Work package 3 Sustainable assessment of measures and treatment systems for road runoffs

Objective

Technical, environmental, economic and socio-cultural parameters must all be taken into account in identifying the most appropriate sustainable blue-green drainage systems for road and highway management. In keeping with the EU WFD, such integrated solutions should also take into account that water in most areas is a key and scarce resource and that water with a good status is a basis for health, economic development and the quality of ecosystems. The integrated management of all water resources is the central component of river basin management plans encompassing within both densely populated urban and rural areas so that the generation and management of road runoff should be viewed as a resource with potential multiple values rather than a waste product to be disposed of. In all cases, road runoff management requires rethinking to cope with the quality dimension of the wet weather flows, taking into account a large number of conditions, constraints and opportunities.

Selecting and designing blue-green drainage systems, it is important to keep in mind not only a "how" but also a "why", that is, not simply select a "one-size-fits-all" solution but in each and every case be aware of receiving water quality as well as the environmental, ecological, and recreational values created by the solutions; increasing referred to as ecosystem services. Also sometimes the best solution for treatment may be unappropriated due to restrictions caused by space availability, topography, etc. A rigid way of selecting structures and control methods will not lead to sustainable solutions. Taking this "why" seriously, the entrance is open for robust solutions via sound scientific methodologies.

It is the objective of this work package to give detailed information of the functionality, performance and sustainability of a range of blue-green solutions, and to give it in a context that allows taking the "why" into account. That is, create a guide that contains detailed information on the whole palette of relevant blue-green solutions and create a tool that helps stakeholders choose the most appropriate system in a specific situation.

Description of work

Blue-green runoff drainage systems – in the UK known as SUDS (Sustainable Urban Drainage Systems) and in the USA are called stormwater BMPs (Best Management Practices) – refer to a range of both structural technologies and nonstructural measures that reduce impacts of stormwater runoff on receiving waters. A central characteristic of a blue-green system is its ability to mimic the predevelopment hydrology. The small-scale structural drainage systems are technologies tailored for low-impact development (LID). In general, structural blue-green systems offer opportunities to reduce flooding and erosion associated with runoff flows with the removal of pollutants. The nonstructural measures include a wide range of approaches, including regulations, management, and public education, with the purpose of reducing the spread of pollutants into the environment.

The first task is to conduct a comprehensive literature review of blue-green drainage systems to manage road runoff. It addresses large-scale structural storage solutions (such as retention ponds and constructed wetlands), infiltration systems (e.g. infiltration basins and trenches), transfer systems (e.g. swales and filter strips) and alternative surface materials (e.g. porous asphalt). It will then addresses low-impact development approaches relevant for road systems and how these can be implemented and operated. Finally it addresses nonstructural solutions. The review focuses on the design, function, performance, and sustainability of the solutions. It puts the solutions into a life cycle context in terms of costs, environmental impacts, services to the ecosystems, and recreational values.

The literature review constitutes the frame for the second task, a survey of guidelines for design, construction, operation, and maintenance of blue-green solutions. It frames the questions to rise in the survey. This task will investigate what guidelines are in use for treatment of road runoff and organize the information to give an overview of what is covered herein.

In the third task, a decision support tool helps the road planer to reach the objective of creating sustainable solutions for road runoff management. It consists of an easy-to-read guide compiled from the knowledge of task 1 and 2 as well as work pages 1 and 2. It develops a software tool that facilitates the selection of the most appropriate solution. It takes into account the cost-efficiency where cost is measured as both construction and operation costs and where efficiency is measured in terms of pollution reduction, enhancement of ecosystems, recreational values, and more.

The fourth and final task is a documentation of the knowledge and methods, where the tools are applied on specific cases and practical examples. These are structured as a training manual, leading the user from simple applications to more complex and interlinked issues. This task does not only exemplify the use of the knowledge and tools, but guides the user through the process of selecting the most sustainable solution in the specific case.