The river basin management plan for the Solway Tweed river basin district 2009–2015

Chapter 3:
Achieving the environmental objectives

Contents*

*Appendices for this document are available on the SEPA website at:
www.sepa.org.uk/water/river_basin_planning.aspx

1. Introduction

This chapter outlines the actions and ways of working that are necessary in order to deliver the environmental objectives set in this river basin management plan. It also explains who has been involved in identifying what actions are necessary and who will then carry them out. This chapter also includes links to some of the other plans and processes that will contribute to the actions in this river basin management plan.

1.1 Managing pressures on the environment

To deliver the environmental objectives it is necessary to understand and appropriately manage the pressures on the water environment. This includes preventing increases in pressures that would cause deterioration in status and reducing those that are causing water bodies to be at less than good status. It takes into account pressure from on-going activities, such as water abstractions, and those remaining from past activities, such as engineering modifications. There are four main types of pressure on the water environment:

- pressures that affect water quality;
- pressures that affect water quantity;
- pressures that affect habitats;
- the presence of invasive non-native species.

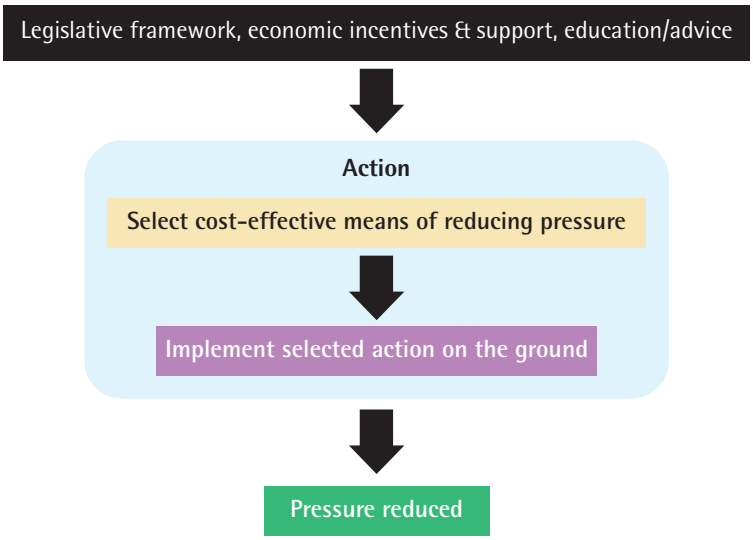
The programme of measures is a list of actions and mechanisms that will prevent water bodies from deteriorating in status or, where necessary, bring about the improvements set out in the plan:

- actions are used to reduce the negative impacts of a pressure, (eg treating sewage effluent before it is discharged into the water environment);
- mechanisms are used for promoting or ensuring action is taken (ie a regulatory requirement or economic incentive or a management agreement).

These actions are 'owned' and carried out by a range of different organisations, groups of people and individuals. An interim report will be produced in 2012 describing our progress in implementing this programme of measures.

The process of achieving environmental objectives by reducing pressure on the water environment is summarised in Figure 1.

Figure 1: Process of achieving objectives by reducing pressures on the water environment



1.2 No deterioration measures

No deterioration measures ensure that existing water uses are appropriately managed and, where possible, ensure new water uses include appropriate mitigation and are located where the water environment can accommodate them. Many 'no deterioration' actions can be achieved by simply observing best practice, for example following a general binding rule or implementing existing licence conditions. Many are ongoing actions ensuring the water environment remains at good status. These actions are often carried out by land and water managers and represent a significant contribution to ensuring the quality and quantity of the water environment. They can be tailored to counteract a possible negative pressure; for example the installation of a sustainable urban drainage system (SUDS) in a new development to collect run-off from new roads and prevent pollution of watercourses. They have an important part to play in ensuring the sustainable use of water.

Accidental pollution incidents

Preventing and reducing the impact of accidental pollution is an important part of protecting the water environment. Steps to prevent such incidents are a key objective of the broad legislative framework of environmental protection that is already in place. For activities requiring a permit or licence from SEPA or the Environment Agency (the agencies), accident prevention measures are included as conditions of authorisation. The agencies regulate a wide-range of activities through permitting systems, including the controlled activities described in the following sections. Major accidents involving dangerous substances can pose a particularly significant threat to human health and the water environment. The agencies and the Health and Safety Executive ensure that establishments where such substances are present in significant quantities have in place appropriate systems to prevent accidents and contingency plans to reduce impacts should they occur.

The agencies framework of environmental legislation also places responsibilities on those whose activities are not necessarily controlled by permitting systems, such as requirements in relation to the storage of oil. More generally, all those involved in the use, transport or disposal of a wide range of pollutants are under a duty to prevent environmental damage being caused by their activities and are liable should it occur.

Comprehensive and targeted guidance is available to help individuals and organisations take the steps required to avoid accidentally causing pollution of the water environment.

1.3 Improvement measures

An important part of the river basin planning process is the assessment of how much improvement is required to ensure that a water body will meet its environmental objective. This assessment begins the process of ensuring that the most appropriate action is selected.

These improvements can involve a mix of regulatory and voluntary actions. In some instances the land or water manager responsible for implementing the action will work with other agencies and voluntary bodies to ensure the improvements take place as quickly and as effectively as possible.

A number of actions are associated with other European directives (eg the Urban Waste Water Treatment Directive) but also contribute to achieving Water Framework Directive objectives. Appendix A contains a list of existing European legislation which will contribute to the programme of measures. Measures to improve protected areas can be found in Chapter 5.

SEPA and the Environment Agency are preparing pollution reduction plans which will provide the focus for co-ordinating work to prevent and reduce pollution by priority substances and other toxic pollutants. As well as helping achieve the objectives for protecting and improving the status of water bodies and for protected areas, the programme as a whole will:

- progressively reduce pollution by priority substances and cease discharges, emissions and losses of the most hazardous of these;
- prevent inputs of hazardous substances into groundwater and limit inputs of others to protect groundwater from deterioration: www.sepa.org.uk/water/groundwater/policy_legislation__guidance/discharges.aspx or www.environment-agency.gov.uk/business/topics/water/31785.aspx

1.4 Developing the programme of measure

In order to develop measures it is essential to understand the pressure impacting on a water body. Substantial work has been undertaken to establish this and it is detailed in Chapter 1. However, for some water bodies further investigations may be required to establish the specific cause of an impact. For all water bodies the extent of improvement required must be established; for more information see Chapter 2: www.sepa.org.uk/water/river_basin_planning.aspx

Where it is necessary to improve the quality of a water body, the most appropriate measure or set of measures has been selected by considering the following factors:

- cost effectiveness;
- technical feasibility;
- best option for the environment as a whole;
- expert judgement.

Many of the ways by which measures are selected are already well established. For example, the water companies in England and Scotland use a cyclical investment planning process known as the Periodic Review and Quality and Standards respectively, to determine their investment programme over a set period. SEPA and the Environment Agency work closely with the water companies to ensure that the most urgent environmental problems are addressed and that the biggest possible environmental improvement is delivered for any given amount of money spent on a project.

To help future appraisals of the costs and benefits of different options, we have contributed to a collaborative programme for research on river basin planning economics co-ordinated by the UK Government. The programme was established in 2004 and ran to 2008. Its outputs include methods for assessing cost-effectiveness, a database of benchmark costs for a range of different options for tackling pressures and a preliminary cost-effectiveness analysis of possible solutions for addressing the main pressures on the water environment[1].

There are three broad mechanisms which will ensure that measures, once identified, will be completed and these are:

- the regulatory framework
- economic incentives and advice
- education and advice

The Environment Agency has had a wide range of existing legislation which forms the regulatory framework for developing and implementing the programme of measures for some time. However, in Scotland new regulation was required and this is discussed in the box below. Appendix A contains a list of the existing regulation that underpins river basin planning.

SEPA's legislative framework

To help achieve the objectives, the Scottish Government has established a new, comprehensive legislative framework for controlling significant pressures on the water environment. At the centre of this framework are the Water Environment (Controlled Activities) (Scotland) Regulations 2005. The regulations require prior-authorisation for a wide range of activities liable to have an adverse impact on the water environment. The activities include:

- activities liable to cause pollution of the water environment;
- abstraction of water from the water environment;
- the construction, alteration or operation of impounding works (eg dams and associated water diversion) in surface waters;
- carrying out building, engineering, or other works in rivers and lochs or in the vicinity of those waters that are likely to have a significant adverse effect on them[2];
- artificial recharge or augmentation of groundwater.

