Citizen Crane: Year Nine Report

December 2023

Working in partnership

Thames Water

Crane Valley Partnership

Report title	
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Executive Summary

This report present the findings of Year Nine of the Citizen Crane programme. These can be summarised as follows:

1. The Citizen Crane team is entering the tenth year of monitoring and evaluation of the ecological value of the Crane Valley ecosystem.

2. For many years we had noted that, despite considerable efforts and investment from many interested parties, there was little or no evidence of improvement in the ecological value of the river.

3. This was considered to be due to (a) the sheer scale of the issues to be dealt with; (b) a degree of inertia in the response of the system and/or (c) new issues being added at a comparable rate to existing issues being resolved.

4. This Year 9 report provides the first indications that the condition of the river system may slowly be improving – not everywhere and not definitively - but in enough places to generate some hope.

5. A major source of encouragement is the new WFD Classification produced by the Environment Agency, which indicates eight parameters improving over the three Crane Waterbodies, and none worsening, over the period from 2019 to 2022.

6. One significant improvement has been in the quality of the winter outflow from Heathrow balancing reservoirs. Last year was the first cold winter with full airport operation, and it is too soon to be confident, however the early results are promising. It will be interesting to see the cumulative benefits to the Lower Crane if this major source of sewage fungus is permanently removed.

7. There are many significant pollution sources remaining in the catchment – including misconnections, cross-connections with the sewerage system, road run-off (with the M4 being a particular problem in the middle of the catchment) and occasional pollution incidents. New TW data have also shown that the two CSO's in the catchment are active sources of sewage effluent.

8. In addition we know that the geomorphology of the catchment is often poor to moderate – with short sections in culvert, longer sections in concrete and large parts of the rest straightened, deepened, widened, toe-boarded or otherwise disconnected from the flood plain and over-shaded.

9. The comparison with RMI data for other rivers across Greater London has indicated that the Crane is comparable to other rivers - with parts which are as bad as the worst and others that are better than most.

10. The Crane is though the only London river system shown by these data to be significantly self-cleansing. Previous Citizen Crane reports have shown that in-river processes are actively removing organic pollution and resulting in major improvements in ecological character towards the base of the catchment.

11. The cross London comparison also shows that there is nothing inevitable about the top of an urban river system being poor quality - in fact no other river shows this pattern – which has been a feature of the River Crane since we started in 2014. This indicates that the problem should be entirely resolvable.

12. A further cause for hope in this respect is the intensive work by TW, the EA and LB Harrow, supported by teams of local volunteers, into the effluent and hydrocarbon pollution problems along the Eastern Yeading Brook, one of the two main tributaries of the Crane catchment. For some years we have recognised that this is the most highly polluted part of the catchment – and the London wide data noted in 11 above indicate it may be one of the most grossly polluted sections of river in Greater London. Major pollution sources have though been identified in the last year and some at least have been removed with others to follow.

13. The Smarter Water Catchment programme is delivering field scale interventions at several locations to enhance the value of the river ecosystem at a local level. It is hoped that these will be replicated across the catchment over the next six years of the Smarter Water Catchment programme to 2030 and ultimately create a joined up high value river corridor.

14. The Smarter Water catchment programme is also encouraging more collaboration between different interested parties. The new TW Crane Interest Group and the EA Crane Working Group are two examples of this. The Citizen Crane team are continuing to reach out to interested parties within the catchment, as well as at a regional and national level, where opportunities arise to discuss and share best practice and learn from each other.

15. The role of the Citizen Crane volunteers remains central. We are extremely grateful and proud of our volunteers who have continued for almost ten years now to go out every month to collect the base data necessary to deliver the Citizen Crane project. Each time the scope of the project has grown, and new opportunities have arisen to expand the volunteer role, they have responded enthusiastically to the challenge and opportunity.

16. The wider community also has a major role to play in the success of this programme – by reporting pollution issues and removing misconnections, as well as by encouraging and supporting the efforts of volunteers and the wider partnership through social media and other means.

17. We are more confident than ever that our long term objective of delivering WFD Good Ecological Status for the Crane Valley or, in the phrase we coined last year:

    > "*An urban river corridor teeming with wildlife and unconstrained by pollution, serving as a vital community resource where people can connect with nature and improve their wellbeing*".

    Can be achieved by the Smarter Water Catchment programme over the period to 2030.

Contents

1 Introduction

This report sets out the findings of year nine of the Citizen Crane programme. This programme started in the Crane Valley catchment in West London in 2014, following major pollution incidents in 2011 and 2013. A project team of three organisations; Friends of the River Crane Environment (FORCE), Frog Environmental (FE) and Zoological Society of London (ZSL); came together to set up the programme. The team is supported by a steering group; including Thames Water (TW), the Environment Agency (EA) and Crane Valley Partnership (CVP). Teams of volunteers were recruited to collect water quality and ecological data from up to 16 sites across the River Crane catchment and reports have been produced each year summarising these data.

The previous Citizen Crane report was the Year Eight report and this summarised the findings of the previous two years, including the Covid-19 lockdown period. Previous to this was the Year Six report, which brought together all the findings from the first six years of operation and was published in 2020. It also provided a baseline condition assessment for the Smarter Water Catchment (SWC) programme, which started in April 2020.

The scope of Citizen Crane has evolved over the last three years in response to the SWC programme. The work has widened to include other citizen science components and is being co-ordinated by a Citizen Crane officer, appointed by ZSL in 2021.

All the previous Citizen Crane reports can be found here https://www.cranevalley.org.uk/project-archive-library/. They describe the work undertaken over the first eight years of Citizen Crane to understand and improve the ecosystem of the River Crane. They reveal the complexity of this urban river and identify up to 18 variables that are affecting the value of the ecosystem to some degree. They also concluded that, despite all the positive interventions over the previous eight years, there had been little or no evidence for improvement in the ecological value of the river. These findings brought home the challenges facing the Citizen Crane team and the wider Smarter Water Catchment (SWC) programme. This report provides an update on the situation to the end of Year 9 in March 2023.

This Year 9 Citizen Crane report presents:

- Core Citizen Crane data collected over the last year
- An outline of other work undertaken by the Citizen Crane team and others
- Conclusions from a review of these data sets

Citizen Crane is part of the SWC Water Quality Monitoring Plan (WQMP) for the catchment. A summary of the progress on the WQMP is included as an Appendix to this report.

This is a summary report only and further information can be found in the other SWC reports referenced, many of which are also held in the Crane Valley Partnership Archive.

2 Citizen Crane Core Investigations

2.1 River Monitoring Initiative

The River Monitoring Initiative (RMI) is a national methodology for assessing the ecological value of a river system through a proxy of up to eight classes of invertebrates, measured and scored using a log scale, and collected on the river by means of three one-minute kick samples. The Citizen Crane volunteer teams have been carrying out RMI assessments at up to 16 sites every month over the nine-year period from April 2014. The main catchment map, including the key monitoring locations, is shown in Figure 2.1 below. This section of the report reviews the findings from last year (April 2022 to March 2023) and uses these data to identify any emerging trends in the overall data set.

The data for 2022-23 for ten long-term monitoring points, and one new data point at Yeading Walk (Site 1b), are set out in Table 2.1 below. Note that the trigger levels for pollution incident reporting were set with the agreement of the Environment Agency at the start of the project.

Table 2.1: Summary of core RMI data 2022 – 2023.

Site	Site number	No. of samples	Median	Mean	Trigger level
Headstone Manor	1	12	3	3	3
Yeading Walk*	1b	12	3	3	2
Spider Park	2	5	3	3	3
Ickenham Marsh	3	12	4	4	3
Newton Park West	4	8	2	2	3
Yeading Brook Meadows	6	9	3	4	4
Minet Country Park	7	8	2	2	3
Donkey Wood - Crane	9	11	8	8	3
Donkey Wood – DNR	10	11	7	7	7
Crane Park Island	11	10	10	10	8
Mill Road Weir	12	11	7	8	7

*Yeading Walk is a new site for this year

The main findings from these data are as follows:

- The general trend follows that of previous years, with the lowest RMI scores at the top of both upstream sub-catchments, quite poor scores in the middle, and the river condition improving significantly towards the base of the catchment
- Note that in broad terms an RMI score of 0 to 3 is indicative of bad to poor water quality and a score of 8 to 10 is indicative of moderate to good water quality
- Trigger levels were breached regularly at both Newton Park West and Minet Country Park – and this is in line with findings from previous years. These breaches are so regular that they are no longer reported to the EA. The causes are considered further in Section 3 below
- Note that the weather conditions in 2022/23 were challenging for invertebrates, with a long hot and dry summer followed by an extensive cold period in the winter

Figure 2.1 below shows the summary annual data sets for each of the nine years from 2014.

