THREE RIVERS DISTRICT COUNCIL

Three Rivers House
Northway
Rickmansworth
Herts WD3 1RL

ENVIRONMENTAL FORUM

VIRTUAL MEETING

NOTICE AND AGENDA

For a virtual/remote meeting to be held on Wednesday, 21 June 2023 at 7.30 pm

Councillors Jon Tankard (Chair), Chris Lloyd (Vice-Chair), Phil Williams, Raj Khiroya, Kevin Raeburn, Reena Ranger OBE, Ian Morris, Abbas Merali, Stephen King, Narinder Sian and one representative from each of the following organisations:

Abbots Langley Parish Council	-	Parish Councillors Suzie Arbon/Kristina Allison
Batchworth Community Council	-	Cllrs Andrea Fraser/Stephen Mander/Craige Coren
Chorleywood Parish Council	-	Parish Councillor Harry Davies
Croxley Green Parish Council	-	Parish Councillor Andrew Gallagher
Sarratt Parish Council	-	Parish Councillor Flora Garvey
Watford Rural Parish Council	-	Parish Councillor Angela Arnold
Affinity Water	-	Sophie Mortimer/ Melissa Ahmet
Bedmond Residents' Association	-	Jan Smith
The Chiltern Society	-	Piers Brown
Chorleywood Residents' Association	-	Jon Bishop/Angela Killick
Colne Valley Fisheries Consultative	-	Tony Booker
Colne Valley Regional Park	-	Stewart Pomeroy
Countryside & Rights of Way	-	Tony Bradford
Eastbury Residents' Association	-	David Caiden
Education for a Sustainable Future	-	Bob Sherren
Farming Community	-	Sally Findlay
Friends of Chorleywood House Estate	-	Andrew York/Tim Venner
Friends of Chorleywood Common	-	Michael Hyde
Friends of Croxley Common Moor	-	Graham Everett
Friends of Stocker's Lake	-	Russell Ball
Hertfordshire Moth Group	-	Andy King
Herts Ecology	-	Martin Hicks
Herts and Middlesex Wildlife Trust	-	Matt Dodds/Tim Hill
Maple Cross & West Hyde Residents Assoc.	-	Carolyn Weston
Maple Lodge Conservation Society	-	Keith Pursall
Ornithologist	-	Graham Clark
Rickmansworth Waterways Trust	-	David Montague
Rickmansworth & District Residents' Assoc.	-	Michael Stimpson/Ash Pattni
Soil Association	-	Rose Lewis
Spokes (South West Herts Cycling Group)	-	Roger Bangs
Sustainable Three Rivers	-	Rosi Jordon/Annabel Foley
Thames Water	-	Simon Diggins
Watford & Three Rivers Friends of the Earth	-	Graham Everett/Anna Addison

Joanne Wagstaffe, Chief Executive
12 June 2023

1. APOLOGIES FOR ABSENCE

2. NOTES (Pages 5 - 12)

a) To receive the notes of the meeting of the Environmental Forum held on 8 March 2023
b) Matters arising (if not covered elsewhere on the agenda)

3. A TALK BY TONY BOOKER, COLNE VALLEY FISHERIES CONSULTIVE (Pages 13 - 112)

Tony will be presenting the findings of a comprehensive micropollutant study on the Colne and will take questions on the presentation.

Documents to review in advance are provided

4. TRDC CLIMATE EMERGENCY AND SUSTAINABILITY STRATEGY CONSULTATION (Pages 113 - 142)

An update from Joanna Hewitson and Elen Roberts on the draft strategy and associated consultation

Documents to review in advance are provided.

5. MEMBERS' INFORMATION EXCHANGE

News, Issues and Environmental Progress reports

6. ANY OTHER BUSINESS (TO ALERT THE CHAIR OF THE FORUM IN ADVANCE OF THE MEETING PLEASE)

Questions to be submitted in advance where possible

If any member wishes to speak at the meeting please advise Elen Roberts on 01923 776611 or email elen.roberts@threerivers.gov.uk or the Chair in advance of the meeting

7. SPEAKERS FOR FUTURE MEETINGS

8. NEXT MEETING
Wednesday 8 November 2023

To join the virtual/remote meeting please see the details below

Join on your computer, mobile app or room device
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THREE RIVERS DISTRICT COUNCIL

At a meeting of the Environmental Forum held virtually via zoom, on Wednesday 08 March 2023, 7.30pm.

Chair:

Cllr Phil Williams

Guest Speaker:

Simon diggings from Thames Water

Three Rivers District Council Officers:

Joanna Hewiston, Jess Hodges

Apologies for absence were received from:

Elen Roberts from Three rivers District Council, Cllr Chris Lloyd, Jane Lay from Abbots Langley Parish Council, Cllr Chris Lloyd, Cllr Reena Ranger to be represented by Alison Wall, Michael Hyde from Friends of Chorleywood Common, Stewart Pomeroy from Colne Valley Regional Park, Tony Bradford from Countryside & Rights of Way.

	Action	**Lead Organisation**
1.	To receive the Notes of the Meeting of the Environmental Forum held on Wednesday 2nd November 2022. Notes agreed from previous meeting.	
2.	Matters arising: **1. Questions raised by Rodger Bangs:** A) As mentioned at previous meetings, does TRDC intend to take any action over the poor and dangerous state of the Ebury Way by the old Travis Perkins site. This is a separate issue to the work on the Ebury Way that HCC - CROW may be reviewing. Last November SPOKES had a work party clearing vegetation and dead wood giving more light to the path, but the surface is still dangerous, made worse by the proximity of the new building and the new fence occupying part of the original path. We wish to know if TRDC intends to take any action regarding the proposals submitted two years ago. *Answer: TRDC are not planning any work over this piece of the Ebury Way. This land is not owned by the Council.* *We understand the tree roots are of concern and these would need to be considered in any proposals going forward.*	

	A possible solution suggested would be the diversion of the public right of way adopted but this requires third party involvement. Nothing has commenced on a diversion. *Councillor Williams will raise this stretch with Countryside Rights of Way to explore options.* B) At the last forum I asked about the status of the local LCWIP. We were told it was imminent and would be available shortly. I am not aware of any recent consultation or proposals. When will the TRDC part of the LCWIP be made available for consultation? *Answer: The Local Cycling and Walking Infrastructure Plan (LCWIP) has been developed jointly with the County Council (a requirement) and Watford Borough Council (a logical partner given the distribution of settlements in the District around the Watford conurbation, and a partner which was required by the County Council).* *The Infrastructure, Housing and Economic Development Committee (IHED) at Three Rivers DC considered a report on the LCWIP on 11 October 2022 and agreed to progressing a full public consultation on the Plan. Officers are currently continuing work with Hertfordshire County Council in developing this consultation and it is expected early May 2023* C) Another issue that is being discussed locally is the new path crossing Croxley Moor to the Ebury Way. Are the gates likely to be changed making it easier to cycle across the moor? *Answer: The current route is not a permissive cycle route and previous proposals for a cycle route across Croxley Common Moor have been removed from the LCWIP following further work and confirmation from Natural England that it would not support cycling (due to noise/vibration) on this SSSI. In addition, cattle graze on the Moor and need to be kept secure. There are no plans to change the access gates.*	
3.	A TALK BY SIMON DIGGINS FROM THAMES WATER. • Over several years water companies have been criticised for many reasons including not recognising the value of the rivers. Thames Water are trying to rectify this by working with local communities and NGOs on various projects, for example: support to the Chilterns Chalk Stream Project, which has improved the condition and signage on the River Chess Walk, in order to improve accessibility to the river. • Taking a more holistic approach, in 2020, Thames have created the Smarter Water Catchment (SWC) programme which is operating on three rivers, and which includes the Chess (the others are the Evenlode in Oxfordshire and Crane in West London). The programme is designed to bring together the water companies, local people, and businesses so that all may benefit. (NB. is also part of a wider government approach, known as the Catchment-Based Approach). The SWC is a 10-year programme, with guaranteed funding until Mar 25; and it is 3 years in, and there will be funding after Mar 25 but it is not yet known. So far, much work has been done on 'baselining':	

assessing river health water quality and ecological data, collected in part through citizen science activities (and, of course, Thames Water's own monitoring).

- Thames Water is very conscious of its obligations and is committed to change, however it will not be rapid. Between now and 2027 significant investment will be made to reduce the amount of spillages by 2030 - 80% reduction to sites near SSSI's and to 50% of sites overall. Specifically, in the Chess, Chesham Sewage Treatment Works (CSTW) will benefit from £16.9m of investment, which should significantly reduce storm discharges.
- Thames are also aware that Maple Lodge Sewage Treatment Works is an issue of concern. Maple Lodge catchment runs from St Albans down to Three Rivers area including Watford. It is not working as well as it should be. Draft plans are being progressed for infrastructure improvement in the amp cycle between 2025-2030, the outcome of which will depend upon Thames's competing priorities and OFWAT decisions. (AFTER COMMENT (SD). Until I started working for Thames, I had no conception how tightly regulated they are and how all investment decisions are scrutinised and must be agreed against other, competing, priorities. That should not stop anyone lobbying, or advocating for change, and is the real purpose of the SWCs: to gain a better understanding of the issues in order that better decisions can be made. END OF COMMENT)
- TW is committed to improving transparency regarding sewage spills and up to date performance data can be found at, EDM Map | Storm discharge data | River health | Thames Water . I commend it.
- Thames are working with Affinity Water to improve systems on both the Colne and Chess. Affinity provides much of the fresh water in the area so naturally, across the region, we co-operate. Both water companies are part of the ColneCan Partnership (the Chess SWC partnership is, in effect, a catchment within another Environment Agency-mandated catchment). They are also looking at how they can improve river systems locally; have worked on the Misbourne and Ver; and are now looking at both the Upper Chess (the Bucks part of the river) and, with Thames, the Colne/Chess confluence and the Colne Basin, which needs some work. As Thames are also planning on improvements in the Upper Chess, linked to the CSTW upgrade, it would be very helpful to fully engage local authorities and groups in what could be done elsewhere. (COMMENT The Chess/Colne confluence and Basin would be worthy of a large-scale River Recovery approach, as it could also be linked to the Croxley Moor Common (and even Ebury Way improvements END OF COMMENT).
- The SWC programme is going to be rolled out further, from 2025 onwards; the Colne is a candidate for this and would have strong support but: a. it is competitive b. there is a lot of work to get the Colne partnership ready.

Questions and Answers:

Thank you for attending and report. Planning applications, what powers do you have at planning application stage to say that you cannot provide water/treatment?

	Answer- Thames are a statutory consultee: looking at provision of fresh water, where Thames are the provider, (although here in Three Rivers it is Affinity Water) and Wastewater removal, where it is Thames's responsibility. Their role is neutral, and we are keen not to be used a barrier against planning: it is their role to say whether that water and wastewater systems are/are not sufficient for the proposed development. *We are always keen to work with local authorities. Beyond development, important considerations are misconnections, whereby surface water run-off, or household 'grey water' is discharged into sewers, over-loading them. Tends to be more of a problem in urban areas but DIY or 'cowboy builders', often get this wrong.* **Sorry didn't submit in advance. Using the Thames interactive map to show real time discharges and check other things. Were there any other discharges in the Chess in 2022 prior to November** *Answer –There were less discharges in 2022 than 2021. Tony Booker clarified the Maple Lodge spill figures - 800 hours 2022, 1000 hours 2021. Spill time doesn't give the whole picture as they do not record the quantity (could be minor or major). There is an ongoing conversation in the Colne Catchment regarding causes of pollution in the Colne as Maple Lodge spillages are one part of the likely cause and it is critical the other sources are addressed too. Simon Diggins agreed, but advised it is very difficult to establish the true source of all the pollutants. He advised that they had established that 1/3 pollution due to water companies, and 2/3'rds from other sources.* **Picked up 2 discharge incidents (October and one in Feb). Were there any others in 2022?** *Answer –as above* **Appreciate your report and commitment. Thames used to provide regular reports on spillages/discharges, this doesn't seem to be the case anymore, the map only shows the latest.** *Answer – Will take this up, but I do know Paul Jennings is on the steering group of smarter water catchment programme, it could be a good idea to talk to Paul.* *Jo. H – Meetings were suspended for a most of 2022 but have now resumed. At the last meeting it was confirmed there have only been 2 discharges since autumn 2022 (Oct and Nov). Slides from the last meeting are attached to these minutes.* **Question from Chris Mitchell: Thames Water did solve big problem in Croxley Green and believe to be successful. When are we to get an update on Bateman road?** *Answer– work should have resumed 13th March 2023 weather depending. Permissions have been received.* **More information on pollution/discharge incidents:** *Tony Booker explained that he will shortly receive a report on micro pollutants obtained upstream in Watford. He will assess the findings and offered to share at the next Environment Forum. He expects that the concern of pollutants will shift away from water treatment/storm outflows (except for materials they weren't designed to treat).*	

4.	TRDC CLIMATE EMERGENCY AND SUSTAINABILITY Following the climate emergency declared in 2019 the first strategy was launched in 2021. It included a target achieve net zero on council operating emissions by 2030 and to enable and inspire the District to achieve net zero by 2045. Since then much has been learned, achieved and evolved , and consequently an updated strategy is going to LEC 15th March, and the papers can be found here The report requested the Leisure, Environment and Communities committee (LEC) to recommend the strategy be available for public consultation May after the purdah and elections are complete. The final draft will be return to LEC in the autumn for adoption. The current action plan will not reflect the objectives on draft strategy March 2024. We will circulate the consultation to members of the Environment Forum and hope you will share to your contacts and provide us feedback. Details of progress on the climate emergency can be found in the draft strategy. If you are aware of households on incomes of less ££31,000 per year with an EPC of D or below grants may be available for insulation so please ask them to contact our home Energy Support Service Emergency on 0800 107 0044 to establish grant opportunities Questions and Answers: **Thank you for the report, deep retrofit on rental properties with EPC of D or below. Is the deep retro fit going to be open to landlords despite income?** *Answer – Yes, it if the house qualifies from an EPC perspective and tenant qualifies on income, then they are included but the landlord will have to contribute a portion.* **When committing to net zero, is the economic impact being considered as it can cause the economy to struggle much more. Very expensive to buy a heat pump and already have a cost-of-living crisis.** *Answer – the economic opportunity for the district to work towards net zero is enormous - every home needs more insulation or an air source heat pump. However, there is a drastic shortage of suitably skilled labour, and this needs to be addressed centrally and through higher education. We are struggling to source contractors locally. Net zero provides employment opportunities in several sectors including ecologists as the Environment Act comes into force. All council buildings and commercial buildings along with biodiversity work (BNG, environment act).* *From a homeowner's perspective the current high fuel costs means the need to reduce emissions is even more urgent, and payback periods are reduced. TRDC have applied for a grant to enable us to assist the able to pay sector, aim to improve access and understanding green finance option for people, if don't win the grant we will have to figure out another way to do this.* **Thank, you very important work. Agree with the skill shortage. Question is for the consultation on the strategy in May. Will there be materials for notice boards, library displays, Parish council schools etc. It is very important to get the message across. I offer to help.** *Answer - Thank you for the nudge. Will be trying to attend all the local area from meetings and will be using all media channels we can to spread the word.*	

5.	Misuse of nature reserves Standing item Topic to be removed from the agenda for future meetings, if there are issues, they can be raised in AOB**.**	
6.	Member Exchange. **Rosi, Sustainable Three Rivers (S3R)** - After long struggle with TRDC S3R have been given permission for a small community garden in the orchard in Rickmansworth adjacent to Three Rivers House for a 12-month trial. Once the license is received, they can start fund raising and crowd funding. S3R thanked everyone who helped and have requested that anyone who can assist with examples of policies such as Health and Safety, equality and diversity would be much appreciated. 2 trees are going to be planted in Rickmansworth High Street, It has taken a lot of time and effort, with thanks to Russell Ball whose dedication and determination has achieved this outcome. Cllr Williams – advised S3R highlighted option to apply to their County Cllr for locality funding. **Cllr Andrea Fraser** –Another round of water butt giveaways for Batchworth residents has been launched, and Cllr Fraser would like to hear from anyone who benefited from the scheme. **Tony Booker** – 1) The Colne micro pollutant report will shortly be available on the ColneCAN website and will be an opportunity to look at the bigger picture, go on the ColneCAN website. 2) Re-AP has just obtained charitable status, and there will be a hub in the Colne valley to collect plastic from aquatic environments that is generally unrecyclable - and it will be re-purposed into useable items. 3) ColneCAN is the Colne catchment partnership that delivers the Catchment Based Approach of river basin management utilising a small amount of funding from DEFRA. Unable to appoint a host, Tony Booker is helping to lead this as a consultant for the foreseeable future with a key objective to bid for the next round of Smarter Water Catchment funding an opportunity which cannot afford to be missed. **Cllr Harry Davies** – Mention that CWPC community garden at the allotments is now up and running with gardening session every Wednesday morning 10-11.30 – anyone with time to spare is welcome. Cllr Williams suggested that Harry could help S3R in their set up phase. Cllr Davies is happy to be contacted by Elen Roberts to share the garden and its' work through TRDC marketing channels **Jan Smith** – Is TRDC aware of the following DEFRA Plan and if so, how will TRDC incorporate it into its Planning system, Environmental Protection, Climate Change Strategy, Local Plan and other relevant *Written answer from Marko Kalik Head of Planning Policy: -* *We are aware of the DEFRA Environmental Plan and its goals and ambition is in line with ours for the Local Plan, though many of the interventions included in the plan are not necessarily possible through planning policy. We are working with Hertfordshire County Council on biodiversity net gain and Local*	

	Nature Recovery Strategies. We have included biodiversity net gain in our emerging Local Plan policies and will be preparing a biodiversity net gain supplementary planning document to support this. *Several other areas covered by our emerging policies are as follows:* • *Water efficiency* • *CO2 emissions* • *Waste and contamination* • *Green Infrastructure* • *Sustainable transport (including active travel)* *Each policy contains elements from the Environmental Plan however they are not directly based on it as it is not a planning document.* **Jan Smith** –. What is TRDC doing to protect the historical meadow, site CFS56, The Horsefield, Bedmond, from proposed development? This site was proposed in the Local Plan consultation of 2018 and still has not been screened out of the Local Plan process. This site is important for its biodiversity and climate change mitigation purposes. It is a perfect example of the type of environment that we should be saving and yet for the past 5 years, has faced the constant threat of destruction. *Cllr Williams advised the land was put forward to local plan so process must be followed.* *Written answer from Marko Kalik Head of Planning Policy: -* *Site CFS56 is being considered as a potential site for allocation in the Local Plan. The site has been consulted on and representations are being considered as we move to the next phase of the Local Plan. We will be consulting on lower housing numbers in the autumn, and as such some sites will be removed. At this stage no decisions have been made. It should be noted that the site does not have any official designation in planning terms. It is not a Site of Special Scientific Interest (SSSI), a Local Nature Reserve, Local Wildlife Site or a Wildlife Trust site.*	
7.	*AOB:*	
8.	*Suggestions for future speakers – Please contact Elen Roberts.* Tony Booker –to present the micro pollutant study.	

EF06/19 DATE OF NEXT MEETING

The Forum noted that the date of the next meeting is Wednesday 21th June 2023.

Associated documents/links related to meeting and action points:

A note from Simon Diggins, Thames Water:

The River Chess Community Fund is open for applications, with community grants available of up to £5,000.
You can find out more and apply for the grant here: https://chilternsociety.org.uk/river-chess-community-grants-of-up-to-5k-available-now-do-you-qualify/

MICROPOLLUTANTS AND THE RIVER COLNE

C.V.F.C

Colne Valley Fisheries Consultative

Summary:

In just a 22-month period, the water samples collected from the river Colne were seen to contain 267 different substances by Gas Chromatography – Mass spectroscopy alone. At least 85 of these carry an Environmental Hazard classification, ranging from harmful, through to very toxic to aquatic life. 150 of the substances found to carry a Human hazard classification. A number of substances (25) carry classifications which state they can cause cancer or are suspected of causing cancer. There were 17 substances detected that can/may damage fertility or the unborn child. None of the substances are native to our natural water system.

Numerous outfalls are present in this area and have often been shown to be misconnected to. Sewage treatment works (STW) also discharge to the river Ver and Colne although the latter at Blackbirds Farm does not 'spill' under storm conditions. These sources may account for many of the substances and chemicals found to be present. Misconnected outfalls will discharge raw, untreated sewage and chemical waste combined with road and agricultural run-off. STW's will discharge treated sewage unless discharging under storm conditions when dilute raw sewage will enter the rivers. Treated sewage (final effluent) cannot be expected to be totally 'clean' however. STW's are only designed to deal with the basics of human existence, using a biological process. Everything else that arrives there may – or, crucially, may not – get some treatment on the way through. But if it does, it isn't by design.

The large number of industrial substances is of concern, with some of those being present in large volume along kilometres of the river Colne water. The detection of agricultural chemicals may be explained to some extent by run off after use in local fields. However, industrial and pharmaceutical substances have also been found at high levels and their entry method is not clear as they do not necessarily relate to obvious point sources of pollution. In addition to this there was an obvious pollution event in December 2021, when petrol components were detected along the River.

Apart from the large number of Industrial, agricultural and pharmaceutical substances, the levels of PAHs are concerning. Some PAHs have breached their MAC-EQS in the water but the accumulation of PAHs in the sediment is particularly remarkable. These values were high at the time of testing and accumulation may only increase these levels. The values should be addressed to determine if irreversible damage is being done to our environment.

Specific testing of the River Colne sediment has shown the POPs (PFAS, PAHs, PCBs, dioxins and Furans) present. There is considerable variation in concentration in the levels between sites. There are also High levels of heavy metals, a number significantly higher than the WHO values for soil. As these POPs chemicals accumulate the levels will potentially increase.

The substances found in the River water and sediment varied in their potential source and use, from agricultural, pharmaceutical, Industrial, road/traffic pollutants, incomplete combustion, human waste and Industrial waste. The substances also varied in their chemical grouping, there were a significant number of Persistent Organic Pollutants detected in the form of PAH's and on a lesser scale PCBs, PFOAs (By LC-MS), Dioxins and Furans. The source of these pollutants may also be varied.
The potential for these river water and sediment polluting substances to impact our drinking water aquifers will increase. Substances that are usually present in small amounts in plastics such as monomers or stabilisers have found their way into an observation borehole, along with other substances that are prevalent in the River Colne. It should be noted that Affinity do not use this borehole for the source of drinking water, it is for monitoring the quality and levels of the groundwater.

Our findings strongly suggest that our environment and water ecosystems are being irretrievably damaged and that there is potential for contaminating our water supply therefore risking harm to ourselves. As the number of outfalls increase, so too will the number of substances in the river that can then seep through the soil, gravels and chalk and potentially reach our drinking water aquifers.
Where raw sewage is present the bacteria, such as E.Coli, and viruses present a significant risk of adversely affecting the health of the general public and animals accessing the river

We have found two endocrine disrupters, four carcinogenic/or potentially carcinogenic and two substances that may damage fertility or the unborn child in a control sample from an observation borehole. A substance that carries a carcinogenic and fertility damaging classification has been found in all samples from Knutsford playing fields to Lairage land in all the samples taken over the eighteen months of this study.

This level of pollution in our rivers, that is likely to increase without meaningful remedial action, must dictate there is an increased risk of water supply aquifers becoming contaminated and it will become increasingly difficult, if not impossible, to remove all those pollutants from the supply. The water sampled from the observation borehole, as with all water samples, was analysed only by a generic GC-MS process. Had a wider range of analytical processes been available to us there is no doubt the number of micro pollutants discovered would significantly increase.

Contents

1.0 Background

The origins of this project were founded in trying to establish the source of an obvious persistent, misconnected but difficult to trace, polluting outfall into the river Colne in Oxhey park, Watford. The lead of Community Connections CIC (CCCIC) who focus their work in the Watford area arranged for a water sample to be taken and analysed in the hope that pollutants identified may give indication as to the location of the source.

It was already known that water quality in the area was generally poor as indicated by very low scores in the monitoring of invertebrate species using the anglers riverfly monitoring initiative (ARMI) https://www.riverflies.org protocols. The target species are good indicators of water quality.

Sites are monitored very regularly and an expected standard (a trigger level) can be set in consultation with the Environment Agency (EA). Any trigger breach should then invoke a pollution investigation by the EA. Sadly that is no longer the case as resource and funding cuts have meant the EA now publicly state that low level diffuse pollution is unlikely to be investigated.

So, we were largely on our own and this led to the water quality analysis that set us on the road of this project. The results of that analysis were made known to the Colne Valley Fisheries Consultative (CVFC).

CVFC were already active in the area (despite there being no angling interest due the lack of fish) and had been since 2012/13 when we became aware of a number of 'Category 1' pollution incidents on the upper Colne. A 'Cat 1' incident is largely determined by the EA as a significant fish mortality. The incidents observed often coincided with heavy rain events and a relationship between them and the many discharging outfalls to river we were discovering became obvious.

Apart from through the efforts of CCCIC and CVFC there was no attention being paid to the upper Colne and representation for it was woeful. CVFC (a voluntary and unfunded organisation) quickly logged and recorded all the outfalls in the area and beyond, developed a pollution reporting app and an invasive species version soon followed. They were also soon co-ordinating the riverfly hub in the area and hosted the recording of results on our website https://www.cvfc.org.uk

It was through this continued work and our questioning of the Water companies, the catchment host (CaBA based approach) and the local authorities that we finally achieved some traction and this was very much the forerunner to the current Rediscovering the River Colne project in the Watford area. Finally, people who had the resources and were actually responsible for the state of the rivers were taking notice - having been shown the way by a group of volunteers. Even now that response is still not at the level that is necessary but at least we have a start.

CVFC is a delivery partner in that project and recently arranged for the EA to undertake fish population surveys at three locations through the area we had undertaken the water quality sampling. Biomass and species mix were very poor but that was no surprise of course. It is obvious that the methodology used by the EA for determining a Cat 1 incident could not be applied in this area – it is arguably outdated and requires urgent revision.

The aim of this study is to confirm the dire state the river is in, to bring that to the attention of the agencies and authorities that should be taking a far more pro-active approach to resolving the issues and of course to provide some facts to the general public who can take decisions about allowing their children and pets to freely access the river.

Hopefully that in turn will lead to increased public awareness of the issues and will inform them how better to respect the aquatic environment.

We also intend this to be a catalyst that will bring about further and more comprehensive research not only in the immediate study area but across the whole catchment.

2.0 River Colne area of study

This study initiated with the sampling sites Knutsford Playing fields, Shaftsbury Road, Oxhey Park and Lairage Land. It then expanded upriver to include the River Ver as a control, and Munden House Ford on the River Colne to show the pollution area. It then expanded to include a site close to the source of the River Colne, Coursers Road and one between the source and Munden House ford, Tykes Water Radlett. The approximate location of these is shown in Figure 1.

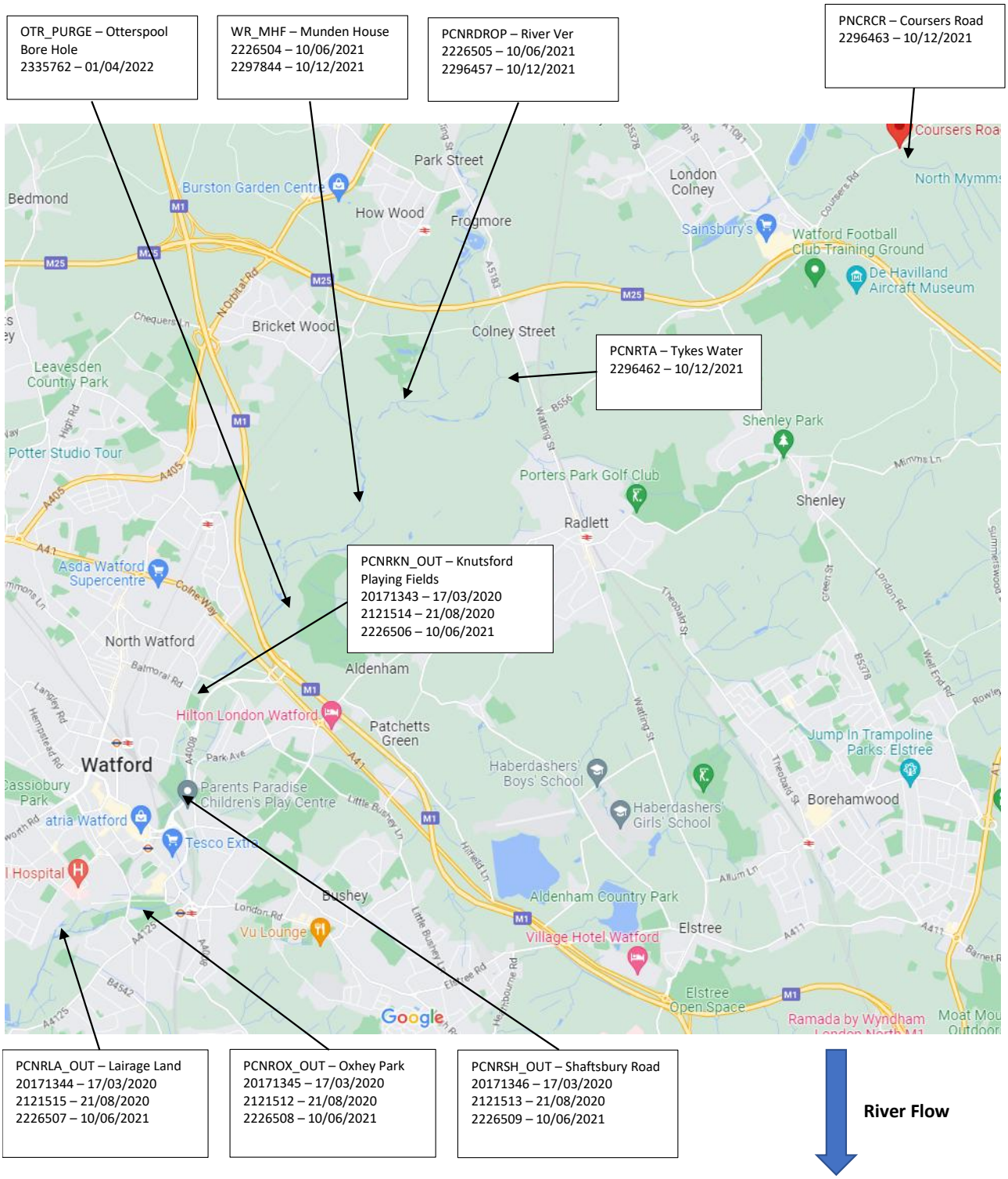

Figure 1 - Map showing the approximate location of the sampling sites

Figure 2 - KnutsfordPlaying Fields outlet (17.3.2021)

Figure 3 - Shaftsbury Road outlet (17.03.2021)

Figure 4 - Oxhey Road outlet (17.03.2021)

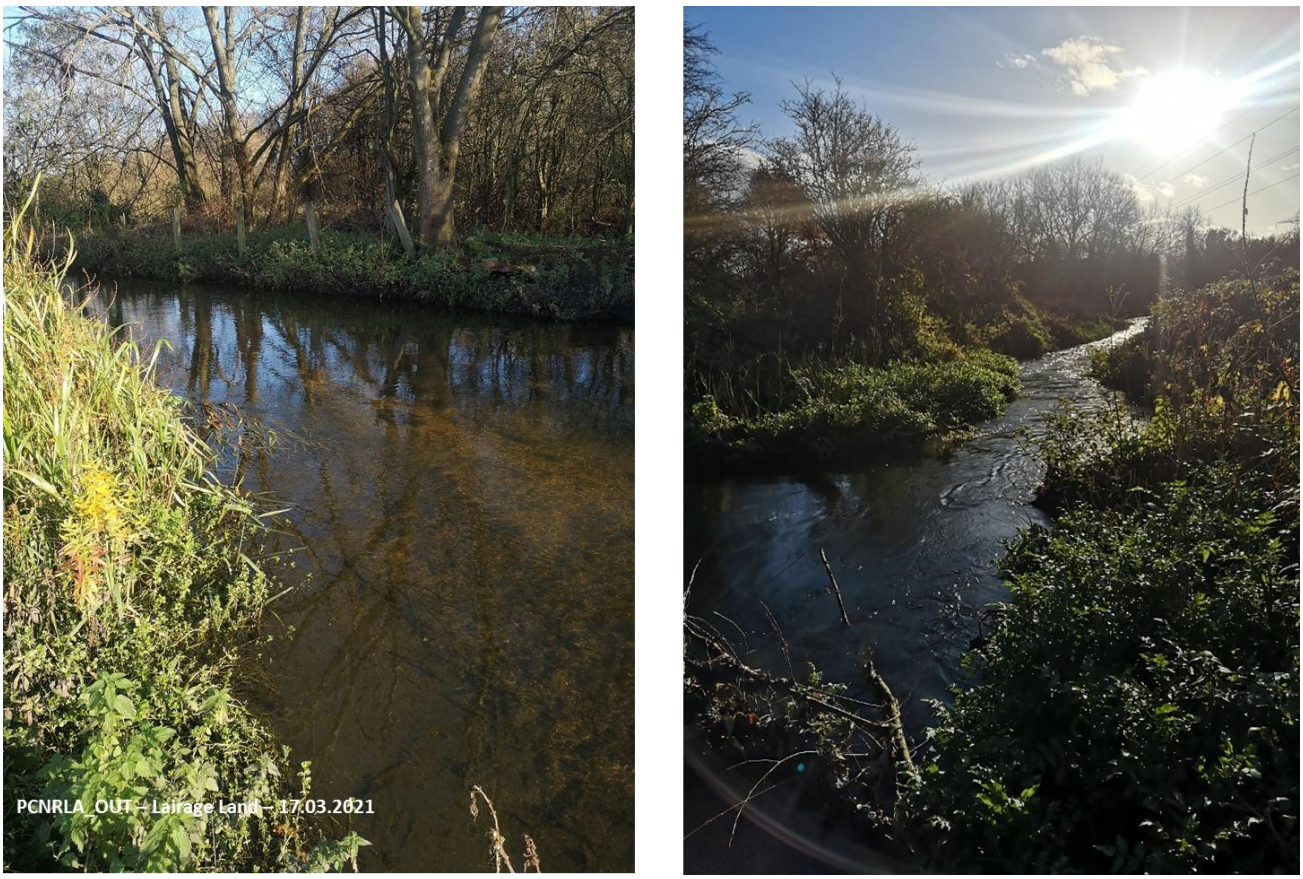

Figure 5 - Lairage Land outlet (17.03.2021)

Figure 6 - River Ver sampling site

3.0 Water Quality Study with Affinity water

The study was initiated in 2019, Affinity water took samples of water initially in 4 locations and then analysed the samples by a generic GC-MS (Gas Chromatography-Mass Spectroscopy) method. The list of chemicals supplied were reported in values of ug/L, Volatile organic compounds were highlighted.

