local environment agency plan

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SOUTH CUMBRIA

CONSULTATION REPORT

MARCH 1997

ENVIRONMENT AGENCY

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PART 1

The purpose of this part of the LEAP is to introduce you to the role of the Agency and the role of Local Environment Agency Plans (LEAP's).

There will also be a brief description of the area covered by the plan.

The principal section of this part of the plan is the issues and option for their resolution. This is the hub of the plan and will form the focus for consultation.

In addition we will outline some protection policies and partnerships which the Agency are involved in.

1.1 Vision for the Local Environment

The area covered by this plan encompasses a high quality environment, large parts of which are recognised to be of national and international importance. For example much of the area is in the Lake District National Park, including England's most famous lake - Windermere. The area also contains important species and habitats such as the internationally important sites in and around Morecambe Bay and the Duddon estuary. The quality of the environment also provides a major recreational facility and attracts large numbers of visitors.

The Agency recognises that it has a major role to play in maintaining and improving the quality of land, air, water and biodiversity in the area. To help promote a sustainable environment the Agency will operate within its regulatory framework but will also work with key partners to tackle environmental issues in an open and holistic way. The environment of the area is unique, and in order to target environmental improvements the Agency will seek to improve scientific understanding of the complex environmental processes at work particularly in the lakes and estuaries.

1.2 The Role of the Environment Agency

The Environment Agency for England and Wales was established on 1 April 1996 as a result of the 1995 Environment Act. It is divided into eight regions and twenty-six areas with the head offices in Bristol and London. The Agency provides a more comprehensive approach to the protection and management of the environment by combining the regulation of air, land and water. Its creation is a major and positive step, merging the expertise of Her Majesty's Inspectorate of Pollution, the Waste Regulation Authorities, the National Rivers Authority, and several smaller units from the Department of the Environment.

The Agency exists to provide high quality environmental protection and improvement. This is achieved by an emphasis on prevention, education and vigorous enforcement wherever necessary.

Industry also benefits because it now deals with one regulator instead of three.

The Environment Agency's statement of Vision, values and our key aims

Our vision is:-

A better environment in England and Wales for present and future generations.

We will:

- protect and improve the environment as a whole by effective regulation, by our own actions and by working with and influencing others
- operate openly and consult widely
- value our employees
- be efficient and businesslike in everything we do

The aims of the Environment Agency are as follows:

Aims

- To achieve significant and continuous improvements in the quality of air, land and water.
- To manage water resources to achieve the correct balance between the needs of the environment and those of abstractors.
- To provide effective defence for people and property against flooding from rivers and the sea.
- To remediate, with others, contaminated land designated as special sites.

1.2 The Role of the Environment Agency

- To achieve a significant increase in packaging waste minimisation and recycling through involvement in the producer responsibility scheme.
- To maintain, improve and develop fisheries.
- To conserve and enhance inland and coastal waters and associated land and their use for recreation.
- To achieve all this in a way which does not impose disproportionate costs on society.
- To influence those aspects of the environment for which the Agency is not directly responsible.

The Work

The Agency takes a much wider view of environmental regulation than was possible for its predecessors, though remaining an independent, impartial and firm regulator in their best traditions.

1.3 The Leap Process and Purpose of Consultation

The production of Local Environmental Agency Plans (LEAPS) within the Agency involves three stages:

- The Local Environment Agency Plan Consultation Report.
- The Local Environment Agency Plan five year Action Plan.
- The Annual Review.

Consultation Report

The Consultation Report includes the following elements:

Vision

The vision expresses the realistic long term aims for the area.

Area Description

An outline of the area covered by the LEAP.

Issues and Options

Having considered the current state of the area and compared it to the objectives, the issues to be considered have been identified.

The identified issues are discussed and where possible options for their resolution are proposed.

The LEAP Consultation Report is intended to form a basis for consultation between the Agency and all those with interests in the area.

Uses

The uses of the area are identified and discussed. Information is presented in the form of a map with supporting text. Uses may have impact on the environment or impose requirements on the environment.

Consultation

The period of consultation lasts for three months. In this time we would ask you to concentrate on the issues that are raised within the report and the options for their resolution (section 1.6). Although we welcome comments and corrections on the supporting information, we would prefer consultees to concentrate on the issues.

1.3 The Leap Process and Purpose of Consultation

Consultees may wish to:

- Raise additional issues not identified in the plan.
- Comment on the issues and options identified in the plan.
- Suggest alternative options for resolving identified issues.

We recognise that many of the issues and options for action identified by the consultation report will involve many organisations or individuals. Your views will be crucial to the preparation of the Action Plan.

Local Environment Agency Plan Action Plan

The Action Plan will be produced following consultation and will have regard to the comments received. Once produced, the plan will form a basis for future actions within the area for the next five years and will be a public document. It will detail the nature of actions required, the cost, timescale and responsible organisations. The Agency will be seeking commitment to planned actions by others wherever possible.

Annual Review

The Agency will be jointly responsible, with other identified organisations and individuals, for implementing the Action Plan. Progress will be monitored and normally reported annually, by means of a review document which will be publicly available.

The review document will comprise the following information:

- A detailed comparison of actual progress against planned progress.
- Identification of additional actions to maintain progress in the light of changes in the area.
- Consideration of the need to update the LEAP.

Update requirements will obviously depend on the particular needs of the area. However, updates to the LEAP will normally be undertaken every five years. Key organisations and individuals forwarding comments will receive an annual review paper to update them with the action plan progress.

The South Cumbria Local Environment Agency Plan Consultation Report attempts to highlight the most significant issues and solutions for rectification within a time scale of five years.

Constraints

The completed plan will inevitably be subject to some limitations.

1.3 The Leap Process and Purpose of Consultation

To ensure improvements and overcome the problems in the area, actions, which in many cases are the responsibility of other organisations and individuals, will be necessary. Where the Agency does not have the powers to make the necessary changes, it will use its influence to improve the state of the area wherever possible.

We would like to hear your views:

- Have all the major issues been highlighted?
- Have all the options been considered for resolving the issues that been identified?
- Do you have any comments to make regarding the plan in general?
- Comments on the South Cumbria Local Environment Agency Plan Consultation Report should be received by 4 July 1997.
- All written responses shall be considered to be in the public domain unless Consultees explicitly request otherwise.
- If you would like to comment on this document please write to:

Michael Harrison
Environmental Planner
Environment Agency
Chertsey Hill
London Road
Carlisle
CA1 2QX

1.4 Sustainable Development and Biodiversity

Sustainable Development

The Agency's overall aim of protecting and enhancing the environment contributes to the Government's and the world wide environmental goal of sustainable development which is defined as:-

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". (Brundtland Definition - Earth Summit, Rio 1992)
This is carried through the Agency's vision statement and requires economic and social activities in England and Wales to be undertaken within the carrying capacity of the environment.

The economy, society and the environment are linked and all form part of a dynamic system that is in constant change. Action, regulation, education and enforcement all have a part to play in working towards sustainable development by the Agency and others.

Integrated environment management is a means by which the Agency can promote sustainable development and LEAPs are an important part of this process.

Biodiversity

Biodiversity is simply a new term meaning the "variety of life".

In the pursuance of the Government's commitment to biodiversity conservation, the Agency will be developing targets for species and habitats of conservation concern. These will relate to the targets for key wetland species and habitats as identified by UK Biodiversity Action Plan, emphasising the contribution that the North West Region can make to the national targets.

1.5 The South Cumbria Leap Area

The plan area covers approximately 1 426 km^2 and has a population of around 183,000 (1994). The population is concentrated in the southern coastal areas, the Furness peninsular and around Kendal and Windermere. The North Western part of the area is very sparsely populated.

The character of the area is principally rural with agriculture and forestry being the principal land uses. The main exception to this is the Barrow area where the character is more urban, and where there is significant industry. Vickers Shipbuilding and Engineering is the largest industrial employer with other significant manufacturers being Kimberley Clark Paper Mill and the Glaxo Wellcome site at Ulverston.

Approximately 98% of the area is within Cumbria, with a small area around Silverdale being in Lancashire.

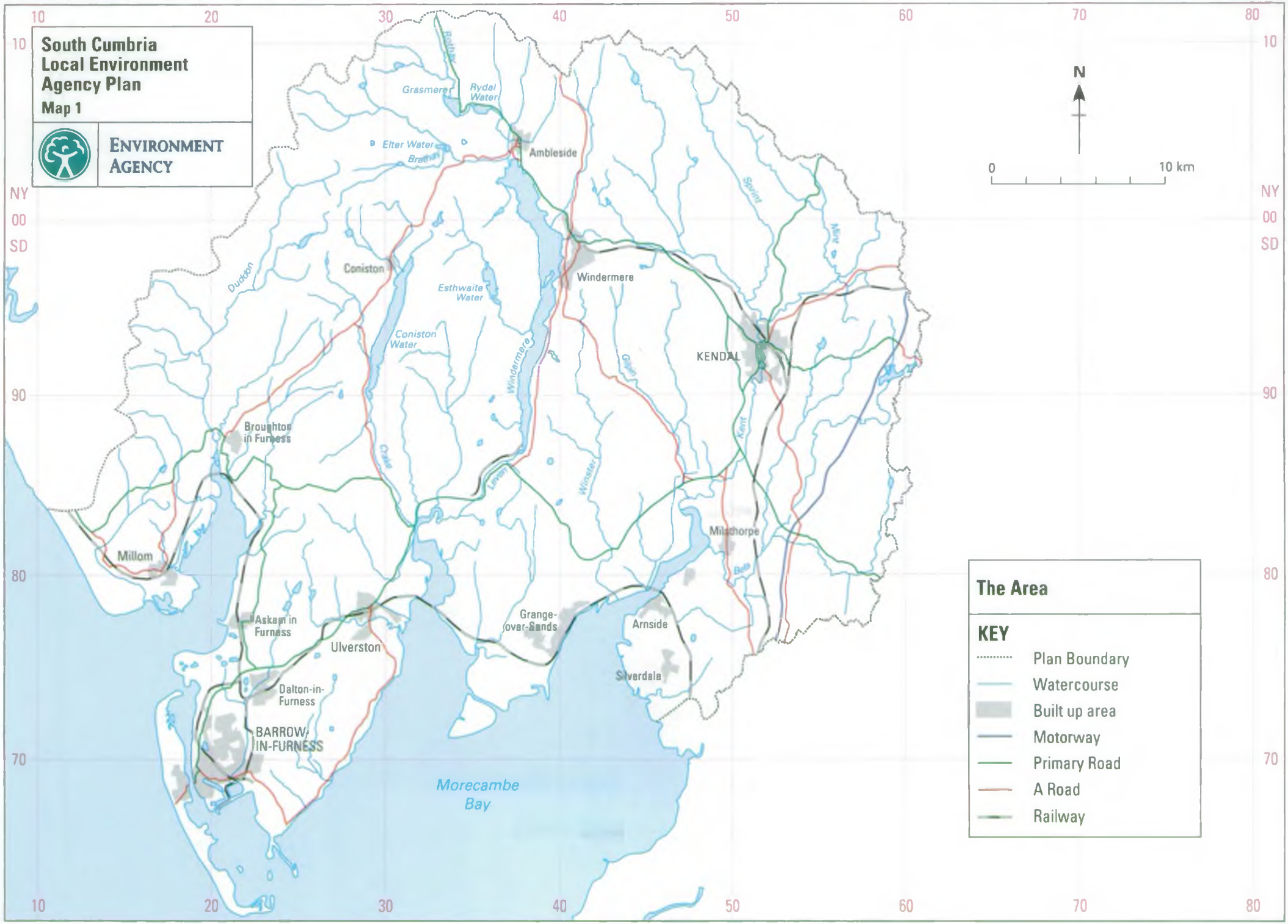
Of the District Councils, the plan area includes the whole of Barrow Borough and a significant portion of South Lakeland District. There is also a small area of Copeland Borough in the west and Lancaster City in the area around Silverdale.

A large part of the area is also in the Lake District National Park. The landscape of the area attracts large number of visitors, and tourism is an important and established part of the local economy.

Windermere is the largest natural lake in England at 1 457 hectares and is a focus for much of the tourist activity of the area. For the more serious walker/climber the area contains some of the Lake Districts highest and most scenically beautiful mountains, including the Langdales, Coniston and Kentmere fells.

The environment of the area is relatively unspoiled in comparison with other parts of England. Water and air quality is generally good, and the legacy of land contamination is much less severe than in the more industrialised parts of the North West Region. The landscape of the area is internationally renowned. The area also contains a significant ecological resource including several internationally important species and habitats and large areas covered by Site of Special Scientific Interest (SSSI) designation.

Despite this high quality environment the Agency is not complacent and aims for continuous environmental improvement. Local issues which the Agency is currently seeking to address on its own or with others are highlighted in the next section of the plan.


South Cumbria
Local Environment
Agency Plan
Map 1
ENVIRONMENT AGENCY
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0
10 km
Grasmere
Rydal Water
Elter Water
Ambleside
Coniston
Esthwaite Water
Coniston Water
Windermere
KENDAL
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Arnside
Silverdale
Milnthorpe
Morecambe Bay
The Area
KEY
Plan Boundary
Watercourse
Built up area
Motorway
Primary Road
A Road
Railway

1.6 Issues and Options for Their Resolution

The issues describe some of the challenges which lie ahead. At this stage the issues are not prioritised, but represent our initial thoughts as to the main issues affecting the area over the next five years.

The issues will form the hub of the action plan produced following consultation. Consequently we would ask you to look carefully at these issues and address your main comments to this section of the plan.

Have all the issues been identified?

Are there other options for resolving the issues?

Which option is likely to provide the best outcome?

Following consideration of all comments we receive on the consultation report we will produce an action plan. In this document we will outline specific action to deal with the issues. Each action will be time framed and where possible costed.

Issue 1 - Drainage problems at Grange over Sands caused by siltation at the foreshore

There is concern from Grange Town Council that the existing retaining wall at the River Winster outfall within the estuary is causing the River Kent channel to be restrained from being located adjacent to the promenade at Grange-over-Sands. The Town Council are concerned that this has led to siltation adjacent to the promenade at Grange over Sands which has also encouraged the growth of Spartina anglica grass. The Council feel the grass is unsightly and believe the situation has also caused surface water drainage problems in the lower lying parts of the town.

Options	Responsibility	Advantages	Disadvantages
Investigate problem through Shoreline Management Plan (SMP) Group and implement recommendations.	Environment Agency SLDC Lancaster City Council.	· Expert consultant already employed. · Neutral consultant employed hence no bias towards who pays the fees.	· Priority ranking order to be established. · No immediate solution offered to Grange-over-SandsTown Council. · SMP to be produced over an 18 month period.
Remove the River Winster outfall channel groyne and breakwater without considering a hydraulic report.	Environment Agency	'Would satisfy' Grange-over-Sands Town Council and lobbiers.	Possible negative consequences for River Winster drainage area. · Consequences on Grange-over-Sands promenade uncertain. · Problem may not be solved.
Repair the existing River Winster outfall in maintenance programme.	Environment Agency	Secures River Winster drainage standards.	· Uncertain on worsening Grange-over-Sands drainage problem. · Public perception of the works.
Do nothing.	Environment Agency	No cost.	No solution offered to local residents.

Issue 2 - Flooding problems

The Agency aims to provide effective flood defences for protection of people and property to a standard appropriate to land use as well as the Agency's and Ministry of Agriculture's indicative standards. Schemes which the Agency feels are justifiable within the LEAP area are outlined below.

Arrad Marsh Sea Defence Embankment

Existing privately maintained Sea Defence Embankment is porous under high tide conditions. Up to 15 properties and agricultural land vulnerable under extreme tidal surge conditions.

Poaka Beck Dalton-in-Furness

Existing river channel, capacity embankments and culvert entrances are not up to urban flood defence standards.

River Rothay, Ambleside

Existing flood defence protection standards are not in place to protect properties between the river Rothay and the town.

River Kent, Arnside Promenade Sea Defence

Up to 8 properties are vulnerable to tidal flooding adjacent to Arnside promenade.

River Kent Carling Steps

Several properties are vulnerable to fluvial flooding from the River Kent under extreme conditions.

Church Beck Coniston

Flooding occurred in 1995 when small industrial units were inundated by Church Beck.

Issue 2 - Flooding problems

Options	Responsibility	Advantages	Disadvantage
Investigate the viability of options to resolve the problems (considering conservation and economic aspects) and promote projects accordingly.	Environment Agency	Existing Flood Defence Standard brought up to acceptable levels of protection, whilst protecting the environment.	Cost of the project. Overcoming objections.
Do nothing.	Environment Agency		Continued flood risk.

Issue 3 - Coastal Area at Risk of Flooding

Following the introduction of the flood warning dissemination system for the fluvial (river) risk zones; a programme of implementing a similar operation for the coastal tidal risk zones is required.

This will involve a programme to more precisely define the areas at risk along the coast. These will generally be areas where the land is below the highest recorded tidal levels. The precise height of the highest known tides will vary around the coast depending on the degree of exposure to tidal surges and wind induced waves. There may be a need to increase the number of tidal monitoring stations in order to undertake these measurements.

Once the zones are identified it will be necessary to assess the risk of overtopping of the existing defences associated with each flood risk zone.

The Agency will then be in a position to implement a new flood warning system for residents and property owners within each zone.

The Agency currently operates a system which gives a general warning of coastal flooding when high tides are expected, but the definition of flooding zones is aimed at improving this service.

Options	Responsibility	Advantages	Disadvantages
Identify vulnerable areas based on highest predictable tidal surges.	Environment Agency	Increases knowledge of predicted highest tidal surge levels at specific locations along the coast.	Costs.
Devise an improved Operation Neptune warning plan which identifies specific risk zones linked to overtopping of existing defences.	Environment Agency as part of the Flood Warning Dissemination project.	Better warnings to the public.	Cost of implementing and running a scheme.

Issue 4 - The impact on groundwater from potential saline intrusion

Heavy abstraction of groundwater for industrial and public supply from the sandstone aquifer around Barrow has exceeded natural recharge. This has resulted in a fall in water levels to well below sea level in areas near the coast. There is a risk of deterioration in groundwater quality from saline water intrusion from the sea.

Abstractors in the affected area are operating within their licensed quantities.

To ensure sustainable use of groundwater the only realistic option open to the Agency is to refuse application for further abstractions within the Furness aquifer. Developers wishing to utilise mains water will not be affected by this embargo.

Options	Responsibility	Advantages	Disadvantages
Enforce embargo on issue of further water abstraction licences. Recommend refusal of planning application unless there is a satisfactory means of water supply.	Environment Agency Local Authorities Developers	Protection of groundwater quality and local abstractors.	Restriction on further development of local water resources.
Explore demand management with existing abstractors	Environment Agency Existing abstractors	Protection of groundwater quality and local abstractors.	
Do nothing	Environment Agency	None	Threat to groundwater quality and impact on local abstractors.

Issue 5 - Lack of accurate flow data on the River Kent at Burneside

The River Kent upstream of Kendal has a rapidly changing profile caused by flood events and gravel accretion during low flow periods. This is causing large errors in the flow measurement at this part of the river. The period of low flows during 1995/96 has highlighted major errors in providing low flow data to customers both within the Agency and externally.

