	26.7	42	79	192	1048	0.042	0.079	0.192	1.048
6	ML024-SW200	River Pinn	Good	24	209.1	24	209	30.6	30.6	48	88	208	1084	0.048	0.088	0.208	1.084
7	ML024-SW201	River Pinn	Good	40	203.8	40	204	28.4	28.4	45	83	199	1064	0.045	0.083	0.199	1.064
8	ML024-SW202	River Pinn	Good	40	187.1	40	187	27.3	27.3	43	80	195	1054	0.043	0.08	0.195	1.054
9	ML024-SW203	River Pinn	Good	38	212.5	38	213	29.2	29.2	46	84	203	1071	0.046	0.084	0.203	1.071
10	ML025-SW200	New years green Bourne	Good	45	396.41	45	250	30.5	30.5	48	87	208	1083	0.048	0.087	0.208	1.083
11	ML025-SW201	New years green Bourne	Good	50	383.1	50	250	29.8	29.8	47	86	205	1077	0.047	0.086	0.205	1.077

Appendix 2

Per Location Surface Water Chemistry Analytical Tables

Baseline Surface Water Sampling
ML023-SW200 Surface Water Chemistry

Statistical Summary

Chem_Group	ChemName	output unit	EQL	Proposed GAC	ML023-SW200	ML023-SW200	ML023-SW200	ML023-SW200	ML023-SW200	ML023-SW200	ML023-SW200	ML023-SW200	ML023-SW200	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)	GAC Magnitude of Exceedance	10th Percentile	90th Percentile	95th Percentile	98th Percentile	First Quartile	Second Quartile (median)	Third Quartile
				Sampled Date Time	14/06/2019	12/07/2019	08/08/2019	11/09/2019	04/10/2019	05/11/2019	02/12/2019	09/01/2020	07/02/2020																			
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020																			
				Lab Report Number	19-9718-1-210619	19-11358-1-220719	19-12844-1-290819	19-14766-1-120820	19-16317-1-241019	19-18121-1-120820	19-19743-1-120820	20-245-2-110220	20-245-4-170220																			
	GRO >C4-C8	µg/l	10	700#11	10	10	10	10	10	10	10	-	-	7	0	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C8-C12	µg/l	10	100#14	10	10	10	10	10	10	10	-	-	7	0	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Aminomethyl phosphonic acid	µg/L	0.2	0.1#1	-	-	1.4	1.4	0.8	-	-	-	-	3	3	0.80	0.80	1.40	1.40	1.20	1.40	0.35	3.00	3.00	14.00	0.92	1.40	1.40	1.40	1.10	1.40	1.40
	% Cation Excess	%		N.V.	0.67	0.96	2.07	3.5	-2.22	-1.03	2.24	0.82	2.73	9	9	-2.22	ND	3.50	3.50	1.10	0.96	1.80	0.00	0.00	-	-1.27	2.88	3.19	3.38	0.67	0.96	2.24
Field	Dissolved oxygen (%saturation)	%		80#2	81.71	-	85.15	68.77	67.37	55.16	94.62	79.94	113.58	8	8	55.16	55.16	113.58	113.58	81.00	80.82	18.00	4.00	4.00	1.42	63.71	100.31	106.94	110.93	68.42	80.82	87.52
	pH	pH Units		6-9#2	7.88	8.181388	8.37	7.93	7.42	8.10	7.73	7.86	8.01	9	9	7.42	7.42	8.37	8.37	7.90	7.93	0.27	0.00	0.00	-	7.67	8.22	8.29	8.34	7.86	7.93	8.10
	Electrical Conductivity	µS/cm		N.V.	458	-	672.98	859.24	730.23	723.71	790.73	850	839	8	8	458.00	458.00	859.24	859.24	740.00	760.48	133.00	0.00	0.00	-	608.48	852.77	856.01	857.95	711.02	760.48	841.75
	Temperature	oC		20#2	14.61	18.40	17.99	14.67	12.86	10.24	5.39	9.78	5.56	9	9	5.39	5.39	18.40	18.40	12.00	12.86	4.80	0.00	0.00	-	5.53	18.07	18.23	18.33	9.78	12.86	14.67
	Dissolved Oxygen (Filtered)	mg/L		N.V.	7.65	-	9.64	6.30	7.50	6.93	9.95	8.09	10.73	8	8	6.30	6.30	10.73	10.73	8.30	7.87	1.60	0.00	0.00	-	6.74	10.18	10.46	10.62	7.36	7.87	9.72
	Field Redox	mV		N.V.	17	-	185.97	191.41	62.27	93.00	14.03	14	92	8	8	14.00	14.00	191.41	191.41	84.00	77.13	73.00	0.00	0.00	-	14.02	187.60	189.51	190.65	16.26	77.13	116.24
	Redox	mV		N.V.	228.62	397.32	387.14	395.37	267.73	300.63	225.59	229.46	310.86	9	9	225.59	225.59	397.32	397.32	305.00	300.63	73.00	0.00	0.00	-	228.01	395.76	396.54	397.01	229.46	300.63	387.14
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	10	10	2	0	10	ND	10	ND		5.00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C4-C12	µg/L	10	100#12	10	10	10	10	10	10	10	10	10	9	0	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	10	10	2	0	10	ND	10	ND		5.00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	EPH C8-C40	µg/L	10	90#15	10	10	10	10	10	10	10	10	10	9	0	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
BTEX	Benzene	µg/L	5	10#2	5	5	5	5	5	5	5	5	5	9	0	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Toluene	µg/L	5	74#4	5	5	5	5	5	5	5	5	5	9	0	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Ethylbenzene	µg/L	5	20#5	5	5	5	5	5	5	5	5	5	9	0	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene (m & p)	µg/L	5	Screened as total Xylene	5	5	5	5	5	5	5	5	5	9	0	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene Total	µg/L		30#5	10	10	10	10	-	10	10	-	-	6	0	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Xylene (o)	µg/L	5	Screened as total Xylene	5	5	5	5	5	5	5	5	5	9	0	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Total BTEX	µg/L		Screened as individual compounds	25	25	25	25	-	25	25	-	-	6	0	25	ND	25	ND	13.00	12.50	0.00	0.00	0.00	-	12.50	12.50	12.50	12.50	12.50	12.50	12.50
Oxygenates	MTBE	µg/L	5	5,100#8	5	5	5	5	5	5	5	5	5	9	0	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Phenolics	Total Phenols	µg/L	150	N.V.	150	150	150	150	150	150	150	150	150	9	0	150	ND	150	ND	75.00	75.00	0.00	0.00	0.00	-	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	1.2	0.8	1.9	-	-	-	-	3	3	0.80	0.80	1.90	1.90	1.30	1.20	0.56	0.00	0.00	-	0.88	1.76	1.83	1.87	1.00	1.20	1.55
Metals	Aluminium (Filtered)	µg/L	1.5	1000#18 (Total Aluminium)	-	-	20	20	20	20	20	20	10.1	6	1	10.10	10.10	20	10.10	10.00	10.00	0.04	0.00	0.00	-	10.00	10.05	10.08	10.09	10.00	10.00	10.00
	Arsenic (Filtered)	µg/L	0.9	50#4	1.8	3.1	2.5	2.3	1.8	1.8	1.8	2	1.7	9	9	1.70	1.70	3.10	3.10	2.10	1.80	0.46	0.00	0.00	-	1.78	2.62	2.86	3.00	1.80	1.80	2.30
	Barium (Filtered)	µg/L	1.8	114.7#8	30.1	40	35.3	39	42.1	36.2	34.7	38.3	34.5	9	9	30.10	30.10	42.10	42.10	37.00	36.20	3.60	0.00	0.00	-	33.62	40.42	41.26	41.76	34.70	36.20	39.00
	Beryllium (Filtered)	µg/L	0.5	12#3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	9	0	0.5	ND	0.5	ND	0.25	0.25	0.00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Boron (Filtered)	µg/L	12	2,000#5	60	88	78	82	83	81	75	88	88	9	9	60.00	60.00	88.00	88.00	80.00	82.00	8.90	0.00	0.00	-	72.00	88.00	88.00	88.00	78.00	82.00	88.00
	Cadmium (Filtered)	µg/L	0.03	0.25#2	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	9	1	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.00	0.00	-	0.02	0.02	0.02	0.03	0.02	0.02	0.02
	Calcium (Filtered)	mg/L	0.2	N.V.	73.7	129.7	98.9	123.6	85.8	93.2	105.2	112.5	106.9	9	9	73.70	73.70	129.70	129.70	103.00	105.20	18.00	0.00	0.00	-	83.38	124.82	127.26	128.72	93.20	105.20	112.50
	Chromium (III+VI) (Filtered)	µg/L	0.2	Screened as individual species	0.8	0.2	0.3	0.2	0.8	0.6	0.4	0.2	0.3	9	7	0.2	0.20	0.80	0.80	0.40	0.30	0.27	0.00	0.00	-	0.10	0.80	0.80	0.80	0.20	0.30	0.60
	Copper (Filtered)	µg/L	1	10.4#(m-bat PNEC to reference)#16	6	2	2	2	5	5	4	3	3	9	9	2.00	2.00	6.00	6.00	3.60	3.00	1.50	0.00	0.00	-	2.00	5.20	5.60	5.84	2.00	3.00	5.00
	Iron	µg/L	20	Screened as filtered	375	86	95	107	221	374	383	663	400	9	9	86.00	86.00	663.00	663.00	300.00	374.00	191.00	0.00	0.00	-	93.20	452.60	557.80	620.92	107.00	374.00	383.00
	Iron (Filtered)	µg/L	20	100#4	91	49	52	20	75	121	100	120	81	9	8	20	49.00	121.00	121.00	78.00	81.00	36.00	0.00	0.00	-	41.20	120.20	120.60	120.84	52.00	81.00	100.00
	Lead (Filtered)	µg/L	0.1	4.14#(m-bat)#16	0.4	0.2	0.4	0.3	0.8	0.5	0.2	0.1	0.2	9	8	0.10	0.10	0.80	0.80	0.32	0.20	0.22	0.00	0.00	-	0.18	0.56	0.68	0.75	0.20	0.20	0.40
	Magnesium (Filtered)	mg/L	0.1	N.V.	9.5	11	9	9.6	10.8	13	15.7	16.7	17	9	9	9.00	9.00	17.00	17.00	12.00	11.00	3.20	0.00	0.00	-	9.40	16.76	16.88	16.95	9.60	11.00	15.70
	Manganese	µg/L	2	Screened as filtered	20	9	11	2	15	21	29	61	31	9	8	2	9.00	61.00	61.00	22.00	20.00	17.00	0.00	0.00	-	7.40	37.00	49.00	56.20	11.00	20.00	29.00
	Manganese (Filtered)	µg/L	2	246.5#(m-bat PNEC)#16	24	15	12	2	28	28	41	69	53	9	8	2	12.00	69.00	69.00	30.00	28.00	21.00	0.00	0.00	-	9.80	56.20	62.60	66.44	15.00	28.00	41.00
	Mercury (Filtered)	µg/L	0.01	0.07#9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	9	0	0.01	ND	0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Nickel (Filtered)	µg/L	0.2	9.3#(m-bat PNEC reference)#16 MAC 34	2.3	2.9	2.5	2.4	2.6	3.5	3.8	5.2	5.1	9	9	2.30	2.30	5.20	5.20	3.40	2.90	1.10	0.00	0.00	-	2.38	5.12	5.16	5.18	2.50	2.90	3.80
	Phosphorus	µg/L	5	Screened as Orthophosphate	274	690	496	576	146	196	194	256	175	9	9	146.00	146.00	690.00	690.00	334.00	256.00	200.00	0.00	0.00	-	169.20	598.80	644.40	671.76	194.00	256.00	496.00
	Selenium (Filtered)	µg/L	1.2	2.67#8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	9	0	1.2	ND	1.2	ND	0.60	0.60	0.00	0.00	0.00	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Vanadium (Filtered)	µg/L	0.6	20#5	2.6	2.4	2.8	3.1	3.1	2	1.7	1.5	1	9	9	1.00	1.00	3.10	3.10	2.20	2.40	0.74	0.00	0.00	-	1.40	3.10	3.10	3.10	1.70	2.40	2.80
	Zinc (Filtered)	µg/L	1.5	26.59#(m-bat PNEC#16 incl. background 2µg/L #2)	7.1	6.3	4.4	8	8.8	10.1	8.7	7.2	8.9	9	9	4.40	4.40	10.10	10.10	7.70	8.00	1.70	0.00	0.00	-	5.92	9.14	9.62	9.91	7.10	8.00	8.80
	Potassium (Filtered)	mg/L	0.1	N.V.	5.9	8.2	7.7	9.2	6.8	6.8	6.3	6.2	5.9	9	9	5.90	5.90	9.20	9.20	7.00	6.80	1.10	0.00	0.00	-	5.90	8.40	8.80	9.04	6.20	6.80	7.70
	Chromium (hexavalent)	µg/L	6	3.4#4	6	6	6	6	6	6	6	6	6	9	0	6	ND	6	ND	3.00	3.00	0.00	0.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7#4 MAC 32	6	6	6	6	6	6	6	6	6	9	0	6	ND	6	ND	3.00	3.00	0.00	0.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Organics	TOC	mg/L	2	N.V.	7	2	7	3	7	11	7	7	7	9	8	2	3.00	11.00	11.00	6.30	7.00	2.80	0.00	0.00	-	2.60	7.80	9.40	10.36	7.00	7.00	7.00
Inorganics	Sodium (Filtered)	mg/L	0.1	20#1	32	54	46.3	58.8	33.9	30.2	34.8	34.4	36.2	9	9	30.20	30.20	58.80	58.80	40.00	34.80	10.00	0.00	0.00	-	31.64	54.96	56.88	58.03	33.90	34.80	46.30
	Cyanide Total	mg/L	0.01	0.001#4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	9	0	0.01	ND	0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Electrical conductivity *(lab)	µS/cm	2	N.V.	541	945	736	921	671	734	707	802	780	9	9	541.00	541.00	945.00	945.00	757.00	736.00	123.00	0.00	0.00	-	645.00	925.80	935.40	941.16	707.00	736.00	802.00
	Sulphate	mg/L	0.5	400#5	66.5	76.8	57.8	69.6	81.5	67.4	95.8	96.6	96.1	9	9	57.80	57.80	96.60	96.60	81.00	81.50	14.00	0.00	0.00	-	64.76	96.20	96.40	96.52	69.60	81.50	95.80
	Chloride	mg/L	0.3	250#5	43	80.3	68.6	79.2	54.8	43	51.3	55	52.7	9	9	43.00	43.00	80.30	80.30	59.00	54.80	14.00	0.00	0.00	-	43.00	79.42	79.86	80.12	51.30	54.80	68.60
	Ortho Phosphate as P	mg/L	0.03	0.085#17	0.18	0.64	0.41	0.55	0.07	0.14	0.18	0.1	0.08	9	9	0.07	0.07	0.64	0.64	0.26	0.18	0.22	7.00	7.00	7.53	0.08	0.57	0.60	0.63	0.10	0.18	0.41
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	2.3	[illegible]	2.8	4.7	11.6	6.9	5.9	5.9	5.6	9	9	2.30	2.30	11.60	11.60	5.60	5.60	2.70	0.00	0.00	-	2.70	7.84	9.72	10.85	4.70	5.60	5.90
	Alkalinity (total) as CaCO3	mg/L	1	N.V.	154	287	216	258	159	199	208	235	216	9	9	154.00	154.00	287.00	287.00	215.00	216.00	43.00	0.00	0.00	-	158.00	263.80	275.40	282.36	199.00	216.00	235.00
	Alkalinity (Carbonate as CaCO3)	mg/L	1	N.V.	1	31	1	1	1	1	1	1	1	9	1	1	31.00	31.00	31.00	3.90	0.50	10.00	0.00	0.00	-	0.50	6.60	18.80	26.12	0.50	0.50	0.50
	Nitrate (as N)	mg/L	0.05	11.3#1	3.34	1.45	1.53	3.52	9.9	4.82	3.69	3.31	2.87	9	9	1.45	1.45	9.90	9.90	3.80	3.34	2.50	0.00	0.00	-	1.51	5.84	7.87	9.09	2.87	3.34	3.69
	Nitrite (as N)	mg/L	0.006	0.152#1	0.063	0.063	0.042	0.088	0.066	0.075	0.053	0.133	0.044	9	9	0.04	0.04	0.13	0.13	0.07	0.06	0.03	0.00	0.00	-	0.04	0.10	0.12	0.13	0.05	0.06	0.08
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	N.V.	154	256	216	258	159	199	208	235	216	9	9	154.00	154.00	258.00	258.00	211.00	216.00	37.00	0.00	0.00	-	158.00	256.40	257.20	257.68	199.00	216.00	235.00
	Ammoniacal Nitrogen as N	mg/L	0.03	0.3#4	0.12	0.06	0.03	0.05	0.12	0.06	0.15	0.36	0.26	9	9	0.03	0.05	0.36	0.36	0.13	0.12	0.11	1.00	1.00	1.20	0.04	0.28	0.32	0.34	0.06	0.12	0.15
	Total Hardness	mg/l	1	N.V.	224	370	285	349	260	288	329	351	339	9	9	224.00	224.00	370.00	370.00	311.00	329.00	49.00	0.00	0.00	-	252.80	354.80	362.40	366.96	285.00	329.00	349.00
	Total Cations	mmol/l	0	N.V.	6	9.94	7.89	9.75	6.82	7.21	8.22	8.64	8.46	9	9	6.00	6.00	9.94	9.94	8.10	8.22	1.30	0.00	0.00	-	6.66	9.79	9.86	9.91	7.21	8.22	8.64
	Total Anions	mmol/l	0	N.V.	5.92	9.75	7.57	9.09	7.13	7.36	7.86	8.5	8.01	9	9	5.92	5.92	9.75	9.75	7.90	7.86	1.10	0.00	0.00	-	6.89	9.22	9.49	9.64	7.36	7.86	8.50
	pH (Lab)	pH Units	0.01	N.V.	7.67	8.34	8.27	8.19	7.92	7.95	8.14	8	8.1	9	9	7.67	7.67	8.34	8.34	8.10	8.10	0.20	0.00	0.00	-	7.87	8.28	8.31	8.33	7.95	8.10	8.19
	TDS	mg/L	35	N.V.	386	586	422	513	463	468	473	566	520	9	9	386.00	386.00	586.00	586.00	489.00	473.00	65.00	0.00	0.00	-	414.80	570.00	578.00	582.80	463.00	473.00	520.00
	TSS	mg/L	10	50#19	10	10	10	10	10	10	12	10	10	9	1	10	12.00	12.00	12.00	5.80	5.00	2.30	0.00	0.00	-	5.00	6.40	9.20	10.88	5.00	5.00	5.00
Other	Oxygen	mg/L	1	Field data screened	-	-	9	-	-	-	-	-	-	1	1	9.00	9.00	9.00	9.00	9.00	9.00	-	0.00	0.00	-	9.00	9.00	9.00	9.00	9.00	9.00	9.00

Comments

Env Stds Comments

#1 WS Regs 2016 (Eng/Wal)
#2 WFD England/Wales. 2015 - AA-EQS Inland
#3 WHO DWG 2017
#4 WFD England/Wales. 2015 - Freshwater Standards
#5 SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6 USEPA RSL (tapwater) (May 2020)
#7 AECOM DWG (WHO method)
#8 PNEC (EU REACH) - Freshwater
#9 WFD England/Wales. 2015 - MAC-EQS Inland

#10 WHO Petroleum Products in Drinking Water. 2015. (WHO> C8-
#11 WHO Petroleum Products in Drinking Water. 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water. 2015. (WHO> C10 -
#13 WHO Petroleum Products in Drinking Water. 2015. (WHO> C8-C10 AL. and AR)
#14 WHO Petroleum Products in Drinking Water. 2015.(WHO> C10 -
#15 WHO Petroleum Products in Drinking Water. 2015.(WHO C16-
#16 m-bat PNEC
#17 WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge limits or environmental permits, May 2018
#19 CSJV specified threshold for compliance with the High Speed Rail (London - West Midlands) Act 2017 Schedule 33 Protective Provisions

SSAC Site Specific Assessment Criteria
(blank) No assessment criteria available
\- Not analysed

Key

XXX Exceedance of Proposed GAC

Percentiles used

Baseline Surface Water Sampling
ML023-SW201 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	Proposed GAC													Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	MAC value	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)	10th Percentile	90th Percentile	95th Percentile	98th Percentile	First Quartile	Second Quartile (median)	Third Quartile
				Location Code	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201	ML023-SW201																			
				Sampled Date Time	13/06/2019	12/07/2019	09/08/2019	26/09/2019	03/10/2019	04/11/2019	02/12/2019	08/01/2020	06/02/2020	06/03/2020	21/04/2020	21/05/2020																			
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020	10 March 2020	11 April 2020	12 May 2020																			
				Lab Report Number	19-9602-1-120820	19-11358-1-220719	19-12937-1-120820	19-15749-1-120820	19-16238-1-120820	19-18059-1-140120	19-19743-1-120820	20-245-1-110220	20-245-3-160320	20-245-6-130320	20-5458-1-140520	20-6567-1-020620	Statistical Summary																		
	GRO >C4-C8	µg/l	10	700#11	10	10	10	10	10	10	10	-	-	-	-	-	7.00	0.00	10	ND	10		ND	5.00	5.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C8-C12	µg/l	10	100#14	10	10	10	10	10	10	10	-	-	-	-	-	7.00	0.00	10	ND	10		ND	5.00	5.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Aminomethyl phosphonic acid	µg/L	0.2	0.1#1	-	-	1.4	1.4	0.76	-	-	-	-	2	0.6	0.6	6.00	5.00	0.60	0.60	2		1.40	0.96	0.88	0.37	6.00	5.00	0.60	1.40	1.40	1.40	0.64	0.88	1.30
	% Cation Excess	%		N.V.	0.35	0.47	-0.36	-2.55	-3.77	-0.24	0.83	-4.68	-1.23	-2.6	1.85	-0.74	12.00	12.00	-4.68	ND	1.85		1.85	-1.10	-0.55	2.00	0.00	0.00	-3.65	0.79	1.29	1.63	-2.56	-0.55	0.38
Field	Dissolved oxygen (%saturation)	%		80#2	78.68	66.71	54.04	72.57	65.73	70.25	84.57	87.98	109.02	86.49	139.72	106.72	12.00	12.00	54.04	54.04	139.72		139.72	85.00	81.63	24.00	6.00	6.00	65.83	108.79	122.83	132.96	69.37	81.63	92.67
	pH	pH Units		6-9#2	7.96	8.01	7.92	8.12	7.97	8.06	7.78	8.06	8.01	8.11	7.85	8.08	12.00	12.00	7.78	7.78	8.12		8.12	8.00	8.01	0.10	0.00	0.00	7.86	8.11	8.12	8.12	7.95	8.01	8.07
	Electrical Conductivity	µS/cm		N.V.	269	902.64	612.69	559.39	838.79	636.64	672.81	558	817	713.60	828	871	12.00	12.00	269.00	269.00	902.64		902.64	690.00	693.21	180.00	0.00	0.00	558.14	867.78	885.24	895.68	599.37	693.21	830.70
	Temperature	oC		20#2	13.63	17.63	18.60	15.27	11.45	11.16	5.15	8.07	5.46	6.92	13.72	19.19	12.00	12.00	5.15	5.15	19.19		19.19	12.00	12.54	5.00	0.00	0.00	5.61	18.50	18.87	19.06	7.78	12.54	15.86
	Dissolved Oxygen (Filtered)	mg/L		N.V.	7.49	6.35	5.04	7.26	8.34	7.65	10.86	10.68	10.91	10.50	13.3	10.16	12.00	12.00	5.04	5.04	13.30		13.30	9.00	9.25	2.40	0.00	0.00	6.44	10.90	11.99	12.77	7.43	9.25	10.72
	Field Redox	mV		N.V.	26	181.35	181.34	185.13	58.67	122.33	7.97	8	95	58.89	173	181	12.00	12.00	7.97	7.97	185.13		185.13	107.00	108.67	73.00	0.00	0.00	9.80	181.35	183.05	184.30	50.51	108.67	181.08
	Redox	mV		N.V.	238.86	382.82	381.98	388.59	265.3	329.2	219.72	224.64	313.91	269.21	385.57	389.98	12.00	12.00	219.72	219.72	389.98		389.98	316.00	321.56	69.00	0.00	0.00	226.06	388.29	389.22	389.67	258.69	321.56	383.51
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	10	10	10	10	10	5.00	0.00	10	ND	10		ND	5.00	5.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C4-C12	µg/L	10	100#12	10	10	10	10	10	10	10	10	10	10	10	10	12.00	0.00	10	ND	10		ND	5.00	5.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	10	10	10	10	10	5.00	0.00	10	ND	10		ND	5.00	5.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	EPH C8-C40	µg/L	10	90#15	10	10	10	10	10	10	10	10	10	10	10	10	12.00	0.00	10	ND	10		ND	5.00	5.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
BTEX	Benzene	µg/L	5	10#2	5	5	5	5	5	5	5	5	5	5	5	5	12.00	0.00	5	ND	5		ND	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Toluene	µg/L	5	74#4	5	5	5	5	5	5	5	5	5	5	5	5	12.00	0.00	5	ND	5		ND	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Ethylbenzene	µg/L	5	20#5	5	5	5	5	5	5	5	5	5	5	5	5	12.00	0.00	5	ND	5		ND	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene (m & p)	µg/L	5	Screened as total Xylene	5	5	5	5	5	5	5	5	5	5	5	5	12.00	0.00	5	ND	5		ND	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene Total	µg/L		30#5	10	10	10	10	10	10	10	-	-	-	-	-	7.00	0.00	10	ND	10		ND	5.00	5.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Xylene (o)	µg/L	5	Screened as total Xylene	5	5	5	5	5	5	5	5	5	5	5	5	12.00	0.00	5	ND	5		ND	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Total BTEX	µg/L		Screened as individual compounds	25	25	25	25	25	25	25	-	-	-	-	-	7.00	0.00	25	ND	25		ND	13.00	12.50	0.00	0.00	0.00	12.50	12.50	12.50	12.50	12.50	12.50	12.50
Oxygenates	MTBE	µg/L	5	5,100#8	5	5	5	5	5	5	5	5	5	5	5	5	12.00	0.00	5	ND	5		ND	2.50	2.50	0.00	0.00	0.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Phenolics	Total Phenols	µg/L	150	N.V.	150	150	150	150	150	150	150	150	150	150	150	150	12.00	0.00	150	ND	150		ND	75.00	75.00	0.00	0.00	0.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	2.4	2.1	0.68	-	-	-	-	2	0.8	0.4	6.00	5.00	0.40	0.40	2.40		2.40	1.20	0.90	0.82	0.00	0.00	0.54	2.25	2.33	2.37	0.71	0.90	1.83
Metals	Aluminium (Filtered)	µg/L	1.5	1000#18	20	-	20	20	20	-	20	20	10.8	37.6	8.1	5.9	10.00	4.00	5.90	5.90	37.60		37.60	12.00	10.00	9.00	0.00	0.00	7.88	13.48	25.54	32.78	10.00	10.00	10.00
	Arsenic (Filtered)	µg/L	0.9	50#4	1.5	3.1	1.9	1.6	2	1.5	1.3	1.1	1.7	1.4	1.9	2.6	12.00	12.00	1.10	1.10	3.10		3.10	1.80	1.65	0.57	0.00	0.00	1.31	2.54	2.83	2.99	1.48	1.65	1.93
	Barium (Filtered)	µg/L	1.8	114.7#8	22.3	38.3	33.3	28.6	48.7	29.7	27.2	30.8	36.3	29.4	38.6	40.2	12.00	12.00	22.30	22.30	48.70		48.70	34.00	32.05	7.10	0.00	0.00	27.34	40.04	44.03	46.83	29.20	32.05	38.38
	Beryllium (Filtered)	µg/L	0.5	12#3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	12.00	0.00	0.5	ND	0.5		ND	0.25	0.25	0.00	0.00	0.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Boron (Filtered)	µg/L	12	2,000#5	48	85	63	58	104	65	52	60	87	67	99	88	12.00	12.00	48.00	48.00	104.00		104.00	73.00	66.00	19.00	0.00	0.00	52.60	97.90	101.25	102.90	59.50	66.00	87.25
	Cadmium (Filtered)	µg/L	0.03	0.15#2	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.03	12.00	2.00	0.03	0.03	0.05		0.05	0.02	0.02	0.01	0.00	0.00	0.02	0.03	0.04	0.05	0.02	0.02	0.02
	Calcium (Filtered)	mg/L	0.2	N.V.	54.4	126	87.7	68	92.9	80.3	84.5	61.9	100.5	65.7	113.7	117.9	12.00	12.00	54.40	54.40	126.00		126.00	88.00	86.10	23.00	0.00	0.00	62.28	117.48	121.55	124.22	67.43	86.10	103.80
	Chromium (III VI) (Filtered)	µg/L	0.2	Screened as individual species	0.9	0.2	0.4	0.7	1	0.6	0.5	0.2	0.3	0.8	0.2	0.3	12.00	10.00	0.2	0.20	1.00		1.00	0.49	0.45	0.31	0.00	0.00	0.11	0.89	0.95	0.98	0.28	0.45	0.73
	Copper (Filtered)	µg/L	1	9.79 #m-bat PNEC #16	5	2	3	2	5	5	5	5	3	6	2	6	12.00	12.00	2.00	2.00	6.00		6.00	3.60	3.00	1.50	0.00	0.00	2.00	5.00	5.45	5.78	2.00	3.00	5.00
	Iron	µg/L	20	Screened as filtered	357	125	176	125	372	688	990	740	531	872	397	442	12.00	12.00	125.00	125.00	990.00		990.00	485.00	419.50	287.00	0.00	0.00	130.10	858.80	925.10	964.04	311.75	419.50	701.00
	Iron (Filtered)	µg/L	20	1000#4	73	49	63	45	72	94	116	69	69	168	116	151	12.00	12.00	45.00	45.00	168.00		168.00	90.00	72.50	39.00	0.00	0.00	50.40	147.50	158.65	164.26	67.50	72.50	116.00
	Lead (Filtered)	µg/L	0.1	4.14 #(m-bat)#16	0.6	0.2	0.8	0.5	0.3	0.4	0.4	0.2	0.2	0.4	0.1	0.2	12.00	12.00	0.10	0.10	0.80		0.80	0.36	0.35	0.20	0.00	0.00	0.20	0.59	0.69	0.76	0.20	0.35	0.43
	Magnesium (Filtered)	mg/L	0.1	N.V.	6	10.3	7	6.7	11.8	11.4	12.7	11.5	16.4	11.6	15.4	12.7	12.00	12.00	6.00	6.00	16.40		16.40	11.00	11.55	3.20	0.00	0.00	6.73	15.13	15.85	16.18	9.48	11.55	12.70
	Manganese	µg/L	2	Screened as filtered	10	12	8	16	29	28	37	33	44	27	61	28	12.00	12.00	8.00	8.00	61.00		61.00	28.00	28.00	15.00	0.00	0.00	10.20	43.30	51.65	57.26	15.00	28.00	34.00
	Manganese (Filtered)	µg/L	2	223.84 #m-bat PNEC #16	19	21	25	7	38	23	29	30	48	49	84	35	12.00	12.00	7.00	7.00	84.00		84.00	34.00	29.50	20.00	0.00	0.00	19.20	48.90	64.75	76.30	22.50	29.50	40.50
	Mercury (Filtered)	µg/L	0.01	0.07#9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12.00	0.00	0.01	ND	0.01		ND	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Nickel (Filtered)	µg/L	0.2	8.92 #m-bat PNEC ef. MAC 34	1.7	2.9	1.9	1.7	3.4	2.7	3.4	2.5	5.1	5.2	5.8	5.6	12.00	12.00	1.70	1.70	5.80	34	5.80	3.50	3.15	1.50	0.00	0.00	1.72	5.56	5.69	5.76	2.35	3.15	5.13
	Phosphorus	µg/L	5	Screened as Ortho Phosphate	260	697	426	253	203	294	217	143	214	124	220	385	12.00	12.00	124.00	124.00	697.00		697.00	286.00	236.50	156.00	0.00	0.00	149.00	421.90	547.95	637.38	211.25	236.50	316.75
	Selenium (Filtered)	µg/L	1.2	2.67#8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	12.00	0.00	1.2	ND	1.2		ND	0.60	0.60	0.00	0.00	0.00	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Vanadium (Filtered)	µg/L	0.6	20#5	2.6	2.5	2.9	3.3	3.3	1.6	1.2	1.1	1.3	1.4	1.3	2.2	12.00	12.00	1.10	1.10	3.30		3.30	2.10	1.90	0.84	0.00	0.00	1.21	3.26	3.30	3.30	1.30	1.90	2.68
	Zinc (Filtered)	µg/L	1.5	26.67 #m-bat PNEC #16 plus background 2µg/L #2)	8	6.8	7.5	6	7.5	7.5	14.8	4.8	8.2	10.2	4.7	8.5	12.00	12.00	4.70	4.70	14.80		14.80	7.90	7.50	2.70	0.00	0.00	4.92	10.03	12.27	13.79	6.60	7.50	8.28
	Potassium (Filtered)	mg/L	0.1	N.V.	4.4	7.4	6.7	5.6	7.2	5.9	6	5.2	6.1	5.2	6.6	6.4	12.00	12.00	4.40	4.40	7.40		7.40	6.10	6.05	0.87	0.00	0.00	5.20	7.15	7.29	7.36	5.50	6.05	6.63
	Chromium (hexavalent)	µg/L	6	3.4#4	6	6	6	6	6	6	6	6	6	6	6	6	12.00	0.00	6	ND	6		ND	3.00	3.00	0.00	12.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7#4 MAC 32	6	6	-	6	6	6	6	6	6	6	6	6	11.00	0.00	6	ND	6	32	ND	3.00	3.00	0.00	11.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Organics	TOC	mg/L	2	N.V.	6	2	8	5	11	9	11	7	8	13	2	3	12.00	10.00	2	3.00	13.00		13.00	6.90	7.50	3.90	0.00	0.00	1.20	11.00	11.90	12.56	4.50	7.50	9.50
Inorganics	Sodium (Filtered)	mg/L	0.1	200#1	23.2	51.1	39.5	29.2	31.1	28.3	29.7	25.7	34.2	24.5	39	37.7	12.00	12.00	23.20	23.20	51.10		51.10	33.00	30.40	8.00	0.00	0.00	24.62	39.45	44.72	48.55	27.65	30.40	38.03
	Cyanide Total	mg/L	0.01	0.001#4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12.00	0.00	0.01	ND	0.01		ND	0.01	0.01	0.00	12.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Electrical conductivity *(lab)	µS/cm	2	N.V.	378	920	607	479	650	613	568	542	771	482	694	13562	12.00	12.00	378.00	378.00	13562.00		13562.00	1689.00	610.00	3742.00	0.00	0.00	479.30	905.10	6608.90	10780.76	527.00	610.00	713.25
	Sulphate	mg/L	0.5	400#5	42.2	81.3	45	49	96.1	72.8	75.6	71.2	89	63.3	94.3	76.9	12.00	12.00	42.20	42.20	96.10		96.10	71.00	74.20	18.00	0.00	0.00	45.40	93.77	95.11	95.70	59.73	74.20	83.23
	Chloride	mg/L	0.3	250#5	30.7	77.2	58.5	39.7	57.9	40.6	45.8	40.5	53.4	37.7	61.7	64.1	12.00	12.00	30.70	30.70	77.20		77.20	51.00	49.60	14.00	0.00	0.00	37.90	63.86	70.00	74.32	40.30	49.60	59.30
	Ortho Phosphate as P	mg/L	0.03	0.081#17	0.15	0.65	0.36	0.21	0.1	0.18	0.16	0.04	0.08	0.06	0.07	-	11.00	11.00	0.04	0.04	0.65		0.65	0.19	0.15	0.18	7.00	7.00	0.06	0.36	0.51	0.59	0.08	0.15	0.20
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	3.6	2.5	3.8	4.7	14.1	6	5.4	3.7	5.1	3.6	5.5	4.1	12.00	12.00	2.50	2.50	14.10		14.10	5.20	4.40	3.00	0.00	0.00	3.60	5.95	9.64	12.32	3.68	4.40	5.43
	Alkalinity (total) as CaCO3	mg/L	1	N.V.	121	274	208	165	161	170	176	155	232	161	231	264	12.00	12.00	121.00	121.00	274.00		274.00	193.00	173.00	48.00	0.00	0.00	155.60	260.80	268.50	271.80	161.00	173.00	231.25
	Alkalinity (Carbonate as CaCO3)	mg/L	1	N.V.	1	1	1	1	1	1	1	1	1	1	1	1	12.00	0.00	1	ND	1		ND	0.50	0.50	0.00	0.00	0.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Nitrate (as N)	mg/L	0.05	11.3#1	1.88	1.6	2.04	2.84	11.88	4.19	2.98	1.22	3	1.67	2.39	2.38	12.00	12.00	1.22	1.22	11.88		11.88	3.20	2.39	2.90	1.00	1.00	1.61	4.07	7.65	10.19	1.83	2.39	2.99
	Nitrite (as N)	mg/L	0.006	0.152#1	0.041	0.06	0.11	0.031	0.07	0.057	0.014	0.04	0.036	0.015	0.044	0.103	12.00	12.00	0.01	0.01	0.11		0.11	0.05	0.04	0.03	0.00	0.00	0.02	0.10	0.11	0.11	0.03	0.04	0.06
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	N.V.	121	274	208	165	161	170	176	155	232	161	231	264	12.00	12.00	121.00	121.00	274.00		274.00	193.00	173.00	48.00	0.00	0.00	155.60	260.80	268.50	271.80	161.00	173.00	231.25
	Ammoniacal Nitrogen as N	mg/L	0.03	0.3#4	0.13	0.13	0.26	0.14	0.15	0.09	0.08	0.4	0.25	0.12	0.18	0.23	12.00	12.00	0.08	0.08	0.40		0.40	0.18	0.15	0.09	1.00	1.00	0.09	0.26	0.32	0.37	0.13	0.15	0.24
	Total Hardness	mg/l	1	N.V.	161	358	249	198	282	249	265	203	320	213	349	348	12.00	12.00	161.00	161.00	358.00		358.00	266.00	257.00	66.00	0.00	0.00	198.50	348.90	353.05	356.02	210.50	257.00	327.00
	Total Cations	mmolc/l	0	N.V.	4.33	9.55	6.84	5.36	7.14	6.33	6.71	5.29	8.01	5.43	8.81	8.73	12.00	12.00	4.33	4.33	9.55		9.55	6.90	6.78	1.60	0.00	0.00	5.30	8.80	9.14	9.39	5.41	6.78	8.19
	Total Anions	mmolc/l	0	N.V.	4.3	9.46	6.89	5.64	7.7	6.36	6.6	5.81	8.21	5.72	8.49	8.86	12.00	12.00	4.30	4.30	9.46		9.46	7.00	6.75	1.60	0.00	0.00	5.65	8.82	9.13	9.33	5.79	6.75	8.28
	pH (Lab)	pH Units	0.01	N.V.	7.37	8.22	7.39	7.86	7.93	7.97	8.08	7.8	7.87	7.97	8.2	8.1	12.00	12.00	7.37	7.37	8.22		8.22	7.90	7.95	0.27	0.00	0.00	7.43	8.19	8.21	8.22	7.85	7.95	8.09
	TDS	mg/L	35	N.V.	283	566	363	334	576	361	364	368	511	419	576	582	12.00	12.00	283.00	283.00	582.00		582.00	442.00	393.50	112.00	0.00	0.00	336.70	576.00	578.70	580.68	362.50	393.50	568.50
	TSS	mg/L	10	50#19	11	10	10	10	10	10	144	10	10	10	10	20	12.00	4.00	10	10.00	144.00		144.00	19.00	5.00	40.00	1.00	1.00	5.00	19.10	75.80	116.72	5.00	5.00	10.25