The GC-MS method is a good method that can detect chemicals that can volatilise and are relatively non-polar. The substances are volatilised to convert them to a gas, then pass through a special column and get separated as the substances will travel at different rates through the column, mostly due to interaction or lack of interaction with the GC-column whilst being carried by an inert gas. The individual chemicals are then identified by mass spectroscopy using the NIST library to identify the substances.

This method obviously has limits, it cannot identify chemicals that do not volatilise under the conditions of the GC method (this would include salts, heavy metals, chemicals that have a higher molecular weight (approximately 800 daltons), chemicals that do not interact with the GC column, substances that do not separate sufficiently for identification etc.

It was initially thought that the results would lead us to where potential pollutants were entering the river, perhaps by a mis-connection. However, the first set of GC-MS results for the four sites on the River Colne started to show us how complex this study was to become.

3.1 Overview of some Regulations/Directives

Water Framework Directive

The Water Framework directive (WFD) 2000/60/EC entered into UK, it was initiated in Europe to ensure that all coastal and inland waters reach and maintain a good status. This study is limited to the chemical pollutants only which are listed in directive 2008/105/EC. This Directive sets out controls for the environmental hazardous pollutants by the implementation of Environmental Quality standards for the annual average (AA-EQS) and Maximum allowable concentration (MAC-EQS) for **priority substances** and **eight other pollutants**. These substances include **metals** cadmium, lead, mercury and nickel, and their compounds; **benzene**;**polyaromatic hydrocarbons (PAH)**; and several **pesticides**.

Several of these priority substances are classed as **hazardous**. These substances have been chosen due to their significant risk to the aquatic environment. The EQS are thresholds which aim to maintain the good quality of substances in natural waters. There are different EQs for inland surface waters (rivers and lakes) and for other surface waters (transitional, coastal and territorial waters). The thresholds are shown in either an average value (over 1 year), annual average AA. To prevent against long term exposure to pollutants in the aquatic environment and the Maximum allowable concentration MAC of the substance. This is to prevent against short exposure to these pollutants, which can occur in pollution leaks. Where the MAC-EQS are marked as 'not applicable'. The AA-EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.

The AA and MAC are in line with the Water Framework Directive 2000/60/EC. The figures quoted in this report are for Inland surface waters encompass rivers and lakes and related artificial or heavily modified water bodies.
Note 11: For the group of priority substances of polyaromatic hydrocarbons (PAH) (No 28), the biota EQS and corresponding AA-EQS in water refer to the concentration of benzo(a)pyrene, on the toxicity of which they are based. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water.

Unless otherwise indicated, the biota EQS relate to fish.

This study has only looked at the chemical/pollutants and not any physio-chemical, biological parameters stated in the Water Framework directive. The list in Annex I, listing the environmental quality standards for priority substances and certain other pollutants uses a number of different analytical techniques which were not all available during this study.

There are 8 PAH's listed, 5 of which are grouped together, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene. The purpose of this is that only Benzo(a)pyrene needs to be monitored for the Annual average (AA-EQS) and EQS-biota.

The Ground Water Directive, a daughter Directive of the WFD, came into force in 2006 (2006/118/EC) and sets to protect groundwater against pollution and deterioration. It sets quality standards for nitrates and pesticides (Annex I)

Active substances in pesticides, including their relevant metabolites, degradation and reaction products (1) 0,1 µg/l 0,5 µg/l (total) (2) and a framework for establishing threshold values (Annex II).

The Water Industry act of 1991

This act controls trade effluent. One of the reasons of this initiation was to preserve and protect our environment and maintain drinking water quality.
This stipulates that trade effluent discharged into the public sewer requires prior consent that may dictate conditions and limits of the discharge.
"any liquid, either with or without particles of matter in suspension in the liquid, which is wholly or partly produced in the course of any trade or industry carried on at a trade premises"

Prioritisation and Early warning system
A prioritisation and Early warning system (PEWS) for England was developed by the Environment agency. The aim of is to monitor and horizon screening work to produce a list of chemicals which act as an early warning system for identifying emerging issues.
It lists the chemicals detected along with a traffic light system to denote their environmental effect on surface water, ground water, soil, biota, sediment and overall. Priority 1 – red, is high risk, high certainty, Priority 2, amber, High risk, low certainly, Priority 3, yellow, low risk, low certainly and Priority 4, green, low risk low certainly.

3.2 Overview of Chemicals – generic type

Polycylic Aromatic Hydrocarbons (PAH's)
PAH's are a group of chemicals composed of carbon and hydrogen. PAH's are formed from processes such as incomplete combustion of natural (coal, crude oil and wood) and man-made combustion sources such as car emissions.
PAHs can also be produced by bacteria and plants also the maturation of crude oil. Exposure is usually associated with inhalation. However, they are found in water-ways as pollutants. It is suspected that the PAHs enter water sources through fossil fuel combustion, petroleum spills, road runoff, industrial wastewater, leaching from creosote treated wood and dry and wet deposition (Karyab et al., 2013).
PAHs have been detected in drinking water, rivers and lakes, groundwater, wastewater, seawater and sediments.

Polycyclic Aromatic Hydrocarbons (PAHs) are hazardous for human health and the environment. A significant number of PAHs are classified as carcinogenic, mutagenic, and reprotoxic. PAHs can be found in a number of consumer products and are restricted due to their high concerns, but also common environmental contaminants. They are also classified as Persistent Organic Pollutants (POP's)

16 of the hundreds of PAH's have been designated as high priority pollutants by the European Chemical Agency (ECHA) due to their toxic , mutagenic carcinogenic and oestrogenic effect on humans: Acenaphthene, Acenaphthylene, Anthracene, Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Benzo[g,h,i]perylene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene , Fluorene, Indeno[1,2,3-c,d]pyrene , Phenanthrene, Pyrene, Naphthalene.

5 of these PAH's are listed in Annex I of the Environmental Quality Standards Directive (EQSD; Directive 2008/105/EC amended by Directive 2013/39/EU): These are the higher molecular weight PAH's, consisting of 5 or 6 rings and have been grouped together, the result for Benzo(a)pyrene is used as a marker for the other 4. These 5 PAH's have an affinity for particulate matter and are persistent in the environment with biodegradation rates in the order of months to years (European Union, 2008, 2012). They also bioaccumulate within organisms and are toxic, with effect concentrations reported in the low µg/l range (European Union, 2008, 2012). With the exception of benzo(g,h,i)perylene, these 5 PAH's have been classified as carcinogenic, with benzo(a)pyrene being the most carcinogenic of the group (European Union, 2012). Benzo(a)pyrene, benzo(k)fluoranthene and benzo(g,h,i)perylene have been listed as substances of very high concern (SVHCs) under the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

These 5 PAHs persist in the environment, accumulate in biota and food chains, and have potential adverse effects on aquatic life and humans, they are classed as priority hazardous substances (PHS) and ubiquitous PBTs (uPBTs).
benzo(a)pyrene,
benzo(b)fluoranthene,
benzo(k)fluoranthene,
benzo(g,h,i)perylene,
indeno(1,2,3-cd)pyrene.

Four of these, (benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3- cd)pyrene) are listed in Annex III of the Persistent Organic Pollutants (POPs) Regulation (EC 850/2004). In June 2016, January 2019, and June 2018, benzo(a)pyrene, benzo(k)fluoranthene, and benzo(g,h,i)perylene, respectively, were listed as substances of very high concern (SVHCs) under the REACH Regulation (EC/1907/2006)

Further to these, some smaller PAHs, naphthalene, anthracene and fluoranthene are listed with their own individual AA and MAC values.

The setting of a biota EQS reflects the PBT characteristics of this group of substances. The biota EQS is driven by risks to human health. The Directive (2013/39/EU) also specifies maximum allowable concentration EQSs (MAC EQSs) for the individual PAHs, except indeno(12,3-cd)pyrene. MAC EQSs are thresholds set to protect aquatic life from short-term toxic effects.

However, the contribution that groundwater makes to the surface water status failures is also considered as part of the WFD and the Groundwater Directive (2006/118/EC as amended by 2014/80/EU). If groundwater contributes more than 50% of the PAH load in any surface water status failure then the groundwater body will also go to poor chemical status. We will be assessing this further as we develop water body classifications for the draft river basin plans

PFAS

Per and Polyfluoroalkyl substances. These are man-made, synthetic substances that have a number of fluorine atoms attached to the (carbon) alkyl chain. This carbon to fluorine bond is so strong that these substances can accumulate over time in the environment, they do not easily break down, some bioaccumulate. A number of these substances are classified as Persistent Organic Pollutants.
PFAS is a generic term for thousands of chemicals (around 12 000). Their use is prolific in industry and household goods, from non-stick coatings on our cookware, repellents on our water-proof textiles, coatings, toys, packaging, fire-fighting foams to name a few.

PFAS have been found in human blood, and food sources such as fish, meat and fruit. PFAS have now become ubiquitous.

PFAS from products can enter the water-ways and they are difficult to remove so can end up in our tap water.

There are increasing regulations for PFAS as they have been lined to health risks such as cancer, hormonal dysfunction, weakened immune system and Environmental damage. There is a proposal underway from February 2023 to ban PFAS. This would take place after a period of 18 months to 12 years.

These substances are not easy to detect using Gas Chromatography-Mass Spectroscopy, liquid chromatography- mass spectrometry is usually used which is far more expensive.

Polychlorinted Biphenyls – PCB

These are man-made substances which are very stable to high temperatures and pressures. They are also termed as Persistent organic pollutants. There are around 209 different PCBs, Polychlorinated Biphenyls. They differ in the level of chlorine and also toxicity, they are highly carcinogenic and since 2001 have listed as a POP and can no longer be produced. The disposal of PCBs and equipment contaminated with PCBs has a sunset date of 2028.

They have proven to pose risks to human and animal health, such as cancer and reproduction problems, due to their toxic and bio-accumulative properties. They were banned from use in 1987 in the UK, prior to this they were industrial classified mainly as an Industrial use chemical. But can be found leaching and being washed from landfill sites.

Dioxins

Like PAH, PCB and PFOA, PFAS, Dioxins are also classified as POPs and as such will accumulate and persist in the environment. Dioxins have been shown to cause adverse developmental effects in fish, birds, and mammals at low exposure levels.

They can be produced by a number of processes such as

- Incineration of municipal solid waste
- Incineration of medical waste
- Secondary copper smelting
- Wood fires
- Land application of sewage sludge
- Cement kilns
- Coal fired power plants
- Residential wood burning
- Chlorine bleaching of wood pulp

Surface water bodies can become contaminated when rainwater carries soil containing dioxins into surface water and when some industries discharge their dioxin-contaminated waste directly into surface water. Dioxins do not easily dissolve in water, so they tend to settle to the bottom and cling to the sediment.

3.3 GC-MS results - format

From the 17th March 2020 until the 10th December 2021 4 sets of samples have been taken from the River Colne. These samples were collected away from the banks of the river and below the surface. These samples were then analysed by a generic GC-MS method and the results, as supplied, can be found in the Annex. The results tabulate chemical name, CAS number and range of substance found in micrograms per litre.

This amounted to a lot of data, as a significant number of substances were found at each testing site, at each sample collection date. It has been difficult to determine what data to highlight in this report as most, if not all the substances, should not be, native components of a River.

The data has been displayed in a number of ways.

1. For each set of data, each sampling date, there is an overview of the findings.
2. As this study is to look at the pollutants in the River Colne due to the change in aquatic species population, the data documented and discussed concentrates on the substances that are harmful to the environment at the time of writing. For each date of sample collection all the substances known to be hazardous to the environment have been tabulated. In most cases this is a significant amount of data which, just by the different environmental hazardous substances listed, gives a good indication of the extent of pollution in the River Colne.

3. Further to this, the substances that were present in all four of the initial sampling sites as of the 17th March 2020, (Knutsford Playing Field, Shaftsbury Road, Oxhey Park and Lairage land), irrespective of their classification, on each sampling date, are documented. On the second, third and fourth sampling dates the substances found in all sites on each sampling date are shown in bold.

4. Substances that are present at high levels or are of specific interest, irrespective of their classification have also been highlighted

5. Finally, the EQS, AA and MAC for the substances found in each round of testing are tabulated.

The classification of the substances shown are at the time of writing this report, however, a number of substances are also shown in annex III of Registration, Evaluation, Authorisation and restriction of chemicals. REACH (EC) 1907/2006 as potential environmentally hazardous chemicals and it may only be a matter of time until they are given an environmental hazard classification.

3.4 First set of testing and results 17th March 2020

The first set of results, from samples taken at Knutsford playing fields (sample ID 2071343), Shaftsbury Road (Sample ID 2071346), Oxhey Park (Sample ID 2071345) and Lairage land (Sample ID 2071344). The full GC-MS results are shown in the appendix -

The data was surprising for a number of reasons.

- The significant number of substances found in each sampling location:
  Knutsford Playing field – 32 substances (Full data shown in the Appendix - Table 25)
  Shaftsbury Road – 41 Substances (Full data shown in the Appendix - Table 26)
  Oxhey Park – 67 substances (Full data shown in the Appendix -Table 27)
  Lairage Land – 34 substances (Full data shown in the Appendix -Table 28)

- A significant number of the substances, 32 substances, carry an environmental hazard phrase i.e. H4xx, are classified as hazardous to the aquatic environment These are shown in Table 1

- There were a number of substances that showed in all four sample areas. That equates to the substances being present in at least 4.2km of the River Colne. These substances are shown in Table 2. 12 of which are hazardous to the environment.
  This raises concern at where the substances are entering the River Colne, at what levels and how long have they been present.
  Given an average river width (10m.), depth (0.5m) and flow ($1m^3/s^{-1}$), when a substance is found at 1ug/L and is found in all 4 consecutive sites, Knutsford to lairage, making the assumption that the chemical is present throughout the river, there is 0.021kg of that substance present at any one time. This figure becomes alarmingly high if we multiply this up for a day or a greater period of time such as 18 months for the consistent offenders.

- Where will all these substances be transported to? The majority of substances do not degrade quickly. They can be taken up by aquatic animals and plants, mammals drinking from the water, absorption into the surrounding soil and river bed and potential transfer to the aquifer - i.e. these substances will not be isolated to an area but will be dispersed by various means.

- A paper titled: *Faecal sterols as indicators of sewage contamination in estuarine sediments of the Tay Estuary, Scotland: an extended baseline survey A. D. Reeves and D. Patton* cites a list of faecal sterols are indicators of sewage contamination. These include coprostanol, which decreases as the distance from the contamination site increases downstream (Brown and Wade, 1984) which was found during our testing at Shaftsbury Road and a greater level at Oxhey Park.

- Other indicators of untreated sewage contamination are Cholesterol, cholestanol, caffeine, campesterol, β-sitosterol and stigmastol, these can come from a number of sources. Caffeine is partially excreted in urine and is increasingly ubiquitous to rivers and coastal waters. The effect of caffeine on aquatic animals/ecosystems is causing increasing concern due to its effect on aquatic life. These substances were also found during testing suggesting that there had been sewage ingress into the River and may be the result of misconnections, storm spills or even final treated effluent from STW's.

- The other substances come from varied applications and are listed as being used in a significant number of uses from paints to metal cleaning.

- The dynamic nature of the River and added complications such as weather, drainage, filtering by plants, etc make it difficult to trace the route of substances.

- The largest concentration of environmentally hazardous chemicals was found in the Shaftsbury Road and Oxhey park locations. These sites are where the sewage indicator, Coprostanol was detected.

Fipronil, a topical pet pesticide, was found in all 4 locations. The level of this substance in a well-known pet spot on treatment for fleas is ~10%. This substance is typically absorbed into the dog blood but potential exists for it to be washed off into the water within the first few days of application. For a large dog (20-30kg) this equates to a treatment of 134mg of Fipronil per month. The concentrations and area over which this substance was detected was not expected.

- A number of substances detected and listed are in line with the WFD for AA and MAC.. The majority of these were PAH's. None of which had greater levels than the MAC. Benzo[b]fluorancthene was found at <0.1ug/L in all samples taken and the maximum allowable concentration is 0.017. Whereas we do not have exact values, it is possible that this substance was present at higher levels than acceptable for the environment by MAC values.

- The samples taken on the 17th March 2020 contained a number of pollutants listed in the Drinking water directive, WFD, have controlled release values published and are also listed in the PEWS.

- Ethanol, 2-butoxy-, phosphate (3:1)(78-51-3) was found at 1-5ug/L, at Oxhey park and this is a substance that can be found in coatings and is a raw material in plastic.

Table 1 Environmentally hazardous substances found in the Rive Colne against location (values in ug/L) on the 17th March 2021

Substance name(CAS number)	Knutsford Playing Field	Shaftsbury Road	Oxhey Park	Lairage Land	CLP Human	CLP Environmenta
Hexyl Cinnamaldehyde (101-86-0)			<0.1		H317	H400, H411
Metaldehyde (108-62-3)[5-1]				<0.1	H228, H310, H361f	H412
Tri-(2-chloroethyl) phosphate (115-96-8) [5-1]	<0.1	<0.1	<0.1	<0.1	H302, H351, H360f	H411
Fipronil (120068-37-3)[5-1]	<0.1	<0.1	<0.1	<0.1	H301, H311, H331, H372,	H400, H410
Galaxolide (1222-05-5)[5-3]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None	H400, H410
2,4,7,9-Tetramethyl-5-decyne-4,7-diol (126-86-3)[5-2]	0.1 - 1		0.1 - 1	0.1 - 1	H317, H318	H402, H412
Pyrene (129-00-0) [1,2,3]	<0.1	<0.1	<0.1	<0.1	None	H400, H410
1,3-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (137-89-3)			0.1 - 1		H360 (may damage fert)	H400
Phytol (150-86-7)		<0.1			H315	H400, H410
Boscalid (188425-85-6)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None	H411
Atrazine (1912-24-9) [1,2,3]	<0.1	<0.1	<0.1	<0.1	H317, H373	H400, H410
Benzo[ghi]perylene (191-24-2) [1,2,3]		<0.1	<0.1		None	H400, H410
Stigmastanol (19466-47-8)			0.1 - 1		None	H413
Benzo[b]fluoranthene (205-99-2) [1,2,3]	<0.1	<0.1	<0.1	<0.1	H350	H400, H410
Fluoranthene (206-44-0)[1,2,3,5-1]	<0.1	<0.1	<0.1	<0.1	H302	H400, H410
Benzo[k]fluoranthene (207-08-9)[1,2,3]		<0.1			H350	H400, H410
Chrysene (218-01-9)			<0.1		H341, H350	H400, H410
Tri-allate (2303-17-5)	<0.1	<0.1	<0.1	<0.1	H302, H307, H373	H400, H410
Propyzamide (23950-58-5) [4]	<0.1	<0.1	<0.1	<0.1	H351	H400, H410
Benzenesulfonamide, N-butyl (3622-84-2)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	Not classified	H412
Benzo[a]pyrene (50-32-8)[3]		<0.1	<0.1		H317, H340, H350, H360FD	H400, H410
Benzo[a]anthracene (56-55-3) [1,2,3]		<0.1	<0.1		H350	H400, H410
Cholest-4-en-3-one (601-57-0)			<0.1		Not Classified	H413
Propiconazole-I (60207-90-1)	<0.1	<0.1		<0.1	H360D, H317, H302	H400, H410
Octocrylene (6197-30-4)			<0.1		None	H410
Hexa(methoxymethyl)melamine (68002-20-0)	<0.1	<0.1	<0.1	<0.1	None	H412
2,2,4-Trimethyl-1,3-pentanediol diisobutyrate (6846-50-0)			<0.1		H361	H412
4-Piperidinone, 2,2,6,6-tetramethyl-(826-36-8)		<0.1	<0.1		H290, H302, H314, H317	H412
Diflufenican (83164-33-4)		<0.1	<0.1		Not classified	H412
Terbutryne (886-50-0)[1]		<0.1	<0.1	<0.1	H302	H400, H410
2-Methoxynaphthalene(93-04-9)			<0.1		H319	H411

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS… [5-4] substance listed as Priority 4 in PEWS

Table 2 - Substances found in all four locations of first sampling in 2020 – irrespective of environmental classification 17th March 2021

Substance name(CAS number)	Knutsford Playing Fields	Shaftsbury Road	Oxhey Park	Lairage Land	CLP environmental
2,5-cyclohexadien-1-one, 2,6-bis(1,1-dimethylethyl)-4-hydroxy-4-methyl-(1000401-12-0)	<0.1	<0.1	<0.1	<0.1	Uknown
N,N,N',N'-Tetraacetylethylenediamine(10543-57-4)[5-4]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None
Tri-(2-chloroethyl) phosphate (115-96-8) **[5-1]**	<0.1	<0.1	<0.1	<0.1	H411
Fipronil (120068-37-3)[5-1]	<0.1	<0.1	<0.1	<0.1	H400, H410
Lidocaine(137-58-6)[5-4]		0.1-1	0.1-1	0.1-1	Unknown
Galaxolide (1222-05-5)[5-3]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H400, H410
Pyrene (129-00-0) [1,2,3,5-1]	<0.1	<0.1	<0.1	<0.1	H400, H410
2-Propanol, 1-chloro-, phosphate (3:1)(13674-84-5)	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None
Boscalid (188425-85-6)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H411
Atrazine (1912-24-9) [1,2,3]	<0.1	<0.1	<0.1	<0.1	H400, H410
2,2,2-Trichloro-1-phenylethanol(2000-43-3)	<0.1	<0.1	<0.1	<0.1	Not classified
Benzo[b]fluoranthene (205-99-2) [1,2,3	<0.1	<0.1	<0.1	<0.1	H400, H410
Fluoranthene (206-44-0)[1,2,3,5-1])	<0.1	<0.1	<0.1	<0.1	H400, H410
Tri-allate(2303-17-5)	<0.1	<0.1	<0.1	<0.1	H400, H410
Propyzamide(23950-58-5) [4]	<0.1	<0.1	<0.1	<0.1	H400, H410
Carbamazepine(298-46-4)[2,5-2]	<0.1	<0.1	<0.1	<0.1	None
Tetramethyl succinimide(3566-61-8)	<0.1	<0.1	<0.1	<0.1	None
Benzenesulfonamide, N-butyl (3622-84-2)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H412
Neophytadiene(504-96-1)	<0.1	<0.1	<0.1	<0.1	
Cholesterol(57-88-5)[5-4]	>5	>5	>5	>5	Not classified
Caffeine(58-08-2)[5-4]	0.1 - 1	0.1 - 1	1 - 5	0.1 - 1	Not classified
Hexa(methoxymethyl)melamine(68002-20-0)	<0.1	<0.1	<0.1	<0.1	H412
Triethyl citrate(77-93-0)	<0.1	<0.1	<0.1	<0.1	Not classified
Triethyl phosphate(78-40-0)	<0.1	<0.1	<0.1	<0.1	Not classified
.gamma.-Sitosterol(83-47-6)	0.1 - 1	0.1 - 1	1 - 5	0.1 - 1	Unknown

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS… [5-4] substance listed as Priority 4 in PEWS

Additional substances of concern

A few additional substances have been selected for highlighting, Coporstanol, Cholestan-3-ol, , (3.beta.,5.beta.)-(360-68-9) is also known as Coprostanol and is a common biomarker for the presence of human faecal matter in the environment as it is a biohydrogenation of cholesterol. This was found at both Shaftsbury Road and Lairage Land sites. It was also surprising to see high levels of Sulphur (1-5ug/L) at Knutsford playing fields and Lairage land – it is unclear if this is from contamination or a natural source as it is essential for plant growth but also harmful in excessive amounts.

Ethanol, 2-butoxy-, phosphate (3:1)(78-51-3) was found at 1-5ug/L, at Oxhey park and this is a substance that can be found in coatings and is a raw material in plastic.

A PAH, Indeno[1,2,3-d]pyrene (193-39-5), not listed in any previous table is also found at Shaftsbury Road and Lairage land.

DEET, (134-62-3) was found in both Oxhey park and Lairage Land sites

Table 3 - Substances found in the River Colne on the 17th March 2020 and listed in the WFD 2000/60/EC

Substance Name (CAS Number)	Knutsford Playing Fields	Shaftsbury Road	Oxhey Park	Lairage Land	AA-EQS	MAC-EQS	EQS Biota (
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg
Atrazine(1912-24-9)	<0.1	<0.1	<0.1	<0.1	0,6	2,0	
Benzo[ghi]perylene (191-24-2) [1,2,3]		<0.1	<0.1		see footnote 11	8,2 × 10–3	see footnote 11
Indeno[1,2,3-cd]pyrene(193-39-5)		<0.1	<0.1		see footnote 11	not applicable	see footnote 11
Benzo[b]fluoranthene(205-99-2)	<0.1	<0.1	<0.1	<0.1	see footnote 11	0,017	see footnote 11
Fluoranthene (206-44-0) [1,2,3,5-1]	<0.1	<0.1	<0.1	<0.1	0,0063	0,12	30
Benzo[k]fluoranthene(207-08-9)		<0.1			see footnote 11	0,017	see footnote 11
Benzo[a]pyrene (50-32-8) [1,2,3]		<0.1	<0.1		1,7 × 10–4	0,27	5
Terbutryne (886-50-0) [1]		<0.1	<0.1	<0.1	0,065	0,34	

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS. [5-4] substance listed as Priority 4 in PEWS

3.5 Second batch of sampling and results 21st August 2020

The second set of results, from samples taken at Knutsford playing fields (sample ID 2121514), Shaftsbury Road (Sample ID 2121513), Oxhey Park (Sample ID 2121512) and Lairage land (Sample ID 2121512). The full GC-MS results are shown in the appendix -

The surprising number of substances found in the first batch of River Colne samples led to a second round of sampling at the same sites.

- The number of substances found.
- Knutsford Playing field – 95 (Full data shown in the Annex Table 29)
  Shaftsbury Road – 54 (Full data shown in the Annex Table 30)
  Oxhey Park – 81 (Full data shown in the Annex Table 31)
- Lairage Land – 59(Full data shown in the Annex Table 32)

- In the first set of results on the 17th March 2020, a total of 35 separate environmentally hazardous substances were detected. During this second round of testing 44 separate substances carrying an environmentally hazardous classification were found. These are tabulated in Table 4

- Significantly more substances were found at Knutsford Playing Field than the other 3 sites. This included 31 environmentally hazardous substances. The increased concentration found at Knutsford Playing Fields strongly suggest that there was a spillage/release into the river at this point or upstream/wash off/river off-shoots.

- The high levels of Environmentally hazardous substances, Tri-(2-chloroethyl) phosphate(115-96-8) (general use plasticizer in coatings, textile, fire resistant foams. , 1H-Benzotriazole(95-14-7), a biocide, inhibitor were all found at 1-5 or greater in Knutsford Playing field and decreasing levels at the next sampling site Shaftsbury Road. With the exception of 1H-Benzotriazole(95-14-7) which was not detected at Shaftsbury Road.

- 50 substances (16 of which are environmentally hazardous) were found in all four testing sites, tabulated in Table 5 This is over double the number of substances which were found in all our sites on the 17th March 2020, 5 months earlier.

- Benzenesulphonamide, N-butyl (3622-84-2) is a plasticiser and was found at 1-5ug/L in Shaftsbury Road, Oxhey Park and Lairage land sites. It has previously been documented as found in effluent from wastewater treatment sites and makes its way into ground water

- Coprotanol, Caffeine and Continine, substances linked to sewage pollution were found at high levels in both the Knutsford Playing Fields and Oxkey Park (1-5ug/L.) Continine is a nicotine by-product found in urine. Cholesterol at levels greater than 5ug/L were found in all four sites. This strongly suggests that there was a significant amount of effluent entering the River Colne. This data suggests that these pollution event/s could be at, or close to Knutsford Playing Fields and Oxhey Park. It could be higher up the river, however and carried down to these sites. However, due to the dynamic nature of rivers and runoffs it is difficult to confirm. This does not take away from the fact that significant levels of effluent/sewage markers were found.

- A number of phthalates di-n-butyl phthalate (86-74-8) and bis (-ethylhexyl)phthalate (117-81-7), Diethyl phthalate (84-61-7) and Dicylcohexyl phthalate (84-61-7) were found at the Knutsford Playing Field site, at 1-5ug/L with the exception of Diethyl phthalate which was present at >5ug/L. Phthalates are known as plasticisers and are found in a significant number of consumer and industrial products, from toys, plastics, insecticides to building materials. A number are environmentally hazardous and some toxic to reproduction. It is not expected that these are a product of human waste but Industry waste/leached from landfill.

- 1H-Benzotriaszole (95-53-4), known as a corrosion inhibitor for copper was found at high levels in Knutsford Playing Fields >5ug/L and 1-5ug/L in the Lairage land sites.

- In addition to these there are also a large number of substances that are found in personal care products present such as N,N,N',N'-Tetraacetyleethylenediamine (CAS 10543-57-4), Chloroxylenol (88-04-0) and Galaxolide (1222-05-5)

- There is also suggestion of an industrial spill/entry of substances into the River.
  Substances such as
  Hexa(methoxymethyl)melamine CAS 68002-20-0, a formaldehyde polymer, ,
  Tri-(2-chloroethyl) phosphate (CAS 115-96-8) found in coatings and furniture,
  Benzenesulfonamide, 4-methyl- (CAS 70-55-3), pesticides an pharmaceuticals, industrial raw material
  2-Propanol, 1-chloro-, phosphate (3:1) (13674-84-5_, flame retardant.
  Tributyl phosphate (CAS 126-73-8) and Caprolactam (CAS 105-60-2) adhesives, coatings and industrial starting material,
  The above are more indicative of industrial chemicals. Sadly, high levels of these use of chemicals are prevalent in all samples.

- Like the first set of samples there were a significant number of PAH's present in the samples. PAHs are still present. There could potentially have been a breach in MAC for four of the PAH,s Benzo[ghi]perylne,
  Benzo[a]fluoranthene, Fluoranthene and Terbutryene. Benzo[b]pyrene did breach the MAC of 0.017ug/L at the Knutsford playing field.
- Further to this a significant number of substances were also listed in the Drinking water directive, have controlled release values published and are also listed in the PEWS

- Sulphur is also present at high levels at the Knutsford playing fields.