To overcome this it is intended to construct a V shaped flow measuring station. This will allow for accurate measurement of flows at the low to medium level range. This will also form invaluable long term data for the River Kent upstream of major confluences with the Rivers Sprint and Mint.

It will also help in assessing the effect of James Cropper plcs intention to start using Kentmere Reservoir to store water for use in maintaining flows in the River Kent.

Options	Responsibility	Advantages	Disadvantages
Install control structure to improve flow measurement.	Environment Agency	Improved data to assist in decision regarding abstraction. Improved service to customers.	
Do nothing	Environment Agency		Poor flow measurement leading to potential environmental damage.

Issue 6 - The environmental impact of old landfill sites

Prior to 1976 landfill sites were operated without a waste disposal licence. In most instances few records of how these sites were managed or what types of waste were disposed of were kept or still exist. The Agency is consulted by local Planning Authorities regarding proposed developments on or near to "closed" and current landfill sites. In the late 1980s the then Waste Regulation Authority consulted all District and Parish Councils to establish a database of all known landfills and any available background information. The South Cumbria LEAP area includes an estimated 130 such sites.

For many sites the only known information is an approximate location. This means that when the Agency is consulted it is unable to provide a detailed or positive response.

The Agency is also unaware of any environmental pollution or potential pollution that such sites may cause, this shortfall needs to be addressed. To fill this gap we intend to undertake an information gathering exercise to assess the state of landfill sites and their environmental impact.

Options	Responsibility	Advantages	Disadvantages
Information gathering exercise on selected landfill sites.	Environment Agency	Improved response to Planning Authorities and increased database of environmental information to assist management decision.	
Do nothing	Environment Agency		Poor response to Planning Authorities and the probability of continuing environmental damage. Uncertainty regarding future development of sites and their remediation.

Issue 7 - Poor Trout Production in some parts of the River Bela catchments

Peasey Beck is a tributary of the River Bela and currently fails to meet the objectives of Rivers Ecosystem (RE) Class 1. This RE failure is supported by biological data.

The beck drains a large agricultural catchment which is a potential source of contamination. In addition water is abstracted from the beck and used to maintain water levels in the Lancaster Canal.

Coincidentally the fisheries strategic survey for 1995 found a number of sites in the catchment with lower than expected trout production, including sites in Peasey Beck. The poor trout production may be linked to the water quality and abstraction arrangements outlined above. Other contributory factors may include restricted areas of spawning substrate, access for adult fish or poor juvenile fish habitat.

All these factors require further investigation and appropriate follow up action.

Options	Responsibility	Advantages	Disadvantages
Joint inter-departmental investigation of abstraction for Lancaster Canal.	Environment Agency	Potential for improved management of flow in Peasey Beck and levels in Killington Lake, with possible knock on benefits to the fishery.	Resources and potential amenity problems on Killington Lake.
Investigate extent and quality of fisheries habitats in Peasey Beck and other parts of the Bela catchment.	Environment Agency	Sound basis for planning habitat improvement work.	
Investigate reasons for water quality problems	Environment Agency	Cause of the problem can be identified and remedial action considered	
Do nothing	Environment Agency		Fish population may decline further and water quality may deteriorate

Issue 8 - Need for a better strategic response to the environmental impacts of droughts

In 1995 application for drought orders in highly sensitive environmental sites in Cumbria resulted in one of the Environment Agency's predecessor bodies facing detailed questions on a wide range of environmental issues. One such site covered by this plan is Lake Windermere.

In similar situations in the future the Agency will need to make clear statements about potential impacts on ecology, landscape and amenity issues and demonstrate that the issues have been investigated and reasonably assessed. To enable such a response to be made there is a need to collect and collate available environmental information in collaboration with partner organisations. This will allow an agreed reference manual of environmental assessments to be used in response to any future drought episodes.

Options	Responsibility	Advantages	Disadvantages
Study of environmental interests of lakes, reservoirs and rivers in relation to drought.	Environment Agency LDNP English Nature NWW Ltd	Improved environmental protection in response to droughts.	
Do nothing.	Environment Agency		Future droughts will not be managed in the best possible way.

Issue 9 - Impact of effluent discharges on the Leven Estuary

There are significant discharges to the Leven Estuary from the Glaxo Wellcome site at Ulverston as well as from North West Water's Ulverston Sewage Treatment Works. The estuary around Carter Pool is currently classified as being of a poor quality in the Agency estuary water quality classification scheme.

The discharges are currently controlled by Environment Agency authorisations which specify the permitted nature and volume of the discharge as well as the timing of discharges in relation to the tides.

The Agency is concerned about the potential combined effects of these discharges on the environment of the estuary. The discharge plume is at times visible in the estuary and there is public perception that this is damaging to the environment.

In response to the situation the Environment Agency is currently undertaking a two year study into the overall impact of these discharges on the estuary and its migratory fishery. This will provide a baseline for negotiation aimed at improving effluent discharges into the estuary.

Options	Responsibility	Advantages	Disadvantages
Use results of Environment Agency estuary study to promote improved effluent quality.	Environment Agency	Sound scientific basis for negotiating improvements. Protection of migratory fishery.	

Issue 10 - Impact of discharges on Cavendish Dock in Barrow

Cavendish Dock is a partially enclosed area of water which has been artificially warmed by discharges of cooling water from Roosecote Power Station.

The dock is also thought to be enriched by discharges from sewer overflows which reach the dock via Mill Beck.

Over time the dock has developed its own eco-system and is designated a Site of Special Scientific Interest (SSSI).

The extensive plant growth in the dock causes high pH levels which exacerbates the toxicity of ammonia present in the dock. In addition there are occasional "blooms" of potentially toxic blue-green algae. All these factors have been detrimental to the fishery.

Options	Responsibility	Advantages	Disadvantages
Survey aimed at understanding the ecological balance in the dock and the part played by current discharges to the dock.	Power Station Operator	Better understanding of the system to aid decision making process.	
Management (removal) of extensive plant growth in the dock.	Power Station Operator	Protects water quality.	Care is needed not to damage eco-system and SSSI status.
Remove storm sewage overflows from Mill Beck.	NWW Ltd	Removal of nutrients which stimulate plant and algae growth, and reduction in ammonia levels.	
Do nothing	Environment Agency		Public concern remains re blue-green algae. Lack of understanding of the eco-system. Excessive plant growth hinders angling

Issue 11 - Eutrophication in Elterwater

Elterwater has been designated by English Nature as a Site of Special Scientific Interest (SSSI) for its' diverse hydrosere which ranges from open water through swamp and fen to marshy grassland and Carr woodlands.

The lake acts as though it were divided into three discreet "basins" with relatively slow flow through and interchange of water. Langdale sewage treatment works discharges treated sewage effluent into the inner basin of the lake. This contributes more than 50% of the total phosphorus load to the lake and 77% of the most usable form of phosphorus (ortho-phosphate). Leading to hyper-eutrophication (nutrient enrichment) of the inner basin. The resultant reduction in water quality leads to total de-oxygenation of deep water in the inner basin. The sediments are also heavily enriched, and this large pool of nutrient is likely to cause problems in the long term even if the impact from the sewage treatment works is removed.

There is a need to consider a range of options for reducing the impact of Langdale Sewage Treatment Works, on the lake. In addition consideration needs to be given as to whether there is a practical way at remediating the nutrient rich sediments.

Options	Responsibility	Advantages	Disadvantages
Re-route sewage discharge to River Brathay upstream of the lake outer basin.	NWW Ltd	Eliminate discharge from inner basin. River made more productive by nutrient input.	Possible long term impact on the outer basin and River Brathay.
Re-route sewage discharge to River Brathay downstream of the lake.	NWW Ltd	Eliminate discharge from lake. Starts natural remediation process immediately.	Increased phosphorous loading on the River Brathay.
Assess natural remediation process and timescales.	Environment Agency	Appropriate decisions can be made for longer term management.	

Issue 12 - Eutrophication of Esthwaite Water

Esthwaite has been designated by English Nature as a Site of Special Scientific Interest (SSSI) and is also a RAMSAR site because of its international importance as a wetland. The site is of national importance for its waterweed species and communities.

Data gathered by the Agency shows the lake to be hyper-eutrophic (very nutrient enriched) with all the attendant water and sediment quality problems and algal blooms associated with this trophic status.

Hawkshead Sewage Treatment Works (STW) discharges treated sewage effluent to the lake. North West Water installed phosphorus removal plant at the sewage works in 1986. This reduced the contribution of total phosphorus input to the lake by the sewage works from 90% to around 50% or less. Improvement is expected in the long term, but to date investigations have been inconclusive.

The phosphorus loading in Cunsey Beck which drains the lake suggests that there are other sources of phosphorus contributing to the eutrophication.

Future investigations will focus on assessing the relative impact from all inputs (ie STW, fish farm, land management, lakes internal nutrient pool) to the lake and the modelling of various scenarios. The results will form the basis of future management options.

Issue 12 - Eutrophication of Esthwaite Water

Options	Responsibility	Advantages	Disadvantages
Maximise potential for improving effluent quality and phosphorus removal at Hawkshead Sewage Treatment Works.	Environment Agency NWW Ltd	Reduce eutrophication in Esthwaite and Cunsey Beck.	Scheme not in current NWW Ltd capital programme agreed with Environment Agency and OFWAT. Investment unlikely before 2000.
Quantify the phosphorus input to the lake from caged fish farm, land management and shallow water recycling.	Environment Agency	Relative impact of all inputs can be assessed. Hard information on which to base negotiations for improvement.	Reliance on contractor.
Take a core of sediments (Benthic Core).	Environment Agency	Measures the real biological impact, and changes can be related to time.	Reliance on contractor.
Macrophyte Survey	Environment Agency English Nature	Measures impact of eutrophication on flora with historical data.	

Issue 13 - Eutrophication in Grasmere

The sewage treatment works (STW) at Grasmere is hydraulically overloaded leading to a constant discharge of weak untreated sewage to Grasmere Lake. The overloading is caused by groundwater infiltration into the sewerage system. The STW is the main source of the nutrient causing eutrophication in the lake.

Options	Responsibility	Advantages	Disadvantages
Solve infiltration and re-introduce phosphate stripping at the STW.	NWW Ltd	Reduction in sewage derived phosphate discharged to Grasmere.	Cannot re-introduce phosphate removal until infiltration solved. Improvement may only be short-term at best.
Re-route sewage to Ambleside STW.	NWW Ltd	Eliminate STW phosphate input to Grasmere. Phosphate-stripping already in place at Ambleside STW.	Costs (significant) Potential impact on Windermere. Better long-term solution.
Re-route to the River Rothay where it leaves Grasmere Lake.	NWW Ltd	Improvements in Grasmere.	Impact on River and Rydal Water - only transfers the problem.

Issue 14 - Potential Flood risk at Haverigg from stormwater overflow

Although the tidal flooding problem at Haverigg was solved by the Flood Alleviation Scheme completed in 1994 there is a risk of flooding from the combined sewer system within the village.

The affects of this problem were masked by the tidal inundation which was alleviated in the original scheme.

NWW Ltd were notified of the problem at the time but were unconvinced of this situation and decided to take no action. The NWW Ltd Pumping Station has insufficient capacity and the combined sewer overflow is tide locked, resulting in backing up of the sewerage system.

Options	Responsibility	Advantages	Disadvantages
Await evidence of stormwater flooding during a tidal surge event linked with local heavy rain and observe the situation	Environment Agency NWW Ltd	The reality of the potential problem can be closely observed	Wait and see approach may leave residents with risk of flooding. Unjust criticism of the tidal flood alleviation scheme may follow.
Carry out discussion with NWW Ltd to see if an investigation into the sewerage system can be agreed.	Environment Agency NWW Ltd	Proactive approach	Costs of the investigation
Do nothing	Environment Agency NWW Ltd	No cost	Problem unresolved

Issue 15 - Impact of Water Abstraction on the River Leven Migratory Fishery

There are two power generating sites on the River Leven, one at Backbarrow and one at Low Wood. The associated abstraction licences are licences of right and the volumes are quite large (not exceeding 253 mld/66 199 ml per year at Backbarrow and similarly 550 mld/127 427 ml per year at Low Wood).

There is a difference of approximately 1km between the abstraction and return point at the downstream site (Low Wood) and this has an impact on fish movement, particularly in association with the weir at the abstraction point. An operating agreement exists between the owners and the Environment Agency not to generate when the river flow drops below a certain level. The agreed level varies depending on the month. The terms of this agreement are based on the best compromise between costs and benefits.

Neither of the two sites are screened and thus fish are not currently excluded. Adult fish spawn in the mill race that feeds the Low Wood site in excess of 30 redds were counted in the 1995/96 spawning season) and their progeny are unlikely to thrive. Kelts and smolts also are drawn into the Mill Race and hence the turbines where some are believed to be damaged or killed. Between 3 and 5 000 smolts were observed in the Low Wood mill race in May 1996.

Under the Salmon and Freshwater Fisheries Act 1975 Section 14, as amended by the Environment Act 1995 Schedule 15, screening obligations imposed on occupiers of mills do not apply to conduits or channels constructed before 18 July 1923.

Options	Responsibility	Advantages	Disadvantages
Screen intake at Low Wood.	Uncertain legal responsibilities	Protects the salmon and sea trout fishery on the Leven (possibly 135 extra salmon adults and 26 extra sea trout adults per year).	Cost of screens.
Screen intake at Backbarrow.	No legal responsibility. Environment Agency have powers to install.	- A contribution (possibly significant) to the Leven salmon and sea trout fishery.	Cost of screens.
Do nothing		No cost	Loss of salmon and sea trout to the Leven Fishery - estimated value of > £166 K lost.

Issue 16 - Impact of Discharges from Combined Sewerage Systems

Sewers on the catchment are largely combined with both foul and surface waters (road drainage etc) being transported in the same sewer for treatment at Sewage Treatment Works (STW's).

Combined Sewer Overflows (CSOs) are located on sewers or at pumping stations and discharge to watercourses. They are designed to prevent foul flooding by relieving the sewerage network of excess flows during storm conditions. When properly designed and constructed they should only operate when there is adequate dilution available in the receiving watercourse. There are also sewer overflows at some STW's where there may be some treatment given to the storm sewage.

In some cases old sewers have become overloaded due to increased residential and commercial development. This has resulted in more frequent discharges than is now considered acceptable.

Within the plan area the following CSOs have been identified as requiring priority attention.

CSO	Options	Responsibility	Advantages	Disadvantages
Mill Beck (Furness Abbey) This reach fails to meet it's water quality objective	Removal of storm sewage overflows.	NWW Ltd	Removes aesthetic problem and water quality improved for fishery.	Cost. Timescales.
Gleaston Combined Sewer Overflow	Remove C.S.O. to Newbiggin STW.	NWW Ltd	Removal of aesthetic problem.	Cost. Timescales.
Ulverston Combined Sewer Overflow	1. Removal of 2' C.S.O.	NWW Ltd	Aesthetic improvement in two inland watercourses.	Costs. Timescales.
	2. Efficient screening	NWW Ltd	Practical interim arrangement prior to improvements. Prevents sewage debris in watercourse.	Partial solution.

Issue 17 - Copper enrichment and algal blooms in Coniston Water

Recent studies on Coniston Water have found copper enrichment of the Lake sediments. This has been caused by previous mineral working in the surrounding catchment. A research programme is needed to further quantify the level of metals and any potential effects on the lake. In addition there is a perception that algal blooms are getting more frequent in Coniston Water. This may or may not be a natural phenomena, but the Agency intends to look more closely at this aspect of the lake ecology.

Options	Responsibility	Advantages	Disadvantages
Measure concentration of metals in different forms in the lake sediments and hence identify metals. Quantify the effect of toxic metal pollution on the lake biota. Assess the likely release of copper under different scenarios of environmental change (eg eutrophication, acidification, and climatic changes. Assess probable impact on the lake.	Environment Agency	Assists long term management and planning. Assess potential effects on food chain.	Cost Cost
Determine the species of algae that are present.	Environment Agency	May indicate factors which favour particular species and indicate potential causes of algal blooms.	Resource. Findings may be inconclusive. Phenomena may be natural.

Issue 18 - Premature Storm Discharges at Sewage Treatment Works

Sewage Treatment Works (STW's) normally have a system for storing and treating excess flows of sewage which reach them during storm events when rainfall increases the flow in the sewers. At Cartmel and Staveley the STW's are constantly overloaded leading to a permanent discharge of partially treated storm sewage. The principal cause is infiltration of groundwater into the sewers.

This permanent storm sewage discharge is causing aesthetic problems because of sewage litter in the river and is also causing localised pollution. In the case of Staveley STW, there is also some concern over the potential impact of the discharges on native crayfish populations in the River Kent.

Location	Options	Responsibility	Advantages	Disadvantages
Cartmel STW	Resolve infiltration problem.	SLDC NWW Ltd	Improve oxygen concentration, minimise fungal growths and improve aesthetics problems.	Cost
Staveley STW	Resolve infiltration problems.	SLDC NWW Ltd	Improvements to aesthetics and protection of crayfish.	Cost

Issue 19 - Inadequate Sewage Treatment

Different levels of sewage treatment are required for different watercourses in order to achieve adequate environmental protection. In the cases below the treatment arrangements are not adequate to protect the watercourse.

Location	Options	Responsibility	Advantages	Disadvantages
Meathop Marsh Drain downstream of Meathop STW. Failure to meet Water Quality Objective of RE4.	1. Pump sewage to Lindale STW.	NWW Ltd	Removes discharge.	Cost.
	2. Improve treatment at Meathop.	NWW Ltd	Potential amelioration of pollution problems. Improve water quality.	May not resolve the issue.
Holme Beck downstream of Holme STW. Failure to meet Water Quality Objective of RE2.	1. Pump to Milnthorpe STW.	NWW Ltd	Removes discharge from Holme Beck. Improve water quality.	Cost.
	2. Pump discharge to the River Bela.	NWW Ltd	Removes discharge from Holme Beck.	Introduces new discharge to Bela.
	3. Update existing works to improve treatment.	NWW Ltd	Amelioration of aesthetic problems.	Cost. May not resolve issue.
Blea Beck downstream of Askam STW. Failure to meet Water Quality Objective of RE4.	STW improvements.	NWW Ltd	Resolve ammonia pollution problems.	Cost
River Rothay downstream of Ambleside STW. Failure to meet Water Quality Objective of RE2.	STW improvements	NWW Ltd	Resolve ammonia pollution problem.	Cost.

Issue 19 - Inadequate Sewage Treatment

Location	Options	Responsibility	Advantages	Disadvantages
Duddon Estuary Villages These discharges give rise to large numbers of pollution incident complaints and cause problems of unsightly sewage litter	1. Improved treatment.	NWW Ltd	Improve aesthetic pollution. Improvement of effluent quality.	Cost.
	2. Relocation of outfall.	NWW Ltd	Improvement on aesthetics.	Cost.
	3. Diversion of flows to existing treatment facilities eg Barrow.	NWW Ltd	Removal of discharge.	Cost.
Walney Island and Barrow Island Sewage Effluent. These discharges are in the vicinity of bathing waters which have failed to meet the standards laid down in the EC Bathing Water Directive. They also give rise to complaints, and cause problems of unsightly sewage litter.	1. Diversion to Barrow STW.	NWW Ltd	Removes discharge. Potential improvement in bacteriological counts in estuarine shellfish beds. Improves amenity value.	Cost.
	2. Uprate treatment at Walney STW.	NWW Ltd	Improves water quality. Ameliorates aesthetic problem. Improves bathing water quality.	May not resolve all issues eg. shellfish bed problems.