The regulations provide for three separate tiers of control: authorisation under general binding rules, registration and licences. This allows the level of regulatory effort to be in proportion to the environmental risk posed by the activity. This, combined with the streamlining of previous disparate legislative controls into a single, cohesive system, makes the new framework a cost-effective means of ensuring improvements

[1]Defra, UK - Environmental Protection - Water - Water Framework Directive.htm

[2]The carrying out of engineering works in estuaries and coastal waters is controlled through a separate regulatory control regime administered by the Scottish Government.

This legislative approach is complemented by education and advice to help people understand how to meet legislative requirements, and economic incentives and funding to encourage and enable people to put advice into action.

Economic incentives and funding encourage and enable voluntary initiatives and ease the burden on those required to take action under the regulatory framework. Voluntary initiatives can make an important contribution to achieving the objectives. Many of those involved in such initiatives have considerable skills and experience in designing projects and of attracting support from the many public and private sources of potential funding.

Examples of economic incentives and funding support that will be used to help achieve the objectives include:

- Rural development contracts under the Scotland Rural Development Programme (SRDP). These provide financial support for voluntary initiatives by land managers and voluntary groups[3], including removal of river embankments, establishment of buffer strips alongside rivers and the creation of wetlands. In England the Rural Develop Programme is focused on improving the rural quality of life and the competiveness of the farming/forestry sectors.
- Funding of investment by Scottish Water/United Utilities/Northumbria Water to reduce pressures from water abstraction and impoundment for public drinking water supply and from sewage disposal.
- Restoration funding from Scottish Government to enable SEPA to provide financial support for restoration projects to address the impacts of past activities.
- Charges for water use licences issued under the Water Environment (Controlled Activities) (Scotland) Regulations 2005 and Water Resources Act 1991 which vary depending on the scale of the activity and the relative risk posed to the water environment.

Education and advice raise understanding of what needs to be done and why, encourage action and disseminate good practice. Education is a two way process: land managers, industry and voluntary organisations as well as public authorities all have knowledge and expertise to contribute. Sharing and applying this knowledge will help to achieve the objectives as cost-effectively as possible.

Initiatives to ensure that action is based on good information and advice include:

- bringing together experts from public bodies, industry and voluntary organisations in the Agencies various advisory groups (see Section 2.2 above);
- collaborating on research into new techniques for improving the water environment;
- consulting on proposed new legislation and guidance;
- publishing good practice guidance. Examples include guidance to farmers[4], forest managers[5], and those undertaking a wide range of other activities that can cause pollution[6];
- providing one-to-one advice to those responsible for pressures on the water environment. Examples include the work of Scotland's Environmental And Rural Services (SEARS) with rural land managers, and the work of the England Catchment Sensitive Farming Delivery Initiative;
- supporting voluntary groups involved in delivering education and advice;
- facilitating discussions between water users to find and agree solutions, for example through groups such as the Solway Firth Partnership.

[4]Agricultural Best Management Practices (BMPs)
[5]www.forestry.gov.uk/pdf/FCGL002.pdf/$FILE/FCGL002.pdf
[6]www.environment-agency.gov.uk/netregs/links/63875.aspx

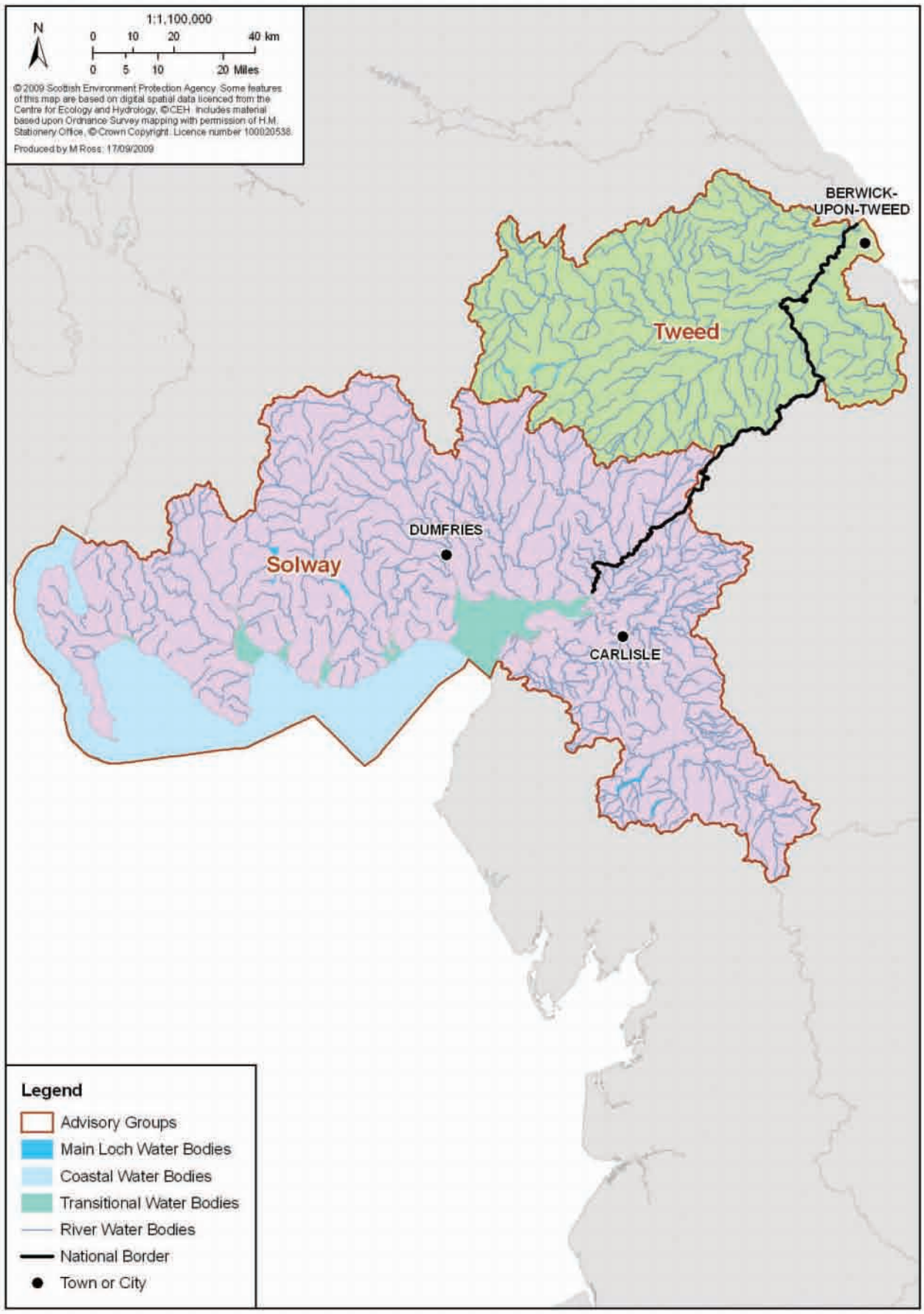
SEPA Restoration funds

To help achieve the planned improvements for 2015, SEPA will focus the funding available for restoration on encouraging, supporting and ensuring:

- the removal of barriers to fish migration other than barriers caused by dams that are the responsibility of a water user (eg Scottish Water, hydroelectricity generating companies, etc) or a public body;
- improvements to the beds and banks of rivers which will deliver multiple benefits and, in particular, complement efforts by farmers in priority catchments (see Section 3.1) to reduce diffuse pollution;
- co-ordination of the targeting of available restoration funding provided by the Scottish Government with other sources of public and private funding (eg under the Scotland Rural Development Programme) so funds are used efficiently;
- work with other public bodies and other organisations to help ensure implementation delivers multiple benefits (eg is co-ordinated with action to achieve biodiversity conservation objectives and work to implement fishery management plans and biosecurity plans produced by District Salmon Fishery Boards and Fishery Trusts).

An assessment of the resilience of the measures required to meet the environmental objectives to potential impacts of climate change has been undertaken. The results are summarised in Appendix B to this chapter.

Map 1: Area advisory groups in Solway Tweed



2. Who will deliver the plan?

There is a long history of managing the water environment in the Solway Tweed river basin district and there have been major improvements in water quality over the past decades. However, the requirements of the Water Framework Directive cover a wider range of water issues and therefore the range of actions that are now considered as part of the river basin planning process has also increased.

Successful delivery of the plan requires a partnership and co-ordinated approach bringing together the efforts of governments, public bodies, the private sector and the voluntary sector (see Table 1). Some organisations have a legal requirement to take river basin planning into account and others undertake actions on a voluntary basis or because it represents best practice. The formal legal responsibility extends to:

- SEPA and the Environment Agency (known as competent authorities in legal terms);
- responsible authorities in Scotland[7];
- public bodies in Scotland and England, which have a duty to have regard to the river basin plan (see Annex 1 Competent authorities).