Comments

Env Stds Comments

#1 WS Regs 2016 (Eng/Wal)
#2 WFD England/Wales. 2015 - AA-EQS Inland
#3 WHO DWG 2017
#4 WFD England/Wales. 2015 - Freshwater Standards
#5 SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6 USEPA RSL (tapwater) (May 2020)
#7 AECOM DWG (WHO method)
#8 PNEC (EU REACH) - Freshwater
#9 WFD England/Wales. 2015 - MAC-EQS Inland
#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-
#11 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-
#12 WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C10 -
#14 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL and AR)
#15 WHO Petroleum Products in Drinking Water, 2015.(WHO> C10 -
#16 WHO Petroleum Products in Drinking Water, 2015 (WHO C16- m-bat PNEC
#17 WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge limits for environmental permits, May 2018
#19 CSJV specified threshold for compliance with the High Speed Rail (London - West Midlands) Act 2017 Schedule 33 Pro active Provisions

SSAC Site Specific Assessment Criteria
(blank) No assessment criteria available
- Not analysed
XXXXX May EC lab data erroneous

Key

XXX Exceedance of Proposed GAC

Percentiles used

Baseline Surface Water Sampling
ML023-SW202 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	Proposed GAC												
				Location_Code	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202	ML023-SW202
				Sampled Date Time	13/06/2019	12/07/2019	09/08/2019	26/09/2019	03/10/2019	04/11/2019	02/12/2019	08/01/2020	06/02/2020	06/0 /2020	21/04/2020	21/05/2020
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020	10 March 2020	11 Apr l 2020	12 May 2020
				Lab Report Number	19-9602-1-120820	19-11358-1-220719	19-12937-1-120820	19-15749-1-120820	19-16238-1-120820	19-18059-1-140120	19-19743-1-120820	20-245-1-110220	20-245-3-160320	20-245-6-130320	20-5458-1-140520	20-6567-1-020620
	GRO >C4-C8	µg/l	10	700#11	<10	<10	<10	<10	< 0	<10	<10	-	-	-	-	-
	GRO >C8-C12	µg/l	10	100#14	<10	<10	<10	<10	< 0	<10	<10	-	-	-	-	-
	Aminomethyl phosphonic acid	µg/L	0.2	0.1 #1	-	-	1.2	0.8	1.01	-	-	-	-	<0.2	1.2	0.7
	% Cation Excess	%		N.V.	0.76	0.6	-3.48	-1.72	-0.66	0.67	3.07	-1.56	-1.12	-3.09	2.77	0.05
Field	Dissolved oxygen (%saturation)	%		80 #2	80.16	76.04	75.29	82.05	70.48	68.43	113.49	53.37	108.85	69.49	93.17	62.74
	pH	pH_Units		6-9 #2	7.85	8.18	8.09	8.32	8.13	8.08	7.71	8.09	8	8.17	7.81	8.03
	Electrical Conductivity	µS/cm		N.V.	546	850.05	729.69	830 22	8 6.63	734.34	928.69	945	934	1102.06	909	922
	Temperature	oC		20 #2	13.3	17.77	18.74	15. 0	10.41	10.62	3.69	9.26	4.16	6.22	13.4	18.8
	Dissolved Oxygen (F ltered)	mg/L		N.V.	7.64	7.25	7.01	8.19	9 28	7.64	10.81	6.59	10.87	8.58	8.88	5.98
	Field Redox	mV		N.V.	23	178.84	182.17	183 66	54.97	115.41	10.01	10	77	48.58	171	236
	Redox	mV		N.V.	236.26	380.19	382.7	387 09	262.46	322.72	222.92	225 82	296.62	259.47	383.4	436.47
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	<10	<10	<10	<10	<10
	GRO >C4-C12	µg/L	10	100#12	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 0	<10
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	<10	<10	<10	<10	<10
	EPH C8-C40	µg/L	10	90#15	<10	<10	<10	<10	< 0	<10	<10	<10	<10	<10	<10	<10
BTEX	Benzene	µg/L	5	10 #2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Toluene	µg/L	5	74 #4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Ethylbenzene	µg/L	5	20#5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene (m & p)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene Total	µg/L		30#5	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-
	Xylene (o)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Total BTEX	µg/L		Screened as individual compounds	<25	<25	<25	<25	<25	<25	<25	-	-	-	-	-
Oxygenates	MTBE	µg/L	5	5 100#8	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Phenolics	Total Phenols	µg/L	150	N.V.	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	2.4	1	0.47	-	-	-	-	<0.2	3.3	0.6
Metals	Aluminium (Filtered)	µg/L	1.5	1000#18 (Total Aluminium)	<20	-	<20	104	<20	-	<20	<20	11.1	77.9	9.7	8.7
	Arsenic (Filtered)	µg/L	0.9	50#4	2.2	2.8	2.6	2.5	2 6	1.8	1.9	2	1.7	2.5	1.9	2.5
	Barium (Filtered)	µg/L	1.8	114.7 #8	37.9	41.4	41.6	40.4	54.5	36.2	37.6	42	38.2	38.2	42.9	46.7
	Beryllium (Filtered)	µg/L	0.5	12#3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Boron (F ltered)	µg/L	12	2 000#5	79	79	88	146	119	77	71	80	79	61	104	95
	Cadmium (Filtered)	µg/L	0.03	0.25#2	<0.03	<0.03	<0.03	0.03	0 05	<0.03	<0.03	<0.03	<0.03	0.04	<0 03	<0.03
	Calcium (F ltered)	mg/L	0.2	N.V.	88.1	128	90.8	86	103.1	98.5	127.1	120	116.6	88.4	123.6	122.6
	Chromium (III VI) (Filtered)	µg/L	0.2	Screened as individual species	0.7	<0.2	0.4	0.7	1.3	0.5	0.4	<0.2	0.3	1.9	<0 2	0.2
	Copper (F ltered)	µg/L	1	9.28 #m-bat PNEC#16	4	<1	3	4	3	4	3	3	3	11	2	2
	Iron	µg/L	20	Screened as filtered	876	1935	629	809	327	613	258	974	1034	937	398	327
	Iron (F ltered)	µg/L	20	1000#4	29	<20	25	40	31	73	84	110	98	140	<20	<20
	Lead (F ltered)	µg/L	0.1	4.14 #(m-bat)#16	0.3	0.1	0.1	0.4	0.3	0.2	0.2	0.2	0.1	0.5	0.1	0.1
	Magnesium (F ltered)	mg/L	0.1	N.V.	12	11.8	10.6	12.3	16.1	13.6	19	19.4	19.4	12.3	21	15.5
	Manganese	µg/L	2	Screened as filtered	23	64	15	18	12	17	14	75	76	20	16	10
	Manganese (Filtered)	µg/L	2	207.16 #m-bat PNEC# 6	11	37	11	6	11	11	19	77	62	79	17	19
	Mercury (Filtered)	µg/L	0.01	0.07#9	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0 01	<0.01
	Nickel (Filtered)	µg/L	0.2	8.54 #m-bat PNEC#16 MAC 34	2	1.4	1.8	2.2	2 8	2.7	2.7	3.3	3.1	4.8	1.8	1.6
	Phosphorus	µg/L	5	Screened as Ortho Phosphate	285	444	339	265	81	218	172	246	224	92	195	182
	Selenium (Filtered)	µg/L	1.2	2.6#8	<1.2	<1.2	<1.2	<1.2	1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1 2	<1.2
	Vanadium (Filtered)	µg/L	0.6	20#5	2.6	4	3.6	3.8	3 2	1.9	1.6	2	1.5	3.3	2.5	4
	Zinc (F ltered)	µg/L	1.5	26.68 #m-bat PNEC#16 incl. background 2µg/L#2)	10.3	4.3	7.8	15.4	9.7	8.9	8.3	7.6	7.2	7.8	4.2	4.1
	Potassium (F ltered)	mg/L	0.1	N.V.	6.3	4.1	5.7	6.2	6	6.6	6	6.2	6.3	10.9	6.1	2.6
	Chromium (hexavalent)	µg/L	6	3.4#4	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7#4 MAC 32	<6	<6	-	<6	<6	<6	<6	<6	<6	<6	<6	<6
Organics	TOC	mg/L	2	N.V.	8	<2	9	6	7	10	9	8	10	17	3	3
Inorganics	Sodium (Filtered)	mg/L	0.1	200#1	39.1	41.4	41.7	38.8	37.2	31	42.5	38.9	38.7	56.4	44.7	41.4
	Cyanide Total	mg/L	0.01	0.001#4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0 01	<0.01
	Electrical conductivity * (lab)	µS/cm	2	N.V.	631	888	718	678	7 6	723	826	887	898	771	7 6	524
	Sulphate	mg/L	0.5	400#5	89.6	81.4	77.9	92.6	109.1	99.5	123.7	126	119.1	93.9	135.4	98
	Chloride	mg/L	0.3	250#5	55.7	63.6	62.7	53.6	53.6	42	62.5	63.7	59.6	94.1	65.4	68.4
	Ortho Phosphate as P	mg/L	0.03	0.085 #17	0.17	0.27	0.23	0.18	0.11	0.12	0.16	0.09	0.08	<0.03	0.1	-
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	8.8	2.5	4.2	5.3	5 8	4	6.2	5	4.8	4	7.5	3.2
	A kalinity (total) as CaCO3	mg/L	1	N.V.	164	277	217	185	213	202	239	256	255	198	224	258
	A kalinity (Carbonate as CaCO3)	mg/L	1	N.V.	<1	42	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Nitrate (as N)	mg/L	0.05	11.3#1	5.94	1.66	2.29	3.66	4 27	2.17	2.86	2.84	2.88	1.56	4.50	1.7
	Nitrite (as N)	mg/L	0.006	0.152 #1	0.146	0.026	0.018	<0.006	<0.006	<0.006	<0.006	0.044	0.018	0.055	0.016	0.025
	A kalinity (Bicarbonate as CaCO3)	mg/L	1	N.V.	164	295	217	185	213	202	239	256	255	198	224	258
	Ammoniacal Nitrogen as N	mg/L	0.03	0. #4	0.09	0.12	0.06	0.04	0.05	0.03	0.06	0.09	0.09	0.16	0.07	0.09
	Total Hardness	mg/l	1	N.V.	271	370	272	267	325	303	398	381	373	273	397	372
	Total Cations	mmolc/l	0	N.V.	7.25	9.26	7.36	7.15	8 24	7.55	9.91	9.44	9.26	8.16	10	9.26
	Total Anions	mmolc/l	0	N.V.	7.14	9.15	7.89	7.4	8.35	7.45	9.32	9.74	9.47	8.68	9.46	9.25
	pH (Lab)	pH Units	0.01	N.V.	7.64	8.29	7.69	8.08	8.13	8.02	8.22	7.79	7.9	7.98	8.1	8.13
	TDS	mg/L	35	N.V.	487	518	447	469	547	488	509	604	612	478	662	641
	TSS	mg/L	10	50#19	26	60	20	19	11	<10	<10	27	24	22	<10	16

Statistical Summary

ChemName	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guide ine Exceedances	Number of Guide ine Exceedances (Detects Only)	GAC Magnitude of Exceedance	10th Percent le	90th Percent le	95th Percentile	98th Percentile	First Quartile	Second Quartile (median)	Third Quartile
GRO >C4-C8	7.00	0 00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C12	7.00	0 00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Aminomethyl phosphonic acid	6.00	5 00	<0.2	0.70	1.20	1.20	0.84	0.91	0.41	6.00	5.00	12.00	0.40	1.20	1.20	1.20	0.73	0.91	1.15
% Cation Excess	12.00	12.00	-3.48	ND	3.07	3.07	-0.31	-0.31	2.00	0.00	0.00	-	-2.95	2.57	2.91	3.00	-1.60	-0.31	0.69
Dissolved oxygen (%saturation)	12.00	12.00	53.37	53.37	113.49	113.49	79.00	75.66	18.00	5.00	5.00	1.42	63.31	107.28	110.94	112.47	69.22	75.66	84.83
pH	12.00	12.00	7.71	7.71	8.32	8.32	8.00	8.08	0.17	0.00	0.00	-	7.81	8.18	8.24	8.29	7.96	8.08	8.14
Electrical Conductivity	12.00	12.00	546.00	546.00	1102.06	1102.06	856.00	879.53	140.00	0.00	0.00	-	730.16	943.90	1015.67	067.50	806.25	879.53	930.02
Temperature	12.00	12.00	3.69	3.69	18.80	18.80	12.00	11.96	5.40	0.00	0.00	-	4.37	18.64	18.76	8.79	8.50	11.96	15.92
Dissolved Oxygen (F ltered)	12.00	12.00	5.98	5.98	10.87	10.87	8.20	7.92	1.50	0.00	0.00	-	6.63	10.65	10.84	0.86	7.19	7.92	8.98
Field Redox	12.00	12.00	10.00	10.00	236.00	236.00	108.00	96.20	80.00	0.00	0.00	-	11.31	183.51	207.21	224.49	42.19	96.20	179.67
Redox	12.00	12.00	222.92	222.92	436.47	436.47	316.00	309.67	75.00	0.00	0.00	-	226.86	386.72	409.31	425.61	253.67	309.67	382.88
GRO >C4-C10	5.00	0 00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5 00	5.00	5.00
GRO >C4-C12	12.00	0 00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C10	5.00	0 00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5 00	5.00	5.00
EPH C8-C40	12.00	0 00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5 00	5.00	5.00
Benzene	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Toluene	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Ethylbenzene	12.00	0 00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene (m & p)	12.00	0 00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene Total	7.00	0 00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Xylene (o)	12.00	0 00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total BTEX	7.00	0 00	<25	ND	<25	ND	13.00	12.50	0.00	0.00	0.00	-	12.50	12.50	12.50	12.50	12.50	12.50	12.50
MTBE	12.00	0 00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total Phenols	12.00	0 00	<150	ND	<150	ND	75.00	75.00	0.00	0.00	0.00	-	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Glyphosate	6.00	5 00	<0.2	0.47	3.30	3.30	1.30	0.80	1.30	0.00	0.00	-	0.29	2.85	3.08	3.21	0.50	0.80	2.05
Aluminium (Filtered)	0.00	5 00	8.70	8.70	104.00	104.00	26.00	10.00	35.00	7.00	2.00	0.10	9.60	80.51	92.26	99.30	10.00	10.00	10.83
Arsenic (Filtered)	12.00	12.00	1.70	1.70	2.80	2.80	2.30	2.35	0.38	0.00	0.00	-	1.81	2.60	2.69	2.76	1.90	2.35	2.53
Barium (Filtered)	12.00	12.00	36.20	36.20	54.50	54.50	41.00	40.90	5.00	0.00	0.00	-	37.63	46.32	50.21	52.78	38.13	40.90	42.23
Beryllium (Filtered)	12.00	0 00	<0.5	ND	<0.5	ND	0.25	0.25	0.00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Boron (F ltered)	12.00	12.00	61.00	61.00	146.00	146.00	90.00	79.50	23.00	0.00	0.00	-	71.60	117.50	131.15	140.06	78.50	79.50	97.25
Cadmium (Filtered)	12.00	3.00	<0.03	0.03	0.05	0.05	0.02	0.02	0.01	0.00	0.00	-	0.02	0.04	0.04	0.05	0 02	0.02	0.02
Calcium (F ltered)	12.00	12.00	86.00	86.00	128.00	128.00	108.00	109.85	17.00	0.00	0.00	-	88.13	126.75	127.51	127.80	90.20	109.85	122.85
Chromium (III VI) (Filtered)	12.00	9 00	<0.2	0.20	1.90	1.90	0.56	0.40	0.55	0.00	0.00	-	0.10	1.24	1.57	1.77	0.18	0.40	0.70
Copper (F ltered)	12.00	11.00	<1	2.00	11.00	11.00	3.50	3.00	2.60	1.00	1.00	1.19	2.00	4.00	7.15	9.46	2.75	3.00	4.00
Iron	12.00	12.00	258.00	258.00	1935.00	1935.00	760.00	719.00	462.00	0.00	0.00	-	327.00	1028.00	1439.45	1736.78	380.25	719.00	946.25
Iron (F ltered)	12.00	9 00	<20	25.00	140.00	140.00	55.00	35.50	44.00	0.00	0.00	-	10.00	108.80	123.50	133.40	21.25	35.50	87.50
Lead (F ltered)	12.00	12.00	0.10	0.10	0.50	0.50	0.22	0.20	0.13	0.00	0.00	-	0.10	0.39	0.45	0.48	0.10	0.20	0.30
Magnesium (F ltered)	12.00	12.00	10.60	10.60	21.00	21.00	15.00	14.55	3.70	0.00	0.00	-	11.82	19.40	20.12	20.65	12.23	14.55	19.10
Manganese	12.00	12.00	10.00	10.00	76.00	76.00	30.00	17.50	26.00	0.00	0.00	-	12.20	73.90	75.45	75.78	14.75	17.50	33.25
Manganese (Filtered)	12.00	12.00	6.00	6.00	79.00	79.00	30.00	18.00	27.00	0.00	0.00	-	11.00	75.50	77.90	78.56	11.00	18.00	43.25
Mercury (Filtered)	12.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0.01	0 01	0.01	0.01
Nickel (Filtered)	12.00	12.00	1.40	1.40	4.80	4.80	2.50	2.45	0.94	0.00	0.00	-	1.62	3.28	3.98	4.47	1 80	2.45	2.88
Phosphorus	12.00	12.00	92.00	92.00	444.00	444.00	237.00	221.00	91.00	0.00	0.00	-	172.90	333.60	386.25	420.90	181.75	221.00	270.00
Selenium (Filtered)	12.00	1.00	<1.2	1.60	1.60	1.60	0.68	0.60	0.29	0.00	0.00	-	0.60	0.60	1.05	1.38	0 60	0.60	0.60
Vanadium (Filtered)	12.00	12.00	1.50	1.50	4.00	4.00	2.80	2.90	0.94	0.00	0.00	-	1.63	3.98	4.00	4.00	1.98	2.90	3.65
Zinc (F ltered)	12.00	12.00	4.10	4.10	15.40	15.40	8.00	7.80	3.10	0.00	0.00	-	4.21	10.24	12.60	14.28	6.48	7.80	9.10
Potassium (F ltered)	12.00	12.00	2.60	2.60	10.90	10.90	6.10	6.15	1.90	0.00	0.00	-	4.26	6.57	8.54	9.95	5.93	6.15	6.30
Chromium (hexavalent)	12.00	0 00	<6	ND	<6	ND	3.00	3.00	0.00	12.00	0.00	-	3.00	3.00	3.00	3.00	3 00	3.00	3.00
Chromium (Trivalent) (Filtered)	11.00	0.00	<6	ND	<6	ND	3.00	3.00	0.00	11.00	0.00	-	3.00	3.00	3.00	3.00	3 00	3.00	3.00
TOC	12.00	11.00	<2	3.00	17.00	17.00	7.60	8.00	4.20	0.00	0.00	-	3.00	10.00	13.15	15.46	5 25	8.00	9.25
Sodium (Filtered)	12.00	12.00	31.00	31.00	56.40	56.40	41.00	40.25	5.90	0.00	0.00	-	37.35	44.48	49.97	53.83	8.78	40.25	41.90
Cyanide Total	12.00	1.00	<0.01	0.01	0.01	0.01	0.01	0.01	0.00	12.00	1.00	10.00	0.01	0.01	0.01	0.01	0 01	0.01	0.01
Electrical conductivity * (lab)	12.00	12.00	524.00	524.00	898.00	898.00	748.00	720.50	113.00	0.00	0.00	-	635.70	887.90	892.50	895.80	706.50	720.50	841.25
Sulphate	12.00	12.00	77.90	77.90	135.40	135.40	104.00	98.75	19.00	0.00	0.00	-	82.22	125.77	130.23	133.33	91.85	98.75	120.25
Chloride	12.00	12.00	42.00	42.00	94.10	94.10	62.00	62.60	12.00	0.00	0.00	-	53.60	68.10	79.97	88.45	55.18	62.60	64.13
Ortho Phosphate as P	11.00	10.00	<0.03	0.08	0.27	0.27	0.14	0.12	0.07	9.00	9.00	3.18	0.08	0.23	0.25	0.26	0.10	0.12	0.18
Nitrogen (Total)	12.00	12.00	2.50	2.50	8.80	8.80	5.10	4.90	1.80	0.00	0.00	-	3.28	7.37	8.09	8.51	4.00	4.90	5.90
A kalinity (total) as CaCO3	12.00	12.00	164.00	164.00	277.00	277.00	224.00	220.50	34.00	0.00	0.00	-	186.30	257.80	266.55	272.82	201.00	220.50	255.25
A kalinity (Carbonate as CaCO3)	12.00	1 00	<1	42.00	42.00	42.00	4.00	0.50	12.00	0.00	0.00	-	0.50	0.50	19.18	32.87	0.50	0.50	0.50
Nitrate (as N)	12.00	12.00	1.56	1.56	5.94	5.94	3.00	2.85	1.30	0.00	0.00	-	1.66	4.47	5.15	5.62	2 05	2.85	3.81
Nitrite (as N)	12.00	8 00	<0.006	0.02	0.15	0.15	0.03	0.02	0.04	0.00	0.00	-	0.00	0.05	0.10	0.13	0.00	0.02	0.03
A kalinity (Bicarbonate as CaCO3)	12.00	12.00	164.00	164.00	258.00	258.00	221.00	220.50	30.00	0.00	0.00	-	186.30	255.90	256.90	257.56	201.00	220.50	243.00
Ammoniacal Nitrogen as N	12.00	12.00	0.03	0.03	0.16	0.16	0.08	0.08	0.04	0.00	0.00	-	0.04	0.12	0.14	0.15	0 06	0.08	0.09
Total Hardness	12.00	12.00	267.00	267.00	398.00	398.00	334.00	347.50	54.00	0.00	0.00	-	271.10	395.40	397.45	397.78	272.75	347.50	375.00
Total Cations	12.00	12.00	7.15	7.15	10.00	10.00	8.60	8.75	1.10	0.00	0.00	-	7.26	9.86	9.95	9.98	7.50	8.75	9.31
Total Anions	12.00	12.00	7.14	7.14	9.74	9.74	8.60	8.92	0.93	0.00	0.00	-	7.41	9.47	9.59	9.68	7.78	8.92	9.36
pH (Lab)	12.00	12.00	7.64	7.64	8.29	8.29	8.00	8.05	0.21	0.00	0.00	-	7.70	8.21	8.25	8.27	7 87	8.05	8.13
TDS	12.00	12.00	447.00	447.00	662.00	662.00	539.00	513.50	73.00	0.00	0.00	-	469.90	638.10	650.45	657.38	484.75	513.50	606.00
TSS	12.00	9 00	<10	11.00	60.00	60.00	20.00	19.50	15.00	1.00	1.00	1.20	5.00	26.90	41.85	52.74	9.50	19.50	24.50

Comments

#1:WS Regs 2016 (Eng/Wal)
#2:WFD England/Wales. 2015 - AA-EQS Inland
#3:WHO DWG 2017
#4:WFD England/Wales. 2015 - Freshwater Standards
#5:SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6:USEPA RSL (tapwater) [May 2020]
#7:AECOM DWG (WHO method)
#8:PNEC (EU REACH) - Freshwater
#9:WFD England/Wales. 2015 - MAC-EQS Inland

#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water. 2015. (WHO> C10 -C12 AR.)
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR.)
#14 WHO Petroleum Products in Drinking Water. 2015.(WHO> C10 -C12 AR.)
#15 WHO Petroleum Products in Drinking Water, 2015.(WHO C16-C35 AR.)
#16 m-bat PNEC
#17 WFD River Phosphorus Ca culator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Gu dance Water companies: water treatment works discharge imits for environmental permits, May 2018
#19 CSJV spec fied threshold for compliance with the High Speed Rail (London - West Midlands) Act 2017 Schedule 33 Protective Provis ons

SSAC: Site Specific Assessment Criteria
(blank): No assessment criteria available
- : Not analysed
XXXXX: May EC lab data erroneous