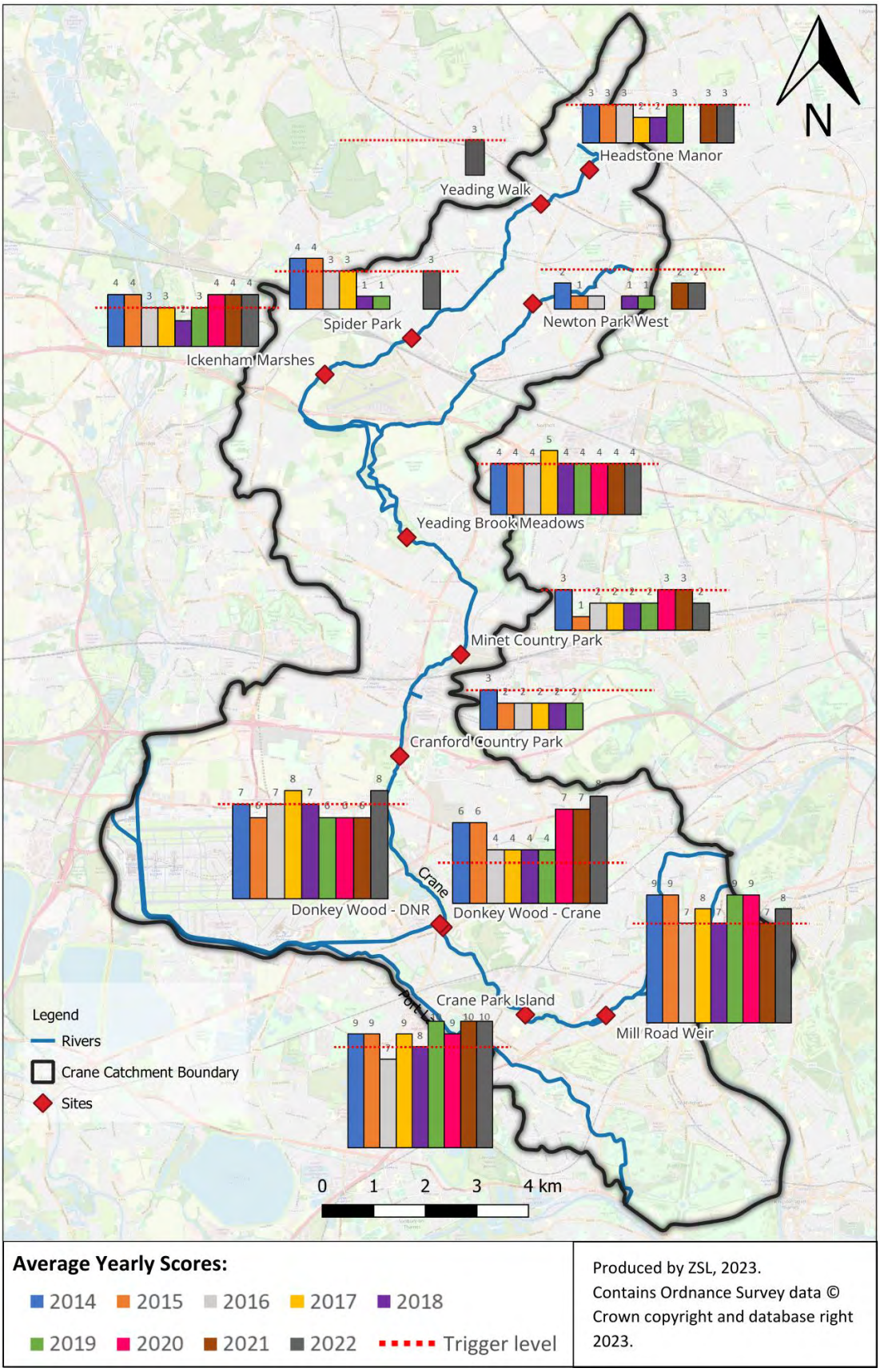

Figure 2.1: RMI data for the nine-year Citizen Crane monitoring period

The following points are noted from these data:

- In broad terms, the RMI data are reasonably consistent for each site across the nine years
- There is some encouragement in the latest data - in that there is little or no sign of a decline in condition, and some indications that RMI scores are slowly improving, over the last year. See Crane Park Island and Donkey Wood in the lower part of the catchment for example
- This is the first year that we have recognised clear signs for optimism – and this despite the weather conditions last year being sub-optimal for river invertebrates

For the first time this year we have seen RMI data for the Longford River. These data have been recorded by the Friends of Hanworth Park* and are for two sites, immediately upstream and downstream of the long culverted section that runs through the park. Preliminary data indicate a mean RMI score of 5 for the section above the culvert and an RMI of 4 for the section below the culvert. These scores appear low for the Longford River, which is receiving relatively high quality water from the River Colne to the west (equivalent to the Upper Dukes' River – Site 10), and indicate there may be other issues at play at these sites, not least the culverting itself.

*Note that these data are collected as part of a separate project supported by Thames Landscape Strategy and are not a part of the Citizen Crane programme.

RMI assessments are being undertaken as part of various enhancement schemes across the catchment – including the Lower Crane restoration project, the Little Park enhancement scheme, the Spider Park plans and Yeading Brook Unbound. Further consideration of these sites is provided in Section 3.8 below.

2.2 Analysis of RMI Data in Relation to Activities at Heathrow

Heathrow Airport uses de-icer to treat the runway and aircraft during periods when the temperature is near or below freezing. Drainage from the eastern part of the airport complex discharges into the River Crane just upstream of the Donkey Wood monitoring site. Monitoring by the Citizen Crane teams in previous years has shown a close correlation between extended periods of cold weather, outbreaks of sewage fungus in the riverbed and reduction in the RMI scores in the three downstream monitoring points 9, 11 and 12 (Donkey Wood, Crane Park Island and Mill Road).

In 2018 Heathrow constructed and commissioned a new treatment system, specifically designed to remove glycol from the airport run-off. This year we have undertaken a review to assess whether there has been any change in the impact of discharges from Heathrow on the river ecosystem downstream.

Table 2.2 below presents weather data from the Heathrow meteorological station and notes the severity of cold weather in terms of the total number of days, as well as periods of consecutive 5+ days and 10+ days, when the minimum temperature was below freezing. Those winters highlighted are considered to have been more severe – a combination of both 20+ days in total and one or more periods of 10+ days per month with the temperature below zero.

Table 2.2: Heathrow cold weather data

Winter	Days below 0C	Period (months)	5+ days/month	10+days/month
2015-16	15	4	2	0
2016-17	26	4	2	1
2017-18	22	4	2	1
2018-19	16	5	1	0
2019-20	13	6	0	0
2020-21	34	6	3	1
2021-22	21	6	1	0
2022-23*	27	3	3	2