Others are voluntarily involved, including wildlife trusts, rivers trusts and fisheries trusts.

Many of the plans, polices or projects run by these organisations will directly contribute to the success of this river basin management plan.

Area advisory groups have been set up to assist with the development of district and area management plans. These groups:

- bring together relevant public bodies, representatives of business sectors that use the water environment, land managers, voluntary environmental organisations and recreational users;
- provide a focus for communication and co-ordination between the different public bodies and for partnership initiatives between public bodies, the private sector and environmental non-government organisations;
- help secure integration by embedding our goals for the water environment into the plans and policies of their member organisations;
- advise on how the different ways of encouraging and ensuring action might be further developed to increase the cost-effectiveness of our programme of measures.

Table 1: Who will deliver the plan

Deliverer	Main role
Government	Governments (in both Scotland and Westminster) provide the legislative and policy framework for the river basin management plan and provide support by direct funding of the agencies and through indirect funding of the process through the agri-environment grant scheme. They also contribute to the funding of water company improvements.
Responsible authorities (Scotland only)	Responsible authorities have been identified as having a duty to consider river basin planning when carrying out their function. These organisations include: • Local authorities, eg through development planning; • Scottish Water, through the Quality and Review process; • Scottish Natural Heritage, through management and advice; • District Salmon Fisheries Boards, through fisheries plans and projects; • The Forestry Commission, through the Forest and Water Guidelines; • The Fisheries Committee.
Other public bodies	Public bodies must have regard to the Solway Tweed river basin management plan and any supplementary plans prepared under the Solway Tweed regulations in both Scotland and England. In England this includes local authorities and Natural England.

[7]Implementing the Water Environment and Water Services (Scotland) Act 2003: The Designation of Responsible Authorities

Table 1: Who will deliver the plan (continued)

Deliverer	Main role
National and local advisory groups	Advisory groups were set up by SEPA and the Environment Agency to help and advise the agencies on the river basin management planning. They will continue to support the implementation of this plan.
Voluntary bodies	Voluntary bodies can be responsible for carrying out large projects to bring about improvements including managing invasive non-native species alongside rivers, improving and installing fish passes and promoting best practices to farmers and landowners.
Individuals	Everyone can help to prevent deterioration and contribute to improvements. Examples include the wise use of water in the home and garden, voluntary conservation activities and ensuring that septic tanks are functioning properly.

In Scotland, a number of other pressure specific advisory groups have been set up to help deliver (and where necessary identify) key actions to bring about improvement. These are summarised in Table 2.

Table 2: Issue specific advisory groups set up in Scotland

Group	Role
Rural diffuse pollution management advisory group	Provide a focus for communication and co-ordination between agencies and organisations involved in rural diffuse pollution management. They will provide advice on developing and co-ordinating action, in particular for the priority catchments identified in Section 3.1
Fish and fisheries advisory group	Provide advice to SEPA on fish and fisheries, particularly in relation to the potential impacts of new hydropower schemes and provide advice to both agencies, when appropriate, on cross-border water bodies.
Sustainable urban drainage advisory group (SUDS working group)	Set up to advise on the specific issue of sustainable urban drainage systems.

Partnership working will help to ensure that the river basin management plan is achieved. The programme of measures has collated actions being implemented by partners to allow these actions to be taken into account when setting water body objectives. It also provides an important opportunity to identify, prioritise and develop new actions to improve the way in which the water environment is protected and restored.

3. Water quality

3.1 Water quality affected by agriculture

Agriculture dominates land use in the Solway Tweed river basin district. Arable cropping is common in the east, while livestock farming tends to dominate in the west, with dairy herds on the lower ground. The landscape characteristics of the district also means that hill farming is common in the Lakeland and Southern Upland.

Action to prevent and reduce pollution

The assessment of the state of the water environment in Chapter 2 provides an outline of the impact of farming on the water environment, including the contribution of diffuse pollution to water bodies not reaching good status. Diffuse pollution is normally the result of cumulative impacts of pollutants from numerous sources on farms throughout the catchment. Consequently, tackling diffuse pollution is best achieved by working with farmers at a catchment scale.

In the English part of the river basin district, the England Catchment Sensitive Farming Delivery Initiative sees farmers and regulators working together to raise awareness of best practice and how to address any potential problems. This approach has been shown to work on the River Till and several of the Eden sub-catchments.

A catchment approach is also being developed for the Scottish part of the Solway Tweed. SEPA has identified areas for further detailed studies to identify pollutant sources, awareness-raising with farms and then actions to deliver improvements. These priority catchments include the rivers and burns within the Galloway and Stewartry Coastal catchments. Additional priority catchments will be identified for action in the second and third cycles, learning from the projects and success achieved during this first cycle.

The voluntary 'Tweed Collaborative Action Project' has been initiated in the Tweed catchment. This project has been set up to provide free advice and support to land managers with submission to grant schemes. A catchment based project has also been set up in the Till to encourage land managers to work together to reduce diffuse pollution and restore wetlands to promote better floodplain management.

An important action that can be implemented across the river basin district is to provide information and training on land management practices. This includes adherence with regulations such as the Water Environment (Controlled Activities) (Scotland) Regulations 2005 and industry-led initiatives such as the Pesticides Voluntary Initiative[8] and the Sheep Dip Pollution Reduction Programme[9].

Table 3 summarises the proposed actions for 2009–2015 to improve those water bodies affected by pollution from agriculture.

[8] www.voluntaryinitiative.org.uk
[9] www.sepa.org.uk/land/agriculture/sheep.aspx

Table 3: Summary of measures to tackle pollution from agriculture

Improvement required	Example of on the ground actions	Responsible for taking action	Mechanism to encourage and ensure action	Responsible for ensuring action
Reduction in nutrient inputs	**Control at source:** Nutrient management plans In-field measures to minimise soil erosion Buffer strips **Intercept and store/treat:** Measures to manage 'dirty water', eg constructed farm wetlands	Land managers	CAR General Binding Rules No. 18, 19, 20 and 21* Guidance Enforcement measures	SEARS
			Code of Good Agricultural Practice	Environment Agency
			Nitrate Vulnerable Zone Action Programme Regulations Guidance and enforcement	Scottish Government, Defra, SEPA, Environment Agency
			Education initiatives Guidance and advice	SRPBA, CLF , NFUS, NFU , SAC, ADAS, FWAG, CRSA, PROMAR Natural England, Environment Agency, Eden Rivers Trust
			Trial catchment projects and demonstration farms	SRPBA, NFUS, SEARS, SAC, FWAG
			Rural Development Programme	Scottish Government and UK Government
			Environment Stewardship schemes	Natural England
			England Catchment Sensitive Farming Delivery Initiative	Environment Agency, Natural England
Reduction in pesticide inputs	**Control at source:** Crop protection management planning Sprayer testing Biobeds Buffer strips	Land managers	CAR General Binding Rule No. 23* Enforcement measures	SEARS, SEPA
			Education initiatives Provision of information Guidance and advice	SEARS, Environment Agency
			Pesticides Voluntary Initiative	SRPBA, CLF, NFUS, NFU, CLBA
			Groundwater Regulations	Environment Agency
			Code of good agricultural practice	Environment Agency
			Rural Development Programme	Scottish Government and UK Government

Improvement required	Example of on the ground actions	Responsible for taking action	Mechanism to encourage and ensure action	Responsible for ensuring action
Reduction in organic waste (organic matter, faecal pathogens and ammonia)	Farm waste management plans Management of steading run-off, eg separation of clean and dirty water Livestock tracks and gates Fencing of water margins	Land managers	CAR General Binding Rules Nos. 10, 18 and 19* guidance Enforcement activities and campaigns	SEARS, SEPA, Environment Agency
			Silage, slurry and agricultural fuel oil regulations Guidance and enforcement	SEPA, Environment Agency
			Education initiatives Guidance Provision of information and advice	SRPBA, CLF, NFUS, NFU, SAC, ADAS, FWAG, PROMAR, Natural England, Environment Agency, Eden Rivers Trust
			Rural Development Programme	Scottish Government and UK Government
			England Catchment Sensitive Farming Delivery Initiative	Environment Agency, Natural England
			Trial catchment projects and demonstration farms	SAC, SEPA
Catchment-based action	Focus advice and enforcement on identified areas	SEPA	Priority catchments	SEARS, SAC, SRPBA, NFUS
		Environment Agency Natural England	England Catchment Sensitive Farming Delivery Initiative	Environment Agency Natural England
	Till Ponds project	Tweed Forum FWAG	Demonstration project on multifunctional role of wetlands	Tweed Forum FWAG Environment Agency Leader+
	Till Project Officer	Tweed Forum	Assist landowners to restore wetlands, manage floodplains and control diffuse pollution	Tweed Forum
	Tweed Collaborative Action	Tweed Forum	Free advice and support to landowners with submission to agric-schemes in order to reduce diffuse pollution through collaboration	Tweed Forum Leader +
	Catchment campaigns	Environment Agency Natural England Eden Rivers Trust	Advice on nutrient/organic waste management	Environment Agency Natural England Eden Rivers Trust

* Water Environment (Diffuse Pollution) (Scotland) Regulations 2008

SEARS = Scotland's Environment and Rural Services
Defra = Department for Environment, Food and Rural Affairs
SRPBA = Scottish Rural Property and Business Association
CLF = Contaminated Land Forum
NFU = National Farmers Union
NFUS = National Farmers Union Scotland
SAC = Scottish Agricultural College
ADAS = Environmental and rural consultancy
FWAG = Farming and Wildlife Advisory Group (England only)
PROMAR = Farm and agri-food consultancy
CLBA = Country Land and Business Association

3.2 Water quality affected by forestry

Forestry is an important land use in the Solway Tweed river basin district. In common with most of the UK the area of native ancient woodland is small but, in places, is an important component of the riparian vegetation. However, the majority of the woodland cover is made up of large-scale non-native plantations (ie conifers) and is found mainly in the Scottish part of the Solway Tweed river basin district.