Issue 20 - Lack of Rural Sewerage Leading to Localised Pollution

Lack of rural sewerage systems and associated sewage treatment has led to a multiplication of private septic tanks and treatment plants in some areas. This makes control difficult and has led to localised pollution.

To achieve improvements the Agency must work with Local Authorities, NWW Ltd and others. Within the plan area the following sites have been identified as the most significant problem areas.

Location	Options	Responsibility	Advantages	Disadvantages
Silecroft Beck. This reach fails to meet it's Water Quality Objective of RE2	Catchment campaign to identify polluting inputs and take action..	NWW Ltd	Reduced impact of existing discharges. Improve water quality.	Cost.
	Provision of public sewer under section 101A of the Water Industry Act 1991 or first time rural sewage treatment.	NWW Ltd		
Black Beck (The Green) This reach fails to meet its Water Quality Objective of RE1.	Provision of public sewer under section 101A of the Water Industry Act 1991 or first time rural sewage treatment.	NWW Ltd	Reduced impact of existing discharges. Improve water quality.	Cost
Ings Village	Provision of public sewer under section 101A of the Water Industry Act 1991 or first time rural sewage treatment.	NWW Ltd	Reduced impact of existing discharges.	Cost.

Issue 20 - Lack of Rural Sewerage Leading to Localised Pollution

Location	Options	Responsibility	Advantages	Disadvantages
Brathay downstream of Ambleside	Provision of public sewer under section 101A of the Water Industry Act 1991 or first time rural sewage treatment.	NWW Ltd	Reduced of impact of existing discharges.	Cost.
Troutbeck Bridge	Provision of public sewer under section 101A of the Water Industry Act 1991 or first time rural sewage treatment.	NWW Ltd	Reduced impact of existing discharges.	Cost.
Silverdale No public sewage system in place, plus limestone base rock leads to potential and actual groundwater contamination.	1. Provision of public sewer under section 101A of the Water Industry Act 1991 or first time rural sewage treatment.	NWW Ltd	Amelioration of problem.	Cost Because of 'local' extreme difficulty in geography and topography it may be difficult to produce a satisfactory resolution.
	2. Object at the planning stage to future development(s) which will add to the problem.	Environment Agency Local Authority and developers.	Prevents further deterioration.	No betterment.
	3. Require any permitted development to install extensive treatment facilities	Environment Agency	Prevents further deterioration.	No betterment.

Issue 21 - Impact of Industrial Discharges on Scarth Hole in Walney Channel

Industrial discharges to Scarth Hole in Walney Channel can cause considerable concern, partly because of the status as a Site of Special Scientific Interest (SSSI).

Furthermore there are unique tidal exchanges which mean that the water body is not "changed" on a daily basis. Low water can leave discharges exposed.

Options	Responsibility	Advantages	Disadvantages
1. Improvement of trade effluent quality.	Industry Environment Agency	Improved effluent quality. Potential reduced impact on Scarth Hole.	Cost. May not resolve the issue.
2. Relocation of discharge.	Industry Environment Agency	Potential amelioration of impact.	Cost. No effluent quality improvements.
3. Tidal discharge.	Industry Environment Agency	Removes discharge at periods of minimum dilution.	Cost. May not resolve issue.
4. Diversion to Barrow STW.	Industry	Removal of discharge.	Cost.

Issue 22 - Failures to Meet Water Quality Objectives (WQOs)

The following failures to meet riverine water quality objectives are attributable to specific known causes some of which require further investigation, and a programme of improvement.

Location	Options	Responsibility	Advantages	Disadvantages
Blelham Beck (QSL Blelham Tarn to Windermere)	Investigation of potential issues	Environment Agency	Provides evidence to facilitate improvements. Maintain WQO.	Resources. It may be climatic problem.
Quicksands Pool (QSL Leighton Moss to FWL (Carnforth Railway)	Investigation of issues eg - saline intrusion -lake management at Leighton Moss - possible polluting inputs	Environment Agency	Freshwater limits may not be applicable. Identify potential concerns. Maintain WQO.	None Complex inter-relationship.
Witherslack Main Drain (QSL Bridge House to FWL (Tidal Doors)	Catchment campaign to identify polluting inputs.	Environment Agency	Mitigate and remediate problems. Maintain WQO.	Cost implications for remedial programme.
Winster (Helton Tarn to Freshwater limit)	Catchment campaign to identify polluting inputs.	Environment Agency	Improvement in oxygen concentration to enhance fishery potential. Maintain WQO.	None.
Holme Beck (QSL Holme to Holme STW)	Investigate integrity of data.	Environment Agency	Obtain data which is more representative of upstream stretch.	Resources.

Issue 22 - Failures to Meet Water Quality Objectives (WQOs)

Location	Options	Responsibility	Advantages	Disadvantages
Holme Beck Trib 10 (QSL at M6 to Holme Beck)	Identify more representative sample point.	Environment Agency	Obtain data which is more representative of upstream stretch.	Resources.

QSL - Quality Survey Limit
FWL - Freshwater Limit
WQO - Water Quality Objectives

The following failures to meet water quality objectives are dealt with under the issues indicated.

Issue 19 Inadequate Sewage Treatment

Meathop Marsh Drain at Meathop
Holme Beck at Holme
River Rothay at Ambleside
Blea Beck at Askam

Issue 8 Poor trout production in some parts of the River Bela.

Peasey Beck

Issue 16 Impact of discharges from combined sewerage systems

Mill Beck at Furness Abbey

Issue 20 Lack of rural sewerage

Silecroft Beck

Issue 23 - River Specific Issues

1. **Mercury in the River Kent**

   Mercury is a toxic, persistent and bioaccumulative metal. Background levels of mercury have been found to be higher than expected. The source is unknown and requires further investigation.

2. **Foam on the River Kent**

   Inputs to Kendal Sewage treatment works (STW) contain detergents which are not removed by the treatment process. This leads to foaming on the river downstream of the sewage works.

3. **Arnside Spring**

   This limestone spring causes a localised nuisance when it become contaminated with organic material such as farm effluent or septic tank effluent.

4. **Mill Beck**

   This is a good quality stream flowing through Windermere Town where it is valued for its amenity. There is a history of intermittent pollution of the stream involving farm effluent, sewage and wrong connections in the Windermere area.

Issue 23 - River Specific Issues

Issue	Options	Responsibility	Advantages	Disadvantages
1. River Kent - concern regarding mercury levels	Investigation of Mercury levels.	Environment Agency	Establishment of current status.	
2. Foam on River Kent	1. Continued utilisation of anti foam at Kendal STW.	NWW Ltd	Amelioration of foaming problems. Aesthetic improvements. Benefits to anglers.	Anti foam present in effluent. No guarantee of resolution of issue.
	2. Introduce additional treatment processes at Kendal STW.	NWW Ltd	Potential amelioration of foaming. Aesthetic improvements. Benefits to anglers.	Significant cost. May need significant R & D to establish appropriate technology.
	3. Control of trade effluent inputs to sewer which then find their way to the STW.	NWW Ltd	Prevention at source. Anti foam agent not required. Innovative technology not required. Aesthetic improvements. Benefits to anglers.	Trade effluent control may not be possible.
3. Arnside Tower Spring (Kent Estuary)	Investigations into limestone geology and hydrology with a view to identifying and eliminating sources of pollution.	Environment Agency	Resolve intermittent pollution problem.	Cost. Complex problem.

Issue 23 - River Specific Issues

Issue	Options	Responsibility	Advantages	Disadvantages
4. Mill Beck Windermere	Campaign to identify and eliminate polluting inputs to the catchment.	Environment Agency Local Authority Local Community	Protect high amenity resource. Protect fish stocks including crayfish.	

Issue 24 - Failure to meet EC Bathing Water Directive Standards at Haverigg, Askam-in-Furness, Walney West Shore, Bardsea and Aldingham

Despite significant investment in new sewerage systems and sewage treatment facilities by North West Water Ltd the identified bathing waters listed above failed to meet the standards laid down in the EC Bathing Water Directive.

There is a need to identify the causes of these failures so that remedial action can be targeted. This work has already begun and will be carried forward throughout 1997.

There is more detailed information about the reasons for failures to meet the Directive Standards in Appendix 8.

Options	Responsibility	Advantages	Disadvantages
Monitoring of bathing waters and intensive investigations to assess reasons for failures and identify any improvement work required.	Environment Agency NWW Ltd Industry	Will allow remedial action to be targeted where needed.	Cost
Action to resolve problems identified	NWW Ltd Industry and others depending on outcomes of investigations	Compliance with Bathing Water Directive Standards. Improved bathing water quality.	Cost

1.7 Protection and Partnership

1.7.1 Introduction

Much of the day to day work of the Agency is aimed at protecting the environment through education, prevention and environmental improvement.

This important work does not feature in the LEAP because the plan is primarily intended to address environmental problems and these are highlighted as issues in section 1.6 above. Much of this routine work is undertaken by the Agency to fulfil its duties and responsibilities. Examples include routine inspection at landfill sites to ensure licence conditions are being compiled with, anti poaching activities by Agency bailiffs, routine river sampling to detect trends in water quality and site visits to factories/sewage works etc to ensure discharge authorisation are being compiled with.

However, the Agency recognises that it is not the only body operating in the field of environmental protection and improvement and that our responsibilities often overlap with those of other organisations.

Where appropriate the Agency will work with partners to achieve environmental protection and improvements. Much of this co-operation goes on at a day to day level between officers in the field and does not require any formal setting up.

Examples include negotiation between Agency inspectors and representitives of individual companies over programmes of investment to improve environmental performance, or assistance afforded by the Police in difficult enforcement action.

However, in some cases the Agency does get involved in more formal partnerships and some of those which are relevant to this LEAP area are outlined below. Others are mentioned under the relevant issues in Section 1.6 of this plan.

Shoreline Management Plans (SMP's)

Shoreline Management Plans are produced by maritime local authorities and provide a strategic framework for coastal defences in an area. The SMP's covering the LEAP are from Rossall point to Earnse point (Morecambe Bay SMP) lead by Lancaster City Council and from Earnse point to St Bees lead by Copeland Borough Council. Both these plans are currently in preparation and the Agency is involved in this work.

Planning Liaison

The Agency seeks to work with Local Planning Authorities to ensure development does not damage the environment or increase the risk of flooding. This is achieved through consultation on development plans and by use of a planning visitor system. This involves the Agency scrutinising all planning application in the area and where necessary passing appropriate comments to the Local Planning Authority.

1.7 Protection and Partnership

Morecambe Bay Conservation Group

This is an informal group intended to focus public attention on the value of the Bay. A prime objective is to encourage education by public participation.

Various activities are organised annually to increase public knowledge about the Bay its management, conservation issues, industries etc

The Agency is a member of the steering group which produces and organises the annual programme.

M6 Corridor Protection Policy

This is a new venture for the Agency in partnership with the Cumbria County Council and is at an early stage. The aim is to look at the Cumbrian M6 corridor and its drainage including all discharges to watercourses or land from motorway drainage. Once the drainage routes are established the Agency will prioritise the potential environmental impact of each discharge point. This will allow the Agency to draw up an action plan to deal with potential problems in priority order. Secondly, it will aid pollution prevention and alleviation following road traffic incidents.

This is likely to be a long term project extending beyond the lifetime of this plan, particularly if the costs of implementing any proposed action is very high.

The Fire Service and Pollution Incidents

The Agency is working closely with Cumbria Fire Service in providing a first line pollution prevention service at road traffic accidents.

The Fire Service are normally first on the scene at road accidents. This gives them a unique opportunity to deal with polluting spillages before they reach a watercourse. The Fire Brigade have agreed to undertake this role where practicable and the Agency will provide training and materials such as oil absorbents. The Fire Service will also notify the Agency of any potentially polluting spillages so that Agency staff can take necessary action.

Local Agenda 21

This is an initiative which has come out of the Rio Earth Summit of 1992. It is designed to achieve sustainable development at a local level.

The lead in developing local Agenda 21 is taken by Local Authorities. The Local Authorities in Cumbria are developing local Agenda 21 initiatives and meet quarterly to exchange ideas and information.

This is a developing idea and will take on a greater shape and direction in the coming months.

The Agency also has responsibilities with regard to sustainable development, and joins with the

local Authorities at their liaison meetings to assist in pursuing the goal sustainable development.

A Local Accord on Native Woodlands in the Lake District National Park

In 1993 the Forestry Commission and the National Parks in England and Wales signed a National Accord to promote and encourage the management and extension of native woodlands in National Parks.

The accord acknowledges the importance of native woods in National Parks and aims to promote the well being of existing woods and the creation of new native woodland areas.

This local agreement affirms the determination of local partners to achieve these ends in the Lake District National Park. The Agency is a signatory to this agreement along with the Lake District National Park Authority, Forestry Authority, Forest Enterprise, English Nature, the Ministry of Agriculture Fisheries and Food, the National Trust and North West Water Ltd.

The Morecambe Bay Partnership

This is intended to be the foundation of a partnership between the users and regulators of Morecambe Bay that will build understanding of the Bay and encourage wide participation in its future management. The aim is to build an economically prosperous and environmentally sustainable future for the communities and the natural and man made features which make the Bay distinctive.

A strategy has been prepared by Local Authorities and English Nature working with local people and organisations in accordance with Government guidance. The Agency has been closely involved in drawing up the strategy and will be heavily involved in implementing many of the proposals in collaboration with others.

The Duddon Estuary Partnership

This is a similar partnership approach to the Morecambe Bay Strategy, but aimed at the Duddon Estuary. The Agency has a similar level of involvement.

Annual Winderclean

Lake Windermere attracts large numbers of visitors both to the shoreline and onto the water itself. This has resulted in substantial problems of littering. In an attempt to clear the litter, and prevent future littering, the Agency, South Lakeland District Council and the Lake District National Park have created the Winderclean partnership.

The clean up involves the use of divers and other volunteers to clear rubbish from the lakeshore and the lake itself. A recycling facility has also been opened on the lakeshore to help prevent littering. Other waste minimisation and pollution prevention initiatives are under consideration.

1.7 Protection and Partnership

Annual Conservation And Fisheries Liaison Meetings

Staff from the Agency meet annually with local representatives of conservation organisations at a round table meeting. The purpose is to discuss the Agency's annual flood defence maintenance programme and other relevant conservation related issues.

The other organisations represented include the Lake District National Park, English Nature, Cumbria Wildlife Trust and the Royal Society for the Protection of Birds.

The Agency also has an annual meeting with the National Trust with a view to working together on matters of mutual interest.

The Agency also hosts an annual meeting with representatives of the local Fisheries Consultative organisations and organises occasional Public Fisheries Seminar.

Site Emergency Plans

As part of the County Councils emergency planning procedures, certain industrial sites have specific emergency plans. Within the LEAP area Glaxo Wellcome at Ulverston, British Gas at Barrow, Vickers Shipbuilding and Engineering Ltd and Laporte Chemicals have such plans. The Agency is involved in these plans to deal with any potential pollution problems which may arise. Exercises designed to test and improve procedures are held regularly, and include staff from the Agency.

PART 2

Part 2 contains supporting information on the environment of the LEAP area. It focuses on the uses activities and physical resources of the area in relation to the work of the Agency.

This "analysis" of the local environment has been helpful in identifying issues outlined in Part 1 of the plan.

We welcome comments on the accuracy and content of this part, but this section will not be repeated in the action plan to be produced following consultation.

Section 2.1

Uses, Activities and Resources

2.1.1 Geology and Hydrogeology (see maps 2 and 3)

South Cumbria encompasses rocks of diverse age and type. It is situated on southern flank of the Lake District dome, the core of which is formed by volcanic and low grade metamorphic (slatey) rocks of Ordovician age; exposed in the north west of the area. These are overlain by a wide tract of Silurian rocks (the Windermere Group) comprising slates and grits. The pre-Carboniferous basement beds form the Lakeland Fells, being generally hard and resistant to erosion. Structurally they tend to be intensely folded and faulted. In hydrogeological terms they may be considered to be effectively impermeable, except for some limited groundwater storage and movement in shallow fractured/weathered zones. Although classed as **non-aquifer**, they support numerous small scale private water supplies (springs) within the area.

Younger Carboniferous rocks, represented predominantly by thick (Dinantian) limestones are present to the south, overlooking Morecambe Bay. The more massive units often show well developed karstic features eg the limestone pavements in the Lyth valley south of Kendal. Groundwater movement is entirely by fissure flow. Locally this has been enhanced by solution weathering, giving rise to rapid and complex flows. As such they are generally highly vulnerable to pollution. Discharges from the limestones often provide significant albeit 'flashy' contributions to surface waters. The limestones may be considered as **minor aquifers**.

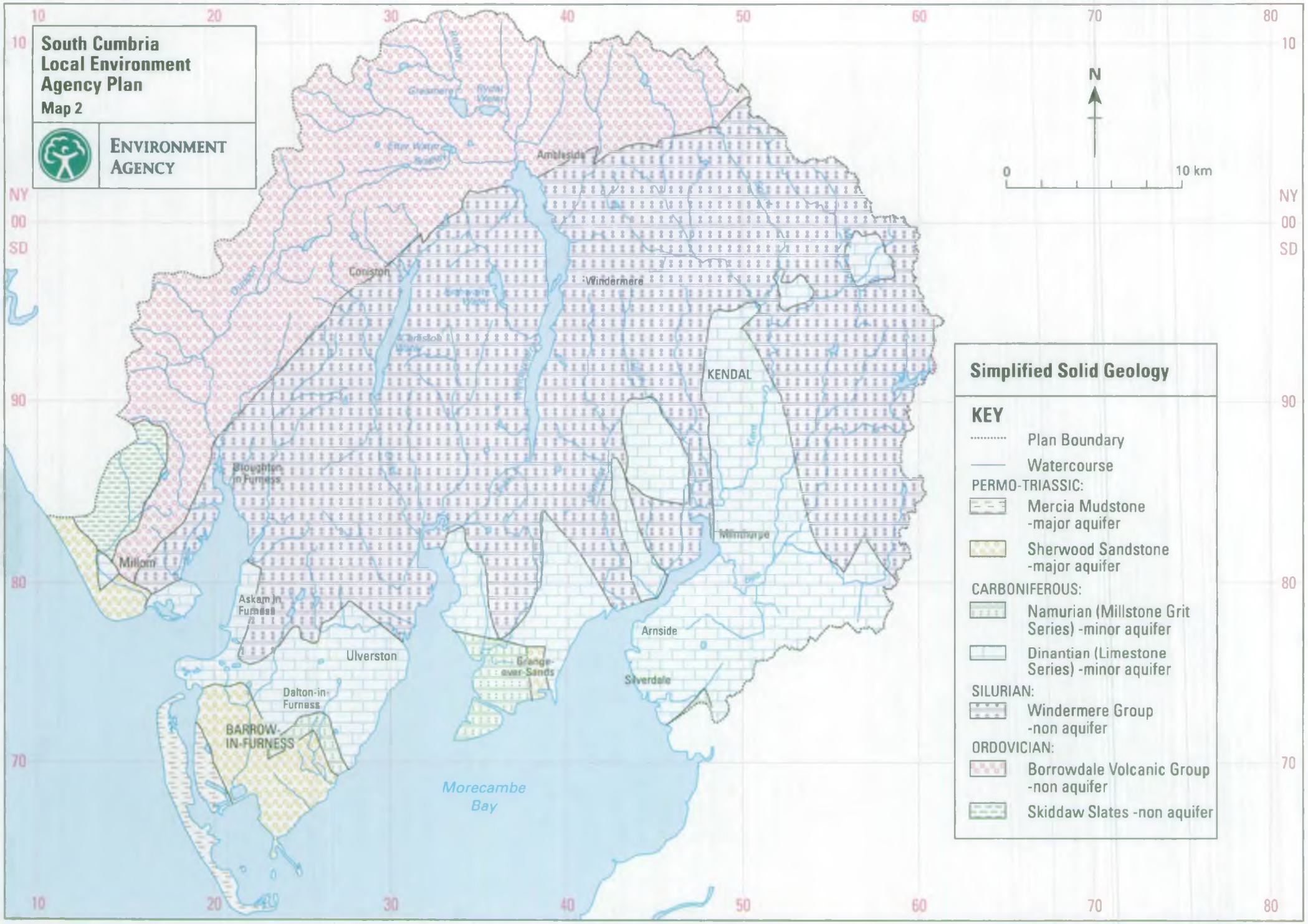
The limestones are important mineral reserves which have been and still are quarried for aggregate. Significant mineralisation has occurred in the limestone in the west of the area, around Dalton-in-Furness. These iron ore (haematite) deposits, associated with major faults disturbances, have been extensively worked by underground methods in the past. Many of the old workings in the veins and 'sops', which extend to considerable depths below sea level, have collapsed resulting in subsidence hollows. These anthropogenic influences will dominate and further complicate the local hydrogeology.