*To the end of Feb 2023 only

Figs 2.2 to 2.4 show the RMI data sets for Sites 9, 11 and 12 for 2014 to 2023

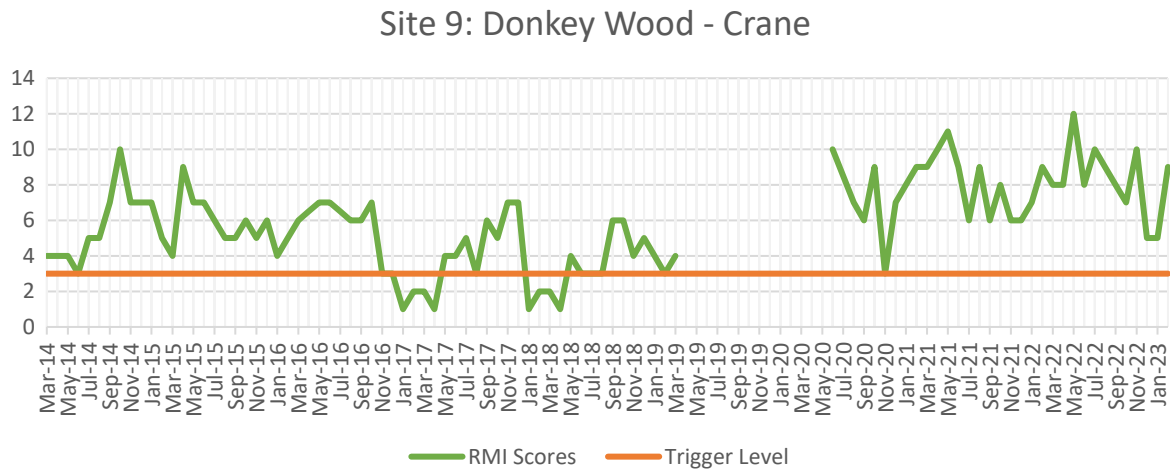

Figure 2.2: RMI data for Site 9 – Donkey Wood

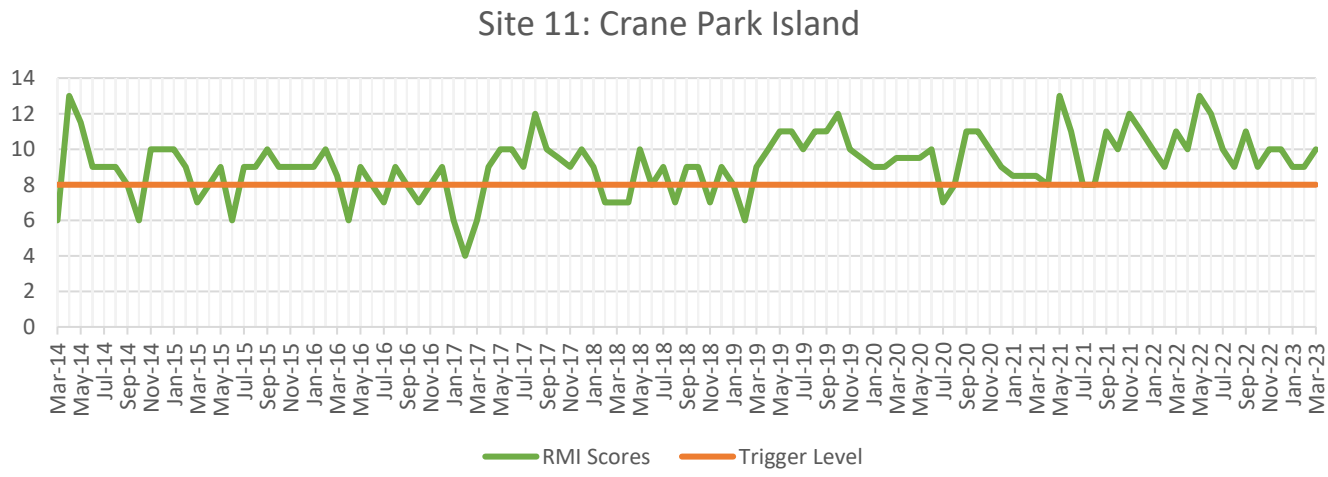

Figure 2.3: RMI data site 11 – Crane Park Island

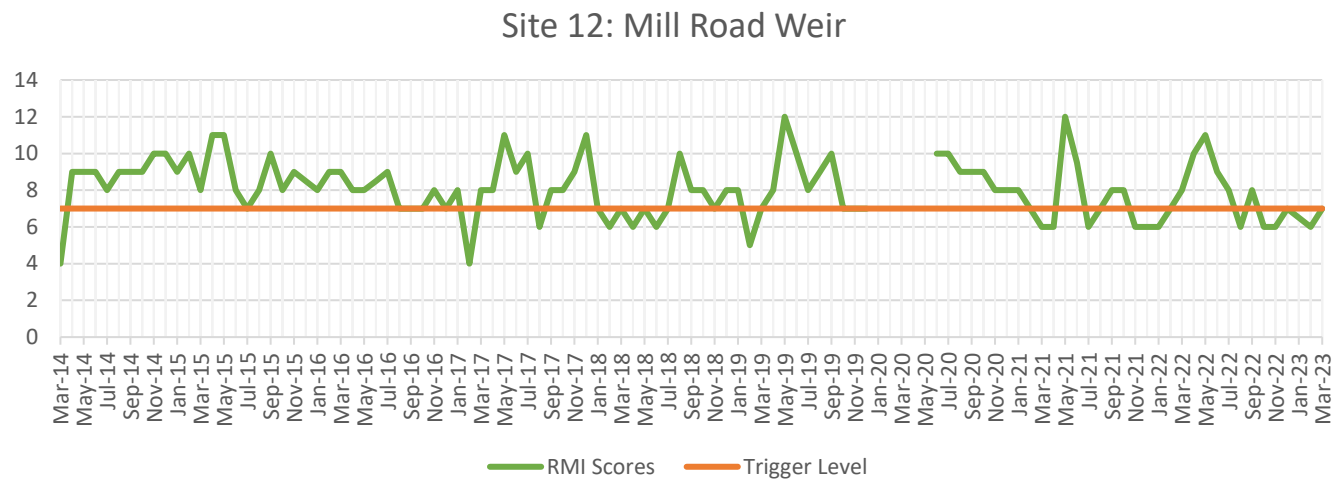

Figure 2.4: RMI data site 12 – Mill Road

The following observations are made from these data:

- There is a natural seasonal variation in RMI scores, with lower scores seen in the winter when there are fewer invertebrates naturally present
- The cold winter periods of 2016/17 and 2017/18 correlate closely with significantly reduced RMI scores at all three sites downstream. Sewage fungus was also noted as coating the riverbed at Site 9 and being present, alongside a greenish water tinge, at Sites 11 and 12 during these periods
- The new Heathrow treatment system was 50 percent operational in winter 2018/19. This was a warmer winter, and the following winters were also either warmer and/or impacted by the lockdown, such that the amount of glycol being used would have been lower than normal
- Winter 2022/23 was the first time that there was both an extended colder period and the airport was fully operational. It was therefore the first proper test of the effectiveness of the treatment system
- We did receive one report of sewage fungus in the river last winter. However, this was not supported by further reports or any visual evidence from the volunteer teams
- The plots show little or no evidence of an impact on the ecosystem, over and above normal seasonal reductions, in winter 2022/23
- Note that reduced RMI scores at Site 12 last winter may be due to the cumulative effects of increased over-shading of this site by encroaching saplings and ivy. There is a plan to test this theory, with a programme of coppicing and ivy removal in 2023/24, working with LB Richmond

This review suggests that the treatment system was effective last winter in reducing the impact of glycol discharges in the ecosystem, compared to previous years with no treatment. This evidence is indicative but not conclusive. The Citizen Crane teams will continue to monitor the river to assess any effects in future winters.

Note that the Citizen Crane team are also engaged with reviewing the proposed new permit for the discharge from Heathrow balancing ponds and submitted a response to the EA on their draft proposals in 2023.

2.3 Comparison with RMI Data Sets from other London Rivers

In 2021 the Zoological Society of London (ZSL) produced a report that compared RMI data sets for various rivers across Greater London. A summary diagram is reproduced here as Figure 2.5.

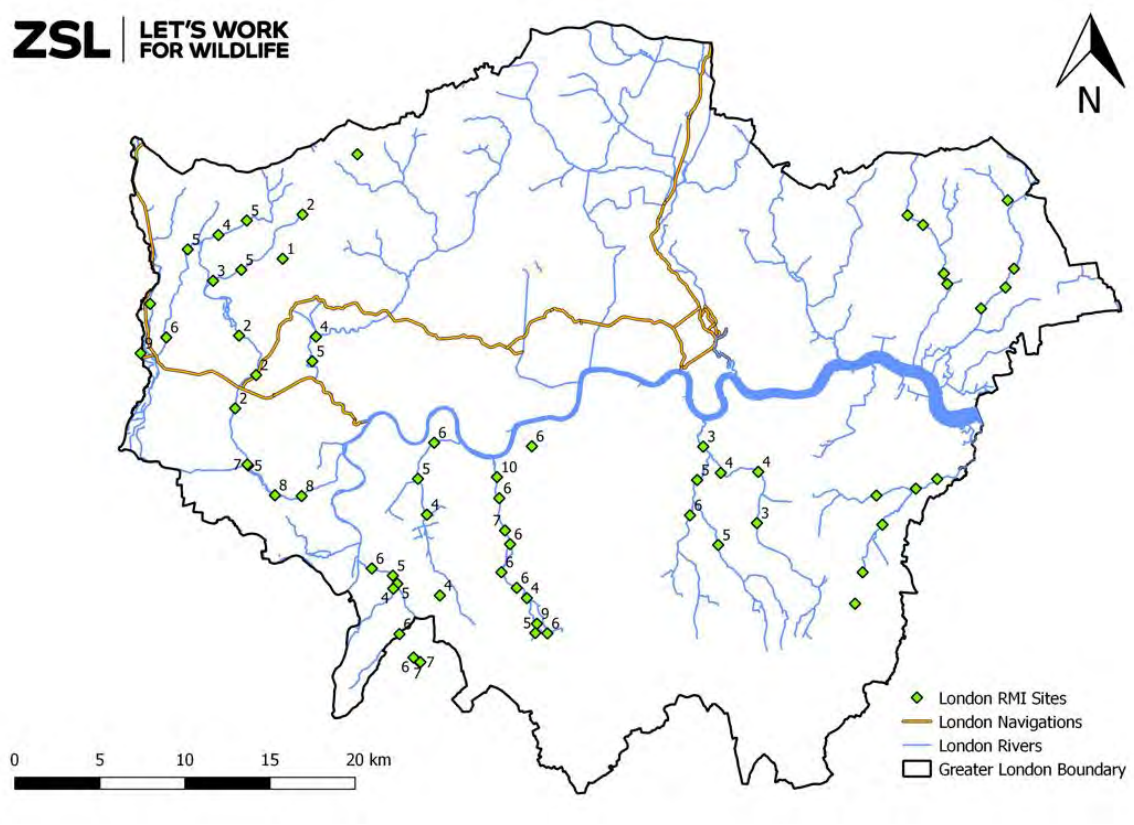

Figure 2.5: RMI Summary Data from London Rivers.

Working from West to East – first North and then South of the Thames - the map shows the following RMI scores:

- 6 to 9 in the middle Colne Valley
- 1 to 8 in the Crane catchment
- Various RMI sites along the Roding, Breame and Ingerbourne but no data
- 4 to 7 on the Hogsmill
- 4 to 6 on the Beverley Brook
- 4 to 10 on the Wandle
- 3 to 6 on the Quaggy and Ravensbourne
- Various sites along the Cray but no data

The following observations are made from these data:

- All the values are in a comparable range
- Only the Crane has the pattern of lowest scores at the top of the catchment and increasing downstream, indicating this pattern is not normal, and may be unusual, even for an urban river
- The Lower Crane catchment is comparable to some of the best parts of the Greater London river network (middle Colne, Upper Hogsmill and Lower Wandle

- The scores in the upper part of the catchment though are as bad, or worse than, any others across Greater London
- The capacity of the River Crane to self-clean with distance downstream is a characteristic that is not shown to the same degree in any of the other river data

In summary, these data indicate that there may be comparable characteristics across London's rivers – i.e. sections that are heavily compromised, with others that are at or approaching good condition, and this may indicate the potential to improve all parts to the condition of the best.