There are three main potential causes of pollution from forestry and forestry operations. These are:

- acidification of watercourses, which can be exacerbated by forestry plantations scavenging atmospheric pollution;
- nutrients (phosphorus) either from fertiliser application during tree planting or released during the disturbance of soils during clear felling operations;
- suspended solids (silt) caused by soil disturbance associated with road building, tree planting and clear felling.

Actions to prevent and reduce pollution

If not undertaken appropriately, forestry operations, including planting, harvesting and the application of fertilisers and pesticides, can pose risks to the water environment. In order to ensure forestry operations do not cause deterioration of the status of a watercourse, it will be necessary to:

- raise awareness and provide training and guidance
  - of the legislative framework;
  - of the Forestry Commission's *Forests & Water Guidelines*;
- link adherence of the *Forests & Water Guidelines* to the provision of grant aid for forestry development.

General measures to address pollution from forestry are listed in Table 4. Targeted effort within the Solway Tweed river basin district on the main risks and issues associated with forestry are summarised here.

Acidification

Due to the combination of poor air quality due to atmospheric pollutants, an acidic (non-buffering) geology and planting of conifer forests close to watercourses, 64% of the water bodies impacted by acidification in Scotland (as measured by a change in pH) are found in the Solway part of the Solway Tweed river basin district. The impact of acidification shown by SEPA monitoring data will be used to inform the continued development of projects and measures to ensure actions focus on those water bodies requiring improvement.

Air pollution – the primary source of this issue – is falling owing to the control of emissions through the Integrated Pollution Prevention and Control (IPPC) Directive. As a result, some waters are showing evidence of recovery. But this recovery is slow and, in some catchments, the presence of high densities of mature conifers may be delaying the process. The rate of recovery may be improved by reducing the area of mature conifers, for example, by diversifying the age structure of plantations, replacing conifers with deciduous trees and leaving more open ground.

The Forestry Commission, SEPA and the Galloway Fisheries Trust are working together to identify catchments that are especially vulnerable to acidification.

Nutrient enrichment

This river basin management plan provides information to enable the identification of freshwater lochs/lakes at risk of additional nutrient input from forestry. In conjunction with the agencies, this information can form the basis for future planning within the forestry industry in the Solway Tweed river basin district. This process will be updated as more information becomes available through monitoring and classification.

Nutrients tend to be 'bound up' with the soil particles and can therefore also enter the water body with any suspended solids released during forestry operations. However, water draining from well-managed woodland tends to be of high quality with low concentrations of nutrients, sediment and pesticides. As such, lower intensity woodland management systems, often but not exclusively associated with native broadleaves, are beneficial for improving water quality. However, to reduce the nutrient loading into sensitive water bodies, it will be necessary to limit the scale of annual planting and felling operations based on the overall size of the catchment. This is supported by the guidance for best practice for sensitive catchments in *Forests & Water Guidelines* (2003).

Suspended solids

The release of suspended solids into watercourses is most likely to occur during forestry operations such as clear felling, site preparation for planting or from forestry roads (particularly when subject to heavy vehicular use). Suspended solids can cause damage to watercourses, including the smothering of fish spawning beds.

Well-located woodland within a catchment can be used to manage erosion and prevent the subsequent siltation of watercourses. *Forests & Water Guidelines* (2003) sets out working methods which, when applied correctly, will prevent suspended solids entering watercourses. It is important to ensure that all forestry operators are aware of, and apply, best working practice through the provision of training – particularly raising awareness of the new general binding rules.

Table 4: Summary of measures for tackling pollution from forestry within Scotland

Improvement required	Example actions on the ground	Responsible for taking action	Mechanism for encouraging and ensuring action	Responsible for ensuring action
Controlling nutrient inputs to lochs	Provide information on nutrient sensitivity of lochs	SEPA Environment Agency	GIS map showing available capacity in lochs	Forestry Commission
	Promote best practice in most sensitive catchments and ensure compliance with *Forest & Water Guidelines* and Water Environment (Diffuse Pollution) (Scotland) Regulations 2008	Forestry Commission Private forestry companies Land owners Scotland's Environment and Rural Services (SEARS) SEPA	Forestry planning SEARS Information campaigns	SEPA Environment Agency
Controlling sediment inputs	Promote best practice in most sensitive catchments and ensure compliance with *Forest & Water Guidelines* and Water Environment (Diffuse Pollution) (Scotland) Regulations 2008	Forestry Commission Private forestry companies Land owners SEARS SEPA		SEPA Environment Agency
Best practice measures in non-grant aided forestry management	Promote and raise awareness and ensure compliance with the *Forests & Water Guidelines* and the diffuse pollution general binding rules	Forestry Commission		SEPA Environment Agency
Reducing impact of forestry and acidification	Identify catchments (or sub-catchments) vulnerable to acidification	Forestry Commission SEPA Galloway Fisheries Trust	Develop project for diffuse pollution – acidification	Landowners and private forestry companies

3.3 Water quality affected by wastewater

Sewage disposal is a long-standing source of pollution that has progressively been reduced over the past 100 years. The extensive wastewater collection and treatment systems in the Solway Tweed river basin district protect the environment and public health.

Sewage disposal issues fall into the following types:

- current issues associated with existing sewage treatment works or sewers that need investment to ensure they meet modern environmental standards;
- future pressures from housing and other developments or impacts from climate change that may require additional levels of treatment;
- localised environmental problems in rural areas caused by private sewage from houses, small hotels, caravan parks and industry that are typically treated by septic tanks or small treatment works.

Actions to prevent and reduce pollution

Discharges of sewage to water are regulated, with all but the very smallest volumes requiring consent from SEPA or the Environment Agency. However, both the general public and industry have an important part to play in helping to prevent pollution through their choices about which products they buy and how they use and dispose of them. For the house-holder this includes their choice of cleaning and detergents which also enter the sewage system. Reducing pollution at source lowers the costs associated with its treatment and produces environmental benefits. This is especially true for hazardous substances, nutrients and sanitary litter. For example, not using certain substances in domestic products (eg using phosphate-free detergents) reduces the need for treatment to remove them from sewage and lowers their concentration in sewage sludge. Scottish Water's 'Bag It and Bin It' campaign promotes the disposal of rubbish such as cotton buds in the bin rather than flushing them down the toilet; this keeps them out of the sewage stream altogether, preventing them from being discharged from Combined Sewage Overflows during heavy rain or choking the fine screens at treatment works – both of which can cause pollution.

Public investments in the sewerage network and in treatment works will continue to be co-ordinated through national investment planning processes. In England this is the Periodic Review/Asset Management Plan process. In Scotland it is the Quality and Standards (Q&S) process[10]. These determine the investment objectives for a five and eight year period respectively in the context of ministerial decisions on the scale of charges that are appropriate.

General measures to address pollution from wastewater are listed in Table 5.

Improvements by Northumbrian Water

Several Northumbrian Water sites in the Tweed and Till catchments have been highlighted for improvement during the Asset Management Plan 4 period (2005–2010). These are mostly to improve the visual aspects of the receiving freshwater environment to better manage the sewage debris.

In addition, an investigation of Northumbrian Water discharges that may be compromising bathing water quality at Spittal Beach to the south of Berwick identified some combined sewer overflows (CSOs) as potential contributors to impaired quality. A scheme has been put forward for funding to improve these during the company's 2010–2015 capital spending round.