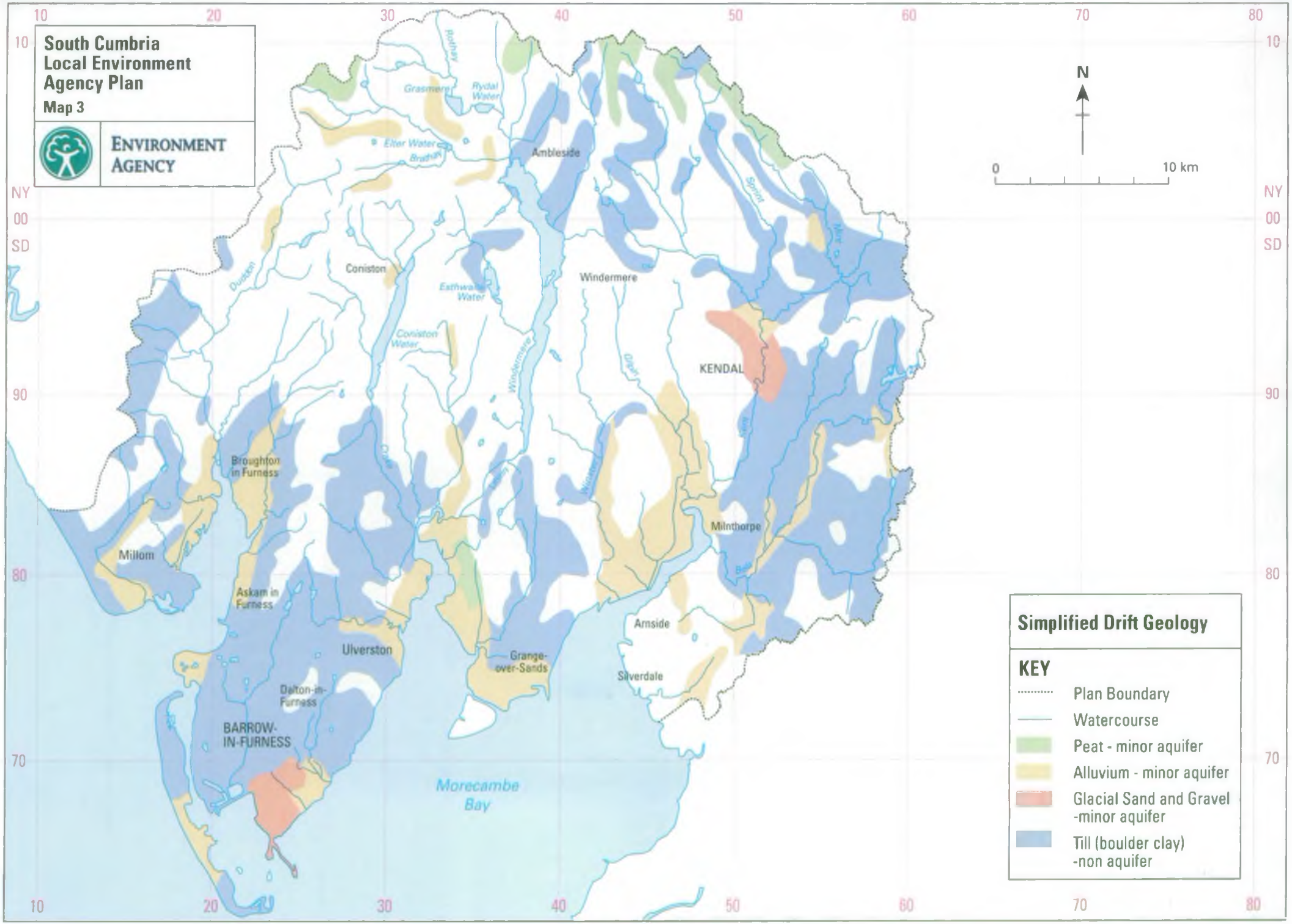
Very localised deposits of the Namurian (Millstone Grit Series) strata, also of Carboniferous age, occur in the extreme south of the area.

The youngest rocks are the Permo-Triassic Sherwood Sandstones and overlying Mercia Mudstones. These form a narrow coastal strip in the west. The Sherwood Sandstone is classed as a **major aquifer**, subdivided into the Furness and West Cumbria aquifer units by the Duddon estuary, whereas the Mercia Mudstones of Walney is **non-aquifer**.

Large scale groundwater abstraction takes place from the Furness aquifer for both public water supply and industrial use. Because of past heavy pumping groundwater levels have been depressed to well below sea level in the northern part of the Furness unit, posing a risk of saline intrusion. It is considered to be fully licensed; indeed there are concerns about long -term sustainability of abstraction. Conversely the West Cumbria aquifer unit, only the southern tip of which is present in the South Cumbria LEAP area, is relatively undeveloped.

The geomorphology of area has been strongly influenced by glaciation. The pre-Carboniferous Lakeland Fells are essentially drift-free, with the exception of localised alluvial deposits and glacial till in the deeply incised valley bottoms, scree development on valley sides and some peat on the high ground, Moving toward the coast, the lower lying Carboniferous and Permo-Triassic rocks


South Cumbria
Local Environment
Agency Plan
Map 2
ENVIRONMENT AGENCY
N
0
10 km
Ambleside
Coniston
Windermere
KENDAL
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Arnside
Silverdale
Morecambe Bay
Simplified Solid Geology
KEY
Plan Boundary
Watercourse
PERMO-TRIASSIC:
Mercia Mudstone -major aquifer
Sherwood Sandstone -major aquifer
CARBONIFEROUS:
Namurian (Millstone Grit Series) -minor aquifer
Dinantian (Limestone Series) -minor aquifer
SILURIAN:
Windermere Group -non aquifer
ORDOVICIAN:
Borrowdale Volcanic Group -non aquifer
Skiddaw Slates -non aquifer


South Cumbria
Local Environment
Agency Plan
Map 3
ENVIRONMENT AGENCY
N
0
10 km
Simplified Drift Geology
KEY
Plan Boundary
Watercourse
Peat - minor aquifer
Alluvium - minor aquifer
Glacial Sand and Gravel -minor aquifer
Till (boulder clay) -non aquifer
Ambleside
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Coniston
Duddon
Eathwaite Water
Coniston Water
Windermere
Winster
Gilpin
Kent
Sprint
KENDAL
Mint
Milnthorpe
Bela
Kent
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Arnside
Silverdale
Morecambe Bay
NY
00
SD
10
20
30
40
50
60
70
80
90

2.1.1 Geology and Hydrogeology (see maps 2 and 3)

are largely covered by alluvium (ranging from coarse gravels to silts/clays). These can form deep channel infills.

Where thick permeable gravels are present the drift represent **minor aquifers** which as well as providing baseflow to watercourses are exploited for industrial purposes eg within the flood plain of the Mint/Kent in Kendal and around Ulverston. In contrast, significant thicknesses of low permeability glacial till will inhibit groundwater recharge to deeper aquifers whilst affording protection from pollution by mans activities. This is particularly relevant in the case of the Furness aquifer.

2.1.2 Conservation - Ecology

General

This section relates to the conservation and enhancement of natural beauty and wildlife, associated with the aquatic environment. This includes formally designated and protected sites, and the wider countryside associated with the aquatic environment.

The Agency has statutory duties to further wherever possible the conservation of special features when carrying out water management activities, to have regard for conservation as part of our pollution prevention and control activities and generally promote the conservation of natural beauty and the wildlife dependent on the aquatic environment.

Local Perspective

The diverse environment of South Cumbria is outstanding and deserves the highest level of environmental protection.

Map 4 shows all the Sites of Special Scientific Interest (SSSI) within the catchment. In addition, County Wildlife Sites (CWS) identified by Cumbria Wildlife Trust are shown.

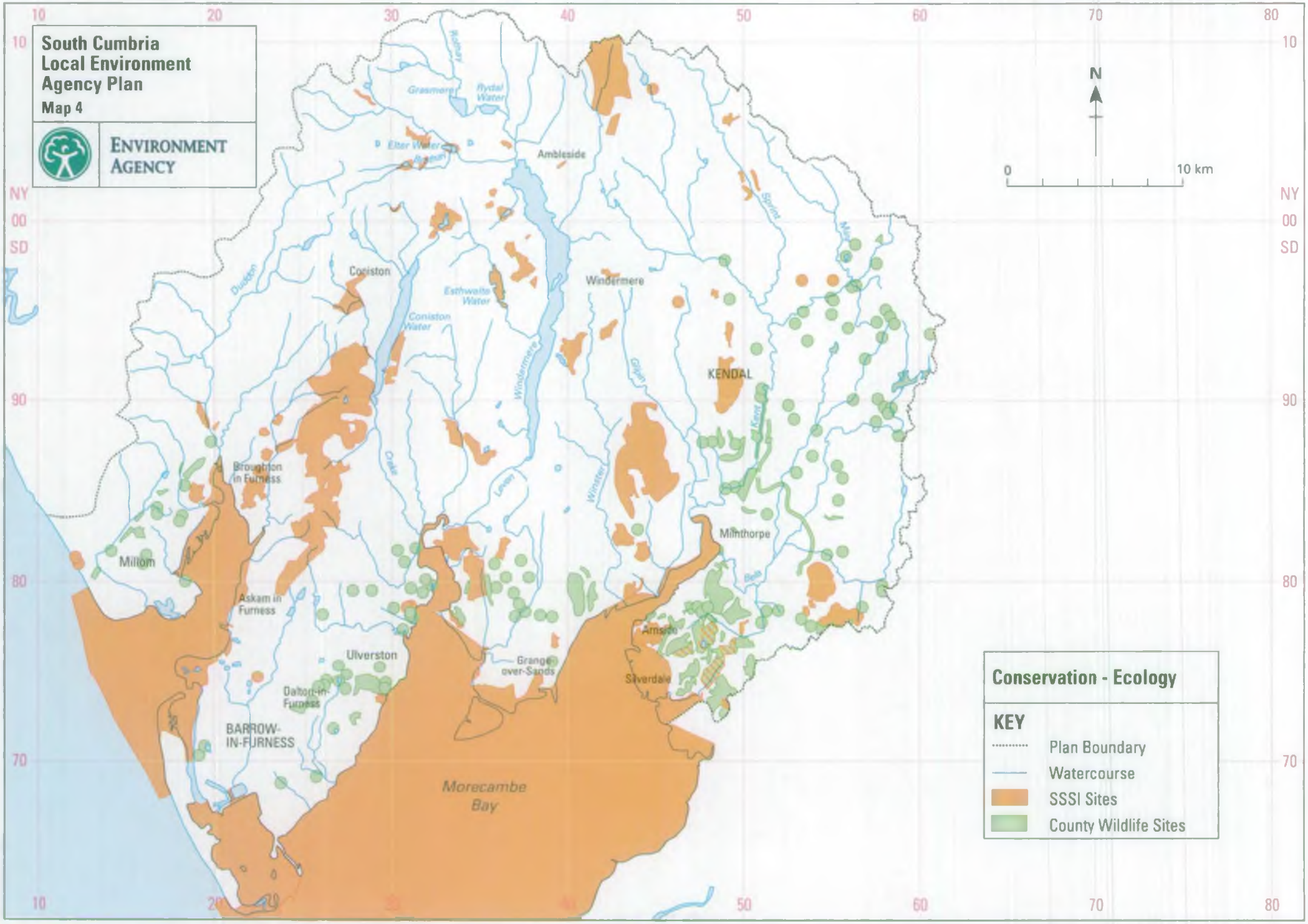
The major catchment rivers rise among the upland acid fells of the central Lake District from where they flow through the softer undulating landscapes of the low fells dissected by numerous streams and minor river valleys.

There are significant wetlands in the catchment including the series of raised bogs found inland of the major river estuaries. Meathop Moss, Foulshaw Moss and Nichols Moss are nationally important (SSSI), with Roundsea Woods and Mosses and the Duddon Mosses recognised as internationally important having been submitted to Europe as candidate Special Areas of Conservation (cSAC) in addition to their SSSI status.

Water Level Management Plans (WLMPs) are a means by which the water level requirements for a range of activities in a particular area, including agriculture, flood defence and conservation can be balanced. The "Conservation Guidelines for Drainage Authorities" (MAFF/DoE 1991) requires the Agency to consult with statutory bodies with a view to drawing up a plan of operational procedures with priority given to SSSI's. The Agency has agreed which sites are relevant to this process and are in the process of producing interim management statements. Full plans will be produced for all sites by 1998.

Much of the coastal area is similarly important for conservation. Morecambe Bay and the Duddon Estuary are SSSI, Special Protection Area (SPA), Ramsar (Morecambe Bay is also a cSAC) wetland sites for their international importance for overwintering wildfowl and waders. South Walney and Piel Channel Flats SSSI provides an important link between these two sites.

These mud and sand flats, mussel scars and marshes, provide a vital link in the chain of west coast estuaries used by migrating birds.


South Cumbria
Local Environment
Agency Plan
Map 4
ENVIRONMENT AGENCY
N
0
10 km
Grasmere
Rydal Water
Elter Water
Rothay
Ambleside
Duddon
Coniston
Esthwaite Water
Coniston Water
Windermere
Brathay
Leven
Crake
Winster
Gilpin
Sprint
Mint
KENDAL
Kent
Bela
Milnthorpe
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Arnside
Silverdale
Morecambe Bay
Conservation - Ecology
KEY
Plan Boundary
Watercourse
SSSI Sites
County Wildlife Sites

2.1.2 Conservation - Ecology

The Duddon Estuary also includes extensive sand dunes which are particularly important for their diverse range of habitats, supporting a number of rare and uncommon plants as well as invertebrates. It is also important for its Natterjack Toads (which are present at sites along the coast throughout the plan area), supporting some 18-24% of the UK population.

A high proportion of the county's ancient semi-natural woodland is found in this catchment, together with significant coniferous plantations particularly in the Grizedale forest area between Coniston and Lake Windermere.

The area is rich in lakes and tarns including many of national conservation importance for the characteristic fauna, flora or habitats they support. Designated SSSI's include Esthwaite Water, Elterwater, Little Langdale Tarn, Blelham Tarn & Bog, Tarn Hows, Claife Tarns & Mires and the Winster Wetlands (Knipe Tarn). Many of these include important surrounding wetlands and hydroseres.

Good char populations are present in Coniston and Lake Windermere.

The River Kent catchment contains nationally important Atlantic stream crayfish populations with other localised populations present where lime rich waters exist.

Giant hogweed has become established in the River Kent catchment and is of concern to the Agency because:-

- it grows extremely densely shading out native plants
- it provides poor habitat for insects, birds and mammals
- it devalues the natural landscape
- it increases the risk of riverbank erosion when it dies back in autumn
- it poses a serious health risk

The Agency is currently in the second year of a ten year plan to eradicate this non native and invasive species from the River Kent system.

Other non native plants such as himalayan balsam and Japanese knotweed are also present in parts of the area.

To the south east of the plan area, limestones form the distinctive scenery of the Lyth Valley, lower Kent valley and the coastal area around Morecambe Bay. Bare and craggy upstanding fells topped by limestone pavements and woodlands contrast with low lying flat valleys. The valley bottoms are important for their large remnants of mosslands, but are more typically intensively managed farmland with straightened, heavily managed watercourses. These limestone areas are particularly rich with many nationally designated sites (SSSI's) for their characteristic fauna and flora.

2.1.2 Conservation - Ecology

The recent recovery of the otter population in the North of the county is not yet being reflected in the plan area. The Otters and Rivers Project 1991-94 revealed only scattered populations centred on the Kent and Leven catchments. Until the general population expansion reaches south Cumbria, the Agency will follow its published National strategy on otter conservation which requires us to....

> "In areas remote from otter strongholds continue river catchment works to improve conditions for wildlife generally, but where resources are limited, expend no special extra effort such as building artificial holts".

Information on the conservation status of the rivers within the plan area is far from complete, being limited to those reaches where river corridor survey has been undertaken in support of Flood Defence maintenance works.

The new River Habitat Survey (RHS) methodology is now ready for implementation, and it will enable us to compare and contrast the habitat quality of watercourse both a regional and national context. With limited resources available, the Regional implementation of RHS has yet to be agreed. Once it is underway, the Agency will be able to look carefully at where habitat improvements for wildlife can be made and where possible this will be done in conjunction with our conservation partners and with landowners.

The Agency, as with it's predecessor, the NRA, is committed to the conservation and protection of those protected species associated with the water environment. Hence we developed a number of projects in collaboration with conservation bodies on a variety of species, as diverse as sandmartin, pearl mussel, crayfish, otter and vendace.

The new wider remit of the Environment Agency includes air and land as well as water.

In addition, the Species and Habitats Directive and Biodiversity Action Plan have produced a whole range of new species to consider in addition to those listed under the Wildlife and Countryside Act, 1981.

In pursuance of the Government's commitment to Biodiversity conservation, the Agency will be developing targets for species and habitats of conservation concern. These will relate to the targets for key wetland species and habitats as identified by the UK Biodiversity Action Plan.

Those species & habitats which are relevant to the plan area are as follows:

bittern, freshwater pearl mussel, glutinous snail, sand bowl snail, great crested newt, medicinal leech, natterjack toad, netted carpet moth, otter, pipistrelle bat, allis shad, twaite shad, skylark, slender naiad, water vole, white clawed crayfish and the habitats of coastal and flood plain grazing marsh, mesotrophic lakes and reedbeds.