The upper and middle reaches of the Crane appear to have lower RMI scores than other comparable rivers. The reasons for these low scores have been considered in previous Citizen Crane reports. The current working model is that the upper reaches are compromised by poor water quality (including misconnections and cross-connections) whereas the middle reaches have poor geomorphology. These theories are being examined further as part of pilot enhancement projects across the catchment under the SWC programme.

The Crane's capacity to self-clean with distance downstream is a valuable and potentially unusual characteristic for an urban river system. Our current working model is that this capacity is largely a function of improved geomorphology in this part of the river – with enhanced energy and more marginal and in-river plants - that increase the scale and effectiveness of riverine treatment processes. The habitat restoration projects delivered through the Smarter Water Catchment programme are being designed to better understand and optimise these processes.

2.4 Water Quality Data

The Citizen Crane team collected monthly water quality samples at up to 12 sites for six years and analysed these for ammonia and phosphate. These data are presented and analysed in detail in the Year 6 report and were used to assess the concentration and loading of these key organic pollutants along the main river corridor.

The sampling procedures were heavily interrupted by the pandemic, and we started to recognise that volunteer led monthly sampling was no longer sustainable at many of our sites. In Year 7 we decided to reduce the Citizen Crane samples to quarterly from two selected sites (Site 8 and Site 12) and this continued through to Year 9. Figures 2.6 to 2.9 below present summary plots of the phosphate data and the ammonia data for all nine years.