Improvements by United Utilities

A number of improvements to sewage discharges and wastewater treatment works are being implemented, planned or proposed by United Utilities. These projects will improve water quality in a number of water bodies within the Solway Estuary, River Eden, River Waver and River Wampool catchments.

The existing sewage discharges to the Solway estuary at Bowness-on-Solway, Port Carlisle, Drumburgh and Glasson will be transferred to a new treatment works at Glasson.

A scheme to transfer the existing discharges at Hackthorpe and Clifton to Penrith wastewater treatment works is currently being undertaken and two septic tank discharges in the Newton Reigny area were also recently transferred to Penrith works. Improvements to the Penrith works and sewer network are also planned.

First time rural sewerage schemes will be implemented at Mealsgate, Moorhouse, Colby, Linstock, Cliburn, Crosby Ravensworth, Hackthorpe, Great Strickland and Aikton where either new treatment works will be built or discharges transferred to existing treatment works.

Upgrades will reduce the amount of phosphorous in discharges from the Carlisle, Brampton, Winskill and Skirwith treatment works. Upgrades to Dalston and Kirkby Stephen treatment works were completed in 2009.

An upgrade to Shap sewage treatment works will improve biological oxygen demand (BOD), ammonia, phosphorous and suspended solid levels in the discharge to the River Leith.

A proposal to move the discharge from Little Bampton treatment works to protect the Biglands Bog Site of Special Scientific Interest was proposed in the submission for funding in the next capital spending round (2010–2015).

[10]See Annex 9 (www.sepa.org.uk/water/river_basin_planning.aspx) for details of the Quality & Standards investment process explaining how investments in the sewerage system are planned.

Improvements by Scottish Water

The improvements Scottish Water plan to deliver to meet the objectives up to 2015 in the Scottish part of the Solway Tweed River Basin District include:

- improving treatment to reduce nutrient loads, oxygen demand and ammonia at two sewage works by 2010 and a further four sewage works by 2014;
- upgrading one sewage work by 2010 and a further four sewage works by 2014 to reduce pollution incidents.

The Scottish Government has issued Directions to Scottish Water for improvements that are required to 2015[11]. Scottish Water and SEPA will continue to work together to find the most cost effective solutions for achieving the objectives for 2021 and 2027.

Table 5: Summary measures for tackling pollution from wastewater

Improvement required	On the ground action	Responsible for taking action	Mechanism for encouraging and ensuring action	Responsible for ensuring action
Reduction in pollution	Better discharge quality from treatment works, where identified under the Quality & Standards (Q&S) programme or Asset Management Plan (AMP) process	Water companies	Identification of improvement within Q&S/AMP Review of permits/licence	Scottish Government SEPA Environment Agency Defra Ofwat Water industry Commission for Scotland Consumer Council for Water Waterwatch Scotland
	Reduced operation of sewer overflows not covered above	Water companies Local authorities and developers	Identification of improvement within Q&S/AMP Review of permits/licence Diversion of surface water flows from sewer during redevelopment of sites	Scottish Government SEPA Environment Agency Defra Ofwat Water industry Commission for Scotland Consumer Council for Water Waterwatch Scotland
Supporting development	Identify where sewerage capacity is limited	Water companies	In Scotland: Memorandum of Understanding between Scottish Water and SEPA In England: existing planning arrangements	Local authorities Environment Agency
	Provide sewerage capacity for future development	Water companies	In Scotland: Memorandum of Understanding between Scottish Water and SEPA In England: existing sewerage provision mechanism	SEPA Environment Agency Local authorities
Reduction in pollution from sewage and surface water discharges	Avoid or reduce pollutants entering sewage system	Households/ businesses	Campaigns and advice provision	Water companies SEPA Environment Agency

[11] www.scotland.gov.uk/Topics/Business-Industry/waterindustryscot/latest-news/swdirections

4. Water quantity

4.1 Managing water use in drought conditions

The Solway Tweed river basin district has been known to experience periods of hot, dry weather during the summer months. Under certain climate change scenarios such weather conditions may become more frequent.

SEPA will develop a national drought plan for managing abstractions during periods of extreme low rainfall. The plan will describe the actions required of those abstracting water from the water environment, such as farmers wishing to irrigate their land. The actions will be designed to ensure the protection of the water environment whilst minimising the impact of the drought conditions on economically important activities. SEPA will work with business and industry representatives in developing the plan.

The Environment Agency, United Utilities and Northumbrian Water all have drought plans that show the actions they will take and how they will communicate with other bodies as a drought develops, takes hold and recedes. These drought plans are all available online via the following links:

- Environment Agency NW Region: www.environment-agency.gov.uk/homeandleisure/drought/31775.aspx
- Environment Agency Yorkshire and North East Region: www.environment-agency.gov.uk/homeandleisure/drought/78511.aspx
- United Utilities: www.unitedutilities.com/FinalDroughtPlan2008.pdf
- Northumbrian Water: www.nwl.co.uk/Final_published_drought_plan_April_2008.pdf

SEPA and the Environment Agency will also continue to work closely with the water companies to ensure that their drought management plans are integrated with drought plans produced to manage abstractions for drinking water supply (see Section 4.3).

The Scottish Government will also introduce legislation to underpin SEPA's drought planning work and to further strengthen the established legislative framework[12] for managing abstractions during drought conditions.

4.2 Changes in water quantity due to electricity generation

There is one large-scale hydropower scheme in the Solway Tweed river basin district which is owned and operated by Scottish Power. The Galloway Hydropower Scheme has modified many of the major rivers and lochs in the River Dee catchment. It consists of six power stations, seven main reservoirs, various dams, tunnels and aqueducts.

The consequences of changes in water quantity associated with large hydropower schemes can include:

- changes in the pattern of water flows in the rivers downstream of dams and intakes;
- consequent changes in the natural pattern of sediment erosion, transport and deposition;
- large variation in water levels in water storage reservoirs.

Actions to manage the impacts of hydropower

In the Solway Tweed river basin district, SEPA and Scottish Power are working together to identify cost-effective solutions to address some of the main impacts of the scheme. This involves jointly assessing whether measures which represent good environmental practice are in place and to use this assessment to classify the ecological potential of the affected water bodies. Fisheries and other information was also gathered at stakeholder workshops. The focus is on getting the balance right between delivering improvements in the water environment and meeting the objectives for reducing greenhouse gas emissions.

Many of the water bodies associated with this scheme have been designated as heavily modified. One of the impacts of the dams and other structures is that they act as barriers to migratory fish, particularly Atlantic salmon. One of the measures to achieve good ecological potential is to review the feasibility of installing fish passes (see Table 6). For more information about heavily modified and artificial water bodies, see Chapter 4: www.sepa.org.uk/water/river_basin_planning.aspx

[12]Natural Heritage (Scotland) Act 1991

There are also a number of small scale 'run-of-river' hydropower plants (installed capacity <2MW) within the river basin district. These small-scale schemes may remove water from a river, pass it through a turbine and return it to the same river, without the need for water storage. With such smaller schemes, developers will be provided with advice as to how to most readily meet the conditions required for authorisations.

The control of hydro-schemes by the English part of the river basin district is covered by existing legislation including abstraction and impoundment licensing, land drainage consent and Habitats Directive requirements within Special Areas of Conservation.

The proposed measures are summarised in Table 6.

Measures to prevent deterioration and promote sustainable water use

A study of the potential for further hydropower generation in Scotland by the Forum for Renewable Energy Development in Scotland (FREDS) identified a capacity of 657 MW of financially viable hydropower development remaining in Scotland.

SEPA will seek to strike the right balance between the objectives for the water environment and the objectives for reducing greenhouse gas emissions. Before considering authorising proposed new hydropower schemes under the Water Environment (Controlled Activities) (Scotland) Regulations 2005, SEPA will ensure that:

- all practicable mitigation measures are taken to minimise the adverse effects of the scheme on the water environment;
- the benefits of the scheme to sustainable development (eg reduced emissions of carbon dioxide) outweigh the benefits of preventing deterioration of status;
- the benefits of the scheme cannot be realised by other means representing a significantly better environmental option and not entailing disproportionate cost.

SEPA will work with local authorities and Scottish Natural Heritage to provide advice to developers to help them identify whether potential schemes are likely to satisfy prior authorisation conditions.

