MAYOR OF LONDON

Road Runoff Water Quality Study

Executive Summary

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Greater London Authority
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1. Background

London's roads are harming London's rivers. This project has identified the roads that are making the highest contribution to river pollution and will help prioritise locations across the city where action should be taken to reduce river pollution.

Figure 1 – (clockwise) A fish kill on the River Lea, Olympic Park, Aug 2013 caused by road runoff; Water samples taken every 15mins during a rainfall event; and Road runoff entering the Hogsmill River

The study provides new and valuable information on pollutant concentrations to allow road owners and operators such as Highways England, Transport for London and Local Authorities to target key stretches of the most polluting roads to design and deliver water quality improvement interventions. This is the first study of its kind in the capital and sheds light on what is a little understood pollution problem affecting large parts of London.

Many of London's rivers are polluted; only one of London's 41 river water bodies is classed as 'good' – three are 'bad', five are 'poor' and the rest are 'moderate' under the EU Water Framework Directive. This means that our rivers are much less healthy than they should be, and that key species such as eel and barbel (a freshwater fish) find it hard to survive in London's rivers. It also makes some of our rivers unpleasant places to visit and enjoy.

According to the Environment Agency[1] the main reasons for poor water across England are agriculture and rural land management (31 per cent), the water industry (28 per cent) and urban and transport (13 per cent).

The focus of this project is to understand, identify and target ‘‘urban and transport’’ pollution, in particular pollution that runs off our roads after heavy rains - or road runoff - that contributes towards poor water quality in London. Until now there has been no evidence to help target resources to tackle river pollution coming from London’s roads.

Road runoff pollution happens when pollutants from oil spills and tyre and brake wear of vehicles build up on roads, especially in dry periods, and are then washed into nearby rivers when it rains. Trace metals, hydrocarbons and other organic pollutants carried into the river pose a significant threat to river health; runoff can carry over 300 different pollutants which can cause damage both in the short and longer term. In extreme cases, it can cause large numbers of fish to die in so-called ‘fish kills’.

Climate change is already resulting in longer dry spells interspersed with heavier downpours and this is expected to become even more extreme. This allows contaminants to build up on the roads during the dry spells which are then quickly washed into rivers when it rains. The impact of the road runoff will be more severe as the concentration of pollutants entering the rivers will be greater.

Locating and quantifying road pollution hot spots is extremely hard, making it difficult to prioritise where to focus interventions such as sustainable drainage systems (SuDS) and wetlands that can capture and treat pollutants before they reach rivers and streams. This project has identified those roads that have the greatest potential to contribute towards pollution in London’s rivers to help identify the best locations for interventions to address this issue.

[1] State of the Environment: Water Quality report 2018

2. The Project

The Environment Agency, Transport for London (TfL) and the Greater London Authority (GLA) have funded Thames21 and Middlesex University to develop a new model, which uses numbers of vehicles and types to predict the amount of pollution deposited on roads and the degree of damage to our rivers. The project was also supported by the Zoological Society of London, Thames Water and South East Rivers Trust.

This modelling is limited to outer London, because in outer London there is a separate surface water system. Surface water is rainwater that collects from roofs, driveways, drains and gutters. In outer London it drains directly to rivers through a separate surface water sewage system, whereas central London has a combined drainage system, where surface water drains alongside domestic foul water pipes to sewage treatment works.

The modelling for this project only applies to the major roads in outer London for which TfL have modelled or observed data around vehicle movements. This equates to nearly 40,000km, 75 per cent of London's major roads.

3. Key Findings

All the roads assessed have high potential for damaging river health. The top 5 per cent (around 3,000km), 10 per cent (around 5,500km) and 20 per cent (around 9,500km) worst polluting roads for the pollutants have been identified, as well as the roads which are likely to be causing the highest amount of pollution in outer London overall. The dark red roads on the map below show the priority roads to target interventions to address road pollution.

The project assessed six pollutants as a representation of over 300 pollutants contained in road runoff: zinc, cadmium, copper, total suspended solids, pyrene and benzo (a) pyrene. Each pollutant assessed has a different threshold for causing damage to river health based on the sensitivity of river species to each pollutant. Every road assessed was found to have high potential for damaging river health for at least two of the six pollutants, while some were found to have high potential for damaging river health for five pollutants. The reason the phrase 'high potential' is used, is because there may already be sustainable drainage systems present on some of these roads which would filter out the pollutants before they reach the river.

The map below shows the roads in London with the highest potential to pollute rivers and streams in London and which are therefore potentially causing the most damage to river health. The worst performing roads are spread across all outer London boroughs and include most of London's major arterial and orbital roads; the north and south circular and London sections of the motorway network.