- DEET, (134-62-3) was found in all sites at 0.1-1ug/L concentrations

Table 4 - Environmentally hazardous Substances found in during the second sampling 17th March 2020 an 21st August 2021

Substance Name(CAS Number)	Knutsford Playing Fields	Shaftsbury Road	Oxhey Park	Lairage Land	CLP Human	CLP Environmental
2,4-Dimethylphenol(105-67-9)	<0.1				H301, H311, H314, H317	H411
1,2,3-Propanetriol, 1-acetate(106-61-6)	<0.1				H315, H319	H412
Metaldehyde (108-62-3)[5-1]	<0.1	<0.1		<0.1	H228, H310, H361f	H412
Triphenyl phosphate(115-86-6)[5-2]	0.1 - 1					H400, H411
Tri-(2-chloroethyl) phosphate (115-96-8) [5-1]	1 - 5	0.1 - 1	0.1 - 1	0.1 - 1	H302, H351, H360f	H411
Benzophenone(119-61-9)[5-2]	0.1 - 1		<0.1		H373 (liver, kidney) (oral)	H412
Fipronil (120068-37-3)[5-1]			<0.1		H301, H311, H331, H372,	H400, H410
Anthracene(120-12-7)[1,2,3]	<0.1				H315	H410
Galaxolide (1222-05-5)[5-3]	0.1 - 1	<0.1	0.1 - 1	<0.1	None	H400, H410
Diphenylamine(122-39-4)		<0.1			H301, H311, H331, H373	H400, H410
2,4,7,9-Tetramethyl-5-decyne-4,7-diol (126-86-3)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H317, H318	H402, H412
Pyrene (129-00-0) [1,2,3,5-1]	0.1 - 1	<0.1	<0.1	<0.1	None	H400, H410
Benzophenone-3(131-57-7)			<0.1		None	H400, H411
Phytol(150-86-7)		<0.1			H315	H400, H410
Benzenesulfonanilide(1678-25-7)	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None	H411
Boscalid (188425-85-6)[5-2]				0.1 - 1	None	H411
Atrazine (1912-24-9) [1,2,3]	<0.1	<0.1	<0.1	<0.1	H317, H373	H400, H410
Benzo[ghi]perylene (191-24-2) [1,2,3]		<0.1			None	H400, H410
Stigmastanol(19466-47-8)	0.1 - 1		0.1 - 1		None	H413
Benzo[b]fluoranthene (205-99-2) [1,2,3	0.1 - 1	<0.1	<0.1	<0.1	H350	H400, H410
Fluoranthene (206-44-0)[1,2,3,5-1])	0.1 - 1	<0.1	<0.1	<0.1	H302	H400, H410
Benzo[k]fluoranthene (207-08-9)[1,2,3]	<0.1				H350	H400, H410
Chrysene(218-01-9)	<0.1				H341, H350	H400, H410
Cresyl diphenyl phosphate(26444-49-5)				<0.1	None	H400, H410
Benzenesulfonamide, N-butyl (3622-84-2)[5-2]		1 - 5	1 - 5	1 - 5	Not classified	H412
Benzo[a]pyrene (50-32-8)[1,2,3]	0.1 - 1	<0.1	<0.1	<0.1	H317, H340, H350, H360FD	H400, H410
Triisopropylphosphate(513-02-0)		<0.1	<0.1	<0.1	H226, H315, H319, H335	H400
Dibenz[a,h]anthracene(53-70-3)[1,2,3]	<0.1				H350	H400, H410
Benzo[a]anthracene(56-55-3)	0.1 - 1	<0.1	<0.1	<0.1	H350	H400, H410
Cholest-4-en-3-one(601-57-0)			0.1 - 1		Not Classified	H413

Propiconazole-I(60207-90-1)	0.1 - 1	<0.1	0.1 - 1	0.1 - 1	H360D, H317, H302	H400, H410
Octocrylene(6197-30-4)	0.1 - 1		0.1 - 1	<0.1	None	H410
Hexa(methoxymethyl)melamine(68002-20-0)	<0.1	<0.1	<0.1	0.1 - 1	None	H412
Diflufenican(83164-33-4)			<0.1		Not classified	H412
di-n-butyl phthalate(84-74-2)	>5	1 - 5			H360DF	H400
Carbazole(86-74-8)	<0.1				H341	H411
Terbutryne (886-50-0)[(1)]	<0.1	<0.1	0.1 - 1	<0.1	H302	H400, H410
Myclobutanil(88671-89-0)			<0.1		H302,H319, H341, H351, H361d	H411
Thymol(89-83-8)			<0.1		H314, H302	H411
Coumarin(91-64-5)	<0.1		<0.1		H302, H317	H412
2-Methoxynaphthalene(93-04-9)	<0.1				H319	H411
1H-Benzotriazole(95-14-7)	>5			1 - 5	H302, H319	H411
o-Toluidine(95-53-4)	<0.1	<0.1	<0.1	<0.1	H301, H319, H331, H350	H400
p-Isopropyltoluene(99-87-6)	<0.1				H226,, H331, H304,	H411

[(1)] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [(2)]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [(3)]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [(4)]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [(5-1)] Substance listed as Priority 1 in PEWS [(5-2)] substance listed as Priority 2 in PEWS [(5-3)] substance listed as Priority 3 in PEWS…[(5-4)] substance listed as Priority 4 in PEWS

Table 5 - Substances found in all four locations in this second round of testing. Those in bold indicate that they have been found in all 4 sites on the 1st (17/03/2020) and 2nd (21/08/2020) testing

Substance Name (CAS Number)	Knutsford Playing Fields	Shaftsbury Road	Oxhey Park	Lairage Land	CLP Human	CLP environmental
N,N,N',N'-Tetraacetylethylenediamine(10543-57-4)[5-4]	1 - 5	0.1 - 1	>5	0.1 - 1	None	None
Tri-(2-chloroethyl) phosphate (115-96-8) [5-1]	1 - 5	0.1 - 1	0.1 - 1	0.1 - 1	H302, H351, H360f	H411
Galaxolide (1222-05-5)[5-3]	**0.1 - 1**	**<0.1**	**0.1 - 1**	**<0.1**	**None**	**H400, H410**
2,4,7,9-Tetramethyl-5-decyne-4,7-diol (126-86-3)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H317, H318	H402, H412
Diphenyl sulfone(127-63-9)	<0.1	<0.1	<0.1	<0.1	H302	None
Pyrene (129-00-0) [1,2,3,5-1]	0.1 - 1	<0.1	<0.1	<0.1	None	H400, H410
Dimethyl phthalate(131-11-3)	0.1 - 1	<0.1	<0.1	<0.1	Not Classified	Not classified
N,N-Diethyl-m-toluamide(134-62-3)[5-4]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H315, H319	None
2-Propanol, 1-chloro-, phosphate (3:1)(13674-84-5)	**1 - 5**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**H302**	**None**
Tris-(1,3-dichloroisopropyl) phosphate(13674-87-8)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H351	None
Benzenesulfonanilide(1678-25-7)	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None	H411
Atrazine(1912-24-9) [1,2,3]	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**H317, H373**	**H400, H410**
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene(1999-85-5)	<0.1	<0.1	<0.1	<0.1	Not Classified	Not classified
Benzo[b]fluoranthene(205-99-2)	**0.1 - 1**	**<0.1**	**<0.1**	**<0.1**	**H350**	**H400, H410**
Fluoranthene (206-44-0)[1,2,3,5-1])	**0.1 - 1**	**<0.1**	**<0.1**	**<0.1**	**H302**	**H400, H410**
Carbamazepine(298-46-4)[2,5-2]	0.1 - 1	<0.1	<0.1	<0.1	H302, H317, H334	None
Tetramethyl succinimide(3566-61-8)	<0.1	<0.1	<0.1	<0.1	Unknown	Unknown
Benzo[a]pyrene (50-32-8)[1,2,3]	0.1 - 1	<0.1	<0.1	<0.1	H317, H340, H350, H360FD	H400, H410
Dimetridazole(551-92-8)	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H315, H319, H335	None
Benzo[a]anthracene (56-55-3) [1,2,3]	0.1 - 1	<0.1	<0.1	<0.1	H350	H400, H410
Cholesterol(57-88-5)[5-4]	**>5**	**>5**	**>5**	**>5**	**Not Classified**	**Not classified**
Caffeine(58-08-2)[5-4]	**1 - 5**	**0.1 - 1**	**1 - 5**	**0.1 - 1**	**H302**	**Not classified**
Propiconazole-I(60207-90-1)	0.1 - 1	<0.1	0.1 - 1	0.1 - 1	H360D, H317, H302	H400, H410
2-(Methylmercapto)benzothiazole (615-22-5)	0.1 - 1	<0.1	<0.1	<0.1	H315, H319, H335	Not classified
Hexa(methoxymethyl)melamine(68002-20-0)	<0.1	<0.1	<0.1	0.1 - 1	None	H412
Triethyl phosphate(78-40-0)	<0.1	<0.1	<0.1	<0.1	H312, H319	Not classified

.gamma.-Sitosterol(83-47-6)	1 - 5	0.1 - 1	1 - 5	0.1 - 1	Unknown	Unknown
Stigmasterol(83-48-7)	1 - 5	0.1 - 1	0.1 - 1	0.1 - 1	H302, H312, H315, H319, H332, H335	None
Chloroxylenol(88-04-0)	1 - 5		0.1 - 1	<0.1	H302, H315, H317, H319	Not classified
Benzenesulfonamide, 2-methyl- (88-19-7)	<0.1	<0.1	<0.1	<0.1	H302	Not Classified
Terbutryne (886-50-0)[1]	<0.1	<0.1	0.1 - 1	<0.1	H302	H400, H410
2(3H)-Benzothiazolone(934-34-9)	1 - 5	0.1 - 1	0.1 - 1	0.1 - 1	H302, H312, H332	None
o-Toluidine(95-53-4)	<0.1	<0.1	<0.1	<0.1	H301, H319, H331, H350	H400

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS… [5-4] substance listed as Priority 4 in PEWS

Additional substances of concern

The table below shows the additional substances to the ones previously listed due to their environmental hazard or prevalence. The high levels, sewage trace indications, substances used in personal use products and substances used in industrial products.

Both p-Cresol (4-methylphenol) 106-44-5 and m-Cresol (3-methylphenol) are listed as VOC, Volatile Organic Compounds.

Table 6 - Additional substances of concern found in the River Colne samples 21 August 2021

Substance Name (CAS Number)	Knutsford Playing Fields	Shaftsbury Road	Oxhey Park	Lairage Land	CLP Human	CLP environmental
N,N,N',N'-Tetraacetylethylenediamine(10543-57-4)[5-4]	1 - 5	0.1 - 1	>5	0.1 - 1	None	None
Sulfur (S8)(10544-50-0)	1 - 5					None
Caprolactam(105-60-2)		>5	1 - 5	1 - 5	H302, H315, H319, H332, H335	None
bis(2-ethylhexyl)phthalate (DEHP)(117-81-7)[1,3,5-1]	1 - 5				H360FD	None
Tributyl phosphate(126-73-8) [4]		1 - 5	>5	>5	H302, H315, H351	None
2-Propanol, 1-chloro-, phosphate (3:1)(13674-84-5)	1 - 5	0.1 - 1	0.1 - 1	0.1 - 1	H302 (majority - not RR)	
Coporstanol, Cholestan-3-ol, , (3.beta.,5.beta.)-(360-68-9)	1 - 5		1 - 5	0.1 - 1	Not classified	None
Cotinine(486-56-6)	1 - 5	0.1 - 1	1 - 5		H302, H315, H319, H335	None
Lidocaine(137-58-6)[5-4]		0.1 - 1	0.1 - 1	0.1 - 1	Unknown	Unknown
Benzenesulfonamide, 4-methyl-(70-55-3)		1 - 5		1 - 5	Not classified	Not Classified
Diethyl phthalate(84-66-2)	>5				Not classified	Not classified
Dicyclohexyl phthalate(84-61-7)	1 - 5				H317, H360D	Not Classified
di-n-butyl phthalate(84-74-2)	>5	1 - 5			H360DF	H400
Chloroxylenol(88-04-0)	1 - 5		0.1 - 1	<0.1	H302, H315, H317, H319	Not classified
Indeno[1,2,3-cd]pyrene[1,2,3]		0.1 - 1	<0.1	0	<0.1	
1H-Benzotriazole(95-14-7)	>5			1 - 5	H302, H319	H411
Benzenesulfonamide(98-10-2)		1 - 5	1 - 5	1 - 5	H302	Not classified
p-Cresol (4-methylphenol)[1] 106-44-5		<0.1	0	0	H314, H311, H301	None
m-Cresol (3-methylphenol)(108-39-4) [1]		<0.1	0	0	H314, H311, H301	None
Phenanthrene(85-01-8)[1,2,3]		<0.1	0	<0.1	H302	

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS. [5-4] substance listed as Priority 4 in PEWS

Table 7 - Substances found in the River Colne on the 21st August 2020 and listed in the WFD 2000/60/EC

Substance Name (CAS Number)	**Knutsford Playing Fields**	**Shaftsbury Road**	**Oxhey Park**	**Lairage Land**	**AA-EQS (2)**	**MAC-EQS (4)**	**EQS Biota (12)**
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg
Atrazine(1912-24-9)	<0.1	<0.1	<0.1	<0.1	0,6	2,0	
Benzo[ghi]perylene (191-24-2) [1,2,3]		<0.1			see footnote 11	8,2 × 10–3	see footnote 11
Indeno[1,2,3-cd]pyrene(193-39-5)	0.1 - 1	<0.1		<0.1	see footnote 11	not applicable	see footnote 11
Benzo[b]fluoranthene(205-99-2)	0.1 - 1	<0.1	<0.1	<0.1	see footnote 11	0,017	see footnote 11
Fluoranthene (206-44-0)[1,2,3,5-1]	0.1 - 1	<0.1	<0.1	<0.1	0,0063	0,12	30
Benzo[k]fluoranthene(207-08-9)	<0.1				see footnote 11	0,017	see footnote 11
Benzo[a]pyrene (50-32-8)[1,2,3]	0.1 - 1	<0.1	<0.1	<0.1	1,7 × 10–4	0,27	5
Terbutryne (886-50-0)[1]	<0.1	<0.1	0.1 - 1	<0.1	0,065	0,34	

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS… [5-4] substance listed as Priority 4 in PEWS

3.6 Third batch of sampling and results 10th June 2021

As with any study, it is good practice to have a base-line/standard with which results can be compared to. The River Ver, at Drop Lane, was chosen as one location and Munden House ford, a location further upriver on the River Colne. – these locations are shown in Figure 1

The third set of results, from samples taken at the river Ver (sample ID 2226505), Munden House Ford (sample ID 2226504), Knutsford playing fields (sample ID 2226506), Shaftsbury Road (Sample ID 2226509), Oxhey Park (Sample ID 2226508) and Lairage land (Sample ID 2226507). The full GC-MS results are shown in the appendix -

- The number of substances found:
  River Ver – 26 substances (Full data shown in the Appendix Table 33)
  Munden House Ford 38 substances (Full data shown in the Appendix Table 34)
  Knutsford Playing field –48 substances (Full data shown in the Appendix Table 36)
  Shaftsbury Road –48 Substances (Full data shown in the Appendix Table 35)
  Oxhey road – 53 substances (Full data shown in the Appendix Table 37)
  Lairage Land – 48 substances (Full data shown in the Appendix Table 38)

- 24 Environmentally hazardous substances were detected in the samples collected on the 21st June 2021. These are shown in Table 8

- The sample from the River Ver had significantly less substances present than the original 4 sampling sites, Knutsford Playing fields, Shaftsbury Road, Oxhey Park and Lairage Land. However, the number of environmentally hazardous substances found were surprising. The River Ver sample did not contain any substance, that was not found in any of the other sampling sites.

- Simazine, Diphenylamine and Boscalid were all found in the River Ver sample and have uses in agriculture. Simazine is listed in the Water Framework Directive-EQS, Drinking Water Directive and has controlled release conditions,

- Benzenesulphonamide, N-butyl (CAS 3622-84-2) was found at 1-5ug/L in the River Ver sample. As this sample was taken as a potential, baseline, this was not expected. The use of this is as a plasticiser additive. Metaldehyde (108-62-3), Squalene (111-02-4) and Tri-(2-Chloroethyl)phosphate (115-96-8) are all substances used in Industry which were all found in the River Ver and the River Colne samples.

- 2,4,7,9-Tetramethyl-5-decyne-4,7-diol(126-86-3), a substance used in the coatings industry was found to be greater than 5ug/L in all the River Colne samples, this includes Munden House Estate sampling site. This suggests that it has entered the River Colne prior to Munden House Ford A more accurate level is not known, but this environmentally hazardous chemical must have entered the River Colne at a high concentration to be at these levels in the River. This length of River Colne equates to 8.1 km.

- Another industrial substance found was Diethylene Glycol dibutyl ether (112-73-2). This is primarily used as a solvent and was found in all sites from Munden House ford to the Lairage Land.

- In addition to this a significant number of pharmaceutical substances, products, were found from Munden House ford to the Lairage land including:
  N,N-Diethyl-m-toluamide, DEET,
  Lidocaine,
  2,2,2-Trichloro-1-phenylethanol,
  Carbamazepine,
  Crotamiton,
  Neophytadiene,
  D-Glucitol, 1,4:3,6-dianhydro-2,5-di-O-methyl
  Ketamine.

- Both the industrial and pharmaceutical waste could suggest that these have been purposely emptied into the water-system/river.

- Caffeine and Cholesterol were found in most samples although Coprostanol was not detected, was below the detection limit, in these samples.

- PAH's were prevalent in both the River Ver and River Colne samples.

- 7 substances were found that are listed with EQS.6 falling below the MAC. Benzo[b]fluoranthene was potentially over the MAC, at 5 sites including the River Ver with a value between 0.01ug/L – the MAC being 0.017ug/L.

- A number of the other substances found were also restricted by one of the aforementioned regulations..

- A significant number of substances found seem to be present in all the River Colne samples. The expansion of the sampling locations was to find a baseline, control and to confirm that the pollutants were originating from around the Knutsford Playing field area by comparing the results from Munden House ford. However, from this set of results, has not allowed us to do this. It has highlighted that the pollution is also further, up-river, towards the source of the Colne. The River Ver does contain less pollutants, but still contains substances that do not belong in the natural habitat.

- DEET was found to be present in all River Colne samples

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Table 8 - Environmentally hazardous Substances found in during in the third sampling sites 10th June 2021

Substance Name (CAS Number)	River Ver	Munden House Ford	Shaftsbury Road	Knutsford Playing Fields	Oxhey Park	Lairage Land	CLP Human	CLP environmental
Metaldehyde (108-62-3)[5-1]	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H228, H310, H361f	H412
Tri-(2-chloroethyl) phosphate (115-96-8) [5-1]	0.01 - 0.1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H351, H360f	H411
Fipronil (120068-37-3)[5-1]		0.1 - 1					H301, H311, H331, H372,	H400, H410
Galaxolide (1222-05-5)[5-3]		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None	H400, H410
Simazine(122-34-9)[1,2,3]	0.01 - 0.1				0.01 - 0.1		H351	H400, H410
Diphenylamine(122-39-4)	0.01 - 0.1	0.01 - 0.1					H301, H311, H331, H373	H400, H410
2,4,7,9-Tetramethyl-5-decyne-4,7-diol (126-86-3)[5-2]		>5	>5	>5	>5	>5	H317, H318	H402, H412
Pyrene (129-00-0) [1,2,3,5-1]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H400, H410
Benzenesulfonanilide(1678-25-7)				0.01 - 0.1	0.01 - 0.1		None	H411
Boscalid (188425-85-6)[5-2]	0.1 - 1	0.1 - 1		0.1 - 1	0.1 - 1	0.1 - 1	None	H411
Atrazine (1912-24-9) [1,2,3]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H317, H373	H400, H410
Benzo[b]fluoranthene (205-99-2) [1,2,3	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H350	H400, H410
Fluoranthene (206-44-0)[1,2,3,5-1])	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302	H400, H410
Ethanone, 2,2-dimethoxy-1,2-diphenyl-(24650-42-8)		0.01 - 0.1					H302, H373	H412
4H-Inden-4-one, 1,2,3,5,6,7-hexahydro-1,1,2,3,3-pentamethyl-(33704-61-9)				0.01 - 0.1			H315, H317, H319	H411
Benzenesulfonamide, N-butyl	#####		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	Not	H412

(3622-84-2)[5-2]							classified	
Benzo[a]pyrene (50-32-8)[1,2,3]	0.01 - 0.1				0.01 - 0.1	0.01 - 0.1	H317, H340, H350, H360FD	H400, H410
Triisopropylphosphate(513-02-0)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H226, H315, H319, H335	H400
Benzo[a]anthracene (56-55-3) [1,2,3]	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H350	H400, H410
Cholest-4-en-3-one(601-57-0)	0.01 - 0.1		0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	Not Classified	H413
Hexa(methoxymethyl)melamine(68002-20-0)		0.1 - 1	0.01 - 0.1	0.01 - 0.1		0.01 - 0.1	None	H412
4-Piperidinone, 2,2,6,6-tetramethyl-(826-36-8)					0.1 - 1	0.1 - 1	H290, H302, H314, H317	H412
Diflufenican(83164-33-4)					0.01 - 0.1	0.01 - 0.1	Not classified	H412
Terbutryne (886-50-0)[1]		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302	H400, H410

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS… [5-4] substance listed as Priority 4 in PEWS

Table 9 - Substances found in all 4 of the initial testing locations. Those in bold have been found in all 4 locations during this testing and the previous 2.

Substance Name (CAS Number)	River Ver	Munden House Ford	Shaftsbury Road	Knutsford Playing Fields	Oxhey Park	Lairage Land	CLP Human	CLP environmental
Indano[2,1-d]1,3-dioxane,(102688-70-0)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Unknown	Unknown
N,N,N',N'-Tetraacetylethylenediamine(10543-57-4)[5-4]		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None	None
Benzenesulfonamide, N-ethyl-2-methyl-(1077-56-1)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not Classified	-
Metaldehyde (108-62-3)[5-1]	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H228, H310, H361f	H412
Squalene(111-02-4)	0.1 - 1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H304	None
Diethylene glycol dibutyl ether(112-73-2)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not Classified	None
Tri-(2-chloroethyl) phosphate (115-96-8) **[5-1]**	0.01 - 0.1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H351, H360f	H411
Galaxolide (1222-05-5)[5-3]		**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**None**	**H400, H410**
2,4,7,9-Tetramethyl-5-decyne-4,7-diol (126-86-3)[5-2]		>5	>5	>5	>5	>5	H317, H318	H402, H412
Pyrene (129-00-0) [1,2,3,5-1]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H400, H410
N,N-Diethyl-m-toluamide(134-62-3)[5-4]		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H315, H319	None
2-Propanol, 1-chloro-, phosphate (3:1)(13674-84-5)	**0.01 - 0.1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**H302**	
Lidocaine(137-58-6)		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302	None
Atrazine(1912-24-9) [1,2,3]	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	***H317, H373***	***H400, H410***
2,2,2-Trichloro-1-phenylethanol(2000-43-3)		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.01 - 0.1	H315, H319	Not classified
Benzo[b]fluoranthene(205-99-2)	**0.01 - 0.1**		**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**H350**	**H400, H410**

Fluoranthene (206-44-0)[1,2,3,5-1])	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	***H302***	***H400, H410***
Carbamazepine(298-46-4)[2,5-2)		**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**H302, H317, H334**	**None**
Tetramethyl succinimide(3566-61-8)	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Unknown	Unknown
Benzenesulfonamide, N-butyl (3622-84-2)[5-2)]	1-5		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	Not classified	H412
Crotamiton(483-63-6)[5-4)]		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H315, H317, H319	None
Neophytadiene(504-96-1)	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Unknown	Unknown
Triisopropylphosphate(513-02-0)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H226, H315, H319, H335	H400
D-Glucitol, 1,4:3,6-dianhydro-2,5-di-O-methyl-(5306-85-4)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not Classified	Not classified
Benzo[a]anthracene(56-55-3)	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	***H350***	***H400, H410***
Cholesterol(57-88-5)[5-4)]	**>5**	**>5**	**>5**	**>5**	**>5**	**>5**	**Not Classified**	**Not classified**
Caffeine(58-08-2)[5-4)]	**0.01 - 0.1**		**0.01 - 0.1**	**0.01 - 0.1**	**0.1 - 1**	**0.1 - 1**	**H302**	**Not classified**
Ketamine(6740-88-1)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not available	Not available
Triethyl citrate(77-93-0)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not classified	Not classified
Triethyl phosphate(78-40-0)		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H312, H319	Not classified

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS… [5-4] substance listed as Priority 4 in PEWS

Table 10 - Substances found in the River Colne on the 10th June 2021 and listed in the WFD 2000/60/EC

Substance Name (CAS Number)	**River Ver**	**Munden House Ford**	**Shaftsbury Road**	**Knutsford Playing Fields**	**Oxhey Park**	**Lairage Land**	**AA-EQS**	**MAC-EQS**	**EQS Biota**
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg
Simazine(122-34-9)[1,2,3]	0.01 - 0.1				0.01 - 0.1		1	4	
Atrazine(1912-24-9)	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0,6	2,0	
Indeno[1,2,3-cd]pyrene(193-39-5)	0.01 - 0.1		0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	see footnote 11	not applicable	see footnote 11
Benzo[b]fluoranthene(205-99-2)	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	see footnote 11	0,017	see footnote 11
Fluoranthene (206-44-0)[1,2,3,5-1]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0,0063	0,12	30
Benzo[a]pyrene (50-32-8)[1,2,3]	0.01 - 0.1				0.01 - 0.1	0.01 - 0.1	1,7 × 10–4	0,27	5
Terbutryne (886-50-0)[1]		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0,065	0,34	

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS. [5-4] substance listed as Priority 4 in PEWS

3.7 Fourth batch of sampling and results 10th December 2021

The pollution levels at Munden House Ford, in the third batch of testing, indicated that this was the close to the entry point of a pollution event or the majority of pollutants were entering the River Colne closer to the Rivers source. Two more sampling locations were added upstream to Munden House Ford, Tykes water Radlett and, closest to the River Colne source, Coursers Road. These locations can be seen in Figure 1

The Fourth set of results, from samples taken at the river Ver (sample ID 2226505), Coursers Road (sample ID 2296463), Tykes Water Radlett (sample ID 2296462),) Munden House Ford (sample ID 2297844), Knutsford playing fields (sample ID 2226506), Shaftsbury Road (Sample ID 2296461), Oxhey Park (Sample ID 2296460) and Lairage land (Sample ID 2296459). The full GC-MS results are shown in the appendix -

- The number of substances found.
  Coursers Road - 63 substances - (Full data shown in the Appendix)
  Tykes Water Radlett 82 substances - (Full data shown in the Appendix)
  River Ver - 52 substances - (Full data shown in the Appendix)
  Munden House Ford – 76 substances - (Full data shown in the Appendix)
  Knutsford Playing field – 67 substances - (Full data shown in the Appendix)
  Shaftsbury Road – 70 substances - (Full data shown in the Appendix)
  Oxhey road – 89 substances - (Full data shown in the Appendix)
  Lairage Land – 114 substances - (Full data shown in the Appendix)

- There were significantly more environmentally hazardous substances found in this round of testing, totalling 75 – these are tabulated in Table 11

- There is strong evidence of a petrol spill/contamination of the River Colne.
  This is evident from the number of benzene based substances such as Ethyl benzene (100-41-4), Azo benzene (103-33-3), Benzene, 1,4-dimethyl (105-05-5), Toluene (108-88-3), MBTE(1634-04-4), o-Xylene and m+p-Xylene (108-38-3 + 106-42-3). In total there are 8 Benzene based substances. And 5 naphthenic substances which are also a component of petrol. It is worth noting that the samples were not taken from the surface of the river, but the body of water and no petrol 'slick' was observed during sample acquisition. It is unclear if all the benzene based substances are from unleaded petrol.

- The highest levels of 1,2,4-Trimethylbenzne and Ethylbenzene were found at the Lairage land site, however, lesser amounts of the aforementioned chemicals were found upstream.

- MBTE is an additive in unleaded petrol – which strongly suggests the presence of unleaded petrol which was only found in the Lairage land sample.

- Tetrachloroethene (127-18-4), a substance used for cleaning metal parts was found in the Ver.

- The sewage substance, coprostanol was found in most of the River Colne samples, but not in the River Ver. Coursers Road, the testing site closest to the source of the River Colne, did not appear to have this substance present. The potential sewage pollution appears to start around Tykes water Radlett. This is backed up by the high levels of Caffeine, Cholesterol and cotinine.

- 2 PCBs were found at the Coursers Road site. 2,3-Dichlorobiphenyl (16605-91-7) an d2,4',5-trichlorobiphenyl (16606-02-3) These are classified as Persistent Organic Pollutants and are listed in the E-PRTR (166/2006)

- A large number of agricultural chemicals were all found at the Coursers Road sampling site. Prosulcarb was also found at Tykes water and the River Ver.
  Silthiofam (175217-20-6)
  Boscali(188425-85-6)
  Pendithalin (40487-42-1)
  Prosulcarb (52888-80-9)
  Aclonifen (74070-46-5)
  Diflufenican (83164-33-4) was determined to be in all River Colne samples and Propyzamide (23950-58-5) was found at greater that 5ug/L at the Coursers road site and all other sampling sites.

  - This is accompanied with numerous personal care product substances Benzophenone-3 (131-57-7) and DEET in all River Colne samples. and a number of pharmaceutical/intermediates
    Dietridazole (55-92-8)
    Teramethyl succinimide (3566-61-8)
    Neophytadiene (504-96-1).

  - 2,4,7,9-Tetramethyl-5-decyne-4,7-diol(126-86-3) is still found in all the River Colne sites from Munden House ford to Lairage land at levels greater than 5ug/L. This was also found at this level in June 2021 (lesser amounts prior to this) Even if this has been an intermittent release, this is still a significant level of environmental hazardous substance polluting the river.
  - Most concerning was the presence of two PCB substances at the source of the River Colne, 2,3-Dichlorobiphenyl (16605-91-7) and 2,4',5-Trichlorobiphenyl (16606-02-3). These PCBs can come from hazardous waste sites, illegal dumping or leaks from electrical transformers.

  - In addition to this the Coursers site also had the highest number and level of herbicides, pesticides and fungicides with Porpyzamide at levels greater than 5ug/L.
  - A surprising substance, hexachloroethane was found at low levels at Tykes water. The source is unclear but can be a by-product of incineration of chlorinated products or used during a manufacturing process, such as aluminium. Another use is as a research chemical.
  - A large number of PAH substances were found throughout the river Colne and Ver.
    Benzo[b]fluoranthene breached the MAC level in all sites tested.
    Benzi[ghi]perylene breached the MAC values in all but the Knutsford playing field sample.
    Benzo[k]fluoranthene breached MAC levels at the River Ver, Munden house ford and Knutsford playing Field
    Aclonifen breached the MAC at Coursers Road

  - A number of other substances found in the River Colne and Ver at this time were listed in one of the aforementioned regulations.

Table 11- Environmentally hazardous Substances found in during in the fourth sampling sites 10th December 2021

	Coursers Road	Tykes water Radlett	River Ver – Drop Lane	Munden House ford	Knutsford Playing Fields	Shaftsbury Road	Oxhey Park	Lairage Land	CLP Human	CLP environmental
Ethyl benzene(100-41-4)[3]							0.1 - 1	1 - 5	H225, H304, H373	H412
Azobenzene(103-33-3)				0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302, H341, H373	H400, H410
n-Propylbenzene(103-65-1)						0.01 - 0.1	0.1 - 1	0.1 - 1	H304, H226, H304,	H411
Benzene, 1,4-diethyl-(105-05-5)						0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H226, h304, H318	H411
2,4-Dimethylphenol(105-67-9)	0.01 - 0.1								H301, H311, H317	H411
1,2-Dibromoethane(106-93-4)								0.01 - 0.1	H301, H311, H335, H350,	H411
Benzene, 1-methyl-4-propyl-(1074-							0.01 - 0.1	0.01 - 0.1	H317, H225	H411
Metaldehyde (108-62-3)[5-1]	0.1 - 1			0.01 - 0.1	0.1 - 1		0.1 - 1	0.1 - 1	H228, H310,	H412
1,3,5-Trimethylbenzene(108-67-8)						0.1 - 1	0.1 - 1	0.1 - 1	H226, H335,	H411
Triphenyl phosphate(115-86-6)[5-2]		0.1 - 1						0.1 - 1		H400, H411
Tri-(2-chloroethyl) phosphate (115-96-8) **[5-1]**	0.1 - 1	0.1 - 1	0.01 - 0.1	0.01 - 0.1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H351,	H411
2,4,6-Tribromophenol(118-79-6)				0.01 - 0.1	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	H302, H319,	H400
Naphthalene, 1,2,3,4-tetrahydro-(11								0.01 - 0.1	H314, H319	H411
Fipronil (120068-37-3)[5-1]				0.1 - 1				0.1 - 1	H301, H311, H372,	H400, H410
Anthracene(120-12-7)[1,2,3]		0.01 - 0.							H315	H410
Galaxolide (1222-05-5)[5-3]		0.01 - 0.		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	None	H400, H410
Diphenylamine(122-39-4)	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H301, H311, H373	H400, H410
2,4,7,9-Tetramethyl-5-decyne-4,7-di 3)[5-2]	0.1 - 1	0.1 - 1		>5	>5	>5	>5	>5	H317, H318	H402, H412
Tetrachloroethene (127-18-4)[3,5-1]			0.1 - 1						H351	H411
Pyrene (129-00-0) [1,2,3,5-1]	0.01 - 0.1	0.01 - 0.	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H400, H410
Benzophenone-3(131-57-7)				0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H400, H411
sec-Butylbenzene(135-98-8)							0.01 - 0.1	0.01 - 0.1	H226, H315,	H411
4-tert-Octylphenol(140-66-9)	0.01 - 0.1	0.01 - 0.	0.01 - 0.1				0.01 - 0.1	0.01 - 0.1	H315	H400, H410
Phytol(150-86-7)			0.01 - 0.1	0.01 - 0.1	0.01 - 0.1		0.01 - 0.1		H315	H400, H410
2,3-Dichlorobiphenyl(16605-91-7)	0.01 - 0.1								H373,	H400, H410
2,4',5-Trichlorobiphenyl(16606-02-	0.01 - 0.1								H373,	H400, H410
Benzenesulfonanilide(1678-25-7)	0.01 - 0.1	0.1 - 1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H411
Silthiofam(175217-20-6)	0.1 - 1								H373,	H411
Boscalid (188425-85-6)[5-2]	0.1 - 1								None	H411
Atrazine (1912-24-9) [1,2,3]			0.01 - 0.1	0.01 - 0.1					H317, H373	H400, H410
Benzo[b]fluoranthene (205-99-2) [1,2,	0.01 - 0.1	0.01 - 0.	0.01 - 0.1	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H400, H410
Stigmastanol(19466-47-8)		0.1 - 1		0.01 - 0.1	0.01 - 0.1		0.1 - 1		None	H413
Fluoranthene (206-44-0)[1,2,3,5-1])	0.01 - 0.1	0.01 - 0.	0.01 - 0.1			0.01 - 0.1	0.01 - 0.1		H302	H400, H410
Benzo[k]fluoranthene (207-08-9)[1,2,			0.01 - 0.1	0.01 - 0.1	0.01 - 0.1				H350	H400, H410
Chrysene(218-01-9)		0.01 - 0.		0.01 - 0.1		0.01 - 0.1		0.01 - 0.1	H341, H350	H400, H410

Tri-allate(2303-17-5)	0.1 - 1	0.01 - 0.		0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302, H307,	H400, H410
Propyzamide(23950-58-5) [4]	>5	0.01 - 0.	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.1 - 1	0.1 - 1	0.1 - 1	H351	H400, H410
Cresyl diphenyl phosphate(26444-4		0.01 - 0.					0.01 - 0.1	0.01 - 0.1	None	H400, H410
Benzenesulfonamide, N-butyl (3622-84-2) [5-2]	1 - 5	1 - 5	1 - 5	1 - 5	1 - 5	1 - 5	1 - 5	1 - 5	Not classifie	H412
Pendimethalin(40487-42-1) [4]	0.1 - 1	0.01 - 0.		0.01 - 0.1					H317	H400, H410
Benzo[a]pyrene (50-32-8) [1,2,3]	0.01 - 0.1	0.01 - 0.	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H317, H340, H360FD	H400, H410
Prosulfocarb(52888-80-9)	0.1 - 1	0.01 - 0.	0.01 - 0.1						H317, H302	H411, H411
Dibenz[a,h]anthracene(53-70-3) [1,2,3	0.01 - 0.1	0.01 - 0.	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	H350	H400, H410
Benzo[a]anthracene(56-55-3)	0.01 - 0.1	0.01 - 0.	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H350	H400, H410
Naphthalene, 2,6-dimethyl-(581-42-								0.01 - 0.1	No CLP	H400, H410
Bixafen(581809-46-3)		0.01 - 0.							No CLP	H400, H410
Cholest-4-en-3-one(601-57-0)					0.01 - 0.1				Not Classifie	H413
Octocrylene(6197-30-4)		0.01 - 0.		0.01 - 0.1	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	None	H410
Hexachloroethane(67-72-1)		0.01 - 0.							H319, H351	H400, H410
Hexa(methoxymethyl)melamine(68			0.1 - 1			0.01 - 0.1			None	H412
Aclonifen(74070-46-5) [1,5-4),	0.1 - 1								H351, H317	H400, H410
Tefluthrin(79538-32-2)								0.01 - 0.1	H330, H310,	H400, H410
Diflufenican(83164-33-4)	0.1 - 1	0.01 - 0.		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not classifie	H412
N-Phenylsuccinimide(83-25-0)	0.01 - 0.1	0.01 - 0.	0.01 - 0.1						H302, H312,	H400, H410
N-nitrosodiphenylamine(86-30-6)					0.01 - 0.1				H317, H351, H373	H410
Fluorene(86-73-7)					0.01 - 0.1			0.01 - 0.1	No CLP	H400, H410
Terbutryne (886-50-0) [1]			0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302	H400, H410
Quinmerac (breakdown product)(90	0.1 - 1								No CLP	H412
Naphthalene (91-20-3) [1,2,3]							0.01 - 0.1	0.1 - 1	H351, H302	H400, H410
2-Methylnaphthalene(91-57-6)						0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302	H411
Coumarin(91-64-5)	0.01 - 0.1	0.01 - 0.	0.01 - 0.1	0.01 - 0.1			0.01 - 0.1		H302, H317	H412
2-Methoxynaphthalene(93-04-9)		0.01 - 0.							H319	H411
1,2,4-Trimethylbenzene(95-63-6)						0.1 - 1	0.1 - 1	1 - 5	H335, H319, H332, H226	H411
2,4,5-Trichlorophenol(95-95-4)				0.01 - 0.1	0.01 - 0.1				H319, H315,	H400, H410
2,4-Di-tert-butylphenol(96-76-4)	0.1 - 1	0.1 - 1					0.1 - 1	0.1 - 1	H315, H318	H400, H410

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS… [5-4] substance listed as Priority 4 in PEWS

Table 12 - Substances found in all 4 of the initial testing locations. Those in bold have been found in all 4 locations during this testing and the previous 3 test dates.