Table 6: Summary of measures to tackle abstraction and flow issues due to major electricity generation schemes within Scotland

Improvement required	Action on the ground	Responsible for taking action	Mechanism to encourage and ensure action	Responsible for ensuring action
Improve flows in rivers and levels in lochs	Provide compensation flows and freshets	Hydropower scheme operating companies	Licence reviews	SEPA
			Provide guidance on mitigation measures to limit adverse impacts on ecological quality	SEPA Scottish Natural Heritage (SNH) Fishery groups
Allow fish migration	Provide for fish passage at dams and weirs	Hydropower scheme operating companies	Licence reviews	SEPA
			Provide guidance on mitigation measures to limit adverse impacts on ecological quality	SEPA SNH Fishery groups

4.3 Changes in water quantity for public water supply

Water supply systems have developed over many decades and the Solway Tweed river basin district is an important source of water. For example, Haweswater Reservoir provides about a quarter of the public water supply for the North-West of England, and Scottish Water provides drinking water to 1.2 million people from sources in the Solway Tweed river basin district.

The principal pressures on water quantity associated with the provision of public water supply include:

- reduction in flows in rivers resulting from abstractions from lochs/lakes rivers and groundwater, with the largest impact being during periods of dry weather when river flows are already low;
- changes in the volume and pattern of water flows in the rivers downstream of reservoir dams;
- consequent changes in the natural pattern of sediment erosion, transport and deposition in rivers downstream of dams;
- large seasonal variations in water levels in water storage reservoirs.

Actions to manage the impacts of public water supply

Water supply systems face a number of challenges:

- individual demand for water for domestic purposes has increased progressively over the last few decades;
- communities are expanding within the river basin district and in adjacent towns and cities supplied by water from upland areas, resulting in increased demand for drinking water;
- leakage from the supply network;
- climate change.

The two main approaches to meeting these challenges are to:

- develop new supplies that take more water from rivers and groundwaters. This might involve building new reservoirs. Any new supplies would need to meet the Water Framework Directive's 'no deterioration' requirement;
- reduce demand through more efficient use of water in existing and newly built houses. Water companies could also reduce the amount of leakage from the pipes in their distribution networks.

Water companies need to achieve the correct balance between developing new supplies, reducing demands for more water and reducing leakage rates. These aspects are considered in their Water Resources Management Plans.

Working with Scottish Water

The Scottish Government has issued Directions to Scottish Water for improvements that are required to 2015[13].

The primary measure used to manage abstraction is regulation. However, in order to reduce the amount of water drawn directly from a water body, Scottish Water has focused on improving its distribution system and set targets for year-on-year reductions in leakage levels. This approach has resulted in a halt and reversal in the demand for water, with a consequent reduction in the volume of water abstracted from the environment. There is also an improvement in the security of supply to customers during drought as well as support for ongoing economic and domestic growth.

Scottish Water is required to support all new developments to provide drinking water supplies at reasonable cost. This may place demands on existing water resources that are not sustainable – particularly in isolated rural areas where sources can be small and with few (if any) alternatives supplies.

The overall level of funding for Scottish Water is determined by ministerial decisions. The spending programme is identified and managed by a public planning process called Quality and Standards. The current programme includes funding to mitigate the environmental impacts of Scottish Water's dams and abstractions at a specified list of sources by implementing improvement measures required by the Water Framework Directive. This programme is delivered through close liaison and technical working groups involving Scottish Water, SEPA, the Drinking Water Quality Regulator for Scotland and the Water Industry Commission Scotland. It includes a review with Scottish Natural Heritage to determine if the current abstraction regime has led to any detrimental impacts on the designated features of any Natura 2000 site.

All Scottish Water's abstraction and impoundment activities are authorised by SEPA under the Controlled Activities Regulations. It is important to understand the impact of these assets on the water environment so that improvement schemes can be developed if required.

[13] www.scotland.gov.uk/Topics/Business-Industry/waterindustryscot/latest-news/swdirections

There are four water resource zones in the Solway Tweed river basin district. These water resource zones are being studied to identify any possible improvements that can be made to improve the associated water bodies. The studies consider a wide range of factors which will allow for:

- increased confidence in the data on water availability and usage;
- forecast future demand;
- confirm the extent to which improvements are required;
- assess whether improvements to compensation flows to rivers below impounding reservoirs can be made without having significant adverse affects on water supply;
- consider options such as:
  - potential for leakage reduction;
  - looking for additional sustainable sources to supplement supplies or for entirely new sources of water;
  - changes to operational regimes to reduce the impact of the abstraction regime;
  - much of the work required within individual water resource zones focuses on improving the understanding of how Scottish Water's activities impact the environment.

As part of its monitoring programme, Scottish Water is undertaking a major programme of work to generate detailed records of abstraction activity by installing monitoring equipment on its licensed abstractions where the water treatment works supply over 50m^3/day. Similarly SEPA is improving its environmental monitoring so as to identify the range of impacts associated with drinking water abstractions and to prioritise the most 'at risk' sites.

Working with United Utilities

United Utilities operates the water supply network in north-west England. Part of this network includes the strategically important aqueducts that allow water from the Haweswater Reservoir system to be transported to supply Manchester and the surrounding area. There are further abstractions on the River Eden at Cumwhinton and on the River Gelt, both of which provide the water supply for Carlisle.

All abstractions by United Utilities are controlled through licences.

Within the River Eden Special Area of Conservation, all major public water supply licences have recently been assessed under the Habitats Directive Review of Consents project. This project reviewed the abstraction licences and the ecological needs of Special Area of Conservation species and habitats and, where necessary, identified any changes to licences necessary to protect the Special Area of Conservation.

Licence changes within much of the Lowther system and the River Gelt abstraction will be made in the coming years. These changes include:

- increases to compensation and/or hands off flows (where necessary);
- building of fish passes;
- changes to gravel management plans to make sure in-river structures do not prevent the downstream migration of important gravels for fish spawning.

These improvements are funded via the water company asset management planning (AMP) process. Some improvements have already happened through AMP4 (2005–2010), with further improvements and investigations proposed in AMP5 (2010–2015).

Working with Northumbrian Water

Northumbrian Water abstracts from groundwaters to supply the towns of Berwick-upon-Tweed and Wooler. This abstraction operates as a separate resource zone in the north-east of Northumberland (Berwick water resource zone). The resource zone is independent from other large water sources in the region in terms of available water and treatment capacity; it needs to be protected and managed in a sustainable manner.

Measures to prevent deterioration and promote sustainable water use

The water companies in England and Scotland are engaged in a number of planning activities aimed at managing water supplies for the long term. These include:

- water resource plans that considers supply and demand management over a 25-year time horizon;
- asset maintenance and leakage plans;
- developing Drinking Water Safety Plans;
- drought planning.

The water companies have, or are developing, drought plans for vulnerable areas serving large populations. These plans set out the steps that will be taken to maintain drinking water supplies as drought threatens and develops whilst avoiding or minimising deterioration in status of the water environment. These will include reducing non-essential uses and enhancing leakage reduction plans or use of less vulnerable sources. The plans will be updated regularly and take into account demographic change and improved understanding of the effects of climate change.

Many of these activities require close working with the Environment Agency/SEPA and are informed by agency planning activities such as:

- Habitats Directive review of consents (Environment Agency and SEPA);
- Catchment Abstraction Management Strategies (Environment Agency).

Promoting sustainable water use is important when considering new housing developments. The Environment Agency, SEPA, water companies, local and regional planning authorities need to work in partnership to make sure robust policies are included in the spatial planning system. These policies need to ensure that:

- new housing is located where a water supply/capacity is available;
- the houses are constructed using water efficient fittings.

Promoting water efficiency across all water users is an important aspect for managing future demand. Some improvements can be achieved through planning conditions where changes to existing houses require planning permission. Increased uptake of the use of water meters can also reduce the amount of water people use.

Considerable effort is going into educating people on using water wisely[14]. The existing partnerships between the Environment Agency, SEPA, water companies, local authorities and others should continue to promote this message.

