

RECENT EXPERIENCE OF SOURCE CONTROL IN SCOTLAND

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Diffuse pollution

During 1993 the Forth River Purification Board (FRPB), a predecessor body of SEPA, made a careful study of all the water within its area which was not of class 1 quality. Whilst good progress was being made toward the achievement of stated water quality improvement targets, which required a reduction of class 3 and 4 waters during the period 1990-95, continued improvement was becoming increasingly difficult. The study revealed that over half of the remaining poor quality water was due to diffuse pollution, and therefore out of the Board's direct control. Similar exercises elsewhere have revealed a similar statistic: the US Environment Protection Agency has recently reported that over 50% of pollution in the US is also due to non-point sources.

In the FRPB study these diffuse sources were identified as agricultural sources, pollution from abandoned mines and surface water from urban development. To tackle these sources the Board needed more than its statutory powers: it needed to develop partnerships with others able to influence land use and practices and to promote alternative practices which do not give rise to pollution.

In the case of urban drainage, this meant the promotion of source control measures, or urban best management practices (BMPs), which will allow urban development to be drained in ways which do not pollute rivers. A strategy was devised to bring these alternatives to traditional drainage methods to the attention of all those involved in the drainage process: clients, planners, designers and engineers.

Water Quality Strategy

Firstly the Board brought together all the data it had at its disposal and published a report⁽¹⁾ showing the impact of surface water discharges. Urban runoff was made one of the key areas of the Water Quality Initiative, launched in May 1994 and supported by a video⁽²⁾. Seminars and presentations on urban drainage BMPs were held for planners, drainage and highway authorities and developers, supported by a specially - written guide to BMPs⁽³⁾. And, probably most importantly, pollution prevention officers stressed the need for improved surface water drainage practices when consulted about consents to discharge surface water.

This strategy therefore aimed at all the levels involved in the specification and installation of drainage schemes, from concept through planning to construction. It has already produced some results in terms of installations in the ground, and many others are planned.

The work of the FRPB has now been assumed by SEPA which will continue to promote source control as a means of reducing water pollution from urban areas. As part of that promotion the Agency is working with Fife Council to develop a major urban area utilising source control. This will act as an important demonstration of the feasibility of source control in the UK, and also show the costs and benefits of this drainage alternative.

Source Control in Urban Development

The development area is a major expansion of Dunfermline, north of Edinburgh, covering approximately 5 Km². The area drains to a number of small watercourses which currently cause some flooding in the surrounding urban areas. Draining the new development using normal surface water sewers would be an expensive undertaking which has been costed at £6.4 million. There is therefore a considerable incentive for an alternative to be found.

Nevertheless, developing a large urban area using the principles of source control has presented a new challenge which has not previously been attempted within the UK institutional framework. The approach taken has been to plan a "strategic" drainage network of swales which utilise the topography of the area and connect existing areas of storage within the catchment. A new wetland area is also planned to be a major amenity feature and provide a large amount of storage. The interlinking swales will provide some storage, encourage water loss through infiltration and provide for water quality improvement.

The swales will drain the road network and also provide a route for site drainage throughout the development. Individual developers building parts of the new development will drain their areas into the strategic swale system subject to a maximum discharge limit. This limit is based on either the flow constrictions in the receiving watercourses or on the pre-development runoff. In either case the limit will not be great and each development will require source control and/or storage as an integral part of the design. In this way developers are not constrained to install any particular source control mechanism and are free to choose which best suits their design and site. Their impact on the overall drainage system is constrained, however, and the problem of excessive runoff is tackled at source.

Source Control Design

Source control measures, and the strategic swale system, will work to enhance water quality and should avoid the deterioration in quality which has accompanied such development in the past. Care is required, however, to ensure that the source control BMPs will actually deliver both water quality and flood attenuation benefits. To achieve water quality benefits designs need only cater for the twice per year storm, whilst flood attenuation designs would typically be designed to accommodate the once in 50 or 100 year event.

With careful design the BMPs can address both needs, but only if the designer is aware of the difference. The designer is also faced with the problem of predicting the performance of BMPs in the absence of UK guidance in their use. The Agency is therefore in discussion with the Scottish Office and a number of other interested parties with the aim of producing such guidance. This will draw largely on European and American experience in the first instance, but will be revised as experience in source control in this country develops.

References

- (1) Forth RPB (1994) "Urban Surface Water Runoff. Discharge quality, impact and extent of the problem in the Forth RPB". Forth RPB, Edinburgh, Scotland.
- (2) Forth RPB (1994) "The Water Quality Initiative". Video produced by Forth RPB, Edinburgh, Scotland.
- (3) Forth RPB (1995) "A Guide to Surface Water Best Management Practices". Forth RPB, Edinburgh, Scotland.
- (4) Schueler, T.R. (1987). Controlling Urban Runoff: A practical manual for planning and designing urban best management practices. Metropolitan Washington Council of Government, Washington, U.S.A.

Session 1- Chairman Richard Long Richard Long Associates

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Question Nick Orman WRc

What experience do we have of pervious pavements over time? do they clog up ?

Answer

We do not have UK data but there is a lot of data collected in Japan the USA and Continental Europe.

You do need to be very careful during the construction process as this is the time when the worst clogging problems can occur.

The French have porous asphalt cleaning equipment, they clean their road systems every 5- 10 years, depending on use

The rate of cleaning depends on where you are and what material is available to clog.

The important fact is cleaning methodologies do exist

Question Rod Hawnt Hydro-Logic Ltd

Why have we not heard anything from the NRA/EA on these issues.

Answer

I have no idea.

Thames NRA have been looking at source control but mainly from the point of view of reducing flooding. There is

not much interest in England and Wales in the water quality issues.

Question Pat Coleman Reid Crowther

With these infiltration methods is there not a liability on groundwater pollution ?

Answer

This is not a big issue in Scotland as aquifers are not used much for water supply, but it is an issue in Southern England on chalk aquifers.

You need to look carefully at the proposed infiltration system, you can use swales wetlands etc. if infiltration is not suitable.

The key is to tailor the solution to the site conditions.

Question Dave Walters Virtual Worlds

I have asked this question before but what is the difference between a polluted water course and a swale.

Answer

This is a tricky legislative issue. A swale is only wet for part of the year it is part of an effluent treatment system and is not a stream . Wetlands to treat pollution sometimes are the source of complaints because they appear to be being polluted.

Public education is a major issue.

Drainage authorities also argue that swales are not sewers so they are not liable for their maintenance.