Substance Name (CAS Number)	Coursers Road	Tykes water Radlett	River Ver - Drop Lane	Munden House ford	Knutsford Playing Fields	Shaftsbury Road	Oxhey Park	Lairage Land	CLP Human	CLP environmental
Benzene, (2-isothiocyanatoethyl)-(2257-09-2)					0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302, H319	Not classified
Azobenzene(103-33-3)				0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302, H341, H350, H373	H400, H410
N,N,N',N'-Tetraacetylethylenediamine(10543-57-4)[5-4]	**0.1 - 1**	**1 - 5**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**None**	**None**
m+p-Xylene(108-38-3+106-42-3)					0.1 - 1	0.1 - 1	1 - 5	>5		
Toluene(108-88-3)[3,4]					0.1 - 1	0.1 - 1	1 - 5	>5	H225, H315, H361d, H336, H304	Not Classified
Squalene(111-02-4)	0.1 - 1	0.1 - 1		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H304	None
Tri-(2-chloroethyl) phosphate (115-96-8)[5-1]	**0.1 - 1**	**0.1 - 1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**H302, H351, H360f**	**H411**
Galaxolide (1222-05-5)[5-3]		**0.01 - 0.1**		**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**None**	**H400, H410**
Diphenylamine(122-39-4)	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H301, H311, H331, H373	H400, H410
Tributyl phosphate(126-73-8)[4]		0.1 - 1			0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	**H302, H315, H351**	**None**
2,4,7,9-Tetramethyl-5-decyne-4,7-diol(126-86-3)	0.1 - 1	0.1 - 1		**>5**	>5	>5	>5	>5	H317, H318	H402, H412
Pyrene (129-00-0)[1,2,3,5-1]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H400, H410
Benzophenone-3(131-57-7)				0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H400, H411
N,N-Diethyl-m-toluamide(134-62-3)[5-4]	0.01 - 0.1	0.1 - 1		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H315, H319	None
2-Propanol, 1-chloro-, phosphate (3:1)(13674-84-5)	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**H302 (majority - not RR)**	
Tris-(1,3-dichloroisopropyl) phosphate(13674-87-8)[5-2]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H351	None
1H-Benzotriazole, 5-methyl-(136-85-6)				0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H314, H318	None
Benzenesulfonanilide(1678-25-7)	0.01 - 0.1	0.1 - 1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	None	H411
Indeno[1,2,3-cd]pyrene(193-39-5)	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.01 - 0.1	0.1 - 1	0.01 - 0.1	H351	None

.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene(1999-85-5)	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not Classified	Not classified
2,2,2-Trichloro-1-phenylethanol(2000-43-3)		0.01 - 0.1		0.1 - 1	0.1 - 1	0.01 - 0.1	0.1 - 1	0.01 - 0.1	H315, H319	Not classified
Benzo[b]fluoranthene (205-99-2) [1,2,3]	**0.01 - 0.1**	**0.01 - 0.1**	**0.1 - 1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**0.01 - 0.1**	**H350**	**H400, H410**
Propyzamide(23950-58-5) [4]	>5	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.1 - 1	0.1 - 1	0.1 - 1	**H351**	**H400, H410**
1,2-Benzisothiazole(272-16-2)	0.01 - 0.1	0.1 - 1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1		
Carbamazepine(298-46-4)[2,5-2)				**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**H302, H317, H334**	**None**
Tetramethyl succinimide(3566-61-8)				**1 - 5**	**1 - 5**	**1 - 5**	**1 - 5**	**1 - 5**		
Coporstanol, Cholestan-3-ol, , (3.beta.,5.beta.)-(360-68-9)		0.1 - 1		0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	Not classified	None
Benzenesulfonamide, N-(3622-84-2)[5-2)	**1 - 5**	**1 - 5**	1 - 5	1 - 5	1 - 5	1 - 5	1 - 5	1 - 5	Not classified	H412
Crotamiton(483-63-6)[5-4)				0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H302, H315, H317, H319	None
Cotinine(486-56-6)				1 - 5	1 - 5	1 - 5	1 - 5	1 - 5	H302, H315, H319, H335	None
Indane(496-11-7)					0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.1 - 1	H226, H304,	No CLP
Benzo[a]pyrene (50-32-8)[1,2,3]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	***H317, H340, H350, H360FD***	***H400, H410***
Neophytadiene(504-96-1)	0.1 - 1	0.01 - 0.1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1		
Dimetridazole(551-92-8)				0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	H315, H319, H335	None
Benzo[a]anthracene (56-55-3) [1,2,3]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	***H350***	***H400, H410***
Cholesterol(57-88-5)[5-4)	**>5**	**>5**	**>5**	**>5**	**>5**	**>5**	**>5**	**>5**	**Not Classified**	**Not classified**
Caffeine(58-08-2)[5-4)	**0.1 - 1**	**1 - 5**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**0.1 - 1**	**H302**	**Not classified**
Vitamin E(59-02-9)	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not classified	Not classified
2-(Methylmercapto)benzothiazole(615-22-5)		0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H315, H319, H335	Not classified
Triethyl citrate(77-93-0)		0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not classified	Not classified
Ethanol, 2-butoxy-, phosphate (3:1)(78-51-3)	0.01 - 0.1	0.1 - 1	0.1 - 1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.1 - 1	0.1 - 1	Not classified	Not classified
Diflufenican(83164-33-4)	0.1 - 1	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	Not classified	H412
.gamma.-Sitosterol(83-47-6)	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	?	?
.gamma.-Sitostenone(84924-96-9)	0.1 - 1	0.1 - 1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1		

Terbutryne (886-50-0)[1]			0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	H302	H400, H410

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS. [5-4] substance listed as Priority 4 in PEWS

Table 13 - Additional substances of concern

Substance Name (CAS Number)	**Coursers Road**	**Tykes water Radlett**	**River Ver - Drop Lane**	**Munden House ford**	**Knutsford Playing Fields**	**Shaftsbury Road**	**Oxhey Park**	**Lairage Land**	**CLP Human**	**CLP environmental**
Caprolactam(105-60-2)			1 - 5						H302, H315, H319, H332, H335	None
m+p-Xylene(108-38-3+106-42-3)					0.1 - 1	0.1 - 1	1 - 5	>5	H315, H332, H312, H226, H304	
Butanedioic acid, dimethyl ester (106-65-0)[5-4]								>5		
Toluene(108-88-3)[3,4]					0.1 - 1	0.1 - 1	1 - 5	>5	H225, H315, H361d, H336, H304	Not Classified
Benzene(71-43-2)[1,2,3]								0.1-1	H225, H315,H319, H304, H340, H350, H372	
Lidocaine(137-58-6)[5-4]				0.1-1		0.1-1	0.1-0.1			
Primidone(125-33-7)				0.1 - 1		1 - 5		0.1 - 1	H302, H351	None
Indeno[1,2,3-cd]pyrene[1,2,3]	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.01 - 0.1	0.1 - 1	0.01 - 0.1		
Flufenacet (142459-58-3)[5-1]	1-5									
MTBE(1634-04-4)							0.1 - 1	1 - 5	H315, H225, H225,	No CLP
2(3H)-Benzothiazolone(934-34-9)		1 - 5		0.1 - 1				0.1 - 1	H302, H312, H332	None
o-Xylene(95-47-6)							0.1 - 1	1 - 5	H226, H312, H332, H315	None

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS. [5-4] substance listed as Priority 4 in PEWS

Table 14 - Substances found in the River Colne on the 10th December 2021 and listed in the WFD 2000/60/EC

	Coursers Road	**Tykes water Radlett**	**River Ver - Drop Lane**	**Munden House ford**	**Knutsford Playing Fields**	**Shaftsbury Road**	**Oxhey Park**	**Lairage Land**	**AA-EQS**	**MAC-EQS**	**EQS Biota**
	ug/L	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/kg**
Anthracene(120-12-7)		0.01 - 0.1							0,1	0,1	
Tetrachloroethene (127-18-4)[3,5-1)]			0.1 - 1						10	not applicable	
4-tert-Octylphenol (140-66-9)	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1				0.01 - 0.1	0.01 - 0.1	0,1	not applicable	
Atrazine(1912-24-9)			0.01 - 0.1	0.01 - 0.1					0,6	2,0	
Benzo[ghi]perylene(191-24-2)	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1		0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	see footnote 11	8,2 × 10–3	**see footnote 11**
Indeno[1,2,3-cd]pyrene(193-39-5)	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.01 - 0.1	0.1 - 1	0.01 - 0.1	see footnote 11	not applicable	**see footnote 11**
Benzo[b]fluoranthene (205-99-2)	0.01 - 0.1	0.01 - 0.1	0.1 - 1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	see footnote 11	0,017	**see footnote 11**
Fluoranthene (206-44-0)[1,2,3,5-1)]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1			0.01 - 0.1	0.01 - 0.1		0,0063	0,12	**30**
Benzo[k]fluoranthene (207-08-9)			0.01 - 0.1	0.01 - 0.1	0.01 - 0.1				see footnote 11	0,017	**see footnote 11**
Benzo[a]pyrene (50-32-8)[1,2,3)]	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	1,7 × 10 –4	0,27	**5**
Benzene(71-43-2)[1,2,3)]								0.1 - 1	10	50	
Aclonifen(74070-46-5)[1,5-4),]	0.1 - 1								0,012	0,04	
Terbutryne (886-50-0)[1)bisphenol]			0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0.01 - 0.1	0,065	0,34	
Naphthalene (91-20-3) [1,2,3)])							0.01 - 0.1	0.1 - 1	2	130	

3.7 Consistent offenders

There have been specific substances that have consistently appeared, at least, at the first four initial sites. They have been in all samples over the 18 month period of testing at Knutsford Playing Field, Shaftsbury Road, Oxhey Park and the Lairage land. These substances are shown below in Table 15 along with potential uses. 4 of these 11 substances carry classifications hazardous to the environment.

The majority of these substances are also listed as a water pollutant, 2 of which are PAHs, 2 potential indicators of sewage, 2 personal care substances and 3 pharmaceutical substances, 2 industrial.

Table 15 - Substances found in all 4 sites during all testing times (17/3/2020-10/12/2021)

Substance name	**CAS Number**		**Technical function (what is the function of the substance)**	**CLP Human**	**CLP Environmental**
N,N,N',N'-Tetraacetylethylenediamine(10543-57-4)[5-4]	10543-57-4		Personal care	None	None
Tri-(2-chloroethyl) phosphate [5-1]	115-96-8		Paints / varnishes / coatings; Automotive; Flooring; Furniture; Adhesives / sealants	H302, H351, H360f	H411
Galaxolide (1222-05-5)[5-3]	1222-05-5		Personal care; Cleaning	None	H400, H410
Pyrene (129-00-0) [1,2,3,5-1]	129-00-0	Priority Hazardous substance PAH	-	None	H400, H410
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5		Construction; Adhesives / sealants; Paints / varnishes / coatings	H302	
Benzo[b]fluoranthene (205-99-2) [1,2,3]	205-99-2	Priority Hazardous substance PAH	-	H350	H400, H410
Carbamazepine	298-46-4		Pharmaceuticals	H302, H317, H334	None
Tetramethyl succinimide	3566-61-8		Pharmaceuticals		
Cholesterol[5-4]	57-88-5		Potential indication of sewage:Personal care; Pharmaceuticals	Not Classified	Not classified
Caffeine(58-08-2)[5-4]	58-08-2		Potential indication of sewage: Personal care	H302	Not classified
.gamma.-Sitosterol	83-47-6		Plant steroid, pharmaceutical	Unknown	Unknown

[1] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1] Substance listed as Priority 1 in PEWS [5-2] substance listed as Priority 2 in PEWS [5-3] substance listed as Priority 3 in PEWS. [5-4] substance listed as Priority 4 in PEWS

4.0 Sediment analysis

Sediment samples were taken at 0.3m at the locations listed below to correlate with the data collated from the River Colne to date. The samples were taken on 11/3/2022. We were interested/concerned that the filtering effect of the sediment could be capturing pollutants and building up to dangerous levels for the environment.

The data has been slightly modified from the supplied data. Any values that indicate that the level is below the threshold of quantitation have been removed to make it easier to see read. In addition to this any substances not observed above the limit of quantitation have been removed. The full data is in the appendix.

The analysis for Polybrominated Diphenyl Ethers (PBDE's) and Polychlorinated Naphthalenes (PCN's) were not detected above the limit of quantitation.

4.1 PAH and Phenol - Sediment

Table 17 shows the phenols and speciated PAH found in the sediment of the River Colne. The values are in mg/kg, that is a factor of 3 larger than the GC-MS results.

p-cresol is classified as a VOC so it was not expected. This is listed in the Drinking water Directive, Water Framework directive and the E-PRTR

The values for the PAH are concerning. In the River Colne water, the levels were significantly lower. To put this into perspective the total levels of PAH over the 2 years of testing, in respective locations have been tabulated against the closest sediment sample point and shown in Figure 7 for The downstream Knutsford Park sediment and River Colne water, Figure 8 at the Lairage Land and Figure 9 at Oxhey Park..

This confirms that the PAH's do have an affinity for the soil and are filtered out of the water and accumulate in the sediment of the River. Being bio accumulative this number will potentially increase more over the coming years.

In addition to the 16 speciated PAHs. The following PAHs were also found.

Table 16 - PAH found in addition to the 16 speciated PAH

		Upstream of bridge at South Mimms Park	Downstream of confluence of Radlett Brook	Downstream of the Radlett Road outfall	Ver adjacent to Drop lane immediately downstream of 'stepping stones'	Upstream of the footbridge at the ford on the Munden estate	Downstream of the Knutsford Park outfall	Downstream of the Oxhey Park outfall	Lairage land
Acenaphthylene	mg/kg	0.85	0.27	0.47	<0.05	0.25	0.74	< 0.05	< 0.05
Acenaphthene	mg/kg	0.67	< 0.05	0.3	<0.05	< 0.05	0.24	< 0.05	< 0.05

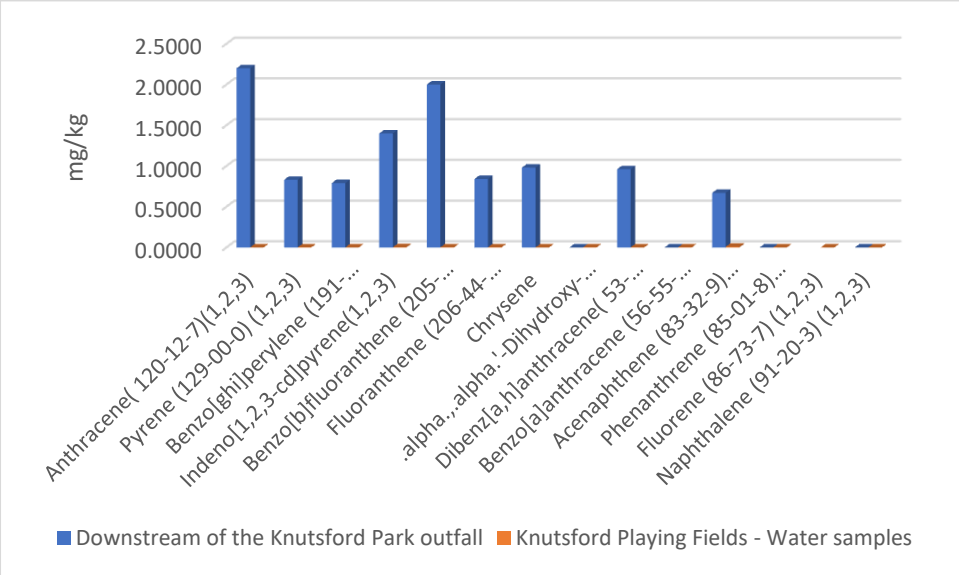


Figure 7 - PAH values in mg/kg found in the sediment (blue) and the total for each PAH from the River at the Knutsford Playing Field location from all samples.

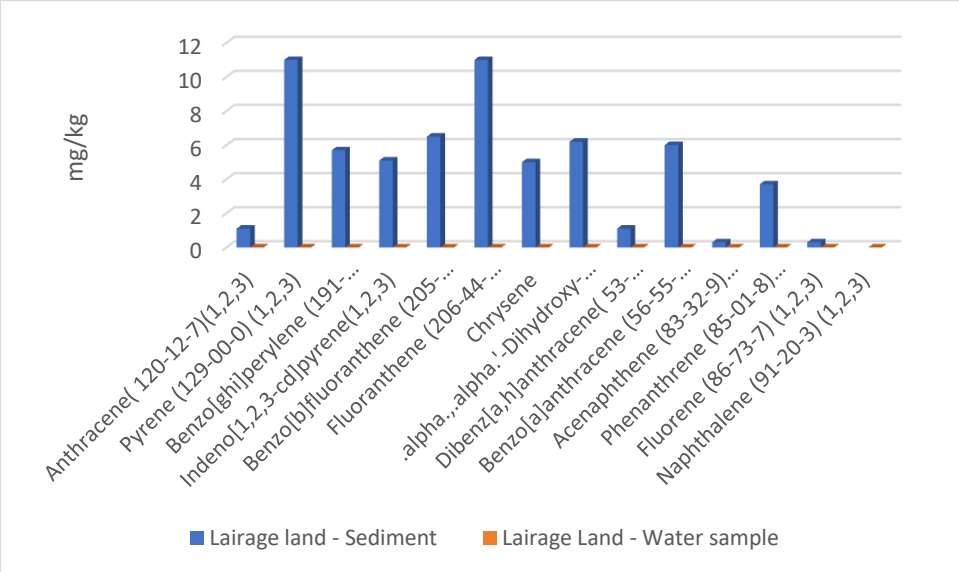


Figure 8 - PAH values in mg/kg found in the sediment (blue) and the total for each PAH from the River at the Lairage Land location from all samples.

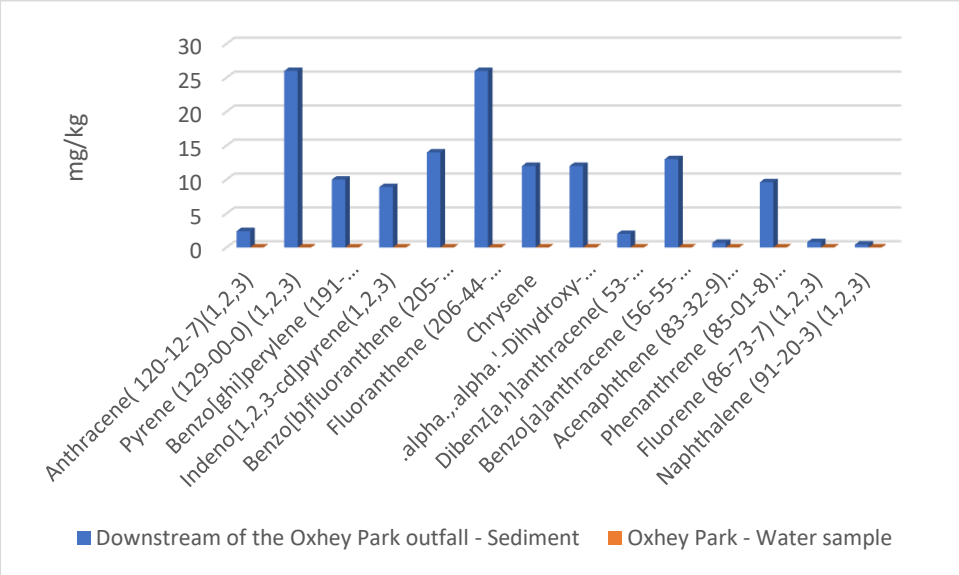


Figure 9 - PAH values in mg/kg found in the sediment (blue) and the total for each PAH from the River at the Oxhey Park location from all samples.

Table 17 - Table Phenols and Speciated PAH's in mg/kg found in the River sediment

Substance	Upstream of bridge at South Mimms Park	Downstream of confluence of Radlett Brook	Downstream of the Radlett Road outfall	Ver adjacent to Drop lane immediately downstream of 'stepping stones'	Upstream of the footbridge at the ford on the Munden estate	Downstream of the Knutsford Park outfall	Downstream of the Oxhey Park outfall	Lairage land
Anthracene (120-12-7)[1,2,3]		0.21	0.81	1.1	0.6		2.4	1.1
Pyrene(129-00-0) (1,2,3,5-1)	2.6	2.2	8.4	14	6.8	2.2	26	11
Benzo[ghi]perylene (191-24-2) (1,2,3)	1	0.91	3.2	6.8	3	0.83	10	5.7
Indeno[1,2,3-cd]pyrene[1,2,3]	0.94	0.82	2.9	5.8	2.7	0.79	8.9	5.1
Benzo[b]fluoranthene (205-99-2) (1,2,3	1.8	1.1	4.6	9.9	4.6	1.4	14	6.5
Fluoranthene (206-44-0)[1,2,3,5-1)]	2.4	2.1	8.1	13	6.3	2	26	11
Chrysene	1.1	0.98	3.4	6.1	3.4	0.84	12	5
Benzo[a]pyrene (50-32-8)[1,2,3]	1.2	1.1	4.1	7.4	3.5	0.98	12	6.2

Dibenz[a,h]anthracene(53-70-3)[1,2,3]	0.2		0.75	1.2	0.6		2	1.1
Benzo[a]anthracene (56-55-3) [1,2,3]	1.2	1.1	4.7	6.7	3.2	0.96	13	6
Acenaphthene (83-32-9) [1,2,3]				0.24			0.67	0.3
Phenanthrene (85-01-8) [1,2,3]	0.59	0.74	3	3.9	2.1	0.67	9.6	3.7
Fluorene (86-73-7) [1,2,3]			0.25	0.37			0.79	0.3
Naphthalene (91-20-3) [1,2,3]							0.41	
Speciated Total EPA-16 PAHs	13.6	12.3	47.7	81	39.4	11.1	**148**	69.8
p-Cresol (4-methylphenol)(106-44-5)[2,3]			1.4					

4.2 Heavy metals - sediment

It has been difficult to find limits for heavy metals in River sediment/rivers. WHO published a table of permissible limits for heavy metals in soils in 1996. Using this table as a guideline, the only heavy metal with all its sample values lower than the target value was Nickle. Limit values for the remaining metals Antimony, Arsenic, Mercury and Silver could not be found or are not available..

Table 18 - WHO permissible limits for heavy metals in plant and soil.

Elements	*Target value of soil (mg/kg)	***Permissible value of plant (mg/kg)
Cd	0.8	0.02
Zn	50	0.60
Cu	36	10
Cr	100	1.30
Pb	85	2
Ni	35	10

*Target values are specified to indicate desirable maximum levels of elements in unpolluted soils
Source: Denneman and Robberse 1990; Ministry of Housing, Netherlands 1994
***Source: WHO (1996) **Table 11:** WHO permissible limits for heavy metals in plant and soil.

Table 19 - Aqua regia extractable heavy metals found in the sediment samples from the River Colne and Ver in mg/kg (ppm). Those in Italics exceed the WHO desirable level

Heavy Metals / Metalloids (Aqua regia extractable)	Colne immediately downstream of	Colne immediately downstream of the Radlett	Colne at Lairage land	Colne immediately downstream of the Knutsford	Colne immediately upstream of the foothridge	Colne immediately downstream of	Ver adjacent to Drop lane immediately	Colne immediately downstream of confluence of	Colne immediately upstream of bridge at
Antimony	**8.3**	**6.2**	**7.5**		**3.6**	**7.2**		**4.5**	
Arsenic	**11**	**6.3**	**8.3**	**9**	**6.6**	**11**	**8.5**	**11**	
Cadmium	***1.9***	***0.9***	***1.8***	**0.5**	***1.1***	***1.6***	**0.5**	**0.9**	
Chromium	**45**	**32**	**55**	**37**	**31**	**39**	**42**	**28**	
Copper	***260***	***100***	***180***	**33**	***97***	***280***	***43***	***48***	
Lead	***290***	***140***	***410***	***97***	***170***	***420***	**52**	**85**	
Mercury	**0.8**	**0.4**	**0.8**	**0.4**	**0.4**	**1.2**			
Nickel	**27**	**18**	**27**	**23**	**20**	**35**	**24**	**24**	
Silver	**3.3**	**1.8**	**5.5**	**1**	**2.4**	**2**	**2.7**		
Zinc	**590**	**310**	**520**	**120**	**280**	**560**	**140**	**190**	

4.3 PCBs - sediment

PCBs had a variety of industrial uses, such as electrical equipment, plastics, coatings and cement to name a few until they were banned in the UK due to the damaging effect to human health. PCBs can leach from landfill sites and also have the ability to absorb organic matter and re-emerge. They are also said to bind tightly to soil

Table 20 - PCBs by GC-MS expressed in in mg/kg in the River Colne sediment

	Colne immediately downstream of the Oxhey Park outfall	Colne immediately downstream of the Radlett Road outfall	Colne at Lairage land	Colne immediately downstream of the Knutsford Park outfall	Colne immediately upstream of the footbridge at the ford on the Munden estate	Ver adjacent to Drop lane immediately downstream of 'stepping stones'	Colne immediately downstream of confluence of Radlett Brook	Colne immediately upstream of bridge at South Mimms Park
PCB Congener 28	**0.005**	**0.005**	**0.006**	**0.007**	**0.006**		**0.003**	**0.006**
PCB Congener 52	**0.002**	**0.004**	**0.005**		**0.005**	**0.003**		
PCB Congener 101	**0.003**	**0.003**	**0.007**		**0.007**	**0.006**	**0.003**	
PCB Congener 118	**0.004**		**0.005**		**0.008**	**0.008**		
PCB Congener 138	**0.006**	**0.005**	**0.011**		**0.011**	**0.008**	**0.004**	
PCB Congener 153	**0.004**		**0.011**		**0.009**	**0.01**		
PCB Congener 180	**0.004**		**0.007**		**0.005**	**0.007**		
Total PCBs	**0.028**	**0.017**	**0.052**		**0.051**	**0.042**	**0.011**	
PCB Congener 118	**0.004**		**0.005**		**0.008**	**0.008**		

4.4 PFAS - sediment

PFOA are listed, like PAH as Persistent Organic Pollutants (POPs). Whereas PAH are created often as a by-product of combustion, and are bio-accumulative and toxic, PFOA are additionally classified as forever chemicals as they are man-made.

The drinking water inspectorate has set a 10ng/L (0.01ug/kg) limit for PFOS and PFOA. The values below are in ug/kg. The values found in all locations are significantly higher than this 0.01ug/kg limit.

Table 21 - PFAS by LV-MS expressed in ug/kg found in the River Colne sediment

PFAS Suite 3		Colne immediately downstream of the Oxhey Park outfall	Colne immediately downstream of the Radlett Road outfall	Colne at Lairage land	Colne immediately downstream of the Knutsford Park outfall	Colne immediately upstream of the footbridge at the ford on the Mumden	Ver adjacent to Drop lane immediately downstream of	Colne immediately downstream of confluence of Radlett Brook	Colne immediately upstream of bridge at South Mimms Park
PFOS C8 Sulphonate	**µg/kg**	**1.1**	**1.6**	**0.9**	**1.5**	**0.5**	**1.1**	**0.4**	**0.5**
PFOA C8 Carboxylic acid	**µg/kg**	**0.1**							
PFDA C10 Carboxylic acid	**µg/kg**	**0.2**	**0.1**	**0.2**					
PFUdA C11 Carboxylic acid	**µg/kg**	**0.1**							
PFDoA C12 Carboxylic acid	**µg/kg**	**0.2**							

4.5 Dioxins - sediment

International Toxic Equivalents (TEQ) have been developed to show the degree of toxicity of a mixture of dioxins. The "Toxic Equivalent" (TEQ) scheme weighs the toxicity of the less toxic compounds as fractions of the toxicity of the most toxic TCDD. Each compound is attributed a specific "Toxic Equivalency Factor" (TEF). This factor indicates the degree of toxicity compared to 2,3,7,8-TCDD, which is given a reference value of 1.

The total 2,3,7,8 Furans and Dioxins along with TEQ are shown in Table 22. These can be seen to vary significantly between sites with a significantly high 2,3,7,8 Dioxin value of 3370 detected in the River Ver sediment, this location also has the highest value for 2,3,7,8, Furans.

It has been difficult to find a dioxin and Furan value to compare the sediment data. However, EU Directive /2000/76/EC does define the total of dioxins and furans, defined as the sum of individual dioxins and furans as specified in Annex I of the said regulation to be 0.3ng/L for the waste water from cleaning of exhaust gases.

Table 22 - Total 2,,37,8, dioxins and Furans (ng/kg and TEQ values found in the sediment of the River Colne (TEQ2 values – non-detected congeners at zero

Sample	Total 2,3,7,8-Furans ng/kg	Total 2,3,7,8-Dioxins ng/kg	TEQ (WHO) Mammals	TEQ (WHO) Fish	TEQ (WHO)-Birds
Oxhey Park	**246**	**1650**	**12**	**12**	**26.1**
Radlett	**197**	**1310**	**9.97**	**9.44**	**21.14**
Lairage	**289**	**1740**	**13.7**	**13.5**	**31.6**
Knutsford	**8.14**	**46.9**	**0.181**	**0.278**	**0.0794**
Munden Footbridge	**162**	**803**	**7.93**	**7.39**	**15.2**
Ver Drop Lane	**566**	**3370**	**29**	**28.3**	**55.6**
Radlett Brook	**65.8**	**411**	**3.66**	**3.39**	**12.3**
South Mimms	**77.6**	**290**	**6.37**	**6.82**	**18.9**

5.0 Borehole sample – Otterspool

This borehole is close in proximity to the River Colne at Munden house. This is classified as an observation borehole, for monitoring the quality and the level of water only and is not used for public water supply. Affinity Water advise that all public water supply abstraction boreholes in the upper Colne are blended together and treated centrally at a large water treatment works and is subject to rigourous treatment, with extensive monitoring to ensure safe and wholesome drinking water is provided to the public at all times. A sample was taken from this borehole to determine if the pollutants could potentially filter through into an aquifer for drinking water. The sample was taken on the 1st April 2022

Three of the substances found have also been found in all of our initial testing sites throughout all four test dates (shown in bold). A number of these substances have been listed in the various water regulations, some of which are not only dangerous to the environment, they also carry human hazards, such as H351 – suspected of causing cancer.

However, it was more concerning to find substances that were seen far less frequently, if at all, in our testing. Such as Bisphenol A, which is a monomer and used to make polymeric materials. The monomeric substance is usually at low ppm concentrations in polymeric materials.

Butylated Hydroxy Toluene has not been observed throughout our GC-MS analysis of the River Colne water so this was far from expected. This substance is only used at low levels in products for stability.

Tetrachloroethane is a Volatile Organic Compound, it was used in automotive products prior to 2003 and is used as a solvent and cleaning fluid.

Table 23 - GC-MS results from the borehole water sampled at Otterspool in ug/L. Bold substances denote that they have been found in all initial sampling sites on all testing dates.

Chemical Name	**CAS number**	**Potential use**	**ug/L**	
Tri-(2-chloroethyl) phosphate[5-1)]	**115-96-8**	**Plasticiser, flame retardant**	**0.01-0.1**	**H411, H302, H351, H360f**
Galaxolide (1222-05-5)[5-3)]	**1222-05-5**	**Personal use**	**0.01-0.1**	**H400, H410**
Simazine(122-34-9) [1,2,3)]	122-34-9	Herbicide	0.01-0.1	H400, H410, H351
Primidone	125-33-7	Pharmaceutical	0.1-1.0	H302, H351
Tetrachloroethene (127-18-4)[3,5-1)]	127-18-4	VOC	0.1-1.0	H411, H351,
Butylated Hydroxytoluene	128-37-0	Antioxidant	0.01-0.1	H400
2-Propanol, 1-chloro-, phosphate (3:1)	**13674-84-5**	**Flame retardant**	**0.01-0.1**	**H302**
1H-Benzotriazole, 5-methyl-	136-85-6	Biocide/antiseptic	0.01-0.1	H314, H318
Lidocaine	137-58-6	Pharmaceutical	0.01-0.1	H302
Atrazine [1,2,3)]	1912-24-9	Herbicide	0.01-0.1	H400, H410, H317, H373
Atrazine desethyl	6190-65-4	Potential degradation product of Atrazine	0.01-0.1	H302, H319, H332
Benzenesulfonamide, 4-methyl-	70-55-3	Plasticiser, intermediate for pesticides	0.01-0.1	Not classified
Triethyl citrate	77-93-0	Plasticiser, solvent	0.01-0.1	Not classified
Bisphenol A[2,5-1)]	80-05-7	Intermediate/monomer	0.1-1	H400, H410 H318, H317, H335, H360F

[1)] Listed in the EU Water Framework directive (2000/60/EC) as a priority hazardous substance, annex X [2)]Listed in the EU Drinking water Directive recast 2020/84-01. Annex 1, Part B (Chemical parameters) [3)]Listed in E-PRTR (166/2006)- 01. Annex II (Pollutants) [4)]Listed in Freshwater specific pollutants and operational environmental standards (EQS) [5-1)] Substance listed as Priority 1 in PEWS [5-2)] substance listed as Priority 2 in PEWS [5-3)] substance listed as Priority 3 in PEWS. [5-4)] substance listed as Priority 4 in PEWS

6.0 Discussion of findings

This study has shown that the River Colne contains a plethora of substances which are non-native to the River and natural environment. Man-made substances, a number of persistent organic pollutants, are polluting our River water and river sediment. They are potentially polluting the source waters that are used and treated to provide our drinking water supply.

The River water analysis by GC-MS analyses specific substances, the substances that volatilise under the Gas chromatography method conditions, which limits this method to a molecular weight of around 800 daltons and less polar molecules.

