Highway runoff: advice for catchment partnerships

Catchment Based Approach

Introduction

Across the UK's road network, highway runoff washes into the environment every time it rains. The runoff is polluted with microplastics, trace metals, hydrocarbons and other organic pollutants which enter our rivers; yet treatment of this pollution is too often absent or inadequate.

The pollution comes from tyre particles, fuel spills and other vehicle fluids, atmospheric deposition (mainly from vehicle exhausts), brake abrasion, road surface fragments, sediment and herbicides. These contain heavy metals and toxic chemicals such as polyaromatic hydrocarbons (PAHs) which have shown to be carcinogenic and hormone disrupting to aquatic life.

There are likely to be hundreds of thousands of highway outfalls across the country discharging this toxic mix into the water environment. Yet these outfalls are unmonitored and largely uncontrolled, despite the control of pollution from National Highways' road network being a statutory duty.

Appreciation of the nature and extent of highway pollution is very low despite pollution from towns, cities and transport officially contributing to 18 per cent of water body failures to achieve good status under the Water Framework Directive, and also despite rapidly growing public concern around river health. This figure of 18% is likely to be an underestimate due to inadequate monitoring and lack of data, and low appreciation of the issue.

Although an understanding exists of the presence and toxicity of substances in highway runoff and the ease with which they can enter watercourses, there is very limited data on runoff discharge volumes and pollutant concentrations. Further investigation is also needed into the impacts of these polluted discharges on ecological and human health (for example via freshwater recreation).

A report published in May 2024 by Stormwater Shepherds and CIWEM ('Highway Runoff and the water environment' https://www.stormwatershepherds.org.uk/wp-content/uploads/2024/05/Highway-runoff-and-the-water-environment-report-combined-LR.pdf) shines a light on the toxic cocktail of pollutants that runs off the UK's road network and into our rivers and water sources every time it rains.

This report identifies the problem caused by pollution from highway outfalls, estimating its scale, nature and cumulative impact, and considers the potential solutions through environmental permitting, funding streams and remediation. It seeks to raise the profile of highway runoff with highway authorities, the public and decision-makers, and ultimately significantly reduce its harm on the environment.

The role of catchment partnerships

In October 2024 CaBA's Urban Water Group, with Stormwater Shepherds, held a workshop in Wigan, focussed on the Douglas catchment, to explore the role of catchment partnerships in tackling the problem of highways runoff *(https://catchmentbasedapproach.org/learn/urban-water-management-and-guidance/*).

The workshop highlighted the important part that catchment partnerships can play in identifying and managing the impact of highways runoff on the water environment. They have a major role in using citizen science to collect data to highlight the magnitude and extent of the pollution, identify problem outfalls, and, using the information they have gathered, prioritise the outfalls in their catchment for applying solutions.

Catchment partnerships can also play a significant role in bringing together partners to design and implement solutions for managing the priority outfalls in their catchment.

By identifying the benefits for potential partners of a scheme, partnerships can be created to work at scale, using multiple sources of funding, to achieve multiple benefits, including managing pollution from highways runoff.

If catchment partnerships identify priority outfalls in need of remedial treatment in their Catchment Management Plan, then they can seize opportunities to manage the pollution from those outfalls when such opportunities arise.

In addition to working with partners to retrofit solutions to manage problematic highway drainage, catchment partnerships have a role in working with highways authorities to get effective highway runoff solutions designed into new road schemes.

The workshop also acknowledged that, given the massive extent of the problem, finding the money to pay for solutions is a huge challenge. Possible ways to pay for it were discussed. The workshop concluded that there is no appetite for new taxes at the moment to raise the funds to do this work at scale. However, catchment partnerships can work together to collect data and build effective schemes in partnership and measure their success. Using citizen science, catchment partnerships can locate priority outfalls and build a picture of the cumulative pollution load they are adding to catchments. By demonstrating the extent of the problem and proving that the process works in this way, we can influence Policy makers and budget setters to assign the resources to solve this problem.

Catchment partnerships can contribute to resolving the problem of highway runoff by:

- Locating sensitive receptors;
- Prioritising polluting outfalls;
- Gathering and sharing data;
- Recording polluting outfalls on Catchment Plans and River Basin Plans;
- Looking for opportunities to implement solutions across a catchment, and
- Identifying the benefactors of a scheme, and those who have an interest in the successful delivery of a scheme.

This work can create opportunities for habitat restoration and the creation of new habitats, and highway authorities will seek to deliver nature-based solutions for the outfalls, that deliver multiple-benefits for the local area. Take care, however, with runoff from trunk roads and motorways, which must receive pre-treatment before it enters a nature-based solution, to protect the nature within the solution from the gross pollution in the untreated runoff. Treatment schemes for highly polluted highway runoff must be pre-treated before we expect nature and natural processes to break down the residual pollution. Catchment Partnerships are perfectly positioned to support highway authorities as they identify opportunities and locations for these schemes.

The workshop developed a process for CaBA catchment partnerships to use to identify priority sites for managing highway runoff, which is set out in Appendix 1.