Key

XXX Exceedance of Proposed GAC
Percent les used

Baseline Surface Water Sampling
ML023-SW203 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	P oposed GAC	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203	ML023-SW203
				Sampled Date Time	13/06/2019	12/07/2019	09/08/2019	26/09/2019	03/10/2019	04/11/2019	03/12/2019	08/01/2020	06/02/2020	06/03/2020	21/04/2020	21/05/2020
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 Septembe 2019	5 Octobe 2019	6 Novembe 2019	7 Decembe 2019	8 Janua y 2020	9 Feb ua y 2020	10 Ma ch 2020	11 Ap l 2020	12 May 2020
				Lab Report Number	19-9602-1-120820	19-11358-1-220719	19-12937-1-120820	19-15749-1-120820	19-16238-1-120820	19-18059-1-140120	19-19821-1-120820	20-245-1-110220	20-245-3-160320	20-245-6-130320	20-5458-1-140520	20-6567-1-020620
	GRO >C4-C8	µg/l	10	P oposed GAC E42	10	10	10	10	10	10	10	-	-	-	-	-
	GRO >C8-C12	µg/l	10	100#14	10	10	10	10	10	10	10	-	-	-	-	-
	Am nomethyl phosphon c ac d	µg/L	0.2	0.1 #1	-	-	1.2	0 8	0 83	-	-	-	-	20	1 2	2
	% Cat on Excess	%		N.V.	-0.27	0.71	2.7	-4.43	-7.61	1.85	1.08	-3.12	-1.58	-2.08	1.95	-0.83
F eld	D ssolved oxygen (%satu at on)	%		80#2	71.17	72.64	45.36	65.56	60.32	58.54	105.34	67.06	109.06	64.03	99.33	69.44
	pH	pH Un ts		6-9#2	7.84	7.87	7.77	7 96	7 96	8 04	7.77	7.87	8.08	8.66	8 04	7 75
	Elect cal Conduct v ty	µS/cm		N.V.	564	848.39	733.31	849.94	845.30	741.49	932.71	981	1001	1169.50	937	943
	Tempe atu e	oC		20#2	13.54	17.01	18.26	15.03	10.85	10.80	5.64	9.44	5.66	6.56	18.16	20.01
	D ssolved Oxygen (F lte ed)	mg/L		N.V.	6.75	6.89	4.26	6 61	7 56	6 46	10.01	8.21	11	7.84	9 42	6 58
	F eld Redox	mV		N.V.	28	182.26	187.52	177.06	52.21	113.45	18.38	18	98	48.50	177	158
	Redox	mV		N.V.	240.39	384.25	388.46	380.71	259.33	320.61	229.73	234.05	316.47	259 11	386.55	357.44
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	10	10	10	10	10
	GRO >C4-C12	µg/L	10	100#12	10	10	10	10	10	10	10	10	10	10	10	10
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	10	10	10	10	10
	EPH C8-C40	µg/L	10	90#15	10	10	10	10	10	10	10	10	10	10	10	10
BTEX	Benzene	µg/L	5	10#2	5	5	5	5	5	5	5	5	5	5	5	5
	Toluene	µg/L	5	74#4	5	5	5	5	5	5	5	5	5	5	5	5
	Ethylbenzene	µg/L	5	20#5	5	5	5	5	5	5	5	5	5	5	5	5
	Xylene (m & p)	µg/L	5	Sc eened as total Xylene	5	5	5	5	5	5	5	5	5	5	5	5
	Xylene Total	µg/L		30#5	10	10	10	10	10	10	10	-	-	-	-	-
	Xylene (o)	µg/L	5	Sc eened as total Xylene	5	5	5	5	5	5	5	5	5	5	5	5
	Total BTEX	µg/L		Sc eened as nd v dual compounds	25	25	25	25	25	25	25	-	-	-	-	-
Oxygenates	MTBE	µg/L	5	5,100#8	5	5	5	5	5	5	5	5	5	5	5	5
Phenol cs	Total Phenols	µg/L	150	N.V.	150	150	150	150	150	150	150	150	150	150	150	150
He b c des	Glyphosate	µg/L	0.2	196#4	-	-	3.1	0 9	0 43	-	-	-	-	20	4 1	2
Metals	Alum n um (F lte ed)	µg/L	1.5	1000#18 (Total Alum n um)	20	-	20	20	20	-	20	20	9.9	132 3	32.7	6 3
	A sen c (F lte ed)	µg/L	0.9	50#4	2.2	3	2.5	2 2	2 6	1 7	2	2.1	1.9	3.6	2 3	2 5
	Ba um F te ed)	µg/L	1.8	114.7#8	40.5	39.1	39.9	36.8	52.1	35.3	39.7	40.3	39.9	37.4	43.4	47.6
	Be yll um (F lte ed)	µg/L	0.5	12#3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Bo on (F lte ed)	µg/L	12	2,000#5	79	77	86	83	117	75	88	85	85	74	113	92
	Cadm um (F lte ed)	µg/L	0.03	0.25#2	0.03	0.03	0.03	0 04	0 06	0.03	0.03	0.03	0.03	0.05	0.03	0.03
	Calc um (F te ed)	mg/L	0.2	N.V.	89.2	127.6	103	80.3	93.8	96.8	127.2	124.2	125	108 3	126.9	128.4
	Ch om um (III VI) (F lte ed)	µg/L	0.2	Sc eened as nd v dual spec es	0.9	0.2	0.3	0 6	0 6	0 4	0.4	0.2	0.4	2	0 2	0 3
	Coppe (F lte ed)	µg/L	1	10.17#m-bat PNEC#16	4	1	3	4	4	4	2	3	3	10	3	2
	I on	µg/L	20	Sc eened as f lte ed	1144	341	351	324	329	1309	583	1204	857	1121	908	9478
	I on (F te ed)	µg/L	20	1000#4	34	22	26	25	29	91	54	56	57	178	20	22
	Lead (F lte ed)	µg/L	0.1	4.14#(m-bat)#16	0.3	0.1	0.1	0 3	0 2	0 3	0.1	0.2	0.1	2.2	0 2	0 3
	Magnes um (F lte ed)	mg/L	0.1	N.V.	12.3	11.2	11.5	11.3	14.5	13.6	18.4	20.3	21.3	14.6	21.4	15.2
	Manganese	µg/L	2	Sc eened as f lte ed	37	32	7	7	9	46	38	79	82	31	48	518
	Manganese (F lte ed)	µg/L	2	237.23#m-bat PNEC#16	21	28	10	3	4	15	26	62	63	74	35	49
	Me cu y (F lte ed)	µg/L	0.01	0.07#9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	N ckel (F lte ed)	µg/L	0.2	9.20#m-bat PNEC#16 MAC 34	2.1	1.2	1.7	2	2 7	2 7	2.6	3.1	2.9	4.6	1 8	1 6
	Phospho us	µg/L	5	Sc eened as O tho Phosphate	286	410	311	245	193	268	262	302	251	110	243	700
	Selen um (F te ed)	µg/L	1.2	2.67#8	1.2	1.2	1.2	1.2	1 6	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Vanad um (F lte ed)	µg/L	0.6	20#5	2.8	3.4	3	3 5	3 1	1 9	1.7	2.3	1.9	5.4	3 5	4 9
	Z nc (F te ed)	µg/L	1.5	26.62#m-bat PNEC#16 ncl. backg ound 2µg/L #2)	13.2	4.8	11.3	13.4	12.1	10.4	9.3	7.5	7.1	10.9	4 5	7 1
	Potass um (F lte ed)	mg/L	0.1	N.V.	6.3	3.9	5.5	6	5 1	6 3	5.9	6.4	6.6	10.5	6 1	1 7
	Ch om um (hexavalent)	µg/L	6	3.4#4	6	6	6	6	6	6	6	6	6	6	6	6
	Ch om um (T valent) (F lte ed)	µg/L	6	4.7#4 MAC 32	6	6	-	6	6	6	6	6	6	6	6	6
O gan cs	TOC	mg/L	2	N.V.	7	2	9	6	7	10	9	5	7	19	2	2
Ino gan cs	Sod um (F lte ed)	mg/L	0.1	200#1	41.9	41.9	45.2	34.2	31	30.2	40.8	40.5	41.4	53.1	45.2	42.2
	Cyan de Total	mg/L	0.01	0.001#4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Elect cal conduct v ty *(lab)	µS/cm	2	N.V.	654	881	706	630	741	732	875	961	817	806	751	9110
	Sulphate	mg/L	0.5	400#5	101.3	79	73.9	96.2	117.2	101.5	137.2	132.3	132.3	118 4	143.7	99.8
	Chlo de	mg/L	0.3	250#5	58.6	63.9	62.3	47.8	54.4	41.6	60.1	65.9	62.6	82.5	65.9	67.3
	O tho Phosphate as P	mg/L	0.03	0.085#17	0.17	0.34	0.22	0 19	0 13	0 12	0.15	0.17	0.15	0.07	0 11	-
	N t ogen (Total)	mg/L	0.5	Sc eened as nd v dual spec es	8.5	3.2	4.3	5 1	5 6	4 2	6.6	5.2	5	4.4	7 4	4 8
	Alkal n ty (tota) as CaCO3	mg/L	1	N.V.	165	273	213	180	214	185	239	279	276	232	233	281
	Alkal n ty (Ca bonate as CaCO3)	mg/L	1	N.V.	1	1	1	1	1	1	1	1	1	17	1	1
	N t ate (as N)	mg/L	0.05	11.3#1	6.01	2.46	2.8	3 42	4 22	2 26	3.54	3.13	3.42	1.92	4 45	1 51
	N t te (as N)	mg/L	0.006	0.152#1	0.171	0.006	0.013	0.006	0.006	0.006	0.006	0.027	0.019	0.048	0.006	0.006
	Alkal n ty (B ca bonate as CaCO3)	mg/L	1	N.V.	165	273	213	180	214	185	239	279	276	215	233	281
	Ammon acal N t ogen as N	mg/L	0.03	0.3#4	0.14	0.04	0.05	0 04	0 05	0 05	0.08	0.12	0.09	0.13	0 06	0 08
	Total Ha dness	mg/l	1	N.V.	275	366	306	248	295	299	395	396	402	332	407	385
	Total Cat ons	mmolc/l	0	N.V.	7.45	9.21	8.19	6 58	7 35	7 42	9.79	9.79	9.96	9.18	10.22	9 54
	Total An ons	mmolc/l	0	N.V.	7.49	9.08	7.76	7 19	8 56	7 15	9.58	10.42	10.28	9.57	9 83	9 7
	pH (Lab)	pH_Un ts	0.01	N.V.	7.53	8.14	7.38	7 84	8 01	7 91	8.09	7.95	8.07	8.4	8 18	7 98
	TDS	mg/L	35	N.V.	589	526	438	437	545	441	624	634	641	694	634	616
	TSS	mg/L	10	50#19	23	12	11	10	10	28	12	16	18	14	25	284

Stat stical Summary

ChemName	Numbe of Results	Numbe of Detects	M n mum Concent at on	M n mum Detect	Max mum Concent at on	Max mum (Exceedance of MAC H ghl ghted) Detect	Ave age (Exceedance of GAC H ghl ghted)	Med an Concent at on	Standa d Dev at on	Numbe of Gu del ne Exceedances	Numbe of Gu del ne Exceedances Detects Only)	GAC Magn tu e of Exceedance	10th Pe cent le	90th Pe cent le	95th Pe cent le	98th Pe cent le	F st Qua t le	Second Qua t le (med an)	Th d Qua t le
GRO >C4-C8	7 00	0 00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C12	7 00	0 00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Am nomethyl phosphon c ac d	6 00	4 00	0.80	0.80	20	1.20	2.50	1.10	3.70	6 00	4.00	12.00	0.82	5.60	7.80	9 12	0.87	1.10	1.20
% Cat on Excess	12.00	12.00	-7.61	ND	2.70	2.70	-0.97	-0.55	3.00	0.00	0.00	-	-4.30	1.94	2.29	2.54	-2.34	-0.55	1.27
D ssolved oxygen (%satu at on)	12.00	12.00	45.36	45 36	109.06	109.06	74 00	68.25	20.00	3 00	3.00	1.36	58.72	104.74	107.01	108.24	63.10	68 25	79.31
pH	12.00	12.00	7.75	7.75	8.66	8.66	8.00	7.92	0.25	0 00	0.00	-	7.77	8.08	8.34	8 54	7.82	7.92	8.04
Elect cal Conduct v ty	12.00	12.00	564.00	564.00	1169.50	1169.50	879.00	891.32	154.00	0 00	0.00	-	734.13	999.00	1076.83	1132 43	819.35	891.32	952.50
Tempe atu e	12.00	12.00	5.64	5.64	20 01	20 01	13 00	12.20	5.20	1 00	1.00	1.00	5.75	18.25	19.05	19.62	8.72	12 20	17.30
D ssolved Oxygen (F lte ed)	12.00	12.00	4.26	4.26	11 00	11 00	7.60	7.22	1.80	0 00	0.00	-	6.48	9.95	10.46	10.78	6.61	7.22	8.51
F eld Redox	12.00	12.00	18.00	18 00	187.52	187.52	105.00	105.72	69.00	0 00	0.00	-	19.34	181.74	184.63	186.37	43.38	105.72	177.01
Redox	12.00	12.00	229.73	229.73	388.46	388.46	313.00	318.54	65.00	0 00	0.00	-	294.68	386.32	387.41	388.04	254.43	318.54	381.60
GRO >C4-C10	5 00	0 00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5 00	5.00	5.00	5.00
GRO >C4-C12	12.00	0 00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5 00	5.00	5.00	5.00
GRO >C8-C10	5 00	0 00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5 00	5.00	5.00	5.00
EPH C8-C40	12.00	0 00	10	ND	10	ND	5.00	5.00	0.00	0 00	0.00	-	5.00	5.00	5.00	5 00	5.00	5.00	5.00
Benzene	12.00	0 00	5	ND	5	ND	2.50	2.50	0.00	0 00	0.00	-	2.50	2.50	2.50	2 50	2.50	2.50	2.50
Toluene	12.00	0 00	5	ND	5	ND	2.50	2.50	0.00	0 00	0.00	-	2.50	2.50	2.50	2 50	2.50	2.50	2.50
Ethylbenzene	12.00	0 00	5	ND	5	ND	2.50	2.50	0.00	0 00	0.00	-	2.50	2.50	2.50	2 50	2.50	2.50	2.50
Xylene (m & p)	12.00	0 00	5	ND	5	ND	2.50	2.50	0.00	0 00	0.00	-	2.50	2.50	2.50	2 50	2.50	2.50	2.50
Xylene Total	7 00	0 00	10	ND	10	ND	5.00	5.00	0.00	0 00	0.00	-	5.00	5.00	5.00	5 00	5.00	5.00	5.00
Xylene (o)	12.00	0 00	5	ND	5	ND	2.50	2.50	0.00	0 00	0.00	-	2.50	2.50	2.50	2 50	2.50	2.50	2.50
Total BTEX	7 00	0 00	25	ND	25	ND	13 00	12.50	0.00	0 00	0.00	-	12.50	12.50	12.50	12.50	12.50	12 50	12.50
MTBE	12.00	0 00	5	ND	5	ND	2.50	2.50	0.00	0 00	0.00	-	2.50	2.50	2.50	2 50	2.50	2.50	2.50
Total Phenols	12.00	0 00	150	ND	150	ND	75 00	75.00	0.00	0 00	0.00	-	75.00	75.00	75.00	75.00	75.00	75 00	75.00
Glyphosate	6 00	4 00	0.43	0.43	20	4.10	3.30	2.05	3.60	0 00	0.00	-	0.67	7.05	8.53	9 41	0.93	2.05	3.85
Alum n um (F lte ed)	10.00	4 00	6.30	6.30	132.30	132.30	24 00	10.00	39.00	0 00	0.00	-	9.54	42.66	87.48	114.37	10.00	10 00	10.00
A sen c (F lte ed)	12.00	12.00	1.70	1.70	3.60	3.60	2.40	2.25	0.52	0 00	0.00	-	1.91	2.96	3.27	3 47	2.08	2.25	2.53
Ba um F te ed)	12.00	12.00	35.30	35 30	52 10	52 10	41 00	39.90	4.70	0 00	0.00	-	36.86	47.18	49.63	51.11	38.68	39 90	41.23
Be yll um (F lte ed)	12.00	0 00	0.5	ND	0 5	ND	0.25	0.25	0.00	0 00	0.00	-	0.25	0.25	0.25	0 25	0.25	0.25	0.25
Bo on (F lte ed)	12.00	12.00	74.00	74 00	117.00	117.00	88 00	85.00	14.00	0 00	0.00	-	75.20	110.90	114.80	116.12	78.50	85 00	89.00
Cadm um (F lte ed)	12.00	3 00	0.03	0.04	0.06	0.06	0.02	0.02	0.02	0 00	0.00	-	0.02	0.05	0.05	0.06	0.02	0.02	0.02
Calc um (F te ed)	12.00	12.00	80.30	80 30	128.40	128.40	111.00	116.25	18.00	0 00	0.00	-	89.66	127.56	127.96	128.22	96.05	116.25	126.98
Ch om um (III VI) (F lte ed)	12.00	11.00	0.2	0.20	2.00	2.00	0.53	0.40	0.51	0 00	0.00	-	0.20	0.87	1.40	1 76	0.28	0.40	0.60
Coppe (F lte ed)	12.00	12.00	1.00	1.00	10 00	10 00	3.60	3.00	2.20	0 00	0.00	-	2.00	4.00	6.70	8.68	2.75	3.00	4.00
I on	12.00	12.00	324.00	324.00	9478.00	9478.00	1496.00	882.50	2542.00	0.00	0.00	-	330.20	1298.50	4985.05	7680 82	348.50	882.50	1159.00
I on (F te ed)	12.00	11.00	20	22 00	178.00	178.00	50 00	31.50	46.00	0 00	0.00	-	22.00	87.60	130.15	158.86	24.25	31 50	56.25
Lead (F lte ed)	12.00	12.00	0.10	0.10	2.20	2.20	0.37	0.20	0.58	0 00	0.00	-	0.10	0.90	1.16	1 78	0.10	0.20	0.30
Magnes um (F lte ed)	12.00	12.00	11.20	11 20	21 40	21 40	15 00	14.55	3.90	0 00	0.00	-	11.32	21.20	21.35	21.38	12.10	14 55	18.88
Manganese	12.00	12.00	7.00	7.00	518.00	518.00	78 00	37.50	141.00	0 00	0.00	-	7.20	81.70	278.20	422.08	25.50	37 50	55.75
Manganese (F lte ed)	12.00	12.00	3.00	3.00	74 00	74 00	33 00	27.00	24.00	0.00	0.00	-	4.60	62.90	67.95	71.58	13.75	27 00	52.25
Me cu y (F lte ed)	12.00	0 00	0.01	ND	0 01	ND	0.01	0.01	0.00	0 00	0.00	-	0.01	0.01	0.01	0 01	0.01	0.01	0.01
N ckel (F lte ed)	12.00	12.00	1 20	1.20	4.60	4.60	2.40	2.35	0.90	0 00	0.00	-	1.61	3.08	3.78	4 27	1.78	2.35	2.75
Phospho us	12.00	12.00	110.00	110.00	700.00	700.00	298.00	265.00	145.00	0 00	0.00	-	198.00	400.10	540.50	636.20	244.50	265.00	304.25
Selen um (F te ed)	12.00	1 00	1.2	1.60	1.60	1.60	0.68	0.60	0.29	0 00	0.00	-	0.60	0.60	1.05	1.38	0.60	0.60	0.60
Vanad um (F lte ed)	12.00	12.00	1.70	1.70	5.40	5.40	3.10	3.05	1.10	0 00	0.00	-	1.90	4.76	5.13	5 29	2.20	3.05	3.50
Z nc (F te ed)	12.00	12.00	4.50	4.50	13 40	13 40	9.30	9.85	3.10	0 00	0.00	-	5.03	13.09	13.29	13.36	7.10	9.85	11.50
Potass um (F lte ed)	12.00	12.00	1.70	1.70	10 50	10 50	5.90	6.05	2.00	0 00	0.00	-	4.02	6.58	8.36	9 64	5.40	6.05	6.33
Ch om um (hexavalent)	12.00	0 00	6	ND	6	ND	3.00	3.00	0.00	0 00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Ch om um (T valent) (F lte ed)	11.00	0 00	6	ND	6	ND	3.00	3.00	0.00	0 00	0.00	-	3.00	3.00	3.00	3 00	3.00	3.00	3.00
TOC	12.00	11.00	2	2.00	19 00	19 00	7.00	7.00	4.80	0 00	0.00	-	2.00	9.90	14.05	17.02	4.25	7.00	9.00
Sod um (F lte ed)	12.00	12.00	30.20	30 20	53 10	53 10	41 00	41.65	6.40	0 00	0.00	-	31.32	45.20	48.76	51.36	38.93	41 65	42.95
Cyan de Total	12.00	0 00	0.01	ND	0 01	ND	0.01	0.01	0.00	12.00	0.00	-	0.01	0.01	0.01	0 01	0.01	0.01	0.01
Elect cal conduct v ty *(lab)	12.00	12.00	630.00	630.00	9110.00	9110.00	1472.00	778.50	2407.00	0 00	0.00	-	659.20	953.00	4628.05	7317 22	725.50	778.50	876.50
Sulphate	12.00	12.00	73.90	73 90	143.70	143.70	111.00	109.35	23.00	0 00	0.00	-	80.72	136.71	140.13	142.27	98.90	109.35	132.30
Chlo de	12.00	12.00	41.60	41 60	82 50	82 50	61 00	62.45	10.00	0 00	0.00	-	48.46	67.16	74.14	79.16	57.55	62 45	65.90
O tho Phosphate as P	11.00	11.00	0.07	0.07	0.34	0.34	0.17	0.15	0.07	10.00	10.00	4.00	0.11	0.22	0.28	0 32	0.13	0.15	0.18
N t ogen (Total)	12.00	12.00	3.20	3.20	8.50	8.50	5.40	5.05	1.50	0 00	0.00	-	4.21	7.32	7.90	8 26	4.38	5.05	5.85
Alkal n ty (tota) as CaCO3	12.00	12.00	165.00	165.00	281.00	281.00	231.00	232.50	41.00	0 00	0.00	-	180.50	278.70	279.90	280.56	206.00	232.50	273.75
Alkal n ty (Ca bonate as CaCO3)	12.00	1 00	1	17 00	17 00	17 00	1.90	0.50	4.80	0.00	0.00	-	0.50	0.50	7.92	13.37	0.50	0.50	0.50
N t ate (as N)	12.00	12.00	1.51	1.51	6.01	6.01	3.30	3.28	1.20	0.00	0.00	-	1.95	4.43	5.15	5 67	2.41	3.28	3.71
N t te (as N)	12.00	5 00	0.006	0.01	0.17	0.17	0.03	0.00	0.05	1.00	1.00	1.13	0.00	0.05	0.10	0 14	0.00	0.00	0.02
Alkal n ty (B ca bonate as CaCO3)	12.00	12.00	165.00	165.00	281.00	281.00	229.00	224.00	41.00	0 00	0.00	-	180.50	278.70	279.90	280.56	206.00	224.00	273.75
Ammon acal N t ogen as N	12.00	12.00	0.04	0.04	0.14	0.14	0.08	0.07	0.04	0 00	0.00	-	0.04	0.13	0.13	0 14	0.05	0.07	0.10
Total Ha dness	12.00	12.00	248.00	248.00	407.00	407.00	342.00	349.00	56.00	0 00	0.00	-	277.00	401.40	404.25	405.90	298.00	349.00	395.25
Total Cat ons	12.00	12.00	6.58	6.58	10 22	10 22	8.70	9.20	1.30	0 00	0.00	-	7.36	9.94	10.08	10.16	7.44	9.20	9.79
Total An ons	12.00	12.00	7.15	7.15	10 42	10 42	8.90	9.33	1.20	0 00	0.00	-	7.22	10.24	10.34	10.39	7.69	9.33	9.73
pH (Lab)	12.00	12.00	7.38	7.38	8.40	8.40	8.00	8.00	0.28	0 00	0.00	-	7.56	8.18	8.28	8 35	7.89	8.00	8.10
TDS	12.00	12.00	437.00	437.00	694.00	694.00	568.00	602.50	90.00	0 00	0.00	-	438.30	640.30	664.85	682.34	504.75	602.50	634.00
TSS	12.00	10.00	10	11 00	284.00	284.00	38 00	15.00	78.00	1 00	1.00	5.68	5.60	27.70	143.20	227.68	11.75	15 00	23.50

Comments
#1 WS Regs 2016 (Eng/Wal)
#2 WFD England/Wales. 2015 - AA-EQS Inland
#3 WHO DWG 2017
#4 WFD England/Wales. 2015 - F eshwate Standa ds
#5 SEPA WAT-SG-53 F esh EQS - AA - 2015
#6 USEPA RSL tapwate) (May 2020)
#7 AECOM DWG (WHO method)
#8 PNEC (EU REACH) - F eshwate
#9 WFD England/Wales, 2015 - MAC-EQS Inland
#10 WHO Pet oleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Pet oleum Products in Drinking Water. 2015. (Toluene)
#12 WHO Pet oleum Products in Drinking Water. 2015. (WHO> C10 -
#13 WHO Pet oleum Products in Drinking Water. 2015. (WHO> C8-C10 AL and AR.)
#14 WHO Pet oleum Products in Drinking Water. 2015. (WHO> C10 -
#15 WHO Pet oleum Products in Drinking Water. 2015. (WHO C16-
#16 m-bat PNEC
#17 WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge limits for environmental permits. May 2016
#19 CSJV specified threshold for compliance with the High Speed Rail (London - West Midlands) Act 2017 Schedule 33 Protective Provisions
SSAC Site Specific Assessment Criteria
(blank) No assessment criteria available
\- Not analysed
XXXXX May EC lab data erroneous

Key
XXX Exceedance of P oposed GAC
Pe cent les used

Baseline Surface Water Sampling
ML023-SW04 Surface Water Chemistry

				Location_Code	ML023-SW204	ML023-SW204	ML023-SW204																			
				Sampled Date Time	1 /06/2019	09/08/2019	06/0 /2020																			
				Monitoring Round	1 June 2019	3 August 2019	10 March 2020																			
				Lab Report Number	19-9602-1-120820	19-12937-1-120820	20-245-6-130320	Statistical Summary																		
Chem_Group	ChemName	output unit	EQL	Proposed GAC				Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guide ine Exceedances	Number of Guideline Exceedances (Detects Only)	GAC Magniture of Exceedance	10th Percent le	90th Percentile	95th Percentile	98th Percentile	First Quartile	Second Quartile (median)	Third Quartile
	GRO >C4-C8	µg/l	10	700#11	<10	52	-	2.00	1.00	<10	52.00	52.00	52.00	28.50	28.50		0.00	0.00	-	9.70	47.30	49.65	51.06	16.75	28.50	40.25
	GRO >C8-C12	µg/l	10	100#14	<10	62	-	2.00	1.00	<10	62.00	62.00	62.00	33.50	33.50		0.00	0.00	-	10.70	56.30	59.15	60.86	19.25	33.50	47.75
	Aminomethyl phosphonic acid	µg/L	0.2	0.1 #1	-	1.1	<2	2.00	1.00	1.10	1.10	<2	1.10	1.05	1.05		2.00	1.00	11.00	1.01	1.09	1.10	1.10	1.03	1.05	1 08
	% Cation Excess	%		N.V.	-5.72	-5.78	0.48	3.00	3.00	-5.78	ND	0.48	0.48	-3.67	-5.72	3.60	0.00	0.00	-	-5.77	-0.76	-0.14	0.23	-5.75	-5.72	-2.62
Field	Dissolved oxygen (%saturation)	%		60 #2	84.20	0.55	53.82	3.00	3.00	0.55	0.55	84.20	84.20	46.19	53.82	42.00	1.00	1.00	1.40	11.20	78.13	81. 6	82.99	27.18	53.82	69.01
	pH	pH_Units		6-9 #2	8.05	7.42	8.13	3.00	3.00	7.42	7.42	8.13	8.13	7.87	8.05	0.39	0.00	0.00	-	7.54	8.12	8.13	8.13	7.73	8.05	8 09
	Electrical Conductivity	µS/cm		N.V.	135	1152.98	565.30	3.00	3.00	135.00	135.00	1152.98	1152.98	617.76	565.30	511.00	0.00	0.00	-	221.06	035.44	1094.21	1129.47	350.15	565.30	859.14
	Temperature	oC		25 #2	14.81	21.73	7.21	3.00	3.00	7.21	7.21	21.73	21.73	14.58	14.81	7. 0	0.00	0.00	-	8.73	20.35	21.04	21.45	11.01	14.81	18.27
	Dissolved Oxygen (Filtered)	mg/L		N.V.	7.4	0.05	6.49	3.00	3.00	0.05	0.05	7.40	7.40	4.65	6.49	4.00	0.00	0.00	-	1.34	7.22	7.31	7.36	3.27	6.49	6.94
	Field Redox	mV		N.V.	-1	79.02	41.44	3.00	3.00	-1.00	ND	79.02	79.02	39.82	41.44	40.00	0.00	0.00	-	7.49	71.50	75.26	77.51	20.22	41.44	60.23
	Redox	mV		N.V.	210.98	276.97	251.53	3.00	3.00	210.98	210.98	276.97	276.97	246.49	251.53	33.00	0.00	0.00	-	219.09	271.88	274.43	275.95	231.26	251.53	264.25
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	<10	1.00	0.00	<10	ND	<10	ND	5.00	5.00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5 00
	GRO >C4-C12	µg/L	10	100#12	<10	114	<10	3.00	1.00	<10	114.00	114.00	114.00	41.33	5.00	63.00	1.00	1.00	1.14	5.00	92.20	103.10	109.64	5.00	5.00	59.50
	GRO >C8-C10	µg/L	10	300#13	-	-	<10	1.00	0.00	<10	ND	<10	ND	5.00	5.00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	EPH C8-C40	µg/L	10	90#15	<10	3210	<10	3.00	1.00	<10	3210.00	32 0.00	3210.00	1073.33	5.00	1850.00	1.00	1.00	35.67	5.00	2569.00	2889.50	3081.80	5.00	5.00	1607.50
BTEX	Benzene	µg/L	5	10 #2	<5	<5	<5	3.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Toluene	µg/L	5	74#4	<5	<5	<5	3.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Ethylbenzene	µg/L	5	20#5	<5	<5	<5	3.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene (m & p)	µg/L	5	Screened as total Xylene	<5	<5	<5	3.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene Total	µg/L		30#5	<10	<10	-	2.00	0.00	<10	ND	<10	ND	5.00	5.00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Xylene (o)	µg/L	5	Screened as total Xylene	<5	<5	<5	3.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Total BTEX	µg/L		Screened as individual compounds	<25	<25	-	2.00	0.00	<25	ND	<25	ND	12.50	12.50		0.00	0.00	-	12.50	12.50	12.50	12.50	12.50	12.50	12.50
Oxygenates	MTBE	µg/L	5	5100#8	<5	<5	<5	3.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Pheno ics	Total Phenols	µg/L	150	N.V.	<150	<150	<150	3.00	0.00	<150	ND	<150	ND	75.00	75.00	0.00	0.00	0.00	-	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Herbicides	Glyphosate	µg/L	2	196#4	-	-	<2	1.00	0.00	<2	ND	<2	ND	1.00	1.00		0.00	0.00	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Metals	Aluminium (Filtered)	µg/L	1.5	1000#18 (Total Aluminium)	29	<20	18.1	3.00	2.00	18.10	18.10	29.00	29.00	19.03	18.10	9.50	0.00	0.00	-	11.62	26.82	27.91	28.56	14.05	18.10	23.55
	Arsenic (F ltered)	µg/L	0.9	50#4	<0.9	2.7	1.1	3.00	2.00	<0.9	1.10	2.70	2.70	1.42	1.10	1.20	0.00	0.00	-	0.58	2.38	2.54	2.64	0.78	1.10	1.90
	Barium (Filtered)	µg/L	1.8	114.7 #8	11.8	48.6	22.3	3.00	3.00	11.80	11.80	48.60	48.60	27.57	22.30	19 00	0.00	0.00	-	13.90	43.34	45.97	47.55	17.05	22.30	35.45
	Beryllium (F ltered)	µg/L	0.5	12#3	<0.5	<0.5	<0.5	3.00	0.00	<0.5	ND	<0.5	ND	0.25	0.25	0.00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Boron (Filtered)	µg/L	12	2 000#5	26	72	52	3.00	3.00	26.00	26.00	72.00	72.00	50.00	52.00	23 00	0.00	0.00	-	31.20	68.00	70.00	71.20	39.00	52.00	62.00
	Cadmium (Filtered)	µg/L	0.03	0.15#2	<0.03	<0.03	0.03	3.00	1.00	<0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.00	0.00	-	0.02	0.03	0.03	0.03	0.02	0.02	0 02
	Calcium (Filtered)	mg/L	0.2	N.V.	24.6	115.3	48.4	3.00	3.00	24.60	24.60	115.30	115.30	62.77	48.40	47.00	0.00	0.00	-	29.36	01.92	108.61	112.62	36.50	48.40	81.85
	Chromium (III VI) (F ltered)	µg/L	0.2	Screened as individual species	0.8	0.6	12.7	3.00	3.00	0.60	0.60	12.70	12.70	4.70	0.80	6.90	0.00	0.00	-	0.64	0.32	11.51	12.22	0.70	0.80	6.75
	Copper (Filtered)	µg/L	1	11. 8 #m-bat PNEC # 6	4	4	5	3.00	3.00	4.00	4.00	5.00	5.00	4.33	4.00	0.58	0.00	0.00	-	4.00	4.80	4.90	4.96	4.00	4.00	4.50
	Iron	µg/L	20	Screened as filtered	323	674	337	3.00	3.00	323.00	323.00	674.00	674.00	444.67	337.00	199.00	0.00	0.00	-	325.80	606.60	640. 0	660.52	330.00	337.00	505.50
	Iron (Filtered)	µg/L	20	1 000#4	93	356	225	3.00	3.00	93.00	93.00	356.00	356.00	224.67	225.00	132.00	0.00	0.00	-	119.40	329.80	342.90	350.76	159.00	225.00	290.50
	Lead (Filtered)	µg/L	0.1	4.14 #(m-bat) #16	0.4	1	0.4	3.00	3.00	0.40	0.40	1.00	1.00	0.60	0.40	0.35	0.00	0.00	-	0.40	0.88	0.94	0.98	0.40	0.40	0.70
	Magnesium (Filtered)	mg/L	0.1	N.V.	2.9	10.9	11.7	3.00	3.00	2.90	2.90	11.70	11.70	8.50	10.90	4.90	0.00	0.00	-	4.50	11.54	11.62	11.67	6.90	10.90	11.30
	Manganese	µg/L	2	Screened as filtered	16	440	22	3.00	3.00	16.00	16.00	440.00	440.00	159.33	22.00	243.00	0.00	0.00	-	17.20	356.40	398.20	423.28	19.00	22.00	231.00
	Manganese (Filtered)	µg/L	2	287.90 #m-bat PNEC # 6	17	432	41	3.00	3.00	17.00	17.00	432.00	432.00	163.33	41.00	233.00	1.00	1.00	1.50	21.80	353.80	392.90	416.36	29.00	41.00	2 6.50
	Mercury (Filtered)	µg/L	0.01	0.07#9	<0.01	<0.01	<0.01	3.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Nickel (Filtered)	µg/L	0.2	4#2 MAC 34	0.7	3.9	1.9	3.00	3.00	0.70	0.70	3.90	3.90	2.17	1.90	1.60	0.00	0.00	-	0.94	3.50	3.70	3.82	1.30	1.90	2.90
	Phosphorus	µg/L	5	Screened as Ortho Phosphate	114	4437	99	3.00	3.00	99.00	99.00	4437.00	4437.00	1550.00	114.00	2500.00	0.00	0.00	-	102.00	3572.40	4004.70	4264.08	106.50	114.00	2275.50
	Selenium (Filtered)	µg/L	1.2	2.67#8	<1.2	<1.2	<1.2	3.00	0.00	<1.2	ND	<1.2	ND	0.60	0.60	0.00	0.00	0.00	-	0.60	0.60	0.60	0.60	0.60	0.60	0 60
	Vanadium (Filtered)	µg/L	0.6	20#5	2.3	1.4	1.4	3.00	3.00	1.40	1.40	2.30	2.30	1.70	1.40	0.52	0.00	0.00	-	1.40	2.12	2.21	2.26	1.40	1.40	1.85
	Zinc (Filtered)	µg/L	1.5	26.46 #m-bat PNEC #16 incl. background 2µg/L #2)	9.2	12.2	13.9	3.00	3.00	9.20	9.20	13.90	13.90	11.77	12.20	2.40	0.00	0.00	-	9.80	13.56	13.73	13.83	10.70	12.20	13.05
	Potassium (Filtered)	mg/L	0.1	N.V.	1.9	19.5	3.5	3.00	3.00	1.90	1.90	19.50	19.50	8. 0	3.50	9.70	0.00	0.00	-	2.22	6.30	17.90	18.86	2.70	3.50	11.50
	Chromium (hexavalent)	µg/L	6	3.4#4	<6	<6	<6	3.00	0.00	<6	ND	<6	ND	3.00	3.00	0.00	3.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7#4 MAC 32	<6	-	13	3.00	2.00	<6	13.00	13.00	13.00	8.00	8.00		2.00	1.00	2.77	4.00	12.00	12.50	12.80	5.50	8.00	10.50
Organics	TOC	mg/L	2	N.V.	4	75	8	3.00	3.00	4.00	4.00	75.00	75.00	29.00	8.00	40.00	0.00	0.00	-	4.80	61.60	68.30	72.32	6.00	8.00	41.50
Inorganics	Sodium (Filtered)	mg/L	0.1	200#1	4.8	77.3	16.5	3.00	3.00	4.80	4.80	77. 0	77.30	32.87	16.50	39.00	0.00	0.00	-	7.14	65.14	71.22	74.87	10.65	16.50	46.90
	Cyanide Total	mg/L	0.01	0.001#4	<0.01	<0.01	<0.01	3.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	3.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Electrical conductivity *(lab)	µS/cm	2	N.V.	157	1150	370	3.00	3.00	157.00	157.00	1150.00	1150.00	559.00	370.00	523.00	0.00	0.00	-	199.60	994.00	1072.00	1118.80	263.50	370.00	760.00
	Sulphate	mg/L	0.5	400#5	19.7	73.3	57.6	3.00	3.00	19.70	19.70	73. 0	73.30	50.20	57.60	28.00	0.00	0.00	-	27.28	70.16	71.73	72.67	38.65	57.60	65.45
	Chloride	mg/L	0.3	250#5	4.5	97.1	21.3	3.00	3.00	4.50	4.50	97. 0	97.10	40.97	21.30	49.00	0.00	0.00	-	7.86	81.94	89.52	94.07	12.90	21.30	59.20
	Ortho Phosphate as P	mg/L	0.03	0.079 #17	0.06	3.65	0.06	3.00	3.00	0.06	0.06	3.65	3.65	1.26	0.06	2. 0	1.00	1.00	46.20	0.06	2.93	3.29	3.51	0.06	0.06	1 86
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	1.9	43	1.9	3.00	3.00	1.90	1.90	43.00	43.00	15.60	1.90	24.00	0.00	0.00	-	1.90	34.78	38.89	41.36	1.90	1.90	22.45
	Alkalinity (total) as CaCO3	mg/L	1	N.V.	69	377	116	3.00	3.00	69.00	69.00	377.00	377.00	187.33	116.00	166.00	0.00	0.00	-	78.40	324.80	350.90	366.56	92.50	116.00	246.50
	Alkalinity (Carbonate as CaCO3)	mg/L	1	N.V.	<1	<1	<1	3.00	0.00	<1	ND	<1	ND	0.50	0.50	0.00	0.00	0.00	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Nitrate (as N)	mg/L	0.05	11.3#1	0.24	<0.05	0.43	3.00	2.00	<0.05	0.24	0.43	0.43	0.23	0.24	0.20	0.00	0.00	-	0.07	0.39	0.41	0.42	0.13	0.24	0.33
	Nitrite (as N)	mg/L	0.006	0.152 #1	0.007	<0.006	<0.006	3.00	1.00	<0.006	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	-	0.00	0.01	0.01	0.01	0.00	0.00	0 01
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	N.V.	69	377	116	3.00	3.00	69.00	69.00	377.00	377.00	187.33	116.00	166.00	0.00	0.00	-	78.40	324.80	350.90	366.56	92.50	116.00	246.50
	Ammoniacal Nitrogen as N	mg/L	0.03	0.6 #2	0.05	33.83	0.03	3.00	3.00	0.03	0.03	33.83	33.83	11.30	0.05	20.00	1.00	1.00	56.38	0.03	27.07	30.45	32.48	0.04	0.05	16.94
	Total Hardness	mg/l	1	N.V.	74	334	170	3.00	3.00	74.00	74.00	334.00	334.00	192.67	170.00	131.00	0.00	0.00	-	93.20	01.20	317.60	327.44	122.00	170.00	252.00
	Total Cations	mmolc/l	0	N.V.	1.73	10.51	4.19	3.00	3.00	1.73	1.73	10.51	10.51	5.48	4.19	4.50	0.00	0.00	-	2.22	9.25	9.88	10.26	2.96	4.19	7.35
	Total Anions	mmolc/l	0	N.V.	1.94	11.8	4.15	3.00	3.00	1.94	1.94	11.80	11.80	5.96	4.15	5.20	0.00	0.00	-	2.38	0.27	11.04	11.49	3.05	4.15	7.98
	pH (Lab)	pH Units	0.01	N.V.	6.95	7.53	7.53	3.00	3.00	6.95	6.95	7.53	7.53	7.34	7.53	0.33	0.00	0.00	-	7.07	7.53	7.53	7.53	7.24	7.53	7.53
	TDS	mg/L	35	N.V.	125	623	330	3.00	3.00	125.00	125.00	623.00	623.00	359.33	330.00	250.00	0.00	0.00	-	166.00	564.40	593.70	611.28	227.50	330.00	476.50
	TSS	mg/L	10	50#19	<10	71	<10	3.00	1.00	<10	71.00	71.00	71.00	27.00	5.00	38.00	1.00	1.00	1.42	5.00	57.80	64.40	68.36	5.00	5.00	38.00