Using the GC-M-S method 267 substances were found in the River water alone.

We have briefly looked at a number of regulations to protect our water-ways and drinking water. Most concentrate on Persistent organic pollutants and agricultural chemicals. The Environment Agency (EA) has produced the Priority and Early Warning System. This PEWS takes actual results from water-ways with the aim of using a real-time approach is to keep up with today's trends in chemical use and substances that are more prevalent today in our water-ways. These substances have been classified by their risk to the environment. We compared this to our findings and there is a lack of parity in between our findings and the EA -PEWS (Table 24 – shows the substances found in the River Colne and PEWS).

The source of these pollutants is potentially from Sewage waste, Industrial waste, Pharmaceutical waste, Agriculture and traffic/road run-off. These could be from direct entry into the river, wash-off from the surrounding areas and water seeping through the soil, carrying pollutants from landfill sites.

The number of substances detected at each site was concerning, the highest number of substances being the last testing date on 10th December 2021 at the Lairage land. 114 substances were detected by GC-MS alone. It maybe that a number of the substances are insignificant in concentration but their accumulative effect may be detrimental. An overview of the substances clearly shows that there has been a number of pollution events around this time. The detection of Petrol components, possibly other benzene-based solvents, substances linked to sewage, herbicides, pesticides, fungicides, pharmaceutical drugs, industrial chemicals and substances found in personal care products clearly show that the River Colne (and River Ver) are being polluted.

Coprasanol (CAS 360-68-9) has been linked to sewage contamination and this has been detected in each round of testing (1-5ug/L to 0.1-1ug/L), this coupled with the cholesterol and caffeine being ever present, strongly suggests that the River Colne has been subjected to a number of sewage outfalls. This is a major issue as not only does untreated sewage contain the substances we have detected it also contains bacterial and viruses, such as E.coli and Hepatitis A. These can cause symptoms such as stomach upsets, skin, ear eye and chest infections, and sore throat. There have been a significant number of reports of people falling ill after contact with river-water due to the sewage content.

N,N,N',N'-Tetraacetylethylenediamine and Galaxolide have been present in all of the initial four sites throughout this study – both of these come from personal care products and more concerning, Galaxolide has been found in the water of the observation borehole.

Sewage entering the river by various means may also explain the vast number of personal use substances and also some Industrial biased substances. However, the high concentration and prevalence of some substances would be difficult to explain by these outfalls. The level of 2,4,7,9-tetramethyl-5-decyne-4,7-diol (TMDD), a chemical used in paper, ink, pesticide, and adhesive industries as a wetting and anti-foaming agent has been found at >5ug/l at 5 Colne outfall sites. Tri-(2-chloroethyl)phosphate and 2-Propanol, 1-chloro-, phosphate have been observed in all the Knutsford to Lairage land sites, that is 4.2km over an 18 month This substance was also found in the Obervation borehole.

Also found by GC-MS was a number of PAH's, classified as Persistent Organic Pollutants. The level and frequency of PAHs make them quite ubiquitous to the River Colne. A number of PAH's have been noted to be present at above the Maximum allowable concentration (MAC-EQS) for inland waters, others are fairly close to this level. Using the Knutsford Playing Field to Lairage land data, we can state that the annual average (AA-EQS) for Benzo[b]fluoranthene has been exceeded. There is potential that more AA-EQS have been exceeded but the GC-MS qualitative data range is too wide to be able determine this. Two PAHs, Pyrene and Benzo[b]fluoranthene have been present in all four of these sites during this testing programme.

The level of PAH's found in the sediment were significantly higher than the River finding, about 100 times. This may be that they have been filtered out as they have an affinity for the sediment. The timeframe it has taken for the PAHs to build up to this level is not known. It may be that this high PAH value will keep increasing as PAHS enter the River.

Another range of substances listed in the POP regulation is PFAS, these are determined by LC-MS and were found in the sediment. They were found in all sampling sites, Oxhey Park contained the biggest PFAS cocktail. It would be interesting, if not worrying, to know how much of these now ubiquitous substances are in the River water

The value for Dioxins and Furans in the sediment seemed significantly high. These were not detected in the water samples and this may be due to the GC-MS method used. These values should be followed up.

The heavy metal values of the sediment are high compared to the WHO recommended values for soil. The highest heavy metals were determined to be from the River Ver at drop Lane with levels of zinc at least 10 times higher than the WHO value, lead nearly 5 times higher and copper 7 times higher. Lairage Land also had excessively high values. Knutsford Playing fields had the lowest heavy metal values with only lead being slightly higher that the WHO value.

The Borehole is close to the River Colne between Munden House ford and Knutsford Playing fields.3 of the 11 consistent offenders found in the River Colne between Knutsford Playing Fields and Lairage Land have shown up in the observation borehole, Galaxolide (personal use), Tri-(2-chloroethyl)phosphate and 2-Propanol, 1-chloro, phosphate (both industrial use). Bisphenol A, which is a monomer for polymers and is classified as endocrine disruptor (ED) was detected in the borehole. As this had not been too prolific in our water samples this was not expected. More concerning was detecting Butylated hydroxytoluene, this substance had not been detected in any of the River samples, it is used an antioxidant at low levels. Very few VOC's have been detected through this study with exception of the products of the petrol pollution in December 2021. So, it was surprising to find the VOC, tetrachloroethene in the borehole. Four of the substances found in the observation Borehole are classified as either potentially or actually carcinogenic to humans. These were Tri-(2-chloroethyl) phosphate, Tetrachloroethene (127-18-4) and Bisphenol A. Tetrachloroethene is also listed in the Drinking Water Directive with a parametric value of 10ug/L, this was found at 0.1-1ug/L in this experimental borehole. And 2 substances that cause damage to fertility or/and the unborn child. As pollution events increase, it is expected that the number of substances will increase in our potential water supply.

It has already been found that PFAS, a generic term which includes PTFE (Teflon) and other fluorinated substances are not detected by GC-MS but by more complex methods of LC-MS. The observation Borehole samples was not analysed by LC-MS so we do not know their level present. A number of PFAS have been found in tap water and in human blood.

Only the generic GC-Ms was carried out on this sample. It was surprising to see no PAH's present in the borehole as they seemed ubiquitous in the River water and sediment. There potentially could be numerous other substances present, such as PFAS, Dioxins, Furans, not detected by this method.

These substances have been filtered through by water to the aquifer, over a period of time. The time-frame is unknown and will be variable and this causes challenges in being able to accurately monitor pollution. The pollution we can detect in our rivers/sediment today, will potentially end up in our aquifers at a later date. It is possible that PAHs may start to show in due course.

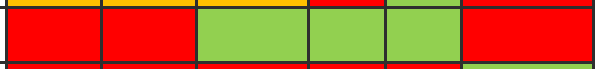
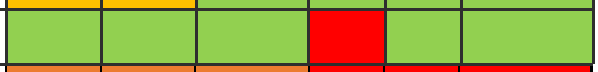
Without positive action now, our water sources may become very difficult, if not impossible to remove specific pollutants that enter our aquifers. .

We should also bear in mind that as substance information on toxicology to the environment and human health increase, the classification of substances may change. This is an ongoing action plan by both ECHA and the HSE. Chemicals that we deem non-toxic today, may well become toxic in the future.

Table 24 - Substances found in the River Colne and also listed in the PEWS (EA)

The colours used below indicate the priority of concern for surface and ground water in which Red = Priority 1, Orange = Priority 2, Yellow = Priority 3 and Green = Priority 4; For soil, biota and sediment the colours indicate need for further consideration (red), no further consideration (green) or insufficient information (white)

Chemical name	Use	Overall	Surface water	Ground water	Soil	Biota	Sediment
2,4,7,9-Tetramethyl-5-decyne- 4,7-diol	Wetting/antifoaming agent						
Benzenesulfonamide, N-butyl	Plasticiser						
Benzenesulfonanilide	Industrial intermediate						
Benzophenone	Lifestyle						
bis(2-ethylhexyl)phthalate (DEHP)	Plasticiser						
Caffeine	Lifestyle						
Cholesterol	Natural and industrial chemical						
Crotamiton	Pharmaceutical						
Fluoranthene	PAH						
Metaldehyde	Molluscicide						
N,N,N',N'-Tetraacetylethylenediamine	Various						
N,N-Diethyl-m-toluamide	Biocide/insect repellent						
Pyrene	PAH						
Tri-(2-chloroethyl) phosphate	Flame retardant						
Triphenyl phosphate (TPHP)	Flame retardant						
Tris (1,3-dichloroisopropyl) phosphate	Various, Additive flame retardant						
Homosalate / (Benzoic acid, 2- hydroxy-, 3,3,5- trimethylcyclohexyl ester)	Cosmetics (white list) UV Filter						
Cocaine	Illegal drug						
Dimethyl succinate	Chemical synthesis, paint & coating additives, pigments solvents & viscosity adjustors, cosmetics						
Galaxolide (HHCB)	Personal care products						
Bisphenol A	Plasticiser						
Boscalid (Nicobifen)	Herbicide						

Carbamazepine	Pharmaceutical	
Diclofenac	Pharmaceutical	
Fipronil	Biocide	
Flufenacet (Fluthiamide)	Herbicide	
Gabapentin	Pharmaceutical	
Lidocaine (Diocaine)	Pharmaceutical	
Tetrachloroethylene / Perchloroethylene	Cleaning solvent in dry cleaning and textile processing and in the manufacture of fluorocarbons. Widespread uses in formulation,	

7.0 Conclusion

The water in the river is demonstrably of very poor quality. That clearly impacts negatively on the ecological system as a whole and in some areas that can be clearly confirmed by sampling the abundance and variety of invertebrate life. The results retuned by the riverfly monitoring initiative in the water/sediment sample study area indicate marked downturns in the numbers and species of invertebrates at a number of locations.

The poorest of those riverfly results 'scores' however are found localised to the urban area around Watford but it is not necessarily the case that the micropullants found here are so significantly different to areas where better riverfly scores are achieved – both up and, crucially, downstream. It is possible therefore that something is being missed in that urban area. It may be that a broader spectrum of analytical process is required – targeted LC-MS on the river water for example. CVFC are already engaging with a number of supporters in the hope that further analysis can be achieved. This study generally needs now to be undertaken at locations further downstream and the Colne and its many distributaries total hundreds of miles of river before the confluences with the Thames at Staines

The number of pollutants entering the River Colne through the many and varied routes is significant, some of which are bio accumulate and will persist for years. This has already been seen for PFAS in drinking water and which have also been recorded in human blood worldwide. This suggests that these chemicals are potentially polluting the source waters that are used and treated to provide our drinking water supply. The constant addition of more and varied chemicals to the river can only ultimately present an increased risk to that drinking water source. Does the capability and capacity exist to remove these chemicals to produce a supply of clean and safe drinking water and, even if that is the case now what does the mid to long term future look like?

The foregoing in this report makes it clear that the routes by which micropulltants enter the river and our groundwater are numerous. It is true to say that sewage treatment works are a significant contributor but the works and the final treated effluent they produce is effectively only the collection point for all that we, the population, send them.

The pollutants we dispose of down our sewers whether deliberately or unwittingly are unlikely to be removed by a process that was not designed so to do. It may be argued therefore that intermittent storm discharges or 'spills' are little more harmful than the constant outflow of pollutnats in final treated effluent. Spills do indeed mean that untreated dilute sewage will reach our waterways and we must all strive to reduce those events. What CVFC would argue however, and we believe this report demonstrates, is that we have bigger problems and higher priorities to worry about than storm spills.

8.0 Addendum

As the team at CVFC were finalising this report two articles of particular interest were published by Communications and Management for Sustainability (CMS) http://www.cmscoms.com/ that are entitled:
Toxic 'forever chemicals' found in toilet paper around the world
and
Growing number of studies detect antibiotics, medicines and caffeine in groundwater
The outcomes of these studies are very similar to those recorded by CVFC and in almost every respect support our findings. The studies specifically state that:
Toilet paper samples from around the globe have been found to contain PFAS – the forever chemicals referred to earlier in this document. Toilet paper is a potential major source of PFAS arriving at treatment plants that cannot be removed and may enter the rivers at discharge points. Hence, these forever chemicals build up in sewage sludge that is then spread on land as fertiliser which then can wash off into rivers. PFAS is generic name for a specific class of chemicals and includes a significant number of poly fluorinated susbstances that are linked to cancer, foetal complications, liver disease, kidney disease, autoimmune disorders and other serious health issues. Some forever chemical hotspots in England were found to have 10 times or more PFAS than the proposed EU safe thresholds

There is significasnt ongoing increases in the production and use of medicines, antimicrobial and pharmaceutical products. These will break down but will enter the environment and could cause both human and ecosystem health risks. Many chemicals and other pollutants are likely to reach soil and water via treated or untreated wastewater.

Surface waters (rivers and lakes) are most likely to be contaminated, although the report goes on to say that it is crucial to assess the risk to human health and environment from contaminants in groundwater given that in some geologies Groundwater has indeed been shown to collect undegraded pollutants such as anti-inflammatory drugs and pesticides with the risks being obvious. Some rivers interact with groundwater with the pollutants in either being able to exchange.

Appendix

Table 25: GC-MS Results for Knutsford Playing Fields, 2071343, 17th March 2020

GCMS Results for Sample:		2071343	
Compound Name	CAS#	Concentration	Units
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1H-Benzotriazole, 5-methyl-	136-85-6	<0.1	µg/L
1-Propanol, 2-(2-methoxypropoxy)-	13588-28-8	<0.1	µg/L
1-Propanone, 3-chloro-1-phenyl-	936-59-4	<0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	<0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2,5-cyclohexadien-1-one, 2,6-bis(1,1-dimethylethyl)-4-hydroxy-4-methyl-	1000401-12-0	<0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzo[b]fluoranthene	205-99-2	<0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	<0.1	µg/L
Cholesta-5,22-dien-3-ol, (3.beta.)-	92218-20-7	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Fipronil	120068-37-3	<0.1	µg/L
Fluoranthene	206-44-0	<0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	<0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
Neophytadiene	504-96-1	<0.1	µg/L
Propiconazole-II	60207-90-1	<0.1	µg/L
Propyzamide	23950-58-5	<0.1	µg/L
Pyrene	129-00-0	<0.1	µg/L
Sulfur (S8)	10544-50-0	1 - 5	µg/L
Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	<0.1	µg/L
Tri-allate	2303-17-5	<0.1	µg/L
Triethyl citrate	77-93-0	<0.1	µg/L
Triethyl phosphate	78-40-0	<0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	<0.1	µg/L

Table 26: GC-MS data Shaftsbury Road, 2071346, 17th March 2020

GCMS Results for Sample:		2071346	
Compound Name	CAS#	Concentration	Units
.gamma.-Sitostenone	84924-96-9	<0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	<0.1	µg/L
2,5-cyclohexadien-1-one, 2,6-bis(1,1-dimethylethyl)-4-hydroxy-4-methyl-	1000401-12-0	<0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-Piperidinone, 2,2,6,6-tetramethyl-	826-36-8	<0.1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Benz[a]anthracene	56-55-3	<0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzo[a]pyrene	50-32-8	<0.1	µg/L
Benzo[b]fluoranthene	205-99-2	<0.1	µg/L
Benzo[ghi]perylene	191-24-2	<0.1	µg/L
Benzo[k]fluoranthene	207-08-9	<0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	<0.1	µg/L
Chloroxylenol	88-04-0	<0.1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Diflufenican	83164-33-4	<0.1	µg/L
Ergosta-5,22-dien-3-ol, (3.beta.,22E,24S)-	17472-78-5	0.1 - 1	µg/L
Fipronil	120068-37-3	<0.1	µg/L
Fluoranthene	206-44-0	<0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	<0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	<0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
Neophytadiene	504-96-1	<0.1	µg/L
Phytol	150-86-7	<0.1	µg/L
Propiconazole-II	60207-90-1	<0.1	µg/L
Propyzamide	23950-58-5	<0.1	µg/L
Pyrene	129-00-0	<0.1	µg/L
Terbutryne	886-50-0	<0.1	µg/L

Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	<0.1	µg/L
Tri-allate	2303-17-5	<0.1	µg/L
Triethyl citrate	77-93-0	<0.1	µg/L
Triethyl phosphate	78-40-0	<0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	<0.1	µg/L

Table 27 GC-MS data Oxhey Park, 2071345, 17th March 2020

GCMS Results for Sample:		2071345	
Compound Name	CAS#	Concentration	Units
(Z)-Decyl icos-9-enoate	1000414-43-4	0.1 - 1	µg/L
.gamma.-Sitostenone	84924-96-9	<0.1	µg/L
.gamma.-Sitosterol	83-47-6	1 - 5	µg/L
1,3-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	137-89-3	0.1 - 1	µg/L
1H-Pyrrole-2,5-dione, 3-ethyl-4-methyl-	20189-42-8	<0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	<0.1	µg/L
2,2,4-Trimethyl-1,3-pentanediol diisobutyrate	6846-50-0	<0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2,5-cyclohexadien-1-one, 2,6-bis(1,1-dimethylethyl)-4-hydroxy-4-methyl-	1000401-12-0	<0.1	µg/L
2-Methoxynaphthalene	93-04-9	<0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4,7-Methano-1H-indenol, hexahydro-	37275-49-3	<0.1	µg/L
4-Piperidinone, 2,2,6,6-tetramethyl-	826-36-8	<0.1	µg/L
7-Octen-2-ol, 2,6-dimethyl-	18479-58-8	0.1 - 1	µg/L
Acetaminophen	103-90-2	0.1 - 1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Benz[a]anthracene	56-55-3	<0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzo[a]pyrene	50-32-8	<0.1	µg/L
Benzo[b]fluoranthene	205-99-2	<0.1	µg/L
Benzo[ghi]perylene	191-24-2	<0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Butyl citrate	77-94-1	<0.1	µg/L
Caffeine	58-08-2	1 - 5	µg/L
Carbamazepine	298-46-4	<0.1	µg/L
Chloroxylenol	88-04-0	0.1 - 1	µg/L

Cholest-4-en-3-one	601-57-0	<0.1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	1 - 5	µg/L
Cholesterol	57-88-5	>5	µg/L
Chrysene	218-01-9	<0.1	µg/L
Cocaine	50-36-2	0.1 - 1	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Cyclohexanol, 5-methyl-2-(1-methylethyl)-	1490-04-6	0.1 - 1	µg/L
Cyclopentaneacetic acid, 3-oxo-2-pentyl-, methyl ester	24851-98-7	0.1 - 1	µg/L
Diflufenican	83164-33-4	<0.1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Ergosta-5,22-dien-3-ol, (3.beta.,22E,24S)-	17472-78-5	0.1 - 1	µg/L
Ergostanol	09/02/6538	0.1 - 1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	1 - 5	µg/L
Ethanol, 2-phenoxy-	122-99-6	<0.1	µg/L
Fipronil	120068-37-3	<0.1	µg/L
Fluoranthene	206-44-0	<0.1	µg/L
Gabapentin	60142-96-3	<0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	<0.1	µg/L
Hexanoic acid, 3,5,5-trimethyl-, hexadecyl ester	1000406-06-7	<0.1	µg/L
Hexanoic acid, 3,5,5-trimethyl-, octadecyl ester	1000406-06-9	<0.1	µg/L
Hexyl Cinnamaldehyde	101-86-0	<0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	<0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	<0.1	µg/L
Octocrylene	6197-30-4	<0.1	µg/L
Octyl-methoxycinnamate	5466-77-3	<0.1	µg/L
Propyzamide	23950-58-5	<0.1	µg/L
Pyrene	129-00-0	<0.1	µg/L
Stigmastanol	19466-47-8	0.1 - 1	µg/L
Terbutryne	886-50-0	<0.1	µg/L
Terpineol	98-55-5	0.1 - 1	µg/L
Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	<0.1	µg/L
tri(2-Ethylhexyl) trimellitate	3319-31-1	<0.1	µg/L
Tri-allate	2303-17-5	<0.1	µg/L
Triethyl citrate	77-93-0	<0.1	µg/L

Triethyl phosphate	78-40-0	<0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	<0.1	µg/L
Vitamin E	59-02-9	<0.1	µg/L

Table 28 GC-MS data Lairage Land, 2071344, 17th March 2020

GCMS Results for Sample:		2071344	
Compound Name	CAS#	Concentration	Units
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-(2,2,3,5,6-Pentamethylcyclohex-4-enyl)-9-(3,3,4-trimethylcyclohex-1-enyl)-3,6-dimethyl-6ethenyl-dec-4-ene	1000373-94-7	<0.1	µg/L
1,1,6-trimethyl-3-methylene-2-(3,6,9,13-tetramethyl-6-ethenye-10,14-dimethylene-pentadec-4-enyl)cyclohexane	1000373-94-5	0.1 - 1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	<0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2,5-cyclohexadien-1-one, 2,6-bis(1,1-dimethylethyl)-4-hydroxy-4-methyl-	1000401-12-0	<0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzo[b]fluoranthene	205-99-2	<0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Campesterol	474-62-4	0.1 - 1	µg/L
Carbamazepine	298-46-4	<0.1	µg/L
Chloroxylenol	88-04-0	<0.1	µg/L
Cholesterol	57-88-5	>5	µg/L
Fipronil	120068-37-3	<0.1	µg/L
Fluoranthene	206-44-0	<0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	<0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	<0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	<0.1	µg/L
Neophytadiene	504-96-1	<0.1	µg/L
Propiconazole-II	60207-90-1	<0.1	µg/L

Propyzamide	23950-58-5	<0.1	µg/L
Pyrene	129-00-0	<0.1	µg/L
Sulfur (S8)	10544-50-0	1 - 5	µg/L
Terbutryne	886-50-0	<0.1	µg/L
Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	<0.1	µg/L
Tri-allate	2303-17-5	<0.1	µg/L
Triethyl citrate	77-93-0	<0.1	µg/L
Triethyl phosphate	78-40-0	<0.1	µg/L

Table 29 GC-MS results Knutsford Playing Fields, 2121514, 21th August 2020

GCMS Results for Sample:		2121514	
Compound Name	CAS#	Concentration	Units
(+)-4-Carene	29050-33-7	<0.1	µg/L
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	<0.1	µg/L
.alpha.-Amyrin	638-95-9	<0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.1 - 1	µg/L
.gamma.-Sitosterol	83-47-6	1 - 5	µg/L
1(3H)-Isobenzofuranone	87-41-2	<0.1	µg/L
1,2,3-Propanetriol, 1-acetate	106-61-6	<0.1	µg/L
1,2-Benzisothiazole	272-16-2	<0.1	µg/L
1-Aminocyclopentanecarboxylic acid n-propargyloxycarbonyl-, dodecyl ester	1000329-01-0	<0.1	µg/L
1H-Benzotriazole	95-14-7	>5	µg/L
1H-Indene, 2,3-dihydro-1,1,3-trimethyl-3-phenyl-	3910-35-8	<0.1	µg/L
2(3H)-Benzothiazolone	934-34-9	1 - 5	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.1 - 1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2,4-Dimethylphenol	105-67-9	<0.1	µg/L
2,5-Hexanedione	110-13-4	<0.1	µg/L
2H-Indol-2-one, 1,3-dihydro	59-48-3	<0.1	µg/L
2-Methoxynaphthalene	93-04-9	<0.1	µg/L
2-Propanol, 1-(2-methoxy-1-methylethoxy)-	20324-32-7	<0.1	µg/L
2-Propanol, 1-(2-methoxypropoxy)-	13429-07-7	0.1 - 1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	1 - 5	µg/L
9,10-Anthraquinone	84-65-1	<0.1	µg/L
Acetamide, N-acetyl-N,N'-1,2-ethanediylbis-	137706-80-0	<0.1	µg/L

Acetophenone	98-86-2	0.1 - 1	µg/L
Anthracene	120-12-7	<0.1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Benz[a]anthracene	56-55-3	0.1 - 1	µg/L
Benzenesulfonamide, 2-methyl-	88-19-7	<0.1	µg/L
Benzenesulfonanilide	1678-25-7	0.1 - 1	µg/L
Benzo[a]pyrene	50-32-8	0.1 - 1	µg/L
Benzo[b]fluoranthene	205-99-2	0.1 - 1	µg/L
Benzo[k]fluoranthene	207-08-9	<0.1	µg/L
Benzophenone	119-61-9	0.1 - 1	µg/L
Bicyclo[2.2.1]heptane-2,5-dione, 1,7,7-trimethyl-	4230-32-4	<0.1	µg/L
Bicyclo[3.1.0]hexan-2-one, 5-(1-methylethyl)-	513-20-2	<0.1	µg/L
bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	1 - 5	µg/L
Butyl citrate	77-94-1	<0.1	µg/L
Caffeine	58-08-2	1 - 5	µg/L
Campesterol	474-62-4	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.1 - 1	µg/L
Carbazole	86-74-8	<0.1	µg/L
Chloroxylenol	88-04-0	1 - 5	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	1 - 5	µg/L
Cholesterol	57-88-5	>5	µg/L
Chrysene	218-01-9	<0.1	µg/L
Cotinine	486-56-6	1 - 5	µg/L
Coumarin	91-64-5	<0.1	µg/L
Cyclohexanol, 5-methyl-2-(1-methylethyl)-	1490-04-6	<0.1	µg/L
Cyclopentaneacetic acid, 3-oxo-2-pentyl-, methyl ester	24851-98-7	0.1 - 1	µg/L
Dibenz[a,h]anthracene	53-70-3	<0.1	µg/L
Dicyclohexyl phthalate	84-61-7	1 - 5	µg/L
Diethyl phthalate	84-66-2	>5	µg/L
Dimethyl phthalate	131-11-3	0.1 - 1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
di-n-butyl phthalate	84-74-2	>5	µg/L
Diphenyl sulfone	127-63-9	<0.1	µg/L
Ergosta-5,22-dien-3-ol, (3.beta.,22E,24S)-	17472-78-5	0.1 - 1	µg/L
Ethyl 4-(ethyloxy)-2-oxobut-3-enoate	1000305-38-2	<0.1	µg/L
Etiracetam	33996-58-6	<0.1	µg/L
Fluoranthene	206-44-0	0.1 - 1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	<0.1	µg/L
Hexathiane	13798-23-7	0.1 - 1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - 1	µg/L

Indole	120-72-9	<0.1	µg/L
m-Cresol (3-methylphenol)	108-39-4	<0.1	µg/L
Metaldehyde	108-62-3	<0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	1 - 5	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Octocrylene	6197-30-4	0.1 - 1	µg/L
o-Toluidine	95-53-4	<0.1	µg/L
Oxiranecarboxylic acid, 3-methyl-3-phenyl-, ethyl ester, cis-	19464-95-0	<0.1	µg/L
p-Cresol (4-methylphenol)	106-44-5	<0.1	µg/L
Phenanthrene	85-01-8	<0.1	µg/L
p-Isopropoxyaniline	7664-66-6	<0.1	µg/L
p-Isopropyltoluene	99-87-6	<0.1	µg/L
Propiconazole-I	60207-90-1	0.1 - 1	µg/L
Propiconazole-II	60207-90-1	<0.1	µg/L
p-Toluic acid, 4-nitrophenyl ester	1000307-77-0	<0.1	µg/L
Pyrene	129-00-0	0.1 - 1	µg/L
Stigmastanol	19466-47-8	0.1 - 1	µg/L
Stigmasterol	83-48-7	1 - 5	µg/L
Sulfur (S8)	10544-50-0	1 - 5	µg/L
Terbutryne	886-50-0	<0.1	µg/L
Terpineol	98-55-5	0.1 - 1	µg/L
Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Theobromine	83-67-0	<0.1	µg/L
Totarol	511-15-9	0.1 - 1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	1 - 5	µg/L
Triacetin	102-76-1	<0.1	µg/L
Tributyl acetylcitrate	77-90-7	0.1 - 1	µg/L
Triethyl citrate	77-93-0	<0.1	µg/L
Triethyl phosphate	78-40-0	<0.1	µg/L
Triphenyl phosphate	115-86-6	0.1 - 1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vitamin E	59-02-9	<0.1	µg/L

Table 30 GC-MS results Shaftsbury Road, 21215134 21th August 2020

GCMS Results for Sample:		2121513	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	<0.1	µg/L
.gamma.-Sitostenone	84924-96-9	<0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
2(3H)-Benzothiazolone	934-34-9	0.1 - 1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	<0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Benz[a]anthracene	56-55-3	<0.1	µg/L
Benzenesulfonamide	98-10-2	1 - 5	µg/L
Benzenesulfonamide, 2-methyl-	88-19-7	<0.1	µg/L
Benzenesulfonamide, 4-methyl-	70-55-3	1 - 5	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.1 - 1	µg/L
Benzo[a]pyrene	50-32-8	<0.1	µg/L
Benzo[b]fluoranthene	205-99-2	<0.1	µg/L
Benzo[ghi]perylene	191-24-2	<0.1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Caprolactam	105-60-2	>5	µg/L
Carbamazepine	298-46-4	<0.1	µg/L
Cholesterol	57-88-5	>5	µg/L
Cotinine	486-56-6	0.1 - 1	µg/L
Dimethyl phthalate	131-11-3	<0.1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
di-n-butyl phthalate	84-74-2	1 - 5	µg/L
Diphenyl sulfone	127-63-9	<0.1	µg/L
Diphenylamine	122-39-4	<0.1	µg/L
Fluoranthene	206-44-0	<0.1	µg/L
Gabapentin	60142-96-3	<0.1	µg/L
Galaxolide	1222-05-5	<0.1	µg/L
Hexa(methoxymethyl)melamine	68002-	<0.1	µg/L

	20-0		
Indeno[1,2,3-cd]pyrene	193-39-5	<0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	<0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	<0.1	µg/L
o-Toluidine	95-53-4	<0.1	µg/L
Phytol	150-86-7	<0.1	µg/L
Primidone	125-33-7	0.1 - 1	µg/L
Propiconazole-I	60207-90-1	<0.1	µg/L
Propiconazole-II	60207-90-1	<0.1	µg/L
Pyrene	129-00-0	<0.1	µg/L
Stigmasterol	83-48-7	0.1 - 1	µg/L
Terbutryne	886-50-0	<0.1	µg/L
Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triacetin	102-76-1	<0.1	µg/L
Triallyl isocyanurate	1025-15-6	<0.1	µg/L
Tributyl phosphate	126-73-8	1 - 5	µg/L
Triethyl citrate	77-93-0	<0.1	µg/L
Triethyl phosphate	78-40-0	<0.1	µg/L
Triisopropylphosphate	513-02-0	<0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L

Table 31 GC-MS results Oxhey Park, 2121512, 21th August 2020

GCMS Results for Sample:		2121512	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	<0.1	µg/L
.gamma.-Sitosterol	83-47-6	1 - 5	µg/L
1,2-Cyclohexanediol, 1-methyl-4-(1-	1946-00-5	0.1 - 1	µg/L

methylethenyl)-			
1H-Indole, 2,3-dihydro-4-methyl-	62108-16-1	<0.1	µg/L
2(3H)-Benzothiazolone	934-34-9	0.1 - 1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	<0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	<0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2,6-Dimethylphenyl isocyanate	28556-81-2	<0.1	µg/L
2-Propanol, 1-(2-methoxypropoxy)-	13429-07-7	<0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Acetamide, N-acetyl-N,N'-1,2-ethanediylbis-	137706-80-0	0.1 - 1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Benz[a]anthracene	56-55-3	<0.1	µg/L
Benzenesulfonamide	98-10-2	1 - 5	µg/L
Benzenesulfonamide, 2-methyl-	88-19-7	<0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.1 - 1	µg/L
Benzo[a]pyrene	50-32-8	<0.1	µg/L
Benzo[b]fluoranthene	205-99-2	<0.1	µg/L
Benzoic acid, pentadecyl ester	1000340-22-8	<0.1	µg/L
Benzophenone	119-61-9	<0.1	µg/L
Benzophenone-3	131-57-7	<0.1	µg/L
Benzothiazole	95-16-9	<0.1	µg/L
Butyl citrate	77-94-1	<0.1	µg/L
Caffeine	58-08-2	1 - 5	µg/L
Campesterol	474-62-4	0.1 - 1	µg/L
Caprolactam	105-60-2	1 - 5	µg/L
Carbamazepine	298-46-4	<0.1	µg/L
Chloroxylenol	88-04-0	0.1 - 1	µg/L
Cholest-4-en-3-one	601-57-0	0.1 - 1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	1 - 5	µg/L
Cholesterol	57-88-5	>5	µg/L
Cocaine	50-36-2	0.1 - 1	µg/L
Cotinine	486-56-6	1 - 5	µg/L
Coumarin	91-64-5	<0.1	µg/L
Cyclohexanol, 5-methyl-2-(1-methylethyl)-	1490-04-6	0.1 - 1	µg/L
Cyclopentaneacetic acid, 3-oxo-2-pentyl-, methyl ester	24851-98-7	0.1 - 1	µg/L
D-Carvone	2244-16-8	<0.1	µg/L
Dichloroxylenol	133-53-9	<0.1	µg/L
Diflufenican	83164-33-4	<0.1	µg/L

Dimethyl phthalate	131-11-3	<0.1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Diphenyl sulfone	127-63-9	<0.1	µg/L
Ergosta-5,22-dien-3-ol, (3.beta.,22E,24S)-	17472-78-5	0.1 - 1	µg/L
Ergostanol	6538-02-9	0.1 - 1	µg/L
Fipronil	120068-37-3	<0.1	µg/L
Fluoranthene	206-44-0	<0.1	µg/L
Gabapentin	60142-96-3	<0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	<0.1	µg/L
Homosalate	118-56-9	0.1 - 1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Myclobutanil	88671-89-0	<0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	>5	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	<0.1	µg/L
Octocrylene	6197-30-4	0.1 - 1	µg/L
o-Toluidine	95-53-4	<0.1	µg/L
Phenanthrene	85-01-8	<0.1	µg/L
p-Isopropoxyaniline	7664-66-6	<0.1	µg/L
Propiconazole-I	60207-90-1	0.1 - 1	µg/L
Propiconazole-II	60207-90-1	<0.1	µg/L
Pyrene	129-00-0	<0.1	µg/L
Stigmast-7-en-3-ol, (3.beta.,5.alpha.,24S)-	18525-35-4	<0.1	µg/L
Stigmastanol	19466-47-8	0.1 - 1	µg/L
Stigmasterol	83-48-7	0.1 - 1	µg/L
Terbutryne	886-50-0	0.1 - 1	µg/L
Terpineol	98-55-5	<0.1	µg/L
Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Theobromine	83-67-0	0.1 - 1	µg/L
Thymol	89-83-8	<0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triacetin	102-76-1	<0.1	µg/L
Tributyl acetylcitrate	77-90-7	0.1 - 1	µg/L
Tributyl phosphate	126-73-8	>5	µg/L
Triethyl citrate	77-93-0	0.1 - 1	µg/L
Triethyl phosphate	78-40-0	<0.1	µg/L
Triisopropylphosphate	513-02-0	<0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	<0.1	µg/L
Vitamin E	59-02-9	<0.1	µg/L