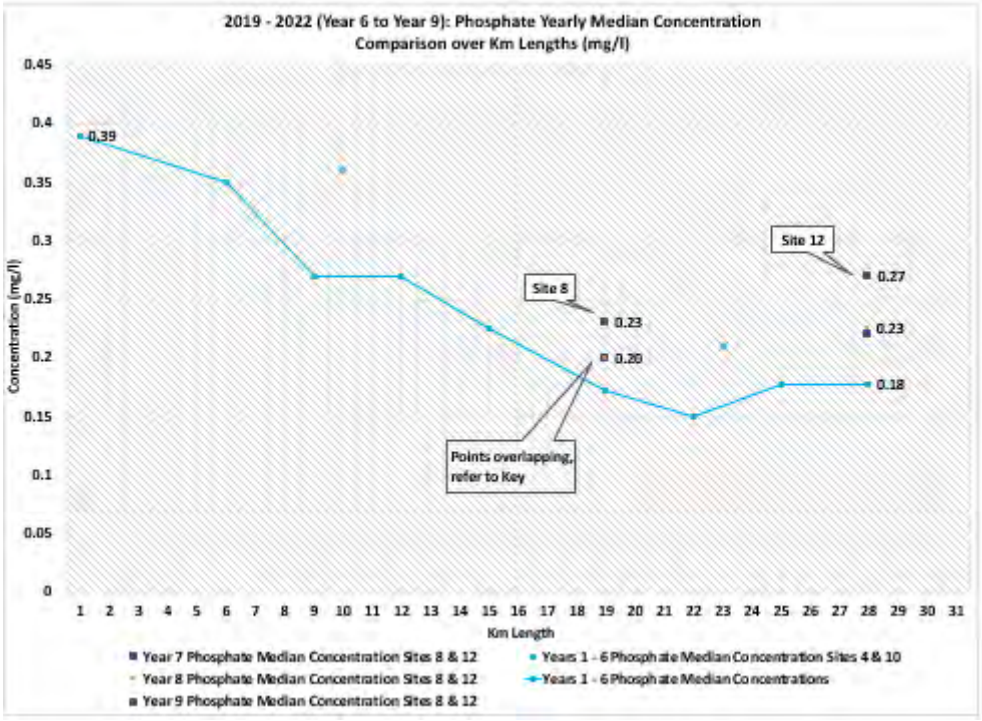

Figure 2.6: Summary of phosphate concentration data for the nine year data set

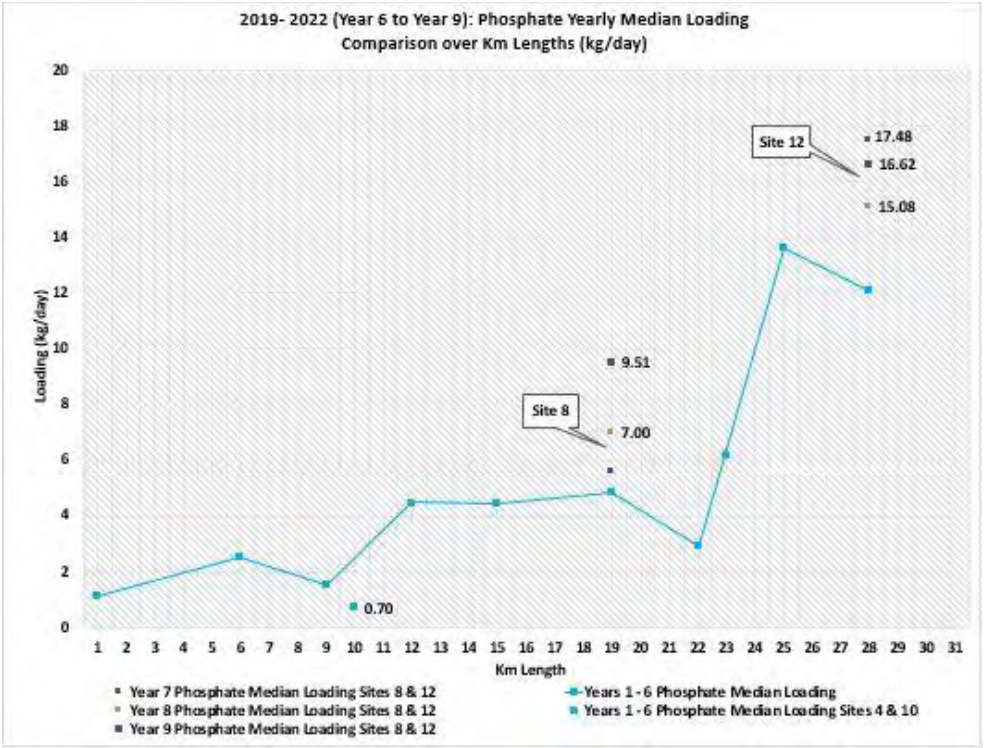

Figure 2.7: Summary of phosphate loading data for the nine year data set

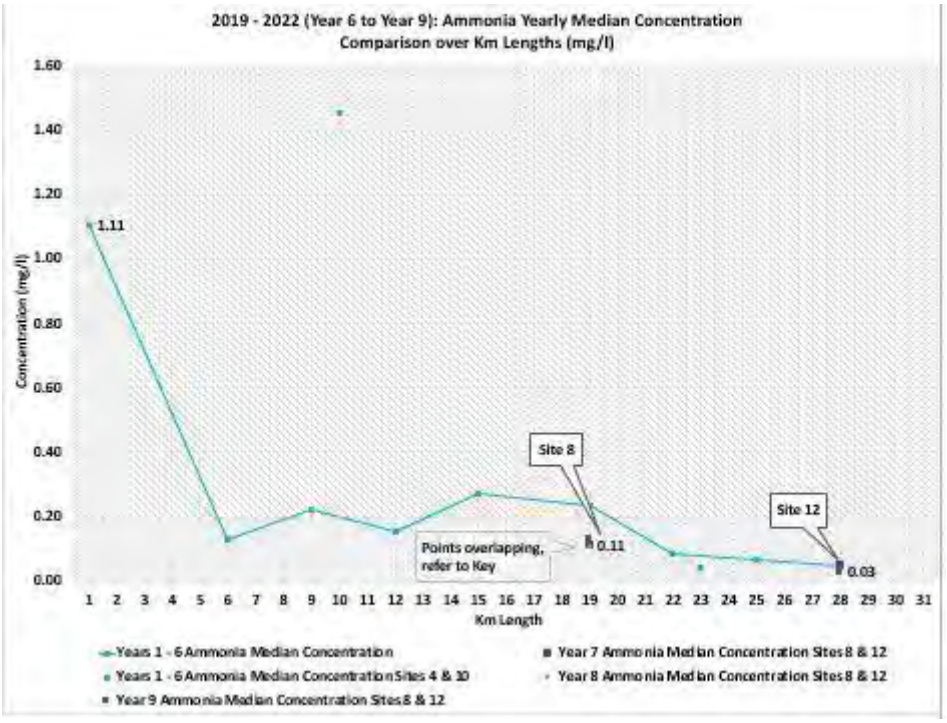

Figure 2.8: summary of ammonia concentration data for the nine year data set

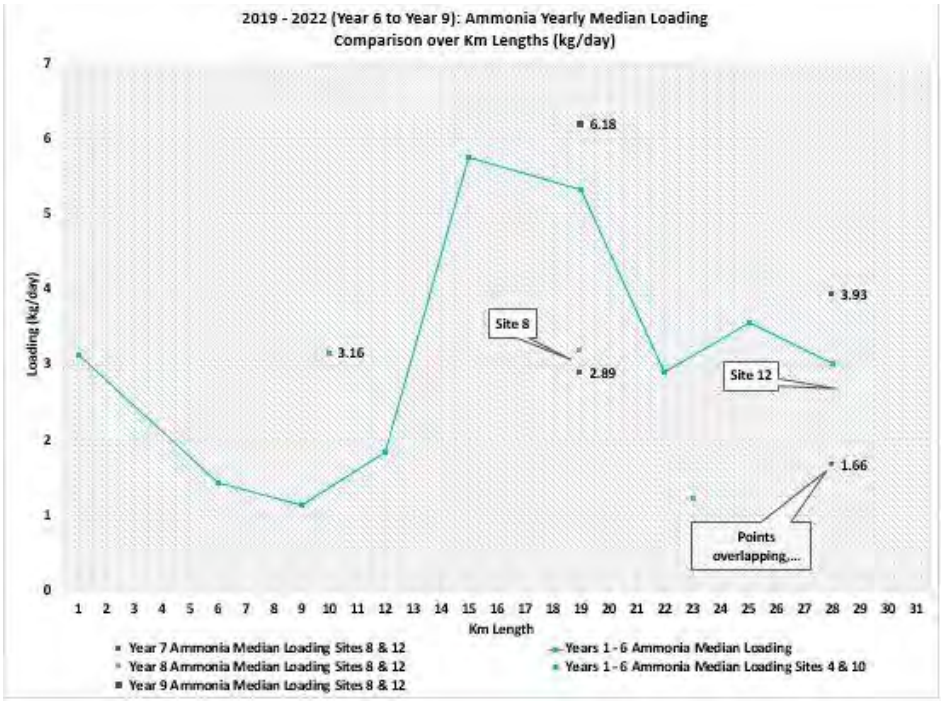

Figure 2.9: summary of ammonia loading data for the nine year data set

The key points from the data are as follows:

- The year 1 to 6 data are summarised as an overall trend line for phosphate and ammonia concentrations and loading along 28km of the river corridor from near the river's source in Harrow to the lower reaches in Twickenham
- Phosphate concentrations (Figure 2.6) fall steadily with distance downstream to km 23 – where there is a major input of phosphate as part of the inflow from the Upper Duke's River

- This input is also seen in the loading data (Figure 2.7) – with an average 8kg/day jump in phosphate across this confluence
- There is evidence that the river is able to remove phosphate (Figure 2.7), with the total loading reducing along several reaches. The main means of reduction is thought to be sedimentation
- Data from Years 7 to 9 (Figure 2.6 and 2.7) show evidence of increased phosphate concentrations and loadings over the last three years
- Ammonia concentrations (Figure 2.8) in Years 1 to 6 were high at the two sources (Headstone and Newton Park) at above 1mg/l – typically the threshold for poor water quality
- Concentrations reduce rapidly with distance downstream – although there is evidence of further inputs in the middle reaches between Yeading Brook Meadows and Cranford Park. This is particularly evident on the loadings data (Figure 2.9), which show a doubling of ammonia loading through this part of the river to around 6kg/day
- The Lower Crane has low ammonia concentrations and shows good evidence of being able to remove ammonia from the river system. Loading reduced by around 3kg/day downstream of Cranford Park despite there being a further input from the Upper Duke's River. Ammonia is largely removed from the river system by oxidation
- Data from Years 7 to 9 indicate that concentrations have reduced over the last three years, although the loading data are more ambiguous

Over the last year we have further reviewed our approach to water quality sampling with reference to:

- The Smarter Water Catchments Water Quality Monitoring Plan (see Appendix 1) – produced by ZSL in 2022
- The value of the quarterly data sets – concluding that in general the quarterly data collected over the last three years have not added significantly to our understanding of the water quality in the Crane valley
- The change in approach by the Environment Agency (EA), which has increased the number of sites in the Crane catchment where they take monthly samples to around a dozen. These samples are analysed for a large suite of parameters including ammonia and phosphate

In the light of these findings, we have decided to discontinue our monthly water quality sampling and focus our attention on the monthly data being produced by the EA monitoring teams.

2.5 Sonde Data

The Citizen Crane team deployed sondes in the river during the initial part of the Smarter Water catchment programme and used these to develop an enhanced understanding of the catchment water quality. These findings are summarised in the Year 8 Report. One of the key findings was the appearance of regular (every 2 to 4 week) peaks in ammonia that lasted a day or so and were typically five to ten times the background concentration.

One or more sondes have also been deployed in the river for many years by the monitoring team at Heathrow Airport, located upstream and downstream of their main discharge point in Donkey Wood. There was however a gap in the recording period from December 2021 to November 2022. Since then, one sonde only has been actively logging water quality every 30 minutes. The data show occasional spikes to between 3 and 6 mg/l that appear to correlate with rainfall events. The spikes appear less regular than previously and are not seen outside of rainfall event periods.

2.6 Pollution Reports

The Citizen Crane team have received several reports of pollution incidents in the catchment over the last year as follows:

- Hydrocarbon pollution in the upper reaches of the Yeading Brook East. This issue has been ongoing for several years and is currently being investigated by Thames Water, EA and local volunteer group Harrow Nature Conservation Forum (see section 3.6 below)
- Sewage pollution in the western arm of the Yeading Brook. There have been several reports of sewage from at least two outfalls into the Yeading Brook at Yeading Walk – see the photo in Figure 2.10 below. These are being investigated by TW
- Hydrocarbon pollution in the Lower Crane and Duke of Northumberland's River. This incident was reported over two days in early 2023. A TW team investigated but no source was found, and the incident has not been repeated
- Effluent pollution at Hospital Bridge Road in the Lower Crane. This has occurred sporadically over the last year. It is typically reported to the Citizen Crane team through social media, and we alert TW and EA staff. An investigation is ongoing by the TW SWOP team

Observations on these reports are as follows:

- There have been positive and rapid responses from the TW operations team in all these cases and the EA team has followed up where appropriate
- The number of incidents, and their severity, appear to have reduced overall. It may though be too early to draw any firm conclusions from this
- No incidents have been reported from the middle reaches of the Crane. This may though be more due to the lack of public access and visibility, combined with the low number of visitors, over much of the middle reaches, rather than a lack of incidents

Thames Water has recently introduced a new on-line reporting system for pollution incidents https://www.thameswater.co.uk/help/report-a-problem#/view-and-report-problems. This was used successfully in reporting a recent (September 2023) pollution incident.

Figure 2.10: pollution incident reported by the public on the western arm of the Yeading Brook
Photo credit – Friends of Yeading Brook Walk.

Thames Water and the Environment Agency contribute information to the National Incident Reporting System (NIRS). The data from 2022 have been made available to the project team in a consolidated form and the following observations were made:

- There were 795 incidents recorded across the Thames Region in 2022 – of which three were Category One and fourteen were Category Two
- Ten incidents were recorded in the Crane catchment - seven of these incidents were Category 3 and three of them were Category 4
- Seven were from a foul sewer, three from a surface water drain and one from a STW
- Six were caused by sewer failure or overflow, two by below ground pipe failure, one by severe weather and one was not identified
- Three incidents were in Harrow, five in Hillingdon; one in Hounslow and one in Richmond borough

These data indicate that there are still regular sewer related incidents recorded in the Crane catchment, equivalent to around one per month.

2.7 Outfall Safari

In Spring 2023 the Citizen Crane team carried out a limited Outfall Safari along the eastern arm of the Yeading Brook. This is the third Outfall Safari carried out in the catchment, following the inaugural full catchment survey in 2016 and a follow up in 2021.

The full findings are set out in a report "Review of the Pilot Study to Innovate the Outfall Safari" and the key findings from our perspective are as follows:

- The survey visited around 50 outfalls and found they scored between 0 (clean) and 16 (grossly polluted)
- These scores were used to further prioritise the TW SWOP investigations in this part of the catchment
- For the first time the monitoring team also deployed a hand-held ammonia meter and this recorded levels of between 0.2 and 6 mg/l from the outfalls
- There was a far from perfect correlation between the outfall scores and the ammonia readings
- The survey also tested a new methodology to provide a unique ID for each outfall using the What 3 Words app

Considering these findings we note:

- This reach of the river system remains the worst polluted of the entire catchment
- This is supported by the outfall safari scores, as well as the ammonia readings, which both indicate widespread effluent pollution issues
- TW are using these data to prioritise their SWOP investigations of this area
- A number of major pollution sources have been identified –though it is proving a challenge to remove these from the surface water drainage system. Note for example that one block of flats containing 60 units has remained as an identified but unresolved misconnection for most of the year
- The findings of this survey are also being used to update the wider approach to outfall safaris across the Thames catchment. The use of hand-held meters will be explored further and the provision of unique Outfall ID's is due to be rolled out to all outfall safaris across the Thames Region

There is further consideration of the issues in the Yeading Brook East in Section 3 below.

Note that a full Outfall Safari is scheduled for the Crane catchment in 2024. This will be third full Outfall Safari for this catchment.