Under the Habitats and Species Directive, additional species found in the plan area are Atlantic salmon, lampreys and bullhead, with the listed habitat of floating mats of water crowfoot also present on the River Kent.

2.1.2 Conservation - Ecology

Our policy and guidance framework with respect to our new responsibilities is currently being developed Nationally.

Until this is forthcoming, within the plan area the Agency will strive to maintain and where practicable enhance:

- The overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems;
- Internationally important and threatened species, habitats and ecosystems;
- The biodiversity of natural and semi-natural habitats where this has diminished over recent decades.

To meet these commitments detailed information is required on the species and habitats listed above and it is unfortunate that this is lacking for many of them within the plan and this remains to be addressed.

Despite limited resources the Agency will endeavour to play a full role in the developing conservation of biodiversity.

The Agency is fully committed to furthering conservation and will adopt the following policies in order to conserve, further and enhance the water environment, within all Agency operations and third party proposals which the Agency licence or are consulted on.

In areas of national conservation importance (eg nationally designated site or with an endangered species under Schedule 5 and 8 of the Wildlife and Countryside Act 1981) the Agency will protect those features which make it so.

In areas of local conservation importance (eg Country Wildlife Site of with locally rare species) and those which provide a wide variety of habitats and a natural river corridor, the Agency will ensure sensitive river management to maintain those interests and prevent them from being degraded.

In areas with limited conservation interest (eg previous unsympathetic river management) but which do contain features of note, the Agency will encourage sensitive river management.

In areas of poor conservation interest, the Agency will endeavour to improve the value of these areas, though this may be in the medium term.

In areas with effectively no conservation interest (eg culverts), rehabilitation is a long term objective.

Overall, current policy is to ensure no detriment and to pursue enhancements where possible. The Agency supports the concept of buffer zones of semi natural vegetation along river banks, but as a non land owning, non grant giving organisation is unable to promote this directly.

2.1.2 Conservation - Ecology

Where opportunities arise through the Agency flood defence maintenance and capital programmes or through collaborative projects with others then provision of buffer zones of natural vegetation will be pursued where appropriate. These can provide a wide range of ecological and fisheries benefit.

2.1.3 Landscape and Heritage (see map 5)

General

The Environment Agency has a duty to conserve and improve the natural beauty of inland and coastal waters, and associated land, and to consider the need to protect and conserve buildings and objects of historic interest. As well as covering nationally important sites, local sites of value are included.

Opportunities for improvement are achieved through the activities of third parties, by the Agency working with local authorities, developers and work undertaken as part of the Agency's capital and maintenance programmes.

Local Perspective

The area contains a wide diversity of attractive landscapes ranging from the high mountains of the Lake District in the north and north west to the salt marshes and mudflats of the Duddon, Leven and Kent Estuaries in the south. The valleys between are equally varied in character. These progress from steep sided glacially eroded U-shaped valleys in the mountains through to more gently sloping and broader valleys nearer the sea. Central to the area are the major lakes of Coniston Water and Windermere. The areas geology often outcrops at the surface and comprises mainly of slate and volcanic with limestone to the south east. A drumlin field consisting of glacial drift occurs to the lowland area south of Kendal.

The landscape has also been heavily influenced by mans activities. Sheep farming on the fells and lowland pastures has created large areas of open rough grazing and pasture land. Drystone walling is characteristic of the upland areas with thorn hedging in the lowlands. Woodland is dominated by coniferous forestry plantations noticeably at Grizedale Forest although attractive deciduous and mixed woodlands are widespread to the central areas of the catchment and around Arnside and Silverdale. The Lyth Valley is noted for its damson orchards.

Sections of the River Gowan, Gilpin, Winster and Great Langdale Beck have been altered and maintained to carry out purely land drainage function. This has resulted in long lengths of canalised, uniform channels devoid of any diversity either in the channels or river corridors. These rivers make poorer landscape features than more natural channels, provide poorer habitats for wildlife and can reduce fish productivity. Rusland Pool and the River Lickle have also been significantly altered in terms of fish habitat diversity as a result of flood defence schemes. It is recognised within the Agency that needs are changing and that it is desirable to consider re-introducing channel features and improve habitats. There is also a growing concern for change outside the Agency in this regard.

Many towns and villages possess attractive historical character originally based on an agricultural economy although many of these settlements are now becoming more reliant on tourist and leisure activities. Tourism particularly during the summer months has become extremely popular with certain 'honey pot' centres such as Windermere and Ambleside reaching saturation point in terms of traffic and visitor numbers. Tourism has a major impact on the landscape both visually and

2.1.3 Landscape and Heritage (see map 5)

physically. Other major elements in the landscape include the M6, to the east of the catchment and the railway running around the Cumbrian coast crossing the main estuaries by prominent viaducts and bridges.

Substantial parts of the catchment fall within the Lake District National Park boundary whilst the Arnside and Silverdale Area of Outstanding Natural Beauty is also included to the south east. The National Trust have a sizable landownership concentrating mainly in the upland areas and around the lakes of Windermere, Coniston and Grasmere.

The County and District Councils recognise "County Landscapes" in their planning systems. These landscapes are important for their topographical, visual, cultural or historic character.

In addition to the protection afforded by these designations and by National Trust ownership, there are a number of agri-environmental schemes operating in the area aimed at protecting important landscapes, habitats and historic features.

The Lake District Environmentally Sensitive Area (ESA) was designated in 1993 and is administered by the Ministry of Agriculture Fisheries and Food (MAFF). It is aimed at supporting the continuation of traditional farming methods which have created or protected the distinctive landscape of the area.

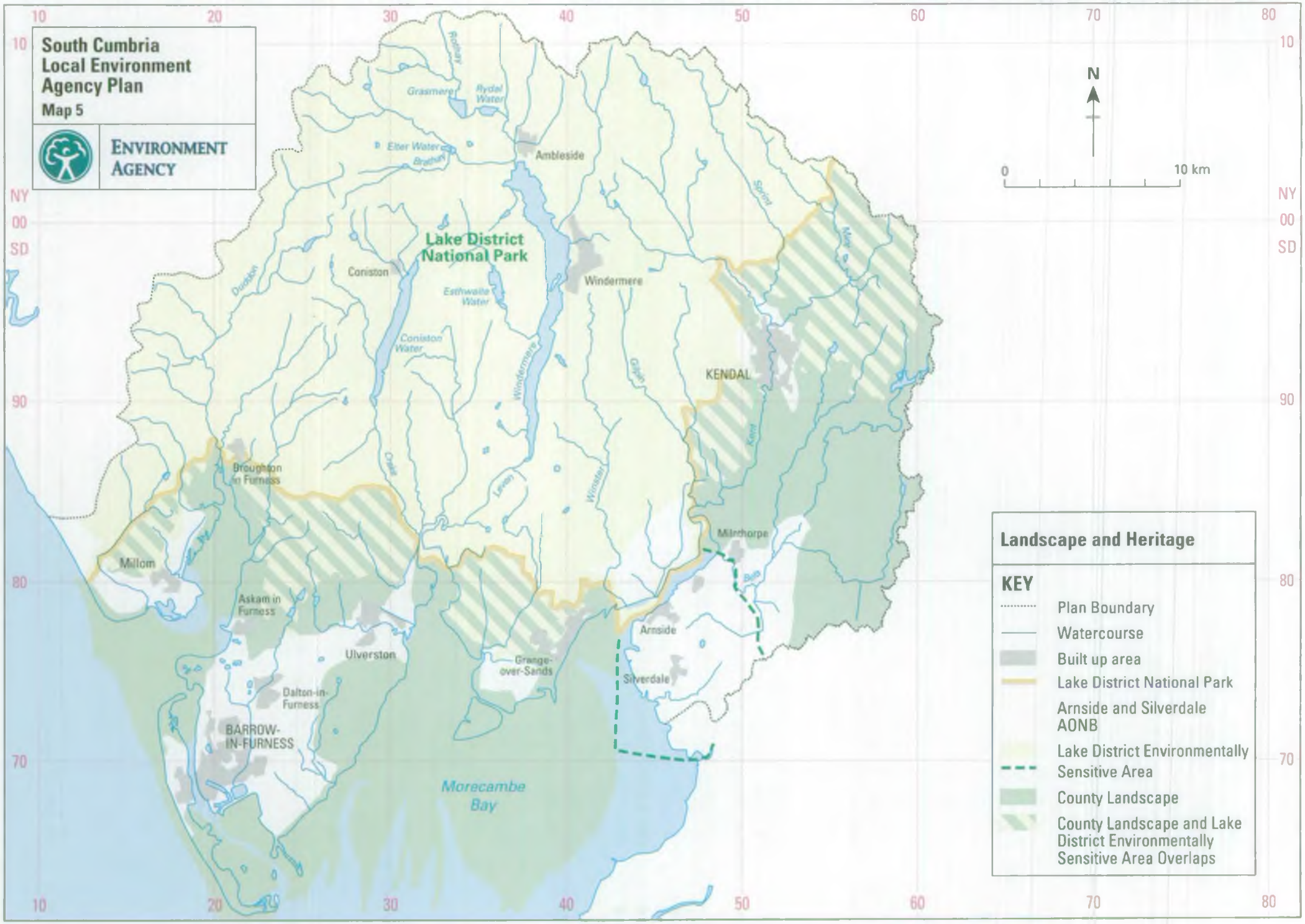
MAFF also administer the Countryside Stewardship Scheme and selects target areas in conjunction with the Countryside Commission, English Nature and English Heritage. This scheme has similar aims to the ESA, but outside the ESA designated area. Within the LEAP area Stewardship money is targeted at areas around Morecambe Bay and the Arnside and Silverdale AONB. There are no hard and fast boundaries to this scheme, and worthy projects outside the target areas may also be considered.

The Ministry also run the Habitat scheme aimed at creating or extending areas of saltmarsh in the LEAP area.

All these schemes offer payment to farmers or landowners to manage land in a way which is sympathetic to the environment and fulfills the aims of the scheme.

There are approximately 3800 records of historic sites and finds from the area listed on the County Sites and Monuments Records, which is the primary archaeological database for Cumbria. 137 sites are designated as Scheduled Ancient Monuments, which are sites considered to be of national importance. The archaeological remains of the area cover almost the whole range of human history from the Late Stone Age, c.8500BC, down to modern times.

One of the earliest and most important sites is Kirkhead Cave near Allithwaite, which has produced evidence of both stone tools and animal bones which are at least 10 000 years old. More visible remains from the later prehistoric period include the Neolithic axe factories in Great Langdale, cairnfields like those on Heathwaite Fell; Bleaberry Haws and at Bannishead near Coniston, and stone circles like those at Swinside, Lacra, and Birkrigg Common. Later still, the expansion of agriculture and settlement is reflected in sites like those at Appleby Slack near


South Cumbria
Local Environment
Agency Plan
Map 5
ENVIRONMENT AGENCY
N
0
10 km
Lake District National Park
Ambleside
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Coniston
Coniston Water
Esthwaite Water
Duddon
Windermere
Crake
Leven
Winster
Gilpin
Sprint
Mint
Kent
KENDAL
Milnthorpe
Bela
Arnside
Silverdale
Grange-over-Sands
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Askam in Furness
Millom
Broughton in Furness
Morecambe Bay
Landscape and Heritage
KEY
Plan Boundary
Watercourse
Built up area
Lake District National Park
Arnside and Silverdale AONB
Lake District Environmentally Sensitive Area
County Landscape
County Landscape and Lake District Environmentally Sensitive Area Overlaps

2.1.3 Landscape and Heritage (see map 5)

Urswick, The Hawk near Broughton, and High Borrans near Troutbeck.

The Roman invasion from c71AD imposed a pronounced military rule on the region, reflected in the remains of forts at Kendal and Ambleside, and the Roman road from Ambleside to Ravenglass across Wrynose. There is little evidence of 'Romanisation' however, and life in most 'native' settlements like those on Little Urswick Crags would have continued much as in the pre-Roman period.

Similarly it is very likely that settlements that had been occupied before and during the Roman occupation continued to be so into the 'Dark Ages', but archaeological evidence from the area for the period between the end of Roman rule and the eleventh century is generally sparse, with the exception of exotic sites like the supposed Viking 'Thing' mount in Little Langdale, and it is not till the later medieval period that significant remains can be identified. The area has a wealth of such remains including castles like Gleaston, Kendal and Piel Island, other fortified sites like Beetham, Arnside, Millom and Hazelslack and major ecclesiastical sites at Cartmel and Furness Abbey. Ulverston, Kendal, Dalton and Milnthorpe are all of medieval origin.

Cumbria is not readily associated with industry, but the industrial archaeology of the area is both extensive and important, based mainly on the exploitation of the iron ores of Furness and the extensive woodland of its hinterland. Remains include early bloomeries in Water Park, and the finery forge at Stoney Hazel, both near Coniston; the Duddon Furnace; and the major iron working and iron mining sites at Backbarrow and Hodbarrow. Other important industrial remains include the extensive copper mining site at Coniston, and individual but characteristic sites like Winster potash pit and Stott Park bobbin mill. The Furness Railway, now the main line between Lancaster and Barrow includes several important historic structures, as do the Ulverston and Lancaster Canals. There is currently some local debate about the possibility of re-opening the Lancaster Canal towards Kendal. Were a serious proposal put forward, the Agency would need to be closely involved in considering the environmental implications.

This brief account gives only a hint of the richness of the archaeological heritage of southern Cumbria, and identifies only a few major sites. There is a much wider historic heritage preserved in more ordinary remains and in the very fabric of the fields, hedgerows, lanes, woods and settlements of the area. Further information can be obtained from the County Archaeology Service, Kendal.

A list of the Scheduled Ancient Monuments in the LEAP area can be found at Appendix 1.

2.1.4 Development

General

The Environment Agency is taking a pro-active role in the land-use planning system. This is in terms of guiding and advising Local Planning Authorities (LPAs) and developers on matters concerning air quality, the water environment and waste management. The aim is to ensure future development is sustainable and land use change is guided and implemented within the overall aim of protecting and enhancing the whole environment.

Past development has had a major influence on shaping the area and the planning system plays an important role in preserving much of it special character. New development has to be carefully considered, to recognise both the potential adverse effects, as well as the benefits, change can have on the environment.

The Agency seeks to assess the likely impact of proposed development and we pursue our aims and policy objectives via the planning consultation process. The final determination of decisions on planning matters rest with the LPA's, however, national government guidelines have advised on the need to consider Agency concerns when formulating a decision. Local Environment Agency Plans are an important part of the ongoing dialogue with LPA's to foster partnerships and identify issues, where environmental problems and potentials can be most actively pursued.

The Agency has statutory regulatory powers and responsibilities to protect the environment. These powers are complemented by, and sometimes more appropriately carried out, by planning legislation. The Agency can provide an independent and authoritative view on a wide range of environment issues. As a statutory consultee under planning legislation, for both development plan preparation and certain types of planning application, our advisory role provides LPA's with information to assess how development will impact on the environment. It also highlights to developers any Agency licences and consents which may be necessary, independent of any planning approval.

We are involved in all levels of the planning process. We are consulted on National Legislation and Guidance, and Regional Planning Guidance. We are also consulted on LPA Development Plans, Structure Plans, Local Plans, Mineral and Waste Plans. We support policies which reflect our interest and highlight constraints to allocations which could have a detrimental impact on the environment if not properly designed and planned. The link between Development Plans and LEAPS is most important. Section 54a of the Town and Country Planning Act 1990 indicates that decisions on development proposals should be made in accordance with development plans unless material considerations indicate otherwise. The recognition of LEAPS in development plan preparation is essential, as certain LEAP issues will have an impact on future land use planning.

Local Perspective

Planning policy within the Plan area has to take account of Regional Planning Guidance for the North West RPG 13, April 1996. Paragraph 420 states "the Environment Agency is currently producing a series of catchment management plans CMP's (Local Environment Agency Plans) which are intended to bring together the management of all water based interests within individualatchment areas. CMP's are intended to provide an input to development plan policy

2.1.4 Development

formulation on issues such as water and sewage infrastructure, location of new facilities, waste disposal, flood plain and sea defence planning. Planning authorities should have regard to CMP's when formulating development plan policy.

The plan area in planning terms is administered by a number of LPA's (see map 6) These are:

Name of LPA	% of Plan Area by Each LPA
Cumbria County Council	41.2
Lake District Special Planning Board	56.3
Copeland Borough Council	4.0
Barrow-in-Furness Borough Council	7.2
South Lakeland District Council	30
Lancaster City Council	2.8
Lancashire County Council	2.8

NB Does not equal 100% due to County Council and District Council dual responsibilities. In addition some responsibilities are shared between the County Council and Lake District National Park

The Replacement Cumbria and Lakeland District Joint Structure Plan cover 98.2% of the Plan area. This Plan contains policies which provide the broad strategic planning framework for Cumbria and the National Park. More detailed policy and site specific proposals using the above framework will be used to guide development in Copeland, South Lakeland, Barrow and the National Park. In Lancashire the same principles apply, using the framework of the Lancaster City Local Plan.

The Lake District National Park is recognised nationally and internationally as a special place. It possesses a unique combination of spectacular and rugged fells penetrated by valleys, tarns and lakes - an area of intrinsic landscape beauty. The National Park provides the focus for the tourist industry and part has been designated as an Environmentally Sensitive Area. However, parts of the Plan area are in decline. For this reason areas like West Cumbria, Barrow, the uplands in the Central Lakes and the Pennine fringe are parts of the United Kingdom eligible for the European Union Structional Funds with objective 2 and 5b status.

Within the plan area, future development and economic growth will be encouraged in a sustainable manner. The many fine landscapes and areas of valuable natural and built heritage, such as the National Park Areas of Outstanding Beauty, National Nature Reserves will be protected and enhanced. The main challenge for planning will be to balance the pressures for change in the countryside whilst ensuring those areas with serious economic difficulties are

2.1.4 Development

supported and promoted for economic regeneration.