Table 32 GC-MS results Lairage Land, 2121515, 21th August 2020

GCMS Results for Sample:		2121515	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	<0.1	µg/L
.alpha.-Amyrin	638-95-9	<0.1	µg/L
.gamma.-Sitostenone	84924-96-9	<0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1H-Benzotriazole	95-14-7	1 - 5	µg/L
2(3H)-Benzothiazolone	934-34-9	0.1 - 1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	<0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Atrazine	1912-24-9	<0.1	µg/L
Atrazine desethyl	6190-65-4	<0.1	µg/L
Benz[a]anthracene	56-55-3	<0.1	µg/L
Benzenesulfonamide	98-10-2	1 - 5	µg/L
Benzenesulfonamide, 2-methyl-	88-19-7	<0.1	µg/L
Benzenesulfonamide, 4-methyl-	70-55-3	1 - 5	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.1 - 1	µg/L
Benzo[a]pyrene	50-32-8	<0.1	µg/L
Benzo[b]fluoranthene	205-99-2	<0.1	µg/L
Bisphenol A	80-05-7	0.1 - 1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Butyl citrate	77-94-1	<0.1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Caprolactam	105-60-2	1 - 5	µg/L
Carbamazepine	298-46-4	<0.1	µg/L
Chloroxylenol	88-04-0	<0.1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Cresyl diphenyl phosphate	26444-49-5	<0.1	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Dimethyl phthalate	131-11-3	<0.1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L

Diphenyl sulfone	127-63-9	<0.1	µg/L
Ergost-5-en-3-ol, (3.beta.)-	4651-51-8	0.1 - 1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	<0.1	µg/L
Fluoranthene	206-44-0	<0.1	µg/L
Gabapentin	60142-96-3	<0.1	µg/L
Galaxolide	1222-05-5	<0.1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	0.1 - 1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	<0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	<0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	<0.1	µg/L
Octocrylene	6197-30-4	<0.1	µg/L
o-Toluidine	95-53-4	<0.1	µg/L
Primidone	125-33-7	0.1 - 1	µg/L
Propiconazole-I	60207-90-1	0.1 - 1	µg/L
Propiconazole-II	60207-90-1	<0.1	µg/L
Pyrene	129-00-0	<0.1	µg/L
Stigmasterol	83-48-7	0.1 - 1	µg/L
Terbutryne	886-50-0	<0.1	µg/L
Tetramethyl succinimide	3566-61-8	<0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Tributyl acetylcitrate	77-90-7	<0.1	µg/L
Tributyl phosphate	126-73-8	>5	µg/L
Triethyl phosphate	78-40-0	<0.1	µg/L
Triisopropylphosphate	513-02-0	<0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L

Table 33 GC-MS results River Ver, 222605 10th June 2021

GCMS Results for Sample:		2226505	
Compound Name	CAS#	Concentration	Units
.beta.-Amyrone	638-97-1	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	1 - 5	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.01 - 0.1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Caffeine	58-08-2	0.01 - 0.1	µg/L
Cholest-4-en-3-one	601-57-0	0.01 - 0.1	µg/L
Cholesta-5,22-dien-3-ol, (3.beta.)-	92218-20-7	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.01 - 0.1	µg/L
Metaldehyde	108-62-3	0.01 - 0.1	µg/L
Neophytadiene	504-96-1	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Simazine	122-34-9	0.01 - 0.1	µg/L
Squalene	111-02-4	0.1 - 1	µg/L
Stigmasta-5,24(28)-dien-3-ol, (3.beta.,24Z)-	481-14-1	0.1 - 1	µg/L
Tetramethyl succinimide	3566-61-8	0.01 - 0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L

Table 34 GC-MS results Munden House Ford, 2226504, 10th June 2021

GCMS Results for Sample:		2226504	
Compound Name	CAS#	Concentration	Units
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-Propanol, 2-(2-methoxypropoxy)-	13588-28-8	0.01 - 0.1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.1 - 1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Benzeneethanol, .alpha.,.alpha.-dimethyl-	100-86-7	0.01 - 0.1	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.01 - 0.1	µg/L
Cholesterol	57-88-5	>5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
D-Glucitol, 1,4:3,6-dianhydro-2,5-di-O-methyl-	5306-85-4	0.01 - 0.1	µg/L
Diethylene glycol dibutyl ether	112-73-2	0.01 - 0.1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Ergost-5-en-3-ol, (3.beta.)-	4651-51-8	0.1 - 1	µg/L
Ethanone, 2,2-dimethoxy-1,2-diphenyl-	24650-42-8	0.01 - 0.1	µg/L
Fipronil	120068-37-3	0.1 - 1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	0.1 - 1	µg/L
Indano[2,1-d]1,3-dioxane,	102688-70-0	0.01 - 0.1	µg/L
Ketamine	6740-88-1	0.01 - 0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Squalene	111-02-4	0.01 - 0.1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	0.01 - 0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Triethyl phosphate	78-40-0	0.01 - 0.1	µg/L

Triisopropylphosphate	513-02-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L

Table 35 GC-MS results Shaftsbury Road, 2226509, 10th June 2021

GCMS Results for Sample:		2226509	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-Propanol, 2-(2-methoxypropoxy)-	13588-28-8	0.01 - 0.1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.1 - 1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Caffeine	58-08-2	0.01 - 0.1	µg/L
Campesterol	474-62-4	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.01 - 0.1	µg/L
Cholest-4-en-3-one	601-57-0	0.01 - 0.1	µg/L
Cholesta-5,22-dien-3-ol, (3.beta.)-	92218-20-7	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
D-Glucitol, 1,4:3,6-dianhydro-2,5-di-O-methyl-	5306-85-4	0.01 - 0.1	µg/L
Diclofenac artifact	15362-40-0	0.01 - 0.1	µg/L
Diethylene glycol dibutyl ether	112-73-2	0.01 - 0.1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.01 - 0.1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	0.01 - 0.1	µg/L
Imidazo[4,5-d]imidazole-2,5-(1H,3H)dione, tetrahydro-1,3,4,6-tetramethyl-	10095-06-4	0.01 - 0.1	µg/L
Indano[2,1-d]1,3-dioxane,	102688-70-0	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.01 - 0.1	µg/L
Isophorone	78-59-1	0.01 - 0.1	µg/L

Ketamine	6740-88-1	0.01 - 0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	0.01 - 0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Squalene	111-02-4	0.01 - 0.1	µg/L
Stigmasterol	83-48-7	0.1 - 1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	0.01 - 0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Triethyl phosphate	78-40-0	0.01 - 0.1	µg/L
Triisopropylphosphate	513-02-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.01 - 0.1	µg/L

Table 36 GC-MS results Knutsford Playing Fields, 2226506, 10th June 2021

GCMS Results for Sample:		2226506	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-Propanol, 2-(2-methoxypropoxy)-	13588-28-8	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.1 - 1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4H-Inden-4-one, 1,2,3,5,6,7-hexahydro-1,1,2,3,3-pentamethyl-	33704-61-9	0.01 - 0.1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzeneethanol, .alpha.,.alpha.-dimethyl-	100-86-7	0.01 - 0.1	µg/L
Benzenemethanol, .alpha.-[1-(ethylmethylamino)ethyl]-, [R-(R*,S*)]-	48141-64-6	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L

Caffeine	58-08-2	0.01 - 0.1	µg/L
Campesterol	474-62-4	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.01 - 0.1	µg/L
Cholesta-5,22-dien-3-ol, (3.beta.)-	92218-20-7	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
D-Glucitol, 1,4:3,6-dianhydro-2,5-di-O-methyl-	5306-85-4	0.01 - 0.1	µg/L
Diethylene glycol dibutyl ether	112-73-2	0.01 - 0.1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.01 - 0.1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	0.01 - 0.1	µg/L
Indano[2,1-d]1,3-dioxane,	102688-70-0	0.01 - 0.1	µg/L
Ketamine	6740-88-1	0.01 - 0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	0.01 - 0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.01 - 0.1	µg/L
Pyrazine	290-37-9	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Squalene	111-02-4	0.01 - 0.1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	0.01 - 0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Tricyclo[5.2.1.0(2,6)]dec-4-en-8-one	1000191-39-7	0.01 - 0.1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Triethyl phosphate	78-40-0	0.01 - 0.1	µg/L
Triisopropylphosphate	513-02-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.01 - 0.1	µg/L

Table 37 GC-MS results Oxhey Park, 2226508, 10th June 2021

GCMS Results for Sample:		2226508	
Compound Name	CAS#	Concentration	Units
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-Propanol, 2-(2-methoxypropoxy)-	13588-28-8	0.1 - 1	µg/L

2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.1 - 1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-Piperidinone, 2,2,6,6-tetramethyl-	826-36-8	0.1 - 1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Bisphenol A	80-05-7	0.1 - 1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.01 - 0.1	µg/L
Cholest-4-en-3-one	601-57-0	0.01 - 0.1	µg/L
Cholesta-5,22-dien-3-ol, (3.beta.)-	92218-20-7	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
D-Glucitol, 1,4:3,6-dianhydro-2,5-di-O-methyl-	5306-85-4	0.01 - 0.1	µg/L
Diclofenac artifact	15362-40-0	0.01 - 0.1	µg/L
Diethylene glycol dibutyl ether	112-73-2	0.01 - 0.1	µg/L
Diflufenican	83164-33-4	0.01 - 0.1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.01 - 0.1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Imidazo[4,5-d]imidazole-2,5-(1H,3H)dione, tetrahydro-1,3,4,6-tetramethyl-	10095-06-4	0.01 - 0.1	µg/L
Indano[2,1-d]1,3-dioxane,	102688-70-0	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.01 - 0.1	µg/L
Ketamine	6740-88-1	0.01 - 0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	0.01 - 0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.01 - 0.1	µg/L
Primidone	125-33-7	0.1 - 1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Simazine	122-34-9	0.01 - 0.1	µg/L
Squalene	111-02-4	0.01 - 0.1	µg/L

Stigmasta-5,24(28)-dien-3-ol, (3.beta.,24Z)-	481-14-1	0.01 - 0.1	µg/L
Stigmasterol	83-48-7	0.1 - 1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	0.01 - 0.1	µg/L

Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Triethyl phosphate	78-40-0	0.01 - 0.1	µg/L
Triisopropylphosphate	513-02-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.01 - 0.1	µg/L

Table 38 GC-MS results Lairage Land, 2226507, 10th June 2021

GCMS Results for Sample:		2226507	
Compound Name	CAS#	Concentration	Units
.beta.-Amyrone	638-97-1	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	1 - 5	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2-Propanol, 1-(2-methoxy-1-methylethoxy)-	20324-32-7	0.01 - 0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-Piperidinone, 2,2,6,6-tetramethyl-	826-36-8	0.1 - 1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, 4-methyl-	70-55-3	0.1 - 1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	0.1 - 1	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.01 - 0.1	µg/L
Cholest-4-en-3-one	601-57-0	0.01 - 0.1	µg/L
Cholesta-5,22-dien-3-ol, (3.beta.)-	92218-20-7	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
D-Glucitol, 1,4:3,6-dianhydro-2,5-di-O-methyl-	5306-85-4	0.01 - 0.1	µg/L
Diethylene glycol dibutyl ether	112-73-2	0.01 - 0.1	µg/L

Diflufenican	83164-33-4	0.01 - 0.1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	0.01 - 0.1	µg/L
Indano[2,1-d]1,3-dioxane,	102688-70-0	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.01 - 0.1	µg/L
Ketamine	6740-88-1	0.01 - 0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	0.01 - 0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Squalene	111-02-4	0.01 - 0.1	µg/L
Stigmasta-5,24(28)-dien-3-ol, (3.beta.,24Z)-	481-14-1	0.1 - 1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	0.01 - 0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Tributyl phosphate	126-73-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Triethyl phosphate	78-40-0	0.01 - 0.1	µg/L
Triisopropylphosphate	513-02-0	0.01 - 0.1	µg/L

Table 39 GC-MS results Coursers Road, 2296463, 10th December 2021

GCMS Results for Sample:		2296463	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.1 - 1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-((1S,3aR,4R,7S,7aS)-4-Hydroxy-7-isopropyl-4-methyloctahydro-1H-inden-1-yl)ethanone	1911-78-0	0.1 - 1	µg/L
1(3H)-Isobenzofuranone	87-41-2	0.01 - 0.1	µg/L
1,2-Benzisothiazole	272-16-2	0.01 - 0.1	µg/L
1H-Pyrrole-2,5-dione, 3-ethyl-4-methyl-	20189-42-8	0.01 - 0.1	µg/L
1-Propanol, 2-(2-hydroxypropoxy)-	106-62-7	0.01 - 0.1	µg/L
2(1H)-Phenanthrenone, 3,4,4a,9,10,10a-hexahydro-6-hydroxy-1,1,4a-trimethyl-7-(1methylethyl)-, (4aS-trans)-	472-37-7	0.01 - 0.1	µg/L

2,3-Dichlorobiphenyl	16605-91-7	0.01 - 0.1	µg/L
2,4',5-Trichlorobiphenyl	16606-02-3	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2,4-Dimethylphenol	105-67-9	0.01 - 0.1	µg/L
2,4-Di-tert-butylphenol	96-76-4	0.1 - 1	µg/L
2-Propanol, 1-(2-methoxy-1-methylethoxy)-	20324-32-7	0.01 - 0.1	µg/L
2-Propanol, 1-(2-methoxypropoxy)-	13429-07-7	0.1 - 1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-tert-Octylphenol	140-66-9	0.01 - 0.1	µg/L
Acetophenone	98-86-2	0.1 - 1	µg/L
Aclonifen	74070-46-5	0.1 - 1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Benzo[ghi]perylene	191-24-2	0.01 - 0.1	µg/L
Boscalid	188425-85-6	0.1 - 1	µg/L
Butyl citrate	77-94-1	0.01 - 0.1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Caprolactam	105-60-2	1 - 5	µg/L
Cholesterol	57-88-5	>5	µg/L
Coumarin	91-64-5	0.01 - 0.1	µg/L
Dibenz[a,h]anthracene	53-70-3	0.01 - 0.1	µg/L
Diflufenican	83164-33-4	0.1 - 1	µg/L
Dimethyl phthalate	131-11-3	0.1 - 1	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.01 - 0.1	µg/L
Flufenacet	142459-58-3	1 - 5	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Hexathiane	13798-23-7	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - 1	µg/L
Lup-20(29)-en-3-one	1617-70-5	0.01 - 0.1	µg/L
Metaldehyde	108-62-3	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.01 - 0.1	µg/L
Neophytadiene	504-96-1	0.1 - 1	µg/L
N-Phenylsuccinimide	83-25-0	0.01 - 0.1	µg/L

Pendimethalin	40487-42-1	0.1 - 1	µg/L
Propyzamide	23950-58-5	>5	µg/L

Prosulfocarb	52888-80-9	0.1 - 1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Quinmerac (breakdown product)	90717-03-6	0.1 - 1	µg/L
Silthiofam	175217-20-6	0.1 - 1	µg/L
Squalene	111-02-4	0.1 - 1	µg/L
Sulfur (S8)	10544-50-0	1 - 5	µg/L
Terpineol	98-55-5	0.01 - 0.1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triacetin	102-76-1	0.01 - 0.1	µg/L
Tri-allate	2303-17-5	0.1 - 1	µg/L
Tributyl acetylcitrate	77-90-7	0.1 - 1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	0.1 - 1	µg/L
Vitamin E	59-02-9	0.01 - 0.1	µg/L

Table 40 GC-MS results Tykes Water Radlett, 2296462, 10th December 2021

GCMS Results for Sample:		2296462	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.1 - 1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-((1S,3aR,4R,7S,7aS)-4-Hydroxy-7-isopropyl-4-methyloctahydro-1H-inden-1-yl)ethanone	1911-78-0	0.1 - 1	µg/L
1,2-Benzisothiazole	272-16-2	0.1 - 1	µg/L
2(3H)-Benzothiazolone	934-34-9	1 - 5	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	0.1 - 1	µg/L
2,4-Di-tert-butylphenol	96-76-4	0.1 - 1	µg/L
2-Chloroethyl benzoate	939-55-9	0.01 - 0.1	µg/L
2-Methoxynaphthalene	93-04-9	0.01 - 0.1	µg/L
2-Propanol, 1-(2-methoxy-1-methylethoxy)-	20324-32-7	0.1 - 1	µg/L
2-Propanol, 1-butoxy-	5131-66-8	0.01 - 0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-tert-Octylphenol	140-66-9	0.01 - 0.1	µg/L
9,10-Anthracenedione, 2,7-dimethyl-	3286-01-9	0.01 - 0.1	µg/L
Acetaminophen	103-90-2	0.1 - 1	µg/L
Acetophenone	98-86-2	0.1 - 1	µg/L

Anthracene	120-12-7	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.1 - 1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Benzo[ghi]perylene	191-24-2	0.01 - 0.1	µg/L
Benzonitrile, 2-hydroxy-	611-20-1	0.01 - 0.1	µg/L
Bisphenol A	80-05-7	0.1 - 1	µg/L
Bixafen	581809-46-3	0.01 - 0.1	µg/L
Butanedioic acid, dimethyl ester	106-65-0	>5	µg/L
Butyl citrate	77-94-1	0.01 - 0.1	µg/L
Butyl citrate	77-94-1	0.01 - 0.1	µg/L
Caffeine	58-08-2	1 - 5	µg/L
Chloroxylenol	88-04-0	0.1 - 1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Chrysene	218-01-9	0.01 - 0.1	µg/L
Coumarin	91-64-5	0.01 - 0.1	µg/L
Cresyl diphenyl phosphate	26444-49-5	0.01 - 0.1	µg/L
Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.)-(.+/-.)-	15356-70-4	0.1 - 1	µg/L
Cyclopentaneacetic acid, 3-oxo-2-pentyl-, methyl ester	24851-98-7	0.1 - 1	µg/L
Dibenz[a,h]anthracene	53-70-3	0.01 - 0.1	µg/L
Didecan-2-yl phthalate	28029-89-2	0.1 - 1	µg/L
Diflufenican	83164-33-4	0.01 - 0.1	µg/L
Dimethyl adipate	627-93-0	1 - 5	µg/L
Dimethyl fumarate	624-49-7	0.01 - 0.1	µg/L
Dimethyl phthalate	131-11-3	1 - 5	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L

Ethanol, 2-[2-(2-methoxyethoxy)ethoxy]-	112-35-6	0.1 - 1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.1 - 1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.01 - 0.1	µg/L
Hexachloroethane	67-72-1	0.01 - 0.1	µg/L
Hexanoic acid, (2-hexanoylaminoethyl)-amide	50905-12-9	0.1 - 1	µg/L
Ibuprofen	15687-27-1	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	1 - 5	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.01 - 0.1	µg/L

N-Phenylsuccinimide	83-25-0	0.01 - 0.1	µg/L
Octocrylene	6197-30-4	0.01 - 0.1	µg/L
p-Cresol (4-methylphenol)	106-44-5	0.1 - 1	µg/L
Pendimethalin	40487-42-1	0.01 - 0.1	µg/L
Phenanthrene	85-01-8	0.01 - 0.1	µg/L
Propyzamide	23950-58-5	0.01 - 0.1	µg/L
Prosulfocarb	52888-80-9	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Squalene	111-02-4	0.1 - 1	µg/L
Stigmastanol	19466-47-8	0.1 - 1	µg/L
Terpineol	98-55-5	0.1 - 1	µg/L
Tetraethyleneglycol monomethylether	23783-42-8	0.1 - 1	µg/L
Theobromine	83-67-0	0.1 - 1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triacetin	102-76-1	0.1 - 1	µg/L
Tri-allate	2303-17-5	0.01 - 0.1	µg/L
Tributyl acetylcitrate	77-90-7	0.1 - 1	µg/L
Tributyl phosphate	126-73-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Triphenyl phosphate	115-86-6	0.1 - 1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	0.1 - 1	µg/L
Vitamin E	59-02-9	0.01 - 0.1	µg/L

Table 41 GC-MS results River Ver, 2296457, 10th December 2021

GCMS Results for Sample:		2296457	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-((1S,3aR,4R,7S,7aS)-4-Hydroxy-7-isopropyl-4-methyloctahydro-1H-inden-1-yl)ethanone	1911-78-0	0.1 - 1	µg/L
2-Ethylhexanoic acid	149-57-5	0.1 - 1	µg/L
2-Propanol, 1-(2-methoxy-1-methylethoxy)-	20324-32-7	0.01 - 0.1	µg/L
2-Propanol, 1-(2-methoxypropoxy)-	13429-07-7	0.1 - 1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-tert-Octylphenol	140-66-9	0.01 - 0.1	µg/L
9,19-Cyclolanostan-3-ol, 24-methylene-, (3.beta.)-	1449-09-8	0.01 - 0.1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Atrazine desethyl	6190-65-4	0.01 - 0.1	µg/L

Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.1 - 1	µg/L
Benzo[ghi]perylene	191-24-2	0.01 - 0.1	µg/L
Benzo[k]fluoranthene	207-08-9	0.01 - 0.1	µg/L
Benzothiazole	95-16-9	0.01 - 0.1	µg/L
Butyl citrate	77-94-1	0.01 - 0.1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Caprolactam	105-60-2	1 - 5	µg/L
Cholesterol	57-88-5	>5	µg/L
Coumarin	91-64-5	0.01 - 0.1	µg/L
Dibenz[a,h]anthracene	53-70-3	0.01 - 0.1	µg/L
Dimethyl phthalate	131-11-3	0.01 - 0.1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Ergost-5-en-3-ol, (3.beta.)-	4651-51-8	0.1 - 1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.1 - 1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	0.1 - 1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.1 - 1	µg/L
N-Phenylsuccinimide	83-25-0	0.01 - 0.1	µg/L
Olean-12-en-3-ol, acetate, (3.beta.)-	1616-93-9	0.01 - 0.1	µg/L
Oplopanonyl acetate	132032-86-1	0.01 - 0.1	µg/L
Phenanthrene	85-01-8	0.01 - 0.1	µg/L
Phytol	150-86-7	0.01 - 0.1	µg/L
Propyzamide	23950-58-5	0.01 - 0.1	µg/L
Prosulfocarb	52888-80-9	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Terpineol	98-55-5	0.01 - 0.1	µg/L
Tetrachloroethene	127-18-4	0.1 - 1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.01 - 0.1	µg/L

Triacetin	102-76-1	0.01 - 0.1	µg/L
Tributyl acetylcitrate	77-90-7	0.1 - 1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	0.01 - 0.1	µg/L

Vitamin E	59-02-9	0.01 - 0.1	µg/L

Table 42 GC-MS results xxxx, 2297844, 10th December 2021

GCMS Results for Sample:		2297844	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1-((1S,3aR,4R,7S,7aS)-4-Hydroxy-7-isopropyl-4-methyloctahydro-1H-inden-1-yl)ethanone	1911-78-0	0.1 - 1	µg/L
1,2-Benzisothiazole	272-16-2	0.01 - 0.1	µg/L
1H-Benzotriazole, 5-methyl-	136-85-6	0.01 - 0.1	µg/L
2(3H)-Benzothiazolone	934-34-9	0.1 - 1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.1 - 1	µg/L
2,4,5-Trichlorophenol	95-95-4	0.01 - 0.1	µg/L
2,4,6-Tribromophenol	118-79-6	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one	10230-62-3	0.01 - 0.1	µg/L
2-Propanol, 1-(2-methoxy-1-methylethoxy)-	20324-32-7	0.1 - 1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Acridine, 9,10-dihydro-	92-81-9	0.01 - 0.1	µg/L
Atrazine	1912-24-9	0.01 - 0.1	µg/L
Azobenzene	103-33-3	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzenesulfonamide, 4-methyl-	70-55-3	1 - 5	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Benzo[ghi]perylene	191-24-2	0.01 - 0.1	µg/L
Benzo[k]fluoranthene	207-08-9	0.01 - 0.1	µg/L
Benzophenone-3	131-57-7	0.01 - 0.1	µg/L
Bisphenol A	80-05-7	0.01 - 0.1	µg/L
Butyl citrate	77-94-1	0.01 - 0.1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.1 - 1	µg/L
Chloroxylenol	88-04-0	0.1 - 1	µg/L

Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Chrysene	218-01-9	0.01 - 0.1	µg/L
Cotinine	486-56-6	1 - 5	µg/L
Coumarin	91-64-5	0.01 - 0.1	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Dibenz[a,h]anthracene	53-70-3	0.01 - 0.1	µg/L
Diflufenican	83164-33-4	0.01 - 0.1	µg/L
Dimethyl phthalate	131-11-3	0.1 - 1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Ergost-5-en-3-ol, (3.beta.)-	4651-51-8	0.01 - 0.1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.01 - 0.1	µg/L
Fipronil	120068-37-3	0.1 - 1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L

Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - 1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
Metaldehyde	108-62-3	0.01 - 0.1	µg/L
Methocarbamol	532-03-6	0.01 - 0.1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.1 - 1	µg/L
Octocrylene	6197-30-4	0.01 - 0.1	µg/L
Pendimethalin	40487-42-1	0.01 - 0.1	µg/L
Phenanthrene	85-01-8	0.01 - 0.1	µg/L
Phytol	150-86-7	0.01 - 0.1	µg/L
Primidone	125-33-7	0.1 - 1	µg/L
Propyzamide	23950-58-5	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Squalene	111-02-4	0.1 - 1	µg/L
Stigmastanol	19466-47-8	0.01 - 0.1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Terpineol	98-55-5	0.1 - 1	µg/L
Tetramethyl succinimide	3566-61-8	1 - 5	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.01 - 0.1	µg/L
Triacetin	102-76-1	0.01 - 0.1	µg/L
Tri-allate	2303-17-5	0.01 - 0.1	µg/L
Triallyl isocyanurate	1025-15-6	0.01 - 0.1	µg/L
Tributyl acetylcitrate	77-90-7	0.01 - 0.1	µg/L

Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	0.01 - 0.1	µg/L
Vitamin E	59-02-9	0.01 - 0.1	µg/L

Table 43 GC-MS results Munden Road, 2296458, 10th December 2021

GCMS Results for Sample:		2296458	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1,2-Benzisothiazole	272-16-2	0.01 - 0.1	µg/L
1H-Benzotriazole, 5-methyl-	136-85-6	0.01 - 0.1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.1 - 1	µg/L
2,4,5-Trichlorophenol	95-95-4	0.01 - 0.1	µg/L
2,4,6-Tribromophenol	118-79-6	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one	10230-62-3	0.01 - 0.1	µg/L
2-Propanol, 1-[2-(2-methoxy-1-methylethoxy)-1-methylethoxy]-	20324-33-8	0.01 - 0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Acridine, 9,10-dihydro-	92-81-9	0.01 - 0.1	µg/L
Azobenzene	103-33-3	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzene, (2-isothiocyanatoethyl)-	2257-09-2	0.01 - 0.1	µg/L
Benzenesulfonamide, 4-methyl-	70-55-3	1 - 5	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Benzo[k]fluoranthene	207-08-9	0.01 - 0.1	µg/L
Benzophenone-3	131-57-7	0.01 - 0.1	µg/L
eine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.1 - 1	µg/L
Cholest-4-en-3-one	601-57-0	0.01 - 0.1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Cotinine	486-56-6	1 - 5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Dibenz[a,h]anthracene	53-70-3	0.01 - 0.1	µg/L

Diflufenican	83164-33-4	0.01 - 0.1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Ergost-5-en-3-ol, (3.beta.)-	4651-51-8	0.1 - 1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.01 - 0.1	µg/L
Fluorene	86-73-7	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Heptafluorobutyric acid, n-octadecyl ester	400-57-7	0.1 - 1	µg/L
Indane	496-11-7	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - 1	µg/L
Isophorone	78-59-1	0.01 - 0.1	µg/L
m+p-Xylene	108-38-3+106	0.1 - 1	µg/L
Metaldehyde	108-62-3	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L

Neophytadiene	504-96-1	0.1 - 1	µg/L
N-nitrosodiphenylamine	86-30-6	0.01 - 0.1	µg/L
Octocrylene	6197-30-4	0.01 - 0.1	µg/L
p-Cresol (4-methylphenol)	106-44-5	0.01 - 0.1	µg/L
Phytol	150-86-7	0.01 - 0.1	µg/L
Propyzamide	23950-58-5	0.01 - 0.1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Squalene	111-02-4	0.1 - 1	µg/L
Stigmastanol	19466-47-8	0.01 - 0.1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	1 - 5	µg/L
Toluene	108-88-3	0.1 - 1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triallyl isocyanurate	1025-15-6	0.01 - 0.1	µg/L
Tributyl phosphate	126-73-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	0.01 - 0.1	µg/L
Vitamin E	59-02-9	0.01 - 0.1	µg/L

Table 44 GC-MS results Knutsford Playing Fields, 2296461, 10th December 2021

GCMS Results for Sample:		2296461	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1,2,4-Trimethylbenzene	95-63-6	0.1 - 1	µg/L
1,2-Benzisothiazole	272-16-2	0.01 - 0.1	µg/L
1,3,5-Trimethylbenzene	108-67-8	0.1 - 1	µg/L
1H-Benzotriazole, 5-methyl-	136-85-6	0.01 - 0.1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one	10230-62-3	0.01 - 0.1	µg/L
2-Methylnaphthalene	91-57-6	0.01 - 0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
Acetophenone	98-86-2	0.1 - 1	µg/L
Azobenzene	103-33-3	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzene, (2-isothiocyanatoethyl)-	2257-09-2	0.01 - 0.1	µg/L
Benzene, 1,4-diethyl-	105-05-5	0.01 - 0.1	µg/L
Benzene, 1-ethyl-4-methyl-	622-96-8	0.1 - 1	µg/L
Benzenesulfonamide, 4-methyl-	70-55-3	1 - 5	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Benzo[ghi]perylene	191-24-2	0.01 - 0.1	µg/L
Benzophenone-3	131-57-7	0.01 - 0.1	µg/L
Bisphenol A	80-05-7	0.1 - 1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.1 - 1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Chrysene	218-01-9	0.01 - 0.1	µg/L
Cotinine	486-56-6	1 - 5	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Diflufenican	83164-33-4	0.01 - 0.1	µg/L

Dimethyl phthalate	131-11-3	0.1 - 1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.01 - 0.1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Hexa(methoxymethyl)melamine	68002-20-0	0.01 - 0.1	µg/L
Indane	496-11-7	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.01 - 0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
m+p-Xylene	108-38-3+106	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L

N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Neophytadiene	504-96-1	0.1 - 1	µg/L
n-Propylbenzene	103-65-1	0.01 - 0.1	µg/L
Pentobarbital	76-74-4	0.01 - 0.1	µg/L
Phenanthrene	85-01-8	0.01 - 0.1	µg/L
Primidone	125-33-7	1 - 5	µg/L
Propane, 1,1-dimethoxy-2-methyl-	41632-89-7	0.01 - 0.1	µg/L
Propyzamide	23950-58-5	0.1 - 1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
Pyridine, 2-(2-phenylethenyl)-	714-08-9	0.01 - 0.1	µg/L
Squalene	111-02-4	0.1 - 1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	1 - 5	µg/L
Toluene	108-88-3	0.1 - 1	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Tri-allate	2303-17-5	0.01 - 0.1	µg/L
Triallyl isocyanurate	1025-15-6	0.01 - 0.1	µg/L
Tributyl phosphate	126-73-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	0.01 - 0.1	µg/L
Vitamin E	59-02-9	0.01 - 0.1	µg/L

Table 45 GC-MS results Oxhey Road, 2296460, 10th December 2021

GCMS Results for Sample:		2296460	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1,2,4-Trimethylbenzene	95-63-6	0.1 - 1	µg/L
1,2-Benzisothiazole	272-16-2	0.01 - 0.1	µg/L
1,3,5-Trimethylbenzene	108-67-8	0.1 - 1	µg/L
1H-Benzotriazole, 5-methyl-	136-85-6	0.01 - 0.1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.1 - 1	µg/L
2,4,6-Tribromophenol	118-79-6	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one	10230-62-3	0.01 - 0.1	µg/L
2,4-Di-tert-butylphenol	96-76-4	0.1 - 1	µg/L
2-Methylnaphthalene	91-57-6	0.01 - 0.1	µg/L
2-Propanol, 1-[2-(2-methoxy-1-methylethoxy)-1-methylethoxy]-	20324-33-8	0.01 - 0.1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-tert-Octylphenol	140-66-9	0.01 - 0.1	µg/L
Acetophenone	98-86-2	0.1 - 1	µg/L
Azobenzene	103-33-3	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzene, (2-isothiocyanatoethyl)-	2257-09-2	0.01 - 0.1	µg/L
Benzene, 1,4-diethyl-	105-05-5	0.01 - 0.1	µg/L
Benzene, 1-ethyl-2,4-dimethyl-	874-41-9	0.01 - 0.1	µg/L
Benzene, 1-ethyl-2-methyl-	611-14-3	0.01 - 0.1	µg/L
Benzene, 1-methyl-4-propyl-	1074-55-1	0.01 - 0.1	µg/L
Benzene, 2-ethyl-1,4-dimethyl-	1758-88-9	0.01 - 0.1	µg/L
Benzenesulfonamide, 4-methyl-	70-55-3	1 - 5	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Benzo[ghi]perylene	191-24-2	0.01 - 0.1	µg/L
Benzophenone-3	131-57-7	0.01 - 0.1	µg/L
Bisphenol A	80-05-7	0.1 - 1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L
Carbamazepine	298-46-4	0.1 - 1	µg/L

Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Cotinine	486-56-6	1 - 5	µg/L
Coumarin	91-64-5	0.01 - 0.1	µg/L
Cresyl diphenyl phosphate	26444-49-5	0.01 - 0.1	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Dibenz[a,h]anthracene	53-70-3	0.01 - 0.1	µg/L
Diflufenican	83164-33-4	0.01 - 0.1	µg/L
Dimethyl phthalate	131-11-3	0.1 - 1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Diphenyl sulfone	127-63-9	0.01 - 0.1	µg/L