An interactive map is available on the GLA website at https://www.london.gov.uk/what-we-do/environment/climate-change/climate-adaptation/water-quality

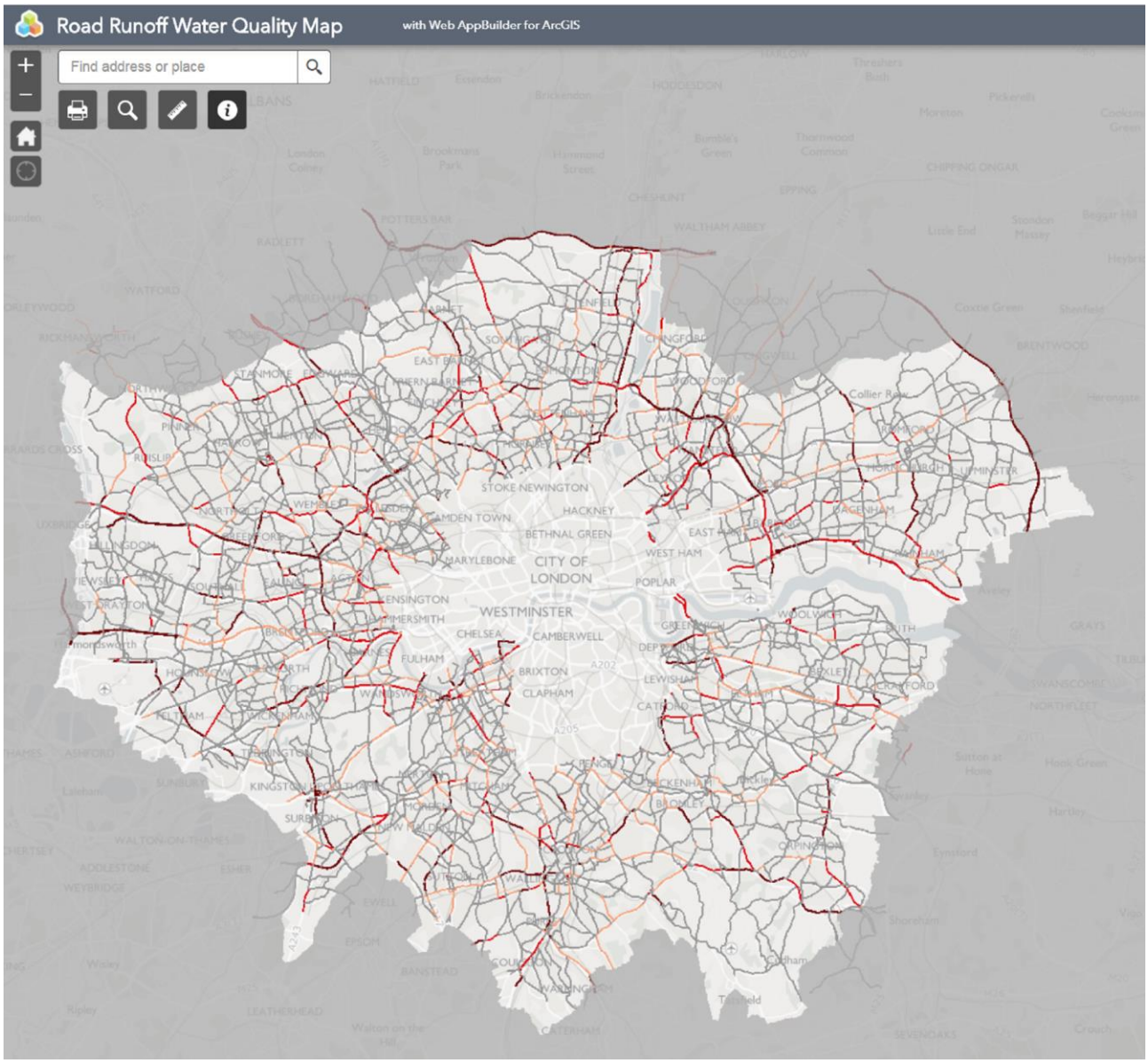

Figure 2 - Road Runoff Water Quality Mapping Application

The full technical methodology report can be found on the Thames21 website[2].

[2] www.thames21.org.uk/improving-rivers/road-run-off

4. How the findings can be used

London's roads are harming London's rivers. This project has identified the roads that are making the highest contribution to river pollution and will help prioritise locations across the city where action can be taken to reduce river pollution.

The study provides new information on pollutant concentrations to allow road owners and operators such as Highways England, TfL and Local Authorities to prioritise and target key stretches of the most polluting roads to design and deliver water quality improvement interventions.

The study can also be used by community groups and local authorities to help support SuDS planning within individual boroughs, ensuring that projects are designed to tackle water quality. These projects can be delivered through community funding grants and borough and water company funding for managing surface water. The Environment Agency also have an important role to play and will use the report findings to inform their work with catchment partnerships and to update the existing River Basin Management Plans in 2021 that are designed to protect and improve the water environment.

Key interventions to help address road runoff issues include sustainable drainage systems (SuDS) and wetlands. Both use natural vegetation and can be designed to suit the needs of each location to capture and treat pollutants. SuDS capture pollutants before they enter the surface water sewer and/or river and can be located at the roadside close to the source of the pollution. Wetlands can be used to treat surface water downstream. The result of this project can be used to help identify suitable locations to construct wetlands. These should be close to the surface water drainage network so that flows can be easily diverted into new wetlands to treat the polluted runoff before returning it to the drainage network or river.

SuDS and wetlands can also provide a host of additional benefits in these locations, including: reducing flood risk, improved amenity, greater biodiversity and localised air quality and cooling benefits. These solutions can be integrated into future highways works along these roads.

The results of this project will inform further work by the GLA and partners to identify the most appropriate type of roadside sustainable drainage system and identify new opportunities for wetland creation for priority locations.

In order to fund sustainable drainage in London the government's current approach to national flood risk funding needs to change to better enable sustainable drainage projects as a means of managing surface water. Sustainable drainage delivers wider environmental benefits including leading to improved water quality, which this cutting-edge project demonstrates, is needed in London.

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