Comments

#1:WS Regs 2016 (Eng/Wa)
#2:WFD England/Wales. 2015 - AA-EQS Inland
#3:WHO DWG 2017
#4:WFD England/Wales. 2015 - Freshwater Standards
#5:SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6:USEPA RSL (tapwater) [May 2020]
#7:AECOM DWG (WHO method)
#8:PNEC (EU REACH) - Freshwater
#9:WFD England/Wales. 2015 - MAC-EQS Inland

#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water, 2015. (WHO> C10 -C12 AR.)
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR.)
#14 WHO Petroleum Products in Drinking Water. 2015.(WHO> C10 -C12 AR.)
#15 WHO Petroleum Products in Drinking Water, 2015.(WHO C16-C35 AR.)
#16 m-bat PNEC
#17 WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge limits for environmental permits, May 2018
#19 CSJV specified threshold for compl ance with the High Speed Rail (London - West Mid ands) Act 2017 Schedule 33 Protective Prov sions

SSAC: Site Specific Assessment Criteria
(blank): No assessment criteria available
-: Not analysed
XXXXX: May EC lab data erroneous

Key

XXX Exceedance of Proposed GAC
Percentiles used

Baseline Surface Water Sampling
ML024-SW200 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	Proposed GAC	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	ML024-SW200	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)	GAC Magniture of Exceedance	10th Percentile	90th Percentile	95th Percentile	98th Percentile	First Quart le	Second Quartile (median)	Third Quartile
				Sampled Date Time	14/06/2019	11/07/2019	08/08/2019	26/09/2019	03/10/2019	04/11/2019	03/12/2019	08/01/2020	06/02/2020	05/03/2020	20/04/2020	20/05/2020																			
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020	0 March 2020	11 April 2020	12 May 2020																			
				Lab Report Number	19-9718-1-210619	19-11279-1-120820	19-12844-1-290819	19-15749-1-120820	19-16238-1-120820	19-18059-1-140120	19-19821-1-120820	20-245-1-110220	20-245-3-160320	20-245-5-130320	20-5458-1-140520	20-6567-1-020620	Statistical Summary																		
	GRO >C4-C8	µg/l	10	Proposed GAC E42	<10	< 0	<10	<10	<10	< 0	<10	-	-	-	-	-	7.00	0.00	<10	ND	<10	ND	5.00	5.00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C8-C12	µg/l	10	100#14	<10	< 0	<10	<10	<10	< 0	<10	-	-	-	-	-	7.00	0.00	<10	ND	<10	ND	5.00	5.00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Aminomethyl phosphonic acid	µg/L	0.2	0.1 #1	-	-	1.4	1	0.74	-	-	-	-	<2	0.6	0.7	6.00	5.00	0.60	0.60	<2	1.40	0.91	0.87	0 29	6.00	5.00	14.00	0.65	1.20	1.30	1. 6	0.71	0.87	1.00
	% Cation Excess	%		N.V.	-0.25	1.25	3.45	-2.86	4.11	-4.68	1.51	-4.77	-1.39	-2.89	1.84	-1.25	12.00	12.00	-4.77	ND	4.11	4.11	-0.49	-0.75	3 00	0.00	0.00	-	-4.50	3.29	3.75	3.96	-2.87	-0.75	1.59
Field	Dissolved oxygen (%saturation)	%		80 #2	80.29	84.51	79.00	56.18	66.17	60.80	80.59	89.13	102.59	84.55	108.81	93.28	12.00	12.00	56. 8	56.18	108.81	108.81	82.00	82.55	16.00	8.00	8.00	1.36	61.34	101.66	105.39	107.44	75.79	82.55	90.16
	pH	pH Units		6-9 #2	7.85	8.08	8.15	7.97	7.74	8.06	7.94	7.83	7.75	8.07	7.73	7.97	12.00	12.00	7.73	7.73	8.15	8.15	7.90	7.95	0.15	0.00	0.00	-	7.74	8.08	8.11	8.13	7.81	7.95	8.06
	Electrical Conductivity	µS/cm		N.V.	453	865.47	799.88	510.62	819.12	632.69	781.06	780	789	747.44	814	879	12.00	12.00	453.00	453.00	879.00	879.00	739.00	785.03	1 6.00	0.00	0.00	-	522.83	860.84	871.56	876.02	718.76	785.03	815.28
	Temperature	oC		20 #2	13.74	17.87	16.23	14.27	10.01	10.48	5.94	9.35	4.56	6.47	10.1	16.51	12.00	12.00	4.56	4.56	17.87	17.87	11.00	10.29	4.40	0.00	0.00	-	5.99	16.48	17.12	17.57	8.63	10.29	14.76
	Dissolved Oxygen (Filtered)	mg/L		N.V.	7.6	8.00	7.75	5.77	8.23	6.85	10.09	8.74	10.54	10.38	10.3	8.83	12.00	12.00	5.77	5.77	10.54	10.54	8.60	8.49	1.50	0.00	0.00	-	6.92	10.37	10.45	10.50	7.71	8.49	10.14
	Field Redox	mV		N.V.	23	183.46	187.27	189.59	44.48	85.70	15.09	15	150	53.69	192	158	12.00	12.00	15.00	15.00	192.00	192.00	108.00	117.85	75.00	0.00	0.00	-	15.88	189.36	190.67	191.47	39.11	117.85	184.41
	Redox	mV		N.V.	235.17	384.73	389.91	393.89	252.3	293.13	226.2	230.83	369.48	264.37	406.69	368.64	12.00	12.00	226.20	226.20	406.69	406.69	318.00	330.89	73.00	0.00	0.00	-	231.26	393.49	399.65	403.87	248.02	330.89	386.03
TPH	GRO >C4-C10	µg/L	10	300# 0	-	-	-	-	-	-	-	<10	< 0	<10	<10	<10	5.00	0.00	<10	ND	<10	ND	5.00	5.00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C4-C12	µg/L	10	100#12	<10	< 0	<10	<10	<10	< 0	<10	<10	< 0	<10	<10	<10	12.00	0.00	<10	ND	<10	ND	5.00	5.00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	<10	< 0	<10	<10	<10	5.00	0.00	<10	ND	<10	ND	5.00	5.00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	EPH C8-C40	µg/L	10	90#15	<10	< 0	<10	<10	<10	< 0	<10	<10	< 0	<10	<10	<10	12.00	0.00	<10	ND	<10	ND	5.00	5.00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
BTEX	Benzene	µg/L	5	10 #2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Toluene	µg/L	5	74 #4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Ethylbenzene	µg/L	5	20#5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene (m & p)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Xylene Total	µg/L		30#5	<10	< 0	<10	<10	<10	< 0	<10	-	-	-	-	-	7.00	0.00	<10	ND	<10	ND	5.00	5.00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Xylene (o)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
	Total BTEX	µg/L		Screened as individual compounds	<25	<25	<25	<25	<25	<25	<25	-	-	-	-	-	7.00	0.00	<25	ND	<25	ND	13.00	12.50	0 00	0.00	0.00	-	12.50	12.50	12.50	12.50	12.50	12.50	12.50
Oxygenates	MTBE	µg/L	5	5 100#3	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Phenolics	Total Phenols	µg/L	150	N.V.	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	12.00	0.00	<150	ND	<150	ND	75.00	75.00	0 00	0.00	0.00	-	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	0.9	1.6	0.78	-	-	-	-	<2	0.8	0.4	6.00	5.00	0.40	0.40	<2	1.60	0.91	0.85	0.39	0.00	0.00	-	0.59	1.30	1.45	1.54	0.79	0.85	0.98
Metals	Aluminium (Filtered)	µg/L	1.5	1000#19 (Total Aluminium)	-	<20	-	<20	<20	-	<20	<20	11.7	32.9	5.7	4.5	9.00	4.00	4.50	4.50	32.90	32.90	12.00	10.00	8.30	0.00	0.00	-	5.46	15.94	24.42	29.51	10.00	10.00	10.00
	Arsenic (Filtered)	µg/L	0.9	50#4	1.8	2.9	2.4	1.7	1.9	1.6	1.7	1.6	1.6	1.5	1.7	2.5	12.00	12.00	1.50	1.50	2.90	2.90	1.90	1.70	0.44	0.00	0.00	-	1.60	2.49	2.68	2.81	1.60	1.70	2.03
	Barium (Filtered)	µg/L	1.8	114.7#8	29.9	36.6	39	31.7	48.6	30.8	35.5	37	34.9	29.8	39.6	40.6	12.00	12.00	29.80	29.80	48.60	48.60	36.00	36.05	5.40	0.00	0.00	-	29.99	40.50	44.20	46.84	31.48	36.05	39.15
	Beryllium (Filtered)	µg/L	0.5	12#3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	12.00	0.00	<0.5	ND	<0.5	ND	0.25	0.25	0 00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Boron (Filtered)	µg/L	12	2 000#3	61	79	80	66	102	68	80	79	82	61	86	84	12.00	12.00	61.00	61.00	102.00	102.00	77.00	79.50	12.00	0.00	0.00	-	61.50	85.80	93.20	98.48	67.50	79.50	82.50
	Cadmium (Filtered)	µg/L	0.03	0.25#2	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	0.05	<0.03	0.04	<0.03	<0.03	0.05	12.00	4.00	<0.03	0.03	0.05	0.05	0.02	0.02	0.01	0.00	0.00	-	0.02	0.05	0.05	0.05	0.02	0.02	0.03
	Calcium (Filtered)	mg/L	0.2	N.V.	74.4	121.9	114.5	73.1	103.6	78.5	103.4	93	98	67.4	113.6	118.7	12.00	12.00	67.40	67.40	121.90	121.90	97.00	100.70	19.00	0.00	0.00	-	73.23	118.28	120.14	121.20	77.48	100.70	113.83
	Chromium (III VI) (Filtered)	µg/L	0.2	Screened as individual species	11.8	0.2	0.3	0.6	1.2	12.5	0.4	<0.2	0.4	10.7	<0.2	0.3	12.00	10.00	<0.2	0.20	12.50	12.50	3.20	0.40	5.10	0.00	0.00	-	0.11	11.69	12.12	12.35	0.28	0.40	3.58
	Copper (Filtered)	µg/L	1	10.66 #m-bat PNEC #16	5	2	2	3	5	5	4	4	4	6	2	2	12.00	12.00	2.00	2.00	6.00	6.00	3.70	4.00	1.40	0.00	0.00	-	2.00	5.00	5.45	5.78	2.00	4.00	5.00
	Iron	µg/L	20	Screened as filtered	392	243	106	124	445	493	416	706	1269	1670	296	220	12.00	12.00	106.00	106.00	1670.00	1670.00	532.00	404.00	476.00	0.00	0.00	-	133.60	1212.70	1449.45	1581.78	237.25	404.00	546.25
	Iron (Filtered)	µg/L	20	1 000	101	50	42	62	77	102	73	52	89	168	86	103	12.00	12.00	42.00	42.00	168.00	168.00	84.00	81.50	34.00	0.00	0.00	-	50.20	102.90	132.25	153.70	59.50	81.50	101.25
	Lead (Filtered)	µg/L	0.1	4.14 #(m-bat)#16	0.5	0.3	<0.4	0.6	0.3	0.6	0.2	0.1	0.2	0.4	0.1	0.3	12.00	11.00	0. 0	0.10	0.60	0.60	0.32	0.30	0.17	0.00	0.00	-	0.11	0.59	0.60	0.60	0.20	0.30	0.43
	Magnesium (Filtered)	mg/L	0.1	N.V.	9.3	10.1	9.4	7	13.3	11.3	15.1	14.9	6.1	11.4	15.5	12.5	12.00	12.00	7.00	7.00	16.10	16.10	12.00	11.95	2.90	0.00	0.00	-	9.31	15.46	15.77	15.97	9.93	11.95	14.95
	Manganese	µg/L	2	Screened as filtered	19	21	15	17	30	26	36	42	66	45	45	29	12.00	12.00	15.00	15.00	66.00	66.00	33.00	29.50	15.00	0.00	0.00	-	17.20	45.00	54.45	61.38	20.50	29.50	42.75
	Manganese (Filtered)	µg/L	2	256.33 #m-bat PNEC #16	24	28	16	7	37	23	40	26	43	46	75	57	12.00	12.00	7.00	7.00	75.00	75.00	35.00	32.50	19.00	0.00	0.00	-	16.70	55.90	65.10	71.04	23.75	32.50	43.75
	Mercury (Filtered)	µg/L	0.01	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0 01	0.01	0.01	0.01
	Nickel (Filtered)	µg/L	0.2	9.58 #m-bat PNEC #16 MAC 34	2.3	3	2.4	1.9	3.5	2.7	3.8	4.2	4.8	5.1	5.2	5.9	12.00	12.00	1.90	1.90	5.90	5.90	3.70	3.65	1.30	0.00	0.00	-	2.31	5.19	5.52	5.75	2.63	3.65	4.88
	Phosphorus	µg/L	5	Screened as Ortho Phosphate	272	659	498	252	193	271	264	238	251	181	173	387	12.00	12.00	173.00	173.00	659.00	659.00	303.00	258.00	144.00	0.00	0.00	-	182.20	486.90	570.45	623.58	226.75	258.00	300.75
	Selenium (Filtered)	µg/L	1.2	2.67	<1.2	<1.2	<1.2	<1.2	1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	12.00	1.00	<1.2	1.20	1.20	1.20	0.65	0.60	0.17	0.00	0.00	-	0.60	0.60	0.87	1.07	0.60	0.60	0.60
	Vanadium (Filtered)	µg/L	0.6	20	2.5	2.9	2.9	3.5	3.2	1.9	1.6	1.5	1.3	1.2	1.3	2.2	12.00	12.00	1.20	1.20	3.50	3.50	2.20	2.05	0 82	0.00	0.00	-	1.30	3.17	3.34	3.43	1.45	2.05	2.90
	Zinc (Filtered)	µg/L	1.5	26.56 #m-bat PNEC #16 incl. background 2µg/L #2)	6.9	6.8	4.9	7	8.4	8.7	13.2	8	10.8	9.8	5.7	18.1	12.00	12.00	4.90	4.90	18.10	18.10	9.00	8.20	3.70	0.00	0.00	-	5.81	12.96	15.41	17.02	6.88	8.20	10.05
	Potassium (Filtered)	mg/L	0.1	N.V.	5.9	7.5	8.2	6.2	8.4	5.9	6.3	6.5	6.2	5.7	6.6	6.5	12.00	12.00	5.70	5.70	8.40	8.40	6.70	6.40	0 89	0.00	0.00	-	5.90	8.13	8.29	8. 6	6.13	6.40	6.83
	Chromium (hexavalent)	µg/L	6	3.4#4	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	12.00	0.00	<6	ND	<6	ND	3.00	3.00	0 00	12.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7#4 MAC 32	12	<6	<6	<6	<6	13	<6	<6	<6	11	<6	<6	12.00	3.00	<6	11.00	13.00	13.00	5.30	3.00	4.10	12.00	3.00	2.77	3.00	11.90	12.45	12.78	3.00	3.00	5.00
Organics	TOC	mg/L	2	N.V.	7	<2	7	6	12	9	9	7	6	13	4	4	12.00	11.00	<2	4.00	13.00	13.00	7.10	7.00	3.40	0.00	0.00	-	4.00	11.70	12.45	12.78	5.50	7.00	9.00
Inorganics	Sodium (Filtered)	mg/L	0.1	200#1	32.6	51	49.3	32.1	37.4	27.8	35	31.2	33.3	29	39.6	36.6	12.00	12.00	27.80	27.80	51.00	51.00	36.00	34.15	7.30	0.00	0.00	-	29.22	48.33	50.07	50.63	31.88	34.15	37.95
	Cyanide Total	mg/L	0.01	0.001#4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	12.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Electrical conductivity *(lab)	µS/cm	2	N.V.	575	887	798	519	696	606	769	727	654	539	674	464	12.00	12.00	464.00	464.00	887.00	887.00	659.00	664.00	125.00	0.00	0.00	-	521.00	795.10	838.05	867.42	566.00	664.00	737.50
	Sulphate	mg/L	0.5	400#5	68.2	69.8	62	56.1	95.7	72.6	98.6	90.2	99.1	66.1	95	76.9	12.00	12.00	56. 0	56.10	99.10	99.10	79.00	74.75	16.00	0.00	0.00	-	62.41	98.31	98.83	98.99	67.68	74.75	95.18
	Chloride	mg/L	0.3	250#5	44	77.4	73.7	44.2	56.3	39.7	52.8	50.1	50	44.6	62.5	63.6	12.00	12.00	39.70	39.70	77.40	77.40	55.00	51.45	12.00	0.00	0.00	-	44.02	72.69	75.37	76.59	44.50	51.45	62.78
	Ortho Phosphate as P	mg/L	0.03	0.088 #P calculator #17	0.17	0.56	0.42	0.2	0.09	0. 6	0.14	0.08	0.08	<0.03	0.06	-	11.00	10.00	<0.03	0.06	0.56	0.56	0.18	0.14	0.17	7.00	7.00	6.36	0.06	0.42	0.49	0.53	0.08	0.14	0.19
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	6.3	2.7	3.8	3.9	13.4	6.1	7	3.6	4.5	3.7	5.2	3.7	12.00	12.00	2.70	2.70	13.40	13.40	5.50	4.85	2 80	0.00	0.00	-	3.70	6.93	9.88	11.99	3.78	4.85	6.15
	Alkalinity (total) as CaCO3	mg/L	1	N.V.	161	267	237	176	154	196	203	231	219	165	231	270	12.00	12.00	154.00	154.00	270.00	270.00	209.00	211.00	40.00	0.00	0.00	-	161.40	264.00	268.35	269.34	173.25	211.00	232.50
	Alkalinity (Carbonate as CaCO3)	mg/L	1	N.V.	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	12.00	0.00	<1	ND	<1	ND	0.50	0.50	0 00	0.00	0.00	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Nitrate (as N)	mg/L	0.05	11.3	2.79	1.59	2.01	2.38	11.34	3.78	3.42	3.04	2.68	1.65	2.30	1.97	12.00	12.00	1.59	1.59	11.34	11.34	3.30	2.63	2 60	1.00	1.00	1.00	1.68	3.74	7.18	9.68	2.00	2.63	3.14
	Nitrite (as N)	mg/L	0.006	0.152#1	0.049	0.047	0.046	0.043	0.061	0.057	0.045	0.064	0.025	0.013	0.046	0.121	12.00	12.00	0.01	0.01	0.12	0.12	0.05	0.05	0.03	0.00	0.00	-	0.03	0.06	0.09	0.11	0.04	0.05	0.06
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	N.V.	161	267	237	176	154	196	203	231	219	165	231	270	12.00	12.00	154.00	154.00	270.00	270.00	209.00	211.00	40.00	0.00	0.00	-	161.40	264.00	268.35	269.34	173.25	211.00	232.50
	Ammoniacal Nitrogen as N	mg/L	0.03	0.3#4	0.1	0.12	0.04	0.1	0.09	0.05	0.18	0.17	0.11	0.09	0.11	0.23	12.00	12.00	0.04	0.04	0.23	0.23	0.12	0.11	0 05	0.00	0.00	-	0.05	0.18	0.20	0.22	0.09	0.11	0.13
	Total Hardness	mg/l	1	N.V.	225	347	326	212	315	244	322	295	313	216	349	349	12.00	12.00	212.00	212.00	349.00	349.00	293.00	314.00	54.00	0.00	0.00	-	216.90	348.80	349.00	349.00	239.25	314.00	331.25
	Total Cations	mmolc/l	0	N.V.	6.05	9.32	8.84	5.78	8.11	6.21	8.09	7.39	7.82	5.71	8.84	8.71	12.00	12.00	5.71	5.71	9.32	9.32	7.60	7.96	1.30	0.00	0.00	-	5.81	8.84	9.06	9.21	6.17	7.96	8.74
	Total Anions	mmolc/l	0	N.V.	6.08	9.09	8.25	6.12	7.47	6.82	7.85	8.13	8.04	6.05	8.52	8.93	12.00	12.00	6.05	6.05	9.09	9.09	7.60	7.95	1.10	0.00	0.00	-	6.08	8.89	9.00	9.05	6.65	7.95	8.32
	pH (Lab)	pH Units	0.01	N.V.	7.68	8.25	8.09	7.68	7.8	7.92	8.08	7.87	7.85	7.89	8.09	8.16	12.00	12.00	7.68	7.68	8.25	8.25	7.90	7.91	0.19	0.00	0.00	-	7.69	8.15	8.20	8.23	7.84	7.91	8.09
	TDS	mg/L	35	N.V.	356	517	473	373	560	380	522	511	472	403	597	550	12.00	12.00	356.00	356.00	597.00	597.00	476.00	492.00	81.00	0.00	0.00	-	373.70	559.00	576.65	588.86	397.25	492.00	529.00
	TSS	mg/L	10	50#19	<10	< 0	<10	<10	<10	< 0	10	<10	32	<10	<10	<10	12.00	2.00	<10	10.00	32.00	32.00	7.70	5.00	7.80	0.00	0.00	-	5.00	9.50	19.90	27.16	5.00	5.00	5.00
Other	Oxygen	mg/L	1	Field data screened	-	-	10	-	-	-	-	-	-	-	-	-	1.00	1.00	10.00	10.00	10.00	10.00		10.00		0.00	0.00	-	10.00	10.00	10.00	10.00	10.00	10.00	10.00

Comments

#1:WS Regs 2016 (Eng/Wal)
#2:WFD England/Wales. 2015 - AA-EQS Inland
#3:WHO DWG 2017
#4:WFD England/Wales. 2015 - Freshwater Standards
#5:SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6:USEPA RSL (tapwater) (May 2020)
#7:AECOM DWG (WHO method)
#8:PNEC (EU REACH) - Freshwater
#9:WFD England/Wales. 2015 - MAC-EQS Inland
#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Petroleum Products in Drinking Water. 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water, 2015. (WHO> C10 -C12 AR.)
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR.)
#14 WHO Petroleum Products in Drinking Water, 2015.(WHO> C10 -C12 AR.)
#15 WHO Petroleum Products in Drinking Water, 2015.(WHO C16-C35 AR.)
#16 m-bat PNEC
#17 WFD River Phosphorus Ca culator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge imits for environmental permits, May 2018
#19 CSJV spec fied thresho d for compliance w th the H gh Speed Ra l (London - West Midlands) Act 2017 Schedule 33 Protective Provisions

SSAC: Site Specific Assessment Criteria
(blank): No assessment criteria available
- : Not analysed
XXXXX : May EC lab data erroneous