Table 7: Summary of planned measures for reducing pressures on water flows and levels for drinking water supply

Improvement required	Examples of on the ground actions	Who will take action on the ground	Mechanisms to encourage and ensure action	Lead responsibility for ensuring action
Reduced water abstraction and impoundment impacts on water flows and levels	**Reduce demand:** Reduce leakage rates in water supply network to enable reduced water abstraction	Water companies	**Legislative:** Water Environment (Controlled Activities) (Scotland) Regulations 2005 Water Act 2003 Water Industry Act 1991 Water Resource Act 1991 &1963 **Economic:** Publically-funded investment programme for Scottish Water (Quality & Standards) Asset Management Plan improvement programme	SEPA Environment Agency United Utilities Northumbria Water Governments Water Industry Commission for Scotland[15] OFWAT Environment Agency

[14]See for example the advice on the Environment Agency's website: www.environment-agency.gov.uk/business/sectors/32715.aspx
[15]www.watercommission.co.uk/

Table 7: Summary of planned measures for reducing pressures on water flows and levels for drinking water supply (continued)

Improvement required	Examples of on the ground actions	Who will take action on the ground	Mechanisms to encourage and ensure action	Lead responsibility for ensuring action
Reduced water abstraction and impoundment impacts on water flows and levels	Improve water use efficiency to enable reduced abstraction	Businesses and households	Water charging scheme for business customers **Education and advice:** Scottish Water Customer Support Guidance and publicity on industrial best practice Vision in Business for the Environment of Scotland (VIBES) competition on industrial best practice	Water companies
			Information for customers on how to use water efficiently particularly in at risk areas Promoting water efficiency in households/businesses	Scottish Water SEPA
			Promote free water meters Promote leakage reduction through active leakage control	United Utilities Northumbria Water Environment Agency
	Increase supply capacity: Integrate and optimise relative use of different sources Increase capacity of existing source (eg install storage for peak demands, increase reservoir capacity) Develop additional sources	Scottish Water	**Legislative:** Water Environment (Controlled Activities) (Scotland) Regulations 2005 Water Act 2003 Water Industry Act 1991 Water Resource Act 1991 & 1963	SEPA Environment Agency
			Economic: Publically-funded investment programme for Scottish Water (Quality & Standards) Asset Management Plan improvement programme	Government Water Industry Commission for Scotland OFWAT

4.4 Changes to water quantity for agriculture

Abstraction of water for agriculture serves many purposes including water for crop irrigation and drinking water for livestock.

Abstraction for irrigation has increased substantially over the past 10 years and is expected to continue to increase. Regulatory controls on abstraction for irrigation have only recently been introduced for most of the Solway Tweed river basin district. These will progressively reduce any over-abstraction, improving the environment and ensuring that more water is available for other users.

Limited water resources are available during dry periods when irrigation is most required. In addition, the combination of climate change and higher food prices may increase the demand for irrigation. This river basin management plan must seek to ensure resources are used efficiently so that water is available to sustain the environment.

Actions to manage abstraction for agriculture

In the Solway Tweed river basin district, slightly different regulations for agricultural abstractions apply either side of the border.

In Scotland abstractions are regulated under the Water Environment (Controlled Activities) (Scotland) Regulations 2005. SEPA will work with farmers to ensure that existing irrigation abstractions are managed so that they do not cause deterioration of status and so that areas that are currently at less than good status due to the overall volumes licensed can be managed. SEPA's understanding of risks to the water environment is partly based on information provided by farmers and information included in their abstraction authorisations. SEPA will work with farmers to improve understanding of the timings and volumes of water abstracted for irrigation and then check this against information in the relevant authorisations. This will enable SEPA to better assess the risk of deterioration posed by any proposed increase in water abstraction.

In England, abstraction in the Eden, Waver, Wampool and English Esk has been licensed since 1963. The Catchment Abstraction Management Strategy (CAMS) for the River Eden catchment indicates that agricultural abstractions do not present significant issues at the moment.

Table 8 provides a summary of proposed measures to promote sustainable water use in agriculture. These actions will not only result in environmental benefits but they will potentially enable farmers to apply for new or higher levels of abstraction where the environment allows.

The Environment Agency CAMS documents indicate where there is potential capacity to take more water and will provide information for farmers to allow them to identify where applications for new abstractions licences can be made. Where farmers are looking to make abstractions they should avoid applying for licences in those catchments that are over-abstracted or have limited capacity. All applications for abstraction licences will still require an assessment of the possible impacts as part of the determination process. Both also recognise the need for joint discussions on abstractions from waters which form the border.

In England, regulations under the Water Act 2003 will bring exempt abstractions above 20m^3 per day within the system of abstraction licensing control; this includes abstraction for trickle irrigation. The revised system of abstraction licensing control will be used to ensure that any new abstraction, water resources impoundment or flow regulation proposals do not result in deterioration of ecological status.

4.5 Surface water abstraction from the River Tweed and its tributaries on the English side of the border

Surface water abstraction from the River Tweed and its tributaries, on the English side of the border, is currently exempt from abstraction licensing by the Environment Agency. The Water Act 2003 introduced powers to remove this exempt area status, however regulations are required to bring these powers into force. Defra consulted on these regulations in July 2009 and we are awaiting their full implementation. When these regulations come into force surface water abstraction, above the default threshold of 20m^3/d, will require an abstraction licence. Surface water abstractions are currently controlled by consents issued by Natural England under the CROW Act. These consents control how much water can be taken from the parts of this catchment with SSSI status.

Current farming practices in this catchment rely heavily on surface water abstractions from the River Till which is a SSSI and a SAC. Initial assessments of climate change scenarios suggest there will be reduced summer rainfall and therefore less water available for irrigation in the future. The Environment Agency will work with farmers in the North Northumberland Abstractors Group and the wider farming community to promote the efficient use of water.

The Environment Agency will also improve the data it holds to refine its understanding of the surface water resource availability status within the catchment. This includes obtaining data from other organisations, improving the hydrological monitoring network and gaining a better understanding of farming practices and actual abstraction volumes. This will enable the Environment Agency to balance the needs of the environment and the very real needs of local business in a changing climate when the abstractions are subject to licensing control.

The Environment Agency is also currently working with SEPA to help meet Water Framework Directive targets for the Tweed estuary and will ensure that both organisations are aware of activities on either side of the border which may affect volumes of water in the lower reaches of the River Tweed.

Table 8: Summary of measures to tackle abstraction and flow issues due to agriculture

Improvement required	On the ground action	Responsible for taking action	Mechanism to encourage and ensure action	Responsible for ensuring action
Improve flows in rivers and levels in groundwater	Align licensed abstraction rates to meet RBMP objectives	Land managers	Water Environment (Controlled Activities) (Scotland) Regulations 2005 Environment Agency reviews/implementation of abstraction licensing in the Till (Water Act 2003 and related regulations)	SEPA Environment Agency
	Improve efficiency of use	Land Managers	Information and advice Require efficient water use by licence review	SEARS SRPBA NFUS SEPA Environment Agency
	Manage timing of abstractions	Land Managers	Develop catchment agreements on timing of abstractions Water Environment (Controlled Activities) (Scotland) Regulations 2005 Water Act 2003 and related regulations in England	SEPA Environment Agency
	Build farm storage ponds to store winter abstractions for summer use	Land managers	Scottish Rural Development Programme funding Advice on construction of farm storage ponds Water Environment (Controlled Activities) (Scotland) Regulations 2005	SEARS SEPA Environment Agency
Sustainable use of water	Abstraction licensing Improved efficiency of use Data collection Catchment Abstraction Management Strategies	SEPA Environment Agency Land managers	Existing regulatory measures and introduction of abstraction licensing for the River Till Advice to farmers on water efficiency	Land managers SEPA Environment Agency

SEARS = Scotland's Environment and Rural Services

SRPBA = Scottish Rural Property and Business Association

NFUS = National Farmers Union Scotland

5. Habitats

5.1 Habitats affected by agriculture

Some of the Solway Tweed's most productive farmland is found alongside rivers. Over many years, these rivers have been modified to enable farmers and land managers to manage the risk of flooding and to increase the area of farmland available. These changes can result in a loss of naturalness of the river system, which can have a negative impact on the ecology of watercourses and potentially increase the risk of flooding downstream.

Actions to manage and improve habitats impacted by agriculture

In many cases it is sufficient to give rivers more space by fencing or by creating buffer strips and then allowing natural processes which permit the water environment to recover its natural diversity and structure.

The measures and mechanisms required to address diffuse pollution and those required to address the impacts of agricultural activities on habitats are often very similar. The catchment approach described in Section 3.1 for diffuse pollution will ensure that actions to tackle diffuse pollution are co-ordinated with those for improvements to habitats. Information on the restoration funds in Scotland can be found in Section 1.4.

The key mechanisms for delivering improvements to habitats with the agricultural sector are:

- Controlled Activities Regulations (CAR) in Scotland;
- rural development plans – for example by linking agri-environment funding at restoration schemes and projects to move agricultural production back from rivers;
- land drainage and FEPA consenting requirements in England;
- use of restoration funding from SEPA to improve the habitat of rivers within priority catchments.
- ensuring favourable condition of sites protected by the Habitats Directive;
- natural flood management schemes;
- ensuring the maintenance of a two-metre buffer strip between a watercourse and arable land as required by general binding rule no. 20. This is an action that Scotland's Environmental and Rural Services (SEARS) will deliver as part of the process of providing support to farmers in Scotland;
- the provision of good practice information to farmers by SEARS, the Environment Agency and non-government organisations.

The proposed measures are summarised in Table 9.

