Case Study

M4 J43–47, South Wales

SDS supports critical motorway improvements with innovative runoff pollution control

SDS Systems
SDS Aqua-Xchange™.

SDS Customer
Centregreat Engineering.

Client
Welsh Government.

Project
M4 Junctions 43 to 47 Highway Improvements.

Purpose
To safeguard the local environment from polluted highway runoff.

Brief to SDS
To provide a treatment solution capable of removing dissolved metals and other pollutants from surface water runoff discharged across multiple motorway junctions. SDS was engaged to deliver a treatment solution as part of the early delivery phase led by Centregreat.

Timing
Installation completed in July 2025.

Project Background Information
The M4 motorway is the primary arterial route across South Wales, serving as a vital link between west Wales, Cardiff, Bristol and the wider UK road network. However, congestion and environmental pressures along the route — especially around Swansea — have sparked widespread concern among commuters, businesses and policymakers.

Sections of the motorway between Junctions 43 and 47 were earmarked for improvements aimed at enhancing traffic flow and safety. Despite wider political debate and a review of future infrastructure investment, targeted works were approved by the Welsh Government to proceed on an interim basis, addressing urgent bottlenecks and environmental issues.

Among the environmental challenges was the need to mitigate the impact of stormwater runoff from the motorway, which carries harmful pollutants such as copper and zinc — a particular risk to nearby rivers and ecosystems.

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Project Objectives

To enhance the resilience and environmental compliance of the M4 corridor.

Project Requirements

The solution was required to remove dissolved and particulate-bound heavy metals from highway runoff while fitting within constrained verge spaces and functioning reliably without power supply or complex maintenance regimes.

Given the route's high traffic volumes and vulnerability to congestion, the treatment system also needed to be fast to install and fully self-operating in operation — with minimal disruption during both delivery and future maintenance.

SDS Product Features

SDS supplied and installed Aqua-Xchange™, the company's high-performance pollution control system comprising an engineered filter media designed to capture and process dissolved metals through ionic exchange and filtration.

Installed within chambers linked to the highway drainage network, SDS Aqua-Xchange™ is ideally suited for roadside applications and requires no external power. The system is robust and low-maintenance, making it particularly suitable for high-risk sites such as motorway verges and junctions where access is usually limited.

By intercepting and treating runoff before it enters natural watercourses, Aqua-Xchange™ supports compliance with water quality standards and helps safeguard downstream biodiversity.

Issues Overcome

The M4 Junctions 43–47 upgrade presented several site-specific challenges for managing highway runoff.

This section of the motorway serves as a key commuter and freight route in South Wales, carrying over 80,000 vehicles per day, including a high proportion of heavy goods vehicles. Runoff from this traffic contains elevated levels of dissolved metals, particularly copper and zinc, which pose a risk to nearby watercourses such as the River Tawe and its tributaries, as well as associated aquatic flora and fauna, including fish populations and invertebrate communities sensitive to metal contamination.

Previous environmental monitoring indicated that untreated highway runoff had the potential to exceed regulatory limits for metals, highlighting the need for an effective pollution control system. Natural Resources Wales (NRW) were consulted as part of the planning and early delivery phase, ensuring that any treatment solution would meet statutory water quality requirements and safeguard downstream biodiversity.

Given the high traffic volumes, tight verge spaces, and restricted access along the motorway corridor, the solution needed to be compact, robust, and fully self-operating without requiring power or complex maintenance. SDS Aqua-Xchange™ was selected as it could deliver high-performance removal of dissolved metals in these constrained conditions, ensuring rapid deployment and minimal disruption to road users while protecting sensitive ecosystems.

Results

The Aqua-Xchange™ system now plays a critical role in protecting local water bodies from harmful contaminants generated by road traffic along one of Wales' busiest transport routes.

Its deployment demonstrates SDS's ability to deliver targeted pollution control in complex highway surroundings — combining environmental stewardship with technical performance and delivery expertise.

Mark Manning, National Specification Manager, SDS, said: *"The Aqua-Xchange™ system provides a practical, effective solution for managing water quality on one of the busiest stretches of the M4. SDS worked closely with project teams to ensure the installation was efficient and disruption was minimised. Our expertise ensured the system would deliver long-term resilience while meeting strict environmental standards. This project demonstrates how sustainable innovation can be successfully integrated into critical infrastructure works."*