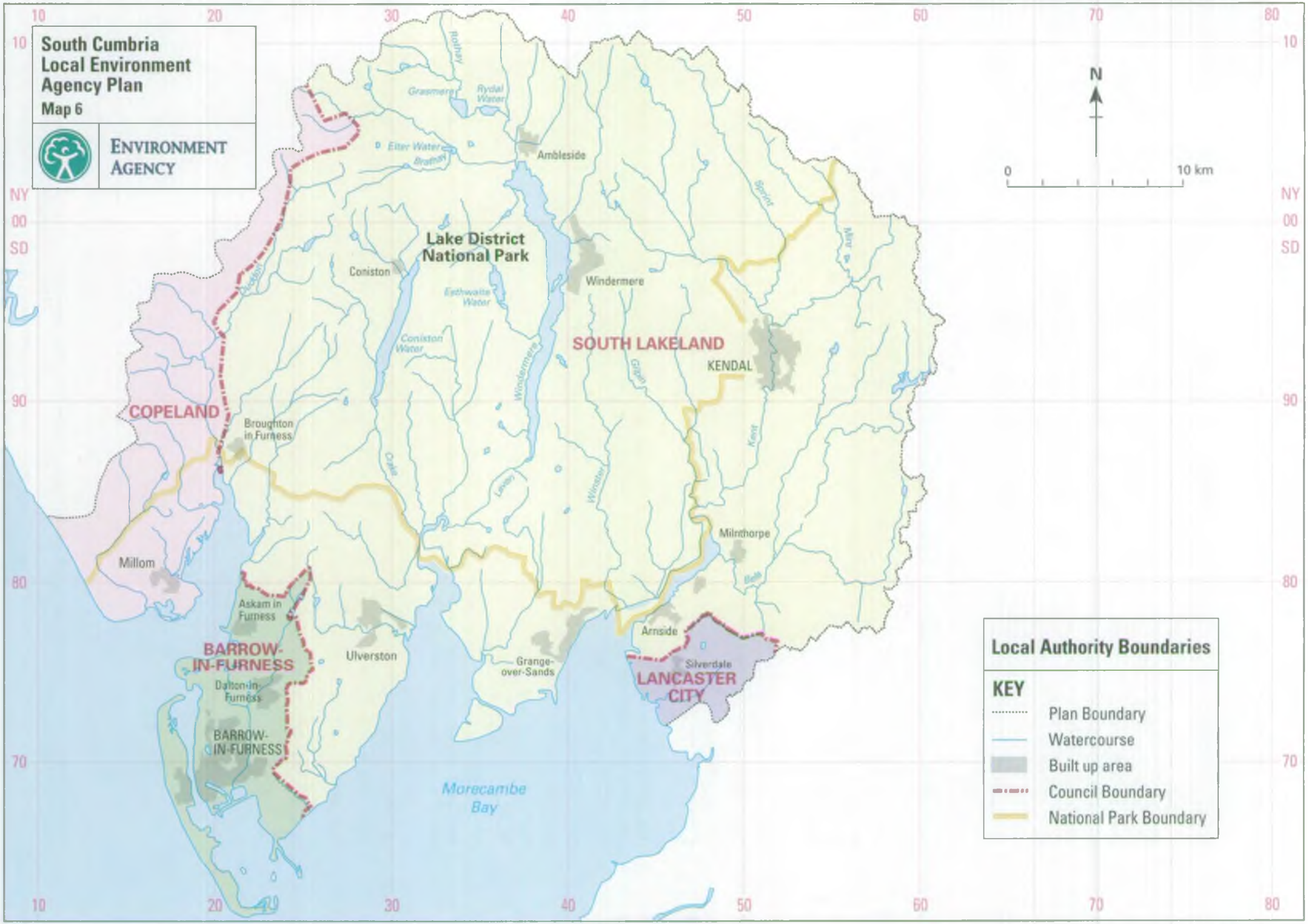
The Agency will support development plan policies which will protect and enhance the environment in accordance with our aims and objectives. To help the LPA's formulate plan policy and minimise the potential for development to increase flood risk, the Agency is carrying out surveys of floodplain, washlands and other land liable to flood and establish the effects of increased run-off on existing development. Once completed these surveys will be passed to the LPA's to ensure planning decisions take account of flood risk issues.

In addition, a number of groundwater vulnerability maps have been produced. These maps give a local perspective to national groundwater policy. District wide indicative maps have been produced for certain LPA's. HMSO are currently printing Groundwater Vulnerability Maps on a wider scale. These maps are intended to increase awareness of those places where groundwater is most at risk. Those responsible for the planning of land will find them useful in learning about the potential impact proposals could have on groundwater. Maps 6, 7 and 10 cover the plan area and are not yet available..

The closure of Libby's factory near Milnthorpe has led to improved water quality in the River Bela. The Agency is concerned that the site may be redeveloped for small industrial units which could threaten water quality in the river. Should this occur, the Agency would like to see all effluents pumped to foul sewer for treatment at Milnthorpe sewage treatment works.

The table on page 63 indicates the current state of development plan preparation within the area. The table highlights LPA policies which protect our aims and objectives. It is hoped that the LPA's will work closely with the Agency so that the information and actions arising in this Plan can be integrated into the respective development plans. Close integration of environmental management and land use planning is considered an essential element of Agenda 21, the blueprint for sustainable development that was launched at the World Summit held in Rio de Janeiro in June 1992. Many LPA's are now preparing Local Agenda 21 documents and Environmental Audits and the Agency will assist, where appropriate. to try and ensure decisions made in the planning field meets the needs of the present without compromising the ability of future generations to meet their own needs.

For the above reasons the Agency will seek to ensure the following policy objectives will be translated into land-use planning policy which will be considered when planning applications are assessed.


South Cumbria
Local Environment
Agency Plan
Map 6
ENVIRONMENT AGENCY
N
0
10 km
Lake District
National Park
Ambleside
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Coniston
Esthwaite Water
Coniston Water
Windermere
Windermere
Leven
Crake
Duddon
Winster
Gilpin
Sprint
Mint
Kent
Bela
SOUTH LAKELAND
KENDAL
COPELAND
Broughton in Furness
Millom
Askam in Furness
BARROW-IN-FURNESS
Dalton-in-Furness
BARROW-IN-FURNESS
Ulverston
Grange-over-Sands
Morecambe Bay
Milnthorpe
Arnside
Silverdale
LANCASTER CITY
Local Authority Boundaries
KEY
Plan Boundary
Watercourse
Built up area
Council Boundary
National Park Boundary

2.1.4 Development

Development Policy Objectives

Flood Defence

To discourage new buildings and land raising in areas at risk from flooding or where development could cause flooding elsewhere:

* by ensuring new development is not at risk from flooding and does not put other areas at risk;

* by encouraging continuous unobstructed areas adjacent to the watercourse to ensure access for essential maintenance or flood flows.

Water Quality

To protect and improve the quality of surface waters and groundwaters:

* by ensuring new development complies with the Policy and Practice for the protection of Groundwater;

* by ensuring new development is served by satisfactory arrangements for the disposal of foul sewage, trade effluent and contaminated surface water;

* by encouraging, where there are sewage treatment capacity problems, new development to be phased to coincide with improved infrastructure;

* by ensuring appropriate development complies with the Control of Pollution (Silage, Slurry, Agricultural Fuel Oil) Regulations 1991;

* by ensuring leachate and drainage is controlled and monitored from contaminated land sites.

Water Resources

To protect surface water and groundwater resources:

* by ensuring development can be or will be served by an adequate means of water supply which will not adversely effect existing users, river flows, water quality, agriculture, fisheries amenity or nature conservation.

* by encouraging the management of surface water run-off (as far as practicable) be treated at source on all new developments through the use of swales, wetlands, soakaways, permeable pavements and roadways:

2.1.4 Development

Conservation and Enhancement of the Water Environment

To protect, conserve and enhance areas of aquatic value and other important elements of the water environment:

* by highlighting the areas of the water environment, including river corridors which are, or have the potential to be of value;

* by discouraging development which would have an adverse impact on the nature conservation, landscape, heritage, fisheries, recreation or amenity value of watercourses, ponds, wetlands and the land physically and visually linked to them.

* by siting development away, wherever possible, from river corridors;

* by seeking to ensure development proposals protect and enhance on-site features and where development is accepted because of overriding considerations, mitigation and compensatory measures are provided so that there is no net loss of environmental value.

Waste Disposal and Contaminated Land Sites

To ensure waste disposal and contaminated land redevelopment does not cause pollution or harm to human health:

* by ensuring there are adequate measures which will be designed to control and monitor water pollution and landfill gas;

* by ensuring development complies with the Government's National Waste Management Strategy.

* by encouraging the re-use of contaminated land sites where the degree and nature of the contamination has been assessed and appropriate remediation measures developed.

Air Quality

To ensure air quality is protected:

* by ensuring development will not have an adverse effect on air quality.

ENVIRONMENT AGENCY INTERESTS AND LPA DEVELOPMENT PLAN POLICIES

	LPA Plan Policies which aim to Protect the Environment (Their Plan Policy references shown)			
Development Plan Name & Status	**Air, Water Quality & Water Resources**	**Flood Defence**	**Fisheries, Recreation & Conservation**	**Minerals, Waste Disposal & Contaminated Land**
Cumbria C C & Lake District Joint Structure Plan 1991-2006, Adopted July 1995	9, 22, 23, 56	18, 24	17	21, 58, 59, 60, 61, 62
Cumbria Minerals & Waste Local Plan. Deposit Consultation ended November 1996	Policy 5 & 7	-	Policy 6	Policy 5, 6 & 7
Lake District Local Plan inc' Minerals & Waste. Public Inquiry ended February 1996	UT1, NE9	UT 3-5	New Policy	M1, M2 & N5
Barrow-in-Furness B C Adopted Local Plan 1991	-	-	-	N/A
Copeland B C Modified Local Plan, following Inspectors Report - June 1996	ENV 24-28, 30-31 SVC 1-4	ENV 15	ENV 4 SVC 1	N/A
South Lakeland D C Modified Deposit Local Plan. Inspectors report received October 1996.	S.29	C20 C21	C7 C22	S.32 S.33
Lancashire C C Modified Structure Plan, following Examination in Public	Policy 6 Policy 10	Policy 8 Policy 15	Policy 7, 9, 13, 54, 55	Policy 63, 66, 67, 68, 69, 70, 76
Lancaster CC Draft Local Plan Consultation ended January 1997	-	-	E4, E16, E18, E36	N/A

TABLE PRODUCED JANUARY 1997

2.1.5 Waste Management

General

The recovery, treatment and disposal of controlled waste are regulated by the Environment Agency through the waste management licensing and exemption system, under the Environmental Protection Act 1990. Controlled waste consists of household, industrial and commercial waste.

The management of more hazardous waste is controlled by the Environment Agency through the new Special Waste Regulations 1996.

Agricultural waste, sewage sludge, and mines and quarry waste are covered by other legislation.

The majority of waste from agriculture premises as defined in the Agriculture Act 1948 is controlled by the Ministry of Agriculture, Fisheries and Food (MAFF).

Agriculture wastes cover a wide variety of potentially polluting materials including manures and silage effluent sheep dips and pesticides. Discharges of agriculture wastes are controlled under Section 85 of the Water Resources Act 1991 and supporting Regulations. Further guidance on handling, storage and disposal of these wastes is contained in a Code of Practice.

Applying sewage sludge to agriculture land is regulated throughout the EU by council Directive 86/278 which is enforced in the UK by the Sludge (use in Agriculture) Regulations 1989. Control over the disposal and recovery of mineral waste is provided under Town and Country Planning legislation and the Mines and Quarries (Tips) Act 1969.

Different types of waste management facilities include, landfill, transfer stations, civic amenity sites, treatment plants, incinerators, scrap yards and recycling process plants. Planning permission will normally be required for the development of a waste management facility. The siting of waste recovery and disposal facilities is decided through the land use planning system by the local planning authorities under the Town and Country Planning Act 1990.

The objective of the waste management licensing and exemption system is to provide a separate control system and ensure that waste management facilities:

- do not cause pollution of the environment
- do not cause harm to human health
- do not become seriously detrimental to the amenities of the locality (only applicable if planning is not in force)

In assessing pollution, waste regulation should have regard to the wider environment. They should consider the impacts of emissions on global climate change and on local air, water, soil, flora and fauna.

It is the duty of each waste collection authority (usually a district, borough, or unitary council) to arrange for the collection of household waste in its area. Municipal waste is often used to describe waste collected by the local authorities, and includes household, civic amenity and some industrial and commercial waste. Waste disposal authorities (usually county, met. or unitary

2.1.5 Waste Management

councils) have a duty to arrange for the disposal of household waste in its area. Local Authorities are also required to provide civic amenity sites where members of the public can deposit waste free of charge.

The way that waste materials are collected and sorted often dictates which waste management option is subsequently used, and whether materials recycling, biological treatment or incineration are economically feasible. The collection method will significantly influence the quality of recovered material.

Local Perspective

Landfill is the main disposal method for the majority of wastes arising in the area. There has however been a significant increase in the landspreading of industrial wastes such as paper pulp. The landspreading of waste is exempt from licensing regulations and is controlled by the Environment Agency. During 1995/96 approximately 17,000 tonnes of such waste was landspread, this waste previously went to a landfill site.

The essential total amount of controlled waste disposed at licensed landfill sites was over 253,500 tonnes during 1995/96. The majority of this waste was disposed at landfill sites which can accept a range of waste types (see Table 1). There are 12 active licensed landfill sites in the plan area, of these 7 landfill sites are licensed to accept only *inert*, ie. concrete, bricks and soil, waste (see Table 2). The distribution of these sites is shown in Map 7.

An increasing amount of inert waste is now being disposed of by exempt activities, such as land restoration and construction projects.

Table 1: Controlled Waste Disposal-Licensed Landfill Sites 1995/96 (Tonnes)

i)	Inert Waste Only Sites		=	53 690
ii)	Other Waste Sites;	Inert	=	54 150
		Construction/Demolition	=	2 480
		Household/Industrial/Commercial	=	142 450
		Special	=	790

Table 2: Licensed Waste Management Facilities (31.03.96)

i)	Landfill-inert waste only	=	12
ii)	-other waste	=	6
iii)	Transfer stations	=	4
iv)	Civic Amenity Sites	=	5
v)	Scrap Yard	=	1

2.1.5 Waste Management

Article 18 of the Town and Country Planning General Development Order 1988 requires local planning authorities to consult the Agency before granting planning permission for proposed developments within 250 metres of land which is or has been in the preceding 30 years been used for the deposit of waste. The Environment Agency is responsible for notifying the planning authorities of all known closed and currently licensed landfill sites in its area. There are 123 landfill sites in the area.

One of the largest landfill sites in the Plan area is at Bennett Bank, Barrow-in-Furness which has had several planning applications to extend the site refused by Cumbria County Council. An appeal against this decision was held by public inquiry in October 1996. The dependance on a small number of landfill sites for the disposal of the majority of the areas waste has caused concern for the main businesses and local authorities. This issue is discussed later.

Before the Agency can issue a waste management licence planning permission has to be approved by the relevant planning authority. Both Cumbria County Council and the Lake District National Park Authority are responsible for waste management applications in their areas.

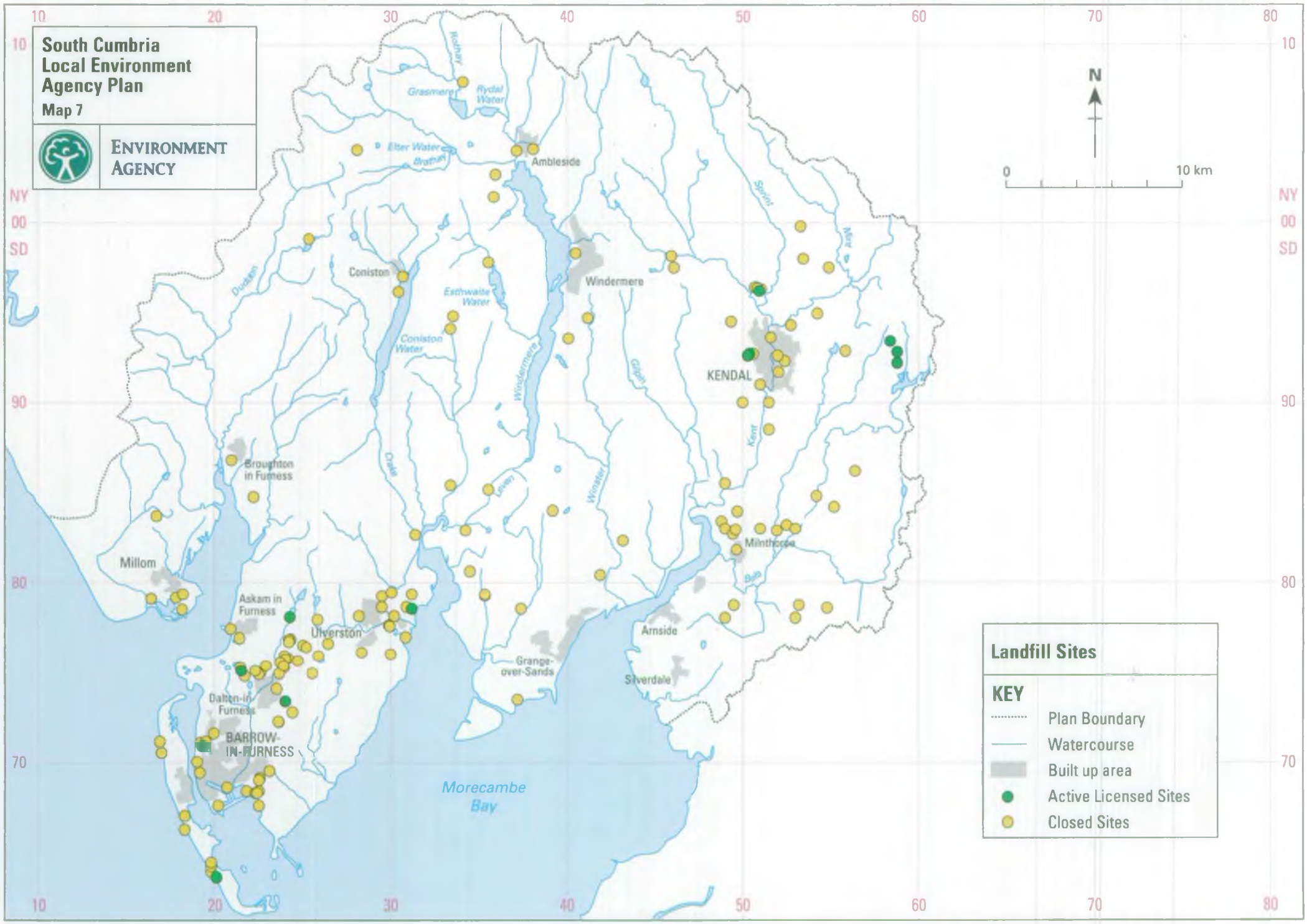
As well as deciding individual planning applications these authorities must also develop waste management planning policy. The development of such policies is undertaken through *Minerals and Waste Local Plans*.

Cumbria County Council and the Lake District National Park Authority have both produced draft consultation Mineral and Waste Local Plans.

In July 1995 the County Council published its draft plan and this outlines its policies and proposals that will guide waste development in Cumbria, (outside the National Parks), to the year 2000. This Plan has highlighted a potential waste management problem in the Furness area because of the completion of existing landfill sites. A subsequent study by consultants into the future options for waste management in this area was completed in June 1996. The study has recommended the need to move the management of waste from a reliance on landfill to other options such as waste minimisation, recycling and composting.

On the 1 October 1996 the first ever national environment tax, *the landfill tax*, was introduced. The main aim of this new tax is to promote more sustainable waste management and to reflect the environmental impact of landfill. There has been concern raised that this increase in waste disposal costs will lead to an upsurge in illegal disposal, including flytipping.

The Department of Environment has charged the Agency with producing a *National Waste Strategy*. An important first stage is to address the issue of inadequate information regarding waste management, especially concerning waste arisings. The Agency will undertake a pilot waste arisings survey early in 1997 and a selected number of businesses throughout the area will be involved. Another key objective of the survey will be to encourage businesses to consider greater waste minimisation and environmental auditing.