3 Other Information

3.1 Combined Sewer Overflows

There are two major Combined Sewer Overflows (CSO's) in the Crane catchment:

- The Field End Road outfall feeds into the Yeading Brook East system
- The Bath Road outfall feeds into the middle Crane catchment. Note that this outfall is linked to the junction of two major trunk sewers (from the west and north) and was the source of the major pollution incident in 2011 which wiped out the ecosystem of the entire river downstream

Photos of the two outfalls are shown below as Figures 3.1 and 3.2 below.

Figure 3.1: Field End Road CSO (left) Figure 3.2 Bath End Road CSO (right).

Both CSO's are major structures and appear capable of providing major outflows to the river system. Evidence from the major pollution event in 2011 indicates that outflows from the Bath Road CSO at this time were several times the rate of the natural river flow for two or more days.

Thames Water started monitoring outflows from Field End Road in 2019 and Bath Road in 2020. In January 2023 TW started to publish live data from all their CSO sites – known as Event Duration Monitoring. This website contains all data for the CSO's: https://www.thameswater.co.uk/about-us/performance/river-health/storm-discharge-data.

Event Duration Monitoring data for the two outfalls is re-produced below in Table 3.1. below:

Table 3.1: EDM data from the Two Crane Valley CSO's.

EDM	Time Start	Time End	Duration Mins
Bath Road	12/01/2023 12:55	12/01/2023 13:22	27
Bath Road	16/01/2023 11:45	16/01/2023 12:45	60
Field End Road	03/11/2022 06:40	03/11/2022 10:05	205

The following points are made from these data:

- This is the first time we have seen any data on the operation of these CSO's
- Both CSO's discharged during the 2022/23 period
- Discharges from Bath Road are a particular concern because (a) this is known to be a deep and large diameter trunk sewer and (b) outflows from this CSO devastated the river in 2011
- The fact that there were two discharges from the Bath Road outfall suggests that it is a not infrequent occurrence, and this raises a significant concern as to the actual impact and the potential risks associated with this outfall
- EDM monitoring only measures the duration of the outflow and not the volume of effluent that is discharged
- The Field End Road outfall flowed for over three hours in November 2022
- The area around Field End Road is known to be a source of major pollution issues for the Yeading Brook East, some at least of which are caused by misconnections, and these are currently being investigated by TW. We will ask them to include this CSO in their ongoing investigations

These data show for the first time that both CSO's are active. In the absence of flow monitoring the scale of the impact cannot be assessed. However, given the size of the outfalls and the impact of the 2011 event these appear to represent potentially major pollution sources for the river. The Government is looking for water companies to reduce the spillage from CSO's to 10 times or less per annum. Our view, given the size and impact of these CSO's, is that the risk of discharge from these two outfalls needs to be reduced to a much lower level than this.

3.2 Thames Water SWOP Programme

The Surface Water Outfall Programme is managed by Thames Water and uses contractors to identify misconnections in the drainage network where properties have plumbed into the surface water drainage system (and consequently the river network) rather than the sewerage system.

Thames Water started its Surface Water Outfall Programme (SWOP) in the previous five-year business cycle (AMP6) from 2015 to 2020 and has continued the SWOP during AMP7.

TW data on the SWOP (to September 2023) are provided in Table 3.1 below.

Table 3.1: TW SWOP Data for AMP6 and AMP7.

	Outfalls	Misconnected Properties Identified	Misconnected Appliances	Misconnected Properties Rectified	Outstanding Misconnected Properties
AMP7 SWOP – Live projects	8	36	408	23	13
AMP7 SWOP – Signed off by the EA	12	137	350	135	2
Waiting List	11	0	0	0	0
Total	**31**	**173**	**758**	**158**	**15**
AMP6 SWOP – Signed off by the EA	39	470	1278	455	15

The following points are made from these data:

- 39 outfalls were signed off in AMP6
- Initial progress in AMP7 was slowed by the pandemic. However, with 18 months to the end of the cycle, the SWOP team are on target to sign off the same order of outfalls over the full five-year period
- The number of appliances per misconnection has increased from below 3 to over 4
- However, the average number of misconnected properties per outfall has reduced (from 12 to 8)
- This may indicate that the misconnection problem is increasing at a household level – even as the SWOP programme is removing the moss grossly polluted outfalls
- It is likely that a further 1000 misconnected appliances will have been removed from the surface water network by the end of this five-year AMP cycle
- Ongoing problems at Hospital Bridge Road – see section 2.6 above – indicate that new* misconnections continue to be added to the network. *Note that the Thames Regional Misconnections Group reported that new misconnections may be added at a sufficient rate that an outfall needs to be put back on to the SWOP programme around ten years after it was first signed off.

In addition, the TW team are also now using the SWOP programme to identify and remove sewer – surface cross-connections from the network. Over 2000 defects have been reported and resolved to date across the Thames Water region in AMP7 as follows:

- Blockages - 352
- Gully dividers – 203
- "Poor housekeeping" – 110
- Private defect – 132
- Missing surface water caps - 1274

These illustrate the scale of the cross-connection issue at a regional level.

In summary:

- The SWOP continues to be effective in removing misconnected properties from the river system
- The identification and rectification of cross-connection problems is also key to enhancing river water quality
- The addition of new misconnections is a major issue that needs prioritising

The Citizen Crane team will continue to work with TW, not least through the Crane Interest Group (see 3.4 below), to tackle the ongoing issues.

3.3 Water Framework Directive Classifications

The Water Framework Directive (WFD) regulations introduced a rigorous method of evaluating the ecosystem value of catchments across the UK. The Crane Valley is divided into three catchments:

- Main Crane
- Yeading Brook – upstream parts of the river
- Portlane Brook –minor catchment included in the Crane valley catchment in 2022

In the period up to 2016 the WFD Classification was undertaken regularly whereas since then it has been undertaken every few years. Tables 3.2 and 3.3 below show the WFD Classifications over the period from 2013 to 2019.

Table 3.2 WFD Data for the Main Crane.

Classification Item	2013	2014	2015	2016	2019
Ecological	Poor	Poor	Poor	Poor	Moderate
Biological quality elements	Poor	Poor	Poor	Poor	Moderate
Fish	Poor	Poor	Poor	Moderate	Moderate
Invertebrates	Poor	Moderate	Moderate	Moderate	Moderate

Table 3.3 WFD Data for the Yeading Brook.

Classification Item	2013	2014	2015	2016	2019
Ecological	Moderate	Moderate	Moderate	Moderate	Moderate
Biological quality elements	Poor	Poor	Poor	Poor	Poor
Invertebrates	Poor	Poor	Poor	Poor	Poor

The following points are made from these data:

- The data in Table 3.2 show the impact of the major pollution incidents in the middle parts of the river in 2011 and 2013. By 2019 the key elements had improved from Poor to Moderate classification
- The data in Table 3.3 show the poor overall condition of the Yeading Brook sections of the catchment over this six year period. Note that these sections are upstream of both major pollution incidents and were unaffected by them

A review of the WFD data was carried out in 2022 and published in 2023 here: Crane Rivers and Lakes Operational Catchment | Catchment Data Explorer. A full update was provided for the main Crane and partial reviews for the other two catchments. There has been no update made to the overall status of the Crane catchment waterbodies as this was a partial review only. The next full classification of the Crane Catchment is due in 2025.

The data for the main Crane are presented in Table 3.4 below.

Table 3.4: WFD Classifications 2022 for the main Crane.

	2019 Class	2022 Class
Overall Water Body Status	Moderate	Not assessed
Ecological Status	Moderate Very Certain	Moderate Very Certain
Biological quality elements	Moderate Very Certain	Moderate Quite Certain
Fish	Moderate Quite Certain	Moderate Quite Certain
Invertebrates	Moderate Uncertain	Good
Macrophytes and Phytobenthos Combined	Moderate Very Certain	Moderate Uncertain
Macrophytes Sub Element	Moderate Very Certain	Good
Phytobenthos Sub Element	Moderate Quite Certain	Moderate Quite Certain
Physico-chemical quality elements	Moderate Very Certain	Moderate Very Certain
Acid Neutralising Capacity	High	High
Ammonia (Phys-Chem)	Good	High
Biochemical Oxygen Demand (BOD)	Moderate Quite Certain	High
Dissolved oxygen	Poor Quite Certain	Good
pH	High	High
Phosphate	Poor Very Certain	Poor Very Certain
Temperature	Moderate Uncertain	High
Hydromorphological Supporting Elements	Sup Good	Sup Good

The following points are noted:

- Five* parameters have improved and none have declined
- Invertebrates and Macrophytes have moved from Moderate to Good Status
- Dissolved Oxygen has moved from Poor to Good Status
- Ammonia has moved from Good to High Status
- Temperature has moved from Moderate to High Status
- Two parameters (fish and phytobenthos – algae and diatoms) remain as Moderate
- One parameter (phosphate) remains as Poor. Note that the WFD Class for the boundary between poor and moderate status is around 0.2mg/l and the lower half of the Crane catchment is typically at or below 0.2 mg/l (see Fig 2.6 above)

*Note that a sixth parameter (BOD) is not on this list and is reported to have improved from Moderate to High.