Table 9: Summary of the priority measures to tackle changes to habitats due to agriculture

Improvement required	Measure/action	Responsible organisations/ sectors	Delivery mechanism	Support provider/ regulator
Riparian vegetation and habitat	Buffer strips Fencing of water margins Planting	Landowners	CAR general binding rules no. 20*	SEARS
			Education initiatives Promotion of guidance and advice	SEARS, SRPBA, NFU/NFUS, SAC, FWAG, ECSFDI, Environment Agency, Natural England, NWDA, Rivers Trusts, CLBA, RSPB, Tweed Forum
			Trial catchment projects and demonstration farms	SEARS, SRPBA, NFU/NFUS, SAC, FWAG, ECSFDI, Environment Agency, Academic institutes
			Rural Development Programme	Scottish Government, SEARS, Defra, NWDA, Natural England
Habitat remediation or improvement	Improve physical habitat of rivers, loch/lakes and estuaries	Landowners Fishery boards/trusts	Partnership projects	SEPA, Scottish Natural Heritage, River Restoration Centre Rural Development Programme, Environment Agency, ECSFDI, Natural England, River trusts, Wildlife trusts, RSPB, Tweed Forum

* Water Environment (Diffuse Pollution) (Scotland) Regulations 2008

SEARS = Scotland's Environment and Rural Services
SRPBA = Scottish Rural Property and Business Association
NFU/NFUS = National Farmers Union and National Farmers Union Scotland
SAC = Scottish Agricultural College
FWAG = Farming and Wildlife Advisory Group (England)
ECSFDI = England Catchment Sensitive Farming Delivery Initiative
NWDA = North West Development Agency
CLBA = Country Landowners and Business Association (England)
RSPB = Royal Society for the Protection of Birds

5.2 Habitats affected by forestry

The large-scale programme of upland conifer afforestation in the middle decades of the 20th century caused a number of problems for the water environment. Until the early 1990s the planting of conifer trees did not leave space for watercourses, a strategy that maximised the productive area but damaged the condition of rivers. More recently *Forests & Water Guidelines* (2003) discourages conifer planting up to the edges of watercourses and, as a preference, promotes open spaces containing deciduous trees.

Actions to manage and improve habitats affected by forestry

The Forestry Commission will continue to require forest managers to comply with the latest version of the *Forests & Water Guidelines* as a condition of receiving funding support. In addition, felling approvals[16] will only be given to given to schemes that conform to the sustainable forest management practices required by the UK Forestry Standard[17].

A further requirement is an assessment of the environmental effects of proposals likely to result in significant environmental impacts and involving:

- afforestation;
- deforestation;
- forest roads;
- forest quarries;

before such proposals are allowed to proceed[18].

In some instances in Scotland, the conversion of uncultivated land and semi-natural areas for intensive agricultural purposes and the large scale restructuring of rural land holdings involving agricultural land will require assessment.

The Forestry Commission is reviewing the water bodies considered to be at risk from morphological impacts and the timing and extent of changes that can be brought about through the existing Forest Design Plan timetable. This work will allow the likelihood of a water body meeting its objective for improvement to habitats to be assessed.

Where additional benefits can be gained by bringing a felling plan forward, this will be discussed with the owner (if in private ownership). These additional benefits can relate to the habitats of watercourses and to other factors such as acidification.

Prioritisation of improvements is an important consideration in the Solway Tweed river basin district, where the extent of forestry cover is high.

The proposed measures are summarised in Table 10.

Table 10: Summary of measures to tackle changes to habitats due to forestry

Improvement required	Measures	Responsible organisations/ sector	Delivery mechanism	Support provider/ regulator
Riparian vegetation	Removal of non-native conifers to create a buffer zone adjacent to water Planting/establishment of native trees within the buffer zone	Forestry Commission Land managers	Forest design plans/forest plans	Forestry Commission
			Forests & Water Guidelines (2003)	
			UK Forestry Standard	
			Rural Development Programme	Governments SEARS
Improved in-stream habitat	Allow space for rivers during new planting Management of machinery during the creation of road networks	Forestry Commission Land managers	Forest design plans/forest plans	Forestry Commission
			Forests & Water Guidelines (2003)	

[16]Under the Forestry Act 1967, felling licences are required from Forestry Commission Scotland before trees can be felled.
[17]www.forestry.gov.uk/pdf/fcfc001.pdf/$FILE/fcfc001.pdf
[18]Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999; www.forestry.gov.uk/forestry/infd-5zgkwl

6. Invasive non-native species

Invasive non-native species in relation to this plan are animals or plants from outside the UK that successfully establish themselves in the water environment, resulting in damage to natural biodiversity and creating potentially significant economic impacts and reducing the amenity value of the site.

Actions to manage invasive non-native species

Addressing problems caused by invasive non-native species requires action within specific water bodies and the consideration of potential sources for re-infestation in the surrounding area. For this reason a catchment approach is often the most appropriate way forward.

Experience in controlling invasive non-native species has shown that:

- complete eradication is costly and difficult (and may even be impossible in practice);
- preventing introduction in the first place is the most cost-effective action.

A three-level hierarchical approach has been adopted by the Invasive Non-Native Species Framework Strategy for Great Britain. This identifies prevention, detection/surveillance and control/eradication as the three main ways of dealing with these species. The objectives of the strategy are:

- To minimise the risk of invasive non-native species entering and becoming established in Great Britain and reduce the risks associated with the movement of species outside their natural range within Great Britain.
- To develop effective mechanisms for detection, surveillance, monitoring and responding to any invasive threats posed by both new and established non-native species.
- To minimise and manage the negative impact of established invasive non-native species in a cost effective manner.

There are several local projects and work programmes already established to eradicate invasive non-native species in the Solway Tweed river basin district. Much of this work is carried out as a voluntary action by wildlife, rivers and fisheries trusts.

Education and awareness-raising is important to help people understand the threat posed by introductions of non-native plants and animals. It is vital that agencies and organisations co-ordinate action and effort. Within the Solway Tweed river basin district it is important that this includes joint working to help manage the risk of movement of invasive non-native species within water bodies such as the Solway estuary, which cross the border.

Other actions which are specific to the first river basin management plan include:

- identification of appropriate actions to manage species that threaten high status sites and good status, together with identification of potential sources of re-infestation in the surrounding area;
- establishment of detection/surveillance/control strategies for problem species;
- risk assessment of pathways for entry of problem species into the river basin district;
- research and development to define species causing deterioration of good ecological status/potential and to identify new methods of control;
- development of biosecurity plans to prevent movement of species between catchments and respond quickly to new infestations.

Area advisory groups will help to identify local priorities for, and the feasibility of, controlling or eradicating populations of high impact invasive non-native species where these put at risk the achievement of river basin planning objectives. In particular we want to develop a partnership approach that:

- gives priority to measures to prevent introductions of invasive non-native species;
- establishes a network that can detect newly introduced non-native species and, where appropriate, undertake rapid action to prevent their establishment;
- develop longer-term mitigation measures such as containment or control for established invasive non-native species where these put at risk ecological status or other Water Framework Directive objectives.

Management of riparian vegetation

There are a number of invasive non-native plants that are found as riparian vegetation – colonising the banks and shores of water bodies, often in dense stands. These plants include:

- Himalayan balsam;
- Japanese knotweed;
- giant hogweed;
- rhododendron.

There are a number of existing voluntary schemes to manage these species. For example, Tweed Forum run the Tweed Invasive Control Programme – continually mapping and controlling riparian plant species.

Once the invasive non-native plants are removed it is important to ensure that appropriate riparian vegetation re-colonises the site.

Legislative framework

Existing legislation, policy and initiatives which will be used to contribute to the management of invasive non-native species include:

- the Invasive Non-Native Species Framework Strategy for Great Britain: protecting our natural heritage from invasive species[19], published jointly by Defra, the Welsh Assembly Government and the then Scottish Executive in 2007;
- Section 14 of the Wildlife and Countryside Act 1981 makes it an offence to release (or to plant) non-native species to the wild[20] (further proposed amendments to Schedule 9 include a wider range of problem species);
- proposed use of Section 14A of the Wildlife and Countryside Act 1981 to ban the sale of species specified in an Order (list of proposals being consulted on);
- Control of Pesticides Regulations 1986/Plant Protection Products Regulations 1997 (use of herbicides to control invasive plants in or near water);
- The Prohibition of Keeping or Release of Live Fish (Specified Species) (Scotland) Order 2003;
- Aquaculture and Fisheries Act (Scotland) 2007;
- biodiversity action planning;[21]
- delivery of the Species Action Framework (co-ordinated by Scottish Natural Heritage).[22]

[19] www.nonnativespecies.org
[20] The is a current consultation in Scotland on the Wildlife and Natural Environment Bill at www.scotland.gov.uk/Publications/2009/06/17133414/0
[21] www.biodiversityscotland.gov.uk
[22] www.snh.org.uk/speciesactionframework/