South Cumbria
Local Environment
Agency Plan
Map 7
ENVIRONMENT AGENCY
N
0
10 km
Grasmere
Rydal Water
Elter Water
Brathay
Ambleside
Rothay
Stock
Mint
Coniston
Dudden
Esthwaite Water
Coniston Water
Windermere
Windermere
Gilpin
KENDAL
Kent
Crake
Leven
Winster
Broughton in Furness
Millom
Mintsbe
Bela
Askam in Furness
Ulverston
Arnside
Grange-over-Sands
Silverdale
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
Landfill Sites
KEY
Plan Boundary
Watercourse
Built up area
Active Licensed Sites
Closed Sites

2.1.6 Fisheries

General

This use relates to the conservation of wild populations of fish and their habitats, recreational fishing for game and coarse fish and commercial fishing for salmon and sea trout.

The Agency has a duty under the Environment Act 1995 to maintain, improve and develop salmon, trout, freshwater fish and eel fisheries under it jurisdiction.

Local Perspective

369.1 kilometres of Salmonid river are designated under the EC Freshwater Fisheries Directive.

The rivers, Kent, Leven, Crake and Duddon support significant fisheries for salmon and sea trout and there are also other minor rivers such as the Bela that also support runs of these migratory fish. Declared catch returns for various rivers are shown in Appendix 2. Resident brown trout occur throughout all these systems..

Char are found in Coniston and Windermere.

Several tarns, lakes and ponds throughout the catchment have good coarse fisheries and there are also several commercial trout fisheries. Ulverston Canal supports one of the most important coarse fisheries in the LEAP areas. Part of the Lancaster Canal is also in the LEAP area and also supports coarse fishing.

The Agency is the Sea Fisheries Authority for inshore parts of the estuaries within the LEAP areas. The estuaries of the Rivers Kent and Leven support a commercial salmon lave net fishery. A total of 14 licences are issued every year. The number of these licences is limited by Net Limitation Order. Declared catch returns are shown in Appendix 3.

To assist the passage of migratory fish over obstacles there are fish passes at various locations throughout the catchment. Natural obstacles to migratory fish remain on several rivers. There are automatic fish counters at Bassinghyll on the River Kent and Backbarrow on the River Leven

The Agency is currently collecting data on fish habitat in the catchment on order to provide a prioritised list of 'sites' in need of habitat re-habilitation.

There are also schemes in hand for other fish habitat improvements and some charitable trusts for river protection schemes are proposed.

The Environment Agency undertakes extensive monitoring of fish stocks such as electrofishing surveys and echo sounding. Map 8 indicates juvenile total Salmonid densities obtained from electrofishing surveys between 1992 and 1996. All the major rivers and streams in the LEAP areas have been surveyed for juvenile populations between 1992 and 1996, and copies of these surveys are available through the local libraries.

Liaison with anglers, riparian owners and associations occurs informally and formally. Informally,

2.1.6 Fisheries

fishery staff are regularly in contact with anglers and other interested parties whilst going about their duties. On a more formal basis, liaison is maintained with the Furness and South Cumbria Fisheries Consultative Association which has within its membership the majority of the fishery owners and angling organisations in the area.

A "Strategy for the Management of Salmon In England and Wales" was produced in February 1996 by the Environment Agency's predecessor, the National Rivers Authority. It sets out four objectives for the future management of this resource and outlines how this could be achieved in practice. A proposed timetable for the introduction of Salmon Action Plans for the Leven/Crake, Kent and Duddon are 1996/97, 1998/99 and 1999/2000 respectively. Declared Salmon rod catches have been increasing in recent years, on the Kent and Leven.

Declared sea trout rod catches have declined in the Leven, Crake and Duddon but increased in the Kent catchment in recent years. Juvenile trout production on the Crake and Duddon has been declining against a background of increasing salmon juvenile numbers. Juvenile trout numbers on the Leven are variable and very good on the Kent.

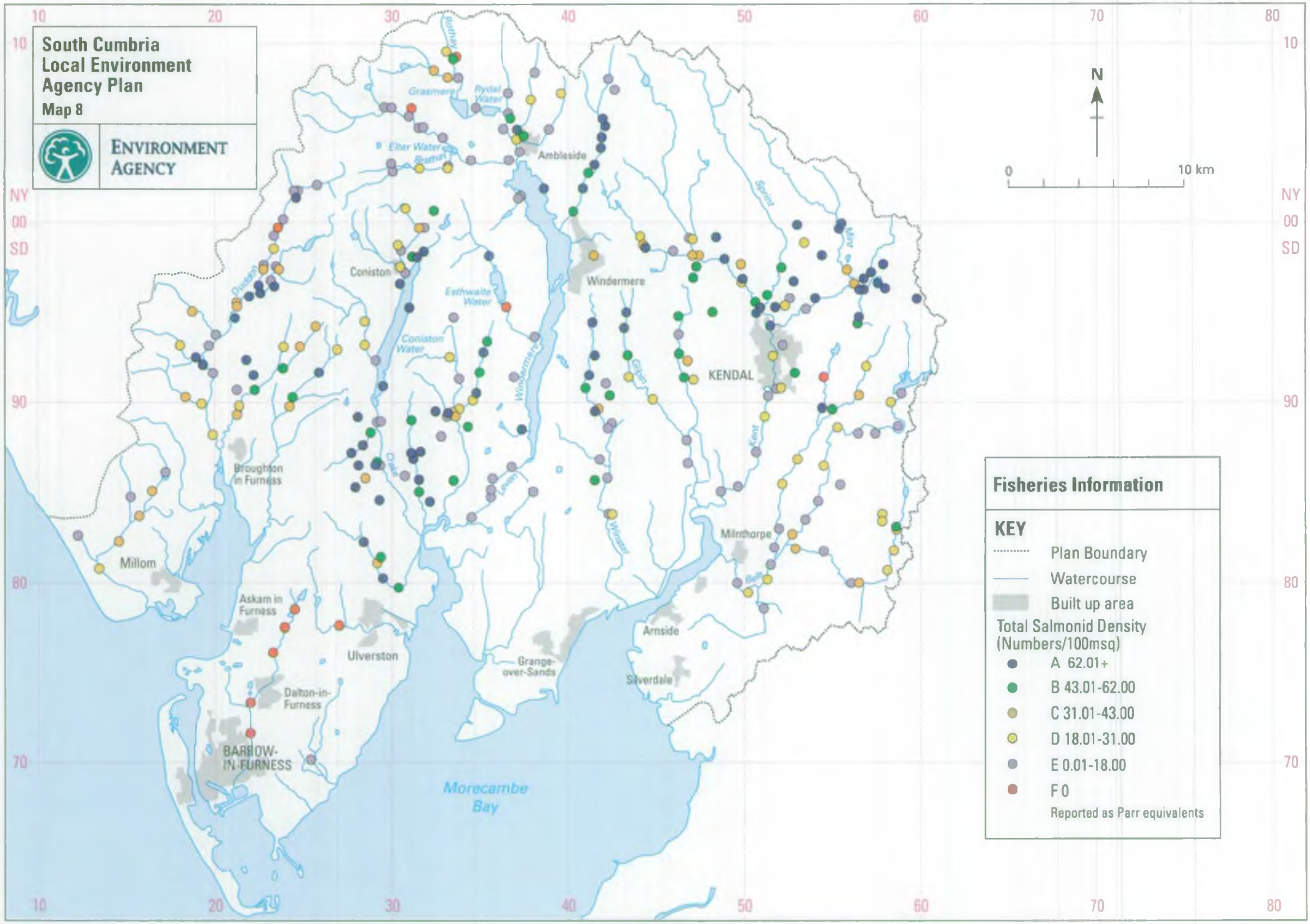
The Bela has recently been opened up to migratory fish runs with the completion of a fish pass at Beetham Weir in 1989. Juvenile salmon numbers have been increasing slowly above the pass since then. Trout numbers are variable throughout the river catchment.

Char is locally common but a nationally rare species which is found in both Windermere and Coniston. Windermere has four genetically discreet char stocks. A possible fifth stock is the autumn river spawning component in the River Brathay, however recent investigations indicate this component is at best remnant and most likely almost extinct. The Institute of Freshwater Ecology (IFE) have considerable data on the remaining four populations. Coniston has one spawning stock and is less well documented.

There is widespread concern amongst fishery owners and the angling community about the apparent impact of fish eating birds (cormorants, mergansers and goosanders). MAFF have commissioned approximately £1M worth of research into this issue and the NRA commissioned research on the River Ribble. Essentially this is a national and European problem requiring a national solution. The current Environment Agency position, is one of not supporting culling these birds unless and until serious damage to fisheries has been established and killing proved an effective means of preventing that damage. The Environment Agency accepts that it may be possible to obtain adequate evidence in a case by case basis for individual fisheries and it will work positively with owners and anglers to establish the full facts in each situation. Where the damage is proven to be economically significant and all other methods of control such as scaring has proved ineffective, the Environment Agency will support the giving of licences to cull.

Fisheries management relies on good data and catch returns are one source. These are required by law but only a percentage comply. The Environment Agency has also introduced a log book scheme to gain more information.

In common with many other areas, the catchment's fish stocks are vulnerable to illegal fishing. Such exploitation is often highly organised and commercially motivated and requires considerable


South Cumbria
Local Environment
Agency Plan
Map 8
ENVIRONMENT AGENCY
N
0
10 km
Fisheries Information
KEY
Plan Boundary
Watercourse
Built up area
Total Salmonid Density
(Numbers/100msq)
A 62.01+
B 43.01-62.00
C 31.01-43.00
D 18.01-31.00
E 0.01-18.00
F 0
Reported as Parr equivalents
Grasmere
Rydal Water
Elter Water
Rothay
Ambleside
Coniston
Esthwaite Water
Coniston Water
Windermere
KENDAL
Sprint
Mint
Kent
Gilpin
Winster
Leven
Crake
Duddon
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Morecambe Bay
Arnside
Silverdale
Milnthorpe
Bela
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SD
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20
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60
70
80
90

2.1.6 Fisheries

resources to police. The Agency enforces fisheries legislation throughout the catchment area of the LEAP including coastal waters out to 6 miles. Such enforcement often involves partnership with other organisations such as the Police, MAFF and the North West and North Wales Sea Fisheries Committee.

Coarse anglers in the LEAP areas have felt their needs have been under-represented by the Agency's predecessor bodies. The Agency assists clubs with fish transfers and rescues including the lending of equipment and giving advice. The Agency's predecessor, the NRA, initiated the development of a coarse fishery on the lower River Winster and the Agency continues to support this. Some of the rivers in the LEAP catchment are fished commercially for eels with both elvers and adults being caught.

2.1.7 Mineral Extraction

General

This use relates to the mining of minerals by either underground workings or surface excavations.

The development of mineral extraction is guided and controlled by minerals planning Authorities who make planning policy and decide on planning applications.

The Agency has a strong interest in development of minerals because of the potential impacts on the environment both during and after operations.

Local Perspective

Within the area of the LEAP Cumbria County Council is the planning authority for minerals except for the area within the Lake District National Park where the Lake District National Park Authority are the minerals planning authority. The current status of these local plans is described in section 2.1.4 Development on page 63

The Agency is a consultee with regard to local minerals and waste plans and seeks to work with the minerals planning authority to ensure planning policies protect the environment. In addition the Agency will scrutinize individual planning applications and pass appropriate comments to the planning authorities concerned.

There is significant mineral extraction activity within the plan area and current sites within planning permission are shown on map 9. All these operations involve surface excavation.

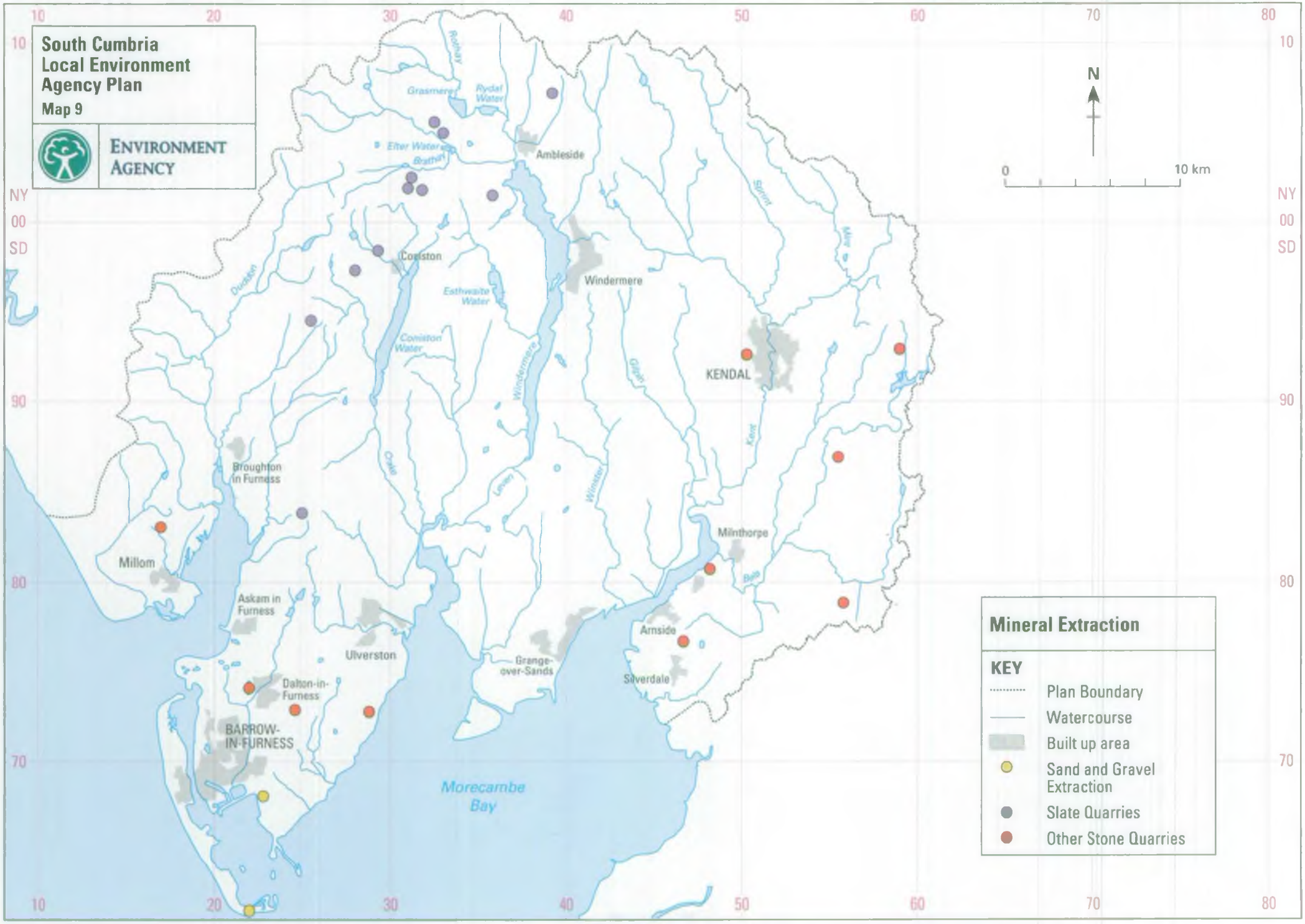
There is also a long history of mineral extraction within the plan area including underground working for minerals.

Much of this activity pre-dates planning control and the application of environmental protection measures. However many of these abandoned workings have become accepted parts of the landscape and are often important archaeological, geological and nature conservation sites. Some old metalliferous mine workings have caused contamination of watercourses with copper and lead, and this legacy remains.

Slate quarrying is a traditional industry in this part of Cumbria and several working sites remain. Historically this operation catered for local building needs and roof slate production. However, since the 1960's the industry has diversified into architectural and decorative products including a significant export trade.

There are also a significant number of quite large limestone quarries in the south of the plan area.

Middlebarrow Limestone Quarry near Silverdale has recently applied for planning permission to excavate below the water table. The Agency is concerned about the potential impact this might have on the aquifer especially if water is pumped from the excavation. Such a action could result


South Cumbria
Local Environment
Agency Plan
Map 9
ENVIRONMENT AGENCY
N
0
10 km
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Ambleside
Coniston
Duddon
Esthwaite Water
Coniston Water
Windermere
Sprint
Mint
Gilpin
KENDAL
Kent
Crake
Leven
Winster
Broughton in Furness
Millom
Milnthorpe
Bela
Askam in Furness
Ulverston
Grange-over-Sands
Arnside
Silverdale
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
Mineral Extraction
KEY
Plan Boundary
Watercourse
Built up area
Sand and Gravel Extraction
Slate Quarries
Other Stone Quarries

2.1.7 Mineral Extraction

in saline water being drawn into the aquifer and impacting local surface and ground water qualities and quantity. Should this work go ahead the Agency will monitor for impacts.

Where quarries have a need to discharge effluents to watercourses they require a consent from the Agency. A number of such consents contain specific conditions to control the quantity and quality of the discharge to within acceptable limits. All such discharges are carefully monitored by Agency inspectors.

2.1.8 Forestry

General

Modern forestry practices are based on much sounder environmental consideration than was the case earlier in the Century.

Although not requiring planning permission, most forestry activity is guided by the Forestry Authority the regulatory arm of the Forestry Commission, through their Woodland Grant Scheme and felling licence system. The Forestry Authority require operators to follow sound environmental practices as a condition of woodland grants and felling licences. These are laid down in a series of guidance notes which the Forestry Authority issue to operators. Any planting scheme exceeding 40 hectares needs a full environmental appraisal which must be approved by the Forestry Authority before grant can be paid.

The Forestry Authority may also provide grant money for management of existing woodland including biodiversity management. Other bodies may also provide financial assistance for woodland management in specific circumstances. For example MAFF may pay grant within the Lake District Environmentally Sensitive Area (ESA) for riverside trees, pollarding etc and Lake District National Park Authority may provide grant and practical assistance for appropriate projects.

Local Perspective

Woodlands have a significant presence within the area, covering in the order of 17 000 hectares (see map 10). The largest single tract of commercial forest is Grizedale Forest between Coniston Water and Windermere.