A partial review of the other two catchments was undertaken and these changes were noted:

- Invertebrates Class in the Portlane Brook improved from Poor to Moderate
- Ammonia Class in the Yeading Brook improved from Bad to Poor

These improvements in the WFD Classifications are very encouraging. The changes for the main Crane in particular indicate that the longer-term objective in the Crane Catchment Plan, of achieving Good Ecological

Status by 2020 is achievable. The Yeading Brook remains in a largely Poor condition but even this is an improvement on the Bad status it held in 2019. The positive changes in the Portlane Brook – which has been outside the scope of the Citizen Crane and Smarter Water Catchment programmes until 2023 – are also encouraging, although this also acts as a caution on allocating too much of the credit to the work of these programmes.

3.4 Crane Interest Group and Crane Working Group

In 2022 TW set up a Crane Interest Group (CIG) in response to questions from the Citizen Crane team about the operation of TW infrastructure and how this interfaces with the river ecosystem. The CIG includes around 10 TW operatives with key interests in this sector. This group has met several times and is considering issues such as:

- The large number of domestic misconnections that are sitting with local authority EHO's for investigation and how to reduce this
- Data to assess the rate at which new misconnections are being added to the river system
- The role of sewer cross-connections into the surface water drainage system as pollution sources
- The approach to the specific pollution issues at Yeading Brook East – which has led to this being prioritised by TW and added as a milestone for the SWC programme
- Approaches to raising the profile of misconnections and other pollution risks with the public
- Hydrocarbon pollution in the Newton Park wetlands – see also section 3.6 below,
- Potential linkages to TW's Surface Water and Drainage & Wastewater Management Plan proposals for the Crane Valley

In 2023 the Environment Agency set up the Crane Working Group (CWG), providing a similar facility for EA work in the Crane Valley. The Citizen Crane team has held and initial meeting with this group in summer 2023 and a joint meeting of the CIG and CWG was held in October 2023.

3.5 Newton Park Investigations

In 2022 the SWC programme funded local volunteer body the Harrow Nature Conservation Forum to carry out investigations of the hydrocarbons that were identified from around 2020 as entering the Newton Ecology Park and Newton Park wetlands, towards the top of the Yeading Brook East catchment. Investigations into this problem are also being carried out by TW and LB Harrow. The findings to date are:

- A suite of hydrocarbons are entering the wetland system and hydrocarbon gases are also causing health issues to local home owners
- One hydrocarbon source was tracked down last year
- The main source may be contaminated land upstream that is leaching into the surface water drainage network – although various business operations are also being investigated

Investigations are ongoing with a view to resolving this issue.

3.6 Chemicals of Emerging Concern

A project led by a team from Imperial College has been sampling the River Crane and River Chess to investigate "Chemicals of Emerging Concern" or CEC's as part of the Smarter Water Catchment programme. The project is almost complete and a summary of the findings to date are as follows:

- Overall, the total CEC concentrations in the River Crane were similar to measurements in other rivers in the London area
- The vast majority of compounds measured at various sites across the catchment presented insignificant environmental risks, but eight presented low risks and four represented medium risk. Of these, six compounds have been highlighted on EU watch lists as chemicals of emerging concern
- These are the antibiotics clarithromycin, azithromycin, sulfamethoxazole, the antidepressant venlafaxine, the anti-inflammatory drug diclofenac and the pesticide acetamiprid

The project team for the Chess have indicated that they may continue their investigations and we shall keep in contact with them regarding any further findings.

3.7 Related Activities by the SWC Team and Partners

The Smarter Water Catchment programme is encouraging the implementation of a range of river enhancement schemes with associated monitoring – using the RMI sampling method and the MORPH geomorphological assessment tool - among other approaches. These sites and schemes are noted below:

- Lower Crane Restoration programme. This programme is tasked with enhancing parts of the lowest 3km of the river corridor, which is straightened and lined with concrete. A pilot site was delivered in 2022, which included 30 metres of concrete bank removal and the creation of a backwater area, alongside new in-river marginal berms and gravel added to the concrete riverbed. The scheme has bedded in well over the first year and RMI data show an improvement from a score of 2 to 6. We were very encouraged to see how such a small-scale intervention can transform the value of the local ecosystem. As a result, the team are now moving forwards with further interventions in the Lower Crane over the next two years.
- Mill Road in Crane Park. This is the furthest downstream of the regular monitoring locations (RMI Site 12). The site has become increasingly shaded by vegetation over the last few years and this is likely to have impacted the ecological value of the reach. The intention is to reduce the shading this winter and see how this might affect the RMI score as well as potentially encourage some aquatic vegetation into the site.
- Little Park and Pevensey enhancement works. This scheme includes the improvement of around 500 metres of river corridor upstream of Crane Park Island (RMI Site 11) alongside the creation of around half a hectare of new and enhanced wet woodland and associated ditches. MORPH surveys have been carried out before and after these interventions and a new RMI site is being set up by a local Friends group.
- Brazil Mill Wood and Donkey Wood. The river runs through these sites for several kilometres, including RMI Site 9 at Donkey Wood. There is evidence (see section 2.2 above) that the new Heathrow glycol treatment system may be providing significant benefit to this reach. However, much of the reach remains largely in shade. There are funds available to enhance the light input and associated geomorphology of this reach over the next few years.

- Frogs Ditch. This small stream drains an area of Hillingdon to the west of the Crane and includes run-off from the M4 as well as Cranford Park downstream. A report by ZSL several years ago, as part of the Citizen Crane programme, identified considerable pollution linked to the run-off as well as sewage inputs from further upstream. Work is being carried out this year to enhance the geomorphology of the stream through Cranford Park and early plans are being developed to create new wetlands to help deal with the road pollution.
- Minet Country Park. The river in this area has very low RMI scores of 1 or 2. It is in a poor geomorphological condition and is not generally visible for much of its length – so there may be unrecorded pollution sources entering the river. It is hoped to investigate this part of the river system further through the SWC programme.
- Spider Park. LB Hillingdon has recently implemented improvements along this reach of the river and more are planned through the SWC programme. RMI Site 2 has been re-instated in order to complement this programme.
- Gutteridge Woods and Ten Acre Wood. Geomorphological enhancements are in the feasibility stage along this extensive reach of the upper and middle river corridor.
- Yeading Brook West. Geomorphological enhancements are in the feasibility stage along this extensive reach of the upper river corridor. A new site (RMI Site 1b) has been set up at Yeading Walk in support of this programme.
- Headstone Wetlands. This major wetland was created in 2021. The SWC team is monitoring the wetland ecosystem with local volunteers. Generally, the ecosystem has developed well and is supporting high value wildlife populations. However, in summer 2022 a combination of poor water quality inputs, and an extended period of hot and dry weather, caused the system to turn anoxic and kill off most of the wetland invertebrates. We were pleased to note that the ecosystem recovered in the early Spring and survived well in Summer 2023. Ongoing monitoring will be used to assess the vulnerability of this ecosystem, and help identify measures to manage this, which will be of value to this and other urban wetlands. This will include a modification of the RMI system for assessing the ecosystem value of urban wetlands. Note that RMI Site 1 is immediately downstream of this wetland.
- Newton Park Wetlands. As noted above this wetland, constructed in 2018 at the top of the eastern arm of the Yeading Brook, is vulnerable to both sewage and hydrocarbon pollution. Previous Citizen Crane investigations have identified a high hydrocarbon sediment load in the wetland basins. We hope that ongoing work by TW and others will help to identify and reduce these loadings and reduce the vulnerability of this wetland system. RMI Site 4 is immediately downstream of this wetland system.
- Longford River in Hanworth Park. Initial RMI monitoring has indicated that this ecosystem is performing in a sub-optimal manner. LB Hounslow has plans to enhance the geomorphology of the River through the park, including taking large parts of it out of culvert. There is as yet no timescale for this work.

These and other schemes will be monitored to identify any local environmental and geomorphological benefits. We also hope to see further cumulative benefits at our regular monitoring points, in due course, as the scale and scope of these interventions increases over the next six years of the Smarter Water catchment programme to 2030.

The Smarter Water Catchment fund is supporting a major programme of geomorphological investigations. Urban River Surveys have revealed that large parts of the catchment are in a poor to moderate condition - with short sections in culvert, longer sections in concrete, and large parts of the rest of the channel straightened, deepened, widened, toe-boarded or otherwise disconnected from the flood plain, as well as being over-shaded.

The Modular River Survey (MORPH) is now being applied to refine our understanding of the river morphology and the potential for improvement. Our Citizen Crane programme has been expanded to help train and support volunteers to apply these techniques in the field. This work is being used to help design many of the remediation schemes listed above and ongoing monitoring is proposed to help tweak and optimise these schemes in the medium to long term.

3.8 Related Activities Outside of the Catchment

The Citizen Crane team have been in discussion with LB Harrow about the development of the DEFRA Policy Challenge, produced as part of the Silk Stream project on the River Brent to the east. This document considers the key issues regarding water company infrastructure and the river ecosystem, many of which have examples in the Crane Catchment.

The Citizen Crane team has also contributed to a Policy document, produced by the Catchment Partnerships in London (CPiL) group, regarding the plans for the next five years of water company activities (to be set out in the AMP8 programme – 2025 to 2030).

Members of the team are also contributing to a national review of citizen science activities in the water and environment sectors funded by DEFRA.

