

## **The Long Term Monitoring of Pollution from Highways Runoff**

### R&D Technical Summary P2-038/TS

Highway surface runoff discharges may contain pollutants that have accumulated on the carriageway, particularly following periods of dry weather. These pollutants can then be transported via the surface water drainage system to discharge to ground or receiving watercourses.

Previous studies have demonstrated that highway runoff affects the quality of waters and sediments. Increased concentrations of metals, hydrocarbons and anions are associated with changes in the structure and functioning of biological communities.

The Highways Agency has a duty to ensure that discharges from the trunk roads and motorways do not pollute receiving waters. Various treatment facilities have been designed and incorporated into recent trunk road and motorway construction but these designs are based on predicted pollutant concentrations. The Highways Agency in association with the Environment Agency commissioned this study to collect data to improve the understanding of contaminants in routine non urban highway runoff and to examine the treatment efficiency of drainage systems and drainage devices in the non urban environment. Many of these systems have been installed to provide environmental protection through hydraulic control, but the potential for additional treatment was recognised.

These data will be used to assess the impact of highway runoff on receiving waters in order to assist in the future design of highway drainage systems.

There were six objectives for the research:

1. To undertake a programme of data collection for non-urban highways under a range of site conditions.
2. To create a database of flows, pollutant loads, rainfall and site details obtained during the study.
3. To identify key determinants and their concentrations in non-urban highway runoff.

4. To establish any relationships between pollutant concentrations and traffic flows, pollutant concentrations and rainfall totals, rainfall intensity, rainfall duration and antecedent dry periods.
5. To identify the treatment efficiency of a number of specified highway drainage types or combinations of treatment devices or facilities.
6. To evaluate the chemical and biological impact of highway runoff on receiving water quality.

The study was carried out by WRc plc over a 5 year period from December 1997. This involved the instrumentation and monitoring of non urban highway surface water drainage and the receiving water at 6 sites. The sites selected were in central Southern England. All sites had a minimum Annual Average Daily Traffic (AADT) of 15,000 vehicles/day. The sites had the following drainage types or combinations of treatment facilities: untreated runoff; bypass oil interceptor and dry balancing pond; oil trap manhole and sedimentation tank; full retention oil trap and wet balancing pond; untreated runoff and filter drain; and, bypass oil interceptor and wet pond/surface flow wetland. Each site was monitored for a minimum of 1 year. Continuous flow monitoring of the watercourse upstream and downstream of the highway runoff discharge location and continuous monitoring of rainfall were undertaken. Water quality samples and in situ measurements were taken at quasi-monthly intervals. Sediment samples were taken at the beginning and end of the monitoring period from the drainage system and from the watercourse. Highway runoff was recorded and sampled for 10 wet weather events during the monitoring period at each site. Flow measurement was undertaken at the point of discharge from the carriageway and liquid samples were taken upstream and downstream of each runoff treatment device. In addition to flow measurement in