Key

XXX	Exceedance of Proposed GAC
	Percent les used

Baseline Surface Water Sampling
ML024-SW201 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	Proposed GAC	ML024-SW201	ML024-SW201	ML024-SW201	ML024-SW201	ML024-SW201	ML024-SW201	ML024-SW201	ML024-SW201	ML024-SW201
				Sampled Date Time	13/06/2019	11/07/2019	08/08/2019	11/09/2019	04/10/2019	05/11/2019	02/12/2019	09/01/2020	07/02/2020
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020
				Lab Report Number	19-9602-1-120820	19-11279-1-120820	19-12844-1-290819	19-14766-1-120820	19-16317-1-241019	19-18121-1-120820	19-19743-1-120820	20-245-2-110220	20-245-4-170220
	GRO >C4-C8	µg/l	10	Proposed GAC E42	<10	<10	<10	< 0	<10	<10	<10	-	-
	GRO >C8-C12	µg/l	10	100#14	<10	<10	<10	< 0	<10	<10	<10	-	-
	Aminomethyl phosphonic acid	µg/L	0.2	0.1 #1	-	-	1.6	1.3	0.9	-	-	-	-
	% Cation Excess	%		N.V.	-0.77	0.6	1.92	5.27	-3.89	-0.35	1.52	-2.75	-0.58
Field	Dissolved oxygen (%saturation)	%		80 #2	81.91	104.75	90.84	88.59	59.57	69.79	111.92	1 0.71	107.55
	pH	pH Units		6-9 #2	7.83	8.21	8.28	8.3	7.85	8.09	7.81	8.12	8.2
	Electrical Conductivity	µS/cm		N.V.	342	854.61	760.08	827	714.60	709.24	759.72	579	794
	Temperature	oC		20 #2	13.54	18.83	17.46	14.97	12.74	9.87	4.93	8.53	5.59
	Dissolved Oxygen (Filtered)	mg/L		N.V.	7.6	9.72	8.67	8.22	7.62	7.88	10.60	10.57	12.15
	Field Redox	mV		N.V.	25	178.62	184.14	189	19.84	84.49	16.21	16	121
	Redox	mV		N.V.	237 25	379.06	385.75	400.97	225.41	292.42	228.13	232.54	339.45
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	< 0	<10
	GRO >C4-C12	µg/L	10	100#12	<10	<10	<10	< 0	<10	<10	<10	< 0	<10
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	< 0	<10
	EPH C8-C40	µg/L	10	90#15	<10	<10	<10	< 0	<10	<10	<10	< 0	<10
BTEX	Benzene	µg/L	5	10 #2	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Toluene	µg/L	5	74 #4	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Ethylbenzene	µg/L	5	20#5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene (m & p)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene Total	µg/L		30#5	<10	<10	<10	< 0	-	<10	<10	-	-
	Xylene (o)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Total BTEX	µg/L		Screened as individual compounds	<25	<25	<25	<25	-	<25	<25	-	-
Oxygenates	MTBE	µg/L	5	5 100#8	<5	<5	<5	<5	<5	<5	<5	<5	<5
Phenolics	Total Phenols	µg/L	150	N.V.	<150	<150	<150	<150	<150	<150	<150	<150	<150
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	1	0.8	4.1	-	-	-	-
Metals	Aluminium (Filtered)	µg/L	1.5	1000#18 (Total Aluminium)	<20	<20	-	<20	<20	<20	<20	<20	11.1
	Arsenic (Filtered)	µg/L	0.9	50#4	1.5	3.1	2.5	2.3	1.8	1.7	1.6	1.1	1.5
	Barium (Filtered)	µg/L	1.8	114.7 #8	22.8	36	38.9	37.5	41.5	34.1	32.9	29	33.1
	Beryllium (Filtered)	µg/L	0.5	12#3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Boron (Filtered)	µg/L	12	2 000#5	49	81	79	75	82	74	66	57	78
	Cadmium (Filtered)	µg/L	0.03	0.25#2	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	0.05	<0.03	0.03
	Calcium (Filtered)	mg/L	0.2	N.V.	56.6	120.7	112.4	119.7	83.5	91.6	102	68.3	97.9
	Chromium (III VI) (Filtered)	µg/L	0.2	Screened as individual species	10.1	0.2	0.3	<0.2	0.8	0.5	0.4	<0.2	0.3
	Copper (Filtered)	µg/L	1	8.77 #m-bat PNEC #16	5	2	2	2	5	5	5	2	4
	Iron	µg/L	20	Screened as filtered	988	126	151	91	230	289	362	590	592
	Iron (Filtered)	µg/L	20	1000#4	70	36	37	<20	86	102	84	66	51
	Lead (Filtered)	µg/L	0.1	4.14 #(m-bat) #16	0.5	0.2	<0.4	0.2	0.4	0.3	0.2	0.2	0.2
	Magnesium (Filtered)	mg/L	0.1	N.V.	6.4	10.3	9.4	9.2	10.3	12.4	15.5	11.5	15.5
	Manganese	µg/L	2	Screened as filtered	42	16	18	<2	20	14	26	28	29
	Manganese (Filtered)	µg/L	2	191.73 #m-bat PNEC #16	18	20	17	3	33	19	38	25	36
	Mercury (Filtered)	µg/L	0.01	0.07#9	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Nickel (Filtered)	µg/L	0.2	8.16 #mbat PNEC #16 MAC 34	1.8	2.7	2.4	2.4	2.9	3.2	3.6	2.5	4.5
	Phosphorus	µg/L	5	Screened as Ortho Phosphate	311	663	478	523	142	192	191	1 0	172
	Selenium (Filtered)	µg/L	1.2	2.67#8	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
	Vanadium (F ltered)	µg/L	0.6	20#5	2.6	2.7	3	3.2	3	1.9	1.5	1.1	1
	Zinc (Filtered)	µg/L	1.5	26.68 #m-bat PNEC #16 plus background 2µg/L #2)	7.3	5.1	4.8	13.3	9.2	10.3	14.8	6.4	8.2
	Potassium (Filtered)	mg/L	0.1	N.V.	4.6	7.6	8.4	8.9	7.6	7.1	6.7	5.4	5.9
	Chromium (hexavalent)	µg/L	6	3.4#4	<6	<6	<6	<6	<6	<6	<6	<6	<6
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7#4 MAC 32	10	<6	<6	<6	<6	<6	<6	<6	<6
Organics	TOC	mg/L	2	0	7	2	8	5	7	10	9	9	9
Inorganics	Sodium (F ltered)	mg/L	0.1	200#1	24.4	50.2	49.7	58.2	33.5	31	34.3	26.6	33.6
	Cyanide Total	mg/L	0.01	0.001#4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Electrical conductivity *(lab)	µS/cm	2	N.V.	401	883	820	819	650	717	687	549	736
	Sulphate	mg/L	0.5	400#5	44.2	69.6	61.8	62.6	91.1	85.3	94.2	71.1	90.5
	Chloride	mg/L	0.3	250#5	32.7	74.7	74.2	79.1	52.4	45.1	50.6	41.2	51.1
	Ortho Phosphate as P	mg/L	0.03	0.083 #17	0.19	0.57	0.4	0.49	0.07	0.16	0.13	0.04	0.07
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	4	3.9	3.3	4.3	9.4	5.9	5.3	3.4	4.8
	Alka inity (tota) as CaCO3	mg/L	1	N.V.	131	274	246	240	165	192	209	162	217
	Alka inity (Carbonate as CaCO3)	mg/L	1	N.V.	<1	24	<1	<1	<1	<1	<1	<1	<1
	Nitrate (as N)	mg/L	0.05	11.3#1	1.93	1.43	1.83	2.92	7.46	4	3.19	1.31	2.74
	Nitrite (as N)	mg/L	0.006	0.152 #1	0.052	0.023	0.022	0.02	0.055	0.065	0.04	0.047	0.022
	Alka inity (Bicarbonate as CaCO3)	mg/L	1	N.V.	131	250	246	240	165	192	209	162	217
	Ammoniacal Nitrogen as N	mg/L	0.03	0.3#4	0.12	0.05	<0.03	0.06	0.09	0.04	0.12	0.33	0.1
	Total Hardness	mg/l	1	N.V.	168	345	320	3 8	252	281	320	219	310
	Total Cations	mmolc/l	0	N.V.	4.53	9.25	8.76	9.49	6.67	7.12	8.03	5.65	7.77
	Total Anions	mmolc/l	0	N.V.	4.6	9.14	8.43	8.54	7.21	7.17	7.79	5.97	7.86
	pH (Lab)	pH Units	0.01	N.V.	7.2	8.3	8.15	8.25	7.89	7.96	8.19	7.82	8.11
	TDS	mg/L	35	N.V.	280	515	482	535	474	421	452	375	613
	TSS	mg/L	10	50#19	24	<10	<10	< 0	<10	<10	12	< 0	12
Other	Oxygen	mg/L	1	Field data screened	-	-	9	-	-	-	-	-	-

Statistical Summary

ChemName	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances Detects	GAC Magnitude of Exceedance	0th Percentile	90th Percentile	95th Percent le	98th Percentile	First Quartile	Second Quart le (median)	Third Quartile
GRO >C4-C8	7.00	0.00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C12	7.00	0.00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Aminomethyl phosphonic acid	3.00	3.00	0.90	0.90	1.60	1.60	1.30	1.30	0.35	3.00	3.00	16.00	0.98	1.54	1.57	1.59	1.10	1.30	1.45
% Cation Excess	9.00	9.00	-3.89	ND	5.27	5.27	0.11	-0.35	2.70	0.00	0.00	-	-2.98	2.59	3.93	4.73	-0.77	-0.35	1.52
Dissolved oxygen (%saturation)	9.00	9.00	59.57	59.57	111.92	111.92	92.00	90.84	19.00	7.00	7.00	1.40	67.75	110.95	111.44	111.73	81.91	90.84	107.55
pH	9.00	9.00	7.81	7.81	8.30	8.30	8.10	8.12	0.20	0.00	0.00	-	7.83	8.28	8.29	8.30	7.85	8.12	8.21
Electrical Conductivity	9.00	9.00	342.00	342.00	854.61	854.61	704.00	759.72	158.00	0.00	0.00	-	531.60	832.52	843.57	850.20	709.24	759.72	794.00
Temperature	9.00	9.00	4.93	4.93	18.83	18.83	12.00	12.74	4.90	0.00	0.00	-	3.46	17.73	18.28	18.61	8.53	12.74	14.97
Dissolved Oxygen (Filtered)	9.00	9.00	7.60	7.60	12.15	12.15	9.20	8.67	1.60	0.00	0.00	-	7.61	10.91	11.53	11.90	7.88	8.67	10.57
Field Redox	9.00	9.00	16.00	16.00	189.00	189.00	93.00	84.49	77.00	0.00	0.00	-	6.17	185.11	187.05	188.22	19.84	84.49	178.62
Redox	9.00	9.00	225.41	225.41	400.97	400.97	302.00	292.42	75.00	0.00	0.00	-	227.59	388.79	394.88	398.53	232.54	292.42	379.06
GRO >C4-C10	2.00	0.00	<10	ND	<10	ND		5.00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C4-C12	9.00	0.00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C10	2.00	0.00	<10	ND	<10	ND		5.00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
EPH C8-C40	9.00	0.00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Benzene	9.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Toluene	9.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Ethylbenzene	9.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene (m & p)	9.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene Total	6.00	0.00	<10	ND	<10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Xylene (o)	9.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total BTEX	6.00	0.00	<25	ND	<25	ND	13.00	12.50	0.00	0.00	0.00	-	12.50	12.50	12.50	12.50	12.50	12.50	12.50
MTBE	9.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total Phenols	9.00	0.00	<150	ND	<150	ND	75.00	75.00	0.00	0.00	0.00	-	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Glyphosate	3.00	3.00	0.80	0.80	4.10	4.10	2.00	1.00	1.90	0.00	0.00	-	0.84	3.48	3.79	3.98	0.90	1.00	2.55
Aluminium (Filtered)	8.00	1.00	11.10	11. 0	<20	11.10	10.00	10.00	0.39	0.00	0.00	-	0.00	10.33	10.72	10.95	10.00	0.00	10.00
Arsenic (Filtered)	9.00	9.00	1.10	1. 0	3.10	3.10	1.90	1.70	0.62	0.00	0.00	-	1.42	2.62	2.86	3.00	1.50	1.70	2.30
Barium (Filtered)	9.00	9.00	22.80	22.80	41.50	41.50	34.00	34.10	5.60	0.00	0.00	-	27.76	39.42	40.46	41.08	32.90	34.10	37.50
Beryllium (Filtered)	9.00	0.00	<0.5	ND	<0.5	ND	0.25	0.25	0.00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Boron (Filtered)	9.00	9.00	49.00	49.00	82.00	82.00	71.00	75.00	12.00	0.00	0.00	-	55.40	81.20	81.60	81.84	66.00	75.00	79.00
Cadmium (Filtered)	9.00	3.00	<0.03	0.03	0.05	0.05	0.02	0.02	0.01	0.00	0.00	-	0.02	0.03	0.04	0.05	0.02	0.02	0.03
Calcium (Filtered)	9.00	9.00	56.60	56.60	120.70	120.70	95.00	97.90	22.00	0.00	0.00	-	65.96	119.90	120.30	120.54	83.50	97.90	112.40
Chromium (III VI) (Filtered)	9.00	7.00	<0.2	0.20	10.10	10.10	1.40	0.30	3.30	0.00	0.00	-	0.10	2.66	6.38	8.61	0.20	0.30	0.50
Copper (Filtered)	9.00	9.00	2.00	2.00	5.00	5.00	3.60	4.00	1.50	0.00	0.00	-	2.00	5.00	5.00	5.00	2.00	4.00	5.00
Iron	9.00	9.00	91.00	91.00	988.00	988.00	380.00	289.00	294.00	0.00	0.00	-	119.00	671.20	829.60	924.64	151.00	289.00	590.00
Iron (Filtered)	9.00	8.00	<20	36.00	102.00	102.00	60.00	66.00	29.00	0.00	0.00	-	0.80	89.20	95.60	99.44	37.00	66.00	84.00
Lead (Filtered)	9.00	8.00	<0.4	0.20	0.50	0.50	0.27	0.20	0.11	0.00	0.00	-	0.20	0.42	0.46	0.48	0.20	0.20	0.30
Magnesium (Filtered)	9.00	9.00	6.40	6.40	15.50	15.50	11.00	10.30	3.00	0.00	0.00	-	8.64	15.50	15.50	15.50	9.40	10.30	12.40
Manganese	9.00	8.00	<2	14.00	42.00	42.00	22.00	20.00	12.00	0.00	0.00	-	11.40	31.60	36.80	39.92	16.00	20.00	28.00
Manganese (Filtered)	9.00	9.00	3.00	3.00	38.00	38.00	23.00	20.00	11.00	0.00	0.00	-	14.20	36.40	37.20	37.68	18.00	20.00	33.00
Mercury (Filtered)	9.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel (Filtered)	9.00	9.00	1.80	1.80	4.50	4.50	2.90	2.70	0.79	0.00	0.00	-	2.28	3.78	4.14	4.36	2.40	2.70	3.20
Phosphorus	9.00	9.00	130.00	130.00	663.00	663.00	311.00	192.00	196.00	0.00	0.00	-	139.60	551.00	607.00	640.60	172.00	192.00	478.00
Selenium (Filtered)	9.00	0.00	<1.2	ND	<1.2	ND	0.60	0.60	0.00	0.00	0.00	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Vanadium (F ltered)	9.00	9.00	1.00	1.00	3.20	3.20	2.20	2.60	0.86	0.00	0.00	-	1.08	3.04	3.12	3.17	1.50	2.60	3.00
Zinc (Filtered)	9.00	9.00	4.80	4.80	14.80	14.80	8.80	8.20	3.50	0.00	0.00	-	5.04	13.60	14.20	14.56	6.40	8.20	10.30
Potassium (Filtered)	9.00	9.00	4.60	4.60	8.90	8.90	6.90	7.10	1.40	0.00	0.00	-	5.24	8.50	8.70	8.82	5.90	7.10	7.60
Chromium (hexavalent)	9.00	0.00	<6	ND	<6	ND	3.00	3.00	0.00	0.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Chromium (Trivalent) (Filtered)	9.00	1.00	<6	10.00	10.00	10.00	3.80	3.00	2. 0	9.00	1.00	2.13	3.00	4.40	7.20	8.88	3.00	3.00	3.00
TOC	9.00	9.00	2.00	2.00	10.00	10.00	7.30	8.00	2.50	0.00	0.00	-	4.40	9.20	9.60	9.84	7.00	8.00	9.00
Sodium (F ltered)	9.00	9.00	24.40	24.40	58.20	58.20	38.00	33.60	12.00	0.00	0.00	-	26.16	51.80	55.00	56.92	31.00	33.60	49.70
Cyanide Total	9.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	9.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Electrical conductivity *(lab)	9.00	9.00	401.00	401.00	883.00	883.00	696.00	717.00	149.00	0.00	0.00	-	519.40	832.60	857.80	872.92	650.00	717.00	819.00
Sulphate	9.00	9.00	44.20	44.20	94.20	94.20	74.00	71.10	17.00	0.00	0.00	-	58.28	91.72	92.96	93.70	62.60	71.10	90.50
Chloride	9.00	9.00	32.70	32.70	79.10	79.10	56.00	51.10	16.00	0.00	0.00	-	39.50	75.58	77.34	78.40	45.10	51.10	74.20
Ortho Phosphate as P	9.00	9.00	0.04	0.04	0.57	0.57	0.24	0.16	0.20	6.00	6.00	6.87	0.06	0.51	0.54	0.56	0.07	0.16	0.40
Nitrogen (Total)	9.00	9.00	3.30	3.30	9.40	9.40	4.90	4.30	1.90	0.00	0.00	-	3.38	6.60	8.00	8.84	3.90	4.30	5.30
Alka inity (tota) as CaCO3	9.00	9.00	131.00	131.00	274.00	274.00	204.00	209.00	46.00	0.00	0.00	-	155.80	251.60	262.80	269.52	165.00	209.00	240.00
Alka inity (Carbonate as CaCO3)	9.00	1.00	<1	24.00	24.00	24.00	3.10	0.50	7.80	0.00	0.00	-	0.50	3.20	14.60	20.24	0.50	0.50	0.50
Nitrate (as N)	9.00	9.00	1.31	1.31	7.46	7.46	3.00	2.74	1.90	0.00	0.00	-	1.41	4.69	6.08	6.91	1.83	2.74	3.19
Nitrite (as N)	9.00	9.00	0.02	0.02	0.07	0.07	0.04	0.04	0.02	0.00	0.00	-	0.02	0.06	0.06	0.06	0.02	0.04	0.05
Alka inity (Bicarbonate as CaCO3)	9.00	9.00	131.00	131.00	250.00	250.00	201.00	209.00	42.00	0.00	0.00	-	155.80	246.80	248.40	249.36	165.00	209.00	240.00
Ammoniacal Nitrogen as N	9.00	8.00	<0.03	0.04	0.33	0.33	0.10	0.09	0.09	1.00	1.00	1.10	0.04	0.16	0.25	0.30	0.05	0.09	0.12
Total Hardness	9.00	9.00	168.00	168.00	345.00	345.00	284.00	310.00	60.00	0.00	0.00	-	208.80	339.40	342.20	343.88	252.00	310.00	320.00
Total Cations	9.00	9.00	4.53	4.53	9.49	9.49	7.50	7.77	1.70	0.00	0.00	-	5.43	9.30	9.39	9.45	6.67	7.77	8.76
Total Anions	9.00	9.00	4.60	4.60	9.14	9.14	7.40	7.79	1.40	0.00	0.00	-	5.70	8.66	8.90	9.04	7.17	7.79	8.43
pH (Lab)	9.00	9.00	7.20	7.20	8.30	8.30	8.00	8.11	0.34	0.00	0.00	-	7.70	8.26	8.28	8.29	7.89	8.11	8.19
TDS	9.00	9.00	280.00	280.00	613.00	613.00	461.00	474.00	96.00	0.00	0.00	-	356.00	550.60	581.80	600.52	421.00	474.00	515.00
TSS	9.00	3.00	<10	12.00	24.00	24.00	8.70	5.00	6.50	0.00	0.00	-	5.00	14.40	19.20	22.08	5.00	5.00	12.00
Oxygen	1.00	1.00	9.00	9.00	9.00	9.00		9.00		0.00	0.00	-	9.00	9.00	9.00	9.00	9.00	9.00	9.00

Comments
#1:WS Regs 2016 (Eng/Wal)
#2:WFD England/Wales. 2015 - AA-EQS Inland
#3:WHO DWG 2017
#4:WFD England/Wales. 2015 - Freshwater Standards
#5:SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6:USEPA RSL (tapwater) [May 2020]
#7:AECOM DWG (WHO method)
#8:PNEC (EU REACH) - Freshwater
#9:WFD England/Wales. 2015 - MAC-EQS Inland
#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water, 2015. (WHO> C10 -C12 AR.)
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR.)
#14 WHO Petroleum Products in Drinking Water, 2015.(WHO> C10 -C12 AR.)
#15 WHO Petroleum Products in Drinking Water. 2015.(WHO C16-C35 AR.)
#16 m-bat PNEC
#17 WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge limits for environmental permits, May 2018
#19 CSJV specified threshold for comp lance with the High Speed Rail (London - West Midlands) Act 2017 Schedu e 33 Protective Provisions

SSAC: Site Specific Assessment Criteria
(blank): No assessment criteria available
- : Not analysed

Key
XXX Exceedance of Proposed GAC
Percentiles used

Baseline Surface Water Sampling
ML024-SW202 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	P oposed GAC	ML024-SW202	ML024-SW202	ML024-SW202	ML024-SW202	ML024-SW202	ML024-SW202	ML024-SW202	ML024-SW202	ML024-SW202
				Sampled Date Time	13/06/2019	12/07/2019	08/08/2019	11/09/2019	04/10/2019	05/11/2019	02/12/2019	09/01/2020	07/02/2020
				Mon tor ng Round	1 June 2019	2 July 2019	3 August 2019	4 Septembe 2019	5 Octobe 2019	6 Novembe 2019	7 Decembe 2019	8 Janua y 2020	9 Feb ua y 2020
				Lab Report Number	19-9602-1-120820	19-11358-1-220719	19-12844-1-290819	19-14766-1-120820	19-16317-1-241019		19-19743-1-120820	20-245-2-110220	20-245-4-170220
	GRO >C4-C8	µg/l	10	P oposed GAC E42	10	10	10	10	10	10	10	-	-
	GRO >C8-C12	µg/l	10	100#14	10	10	10	10	10	10	10	-	-
	Am nomethyl phosphon c ac d	µg/L	0.2	0.1 #1	-	-	0.2	0.2	0.3	-	-	-	-
	% Cat on Excess	%		N.V.	-1.79	-1.32	3.14	5.12	-5.06	-1.62	-1.76	-1.14	-0.52
F eld	D ssolved oxygen (%satu at on)	%		80 #2	94.57	99.67	75.95	84.39	68.40	85.55	128 70	117.57	115.09
	pH	pH Un ts		6-9 #2	7.84	8.29	8.13	8.39	7.94	8.19	7.81	8.52	8.06
	Elect cal Conduct v ty	µS/cm		N.V.	307	2.29	828.7	762.1	706.5	675.5	542 2	489	589
	Tempe atu e	oC		20 #2	14.86	21.47	17.63	15.03	12.73	10.10	5.39	7.92	5.53
	D ssolved Oxygen (F te ed)	mg/L		N.V.	8.55	9.01	7.20	8.50	8.64	9.05	11.95	11.15	12.17
	F eld Redox	mV		N.V.	25	187 70	182.86	188.07	63.96	102.15	16.31	16	127
	Redox	mV		N.V.	236 26	385 89	384.33	391.72	269.53	309.89	227 87	233.04	345.16
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	10	10
	GRO >C4-C12	µg/L	10	100#12	10	10	10	10	10	10	10	10	10
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	10	10
	EPH C8-C40	µg/L	10	90#15	10	10	10	10	10	10	10	10	10
BTEX	Benzene	µg/L	5	10 #2	5	5	5	5	5	5	5	5	5
	Toluene	µg/L	5	74 #4	5	5	5	5	5	5	5	5	5
	Ethylbenzene	µg/L	5	20#5	5	5	5	5	5	5	5	5	5
	Xylene (m & p)	µg/L	5	Sc eened as total Xylene	5	5	5	5	5	5	5	5	5
	Xylene Total	µg/L		30#5	10	10	10	10	-	10	10	-	-
	Xylene (o)	µg/L	5	Sc eened as total Xylene	5	5	5	5	5	5	5	5	5
	Total BTEX	µg/L		Sc eened as nd v dual compounds	25	25	25	25	-	25	25	-	-
Oxygenates	MTBE	µg/L	5	5,100#8	5	5	5	5	5	5	5	5	5
Phenol cs	Total Phenols	µg/L	150	N.V.	150	150	150	150	150	150	150	150	150
He b c des	Glyphosate	µg/L	0.2	196#4	-	-	0.2	0.2	0.2	-	-	-	-
Metals	Alum n um (F lte ed)	µg/L	1.5	1000#18 (Total Alum n um)	20	-	-	20	20	20	20	20	30.7
	A sen c (F te ed)	µg/L	0.9	50#4	1.3	1.6	1.6	1.4	1.5	1.3	1	0.9	0.9
	Ba um (F lte ed)	µg/L	1.8	114.7 #8	19.2	25.4	34.9	26.2	31.7	25.1	30.3	28.3	23.9
	Be yll um (F lte ed)	µg/L	0.5	12#3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Bo on (F lte ed)	µg/L	12	2,000#5	42	59	63	55	70	61	51	47	47
	Cadm um (F te ed)	µg/L	0.03	0.15#2	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.04
	Calc um (F lte ed)	mg/L	0.2	N.V.	51	115 6	120 1	118.7	88.5	86.8	58.5	55.3	70.4
	Ch om um (I I VI) (F te ed)	µg/L	0.2	Sc eened as nd v dual spec es	1	9.2	0.4	8.4	0.9	0.6	0.2	0.2	0.6
	Coppe (F te ed)	µg/L	1	8.14 #m-bat PNEC #16	5	1	1	1	3	4	1	2	4
	I on	µg/L	20	Sc eened as f lte ed	931	170	1127	110	215	390	495	491	354
	I on (F lte ed)	µg/L	20	1000#4	62	20	20	20	39	98	85	62	100
	Lead (F lte ed)	µg/L	0.1	4 14 #(m-bat) #16	0.5	0.1	0.4	0.1	0.3	0.3	0.3	0.2	0.3
	Magnes um (F te ed)	mg/L	0.1	N.V.	4.9	5.3	5.8	5.6	7.7	10.4	11.1	10.1	11.4
	Manganese	µg/L	2	Sc eened as f lte ed	114	8	77	2	12	21	44	25	20
	Manganese (F te ed)	µg/L	2	174.04 #m-bat PNEC #16	18	10	66	2	16	27	57	24	29
	Me cu y (F lte ed)	µg/L	0.01	0.07#9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	N ckel (F lte ed)	µg/L	0.2	7.69 #mbat PNEC #16 MAC 34	1.7	1.5	1.6	1.4	2.4	3	1.7	1.8	3.8
	Phospho us	µg/L	5	Sc eened as O tho Phosphate	303	613	557	602	276	264	84	82	159
	Selen um (F lte ed)	µg/L	1.2	2.67#8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Vanad um (F lte ed)	µg/L	0.6	20	2	1.8	2.1	2	2.2	1.3	0.9	0.9	0.7
	Z nc (F lte ed)	µg/L	1.5	26.68 #m-bat PNEC #16plus backg ound 2µg/L #2)	12.7	3.5	2.8	4	11.3	14.3	4.4	4	7.8
	Potass um (F te ed)	mg/L	0.1	N.V.	4.2	4.4	7	7	6.5	6.6	5.6	5.1	5.7
	Ch om um (hexavalent)	µg/L	6	3.4#4	6	6	6	6	6	6	6	6	6
	Ch om um (T valent) (F lte ed)	µg/L	6	4.7#4 MAC 32	6	9	6	8	6	6	6	6	6
O gan cs	TOC	mg/L	2	N.V.	7	2	5	4	4	11	9	10	12
Ino gan cs	Sod um (F lte ed)	mg/L	0.1	200#1	24.5	34.9	51.2	49.7	35.6	30.8	30.3	24.6	26.5
	Cyan de Total	mg/L	0.01	0.001#4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Elect cal conduct v ty *(lab)	µS/cm	2	N.V.	400	751	851	763	643	669	484	473	541
	Sulphate	mg/L	0.5	400#5	33.8	49.3	46.7	46.9	63.4	76.2	67.1	61.5	65.5
	Chlo de	mg/L	0.3	250#5	32.1	54.8	81.7	65.6	57.4	45.1	46.3	36.4	40.8
	O tho Phosphate as P	mg/L	0.03	0.080 #17	0.18	0.56	0.47	0.58	0.27	0.27	0.03	0.03	0.11
	N t ogen (Tota)	µg/L	500	Sc eened as nd v dual spec es	4.2	5.1	6	5.2	5.2	5.1	4.1	2.7	4.7
	Alkal n ty (total) as CaCO3	mg/L	1	N.V.	127	259	240	238	214	192	137	127	155
	Alkal n ty (Ca bonate as CaCO3)	mg/L	1	N.V.	1	1	1	16	1	1	1	1	1
	N t ate (as N)	mg/L	0.05	11.3#1	1.64	4.13	3.76	4.06	3.7	3.09	0.48	0.73	2.78
	N t te (as N)	mg/L	0.006	0.152 #1	0.027	0.042	0.028	0.009	0.008	0.015	0.013	0.022	0.006
	Alkal n ty (B ca bonate as CaCO3)	mg/L	1	N.V.	127	259	240	222	214	192	137	127	155
	Ammon acal N t ogen as N	mg/L	0.03	0.3#4	0.23	0.14	0.09	0.05	0.05	0.2	1.2	0.43	0.06
	Total Ha dness	mg/l	1	N.V.	148	311	325	320	254	261	193	181	224
	Total Cat ons	mmolc/l	0	N.V.	4.12	7.84	8.88	8.73	6.76	6.7	5.29	4.79	5.75
	Total An ons	mmolc/l	0	N.V.	4.27	8.05	8.34	7.88	7.48	6.92	5.48	4.9	5.81
	pH (Lab)	pH_Un ts	0.01	N.V.	7.25	8.23	8.06	8.33	8.18	8.01	8.11	7.72	7.94
	TDS	mg/L	35	N.V.	259	464	488	462	445	406	359	309	407
	TSS	mg/L	10	50#19	20	10	23	10	10	10	18	11	10
Othe	Oxygen	mg/L	1	F eld data sc eened	-	-	9	-	-	-	-	-	-