Example 1: Managing highway runoff from the M65 at Clayton le Moors

There are two outfalls from the M65 near Clayton le Moors that have been identified as high-risk outfalls. They discharge into tributaries of Hyndburn Brook. National Highways have identified an opportunity to install a treatment system in the carpark of a hotel adjacent to the motorway for one outfall. For the other outfall, they had concluded that there was not enough space for the installation of a treatment system on their land. However, there is a convenient package of land that would be perfect for the installation of a treatment scheme. By meeting with the local catchment partnership at the CaBA workshop in Wigan, National Highways learnt that the farmer that owns that piece of land works with the catchment partnership and might be open to discussions about using that piece of land. The catchment partnership said that they could initiate and broker the conversations with the farmer.

This example demonstrates the important role of catchment partnerships in brokering solutions to manage highways runoff pollution. It shows how the catchment partnership can act as a facilitator, working with partners together across a catchment. It also shows the importance of local knowledge and local contacts that the various groups working on a river catchment have.

Example 2: Stover Park

Stover Park is a beautiful Country Park near Exeter, with a variety of bird life and a large lake. The lake is a designated SSSI and it used to support an extensive population of water lilies, but the water quality in the lake was failing, and the water lilies were receding. Natural England contacted the Environment Agency to see if anything could be done to improve water quality in the lake, because they were compiling a Lottery Funding bid to restore the lake and they recognised that, in order for the restoration to be successful, they needed to improve the quality of the runoff entering the lake.

The team quickly identified that the biggest source of pollution entering the lake was the runoff from the A38 and worked with Devon County Council Highways and National Highways to develop a project to manage the runoff and to reduce pollution. This concluded when National Highways built a large treatment scheme, comprising two sediment traps and two reedbeds to reduce the pollution in the runoff before it entered the lake. There is now a project underway to remove the historic contaminated sediment from the lake and to deliver continued improvements.

This project was successful because of all the partners had mutually supportive interests and worked together joining up budgets to make it happen, and Devon County Council provided the land for the installations and agreed to carry out maintenance, for which they received a commuted sum.
Link to information about the project: https://nationalhighways.co.uk/national-highways-eco-drive-aiming-to-bring-water-lilies-back-to-devon-park/
Photo of the reedbed taken in Winter 2022:

Example 3: Highway runoff treatment pond on the Congleton Link Road

The Congleton Link Road was opened to the public on 16th April 2021. It was delivered by Cheshire East Council and its contractors. The design includes highway runoff treatment ponds that include closure devices at the outlet, to prevent pollution of the River Dane.

In addition to working with partners to retrofit solutions to manage problematic highway drainage, catchment partnerships have a role in getting effective highway runoff solutions designed into new road schemes. This example shows how pollution treatment devices can be included in a road scheme, but that they need to be designed into the scheme from the outset so that the extra land needed is included in the 'red line' of the site to make them possible.

The treatment pond for runoff from the Bypass

This is the closure device on the outlet from the pond. This can be closed in the event of a spill or an accident.

Appendix 1: A process for CaBA catchment partnerships to use to identify priority sites for managing highway runoff

Step 1
Identify sensitive catchments with upper sections that are impacted by significant highway runoff (start by looking at the map of National Highways priority outfalls and the locations of major roads with a high traffic density, and local knowledge). Find where the highway drainage outfalls are. (See the Thames21 Road Pollution Solutions Tool: https://www.thames21.org.uk/improving-rivers/road-run-off/).

Step 2
Look for other sources of pollution and other highway outfalls around the same location that will be increasing the pollution baseload – use maps of consented discharge points, and local knowledge. Remember to consider local roads as well as those from National Highways' roads.

Step 3
Identify existing data sources on pollution from the highway drainage outfalls, and gaps in the data. Gather data to fill gaps and support the case for intervention (this should be done in parallel with steps 4 and 5) This can include Riverfly sampling as well as chemical sampling.

Step 4
Look for sites that could be suitable for treating and managing the highway runoff. These are areas that would be suitable locations for interventions such as managed wetlands and retention ponds. Find out who owns and/or controls these sites, and who would benefit from their development as SuDS.

Step 5
Engage with the highway authorities responsible for the outfalls. Identify who else might have an interest. Consider what partnership arrangements might be made to deliver the interventions identified in Step 4. How will each potential partner benefit? What can they offer? What are their timescales? (for more detailed advice on developing projects and securing funding, see Section 5 of the 2020 CaBA guidance "Urban Partnerships: delivering sustainable urban water management through local action https://catchmentbasedapproach.org/learn/urban-water-management-and-guidance/)

Step 6
Work with the highway authority and the Environment Agency as solutions are delivered to make sure that the design is rigorous and the scheme will properly protect the water environment. This may include, for example, the scrutiny of hydrogeological risk assessments for discharges to ground.

Step 7
Once treatment schemes have been delivered in your catchment, work with the Partnership to keep an eye on the scheme and to make sure that the highway authority and other partners deliver all the necessary maintenance operations to keep the scheme in good working condition.