The Citizen Crane team understands from the project team on the River Chess that measures are proposed to add Phosphorus treatment to Chesham Sewage Works in the next round of water company investments to 2030. The Colne and Chess catchments are a major source of phosphate into the Crane, via the Upper Duke's River, so any proposals to reduce these inputs are to be welcomed.

4 Communications and Engagement

This section identifies the key means of communication and engagement between the Citizen Crane team and a wider group of interested parties, including the general public, as follows:

1. The Citizen Crane team works with a steering group - including EA, TW and CVP representatives and this meets every quarter.
2. The team is supported by a network of around 70 volunteers that carry out the monthly monitoring. Regular training is provided to support existing volunteers and identify new ones. These volunteers are also encouraged to join other Citizen Science initiatives being developed by the Smarter Water Catchment team – including the MORPH geomorphological surveys, bat surveys and water vole surveys. A monthly newsletter is sent to the volunteers to keep them updated.
3. The Smarter Water Catchment programme has an active Communities theme led by Let's Go Outside and Learn (LGOAL). This team has identified over 60 Community Groups with an interest in the river and associated open spaces. These linkages are already generating opportunities for projects and engagement of mutual interest and have led to the Citizen Crane RMI monitoring being expanded to several new sites for example.
4. LGOAL are also considering options for further supporting volunteers – including training qualifications such as AQA (Awards) and possible benefits of volunteering (a rewards scheme).
5. LGOAL and their communities team are also working alongside ZSL and others to consider how best to engage more widely across all local communities. An Equalities Diversity and Inclusion (EDI) plan has been drafted and the teams are working together to implement it.
6. The Crane Valley Partnership produces a quarterly newsletter that goes out to over 250 local interested parties and includes regular updates about the Citizen Crane programme.
7. The Citizen Crane forum is held every year and last year around 60 delegates attended at London Zoo
8. In the last year the Citizen Crane team has provided presentations, reports and updates to the following:
    - The Crane Valley Conference and associated State of the Crane Environment Report
    - ZSL London Citizen Science Forum
    - River Restoration Centre annual conference
    - Catchment Partnerships in London
    - Thames Rivers Trust
    - The National Connect Right Group
9. Social media continues to be a regular source of updates about general activities as well as pollution reports and information.

These activities are anticipated to continue and expand in the next year.

5 Conclusions

1. The Citizen Crane team is entering the tenth year of monitoring and evaluation of the ecological value of the Crane Valley ecosystem.

2. For many years we had noted that, despite considerable efforts and investment from many interested parties, there was little or no evidence of improvement in the ecological value of the river.

3. This was considered to be due to (a) the sheer scale of the issues to be dealt with; (b) a degree of inertia in the response of the system and/or (c) new issues being added at a comparable rate to existing issues being resolved.

4. This Year 9 report provides the first indications that the condition of the river system may slowly be improving – not everywhere and not definitively - but in enough places to generate some hope.

5. A major source of encouragement is the new WFD Classification produced by the Environment Agency, which indicates eight parameters improving over the three Crane Waterbodies, and none worsening, over the period from 2019 to 2022.

6. One significant improvement has been in the quality of the winter outflow from Heathrow balancing reservoirs. Last year was the first cold winter with full airport operation, and it is too soon to be confident, however the early results are promising. It will be interesting to see the cumulative benefits to the Lower Crane if this major source of sewage fungus is permanently removed.

7. There are many significant pollution sources remaining in the catchment – including misconnections, cross-connections with the sewerage system, road run-off (with the M4 being a particular problem in the middle of the catchment) and occasional pollution incidents. New TW data have also shown that the two CSO's in the catchment are active sources of sewage effluent.

8. In addition, we know that the geomorphology of the catchment is often poor to moderate – with short sections in culvert, longer sections in concrete and large parts of the rest straightened, deepened, widened, toe-boarded or otherwise disconnected from the flood plain and over-shaded.

9. The comparison with RMI data for other rivers across Greater London has indicated that the Crane is comparable to other rivers - with parts which are as bad as the worst and others that are better than most.

10. The Crane is though the only London river system shown by these data to be significantly self-cleansing. Previous Citizen Crane reports have shown that in-river processes are actively removing organic pollution and resulting in major improvements in ecological character towards the base of the catchment.

11. The cross London comparison also shows that there is nothing inevitable about the top of an urban river system being poor quality - in fact no other river shows this pattern – which has been a feature

of the River Crane since we started in 2014. This indicates that the problem should be entirely resolvable.

12. A further cause for hope in this respect is the intensive work by TW, the EA and LB Harrow, supported by teams of local volunteers, into the effluent and hydrocarbon pollution problems along the Eastern Yeading Brook, one of the two main tributaries of the Crane catchment. For some years we have recognised that this is the most highly polluted part of the catchment – and the London wide data noted in 11 above indicate it may be one of the most grossly polluted sections of river in Greater London. Major pollution sources have though been identified in the last year and some at least have been removed with others to follow.

13. The Smarter Water Catchment programme is delivering field scale interventions at several locations to enhance the value of the river ecosystem at a local level. It is hoped that these will be replicated across the catchment over the next six years of the Smarter Water Catchment programme to 2030 and ultimately create a joined up high value river corridor.

14. The Smarter Water catchment programme is also encouraging more collaboration between different interested parties. The new TW Crane Interest Group and the EA Crane Working Group are two examples of this. The Citizen Crane team are continuing to reach out to interested parties within the catchment, as well as at a regional and national level, where opportunities arise to discuss and share best practice and learn from each other.

15. The role of the Citizen Crane volunteers remains central. We are extremely grateful and proud of our volunteers who have continued for almost ten years now to go out every month to collect the base data necessary to deliver the Citizen Crane project. Each time the scope of the project has grown, and new opportunities have arisen to expand the volunteer role, they have responded enthusiastically to the challenge and opportunity.

16. The wider community also has a major role to play in the success of this programme – by reporting pollution issues and removing misconnections, as well as by encouraging and supporting the efforts of volunteers and the wider partnership through social media and other means.

17. We are more confident than ever that our long term objective of delivering WFD Good Ecological Status for the Crane Valley or, in the phrase we coined last year:

> "*An urban river corridor teeming with wildlife and unconstrained by pollution, serving as a vital community resource where people can connect with nature and improve their wellbeing*".

Can be achieved by the Smarter Water Catchment programme over the period to 2030.

Appendices

Appendix 1: Activities within the Water Quality Monitoring Plan and their status (WQMP)

Table A.1: Water quality and linked ecological health parameters and how they will be monitored.

What do we need to monitor	How	Who	Why	Location	Frequency	Status
Biological elements						
Macroinvertebrates	Riverfly Monitoring Initiative (RMI)	Citizen Crane	Long-term trends, detection of pollution events, community engagement	Multiple sites	Monthly	Ongoing (completed for Apr22 – Mar23)
Macroinvertebrates	Walley, Hawkes, Paisley & Trigg (WHPT)	EA	Long-term trends at three sites with 20 + years of continuous monitoring	EA site references 34166, 34254 and 34253	Minimum once every 3 years	Ongoing
Phys-chemical						
Multiple parameters including dissolved oxygen and ammonium	Sondes	Heathrow Airport Ltd	Trends/ wet weather response	Donkey Wood DNR Longford	Continuous	Ongoing (ZSL & CC now have access to live sondes data for 1 site)
Total ammonium nitrogen and phosphate concentration	Spot samples analysed at TW labs	Citizen Crane	Long-term concentration and load (by calculation with flow data)	Cranford and Kneller Gardens	Quarterly	Ongoing (now using EA data) Completed for Apr22 – Mar23)
Chemicals of emerging concern/watch list						
PFAS/ “forever chemicals”	Join a SWC research project on emerging chemical threats	Imperial Dr. Leon Barron	Support research with national impact	Multiple sites	Initial study in 2022/23	Report completed
Neonicotinoid insecticides	“”					“
Pharmaceuticals	“”					“

Table A.2: Known impacts on the rivers and how they will be monitored

Impact	How will it be monitored	Frequency	Status
All reported pollution incidents – frequency and severity	Environment Agency National Incident Recording System (NIRS) database Thames Water reporting system	Annual reports collated and analysed from the EA and TW	Completed and included in the CC Yr9 Report
Polluted Surface Water Outfalls	Outfall Safari (see notes below)	Every two years	Ongoing (completed for Yeading Brook East - June 2023)
Misconnections, cross-connections, and other forms of pollution entering via the surface water network	Thames Water and Citizen Crane to work together to define data needs and reporting processes on network issues	TBC	Completed
CSO discharges	Event Duration Monitoring by Thames Water	Continuous	Ongoing (data gathered for Apr 22 – Mar 23)
Inappropriate bankside activities and land drainage that cause silt contamination during wet weather – e.g. bank poaching	Modular River Survey (MORPH)	TBC	Training of volunteers and Cartographer support for roll out of annual surveys from 2024
Use of herbicide and pesticide near river e.g. poor amenity grassland management	Imperial study on Emerging Chemical Threats	Initial study in 2022/23	Completed (initial presentation has been given and final report due September 23)
Airport de-icing	RMI upstream and downstream of Heathrow outfall	Monthly	Ongoing (completed for Apr22 – Mar23)
Road runoff	No plans for more evidence gathering – hotspots have been identified Future evidence gathering will be linked to remediation projects		N/A

Working in partnership