Diphenylamine	122-39-4	0.01 - 0.1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.1 - 1	µg/L
Ethyl benzene	100-41-4	0.1 - 1	µg/L
Fluoranthene	206-44-0	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Indane	496-11-7	0.01 - 0.1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.1 - 1	µg/L
Isophorone	78-59-1	0.01 - 0.1	µg/L
Lidocaine	137-58-6	0.1 - 1	µg/L
m+p-Xylene	108-38-3+106	1 - 5	µg/L
Metaldehyde	108-62-3	0.1 - 1	µg/L
MTBE	1634-04-4	0.1 - 1	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Naphthalene	91-20-3	0.01 - 0.1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-5,7-dimethyl-	21693-54-9	0.01 - 0.1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-5-methyl-	2809-64-5	0.01 - 0.1	µg/L
Neophytadiene	504-96-1	0.1 - 1	µg/L
n-Propylbenzene	103-65-1	0.1 - 1	µg/L
Octocrylene	6197-30-4	0.01 - 0.1	µg/L
o-Xylene	95-47-6	0.1 - 1	µg/L
Pentobarbital	76-74-4	0.01 - 0.1	µg/L
Phenanthrene	85-01-8	0.01 - 0.1	µg/L
Phytol	150-86-7	0.01 - 0.1	µg/L
Propyzamide	23950-58-5	0.1 - 1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
sec-Butylbenzene	135-98-8	0.01 - 0.1	µg/L
Squalene	111-02-4	0.1 - 1	µg/L
Stigmastanol	19466-47-8	0.1 - 1	µg/L

Terbutryne	886-50-0	0.01 - 0.1	µg/L
Tetramethyl succinimide	3566-61-8	1 - 5	µg/L
Toluene	108-88-3	1 - 5	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triacetin	102-76-1	0.01 - 0.1	µg/L
Tri-allate	2303-17-5	0.01 - 0.1	µg/L
Triallyl isocyanurate	1025-15-6	0.01 - 0.1	µg/L
Tributyl acetylcitrate	77-90-7	0.01 - 0.1	µg/L
Tributyl phosphate	126-73-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vitamin E	59-02-9	0.01 - 0.1	µg/L

Table 46 GC-MS results Lairage Land, 2296459, 10th December 2021

GCMS Results for Sample:		2296459	
Compound Name	CAS#	Concentration	Units
.alpha.,.alpha.'-Dihydroxy-m-diisopropylbenzene	1999-85-5	0.01 - 0.1	µg/L
.gamma.-Sitostenone	84924-96-9	0.01 - 0.1	µg/L
.gamma.-Sitosterol	83-47-6	0.1 - 1	µg/L
1,2,4-Trimethylbenzene	95-63-6	1 - 5	µg/L
1,2-Benzisothiazole	272-16-2	0.01 - 0.1	µg/L
1,2-Dibromoethane	106-93-4	0.01 - 0.1	µg/L
1,3,5-Trimethylbenzene	108-67-8	0.1 - 1	µg/L
1H-Benzotriazole, 5-methyl-	136-85-6	0.01 - 0.1	µg/L
1H-Indene, 2,3-dihydro-5-methyl-	874-35-1	0.01 - 0.1	µg/L
2(3H)-Benzothiazolone	934-34-9	0.1 - 1	µg/L
2-(Methylmercapto)benzothiazole	615-22-5	0.01 - 0.1	µg/L
2,2,2-Trichloro-1-phenylethanol	2000-43-3	0.01 - 0.1	µg/L
2,4,6-Tribromophenol	118-79-6	0.01 - 0.1	µg/L
2,4,7,9-Tetramethyl-5-decyne-4,7-diol	126-86-3	>5	µg/L
2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-one	10230-62-3	0.01 - 0.1	µg/L
2,4-Di-tert-butylphenol	96-76-4	0.1 - 1	µg/L
2-Methylnaphthalene	91-57-6	0.01 - 0.1	µg/L
2-Propanol, 1-[2-(2-methoxy-1-methylethoxy)-1-methylethoxy]-	20324-33-8	0.1 - 1	µg/L
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	0.1 - 1	µg/L
4-tert-Octylphenol	140-66-9	0.01 - 0.1	µg/L
acenaphthene	83-32-9	0.01 - 0.1	µg/L

Acetophenone	98-86-2	0.1 - 1	µg/L
Azobenzene	103-33-3	0.01 - 0.1	µg/L
Benz[a]anthracene	56-55-3	0.01 - 0.1	µg/L
Benzaldehyde	100-52-7	0.01 - 0.1	µg/L
Benzene	71-43-2	0.1 - 1	µg/L
Benzene, (1-methyl-1-propenyl)-, (E)-	768-00-3	0.01 - 0.1	µg/L
Benzene, (2-isothiocyanatoethyl)-	2257-09-2	0.01 - 0.1	µg/L
Benzene, 1,2,3,5-tetramethyl-	527-53-7	0.1 - 1	µg/L
Benzene, 1,2,4-trimethyl-	95-63-6	0.1 - 1	µg/L
Benzene, 1,4-diethyl-	105-05-5	0.01 - 0.1	µg/L
Benzene, 1-ethyl-2,4-dimethyl-	874-41-9	0.01 - 0.1	µg/L
Benzene, 1-ethyl-2-methyl-	611-14-3	0.1 - 1	µg/L
Benzene, 1-ethyl-3-methyl-	620-14-4	1 - 5	µg/L
Benzene, 1-ethyl-4-methyl-	622-96-8	1 - 5	µg/L
Benzene, 1-methyl-4-propyl-	1074-55-1	0.01 - 0.1	µg/L
Benzene, 2-ethyl-1,4-dimethyl-	1758-88-9	0.1 - 1	µg/L
Benzene, 4-ethenyl-1,2-dimethyl-	27831-13-6	0.01 - 0.1	µg/L
Benzenesulfonamide, N-butyl	3622-84-2	1 - 5	µg/L
Benzenesulfonamide, N-ethyl-2-methyl-	1077-56-1	0.01 - 0.1	µg/L
Benzenesulfonanilide	1678-25-7	0.01 - 0.1	µg/L
Benzo[a]pyrene	50-32-8	0.01 - 0.1	µg/L
Benzo[b]fluoranthene	205-99-2	0.01 - 0.1	µg/L
Benzo[ghi]perylene	191-24-2	0.01 - 0.1	µg/L
Benzophenone-3	131-57-7	0.01 - 0.1	µg/L
Bisphenol A	80-05-7	0.1 - 1	µg/L
Butyl citrate	77-94-1	0.01 - 0.1	µg/L
Caffeine	58-08-2	0.1 - 1	µg/L

Carbamazepine	298-46-4	0.1 - 1	µg/L
Chloroxylenol	88-04-0	0.01 - 0.1	µg/L
Cholestan-3-ol, (3.beta.,5.beta.)-	360-68-9	0.1 - 1	µg/L
Cholesterol	57-88-5	>5	µg/L
Chrysene	218-01-9	0.01 - 0.1	µg/L
Cotinine	486-56-6	1 - 5	µg/L
Cresyl diphenyl phosphate	26444-49-5	0.01 - 0.1	µg/L
Crotamiton	483-63-6	0.1 - 1	µg/L
Dibenz[a,h]anthracene	53-70-3	0.01 - 0.1	µg/L
Diflufenican	83164-33-4	0.01 - 0.1	µg/L
Dimethyl phthalate	131-11-3	0.1 - 1	µg/L
Dimetridazole	551-92-8	0.1 - 1	µg/L
Diphenylamine	122-39-4	0.01 - 0.1	µg/L

Ergost-5-en-3-ol, (3.beta.)-	4651-51-8	0.1 - 1	µg/L
Ethanol, 2-butoxy-, phosphate (3:1)	78-51-3	0.1 - 1	µg/L
Ethyl benzene	100-41-4	1 - 5	µg/L
Fipronil	120068-37-3	0.1 - 1	µg/L
Fluorene	86-73-7	0.01 - 0.1	µg/L
Galaxolide	1222-05-5	0.1 - 1	µg/L
Indane	496-11-7	0.1 - 1	µg/L
Indeno[1,2,3-cd]pyrene	193-39-5	0.01 - 0.1	µg/L
Isophorone	78-59-1	0.01 - 0.1	µg/L
m+p-Xylene	108-38-3+106-	>5	µg/L
Metaldehyde	108-62-3	0.1 - 1	µg/L
Methyl Methacrylate	80-62-6	0.01 - 0.1	µg/L
MTBE	1634-04-4	1 - 5	µg/L
N,N,N',N'-Tetraacetylethylenediamine	10543-57-4	0.1 - 1	µg/L
N,N-Diethyl-m-toluamide	134-62-3	0.1 - 1	µg/L
Naphthalene	91-20-3	0.1 - 1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-	119-64-2	0.01 - 0.1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-1-methyl-	1559-81-5	0.01 - 0.1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-2,6-dimethyl-	7524-63-2	0.01 - 0.1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-2-methyl-	3877-19-8	0.01 - 0.1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-5,7-dimethyl-	21693-54-9	0.01 - 0.1	µg/L
Naphthalene, 1,2,3,4-tetrahydro-5-methyl-	2809-64-5	0.01 - 0.1	µg/L
Naphthalene, 1,2-dimethyl-	573-98-8	0.01 - 0.1	µg/L
Naphthalene, 1,6-dimethyl-	575-43-9	0.01 - 0.1	µg/L
Naphthalene, 2,6-dimethyl-	581-42-0	0.01 - 0.1	µg/L
Naphthalene, 2-methyl-	91-57-6	0.01 - 0.1	µg/L
Neophytadiene	504-96-1	0.1 - 1	µg/L
n-Propylbenzene	103-65-1	0.1 - 1	µg/L
o-Cresol (2-methylphenol)	95-48-7	0.1 - 1	µg/L
Octocrylene	6197-30-4	0.01 - 0.1	µg/L
o-Xylene	95-47-6	1 - 5	µg/L
Pentobarbital	76-74-4	0.01 - 0.1	µg/L
Phenanthrene	85-01-8	0.01 - 0.1	µg/L
Primidone	125-33-7	0.1 - 1	µg/L
Propyzamide	23950-58-5	0.1 - 1	µg/L
Pyrene	129-00-0	0.01 - 0.1	µg/L
sec-Butylbenzene	135-98-8	0.01 - 0.1	µg/L

Squalene	111-02-4	0.1 - 1	µg/L
Tefluthrin	79538-32-2	0.01 - 0.1	µg/L
Terbutryne	886-50-0	0.01 - 0.1	µg/L

Tetramethyl succinimide	3566-61-8	1 - 5	µg/L
Toluene	108-88-3	>5	µg/L
Tri-(2-chloroethyl) phosphate	115-96-8	0.1 - 1	µg/L
Triacetin	102-76-1	0.01 - 0.1	µg/L
Tri-allate	2303-17-5	0.01 - 0.1	µg/L
Triallyl isocyanurate	1025-15-6	0.01 - 0.1	µg/L
Tributyl acetylcitrate	77-90-7	0.1 - 1	µg/L
Tributyl phosphate	126-73-8	0.1 - 1	µg/L
Triethyl citrate	77-93-0	0.01 - 0.1	µg/L
Triphenyl phosphate	115-86-6	0.1 - 1	µg/L
Tris-(1,3-dichloroisopropyl) phosphate	13674-87-8	0.1 - 1	µg/L
Vanillin	121-33-5	0.1 - 1	µg/L
Vitamin E	59-02-9	0.01 - 0.1	µg/L

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THE CVFC MICROPOLLUTANT REPORT – WHAT ARE THE IMPLICATIONS FOR RIVER USERS AND IS THERE POTENTIAL FOR HARM?

The river Colne is not unique in the chemical loading its water and sediments contain. Studies on other rivers have determined this to be the case and the Environment Agency (EA) acknowledge only 14% of rivers in the country meet good ecological status and none meet good chemical status given the criteria of the water framework directive (WFD).

The Colne and other waters of the catchment, meet neither nor do any designated bathing waters exist.

Our study identifies some of the micropollutants present in the Colne and Ver but we can be assured other tributaries, distributaries and many of the lakes in the catchment will be similarly blighted so the issues are not localised. Without doubt many more pollutants than the 267 already catalogued would be discovered if a wider suite of analysis methods was applied.

We are able to state the classification for each which determines the risk they present individually. What cannot be stated is the detrimental affect any of those will have on the environment or indeed human health given the apparently low concentrations we find – opinion on what should be regarded as 'low' differs widely however with some academics holding the view that some should be considered high.

Given that and, as many of these are not constant, and will vary depending on location any such prediction about impact is difficult. So too is what the combined effect of those chemicals would be – especially where we see evidence of accumulation.

Whilst a more in depth study would provide clarity it could not take account of the infinite variables - concentrations of substances present or condition changes such as more/less water in the river to affect dilution.

The visual state of a river can sometimes be a guide as to the risk it presents (such as when sewage fungus is present) but generally the pollutants are invisible. Even when the EA determine a given water to be of bathing quality standard it does so by testing for only Escherichia coli or E. coli (EC) and Intestinal enterococci (IE). These bacteria can come from many sources including sewage, agricultural livestock, wildlife, birds and road drainage and are likely to have effect quickly on humans.

Such analysis takes no account of the myriads of other potentially damaging pollutants present that may have longer lasting and unknown risks attached.

Whilst we may assume that members of the public will treat river water and riparian environments as a potential health risk the reality is far from that. Children are allowed to play freely in the water in such a way that ingestion is inevitable, pets are allowed to drink, wild swimming is common and all manner of other water related activity is encouraged – often even by the very organisations that should, and now do, know better.

A question facing us is should we issue formal warnings about the potential for harm and risk the back lash from that?

Another though of course is what would be the outcome of a person becoming ill or dying through contact with water and it becoming known that we could, and perhaps should, have issued some warning given the evidence we hold?

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Three Rivers Climate Emergency and Sustainability Strategy 2023-2026

Table of Contents:

Foreword

TBA

Phil Williams,
Lead Member for Environmental Services and Sustainability.

Introduction

Since the original Climate Emergency and Sustainability Strategy was published in 2021, the climate has continued to change as a result of human activity. In 2022, the estimated rise in global mean temperature was 1.16 degrees higher than the pre-industrial period[1] and global carbon emissions were at a record high. If current emissions levels continue, there is a 50% chance we will exceed global warming of 1.5C within the next nine years[2].
Climate-related disasters have increased by five times over the past 50 years, causing US$202 million in losses daily[3]. Despite the Paris Agreement goal of limiting global warming to well below 2°C, under current policies we are more likely to be facing anywhere between 2.2°C and 3.4°C increase by 2100 if we do not undertake rapid and significant emissions reductions[4].

The effect of these shifts in global climatic systems can be observed in every region on Earth, including in Three Rivers. The need for swift and deep emissions reductions to prevent dangerous levels of global heating, while adapting and building resilience to the effects of climate change that are already irreversible, remain the most urgent tasks of our time.

Three Rivers District Council has been at the forefront of bringing forward work streams to mitigate the Climate Emergency. The Council declared a climate emergency in 2019 and continues to lead responsibly, by our own example, whilst encouraging and enabling others to join us on our journey towards net zero and climate resilience. This strategy covering the period of the new Corporate Framework acknowledges that mitigation alone is no longer sufficient to combat climate change; climate adaptation is now also critical to the future of our District.

In 2020, Three Rivers District emissions were recorded at 474,300 tCO2 compared to 730,800 tCO2 in 2005[5] an average annual emissions reduction of 2.2%, This is positive progress but with Tyndall Centre calculations showing that the District will need to reduce its emissions by 14.1% annually to make its fair contribution to the Paris Climate Change Agreement and with much of the reduction to date linked to grid decarbonisation, there remains much still to do.

Reducing emissions by 14% per year is an immense challenge that will require concerted and sustained efforts from the entire District from not just the Council but from our businesses, communities, residents and visitors if it is to be achieved. Our ability to reach net zero at the local level is further complicated in that it is greatly dependent on national and international action on climate change mitigation. Addressing the planetary scale problem of climate change requires urgent and strong top-down leadership, and global collective action. Three Rivers will play its part, but so too must others.

[1] 2022: sixth warmest year on record globally - Met Office
[2] ESSD - Global Carbon Budget 2022 (copernicus.org)
[3] Weather-related disasters increase over past 50 years, causing more damage but fewer deaths | World Meteorological Organization (wmo.int)
[4] The CAT Thermometer | Climate Action Tracker
[5] https://www.gov.uk/government/collections/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics

This Strategy focuses on what the Council and its partners are and plan to do within the parameters of the current legal, financial, regulatory and technological frameworks, under which we must operate. It seeks to show how the Council proposes to stay on course to reach its net zero and climate resilience ambitions within the external constraints that we are bound by.

At a national level, as recognised in the Skidmore Mission Zero report, there is significantly more that is needed to enable local authorities and the areas they serve to achieve net zero targets with, *a need for* national policy confidence, continuity and long term funding certainty.

This new strategy builds on the success of the initial Climate Emergency and Sustainability Strategy (2021) with aims and objectives derived from the independently modelled "Route to Zero" pathways for Three Rivers, which in turn will drive our Action Plan for the coming years. In responding to the climate emergency Three Rivers District Council will not only seek to limit the impacts of climate change, but also to secure wider benefits for communities including health, prosperity, and greater equality alongside protection of and resilience for the natural world.

National Policies on Climate and Sustainability:

Legislation and Strategies in existence at time of the 2021 Strategy:

- **The Climate Change Act 2008 (Order 2019)** introduced the legally binding target for the UK to achieve at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) by 2050.
- **The 25 Year Environment Plan 2018** sets comprehensive goals and targets to improve the UK's air and water quality, and protect threatened plants, trees and wildlife.
- **The Resource and Waste Strategy 2018** outlines the actions the UK will take to minimise waste, promote resource efficiency and move towards a circular economy.
- **The Clean Air Strategy 2019** focuses on reducing industrial, agricultural and transport emissions and aims to reduce particulate matter emissions from solid fuel used in homes.

New Legislation and policies published since the 2021 Strategy:

- **The Environment Act 2021** sets out new legal frameworks for air pollution, water quality, biodiversity conservation, waste and resource management, and the use of chemicals.
  The Act is a key vehicle to deliver the goals and targets set out in the *Government's 25 Year Environment Plan* and places greater statutory duties on local government in delivering its policies, most notably through ensuring a minimum 10% net-gain in biodiversity is delivered in all new housing and development, and creating or contributing to Local Nature Recovery Strategies.
- **The Net Zero Strategy: Build Back Greener 2021** sets out policies and proposals for decarbonising all sectors of the UK economy to meet our net zero target by 2050.
- **The Heat and Buildings Strategy 2021** describes how the Government intends to decarbonise homes, and commercial, industrial and public sector buildings, to reach net zero by 2050.
- **Industrial Decarbonisation Strategy 2021** details how industry can decarbonise in line with net zero.
- **British Energy Security Strategy 2022** sets out how Britain will accelerate nationally generated power for greater energy independence.

Our Progress So Far

In 2021-2022, the Council has:

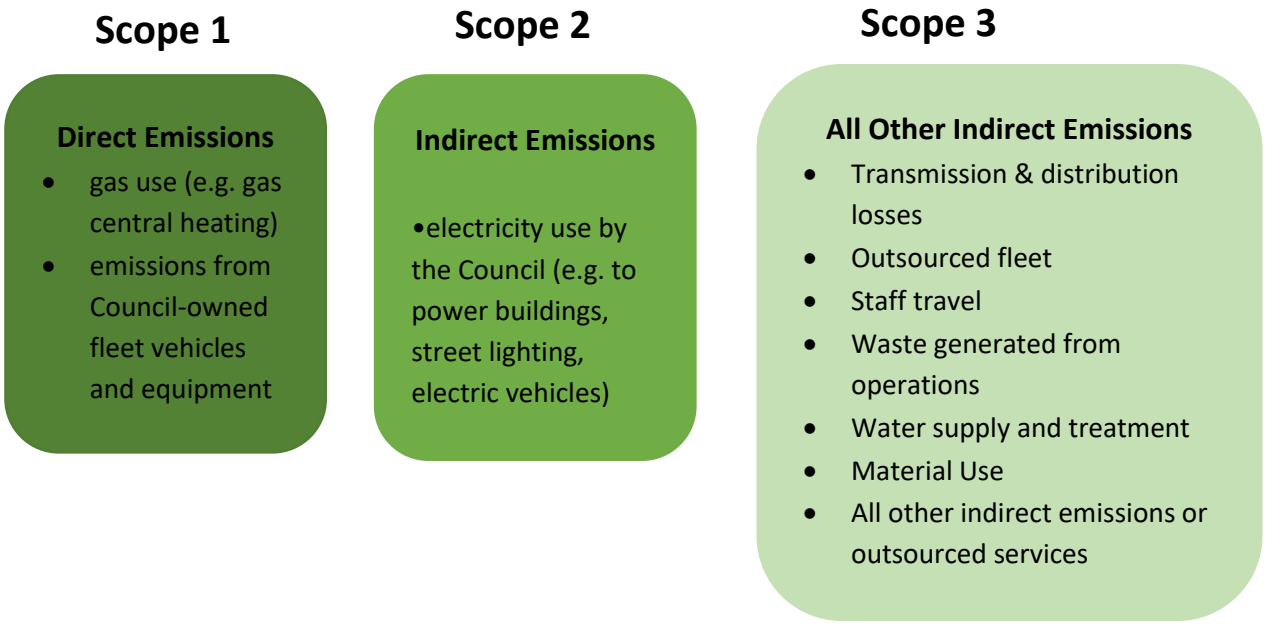
- Achieved reductions in Council emissions through the completion of the new, energy efficient depot and retrofit of Three Rivers House including the installation of air source heat pump technology, installing solar lights in car parks and park lighting, and the purchase of two electric vans.
- Supported the Hertfordshire-wide Solar Together project, with 203 homes in our District participating to-date.
- Retrofitted 117 homes in the District saving 161.2 tonnes of carbon dioxide annually, equivalent to carbon savings of 1.4TCO_2 per home, per year.
- Supported energy efficiency improvements for the least efficient homes in the District through the delivery of Energy Company Obligation (ECO4) and Social Housing Decarbonisation (SHDF) schemes.
- Commissioned the National Energy Foundation to provide an independent Home Energy Support Service helpline, where residents can get free, expert advice on energy saving, energy bills, and energy efficiency improvements. In 2022, the helpline provided advice and interventions to over 200 residents.
- Engaged with over 1600 people, in-person across the District at a wide range of events from school activities and information stands to conferences and talks.
- Published a "Guide to Greening Your Home" document filled with information, top tips, and ideas to inspire residents to make sustainable changes to their homes and gardens, reduce their carbon and water footprints, and enhance biodiversity.
- Adopted a Climate and Sustainability Impact Assessment process that embeds consideration of climate and sustainability in to the Council's decision-making processes.
- Introduced Climate Change training for all Council staff, with senior leadership and sustainability officers benefiting from advanced training on climate change and adaptation.
- Introduced a grassland management plan resulting in a new woodland of approximately 350 small trees; 2 areas of bulb planting; over 50 standard trees and a distinct change in grassland management for the benefit of wildlife.
- 2940 free trees were given to residents of Three Rivers with a joint initiative from TRDC and HCC
- Planted 750 trees in Leavesden County Park and Denham Way Playing Fields and 25 street trees in South Oxhey for the Queen's Green Canopy.
- Introduced grazing to the Horses Field at Leavesden Country Park to encourage biodiversity expansion.
- Developed and approved a management plan for the Rickmansworth Aquadrome.
- Hosted 27 wildlife themed events attended by more than 500 local people.
- Resurfaced a significant section of the Ebury Way trail for walkers and cyclists.
- Improved the northbound link in the Grand Union Canal towpath (Three Rivers) route, which connects 7 local settlements along a six-mile stretch northwards of Rickmansworth
- Developed and consulted on the District's Local Walking and Cycling Infrastructure Plan.
- Installed 50 walking wayfinding signs across Croxley Green.
- Promoted Sustainable Travel planning within the District Council and with local businesses.
- Installed Real Time Information signs at 15 district bus stops.
- Established the Three Rivers Water Partnership.
- Piloted the #WorthSaving food waste reduction project.

Awarded community grants for low-carbon infrastructure totalling £7,020 and through the Three Rivers Sustainable Business Programme, helped 12 SMEs develop climate action plans.

Three Rivers District Council Emissions

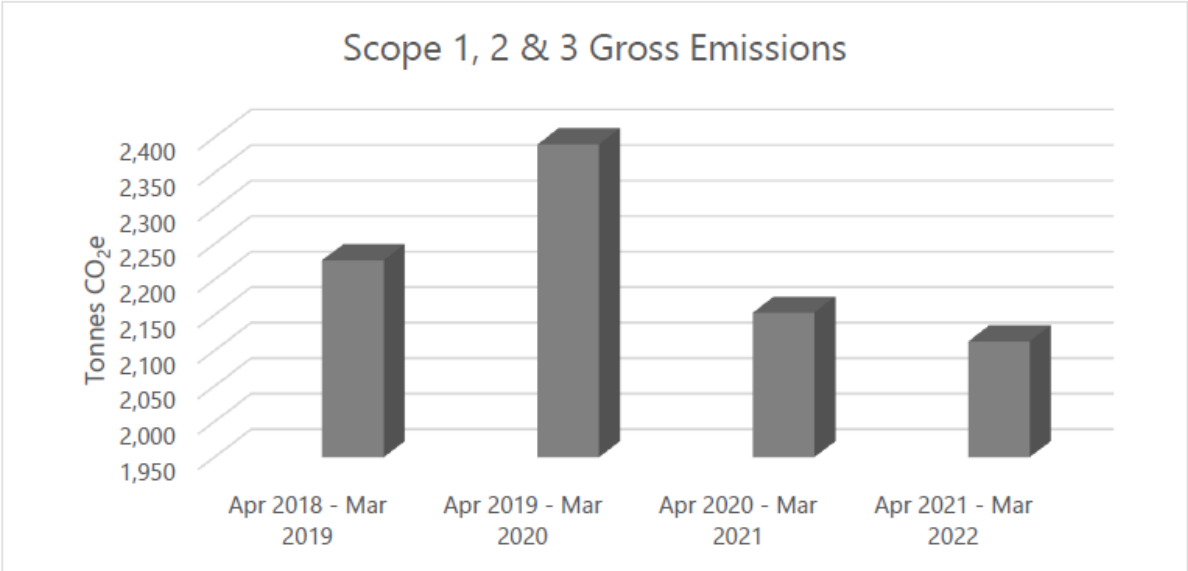
The Council measures and publishes its own emissions annually in accordance with best practise guidance of the Greenhouse Gas Protocol and uses conversion factors for the carbon dioxide equivalent (CO2e) published by the Department for Business, Energy & Industrial Strategy (now the Department for Energy Security and Net Zero).

The Council's emissions can be divided in to three "Scopes", which are described below.
Scope 1: release emissions directly into the atmosphere.
Scope 2: emissions associated with our consumption of purchased electricity, heat, steam and cooling.
Scope 3: emissions that result from other Council activities, but occur at sources which we do not own, control or have full authority over, for example leased assets such as the leisure centres.



Scope 3 emissions are complicated, extensive and far-reaching. They are very difficult to measure accurately for year-on-year comparison purposes with no consistent methodology currently in use.
To enable comparison of the Council's GHG emissions over time, to identify trends, assess the performance of the Council, and avoid duplication of emissions accounting, we aim to maintain consistent accounting approaches, reporting boundaries, and calculation methodologies. Therefore, for Scope 3 emissions, the Council reports only those emissions which are currently measurable, accessible and accurate. Presently, this primarily consists of the emissions generated by our leisure centres, staff and councillor business mileage, and emissions associated with the transmission and distribution of electricity, and water usage on Council-owned property.
Through the Council's Procurement Strategy, suppliers are encouraged to reduce their own emissions and environmental impacts, particularly in relation to the goods or services they provide to the Council.

Figure 2 TRDC Carbon Emissions for 2021/22

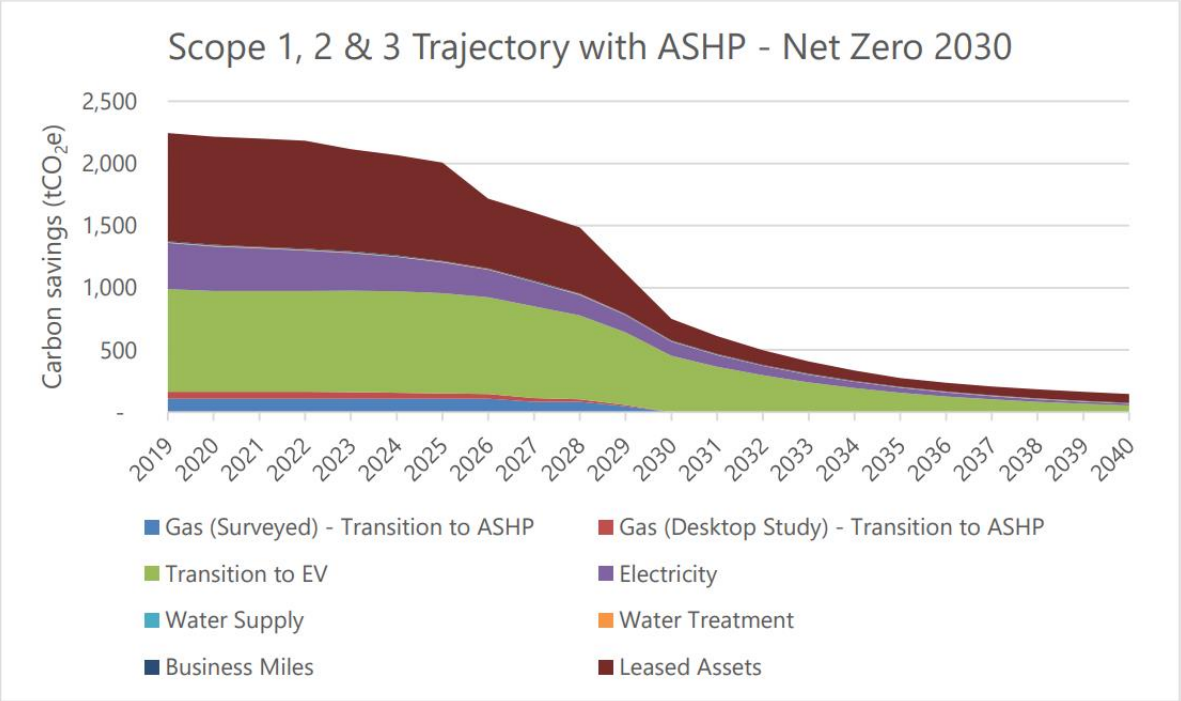


A significant reduction in emissions occurred in 2020-21 as a consequence of the introduction of hybrid working for all Council office staff.

In order to better understand the actions that need to be taken locally, the Council commissioned the Association for Public Service Excellence (APSE) to establish the net zero trajectory for Council emissions. All buildings were surveyed to ensure the recommendations were based on an accurate reflection of the estate and the changes which would be required to decarbonise.

Figure 3 shows the theoretical trajectory that APSE produced, representing an overall saving of 1,493tCO2e (67%) when comparing 2020 to 2030 utilising Air Source Heat Pumps, (ASHP). It is estimated that there will be 751 tCO2e from hard-to-reduce sources that will remain by 2030 and would need to be offset through a combination of Solar PV installations and tree planting schemes to enable the Council to reach net-zero. The estimated cost of this offsetting is £736,000 at 2022 prices.

Figure 3



To achieve this theoretical trajectory it was estimated that a total investment of £19 million (at 2022 prices) would be required to improve building energy efficiency, install ASHP technology, generate renewable energy, and develop a tree planting scheme. It is estimated that these interventions would save the Council £160,626 per year by 2030. It is therefore clear that there are significant financial challenges in realising the Council's ambitions.

Our Approach to Net Zero for Council Operations

Given the costs outlined above, it is apparent that achieving net zero for Council operations in the current fiscal context of local government is exceptionally challenging due to:-

- the increasingly high cost of retrofit
- the high operational cost of heat pump technologies due to the high unit costs of electricity
- skills shortages
- the lack of reflection of net zero in national planning processes and policies
- uncertainty over "low-carbon" technologies such as hydrogen
- lack of a clear decarbonisation plan by the Government
- lack of resource and finance in central and local Government, and reduced capacity of many residents to spend on pro-environmental changes due to ongoing cost of living crisis.

One of the objectives in this strategy is to model how and to what extent the net-zero trajectory could be achieved, taking into account existing challenges, affordability, sources of

finance, practicality, suitability of low carbon technology, and consideration of existing plant replacement timetables.

The emphasis of this 3-year strategy is to focus on actions that are achievable within the current funding landscape but will deliver substantial emissions reductions. For example, we will undertake an in-depth assessment on how to expand the Solar PV capacity of Council buildings and land. Whilst this would require substantial upfront investment, the positive return on investment is likely to make it affordable.

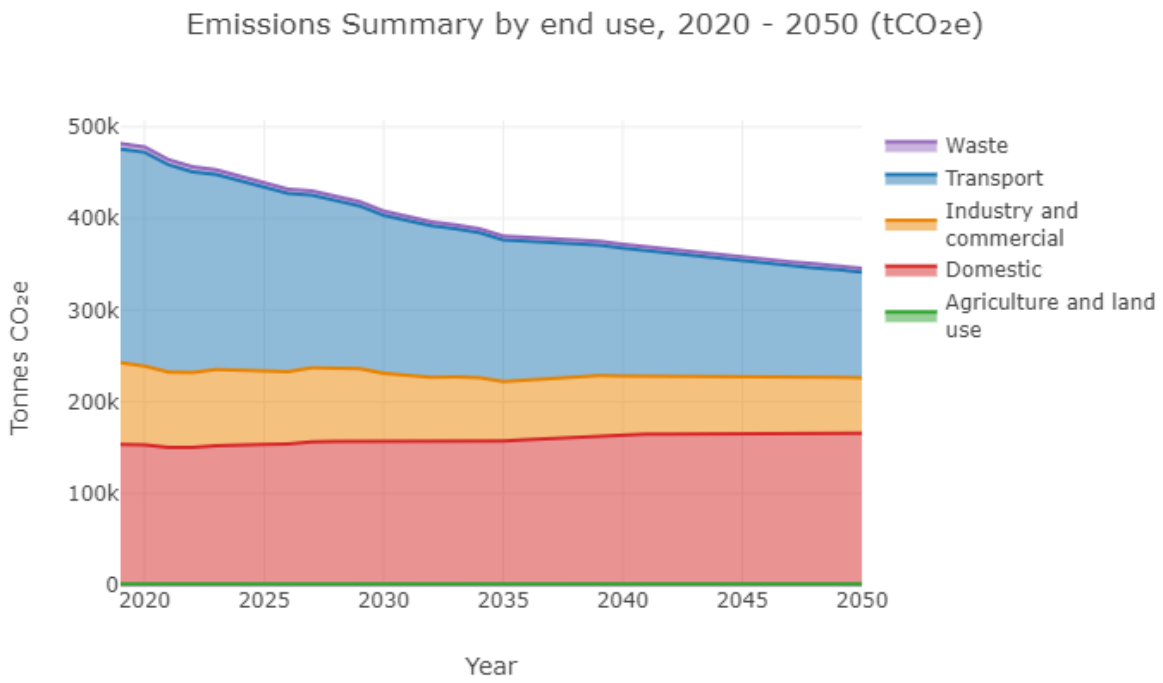
As recognised by the "Mission Zero" review of Net Zero (2023), the Council needs long-term certainty of government funding in order to make net zero investment plans through to 2030, and beyond.