Statistical Summary

ChemName	Numbe of Results	Numbe of Detects	M n mum Concent at on	M n mum Detect	Max mum Concent at on	Max mum (Exceedance of MAC H ghl ghted) Detect	Ave age (Exceedance of GAC H ghl ghted) Concent at on	Med an Concent at on	Standa d Dev at on	Numbe of Gu del ne Exceedances	Numbe of Gu del ne Exceedances (Detects Only)	GAC Magn tu e of Exceedance	10th Pe cent le	90th Pe cent le	95th Pe cent le	98th Pe cent le	F st Qua t le	Second Qua t le (med an)	Th d Qua t le
GRO >C4-C8	7.00	0.00	10	ND	10	ND	5.00	5 00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C12	7.00	0.00	10	ND	10	ND	5.00	5 00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Am nomethyl phosphon c ac d	3.00	2.00	0.2	0.20	0.30	0.30	0.20	0 20	0 10	3.00	2.00	3.00	0.12	0.28	0.29	0.30	0.15	0.20	0.25
% Cat on Excess	9.00	9.00	-5.06	ND	5.12	5.12	-0.55	-1 32	3 00	0.00	0.00	-	-2.44	3.54	4.33	4.80	-1.76	-1.32	-0.52
D ssolved oxygen (%satu at on)	9.00	9.00	68.40	68.40	128 70	128 70	97.00	94.57	20.00	7.00	7.00	1.61	74 44	119.80	124.25	126.92	84 39	94 57	115.09
pH	9.00	9.00	7.81	7.81	8.52	8.52	8.10	8 13	0 25	0.00	0.00	-	7.83	8.42	8.47	8.50	7.94	8.13	8.29
Elect cal Conduct v ty	9.00	9.00	2.29	2.29	828 68	828 68	545 00	589.00	257.00	0.00	0.00	-	246.06	775.43	802.06	818.03	489.00	589.00	706.49
Tempe atu e	9.00	9.00	5.39	5.39	21.47	21.47	12.00	12.73	5 50	1.00	1.00	1.07	5.50	18 40	19 93	20 85	7.92	12 73	15 03
D ssolved Oxygen (F te ed)	9.00	9.00	7.20	7.20	12.17	12.17	9.60	9 01	1 70	0.00	0.00	-	8.24	12 00	12 08	12 14	8.55	9.01	11 15
F eld Redox	9.00	9.00	16.00	16.00	188 07	188 07	101 00	102.15	74.00	0.00	0.00	-	16 25	187.78	187.92	188.01	25 00	102.15	182.86
Redox	9.00	9.00	227.87	227 87	391 72	391 72	309 00	309.89	70.00	0.00	0.00	-	232.01	387.06	389.39	390.79	236.26	309.89	384.33
GRO >C4-C10	2.00	0.00	10	ND	10	ND		5 00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C4-C12	9.00	0.00	10	ND	10	ND	5.00	5 00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C10	2.00	0.00	10	ND	10	ND		5 00		0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
EPH C8-C40	9.00	0.00	10	ND	10	ND	5.00	5 00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Benzene	9.00	0.00	5	ND	5	ND	2.50	2 50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Toluene	9.00	0.00	5	ND	5	ND	2.50	2 50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Ethylbenzene	9.00	0.00	5	ND	5	ND	2.50	2 50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene (m & p)	9.00	0.00	5	ND	5	ND	2.50	2 50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene Total	6.00	0.00	10	ND	10	ND	5.00	5 00	0 00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Xylene (o)	9.00	0.00	5	ND	5	ND	2.50	2 50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total BTEX	6.00	0.00	25	ND	25	ND	13.00	12.50	0 00	0.00	0.00	-	12 50	12 50	12 50	12 50	12 50	12 50	12 50
MTBE	9.00	0.00	5	ND	5	ND	2.50	2 50	0 00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total Phenols	9.00	0.00	150	ND	150	ND	75.00	75.00	0 00	0.00	0.00	-	75 00	75 00	75 00	75 00	75 00	75 00	75 00
Glyphosate	3.00	0.00	0.2	ND	0.2	ND	0.10	0 10	0 00	0.00	0.00	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Alum n um (F lte ed)	7.00	1.00	20	30.70	30.70	30.70	13.00	10.00	7 80	0.00	0.00	-	10 00	18 28	24 49	28 22	10 00	10 00	10 00
A sen c (F te ed)	9.00	8.00	0.9	0.90	1.60	1.60	1.20	1 30	0 38	0.00	0.00	-	0.81	1.60	1.60	1.60	1.00	1.30	1.50
Ba um (F lte ed)	9.00	9.00	19.20	19.20	34.90	34.90	27.00	26.20	4 70	0.00	0.00	-	22 96	32 34	33 62	34 39	25 10	26 20	30 30
Be yll um (F lte ed)	9.00	0.00	0.5	ND	0.5	ND	0.25	0 25	0 00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Bo on (F lte ed)	9.00	9.00	42.00	42.00	70.00	70.00	55.00	55.00	9 00	0.00	0.00	-	46 00	64 40	67 20	68 88	47 00	55 00	61 00
Cadm um (F te ed)	9.00	3.00	0.03	0.03	0.04	0.04	0.02	0 02	0 01	0.00	0.00	-	0.02	0.04	0.04	0.04	0.02	0.02	0.03
Calc um (F lte ed)	9.00	9.00	51.00	51.00	120 10	120 10	85.00	86.80	28.00	0.00	0.00	-	54 44	118.98	119.54	119.88	58 50	86 80	115.60
Ch om um (I I VI) (F te ed)	9.00	7.00	0.2	0.40	9.20	9.20	2.40	0 60	3 70	0.00	0.00	-	0.10	8.56	8.88	9.07	0.40	0.60	1.00
Coppe (F te ed)	9.00	8.00	1	1.00	5.00	5.00	2.40	2 00	1 70	0.00	0.00	-	0.90	4.20	4.60	4.84	1.00	2.00	4.00
I on	9.00	9.00	110.00	110 00	1127.00	1127.00	476 00	390.00	344.00	0.00	0.00	-	158.00	970.20	1048.60	1095.64	215.00	390.00	495.00
I on (F lte ed)	9.00	6.00	20	39.00	100 00	100 00	53.00	62.00	37.00	0.00	0.00	-	10 00	98 40	99 20	99 68	10 00	62 00	85 00
Lead (F lte ed)	9.00	8.00	0.10	0.10	0.50	0.50	0.26	0 30	0 12	0.00	0.00	-	0.10	0.34	0.42	0.47	0.20	0.30	0.30
Magnes um (F te ed)	9.00	9.00	4.90	4.90	11.40	11.40	8.00	7 70	2 70	0.00	0.00	-	5.22	11 16	11 28	11 35	5.60	7.70	10 40
Manganese	9.00	8.00	2	2.00	114 00	114 00	36.00	21.00	37.00	0.00	0.00	-	6.60	84 40	99 20	108.08	12 00	21 00	44 00
Manganese (F te ed)	9.00	8.00	2	10.00	66.00	66.00	28.00	24.00	21.00	0.00	0.00	-	8.20	58 80	62 40	64 56	16 00	24 00	29 00
Me cu y (F lte ed)	9.00	0.00	0.01	ND	0.01	ND	0.01	0 01	0 00	0.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
N ckel (F lte ed)	9.00	9.00	1.40	1.40	3.80	3.80	2.10	1 70	0 81	0.00	0.00	-	1.48	3.16	3.48	3.67	1.60	1.70	2.40
Phospho us	9.00	9.00	82.00	82.00	613 00	613 00	327 00	276.00	214.00	0.00	0.00	-	83 60	604.20	608.60	611.24	159.00	276.00	557.00
Selen um (F lte ed)	9.00	0.00	1.2	ND	1.2	ND	0.60	0 60	0 00	0.00	0.00	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Vanad um (F lte ed)	9.00	9.00	0.70	0.70	2.20	2.20	1.50	1 80	0 59	0.00	0.00	-	0.86	2.12	2.16	2.18	0.90	1.80	2.00
Z nc (F lte ed)	9.00	9.00	2.80	2.80	14.30	14.30	7.20	4 40	4 50	0.00	0.00	-	3.36	13 02	13 66	14 04	4.00	4.40	11 30
Potass um (F te ed)	9.00	9.00	4.20	4.20	7.00	7.00	5.80	5 70	1 10	0.00	0.00	-	4.36	7.00	7.00	7.00	5.10	5.70	6.60
Ch om um (hexavalent)	9.00	0.00	6	ND	6	ND	3.00	3 00	0 00	9.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Ch om um (T valent) (F lte ed)	9.00	2.00	6	8.00	9.00	9.00	4.20	3 00	2 40	9.00	2.00	1.91	3.00	8.20	8.60	8.84	3.00	3.00	3.00
TOC	9.00	8.00	2	4.00	12.00	12.00	7.00	7 00	3 70	0.00	0.00	-	3.40	11 20	11 60	11 84	4.00	7.00	10 00
Sod um (F lte ed)	9.00	9.00	24.50	24.50	51.20	51.20	34.00	30.80	10.00	0.00	0.00	-	24 58	50 00	50 60	50 96	26 50	30 80	35 60
Cyan de Total	9.00	0.00	0.01	ND	0.01	ND	0.01	0 01	0 00	9.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Elect cal conduct v ty *(lab)	9.00	9.00	400.00	400 00	851 00	851 00	619 00	643.00	154.00	0.00	0.00	-	458.40	780.60	815.80	836.92	484.00	643.00	751.00
Sulphate	9.00	9.00	33.80	33.80	76.20	76.20	57.00	61.50	13.00	0.00	0.00	-	44 12	68 92	72 56	74 74	46 90	61 50	65 50
Chlo de	9.00	9.00	32.10	32.10	81.70	81.70	51.00	46.30	16.00	0.00	0.00	-	35 94	68 82	75 26	79 12	40 80	46 30	57 40
O tho Phosphate as P	9.00	8.00	0.03	0.03	0.58	0.58	0.28	0 27	0 22	7.00	7.00	7.25	0.03	0.56	0.57	0.58	0.11	0.27	0.47
N t ogen (Tota)	9.00	9.00	2.70	2.70	6.00	6.00	4.70	5 10	0 94	0.00	0.00	-	3.82	5.36	5.68	5.87	4.20	5.10	5.20
Alkal n ty (total) as CaCO3	9.00	9.00	127.00	127 00	259 00	259.00	188 00	192.00	53.00	0.00	0.00	-	127.00	243.80	251.40	255.96	137.00	192.00	238.00
Alkal n ty (Ca bonate as CaCO3)	9.00	1.00	1	16.00	16.00	16.00	2.30	0 50	5 20	0.00	0.00	-	0.50	3.60	9.80	13 52	0.50	0.50	0.50
N t ate (as N)	9.00	9.00	0.48	0.48	4.13	4.13	2.70	3 09	1 40	0.00	0.00	-	0.68	4.07	4.10	4.12	1.64	3.09	3.76
N t te (as N)	9.00	8.00	0.006	0.01	0.04	0.04	0.02	0 02	0 01	0.00	0.00	-	0.01	0.03	0.04	0.04	0.01	0.02	0.03
Alkal n ty (B ca bonate as CaCO3)	9.00	9.00	127.00	127 00	259 00	259 00	186 00	192.00	51.00	0.00	0.00	-	127.00	243.80	251.40	255.96	137.00	192.00	222.00
Ammon acal N t ogen as N	9.00	9.00	0.05	0.05	1.20	1.20	0.27	0 14	0 37	2.00	2.00	4.00	0.05	0.58	0.89	1.08	0.06	0.14	0.23
Total Ha dness	9.00	9.00	148.00	148 00	325 00	325 00	246 00	254.00	65.00	0.00	0.00	-	174.40	321.00	323.00	324.20	193.00	254.00	311.00
Total Cat ons	9.00	9.00	4.12	4.12	8.88	8.88	6.50	6 70	1 70	0.00	0.00	-	4.66	8.76	8.82	8.86	5.29	6.70	7.84
Total An ons	9.00	9.00	4.27	4.27	8.34	8.34	6.60	6 92	1 50	0.00	0.00	-	4.77	8.11	8.22	8.29	5.48	6.92	7.88
pH (Lab)	9.00	9.00	7.25	7.25	8.33	8.33	8.00	8 06	0 33	0.00	0.00	-	7.63	8.25	8.29	8.31	7.94	8.06	8.18
TDS	9.00	9.00	259.00	259 00	488 00	488 00	400 00	407.00	77.00	0.00	0.00	-	299.00	468.80	478.40	484.16	359.00	407.00	462.00
TSS	9.00	4.00	10	11.00	23.00	23.00	11.00	5.00	7 50	0.00	0.00	-	5.00	20 60	21 80	22 52	5.00	5.00	18.00
Oxygen	1.00	1.00	9.00	9.00	9.00	9.00		9 00	0.00	0.00	0.00	-	9.00	9.00	9.00	9.00	9.00	9.00	9.00

Comments

#1 WS Regs 2016 (Eng/Wa)
#2 WFD England/Wales. 2015 - AA-EQS Inland
#3 WHO DWG 2017
#4 WFD England/Wales. 2015 - F eshwate Standa ds
#5 SEPA WAT-SG-53 F esh EQS - AA - 2015
#6 USEPA RSL (tapwate) [May 2020]
#7 AECOM DWG (WHO method)
#8 PNEC (EU REACH) - F eshwate
#9 WFD England/Wales. 2015 - MAC-EQS Inland
#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water, 2015. (WHO> C10 -
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR)
#14 WHO Petroleum Products in Drinking Water, 2015.(WHO> C10 -
#15 WHO Petroleum Products in Drinking Water, 2015.(WHO C16-
#16 m-bat PNEC
#17 WFD River Phosphorus Calcula or based UKTAG 2015 including 2µg/L background concentrat on for River Thames.
#18 EA, Guidance Water compan es: water treatment works discharge im ts or environmental permits, May 2018
#19 CSJV speci ied threshold or compliance with the H gh Speed Rail (London - West Midlands) Act 2017 Schedule 33 Protective Prov sions

SSAC S te Spec f c Assessment C te a
(blank) No assessment c te a ava lable
- Not analysed

Key

XXX	Exceedance of P oposed GAC
	Pe cent les used

Baseline Surface Water Sampling
ML024-SW203 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	Proposed GAC	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203	ML024-SW203
				Sampled Date Time	14/06/2019	11/07/2019	08/08/2019	26/09/2019	03/10/2019	04/11/2019	03/12/2019	08/01/2020	06/02/2020	05/03/2020	20/04/2020	20/05/2020
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020	10 March 2020	11 April 2020	12 May 2020
				Lab Report Number	19-9718-1-210619	19-11279-1-120820	19-12844-1-290819	19-15749-1-120820	19-16238-1-120820	19-18059-1-140120	19-19821-1-120820	20-245-1-110220	20-245-3-160320	20-245-5-130320	20-5458-1-140520	20-6567-1-020620
	GRO >C4-C8	µg/l	10	Proposed GAC E42	10	10	10	10	10	10	10	-	-	-	-	-
	GRO >C8-C12	µg/l	10	100#14	10	10	10	10	10	10	10	-	-	-	-	-
	Aminomethyl phosphonic acid	µg/L	0.2	0.1#1	-	-	1.4	1	0.72	-	-	-	-	2	0.6	0.7
	% Cation Excess	%		N.V.	-2.32	2.45	0.93	1.12	-4.19	-3.93	0.63	-4.28	-0.56	-2.58	-0.06	-1.53
Field	Dissolved oxygen (%saturation)	%		80#2	81.04	98.91	63.52	53.12	71.62	59.94	79.68	83.59	106.27	84.61	116.72	98.21
	pH	pH Units		6-9#2	7.85	7.90	7.94	7.98	7.55	8.22	7.99	7.87	8.11	8.08	7.85	7.99
	Electrical Conductivity	µS/cm		N.V.	444	22.11	794.68	506.00	809.92	645.51	776.99	816	790	738.40	808	875
	Temperature	oC		20#2	13.68	19.34	16.06	13.99	10.07	10.52	5.75	9.49	4.46	6.65	10.73	16.61
	Dissolved Oxygen (Filtered)	mg/L		N.V.	7.36	8.98	6.25	5.46	8.05	6.74	9.99	8.22	10.93	10.34	10.6	8.92
	Field Redox	mV		N.V.	31	186.71	186.77	188.26	45.90	100.32	12.79	13	116	54.21	181	180
	Redox	mV		N.V.	243.49	386.73	389.57	392.79	253.67	307.71	224.05	228.42	335.6	264.75	395.54	382.33
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	10	10	10	10	10
	GRO >C4-C12	µg/L	10	100#12	10	10	10	10	10	10	10	10	10	10	10	10
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	10	10	10	10	10
	EPH C8-C40	µg/L	10	90#15	10	10	10	10	10	10	10	10	10	10	10	10
BTEX	Benzene	µg/L	5	10#2	2	5	5	5	5	5	5	5	5	5	5	5
	Toluene	µg/L	5	74#4	5	5	5	5	5	5	5	5	5	5	5	5
	Ethylbenzene	µg/L	5	20#5	5	5	5	5	5	5	5	5	5	5	5	5
	Xylene (m & p)	µg/L	5	Screened as total Xylene	5	5	5	5	5	5	5	5	5	5	5	5
	Xylene Total	µg/L		30#5	10	10	10	10	10	10	10	-	-	-	-	-
	Xylene (o)	µg/L	5	Screened as total Xylene	5	5	5	5	5	5	5	5	5	5	5	5
	Total BTEX	µg/L		Screened as individual compounds	25	25	25	25	25	25	25	-	-	-	-	-
Oxygenates	MTBE	µg/L	5	5,100#8	5	5	5	5	5	5	5	5	5	5	5	5
Phenolics	Total Phenols	µg/L	150	N.V.	150	150	150	150	150	150	150	150	150	150	150	150
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	1	1.5	0.71	-	-	-	-	2	0.8	0.4
Metals	Aluminium (Filtered)	µg/L	15	1000#18 (Total Aluminium)	-	20	-	20	20	-	20	20	11.2	31.2	83.7	5.2
	Arsenic (Filtered)	µg/L	0.9	50#4	1.8	3	2.4	1.7	1.9	1.6	1.7	1.8	1.6	1.5	1.7	2.5
	Barium (Filtered)	µg/L	1.8	114.7#8	29.5	37.7	43.4	31.5	47	32	35.8	39.7	35.1	29.4	39.9	39.7
	Beryllium (Filtered)	µg/L	0.5	12#3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Boron (Filtered)	µg/L	12	2,000#5	62	81	79	66	105	69	80	87	85	63	88	82
	Cadmium (Filtered)	µg/L	0.03	0.25#2	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.04	0.03	0.03	0.04
	Calcium (Filtered)	mg/L	0.2	N.V.	72.7	125.6	112.8	74.1	91.1	80.3	101.4	100.6	99.4	67.3	112	116.7
	Chromium (III+VI) (Filtered)	µg/L	0.2	Screened as individual species	9.2	0.2	0.3	0.5	1.1	7	0.4	0.2	0.4	0.7	0.3	0.2
	Copper (Filtered)	µg/L	1	10.42 #m-bat PNEC #16	2	5	2	3	5	5	4	3	5	3	5	3
	Iron	µg/L	20	Screened as filtered	345	467	103	172	495	464	445	647	622	1789	407	307
	Iron (Filtered)	µg/L	20	1000#4	105	60	43	49	74	101	70	67	87	172	101	112
	Lead (Filtered)	µg/L	0.1	4.14 #(m-bat)#16	0.5	0.3	0.4	0.6	0.3	0.4	0.2	0.1	0.2	0.4	0.2	0.3
	Magnesium (Filtered)	mg/L	0.1	N.V.	9	10.2	9.3	7.1	11.6	11.7	14.9	16	16.4	11.4	15.3	12.9
	Manganese	µg/L	2	Screened as filtered	17	33	18	18	29	24	36	45	42	46	50	35
	Manganese (Filtered)	µg/L	2	246.59 #m-bat PNEC #16	24	43	19	11	36	23	38	49	43	47	91	59
	Mercury (Filtered)	µg/L	0.01	0.07#9	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Nickel (Filtered)	µg/L	0.2	9.39 #m-bat PNEC#16 MAC 34	2.4	3	2.5	1.9	3.5	2.8	3.8	4.6	5	5.2	5.3	5.5
	Phosphorus	µg/L	5	Screened as Orthophosphate	267	687	491	260	194	262	259	243	207	186	194	371
	Selenium (Filtered)	µg/L	1.2	2.67#8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Vanadium (Filtered)	µg/L	0.6	20#5	2.6	2.9	2.9	3.4	3.2	1.9	1.5	1.5	1.3	1.1	1.8	2.2
	Zinc (Filtered)	µg/L	1.5	26.59 #m-bat PNEC #16 plus background (2µg/L #2)	7.6	7.6	5.7	6.8	8.7	8.5	13.1	9.2	10.1	10.3	5.4	14
	Potassium (Filtered)	mg/L	0.1	N.V.	5.8	7.9	8	6.3	7.1	6.1	6.3	6.2	6.1	5.4	6.5	6.3
	Chromium (hexavalent)	µg/L	6	3.4#4	6	6	6	6	6	6	6	6	6	6	6	6
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7#4 MAC 32	9	6	6	6	6	7	6	6	6	6	6	6
Organics	TOC	mg/L	2	N.V.	-	2	5	5	12	9	8	6	7	14	5	2
Inorganics	Sodium (Filtered)	mg/L	0.1	200#1	31.8	52.7	48.4	32.5	29.6	28.4	34.3	32.9	33.8	28.4	39.4	37.1
	Cyanide Total	mg/L	0.01	0.001#4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Electrical conductivity (lab)	µS/cm	2	N.V.	575	903	843	574	684	594	765	797	686	471	832	468
	Sulphate	mg/L	0.5	400#5	67.1	69.9	61.3	56.7	94.4	74.4	94.2	95.7	99.9	64.8	92.9	76.1
	Chloride	mg/L	0.3	250#5	43.3	76	72.9	44.6	55.7	41.2	52.9	53.8	50	43.4	62.3	63.3
	Orthophosphate as P	mg/L	0.03	0.084#17	0.17	0.57	0.43	0.2	0.08	0.16	0.12	0.09	0.08	0.03	0.06	
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	4.7	2.9	3.3	4	13.8	6	6.8	5.3	4.6	3.6	5.2	3.4
	Alkalinity (total) as CaCO3	mg/L	1	N.V.	168	271	253	155	161	194	207	245	217	164	244	271
	Alkalinity (Carbonate as CaCO3)	mg/L	1	N.V.	1	1	1	1	1	1	1	1	1	1	1	1
	Nitrate (as N)	mg/L	0.05	11.3#1	2.8	1.66	2.04	2.63	11.54	4.01	3.43	3.17	2.89	1.67	2.33	1.99
	Nitrite (as N)	mg/L	0.006	0.152#1	0.053	0.049	0.053	0.045	0.062	0.059	0.045	0.089	0.025	0.009	0.045	0.116
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	N.V.	168	271	253	155	161	194	207	245	217	164	244	271
	Ammoniacal Nitrogen as N	mg/L	0.03	0.3#4	0.11	0.16	0.06	0.11	0.09	0.05	0.14	0.21	0.11	0.08	0.12	0.21
	Total Hardness	mg/l	1	N.V.	220	357	321	215	276	250	316	319	317	216	344	346
	Total Cations	mmolc/l	0	N.V.	5.9	9.6	8.7	5.86	6.97	6.36	7.94	7.93	7.94	5.67	8.73	8.66
	Total Anions	mmolc/l	0	N.V.	6.18	9.14	8.54	5.73	7.58	6.88	7.84	8.64	8.03	5.97	8.74	8.93
	pH (Lab)	pH Units	0.01	N.V.	7.69	8.13	8.03	7.92	7.71	7.9	8.11	7.92	7.98	8.03	8.12	8.22
	TDS	mg/L	35	N.V.	373	515	489	343	515	357	520	533	485	443	571	532
	TSS	mg/L	10	50#19	10	15	10	10	10	10	12	10	10	20	10	10
Other	Oxygen	mg/L	1	Field data screened	-	-	9	-	-	-	-	-	-	-	-	-

Statistical Summary

ChemName	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)	GAC Magnitude of Exceedance	10th Percentile	90th Percentile	95th Percentile	98th Percentile	First Quartile	Second Quartile (median)	Third Quartile
GRO >C4-C8	7.00	0.00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C12	7.00	0.00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Aminomethyl phosphonic acid	6.00	5.00	0.60	0.60	2	1.40	0.90	0.86	0.29	6.00	5.00	14.00	0.65	1.20	1.30	1.36	0.71	0.86	1.00
% Cation Excess	12.00	12.00	-4.28	ND	2.45	2.45	-1.20	-1.05	2.30	0.00	0.00	-	-4.16	1.10	1.72	2.16	-2.92	-1.05	0.71
Dissolved oxygen (%saturation)	12.00	12.00	53.12	53.12	116.72	116.72	83.00	82.31	19.00	7.00	7.00	1.46	80.30	105.53	110.97	114.42	69.59	82.31	98.39
pH	12.00	12.00	7.55	7.55	8.22	8.22	7.90	7.96	0.17	0.00	0.00	-	7.85	8.11	8.16	8.20	7.87	7.96	8.01
Electrical Conductivity	12.00	12.00	22.11	22.11	875.00	875.00	669.00	783.49	242.00	0.00	0.00	-	450.20	815.39	842.55	862.02	610.63	783.49	808.48
Temperature	12.00	12.00	4.46	4.46	19.34	19.34	11.00	10.63	4.60	0.00	0.00	-	5.84	16.55	17.84	18.74	8.78	10.63	14.51
Dissolved Oxygen (Filtered)	12.00	12.00	5.46	5.46	10.93	10.93	8.50	8.57	1.80	0.00	0.00	-	6.30	10.57	10.75	10.86	7.20	8.57	10.08
Field Redox	12.00	12.00	12.79	12.79	188.26	188.26	108.00	108.16	74.00	0.00	0.00	-	14.80	186.76	187.44	187.93	42.18	108.16	182.43
Redox	12.00	12.00	224.05	224.05	395.54	395.54	317.00	321.66	71.00	0.00	0.00	-	229.93	392.47	394.03	394.94	251.13	321.66	387.44
GRO >C4-C10	5.00	0.00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C4-C12	12.00	0.00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C10	5.00	0.00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
EPH C8-C40	12.00	0.00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Benzene	12.00	1.00	2.00	2.00	5	2.00	2.50	2.50	0.14	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Toluene	12.00	0.00	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Ethylbenzene	12.00	0.00	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene (m & p)	12.00	0.00	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene Total	7.00	0.00	10	ND	10	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Xylene (o)	12.00	0.00	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total BTEX	7.00	0.00	25	ND	25	ND	13.00	12.50	0.00	0.00	0.00	-	12.50	12.50	12.50	12.50	12.50	12.50	12.50
MTBE	12.00	0.00	5	ND	5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total Phenols	12.00	0.00	150	ND	150	ND	75.00	75.00	0.00	0.00	0.00	-	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Glyphosate	6.00	5.00	0.40	0.40	2	1.50	0.90	0.90	0.37	0.00	0.00	-	0.56	1.25	1.38	1.45	0.73	0.90	1.00
Aluminium (Filtered)	9.00	4.00	5.20	5.20	83.70	83.70	20.00	10.00	25.00	0.00	0.00	-	9.04	41.70	62.70	75.30	10.00	10.00	11.20
Arsenic (Filtered)	12.00	12.00	1.50	1.50	3.00	3.00	1.90	1.75	0.46	0.00	0.00	-	1.60	2.49	2.73	2.89	1.68	1.75	2.03
Barium (Filtered)	12.00	12.00	29.40	29.40	47.00	47.00	37.00	36.75	5.50	0.00	0.00	-	29.70	43.05	45.02	46.21	31.88	36.75	39.75
Beryllium (Filtered)	12.00	0.00	0.5	ND	0.5	ND	0.25	0.25	0.00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Boron (Filtered)	12.00	12.00	62.00	62.00	105.00	105.00	79.00	80.50	12.00	0.00	0.00	-	63.30	87.90	95.65	101.26	68.25	80.50	85.50
Cadmium (Filtered)	12.00	5.00	0.03	0.03	0.05	0.05	0.03	0.02	0.01	0.00	0.00	-	0.02	0.04	0.04	0.05	0.02	0.02	0.03
Calcium (Filtered)	12.00	12.00	67.30	67.30	125.60	125.60	96.00	100.00	19.00	0.00	0.00	-	72.84	116.31	120.71	123.64	78.75	100.00	112.20
Chromium (III+VI) (Filtered)	12.00	10.00	0.2	0.20	9.20	9.20	1.70	0.40	3.00	0.00	0.00	-	0.11	6.41	7.99	8.72	0.28	0.40	0.80
Copper (Filtered)	12.00	12.00	2.00	2.00	6.00	6.00	3.60	3.50	1.40	0.00	0.00	-	2.00	5.00	5.45	5.78	2.00	3.50	5.00
Iron	12.00	12.00	103.00	103.00	1789.00	1789.00	522.00	454.50	430.00	0.00	0.00	-	185.50	644.50	1160.90	1537.76	335.50	454.50	526.75
Iron (Filtered)	12.00	12.00	43.00	43.00	172.00	172.00	87.00	80.50	35.00	0.00	0.00	-	50.10	111.30	139.00	158.80	65.25	80.50	102.00
Lead (Filtered)	12.00	11.00	0.10	0.10	0.60	0.60	0.31	0.30	0.14	0.00	0.00	-	0.20	0.49	0.55	0.58	0.20	0.30	0.40
Magnesium (Filtered)	12.00	12.00	7.10	7.10	16.40	16.40	12.00	11.65	3.00	0.00	0.00	-	9.03	15.93	16.18	16.31	9.98	11.65	15.00
Manganese	12.00	12.00	17.00	17.00	50.00	50.00	33.00	34.00	12.00	0.00	0.00	-	18.00	45.90	47.80	49.12	22.50	34.00	42.75
Manganese (Filtered)	12.00	12.00	11.00	11.00	91.00	91.00	40.00	40.50	21.00	0.00	0.00	-	19.40	58.00	73.40	83.96	23.75	40.50	47.50
Mercury (Filtered)	12.00	0.00	0.01	ND	0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel (Filtered)	12.00	12.00	1.90	1.90	5.50	5.50	3.80	3.65	1.30	0.00	0.00	-	2.41	5.29	5.39	5.46	2.73	3.65	5.05
Phosphorus	12.00	12.00	186.00	186.00	687.00	687.00	302.00	259.50	149.00	0.00	0.00	-	194.00	479.00	579.20	643.88	203.75	259.50	295.00
Selenium (Filtered)	12.00	0.00	1.2	ND	1.2	ND	0.60	0.60	0.00	0.00	0.00	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Vanadium (Filtered)	12.00	12.00	1.10	1.10	3.40	3.40	2.20	2.05	0.79	0.00	0.00	-	1.32	3.17	3.29	3.36	1.50	2.05	2.90
Zinc (Filtered)	12.00	12.00	5.40	5.40	14.00	14.00	8.90	8.60	2.70	0.00	0.00	-	5.81	12.82	13.51	13.80	7.40	8.60	10.15
Potassium (Filtered)	12.00	12.00	5.40	5.40	8.00	8.00	6.50	6.30	0.79	0.00	0.00	-	5.83	7.82	7.95	7.98	6.10	6.30	6.65
Chromium (hexavalent)	12.00	0.00	6	ND	6	ND	3.00	3.00	0.00	12.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Chromium (Trivalent) (Filtered)	12.00	2.00	6	7.00	9.00	9.00	3.80	3.00	2.00	12.00	2.00	1.91	3.00	6.60	7.90	8.56	3.00	3.00	3.00
TOC	11.00	11.00	2	2.00	14.00	14.00	6.80	6.50	3.70	0.00	0.00	-	2.30	11.70	12.90	13.56	5.00	6.50	8.25
Sodium (Filtered)	12.00	12.00	28.40	28.40	52.70	52.70	36.00	33.35	7.70	0.00	0.00	-	28.52	47.50	50.34	51.75	31.25	33.35	37.68
Cyanide Total	12.00	0.00	0.01	ND	0.01	ND	0.01	0.01	0.00	12.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Electrical conductivity (lab)	12.00	12.00	468.00	468.00	903.00	903.00	685.00	685.00	147.00	0.00	0.00	-	481.30	841.90	870.00	889.80	574.75	685.00	805.75
Sulphate	12.00	12.00	56.70	56.70	99.90	99.90	79.00	75.25	16.00	0.00	0.00	-	61.65	95.57	97.59	98.98	66.53	75.25	94.25
Chloride	12.00	12.00	41.20	41.20	76.00	76.00	55.00	53.35	12.00	0.00	0.00	-	43.31	71.94	74.30	75.32	44.30	53.35	62.55
Orthophosphate as P	11.00	10.00	0.03	0.06	0.57	0.57	0.18	0.12	0.17	7.00	7.00	6.79	0.06	0.43	0.50	0.54	0.08	0.12	0.19
Nitrogen (Total)	12.00	12.00	2.90	2.90	13.80	13.80	5.30	4.65	2.90	0.00	0.00	-	3.31	6.72	9.95	12.26	3.55	4.65	5.48
Alkalinity (total) as CaCO3	12.00	12.00	155.00	155.00	271.00	271.00	213.00	212.00	44.00	0.00	0.00	-	161.30	269.20	271.00	271.00	167.00	212.00	247.00
Alkalinity (Carbonate as CaCO3)	12.00	0.00	1	ND	1	ND	0.50	0.50	0.00	0.00	0.00	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Nitrate (as N)	12.00	12.00	1.66	1.66	11.54	11.54	3.30	2.72	2.70	1.00	1.00	1.02	1.70	3.95	7.40	9.88	2.03	2.72	3.24
Nitrite (as N)	12.00	12.00	0.01	0.01	0.12	0.12	0.05	0.05	0.03	0.00	0.00	-	0.03	0.09	0.10	0.11	0.05	0.05	0.06
Alkalinity (Bicarbonate as CaCO3)	12.00	12.00	155.00	155.00	271.00	271.00	213.00	212.00	44.00	0.00	0.00	-	161.30	269.20	271.00	271.00	167.00	212.00	247.00
Ammoniacal Nitrogen as N	12.00	12.00	0.05	0.05	0.21	0.21	0.12	0.11	0.05	0.00	0.00	-	0.06	0.21	0.21	0.21	0.09	0.11	0.15
Total Hardness	12.00	12.00	215.00	215.00	357.00	357.00	291.00	316.50	54.00	0.00	0.00	-	216.40	345.80	350.95	354.58	242.50	316.50	326.75
Total Cations	12.00	12.00	5.67	5.67	9.60	9.60	7.50	7.94	1.30	0.00	0.00	-	5.86	8.73	9.12	9.41	6.25	7.94	8.67
Total Anions	12.00	12.00	5.73	5.73	9.14	9.14	7.70	7.94	1.20	0.00	0.00	-	5.99	8.91	9.02	9.09	6.71	7.94	8.67
pH (Lab)	12.00	12.00	7.69	7.69	8.22	8.22	8.00	8.01	0.16	0.00	0.00	-	7.73	8.13	8.17	8.20	7.92	8.01	8.11
TDS	12.00	12.00	343.00	343.00	571.00	571.00	473.00	502.00	76.00	0.00	0.00	-	358.60	532.90	550.10	562.64	425.50	502.00	523.00
TSS	12.00	5.00	10	10.00	20.00	20.00	8.50	5.00	5.00	0.00	0.00	-	5.00	14.70	17.25	18.90	5.00	5.00	10.50
Oxygen	1.00	1.00	9.00	9.00	9.00	9.00	9.00	9.00	0.00	0.00	0.00	-	9.00	9.00	9.00	9.00	9.00	9.00	9.00

Comments

#1 WS Regs 2016 (Eng/Wal)
#2 WFD England/Wales. 2015 - AA-EQS Inland
#3 WHO DWG 2017
#4 WFD England/Wales. 2015 - Freshwater Standards
#5 SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6 USEPA RSL (tapwater) [May 2020]
#7 AECOM DWG (WHO method)
#8 PNEC (EU REACH) - Freshwater
#9 WFD England/Wales. 2015 - MAC-EQS Inland
#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water. 2015. (WHO> C10 -
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR.)
#14 WHO Petroleum Products in Drinking Water, 2015.(WHO> C10 -
#15 WHO Petroleum Products in Drinking Water, 2015.(WHO C16-
#16 m-bat PNEC
#17 WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge limits for environmental permits, May 2018
#19 CSJV specified threshold for compliance with the High Speed Rail (London - West Midlands) Act 2017 Schedule 33 Protective Provisions

SSAC Site Specific Assessment Criteria
(blank) No assessment criteria available
- Not analysed
XXXXX May EC lab data erroneous

Key

XXX Exceedance of Proposed GAC
Percentiles used

Baseline Surface Water Sampling
ML025-SW200 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	Proposed GAC	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200	ML025-SW200
				Sampled Date Time	14/06/2019	11/07/2019	08/08/2019	26/09/2019	03/10/2019	04/11/2019	03/12/2019	08/01/2020	06/02/2020	05/03/2020	20/04/2020	20/05/2020
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020	10 March 2020	11 April 2020	12 May 2020
				Lab Report Number	19-9718-1-210619	19-11279-1-120820	19-12844-1-290819	19-15749-1-120820	19-16238-1-120820	19-18059-1-140120	19-19893-1-111219	20-245-1-110220	20-245-3-160320	20-245-5-130320	20-5458-1-140520	20-6567-1-020620
	GRO >C4-C8	µg/l	10	Proposed GAC E42	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-
	GRO >C8-C12	µg/l	10	100#14	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-
	Aminomethyl phosphonic acid	µg/L	0.2	0.1 #1	-	-	3.9	0.7	<2	-	-	-	-	<2	<2	<2
	% Cation Excess	%		N.V.	3.36	0.94	0.5	0.21	3.5	-2.58	-1.83	-6.22	-3.23	-3.46	-8.56	-11.22
Field	Dissolved oxygen (%saturation)	%		80 #2	44.16	34.90	55.39	33.32	70.41	63.68	75.34	62.99	94.55	90.03	73.34	38.97
	pH	pH Units		6-9 #2	7.76	7.79	7.94	7.91	7.98	8.13	7.83	7.6	7.69	8.08	7.81	7.95
	Electrical Conductivity	µS/cm		N.V.	792	1962.757	1543.22	1321. 6	1158.83	1167.70	1226.16	1533	948	734.00	2091	2670
	Temperature	oC		23 #2	12.67	14.25	14.18	13.38	9.28	9.68	6.13	8.97	5.47	5.78	10.47	14.7
	Dissolved Oxygen (Filtered)	mg/L		N.V.	4.51	3.56	5.66	3.47	8.07	7.30	9.31	6.44	9.86	11.24	7.49	3.98
	Field Redox	mV		N.V.	-12	171.60	185.27	185.68	36.31	23.31	10.85	11	20	45.56	167	254
	Redox	mV		N.V.	201.79	375.91	389.65	390.71	244.72	231.39	221.81	226.86	238.88	256.8	381.92	457.93
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	<10	<10	<10	<10	<10
	GRO >C4-C12	µg/L	10	100#12	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	<10	<10	<10	<10	<10
	EPH C8-C40	µg/L	10	90#15	<10	<10	<10	570	410	2000	<10	<10	<10	<10	<10	<10
BTEX	Benzene	µg/L	5	10#2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Toluene	µg/L	5	74#4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Ethylbenzene	µg/L	5	20#5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene (m & p)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene Total	µg/L		30#5	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-
	Xylene (o)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Total BTEX	µg/L		Screened as individual compounds	<25	<25	<25	<25	<25	<25	<25	-	-	-	-	-
Oxygenates	MTBE	µg/L	5	5 00#8	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Phenolics	Total Phenols	µg/L	150	N.V.	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	0.6	0.3	<2	-	-	-	-	<2	<2	<2
Metals	Aluminium (Filtered)	µg/L	1.5	000#18 (Total Aluminium)	-	<20	-	<20	<20	-	-	<20	20.8	30.5	7.9	9.4
	Arsenic (Filtered)	µg/L	0.9	50#4 MAC 25	2.3	2	1.9	2.7	2.8	3	2.4	2	1.6	1.5	2	1.8
	Barium (Filtered)	µg/L	1.8	114.7 #8	41.2	79.6	62.6	44.3	41	43.8	41.3	122.6	57.3	29.7	167.3	206.6
	Beryllium (Filtered)	µg/L	0.5	12#3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Boron (Filtered)	µg/L	12	2 000#5	316	2809	1724	318	206	177	231	1762	661	151	5148	7229
	Cadmium (Filtered)	µg/L	0.03	0 25#2	0.1	<0.03	<0.03	0.2	0.16	0.18	0.06	0.04	0.03	0.03	<0.03	<0.03
	Calcium (Filtered)	mg/L	0.2	N.V.	117.2	147.6	117.3	134	141	135.6	133.4	149	96.9	61.4	163.8	129.5
	Chromium (III VI) (Filtered)	µg/L	0.2	Screened as individual species	6.6	1	0.8	0.6	0.7	0.6	8.2	0.4	0.7	7.5	1.2	1.8
	Copper (Filtered)	µg/L	1	11.27 #m-bat PNEC #16	10	3	3	11	9	7	8	5	6	8	3	2
	Iron	µg/L	20	Screened as F ltered	2795	614	1266	3194	4652	4038	810	2908	2555	2359	2656	3393
	Iron (Filtered)	µg/L	20	1000#4	120	286	238	55	72	241	121	785	674	324	140	165
	Lead (Filtered)	µg/L	0.1	4.14 #(m-bat) #16	1.6	1	2.8	1.9	0.8	1.7	0.5	0.2	0.8	1.7	0.2	0.3
	Magnesium (Filtered)	mg/L	0.1	N.V.	17.2	32.4	20.7	17.1	19.9	20	21.5	33.1	19.1	11.7	49.7	57
	Manganese	µg/L	2	Screened as F ltered	87	60	25	69	92	90	47	206	81	37	151	125
	Manganese (Filtered)	µg/L	2	282.38 #m-bat PNEC #16	54	56	21	40	22	46	44	206	70	25	145	134
	Mercury (Filtered)	µg/L	0.01	0.07#9	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Nickel (Filtered)	µg/L	0.2	10.06 #m-bat PNEC #16 MAC 34	7.1	5.3	4.4	10.9	8.3	8.3	6.1	7.4	5	4.7	7.5	7.3
	Phosphorus	µg/L	5	Screened as Ortho Phosphate	650	3213	2718	686	597	782	324	341	365	317	404	684
	Selenium (Filtered)	µg/L	1.2	2 67#8	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
	Vanadium (F ltered)	µg/L	0.6	20#5	2.5	1.7	1.4	4.5	3.6	2.2	2	2.1	1.5	1.2	1.6	1.5
	Zinc (Filtered)	µg/L	1.5	26.48 #m-bat PNEC #16 incl. background 2µg/L #2)	27.9	10.4	9.9	51.4	21.5	28.3	20.9	18.8	13.1	10.2	8.9	10.1
	Potassium (Filtered)	mg/L	0.1	N.V.	25	45.6	35.9	27.4	27.6	24.7	21.3	33.7	18.4	11.3	52.7	67.1
	Chromium (hexavalent)	µg/L	6	3.4	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
	Chromium (Trivalent) (Filtered)	µg/L	6	4.7 MAC 34	7	<6	<6	<6	<6	<6	8	<6	<6	8	<6	<6
Organics	TOC	mg/L	2	N.V.	14	17	20	20	21	21	19	24	18	23	23	22
Inorganics	Sodium (Filtered)	mg/L	0.1	200#1	83.7	198.7	152.3	72.5	60.1	56.8	70.8	69.2	48.6	29.1	132.9	191.8
	Cyanide Total	mg/L	0.01	0.001#4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Electrical conductivity *(lab)	µS/cm	2	N.V.	1059	2035	1655	1056	891	095	1043	1464	856	470	1858	2296
	Sulphate	mg/L	0.5	400#5	115.6	69	50.1	161.4	176.4	147.3	157.5	120.5	88.7	55.4	81.2	33.9
	Chloride	mg/L	0.3	250#5	89.3	255.9	208	95.1	83.3	85.8	114.7	90.5	67.3	42.8	145.9	212.4
	Ortho Phosphate as P	mg/L	0.03	0.087 #17	0.3	2.38	2.34	0.45	0.25	0.4	0.14	<0.03	<0.03	0.1	0.05	-
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	6	60.4	49.4	5.2	6.1	7.8	7.1	24.6	11.9	6	33.9	99
	Alka inity (total) as CaCO3	mg/L	1	N.V.	279	349	240	279	247	316	286	532	279	173	845	932
	Alka inity (Carbonate as CaCO3)	mg/L	1	N.V.	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Nitrate (as N)	mg/L	0.05	11.3#1	3.97	53.72	45.34	3.96	3.01	4.36	3.78	2.62	3.74	2.19	4.50	17.28
	Nitrite (as N)	mg/L	0.006	0.152 #1	0.235	1.518	0.111	0.031	0.007	0.018	0.059	0.086	0.097	0.015	0.224	0.452
	Alka inity (Bicarbonate as CaCO)	mg/L	1	N.V.	279	349	240	279	247	316	286	532	279	173	845	932
	Ammoniacal Nitrogen as N	mg/L	0.03	0.3#4	0.6	0.19	0.06	0.38	0.09	0.18	0.26	17.81	5.23	1.11	50.78	80.57
	Total Hardness	mg/l	1	N.V.	365	505	380	407	436	423	424	512	322	203	618	563
	Total Cations	mmolc/l	0	N.V.	11.54	19.84	15.1	11.95	11.99	11.51	12.05	14.03	8.99	5.58	19.39	21.21
	Total Anions	mmolc/l	0	N.V.	10.79	19.47	14.95	11.9	11. 8	12.12	12.5	15.89	9.59	5.98	23.02	26.57
	pH (Lab)	pH_Units	0.01	N.V.	7.81	7.96	7.93	7.99	8.07	8.22	8.07	7.56	7.73	7.9	8.07	8.02
	TDS	mg/L	35	N.V.	695	1315	1018	753	778	767	827	896	552	399	1067	1282
	TSS	mg/L	10	50#19	68	15	11	66	171	97	21	24	24	15	11	24
Other	Oxygen	mg/L	1	Field data screened	-	-	9	-	-	-	-	-	-	-	-	-

Statistical Summary

ChemName	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guide ine Exceedances (Detects Only)	GAC Magniture of Exceedance	10th Percentil e	90th Percentile	95th Percentile	98th Percentile	First Quart le	Second Quartile (median)	Third Quartile
GRO >C4-C8	7	0	<10	ND	<10	ND	5.00	5	0	0	0	-	5	5	5	5	5	5	5
GRO >C8-C12	7	0	<10	ND	<10	ND	5	5	0	0	0	-	5	5	5	5	5	5	5
Aminomethyl phosphonic acid	6	2	0.7	0.7	3.9	3.9	1.4	1	1.2	6	2	39	0.85	2.45	3.175	3.61	1	1	1
% Cation Excess	12	12	-11.22	ND	3.5	3.5	-2.4	-2.205	4.5	0	0	-	-8.326	3.118	3.423	3.4692	-4.15	-2.205	0.61
Dissolved oxygen (%saturation)	12	12	33.32	33.32	94.55	94.55	61	63.33	21	2	2	1.182	35.31	88.56	92.06	93.55	42.86	63.33	73.84
pH	12	12	7.6	7.6	8.126693	8.126693	7.9	7.87	0.15	0	0	-	7.70	8.07	8.10	8.12	7.78	7.87	7.96
Electrical Conductivity	12	12	734.00	734.00	2670.00	2670 00	1429	1273.76	572	0	0	-	807.60	2078.18	2351.55	2542.62	1106.12	1273.76	1648.10
Temperature	12	12	5.47	5.47	14.7	14.7	10	10.07	3.4	0	0	-	5.81	14.24	14.45	14.60	8.26	10.07	13.58
Dissolved Oxygen (Filtered)	12	12	3.47	3.47	11.24	11.24	6.7	6.87	2.6	0	0	-	3.61	9.81	10.48	10.94	4.38	6.87	8.38
Field Redox	12	12	-12	ND	254	254	92	40.93	93	0	0	-	10.87	185.64	216.42	238.97	17.75	40.93	175.02
Redox	12	12	201.79	201.79	457.93	457.93	302	250.76	90	0	0	-	222.32	390.60	420.96	443.14	230.26	250.76	383.85
GRO >C4-C10	5	0	<10	ND	<10	ND	5	5	0	0	0	-	5	5	5	5	5	5	5
GRO >C4-C12	12	0	<10	ND	<10	ND	5	5	0	0	0	-	5	5	5	5	5	5	5
GRO >C8-C10	5	0	<10	ND	<10	ND	5	5	0	0	0	-	5	5	5	5	5	5	5
EPH C8-C40	12	3	<10	410	2000	2000	252	5	582	3	3	22.22	5	554	1213.5	1685.4	5	5	106.25
Benzene	12	0	<5	ND	<5	ND	2.5	2.5	0	0	0	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Toluene	12	0	<5	ND	<5	ND	2.5	2.5	0	0	0	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Ethylbenzene	12	0	<5	ND	<5	ND	2.5	2.5	0	0	0	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Xylene (m & p)	12	0	<5	ND	<5	ND	2.5	2.5	0	0	0	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Xylene Total	7	0	<10	ND	<10	ND	5	5	0	0	0	-	5	5	5	5	5	5	5
Xylene (o)	12	0	<5	ND	<5	ND	2.5	2.5	0	0	0	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Total BTEX	7	0	<25	ND	<25	ND	13	12.5	0	0	0	-	12.5	12.5	12.5	12.5	12.5	12.5	12.5
MTBE	12	0	<5	ND	<5	ND	2.5	2.5	0	0	0	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Total Phenols	12	0	<150	ND	<150	ND	75	75	0	0	0	-	75	75	75	75	75	75	75
Glyphosate	6	2	0.3	0.3	<2	0.6	0.82	1	0.3	0	0	-	0.45	1	1	1	0.7	1	1
Aluminium (Filtered)	8	4	7.9	7.9	30.5	30.5	14	10	7.9	0	0	-	8.95	23.71	27.11	29.14	9.85	10	12.7
Arsenic (Filtered)	12	12	1.5	1.5	3	3	2.2	2	0.48	0	0	-	1.62	2.79	2.89	2.956	1.875	2	2.475
Barium (Filtered)	12	12	29.7	29.7	206.6	206.6	78	50.8	57	3	3	1.801	41.02	162.83	184.99	197.95	41.275	50.8	90.35
Beryllium (Filtered)	12	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Boron (Filtered)	12	12	151	151	7229	7229	1729	489.5	2289	3	3	3.615	179.9	4914.1	6084.45	6771.18	239.75	489.5	2023.75
Cadmium (Filtered)	12	8	<0.03	0.03	0.2	0.2	0.072	0.035	0.07	0	0	-	0.015	0.178	0.189	0.1956	0.015	0.035	0.115
Calcium (Filtered)	12	12	61.4	61.4	163 8	163.8	127	133.7	27	0	0	-	98.93	148.86	155.66	160.54	117.28	133.7	142.65
Chromium (III VI) (Filtered)	12	12	0.4	0.4	8.2	8.2	2.5	0.9	3	0	0	-	0.6	7.41	7.815	8.046	0.675	0.9	3
Copper (Filtered)	12	12	2	2	11	11	6.3	6.5	3	0	0	-	3	9.9	10.45	10.78	3	6.5	8.25
Iron	12	12	810	810	4652	4652	2687	2725.5	1100	0	0	-	1300.8	3973.5	4314.3	45 6.92	2172.75	2725.5	3243.75
Iron (Filtered)	12	12	55	55	785	785	268	201.5	232	0	0	-	76.8	639	723.95	760.58	120.75	201.5	295.5
Lead (Filtered)	12	12	0.2	0.2	2.8	2.8	1.1	0.9	0.81	0	0	-	0.21	1.88	2.305	2.602	0.45	0.9	1.7
Magnesium (Filtered)	12	12	11.7	11.7	57	57	27	20.35	14	0	0	-	17.11	48.04	52.985	55.394	18.625	20.35	32.575
Manganese	12	12	25	25	206	206	89	84	51	0	0	-	38	148.4	175.75	193.9	56.75	84	100.25
Manganese (Filtered)	12	12	21	21	206	206	72	50	58	0	0	-	22.3	143.9	172.45	192.58	36.25	50	86
Mercury (Filtered)	12	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0	-	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nickel (Filtered)	12	12	4.4	4.4	10.9	10.9	6.9	7.2	1.9	1	1	1.083	4.73	8.3	9.47	10.328	5.225	7.2	7.7
Phosphorus	12	12	317	317	3213	3213	923	623.5	974	0	0	-	325.7	2524.4	2940.75	3104.1	359	623.5	710
Selenium (Filtered)	12	0	<1.2	ND	<1.2	ND	0.6	0.6	0	0	0	-	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Vanadium (F ltered)	12	12	1.2	1.2	4.5	4.5	2.2	1.85	0.98	0	0	-	1.41	3.49	4.005	4.302	1.5	1.85	2.275
Zinc (Filtered)	12	12	8.9	8.9	51.4	51.4	19	15.95	12	3	3	1.941	9.92	28.26	38.695	46.318	10.175	15.95	23.1
Potassium (Filtered)	12	12	11.3	11.3	67.1	67.1	33	27.5	16	0	0	-	18.69	51.99	59.18	63.932	23.85	27.5	38.325
Chromium (hexavalent)	12	0	<6	ND	<6	ND	3	3	0	12	0	-	3	3	3	3	3	3	3
Chromium (Trivalent) (Filtered)	12	3	<6	7	8	8	4.2	3	2.1	12	3	1.702	3	7.9	8.00	8	3	3	4
TOC	12	12	14	14	24	24	20	20.5	2.9	0	0	-	17.1	23	23.45	23.78	8.75	20.5	22.25
Sodium (Filtered)	12	12	29.1	29.1	198.7	198.7	97	71.65	57	0	0	-	49.42	187.85	194.91	197.18	59.28	71.65	137.75
Cyanide Total	12	0	<0.01	ND	<0.01	ND	0.005	0.005	0	12	0	-	0.005	0.005	0.005	0.005	0.005	0.005	0.01
Electrical conductivity *(lab)	12	12	470	470	2296	2296	1315	1077	545	0	0	-	859.5	2017.3	2152.45	22 8.58	1005	1077	1705.75
Sulphate	12	12	33.9	33.9	176.4	176.4	105	102.15	48	0	0	-	50.63	161.01	168.15	173.1	65.6	102.15	149.85
Chloride	12	12	42.8	42.8	255.9	255.9	124	92.8	67	1	1	1.024	68.9	211.96	231.98	246.33	85.18	92.8	161.43
Ortho Phosphate as P	11	9	<0.03	0.05	2.38	2.38	0.59	0.25	0.89	8	8	27.36	0.015	2.34	2.36	2.372	0.075	0.25	0.43
Nitrogen (Total)	12	12	5.2	5.2	99	99	26	9.85	30	0	0	-	6	59.3	77.77	90.51	6.075	9.85	37.78
Alka inity (total) as CaCO3	12	12	173	173	932	932	396	282.5	246	0	0	-	240.7	813.7	884.15	912.86	271	282.5	394.75
Alka inity (Carbonate as CaCO3)	12	0	<1	ND	<1	ND	0.5	0.5	0	0	0	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nitrate (as N)	12	12	2.191100068	2.191100068	53.72	53.72	12	3.965	18	3	3	4.754	2.66	42.534	49.111	51.88	3.5575	3.965	7.69
Nitrite (as N)	12	12	0.007	0.007	1.5 8	1.518	0.24	0.0915	0.42	4	4	9.987	0.0153	0.4303	0.9317	1.28	0.02775	0.0915	0.23
Alka inity (Bicarbonate as CaCO)	12	12	173	173	932	932	396	282.5	246	0	0	-	240.7	813.7	884.15	912.86	271	282.5	394.75
Ammoniacal Nitrogen as N	12	12	0.06	0.06	80.57	80.57	13	0.49	26	7	7	268.57	0.099	47.48	64.19	74.02	0.1875	0.49	8.38
Total Hardness	12	12	203	203	618	618	430	423.5	111	0	0	-	326.3	557.9	587.75	605.9	376.25	423.5	506.75
Total Cations	12	12	5.58	5.58	21.21	21.21	14	12.02	4.6	0	0	-	9.242	19.80	20.46	20.91	11.53	12.02	16.17
Total Anions	12	12	5.98	5.98	26.57	26.57	14	12.31	5.9	0	0	-	9.71	22.67	24.62	25.79	11.08	12.31	16.79
pH (Lab)	12	12	7.56	7.56	8.22	8.22	7.9	7.975	0.18	0	0	-	7.738	8.07	8.1375	8.187	7.8775	7.975	8.07
TDS	12	12	399	399	1315	1315	862	802.5	272	0	0	-	566.3	1260.5	1296.85	1307.74	738.5	802.5	1030.25
TSS	12	12	11	11	171	171	46	24	48	4	4	3.42	11.4	94.1	130.3	154.72	15	24	66.5
Oxygen	1	1	9	9	9	9		9	0	0	0	-	9	9	9	9	9	9	9

Comments

#1:WS Regs 2016 (Eng/Wal)
#2:WFD England/Wales. 2015 - AA-EQS Inland
#3:WHO DWG 2017
#4:WFD England/Wales. 2015 - Freshwater Standards
#5:SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6:USEPA RSL (tapwater) [May 2020]
#7:AECOM DWG (WHO method)
#8:PNEC (EU REACH) - Freshwater
#9:WFD England/Wales. 2015 - MAC-EQS Inland
#10 WHO Petroleum Products in Drinking Water, 2015. (WHO> C9-C10 AL.)
#11 WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#12 WHO Petroleum Products in Drinking Water, 2015. (WHO> C10 -C12 AR.)
#13 WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR.)
#14 WHO Petroleum Products in Drinking Water, 2015.(WHO> C10 -C12 AR.)
#15 WHO Petroleum Products in Drinking Water, 2015.(WHO C16-C35 AR.)
#16 m-bat PNEC
#17 WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentration for River Thames.
#18 EA, Guidance Water companies: water treatment works discharge limits for environmental permits, May 2018
#19 CSJV specified threshold for comp iance with the High Speed Rail (London - West Mid ands) Act 2017 Schedule 33 Protective Provisions

SSAC: Site Specific Assessment Criteria
(blank): No assessment criteria available
-: Not analysed
XXXXX: May EC lab data erroneous

Key

XXX Exceedance of Proposed GAC
Percentiles used

Baseline Surface Water Sampling
ML025-SW201 Surface Water Chemistry

Chem_Group	ChemName	output unit	EQL	Location_Code	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201	ML025-SW201
				Sampled Date Time	14/06/2019	11/07/2019	08/08/2019	26/09/2019	03/10/2019	04/1 /2019	03/12/2019	08/01/2020	06/02/2020	05/03/2020	20/04/2020	20/05/2020
				Monitoring Round	1 June 2019	2 July 2019	3 August 2019	4 September 2019	5 October 2019	6 November 2019	7 December 2019	8 January 2020	9 February 2020	10 March 2020	11 April 2020	12 May 2020
				Lab Report Number	19-97 8-1-210619	19-11279-1-120820	19-12844-1-290819	19-15749-1-120820	19- 6238-1-120820	19-18059-1-140120	19-19821-1-120820	20-245-1-110220	20-245-3-160320	20-245-5-130320	20-5458-1-140520	20-6567-1-020620
				Proposed GAC												
	GRO >C4-C8	µg/l	10	Proposed GAC E42	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-
	GRO >C8-C12	µg/l	10	100#14	<10	<10	<10	< 0	<10	<10	<10	-	-	-	-	-
	Aminomethyl phosphonic acid	µg/L	0.2	0.1 #1	-	-	2.9	0.8	0.51	-	-	-	-	<2	<2	<2
	% Cation Excess	%		N.V.	1.16	1.96	1.01	0 82	-2.61	-1.61	1.24	-6.17	-1.46	-6.48	-8.09	-13.43
Field	Dissolved oxygen (%saturation)	%		80 #2	40.78	65.02	49.94	36.06	63.79	55.29	95.94	70.64	90.63	88.57	42.72	79.19
	pH	pH Units		6-9 #2	7.75	8.00	8.06	7.93	7.91	8.09	7.79	7.59	7.84	8.08	7.87	8.06
	Electrical Conductivity	µS/cm		N.V.	814	0	1303.23	1498.89	1167.42	1172.20	1216. 6	1467	842	732.74	2047	2496
	Temperature	oC		23 #2	12.76	16.67	15.71	13.07	8.17	9.49	5.68	9.16	4.76	5.74	0.49	17.21
	Dissolved Oxygen (Filtered)	mg/L		N.V.	3.98	6.35	4.93	3.79	8.00	6.29	9.81	6.98	9.53	11.07	4.17	7.73
	Field Redox	mV		N.V.	0	183.14	182.94	183.16	51.99	113.91	16.08	16	98	50.94	179	361
	Redox	mV		N.V.	213.4	385.42	386.03	388.45	261.31	322.15	227.4	231.95	317.12	262.21	394.11	362.82
TPH	GRO >C4-C10	µg/L	10	300#10	-	-	-	-	-	-	-	<10	<10	<10	<10	<10
	GRO >C4-C12	µg/L	10	100#12	<10	<10	<10	< 0	<10	<10	<10	<10	<10	<10	<10	<10
	GRO >C8-C10	µg/L	10	300#13	-	-	-	-	-	-	-	<10	<10	<10	<10	<10
	EPH C8-C40	µg/L	10	90#15	<10	<10	<10	< 0	<10	700	<10	<10	<10	<10	<10	<10
BTEX	Benzene	µg/L	5	10#2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Toluene	µg/L	5	74#4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Ethylbenzene	µg/L	5	20#5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene (m & p)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Xylene Total	µg/L		30#5	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-
	Xylene (o)	µg/L	5	Screened as total Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Total BTEX	µg/L		Screened as individual compounds	<25	<25	<25	<25	<25	<25	<25	-	-	-	-	-
Oxygenates	MTBE	µg/L	5	5 100#8	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Phenolics	Total Phenols	µg/L	150	N.V.	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150	<150
Herbicides	Glyphosate	µg/L	0.2	196#4	-	-	0.4	0.4	0.2	-	-	-	-	<2	<2	<2
Metals	Aluminium (Filtered)	µg/L	1.5	000#18 (Total Aluminium)	-	<20	-	43	<20	-	<20	<20	12.5	34	8.9	27
	Arsenic (Filtered)	µg/L	0.9	50#4	2.2	3	2.9	2 6	2.9	2.8	2.2	1.5	1.3	1.5	1.9	1.9
	Barium (Filtered)	µg/L	1.8	114.7 #8	42.7	52.9	45	44.1	42.7	42.2	42.2	1 6.1	53	29	149.3	172.5
	Beryllium (Filtered)	µg/L	0.5	12#3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Boron (F ltered)	µg/L	12	2 000#5	512	1895	1456	313	202	219	236	1615	645	152	4743	6955
	Cadmium (Filtered)	µg/L	0.03	0.25#2	0.05	0.04	0.03	0.12	0.16	0.09	0.05	0.04	0.03	0.03	<0.03	0.05
	Calcium (Filtered)	mg/L	0.2	N.V.	123.4	135.9	103.5	124.2	129.2	138	135.7	144.4	95.4	60.5	62.6	111.7
	Chromium (III VI) (Filtered)	µg/L	0.2	Screened as individual species	0.6	0.7	0.6	4 8	0.7	0.5	0.5	0.3	0.7	1	1.1	1.7
	Copper (Filtered)	µg/L	1	10.79 #m-bat PNEC #16	7	6	8	12	11	7	8	6	6	8	5	6
	Iron	µg/L	20	Screened as filtered	1252	335	583	402	167	1275	559	1538	1901	2213	2440	1130
	Iron (Filtered)	µg/L	20	1 000#4	120	61	41	68	60	88	88	112	262	294	63	112
	Lead (Filtered)	µg/L	0.1	4.14 #(m-bat) #16	1.7	1.1	1.4	2.1	1.1	2.3	0.5	0 2	0.5	1.8	0.3	0.3
	Magnesium (Filtered)	mg/L	0.1	N.V.	17.2	24.2	17	15.1	18.5	19.8	21.8	31.7	18.9	11.4	47.3	56.2
	Manganese	µg/L	2	Screened as filtered	35	18	29	12	13	47	38	162	75	36	76	157
	Manganese (Filtered)	µg/L	2	261.34 #m-bat PNEC #16	33	15	25	10	14	28	37	171	71	26	87	174
	Mercury (Filtered)	µg/L	0.01	0.07#9	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Nickel (F ltered)	µg/L	0.2	9.68 #m-bat PNEC #16 MAC 34	7.5	5.3	5.1	11.6	9	8.5	5.9	7	5	4.8	7.6	8.2
	Phosphorus	µg/L	5	Screened as Ortho Phosphate	528	1396	1612	535	333	668	327	250	279	304	436	407
	Selenium (F ltered)	µg/L	1.2	2.67#8	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
	Vanadium (Filtered)	µg/L	0.6	20#5	2.3	2.3	1.8	3.5	3.3	1.9	1.5	1 6	1.2	1.2	1.5	1.2
	Zinc (Filtered)	µg/L	1.5	26.48 #m-bat PNEC #16 incl. background 2µg/L #2)	35.3	24.3	24.3	54.3	36.4	39.2	23.4	20	15.4	10.3	14.9	21.2
	Potassium (Filtered)	mg/L	0.1	N.V.	25.2	36.9	33.3	25.4	24.4	26.1	21.6	32.4	17.9	11.1	50.4	67.6
	Chromium (hexavalent)	µg/L	6	3.4#4	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
	Chromium (Trivalent) (F ltered)	µg/L	6	4.7#4 MAC 32	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Organics	TOC	mg/L	2	N.V.	16	12	18	20	23	20	22	18	20	22	23	30
Inorganics	Sodium (Filtered)	mg/L	0.1	200#1	72.3	154.2	128.8	69.2	51.3	62.6	71.2	66.5	46.4	28.5	131.9	190.5
	Cyanide Total	mg/L	0.01	0.001#4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Electrical conductivity * (lab)	µS/cm	2	N.V.	1046	1613	1402	949	1014	627	1155	1391	864	479	813	1521
	Sulphate	mg/L	0.5	400#5	132.9	71.8	59.5	151.9	179.4	154.6	161.9	117.1	86	54.8	83	34
	Chloride	mg/L	0.3	250#5	93.8	191.4	165.6	96.6	87.1	89.7	108.2	86.8	63.6	42.6	152.9	213.9
	Ortho Phosphate as P	mg/L	0.03	0.086 #17	0.23	1.22	1.44	0.47	0.26	0.49	0.18	<0.03	0.05	0.1	0.07	-
	Nitrogen (Total)	mg/L	0.5	Screened as individual species	9.9	30.2	29.5	5 6	4.9	9	8.2	23.2	10.5	6.1	57.8	92.2
	Alkalinity (total) as CaCO3	mg/L	1	N.V.	263	348	248	241	252	308	261	511	261	187	793	925
	Alkalinity (Carbonate as CaCO3)	mg/L	1	N.V.	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Nitrate (as N)	mg/L	0.05	11.3#1	6.06	27.18	26.45	2.95	2.43	5.41	3.73	3	3.44	2.26	6.80	17.38
	Nitrite (as N)	mg/L	0.006	0.152 #1	0.6	0.15	0.213	0 086	<0.006	0.067	0.051	0.171	0.116	0.019	0.625	1.91
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	N.V.	263	348	248	241	252	308	261	511	261	187	793	925
	Ammoniacal Nitrogen as N	mg/L	0.03	0.3#4	0.58	0.1	0.11	0 21	0.04	0.43	0.19	16.13	4.53	1.06	45.18	72.07
	Total Hardness	mg/l	1	N.V.	381	441	330	374	401	428	431	494	318	199	605	515
	Total Cations	mmolc/l	0	N.V.	11. 6	16.42	13.02	11.1	10.82	11.91	12.21	13.54	8.79	5.48	19.03	20.21
	Total Anions	mmolc/l	0	N.V.	11.1	15.79	12.76	10.92	11.4	12.3	11.91	15.32	9.05	6.24	22.38	26.48
	pH (Lab)	pH Units	0.01	N.V.	7.86	8.24	7.99	8 03	8.1	8.07	8.05	7.89	7.91	7.87	8.09	8.18
	TDS	mg/L	35	N.V.	726	999	804	706	777	749	850	849	547	407	988	1298
	TSS	mg/L	10	50#19	27	<10	10	< 0	<10	31	14	< 0	11	12	<10	15
Other	Oxygen	mg/L	1	Field data screened	-	-	6	-	-	-	-	-	-	-	-	-