Three Rivers District Emissions

In addition to considering the Council's own emissions, the APSE report provided analysis of emissions of the wider district as a whole and considered what would be required to achieve net zero at district level by 2050.

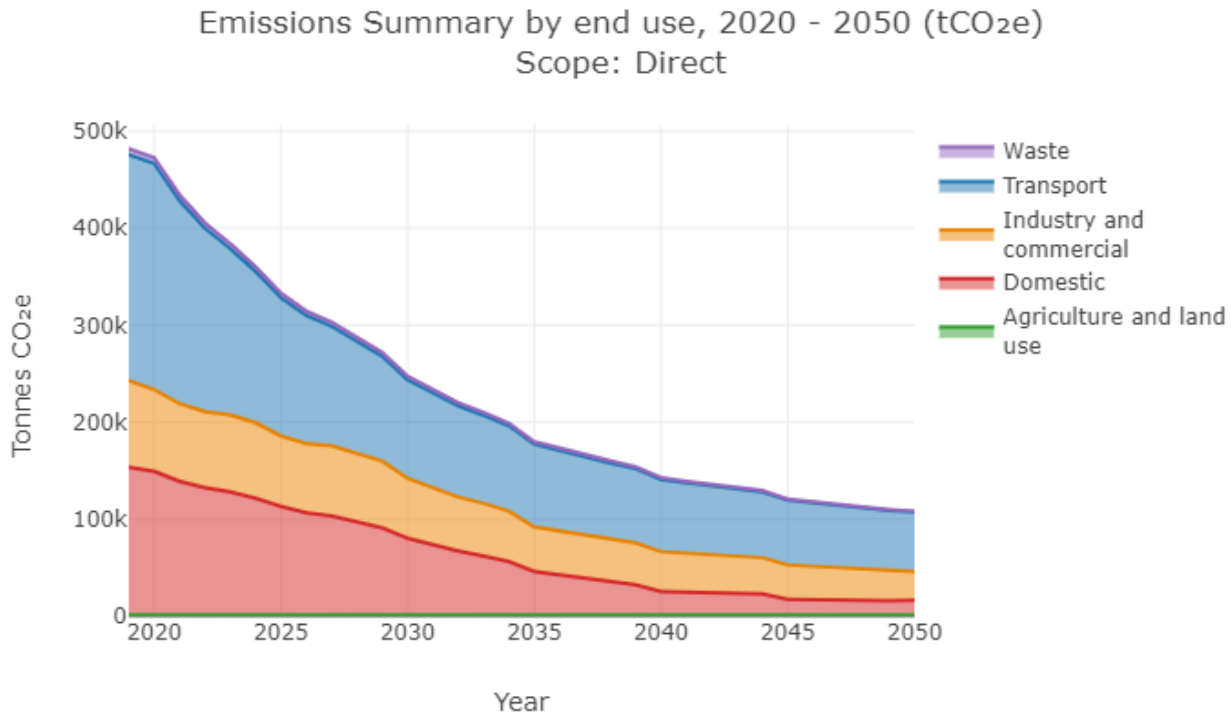
Figure 4 shows the district emits just under 500,000 t CO2e per annum and if no interventions are made, then the effects of grid decarbonisation and the transition to electric vehicles will only have a moderate effect.

Figure 4 Business as Usual



However if ambitious interventions are made, Figure 5 shows emissions could be reduced by 77%t 108,000 t CO2e.

Figure 5 High Ambition Carbon Reduction Interventions



In order to achieve its high-level ambitions for the district, the Council will demonstrate leadership that will seek to inspire businesses, community groups and individual residents to take action to achieve their own personal or organisational net zero.

Carbon emissions associated with domestic dwellings remain a key area to address both in terms of reducing overall energy demand through better insulation and in a switch to electric heating which can benefit from the grid decarbonisation at a national level.

Ward- Level Emissions

The emissions generated across Three Rivers vary considerably between local areas. Data from the Community Carbon Calculator indicates that residents in Chorleywood North and Sarratt, and Moor Park wards have the highest carbon footprints in the district with each household producing an average of 25 tonnes of carbon per year. Residents in South Oxhey, however, have the lowest carbon footprints in the district, producing an average of 12 tonnes of carbon annually.

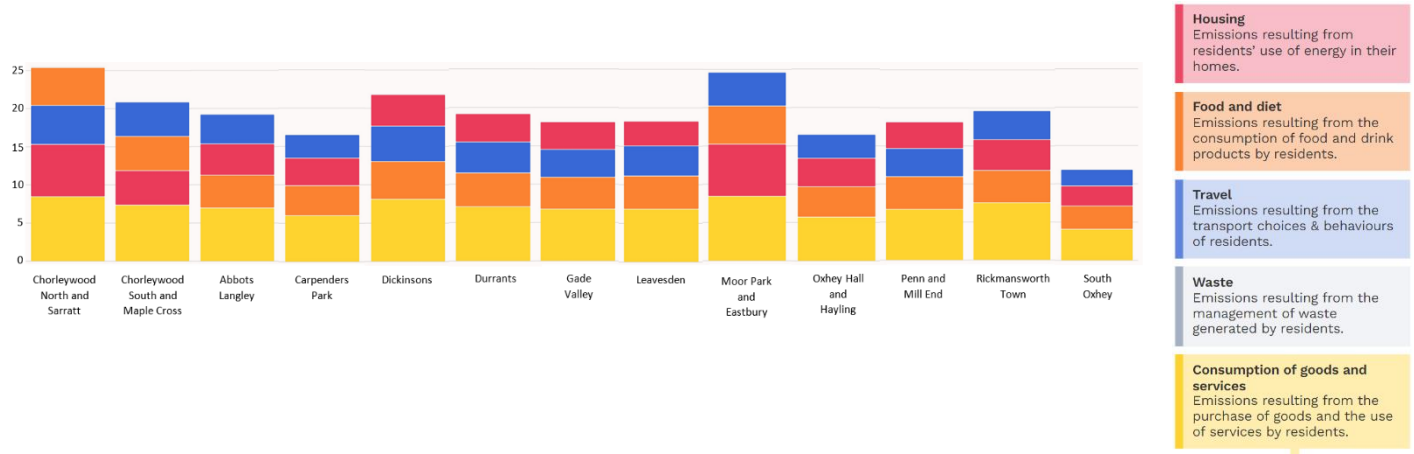
Nevertheless, all of the wards in Three Rivers currently produce emissions above the UK average [6.42tCO2e per person per year in 2019][6] and far exceed what is required to limit global temperature rise to the Paris Agreement goal of 1.5°C [<3tCO2e per person per year from 2035])[7].

Whilst this ward-level data is based on assumptions and estimates, it illustrates the differential impact of residents' day-to-day activities in different parts of the district. Such local level insights are useful in targeting communications and support in different areas and demonstrate the importance of action to reduce emissions at the local level; from ward-based initiatives organised by Parish Councils, to community-led action from community

[6] https://www.climatewatchdata.org/ghg-emissions?breakBy=countries&calculation=PER_CAPITA&end_year=2019&gases=all-ghg&regions=GBR&start_year=1990
[7] The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf (theccc.org.uk)

groups, faith groups, residents associations and charities, all the way down to individual actions taken by residents.

The Council cannot realise its vision of a net zero Three Rivers alone, it requires everyone to do their bit to contribute, no matter how big or small.



Carbon Offsetting

There are a variety of ways to reach net-zero, not all of them equal. The Council will follow the carbon management hierarchy; this means we will prioritise emissions avoidance and reduction, and only replace or compensate our hard-to-treat emissions as a last resort. Tree planting and expanding renewable energy generation will play a key role in any offsetting that is needed for the Council to reach net zero.

Climate Change Adaptation

The Council recognises that even if all greenhouse gas emissions ceased immediately, the emissions produced over the last century have already committed us to a certain degree of global warming. The effects of the resultant climate change in the UK, including, hotter drier summers, warmer wetter winters, and more frequent and intense extreme weather events, are being experienced with increasing regularity.

In 2022, Three Rivers experienced serious drought, dried up chalk streams, and wildfires. These issues cause real and present risks to our built and natural environments, the health and wellbeing of our residents and local wildlife, and to our local economy.

In the summer of 2022, landscape fires broke out across the country due to the extreme hot and dry conditions, including in Three Rivers, where fires were reported at Leavesden Country Park, South Oxhey Playing Fields and Oxhey Woods. Pictured: the aftermath of a landscape fire at South Oxhey Playing Fields.

While the Council works to limit further climate change by reducing greenhouse gas emissions from the Council's operations and across the district, it is recognised that mitigation alone is no longer sufficient. Adapting to our changing climate and building the district's resilience to the impacts of the changes that now face our communities, businesses, services, and natural spaces, is increasingly important.

Measurement, Governance and Next Steps

The Climate Emergency and Sustainability Strategy 2023-2026 is supported by an Action Plan which is updated continuously and reviewed bi-annually by the Leisure, Environment and Community Committee. Progress on the work of the Council on the climate emergency can be followed on the Council's website here.

The establishment of the route to zero for Council measured operational emissions will produce annual carbon reduction targets, against which progress will be measured.

The District Council's role

Three Rivers District Council declared a climate emergency in 2019 and is committed to achieving net-zero for its own measurable emissions by 2030, and working with partners to support the district in achieving net-zero by 2045.

The aims and objectives in this Strategy all follow a hierarchy of action which recognises the three broad spheres of influence that Three Rivers District Council can have.

Enable and Engage

Aim: **Inspire everyone to work together to adopt sustainable lifestyles and make climate aware decisions.**

Three Rivers together with the community has an opportunity to lead a new low-carbon future enabling cleaner, healthier lifestyles where the local economy thrives through the growth of sustainable and green businesses. We recognise the key role that the Council has in leading and inspiring local people to be part of the solution; contributing to the enrichment of local biodiversity, altering habits and encouraging improved home efficiency and to reduce their carbon, water and ecological footprints.

To achieve our aim we will:

- Embed consideration of the climate and ecological emergencies into the culture and decision making of the Council.
- Reduce the district's vulnerability to the impacts of climate change and take advantage of any opportunities that arise.
- Inspire and enable everyone in the district to adopt sustainable, climate resilient behaviours.
- Provide and foster an attractive environment for sustainable business and "green" jobs.

Energy

Aim: Minimise energy-related emissions in the district through reducing consumption, improving efficiency and transitioning to renewable energy sources to achieve net-zero targets (2030 – council emissions, 2045 – district-wide emissions).

Renewable energy projects can generate lasting cost and carbon savings, and protect against future energy price rises. They can also deliver broader social objectives such as ensuring security of supply and addressing fuel poverty.

Recent exposure to increasingly high prices for imported fossil fuels[8], highlights the importance of deploying renewables at scale and reducing our reliance on fossil fuels urgently as well as reducing the energy demand through improved fuel efficiencies

The Council is restricted in the amount of renewable energy it can produce by the constraints of its estate, however as a community leader and planning authority we can inspire and enable residents, businesses, and other land owners in the district to invest in their own renewable energy production.

To achieve our aim we will:

- Establish the route to net-zero for the Council's measurable operational emissions.
- Make further progress towards the management of a Net Zero Carbon Council estate.
- Develop the business case for solar PV on Council buildings, sites and car parks.
- Research options for decentralised renewable energy generation.
- Encourage and enable renewable energy generation in the district.
- Help residents and businesses identify how they can reduce their energy use.

[8] Quarterly Energy Prices UK April to June 2022 (publishing.service.gov.uk)

Sustainable Design and Construction

Aim: The highest standards of sustainable design and construction

The Future Homes and Building standard is expected to pass into legislation in 2024 with implementation following in 2025. Under the current proposals, all new homes would be required to produce 75-80% less carbon emissions than allowed under current regulations. The goal of the standard is that, by 2025, new homes will be "zero carbon ready" so that they will not need retrofit to become carbon neutral once the electricity grid has been decarbonised.

As a Local Planning Authority, Three Rivers District Council has a responsibility to produce the Strategic Local Plan and determine and enforce planning applications and Building Regulations. The Council's policies will, therefore, be reviewed and strengthened as Building Regulation changes allow. We will strive, within the constraints of the national planning framework, for the highest standards of sustainable design and construction so that the district can have adaptable buildings which are resilient to the effects of climate change, and minimise the use of natural resources over the intended lifetime of a development.

To achieve our aim we will:

- Progress towards approval of a new Local Plan that can secure the highest standards of environmental performance and sustainability in development.
- Encourage developers within Three Rivers to adopt net zero design standards.
- Require all major developments to submit an adaptation strategy and sustainability statement to demonstrate how the development will mitigate and adapt to climate change over its lifetime.
- Integrate renewable energy within any new Council developments, Council joint venture developments and within public and private sector developments.
- For major non-residential developments, proposals should achieve BREEAM 'Excellent' as a minimum with the ambition to achieve "Outstanding."
- Ensure developments minimise the use of water resources, minimise impact on sewerage infrastructure, and do not increase the risk of flood on site or in the adjacent areas.
- Encourage Biodiversity Net-Gain to be achieved on site or within the district.

Efficiency of Existing Buildings

Aim: Improve industrial, commercial and domestic energy efficiency in the district in existing buildings.

Home energy use accounts for 28.8% of the district's greenhouse gas emissions (2020)[9], making it an area of significant emissions reductions potential and thus a key sector to focus on to meet the district level net-zero target.

Improving the energy efficiency of domestic and commercial buildings is not only an essential component of reducing greenhouse gas emissions to mitigate climate change at the local level, it also contributes to tackling fuel poverty, improving public health and wellbeing, and supporting the green economy.

The Council is a non-stock holding Authority, with the exception of a small number of temporary accommodation dwellings. Registered Social Housing Providers own and manage socially rented housing in the district with the Council maintaining a regulatory function to enforce Minimum Energy Efficiency Standards (MEES) for privately rented properties.

To achieve our aim we will:

- Reduce carbon emissions from existing Council buildings through retrofit.
- Co-ordinate a Domestic Decarbonisation programme for the district, in collaboration with Housing Associations and Social Landlords.
- Educate residents on the ways that they can reduce their energy consumption.
- Encourage the retrofitting of buildings for energy efficiency improvements at the change point of application for planning permission[10].
- Develop the local retrofit sector to increase capacity for retrofit projects in the district.

[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1086980/UK-local-authority-ghg-emissions-2020.xlsx

[10] https://www.threerivers.gov.uk/download?id=47493

Sustainable Travel and Air Quality

Aim: Enable and encourage journeys to be made by sustainable transport modes

Hertfordshire has some of the highest vehicle ownership levels in the country, with 87% of residents with access to a car compared to 74% nationally.[11]

The Council is playing its part to reduce resident and commercial reliance on carbon-fuelled transport, working closely in partnership with the local Highway Authority (Hertfordshire County Council), and other stakeholders to encourage, enable and, where it falls within the remit of the district Council, to deliver:

- Improved public transport accessibility
- High quality active travel infrastructure
- Travel behaviour change
- Parking management that encourages sustainable mobility
- Improved streetscapes

There are two Air Quality Management Areas (AQMAs) in Chorleywood, the plans for which can be found at: https://www.airqualityengland.co.uk/local-authority/hnb-reports.

To achieve our aim we will:

- Adopt the Local Cycling and Walking Infrastructure Plan.
- Support and promote the concept of 20 Minute Neighbourhoods.
- Support our partners in the development and promotion of strategic sustainable passenger transport and infrastructure.
- Promote and improve the public experience and perception of public transport.
- Work with the Hertfordshire Climate Change and Sustainability Partnership (HCCSP) to develop a county wide programme that supports a transition to low carbon private hire vehicles and taxis.
- Maximise opportunities via planning and development control to promote travel planning and increase sustainable low- and zero-carbon transport infrastructure.
- Ensure Air Quality Management Plans are successfully delivered.
- Encourage behaviour change on vehicle idling through education and partnership working.
- Expand electric vehicle charging infrastructure within Three Rivers.

[11] https://www.hertfordshire.gov.uk/media-library/documents/environment-and-planning/planning/planning-in-hertfordshire/the-sustainable-modes-of-travel-strategy-smots-2022.pdf

Waste Management and a Circular Economy

Aim: **Reduce the volume of waste produced and encourage a circular economy.**

Modern consumerism and throw-away culture is unsustainable. It generates greenhouse gasses and uses unnecessary natural resources. The volume of waste created as a result currently means that a significant portion has to be exported overseas to be recycled, which in turn, leads to further environmental issues and carbon emissions.

The Council is a waste collection Authority with Hertfordshire County Council holding the responsibility of the waste disposal Authority. Consequently, how our waste is disposed of and treated is not under the Council's direct influence as contracts held by Hertfordshire County Council with re-processors influence what can and cannot be collected for recycling.

To achieve our aim we will:

- Reduce waste and increase the proportion of recycling, composting and reuse within Council operations.

- Play an active role in the Hertfordshire Waste Partnership.

- Consult on and comply with the Government's Resources and Waste Strategy.

- Inspire and enable households and businesses to reduce the waste produced and increase recycling and composting. Achieve 65% recycling and composting rate, 10% landfill, and 25% incineration by 2035 for household waste. Total volume of waste is 61% of 2017 levels by 2040.

- Maintain our position as one of the highest recycling authorities in England.

- Consider all suitable technology when replacing waste collection vehicles to reduce their carbon footprint, and continue to use them to promote reuse and recycling.

Biodiversity

Aim: Ensure net gains in local biodiversity that protect and enhance habitats and species, and utilise the power of nature to build climate resilience.

Three Rivers is home to a rich diversity of habitats and species including those of high priority with the district fortunate to benefit from ancient woodland, chalk streams and wet woodlands. Site specific management plans are in place to assess and ensure the most appropriate management techniques for the habitats present, for example; conservation grazing is utilised on several grassland sites across the district resulting in a wider floristic diversity.

The Three Rivers Nature Recovery and Tree Strategies support delivery of this Strategy, ensuring also the protection and enhancement of the natural world both for the benefit of biodiversity and contributions towards mitigating climate change.

Engagement with local communities regarding the value of the natural world is vital to its protection and enhancement. Through, for example, wildlife based events such as bat walks, interpretation explaining the habitats present on site, outreach with local schools and community groups or advice to local residents on how to help wildlife in the garden or window box the Council seeks to engage its residents in their natural surroundings.

Route to zero emissions modelling has identified the huge role that trees will need to play in mitigating our unavoidable climate emissions. It is estimated that tree coverage will need to expand by more than 30% by 2050, however, this needs to be balanced with the extremely important role that our grassland areas have in providing environments for biodiversity to thrive, and against the need for food production. As leaders in combating the climate emergency the Council will continue to work with our partners and fellow landowners in the district to navigate the competing demands for our land.

To achieve our aim we will:

- Ensure that all TRDC-owned land is managed sustainably and for the benefit of biodiversity, soil health, education, responsible recreation and climate resilience.

- Understand the value of trees in the district and the role they will play in tackling the climate emergency locally.

- Encourage ecologically-resilient and varied landscapes to ensure that habitats remain diverse and adaptable to the impacts of climate change, thereby safeguarding local flora and fauna.

- Maximise opportunities for biodiversity arising from Biodiversity Net Gain requirements to protect, enhance and extend existing habitats within the district.

- Support landowners in the district to enhance biodiversity through proactive land management including rewilding, tree planting, improving soil health, and creating wildlife corridors.

- Encourage local residents and householders in the district to improve biodiversity in their private gardens and the district's open spaces.

Water and Flooding

Aim: Reduce water consumption, prevent contamination of our river network, mitigate the impacts of and support resilience to flooding.

Hertfordshire is one of the driest counties in the UK with average rainfall only two thirds of the national average yet its residents are amongst the highest consumers of water in the UK (8% above the national average, at 153 litres per person per day).[12] Chalk Stream in Crisis, produced by The Rivers Trust, reported low flows and chronic over abstraction in our chalk streams. In addition, the sewage overflows and pollutants that end up in the rivers and in riverine habitats places the district's three rivers under severe pressure.

Meanwhile, a Strategic Flood Risk Assessment (SFRA) has identified that over 2400 properties in Three Rivers are at high risk of flooding. The Colne and Gade catchments were identified as highly sensitive with warmer, wetter winters and more severe weather due to climate change likely to further increase the risk of future flooding.

One way of preventing additional pressure on water supplies is to ensure that any new development does not increase water abstraction for drinking water above existing levels – water neutrality. Whilst this is not currently enforceable in Three Rivers, it is a concept which is having an impact in other parts of the county and is expected to grow in importance over the coming years.

The Council has no statutory duty with regard to water, instead we focus on encouraging those with responsibilities to work together to benefit residents and our chalk streams**.** To that end, the Council established and hosts regular meetings of a local Water Partnership, providing key stakeholders with a network and constructive platform to discuss issues, raise awareness and establish solutions in order to achieve the above aim.

To achieve our aim we will:

- Reduce the Council's water consumption across its estate.
- Require new development to facilitate optimum water and waste water efficiency and flood mitigation measures, aiming towards water neutrality.
- Work in partnership on a catchment-scale with key stakeholders to protect and enhance local rivers and the habitats which surround them.
- Promote reductions in water consumption in the district.
- Actively encourage Thames Water to invest in their waste water catchments and the Maple Lodge Sewage Treatment Works to ensure sufficient capacity and eradication of untreated sewage discharges into the chalk streams.
- Refuse development if it is subject to unacceptable flood risk or if it would exacerbate flood risk on site or elsewhere.

[12] https://www.hertfordshire.gov.uk/microsites/building-futures/a-sustainable-design-toolkit/technical-modules/water/water-facts.aspx

Adaptation and Resilience

Aim: Create communities, services, infrastructure and environments that are climate resilient.

Climate adaptation is critical to the future of our district and is a priority for the Council under the Corporate Framework 2023-26. Evidence is increasing of the ways in which the climate changes already being experienced exacerbates existing inequities with lower-income and other marginalized communities who are, for example, disproportionately affected by the extreme weather conditions, not least because they are often unable to meet the expense of the adaptation measures that now must go hand in hand with carbon mitigation.

Fostering increased local resilience will require extensive collaboration between the Council, residents, public, private, and voluntary sector organisations, and partners across a wide range of concerns including energy, food and water supply, public health, transport and emergency services.

Adaptation and increased resilience will be needed cross every level and department of the Council. To achieve this, the Council will continue to work in partnership with other key partners particularly Hertfordshire County Council, who hold responsibility for managing and maintaining the infrastructure for flood risk and are the Highways Authority responsible for to prevention and alleviation of flooding through road surface drainage as well as the Environment Agency which is responsible for flooding from rivers.

To achieve our aim we will:

- Ensure our emergency and public health plans account for more severe weather and its impacts on communities.
- Prioritize climate adaptation efforts that explicitly help our most vulnerable populations.
- Assess climate risks and subsequent adaptations required to ensure the resilience of the Council’s buildings and services to the impacts of climate change.
- Ensure the Councils infrastructure, landscapes, services are built, maintained and managed to be resilient to the impacts of climate change.
- Inspire and support stakeholders, partners, community groups, businesses and residents to be resilient to the impacts of climate change.

Food and Agriculture

Aim: Encourage sustainable food production and consumption in the district, and engage with farmers to improve habitat networks.

Climate related risks are, and will continue to have, a significant impact on food security, particularly given the global nature of food supply chains. Exposure to rising food prices and tackling this associated carbon emissions requires an increase in local food production, a reduction in food waste and a shift towards a more plant based diet. Encouraging local growing, preparation and consumption of more seasonal local food provides opportunities to engage with resident on nutrition and its positive impacts on health and wellbeing.

The Hertfordshire State of Nature reports that only 3% of species in the county are connected to farmland. Working with landowners on habitat networks can create vital natural corridors that will support the expansion of wildlife populations.

The Council acknowledges that its influence over food production and consumption is limited, however, through our community partnerships and social media campaigns we can improve knowledge and awareness of the benefits of shopping and eating more sustainably.

To achieve our aim we will:

- Encourage and inspire local land owners to increase biodiversity and climate resilience on their land, and explore options for renewable energy production.
- Inspire and encourage local, sustainable food producers to connect food retailers, the hospitality sector, and residents.
- Encourage local food production through the development of community gardens, allotments, and orchards, and
- Engage with local businesses, community groups, and residents to adopt sustainable food consumption and reduce food waste.

Three Rivers District Council

Draft Climate Emergency and Sustainability Strategy March 2023 summary report for consultation purposes.

Date: 10th May 2023

THREE RIVERS DISTRICT COUNCIL

Draft Climate Emergency and Sustainability Strategy

1 Summary

1.1 The current Climate Emergency and Sustainability Strategy was adopted by committee March 2021. This was followed up by an Action Plan

1.2 Climate change is a core pillar of the Council's new Corporate Framework. Through this strategy the Council will consider the climate emergency and sustainability in all its decisions, steering council operations towards net-zero by 2030. It demonstrates strong leadership to inspire and influence the District to achieve net-zero by 2045 and acknowledges that mitigation alone is no longer sufficient to combat climate change; climate adaptation is now also critical to the future of our District.

1.3 The Leisure Environment and Communities Committee approved the L Draft Climate Emergency and Sustainability Strategy March 2023 for consultation.

1.4

2 Details

2.1 Since the original Climate Emergency and Sustainability Strategy was published in 2021, the climate has continued to change as a result of human activity. In 2022, the estimated rise in global mean temperature was 1.16 degrees higher than the pre-industrial period[1] and global carbon emissions were at a record high[2]. The effect of these shifts in global climatic systems can be observed in every region on Earth, including in Three Rivers. The need for rapid and deep emissions reductions to prevent dangerous levels of global heating, while adapting and building resilience to the effects of climate change that are already irreversible, remain the most urgent tasks of our time.

2.2 Since the last strategy, new legislation has been enacted, most notably the Environment Act 2021 which obliges local planning authorities to require a minimum 10% biodiversity net gain from development amongst numerous other requirements.

2.3 Substantial progress has been made by this Council in tackling the Climate Emergency - the highlights of which include:

- retrofitting 117 fuel poor homes
- building a new depot to optimal energy efficiency standards

[1] 2022: sixth warmest year on record globally - Met Office

[2] ESSD - Global Carbon Budget 2022 (copernicus.org)

- establishing a free-to-call Home Energy Support Service
- engaging with over 1600 people in the district on climate and sustainability issues
- embedding climate change into Council decision making
- introducing a new grassland management regime and planting 750 trees across the District together with providing over 2500 free trees and hedging to residents

2.4 As recognised by the "Mission Zero" review of Net Zero (2023), the Council needs long-term certainty of government funding in order to make net zero investment plans through to 2030, and beyond

2.5 Council emissions are measured annually and have declined by 5% since 18/19 to 2113 tCO2e.

2.6 The Association for Public Service Excellence (APSE) trajectory at Appendix 2 advises a budget of £19m (at 2022 prices) is required to achieve net zero by 2030. The updated strategy will establish how this can be achieved given the current financial climate for local government. The strategy focuses on objectives which are achievable within the current funding environment, but that will lead to a substantial drop in emissions. For example, it requires an in depth review and exploration of expanding the Solar PV capacity of the Council. Whilst a substantial investment would be required, the subsequent cost savings are likely to mean it is affordable.

2.7 Appendix 2 reports that the district emits just under 500,000 tCO2e per annum but identifies that grid decarbonisation and transition to electric vehicles alone will only lead to a moderate reduction in emissions. Therefore, the Council will need to demonstrate leadership to inspire everyone to play their part.

2.8 Chorleywood North and Sarratt, and Moor Park wards are the highest emitters in the district with households producing on average 25 tCO2e per annum. Residents in South Oxhey have the lowest carbon footprints, producing an average of 12 tCO2e annually[3] by comparison. The strategy recognises that for the district to achieve its vision of net zero by 2045, everyone must do their bit to contribute, no matter how big or small.

2.9 Given the international and national context, it is clear net zero is a challenge, and the emphasis of this strategy is that we are doing all that we can within the parameters and resources available. There is no doubt central government has significantly more to do to enable local authorities and districts to achieve their net zero targets. The revised strategy keeps us on course by focusing on the immediate reductions we *can* make.

[3] Impact | Community carbon calculator (impact-tool.org.uk)

2.10 There is renewed emphasis on adaptation in recognition of the local impacts which were demonstrated so clearly in 2022 with extreme heat, drought, and wildfires,

2.11 The original objectives have been reviewed and updated to further develop initiatives to tackle the climate emergency. These objectives will generate new actions and revise existing actions in the Climate Emergency and Sustainability Action Plan together with the continuation of projects underway.

2.12 This strategy will be supported by the Action Plan which is updated continuously and reviewed bi-annually by the Leisure, Environment and Community Committee.

3 Financial Implications

3.1 The Independent review of Net Zero 2022 recommends the Government provides continuity and long-term funding certainty. As a local authority, we need this long-term certainty of local government funding in order to make investment plans through to 2030.

3.2 Where possible, external funding will be sought for individual projects which will be approved either through Policy and Resources Committee or through the Strategic, Service and Financial Planning process.

Background Papers

APPENDICES / ATTACHMENTS

Appendix 1: Climate Emergency and Sustainability Strategy

THREE RIVERS DISTRICT COUNCIL

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Virtual/Remote Environmental Forum – Protocol

1. **Notice of a Remote Meeting -** The Committee Team will issue the forum agenda on behalf of the Chief Executive and will send a virtual meeting request with a date and time of the remote meeting.
2. **Membership-**This meeting will be a remote virtual public meeting of the Environmental Forum which comprises:
   8 District Councillors
   7 Parish Councillors
   Affinity Water
   Chorleywood Residents' Association
   Countryside Management Service
   Eastbury Residents' Association
   Education for a Sustainable Future
   Farming Community
   Friends of Chorleywood House Estate
   Friends of Chorleywood Common
   Hertfordshire Moth Group
   Herts Environmental Records Centre
   Herts and Middlesex Wildlife Trust
   Maple Lodge Conservation Society
   Rickmansworth Waterways Trust/Croxley Green Parish Council
   The Rickmansworth Society and Rickmansworth and District Residents' Assoc.
   Spokes (South West Herts Cycling Group)
   Watford & Three Rivers Friends of the Earth and Friends of Croxley Common Moor
   Colne Valley Fisheries Consultative
   Friends of Stocker's Lake
   Members of the Forum are asked to adhere to the following protocol during remote attendance at the Environmental Forum meeting:
3. **Forum Members** are asked to join the meeting no later than 15 minutes before the start to allow themselves and the meetings facilitators the opportunity to test the equipment.
4. **The Agenda and reports** for the remote meeting will be sent by the Committee Team 16 days before the meeting and will be circulated to the Members of the Forum and published the Council's website 14 days before the meeting.
5. **The Environmental Forum** meeting is a remote meeting in that it is being conducted at no specific location and all participants are at various locations,
6. **Types of Remote Link –** Forum Members are being provided with an invite/remote link/telephone number in order to be able to participate in the remote meeting.
7. **The Conduct** – details provided below are set out in relation to Environmental Forum meetings and holding them as remote meetings where discussions can take place. As the Forum is not a decision making body no decisions are required to be made.
8. **The Notes of the meeting** – will be agreed by the Forum as a record of the meeting.
9. **Opening of the Meeting -** The Chair will open the meeting by confirming who is present: Members of the Forum and any invited organisations will then introduce themselves. The Officers present will record attendance on behalf of Forum Members.
10. **Livestreaming** - The Forum is not a decision making body and whilst every effort will be made to live stream the meeting for the public at large if the connectivity is lost with the live streaming the meeting could continue. The Officer responsible for monitoring the live streaming would immediately notify the Chair who could either continue the meeting or decide to adjourn the meeting until such time as the live stream has been

restored. In the event that it cannot be restored within 10 minutes of the start of any adjournment the Chair can decide whether to continue the meeting or adjourn the meeting to another date and time.

11. **Order of Business** - The Chair, will proceed in the order of business as presented on the published agenda.
12. **The Discussion –** The Chair will state the item to be discussed and ask the Lead Officer/Forum Member to give a brief description of the item/presentation and provide any updated information.
    - Members of the Forum will be asked by the Chair if they wish to speak.
    - All Forum Members to have their video turned off and microphones muted when not talking.
    - When a Member of the Forum wishes to speak they should do so by pressing the hand signal so that the Chair/Lead Officer is able to identify when a Member wishes to speak, at the Chairs discretion, Members may also use the chat facility to indicate to the Chair that they wish to speak.
    - Members will unmute their microphone and turn their cameras on when the Chair invites them to speak.
    - The chat facility must not be used for private conversations between Forum Members.
    - Only speak when invited to by the Chair
    - Only one person may speak at any one time
    - All forum members should turn on the microphone and also the video-feed (if available or unless speaking to a diagram, presentation slide or drawing), then state their name before making a comment
    - When referring to a specific report, page, or slide, mention the report, page, or slide so that all members have a clear understanding of what is being discussed at all times.

12. **Disruption to remote conferencing** - should any aspect of the conference link fail, the Chair may call a short adjournment of up to ten minutes to determine whether the link can quickly be re-established. In the event of individual link failures, the remote Forum Member(s) will be deemed to have left the meeting at the point of failure and if the link cannot be re-established then the presumption will be that the meeting should continue. If the link is successfully re-established then the remote Forum Member(s) will be deemed to have returned at the point of re-establishment.
13. **Process for each item/report** – the same process will follow for each item on in the agenda.
14. **Actions** will be recorded in the notes and circulated after the meeting to the Forum Members and Councillors.
15. **The Protocol** is a guide as to how virtual Environmental Forum meetings should be conducted. The Chair has discretion to amend this protocol as necessary when circumstances arise