Statistical Summary

ChemName	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum (Exceedance of MAC Highlighted) Detect	Average (Exceedance of GAC Highlighted) Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)	GAC Magnitude of Exceedance	10th Percentile	90th Percentile	95th Percentile	98th Percentile	First Quartile	Second Quartile (median)	Third Quartile
GRO >C4-C8	7.00	0.00	<10	ND	< 0	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C12	7.00	0.00	<10	ND	< 0	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5 00
Aminomethyl phosphonic acid	6.00	3.00	0.51	0.51	2.90	2.90	1.20	1.00	0.85	6.00	3.00	29.00	0.66	1.95	2.43	2.71	0.85	1.00	1 00
% Cation Excess	12.00	12.00	-13.43	ND	1.96	1.96	-2.80	-1.54	4.80	0.00	0.00	-	-7.93	1.23	1.56	1.80	-6.25	-1.54	1 05
Dissolved oxygen (%saturation)	12.00	12.00	36.06	36.06	95.94	95.94	65.00	64.41	21.00	3.00	3.00	1.20	40.97	90.43	93.02	94.77	48.14	64.41	81.54
pH	12.00	12.00	7.59	7.59	8 09	8.09	7.90	7.92	0.15	0.00	0.00	-	7.75	8.07	8.08	8.08	7.83	7.92	8 06
Electrical Conductivity	12.00	12.00	0.00	732.74	2496.00	2496 00	1230.00	1194.28	639.00	0.00	0.00	-	740.87	1992.19	2249.05	2397.22	835.00	1194.28	1474.97
Temperature	12.00	12.00	4.76	4.76	17.21	17.21	11.00	9.99	4.40	0.00	0.00	-	5.69	16.58	16.91	17.09	7.56	9.99	13.73
Dissolved Oxygen (Filtered)	12.00	12.00	3.79	3.79	11.07	11.07	6.90	6.66	2.40	0.00	0.00	-	4.00	9.79	10.38	10.80	4.74	6.66	8.38
Field Redox	12.00	12.00	0.00	16.00	361.00	361.00	120.00	105.95	04.00	0.00	0.00	-	16.01	183.16	263.19	321.88	42 22	105.95	182.99
Redox	12.00	12.00	213.40	213.40	562.82	562.82	329.00	319.64	01.00	0.00	0.00	-	227.86	393.54	470.03	525.70	253.97	319.64	386.64
GRO >C4-C10	5.00	0.00	<10	ND	< 0	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5 00
GRO >C4-C12	12.00	0.00	<10	ND	< 0	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5.00
GRO >C8-C10	5.00	0.00	<10	ND	< 0	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5 00
EPH C8-C40	12.00	1.00	<10	700.00	700.00	700.00	63.00	5.00	201.00	1.00	1.00	7.78	5.00	5.00	317.75	547.10	5.00	5.00	5 00
Benzene	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Toluene	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Ethylbenzene	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene (m & p)	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Xylene Total	7.00	0.00	<10	ND	< 0	ND	5.00	5.00	0.00	0.00	0.00	-	5.00	5.00	5.00	5.00	5.00	5.00	5 00
Xylene (o)	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total BTEX	7.00	0.00	<25	ND	<25	ND	13.00	12.50	0.00	0.00	0.00	-	12.50	12.50	12.50	12.50	12.50	12.50	12.50
MTBE	12.00	0.00	<5	ND	<5	ND	2.50	2.50	0.00	0.00	0.00	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total Phenols	12.00	0.00	<150	ND	<150	ND	75.00	75.00	0.00	0.00	0.00	-	75.00	75.00	75 00	75.00	75 00	75.00	75.00
Glyphosate	6.00	3.00	0.20	0.20	<2	0.40	0.67	0.70	0.37	0.00	0.00	-	0.30	1.00	1.00	1.00	0.40	0.70	1.00
Aluminium (Filtered)	9.00	5.00	8.90	8.90	43.00	43.00	18.00	10.00	13.00	0.00	0.00	-	9.78	35.80	39.40	41.56	10 00	10.00	27.00
Arsenic (Filtered)	12.00	12.00	1.30	1.30	3.00	3.00	2.20	2.20	0.61	0.00	0.00	-	1.50	2.90	2.95	2.98	1.80	2.20	2.83
Barium (Filtered)	12.00	12.00	29.00	29.00	172.50	172.50	69.00	44.55	48.00	3.00	3.00	1.50	42.20	145.98	159.74	167.40	42.58	44.55	68.78
Beryllium (Filtered)	12.00	0.00	<0.5	ND	<0.5	ND	0.25	0.25	0.00	0.00	0.00	-	0.25	0.25	0.25	0.25	0.25	0.25	0 25
Boron (F ltered)	12.00	12.00	152.00	152.00	6955.00	6955 00	1579.00	578.50	2137.00	2.00	2.00	3.48	203.70	4458.20	57 8.40	6468.36	231.75	578.50	1685.00
Cadmium (Filtered)	12.00	11.00	<0.03	0.03	0. 6	0.16	0.06	0.05	0.04	0.00	0.00	-	0.03	0.12	0.14	0.15	0.03	0.05	0.06
Calcium (Filtered)	12.00	12.00	60.50	60.50	162.60	162.60	122.00	126.70	27.00	0.00	0.00	-	96.21	143.76	152.59	158.60	109.65	126.70	1 6.43
Chromium (III VI) (Filtered)	12.00	12.00	0.30	0.30	4 80	4.80	1.10	0.70	1.20	0.00	0.00	-	0.50	1.64	3. 0	4.12	0.58	0.70	1 03
Copper (Filtered)	12.00	12.00	5.00	5.00	12.00	12.00	7.50	7.00	2.10	2.00	2.00	1.11	6.00	10.70	11.45	11.78	6.00	7.00	8 00
Iron	12.00	12.00	167.00	167.00	2440.00	2440.00	1150.00	1191.00	763.00	0.00	0.00	-	341.70	2181.80	2315.15	2390.06	519.75	1191.00	1628.75
Iron (Filtered)	12.00	12.00	41.00	41.00	294.00	294.00	122.00	100.00	80.00	0.00	0.00	-	60.10	252.10	276.40	286.96	66.25	100.00	1 0.75
Lead (Filtered)	12.00	12.00	0.20	0.20	2.30	2.30	1.10	1.10	0.75	0.00	0.00	-	0.30	2.07	2.19	2.26	0.45	1.10	1.73
Magnesium (Filtered)	12.00	12.00	11.40	11.40	56.20	56.20	25.00	19.35	14.00	0.00	0.00	-	15.29	45.74	51.31	54.24	17.15	19.35	26.08
Manganese	12.00	12.00	12.00	12.00	162.00	162.00	58.00	37.00	52.00	0.00	0.00	-	13.50	148.90	159.25	160.90	26.25	37.00	75.25
Manganese (Filtered)	12.00	12.00	10.00	10.00	174.00	174.00	58.00	30.50	58.00	0.00	0.00	-	14.10	162.60	172.35	173.34	22.50	30.50	75.00
Mercury (Filtered)	12.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0.00	0.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0 01
Nickel (F ltered)	12.00	12.00	4.80	4.80	11.60	11.60	7.10	7.25	2.00	1.00	1.00	1.20	5.01	8.95	10.17	11.03	5.25	7.25	8 28
Phosphorus	12.00	12.00	250.00	250.00	1612.00	1612.00	590.00	421.50	447.00	0.00	0.00	-	281.50	1323.20	1493.20	1564.48	321.25	421.50	568.25
Selenium (F ltered)	12.00	0.00	<1.2	ND	<1.2	ND	0.60	0.60	0.00	0.00	0.00	-	0.60	0.60	0.60	0.60	0.60	0.60	0 60
Vanadium (Filtered)	12.00	12.00	1.20	1.20	3.50	3.50	1.90	1.70	0.78	0.00	0.00	-	1.20	3.20	3.39	3.46	1.43	1.70	2.30
Zinc (Filtered)	12.00	12.00	10.30	10.30	54.30	54.30	27.00	23.85	13.00	4.00	4.00	2.05	14.95	38.92	46 00	50.98	18.85	23.85	35.58
Potassium (Filtered)	12.00	12.00	11.10	11.10	67.60	67.60	31.00	25.75	15.00	0.00	0.00	-	18.27	49.05	58.14	63.82	23.70	25.75	34.20
Chromium (hexavalent)	12.00	0.00	<6	ND	<6	ND	3.00	3.00	0 00	12.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3 00
Chromium (Trivalent) (F ltered)	12.00	0.00	<6	ND	<6	ND	3.00	3.00	0.00	12.00	0.00	-	3.00	3.00	3.00	3.00	3.00	3.00	3.00
TOC	12.00	12.00	12.00	12.00	30.00	30.00	20.00	20.00	4.40	0.00	0.00	-	16.20	23.00	26.15	28.46	18.00	20.00	22.25
Sodium (Filtered)	12.00	12.00	28.50	28.50	190.50	190.50	89.00	70.20	50.00	0.00	0.00	-	46.89	151.97	170.54	182.51	59.78	70.20	129.58
Cyanide Total	12.00	0.00	<0.01	ND	<0.01	ND	0.01	0.01	0 00	12.00	0.00	-	0.01	0.01	0.01	0.01	0.01	0.01	0 01
Electrical conductivity * (lab)	12.00	12.00	479.00	479.00	1813.00	1813.00	1156.00	1100.50	403.00	0.00	0.00	-	650.70	1603.80	1703.00	1769.00	927.75	1100.50	1431.75
Sulphate	12.00	12.00	34.00	34.00	179.40	179.40	107.00	101.55	49.00	0.00	0.00	-	55.27	161.17	169.78	175.55	68.73	101.55	152.58
Chloride	12.00	12.00	42.60	42.60	213.90	213.90	116.00	95.20	53.00	0.00	0.00	-	65.92	188.82	201.53	208.95	87 03	95.20	156.08
Ortho Phosphate as P	11.00	0.00	<0.03	0.05	1.44	1.44	0.41	0.23	0.48	8.00	8.00	6.74	0.05	1.22	1.33	1.40	0.09	0.23	0.48
Nitrogen (Total)	12.00	12.00	4.90	4.90	92.20	92.20	24.00	10.20	27.00	0.00	0.00	-	5.65	55.04	73 28	84.63	7.68	10.20	29.68
Alkalinity (total) as CaCO3	12.00	12.00	187.00	187.00	925.00	925.00	383.00	262.00	238.00	0.00	0.00	-	241.70	764.80	852.40	895.96	251.00	262.00	388.75
Alkalinity (Carbonate as CaCO3)	12.00	0.00	<1	ND	<1	ND	0.50	0.50	0.00	0.00	0.00	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Nitrate (as N)	12.00	12.00	2.26	2.26	27.18	27.18	8.90	4.57	9.30	3.00	3.00	2.41	2.48	25.54	26.78	27.02	2.99	4.57	9.44
Nitrite (as N)	12.00	11.00	<0.006	0.02	1.91	1.91	0.33	0.13	0.54	5.00	5.00	12.57	0.02	0.62	1.20	1.63	0.06	0.13	0.31
Alkalinity (Bicarbonate as CaCO3)	12.00	12.00	187.00	187.00	925.00	925.00	383.00	262.00	238.00	0.00	0.00	-	241.70	764.80	852.40	895.96	251.00	262.00	388.75
Ammoniacal Nitrogen as N	12.00	12.00	0.04	0.04	72.07	72.07	12.00	0.51	23.00	7.00	7.00	240.23	0.10	42.28	57 28	66.15	0.17	0.51	7.43
Total Hardness	12.00	12.00	199.00	199.00	605.00	605.00	410.00	414.50	04.00	0.00	0.00	-	319.20	512.90	555.50	585.20	363.00	414.50	454.25
Total Cations	12.00	12.00	5.48	5.48	20.21	20.21	13.00	12.06	4.10	0.00	0.00	-	8.99	18.77	19.56	19.95	11 03	12.06	14.26
Total Anions	12.00	12.00	6.24	6.24	26.48	26.48	14.00	12.11	5.60	0.00	0.00	-	9.24	21.72	24.23	25.58	11 06	12.11	15.44
pH (Lab)	12.00	12.00	7.86	7.86	8 24	8.24	8.00	8.04	0.12	0.00	0.00	-	7.87	8.17	8.21	8.23	7.91	8.04	8 09
TDS	12.00	12.00	407.00	407.00	1298.00	1298 00	808.00	790.50	226.00	0.00	0.00	-	562.90	997.90	1133.55	1232.22	721.00	790.50	884.50
TSS	12.00	7.00	<10	10.00	31.00	31.00	12.00	10.50	8.80	0.00	0.00	-	5.00	25.80	28.80	30.12	5.00	10.50	14.25
Oxygen	1.00	1.00	6.00	6.00	6 00	6.00		6.00		0.00	0.00	-	6.00	6.00	6.00	6.00	6.00	6.00	6 00

Comments

#1:WS Regs 20 6 (Eng/Wal)
#2:WFD England/Wales. 2015 - AA-EQS Inland
#3:WHO DWG 2017
#4:WFD England/Wales. 2015 - Freshwater Standards
#5:SEPA WAT-SG-53 Fresh EQS - AA - 2015
#6:USEPA RSL (tapwater) [May 2020]
#7:AECOM DWG (WHO method)
#8:PNEC (EU REACH) - Freshwater
#9:WFD England/Wales. 2015 - MAC-EQS Inland

# 0	WHO Petroleum Products in Drinking Water. 2015. (WHO> C9-C10 AL.)
#11	WHO Petroleum Products in Drinking Water, 2015. (Toluene)
#12	WHO Petroleum Products in Drinking Water, 2015. (WHO> C10 -C12 AR.)
#13	WHO Petroleum Products in Drinking Water, 2015. (WHO> C8-C10 AL. and AR.)
#14	WHO Petroleum Products in Drinking Water, 2015.(WHO> C10 -C12 AR.)
#15	WHO Petroleum Products in Drinking Water. 2015.(WHO C16-C35 AR.)
# 6	m-bat PNEC
#17	WFD River Phosphorus Calculator based UKTAG 2015 including 2µg/L background concentrat on for River Thames.
# 8	EA, Guidance Water companies: water treatment works discharge limits for environmental permits, May 2018
#19	CSJV specified thresho d for compliance w th the H gh Speed Ra l (London - West Midlands) Act 2017 Schedule 33 Protective Provisions

SSAC: Site Spec fic Assessment Criteria
(blank): No assessment criteria available
 - : Not analysed
XXXXX : May EC lab data erroneous

Key

XXX Exceedance of Proposed GAC
Percentiles used

Appendix 3

CSM Evaluation Matrix

AECOM

Environmental Risk Assessment Principles

Using criteria based on those presented in Section 6.3 of the CIRIA Report "Contaminated Land Risk Assessment: A Guide to Good Practice" (CIRIA Report C552) the magnitude of the risk associated with potential contamination at the site has been assessed. To do this an estimate is made of:

- The potential severity of the risk; and
- The likelihood of risk occurring.

The severity of the risk is classified according to the criteria in Table 1.1 below.

Table 1.1: Severity of Risk

Severity	Examples
High	Acute risks to human health likely to result in "significant harm" (e.g. very high concentrations of contaminants/ground gases) Catastrophic damage to buildings/property (e.g. by explosion, sites with high gassing potential, extensive VOC contamination) Major pollution of controlled waters (e.g. surface watercourses or principal aquifers/source protection zones) Short term risk to a particular ecosystem
Medium	Chronic (long-term) risk to human health likely to result in "significant harm" (e.g. elevated concentration of contaminants/ground gases) Pollution of sensitive controlled waters (e.g. surface watercourses or principal/secondary A aquifers) Significant effects on sensitive ecosystems or species
Mild	Pollution of non-sensitive waters (e.g. smaller surface watercourses or Secondary B aquifers or unproductive strata) Significant damage to crops, buildings, structures or services (e.g. by explosion, sites with medium gassing potential, elevated concentrations of contaminants)
Minor	Non-permanent human health effects (requirement for protective equipment during site works to mitigate health effects) Damage to non-sensitive ecosystems or species Minor (easily repairable) damage to buildings, structures or services (e.g. by explosion, sites with low gassing potential)

The probability of the risk occurring is classified according to the criteria in Table 1.2.

Table 1.2: Probability of Risk

Probability	Examples
High likelihood	Pollutant linkage may be present that appears very likely in the short-term and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor.

Likely	Pollutant linkage may be present, and it is probable that the risk will occur.
Low likelihood	Pollutant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present but the circumstances under which harm would occur even in the long-term are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown in Table 1.3.

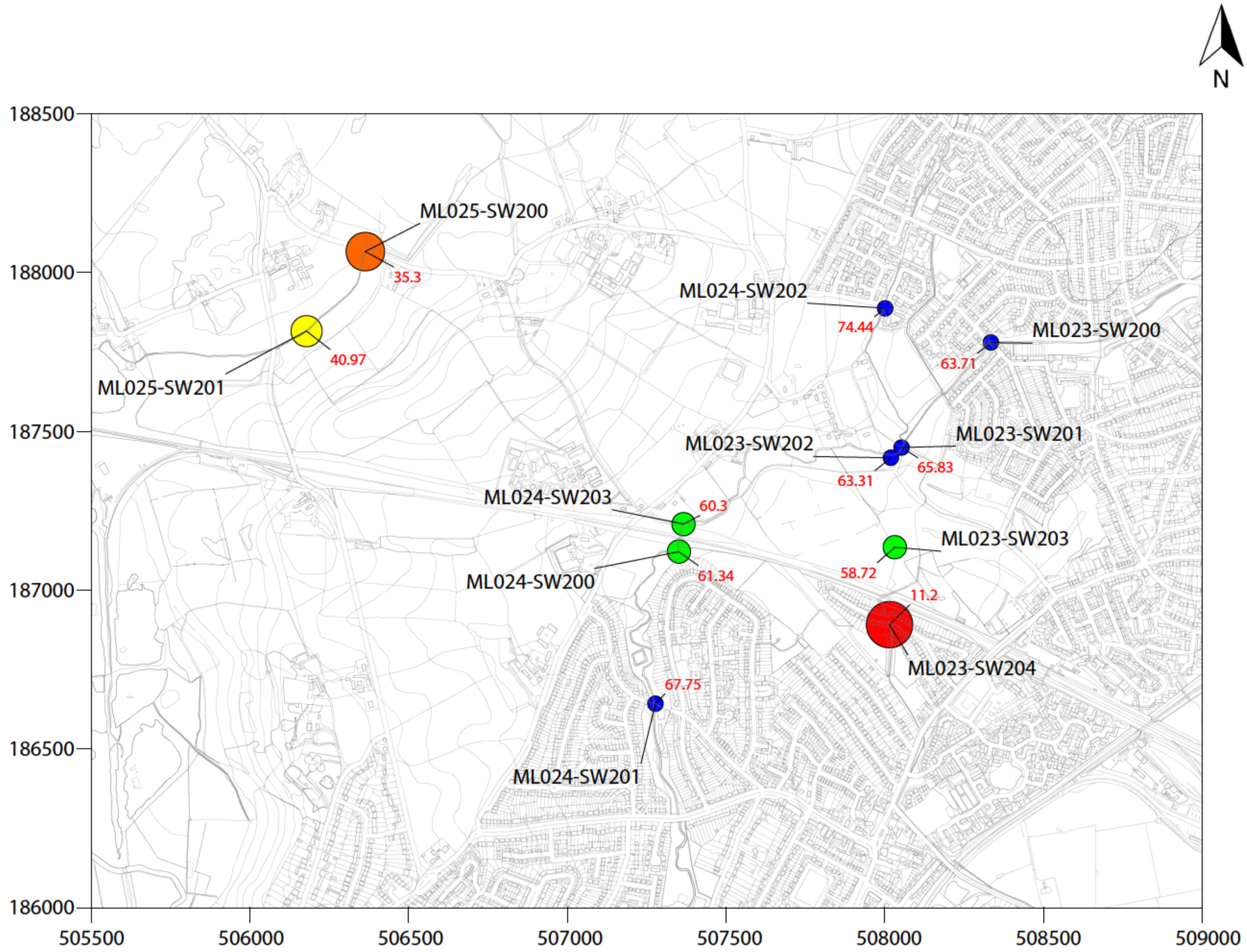
Table 1.3: Comparison of Probability and Severity

		Severity			
		High	Medium	Mild	Minor
Probability	High likelihood	**Very High Risk**	**High Risk**	**Moderate Risk**	**Moderate/Low Risk**
	Likely	**High Risk**	**Moderate Risk**	**Moderate/Low Risk**	**Low Risk**
	Low likelihood	**Moderate Risk**	**Moderate/Low Risk**	**Low Risk**	**Very Low Risk**
	Unlikely	**Moderate/Low Risk**	**Low Risk**	**Very Low Risk**	**Very Low Risk**

The requirements for further works or mitigation are dependent on the significance of the risk. Generally, 'Moderate' to 'Very High' risks are considered to be significant and in need of further assessment/mitigation, and 'Very Low' to 'Low' risks are generally considered insignificant and not requiring further assessment/mitigation. Professional judgement is often required in the determination of whether an effect is considered to be significant by taking account of whether effects are considered to be positive or negative, permanent or temporary, direct or indirect, the duration and frequency of the effect and whether any secondary effects are caused.

Appendix 4

Concentration Plots for Dissolved Oxygen, Ammoniacal Nitrogen, Orthophosphate and AMPA



Key

DO (%) (10th percentile)

- 11.2 to 23.848
- 23.848 to 36.496
- 36.496 to 49.144
- 49.144 to 61.792
- 61.792 to 74.45

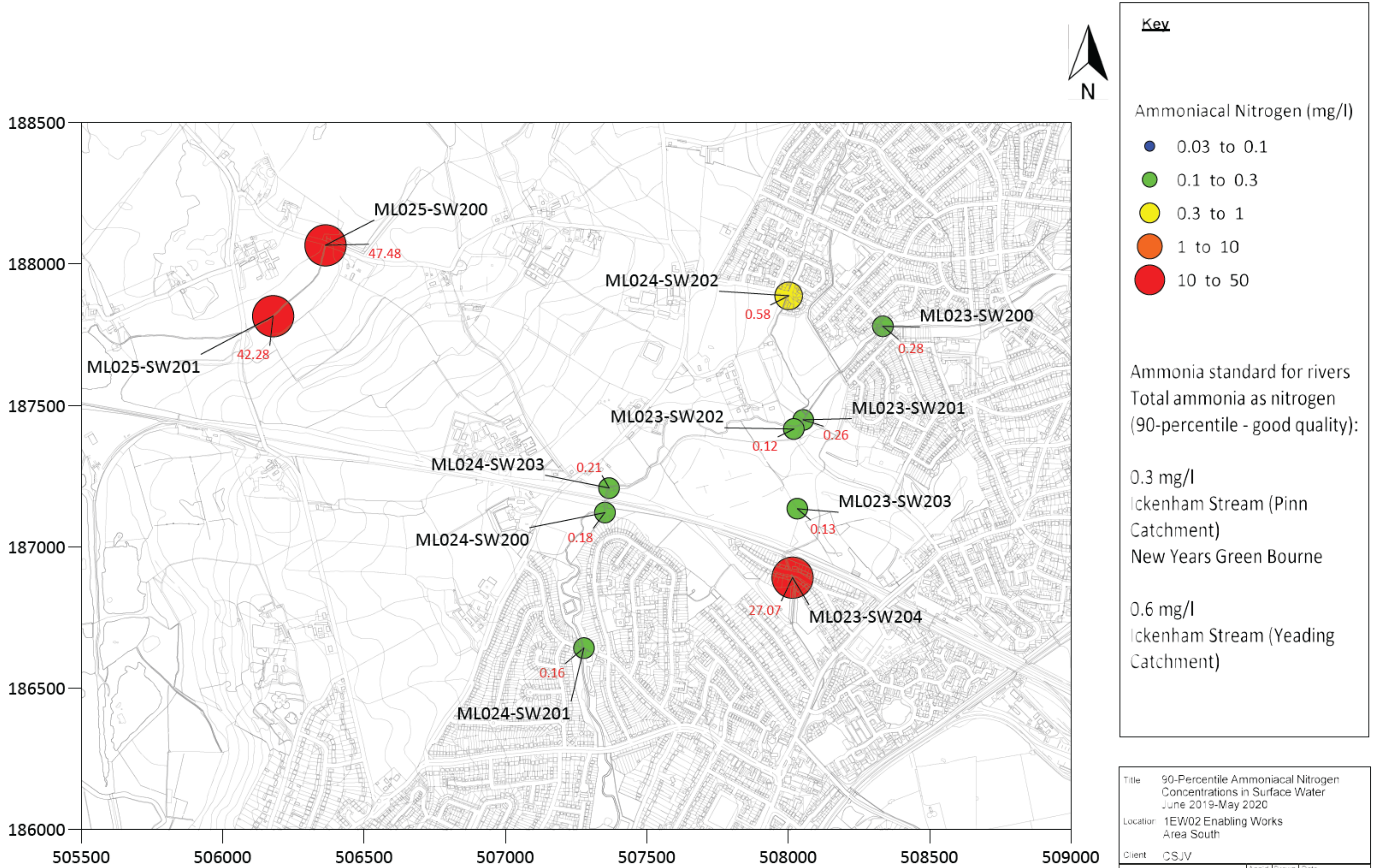
Dissolved Oxygen (DO) (WFD) (Standards and Classification) Directions (England and Wales) 2015 – Freshwater EQS.
10-percentile GAC:

80%
Ickenham Stream (Pinn Catchment)
New Years Green Bourne

60%
Ickenham Stream (Yeading Catchment)

Title	Dissolved Oxygen (% saturation) in Surface Water June 2019 - May 2020
Location	1EW02 Enabling Works Area South
Client	CSJV

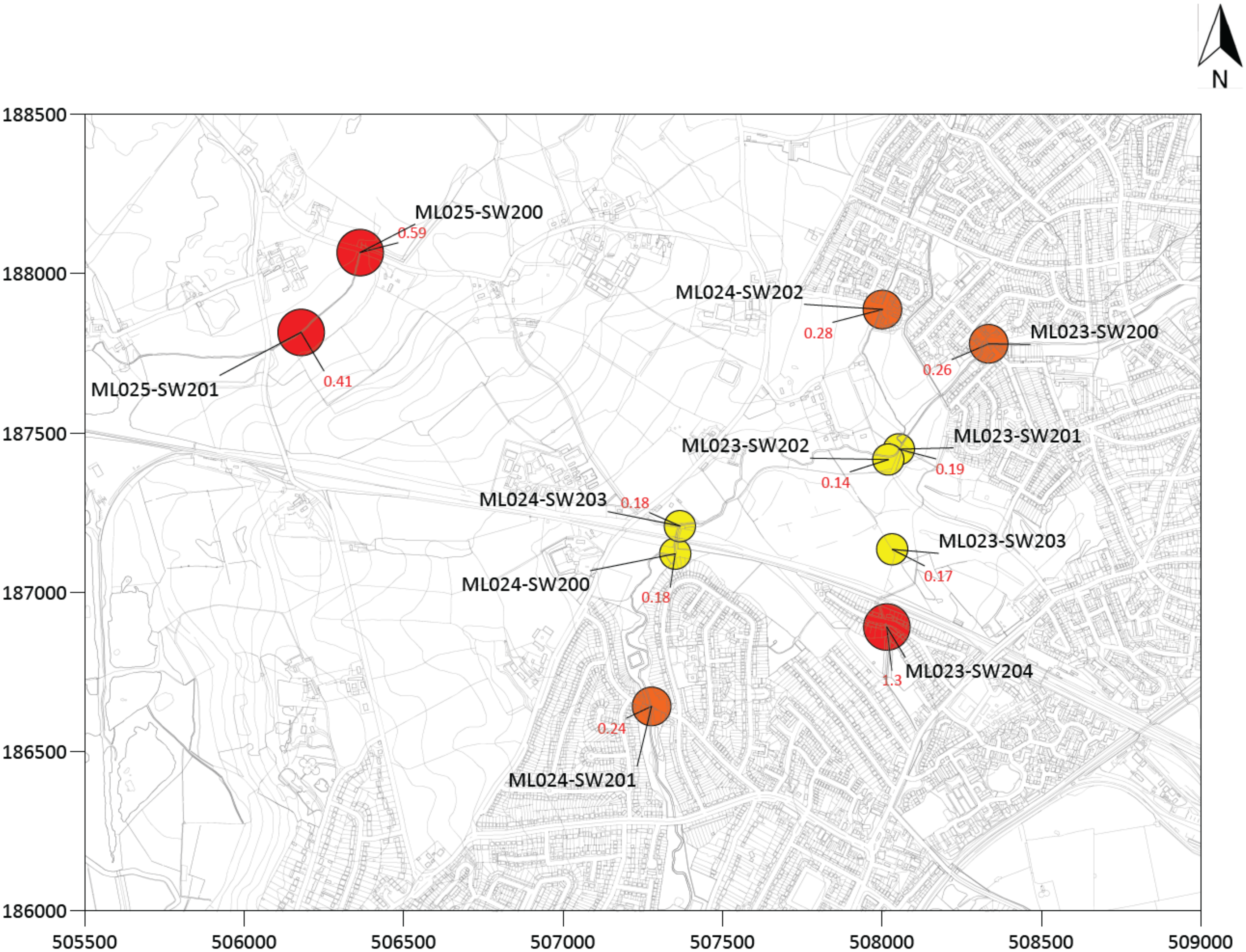
App'd [redacted]	Drawn [redacted]	Date JAN 2021
DRAFT		Version 1
Scale -		Project No 60606641
Drg. Size A4		PLATE 1



Title	90-Percentile Ammoniacal Nitrogen Concentrations in Surface Water June 2019-May 2020
Location	1EW02 Enabling Works Area South
Client	CSJV

AECOM

App'd [redacted]	Drawn [redacted]	Date JAN 2021
DRAFT		Version 1
Scale -		Project No 60605641
Drg Size A4		PLATE 2



Key

Orthophosphate (mg/l)

- 0.03 to 0.05
- 0.05 to 0.079
- 0.079 to 0.2
- 0.2 to 0.4
- 0.4 to 1.301

Orthophosphate standard for rivers (UKTAG calculator):

0.083 mg/l
Ickenham Stream (Pinn Catchment)

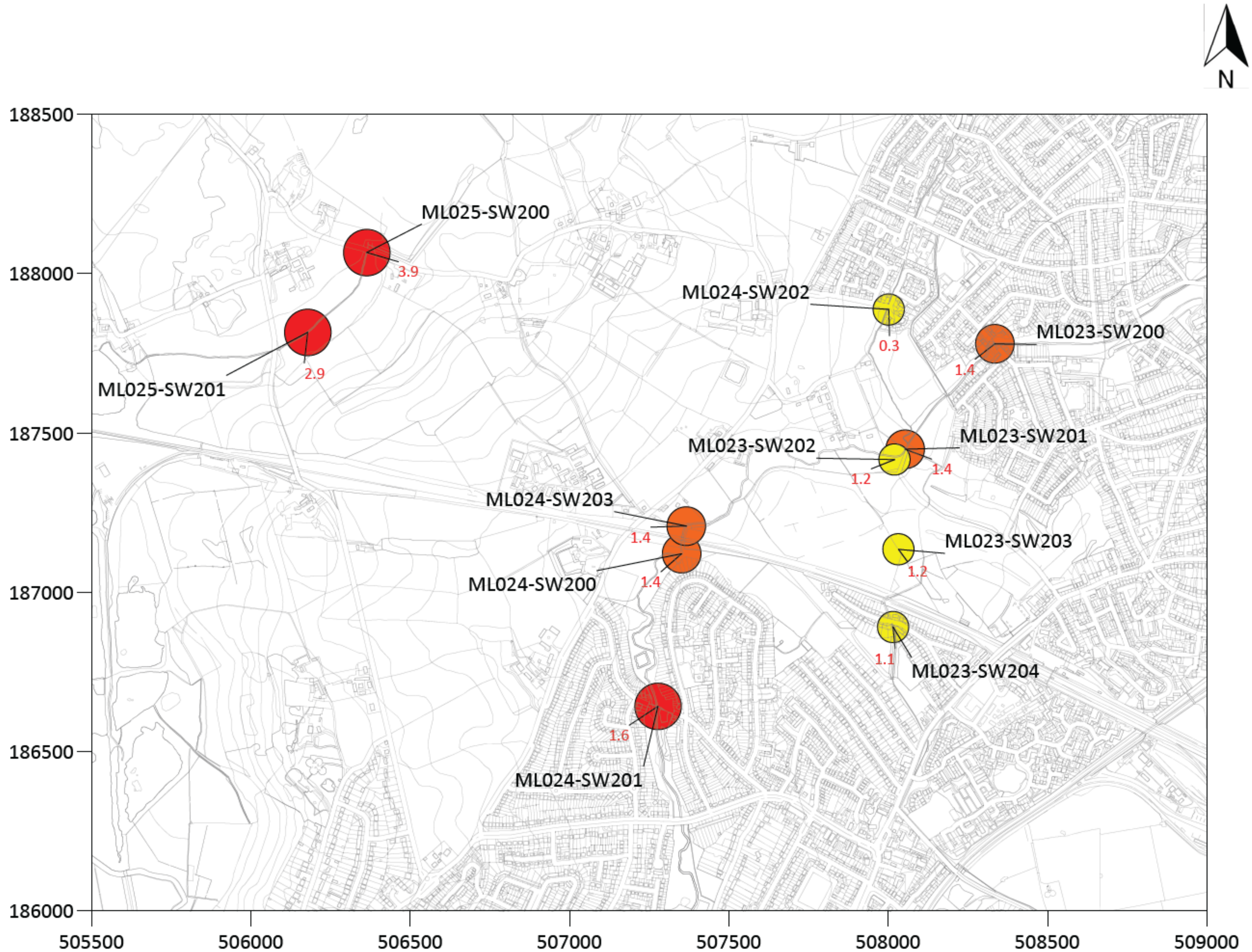
0.086 mg/l
New Years Green Bourne

0.079 mg/l
Ickenham Stream (Yeading Catchment)

Title	Average Orthophosphate Concentrations in Surface Water June 2019-May 2020
Location	1EW02 Enabling Works Area South
Client	CSJV

App'd [redacted]	Drawn [redacted]	Date JAN 2021
DRAFT		Version 1
Scale -		Project No 60605641
Drg Size A4		PLATE 3

AECOM



Key

AMPA (µg/l)

- 0.1 to 1.4
- 1.4 to 1.6
- 1.6 to 3.901

Aminomethyl phosphonic acid (AMPA)
DWS (Water, England & Wales - Water Supply (Water Quality) Regulations, 2016 No. 614 for other pesticides:

0.1 µg/l

Title	Maximum AMPA Concentrations in Surface Water June 2019-May 2020
Location	1EW02 Enabling Works Area South
Client	CSJV

AECOM

App'd [redacted]	Drawn [redacted]	Date JAN 2021	
DRAFT		Version 1	
Scale -		Project No 60605641	
Drg. Size A4		PLATE 4	