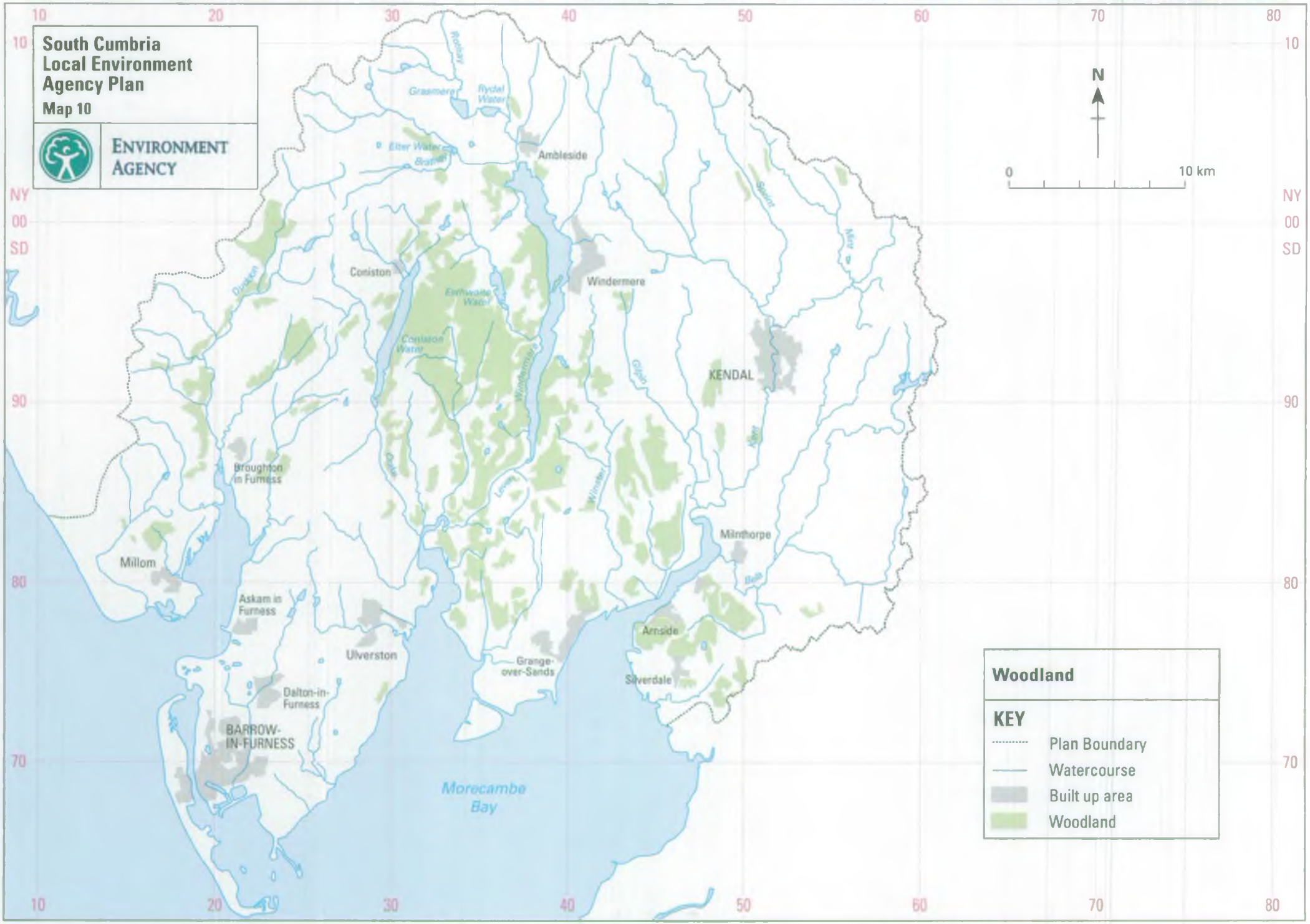
The Forestry Authority is particularly concerned about a lack of sustainable management of existing woodlands within the area covered by this LEAP.

The National Trust are significant landowners in the area and manage large tracts of woodland, principally along the western shore of Windermere and around Coniston Water.

Locally the Environment Agency has a good working relationship with the Forestry Authority and others involved in woodland management. The Agency is given opportunity to comment on all woodland management proposals which pass through the Forestry Authority Woodland Grant Scheme. In addition the Agency is consulted over all Forest Design Plans produced by Forest Enterprise (the commercial are of the Forestry Commission).

The Agency is also a signatory to the "local accord on native woodlands in the Lake District National Park", aimed at promoting the maintenance and recreation of native woodland within the National Park.

The Agency is keen to ensure that new forestry does not exacerbate the problem of acid deposition. Within the area of the LEAP there are a number of 5km squares where acid deposition exceeds the "critical load" which the environment is able to assimilate. The Agency


South Cumbria
Local Environment
Agency Plan
Map 10
ENVIRONMENT AGENCY
N
0
10 km
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Ambleside
Coniston
Duddon
Esthwaite Water
Coniston Water
Windermere
Leven
Crake
Gilpin
Winster
Sprint
Mint
KENDAL
Kent
Bela
Milnthorpe
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Arnside
Silverdale
Morecambe Bay
Woodland
KEY
Plan Boundary
Watercourse
Built up area
Woodland

will therefore pay particular attention to Forestry in these areas, although in reality larger scale conifer afforestation in such locations is unlikely.

Objectives

To support woodland management and tree planting where this can be shown to provide environmental benefit.

2.1.9 Catchment Drainage - Flooding and Flood Alleviation

General

This use relates to the protection of people and property against flooding from rivers and the sea. Normally flooding is a result of extreme weather conditions such as very heavy rainfall or storms combined with high tides. Flood events are described in terms of frequency at which, on average, a certain severity of flood is exceeded. This frequency is usually expressed as a return period in years e.g. 1 in 50 years. The effectiveness of flood defences can be measured in terms of the return period up to which they prevent flooding. Different types of land use receive different levels of protection, with urban areas generally receiving the greatest protection. The Ministry of Agriculture, Fisheries and Food (MAFF) suggest levels of protection which range from 1 in 200 years for dense urban development to 1 in 5 years for poor agricultural land when considering tidal flooding. Equivalent figures for non tidal flooding are 1 in 100 years and 1 in 1 year.

The flood plain is an important element of the overall river system to convey flood flows. In a major flood event water is "stored" temporarily in the flood plain thereby attenuating flooding downstream.

Historic development on flood plains has led to the need for construction and maintenance of flood defences. The Agency seek to control any activity on the flood plain likely to worsen flood conditions. This is achieved through liaison with local planning authorities to influence the control of development in the flood plain, and through Agency byelaws.

The provision of new flood defences and the maintenance of existing schemes and channel capacity needs to be undertaken with care to ensure minimum impact on other river uses (notably Fisheries and Conservation). To this end extensive internal and external consultations are carried out with all interested parties.

The Agency has a duty to exercise general supervision over all matters relating to flood defence. Certain watercourses have a formal designation of "Main River". This designation means the Agency has permissive powers to carry out works on these rivers and has greater controls over activities in the channel or on the adjacent banks.

The responsibility for the maintenance of any watercourse normally rests with the riparian landowner, whose ownership as a general rule extends to the centre line of any such river. However, the Agency does have control of the construction of any structure in or close to the statutory Main River. This and other activities likely to affect the bed or bank of the river requires the formal consent of the Agency.

The Agency has limited powers in respect of consents for weirs, dams and culverts and similar obstructions on watercourses, which are not designated statutory main river. District and County Councils have powers to carry out schemes on such watercourses, but no legal obligations to do so. They require the Agency's consent under its overall supervisory duty for drainage matters.

2.1.9 Catchment Drainage - Flooding and Flood Alleviation

Local Perspective (see Map 11)

The rivers in the South Cumbria LEAP area flow southwards into Morecambe Bay or the Duddon Estuary. Due to the steepness of these rivers flooding caused by heavy and persistent rainfall occurs and recedes very quickly. The exceptions are the River Leven at the outflow of Windermere and the River Crake at the outflow of Coniston Water which exhibit longer flatter hydrographs.

The Environment Agency operates a Formal Flood Warning Zone for the River Kent in the Kendal area for which the Agency uses Automatic Voice Messages, sirens, BBC Radio Cumbria, Bay Radio, AA Roadwatch and Teletext to issue and up-date Flood Warnings. Warnings are based on the summation of the flows in the rivers Kent, Mint and Sprint together with rainfall data and predictions.

Major flooding occurred in Kendal in the 1950's and 1960's. From 1971-78 a flood alleviation scheme was constructed which brought relief to the town. Particularly major flooding occurred in 1954, 1964 and 1968 when up to 300 properties were flooded.

Since it's completion the flood alleviation scheme has been severely tested in 1979, 1982, and 1985 (to full 1 in 40 year design standard) and 1995. Parts of the town remain vulnerable to flooding due to the uneconomic methods available of defending parts of Busher Walk, and Helsington Mills. Following the 1985 floods parts of Burneside to the North of Kendal, and Mintsfeet Industrial Estate had improvements to their flood defences carried out.

The channel improvements carried out to the River Kent have now mellowed in appearance, however due to the need to constrain vegetation growth it is necessary to periodically remove bushes and small trees from the stone revetment along Aynam Road. This has caused concern to local residents and naturalists. However the work has been carried out in a sympathetic manner in the correct season including consultation with interested parties.

Other fluvial flood risk areas in the South Cumbria LEAP area include Ambleside from the River Rothay, Grasmere also from in the River Rothay, the Great Langdale valley from Great Langdale Beck and Baysbrown Pool and parts of Coniston from Church Beck.

Much of this flooding is caused by high intensity rainfall on wet catchments which are 'flashy' in nature.

Specific issues of locations where flood alleviation works are included in the Flood Defence Capital Programme appear in issue number 2 in part 1 of this plan.

Also large agricultural areas particularly the Lyth Valley have benefited from land drainage schemes in the past. Five pumping stations drain over 1000 hectares of land which previously flooded regularly until the scheme was completed in 1986. This has however raised the criticism of canalised channels which are detrimental to conservation interests.

2.1.9 Catchment Drainage - Flooding and Flood Alleviation

The existing operational railway line forms an important "first line" sea defence embankment to over 21km of coast around Morecambe Bay. If the railway line was abandoned for operational reasons by Railtrack its role as a primary sea defence could be in jeopardy leaving vulnerable areas at risk of tidal flooding. In this case the question of who maintains the embankment would arise. The Agency is currently pursuing this question, although we have no indication that the line will close in the near future.

In September 1996 a severe flash flood devastated a number of campsites in the Spanish Pyrenees, leading to several deaths. In response to this, the Agency has set up a project to assess whether there is a similar flood risk to caravan and campsites in Cumbria.

Sea Defence and Coastal Protection

Sea defence is the protection of any low lying land or assets by inundation from the sea. Both the Agency and Local Authorities have permissive powers to carry out works to prevent flooding from the sea.

Coastal protection is defined as the prevention of erosion by the sea of land. This is administered by Local Authorities.

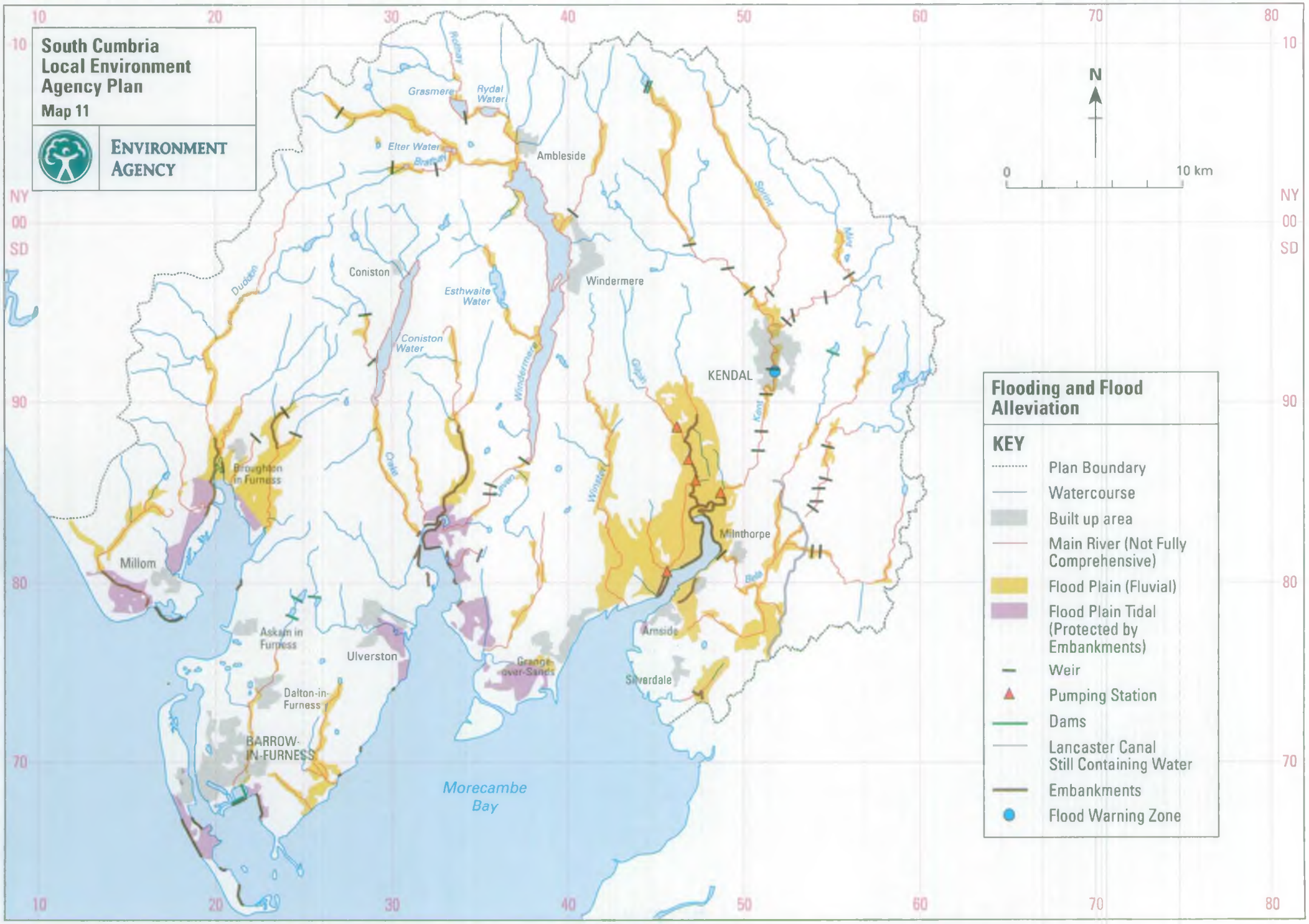
Shoreline Management Plans (SMP's) produced by Local Authorities are intended to provide a strategic framework for the management of coastal defences in an area. The SMP's covering the LEAP area are from Rossall Point to Earnse Point (Morecambe Bay SMP) lead by Lancaster City Council and from Earnse Point to St Bees Head lead by Copeland Borough Council. Both these plans are currently in preparation and the Agency is involved in this work.

The Environment Agency has been closely involved in the preparation of the Duddon Estuary Initiative and the Morecambe Bay Strategy. Both policy projects contain strategy issues involving Sea and Tidal Defences.

Sea Defences and Tidal Embankments protect up to 58km^2 of land within the LEAP Area. 44.7km of Sea Defence and Tidal embankments are maintained by the Environment Agency whilst a total length of approximately 6km is privately owned and maintained. This represents a large percentage of Coastal Defences within the North West Region of the Environment Agency.

The majority of these defences (90%) are turf-covered earth embankments which prevent inundation of the land by the sea during high tides and tidal surges.

Major tidal surges in 1977, 1983 and 1990 caused extensive flooding to agricultural land and properties. Many schemes on the River Kent and the River Duddon estuaries have been carried out.


South Cumbria
Local Environment
Agency Plan
Map 11
ENVIRONMENT AGENCY
N
0
10 km
Flooding and Flood Alleviation
KEY
Plan Boundary
Watercourse
Built up area
Main River (Not Fully Comprehensive)
Flood Plain (Fluvial)
Flood Plain Tidal (Protected by Embankments)
Weir
Pumping Station
Dams
Lancaster Canal Still Containing Water
Embankments
Flood Warning Zone
Grasmere
Rydal Water
Elter Water
Ambleside
Coniston
Esthwaite Water
Coniston Water
Windermere
KENDAL
Broughton in Furness
Millom
Milnthorpe
Askam in Furness
Ulverston
Grange-over-Sands
Arnside
Silverdale
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
Duddon
Crake
Leven
Winster
Gilpin
Kent
Sprint
Mint
Bela
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SD
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90

2.1.9 Catchment Drainage - Flooding and Flood Alleviation

Flood Warning

From 1 September 1996 the Environment Agency took over the lead role in passing Flood Warnings to people who are at risk so that they can take action to protect themselves and their properties. These warnings will be issued either by an automatic telephone system, loudhailers, sirens or flood wardens. Updates will be broadcast by local radio or can be obtained by the use of the Floodcall 'dial and listen' national telephone service.

The police will continue to co-ordinate responses to major emergencies whilst the Fire and Rescue Service will provide help during evacuation of properties.

Local Authorities will operate contingency plans and provide sand bags in areas at risk of flooding.

Standards of Service for Flood Protection

A system has been developed by the Agency to determine the present standard of service being achieved for flood defence. The system determines whether present levels of maintenance have produced a level of protection to the target standard. The river system is divided into reaches between 4-7km in length. An assessment is made of the "Land Use" by considering for each reach the agricultural or urban content within the flood plain and for each element (eg road, house, intensive grazing) a score is given. The score is measured by a single unit called a house equivalent and by the score achieved the reach is placed into one of several land use bands. For typical land use relating to each band see Appendix 4.

Standards of Service maps have not yet been finalised for the catchment, but once completed will assist in determining future maintenance programmes.

Where target standards of protection are not being met, the Agency will consider making capital investment in flood defences. The target standard for urban fluvial flood defences is 1 in 100 years, although a lower standard can be accepted if this is all that can be justified by cost benefit analysis.. It must be recognised that it is not feasible to protect all property to the highest possible standard because of cost benefit and environmental constraints.

Development of the Natural Flood Plain

The flood plain of the River Kent through Kendal acts as a storage area for floodwaters and it is vital to preserve this flood plain to prevent increasing flood risk to the town. There is continual pressure from developers to allow building within the flood plain, but the Agency will work with Local Planning Authorities in resisting such development unless it can be demonstrated that flood risk is not increased.

Main River and River Control Structures

There are 605km of 'main river' in the catchment much of which requires regular maintenance by the Agency to minimise flooding. Maintenance commitment remains intensive in the River Kent,

2.1.9 Catchment Drainage - Flooding and Flood Alleviation

River Leven and River Duddon estuary areas.

Within the catchment there are control structures on the main river of which 71 are controlled and operated by the Environment Agency. The most significant control structure is the Newby Bridge sluice gates which are used to help control the level of Lake Windermere following heavy rainfall and lake level rises.

The Agency structures are weirs at flow gauging stations, five pumping stations and 48 sluices.

The non Agency structures are mainly used for abstraction purposes and are regulated through legislation and the Agency's Land Drainage Byelaws.

The designation of watercourses as "Main River" has evolved over many years and reflects the past importance of good standards of land drainage and agricultural production. The emphasis has changed over recent years from agricultural land drainage in rural area to urban flood alleviation. The Agency has developed guidelines to identify those watercourses which should be designated as "Main River" and future enmainings will be consistent with this approach. In considering enmaining ordinary (non-main) watercourses in urban areas the Agency will, however, have to be mindful of the implications in terms of the limited resources available to undertake works.

Back Drain, Ulverston provides the main drainage outlet for the Ulverston Canal. Although the canal is owned by Glaxo Wellcome and is kept for fire fighting purposes only, its maintenance responsibility remains with the company.

The watercourse is 'main-river' for which the Environment Agency receives a contribution towards its upkeep. Over the years the revetment which provides stability to the channel has deteriorated and causes drainage problems to the adjoining land not owned by Glaxo Wellcome. An agreed programme of substantial maintenance and replacement expenditure is required for the drainage area.

Flood Alleviation Objectives

Where justifiable to provide effective flood defence, for the protection of people and property to a standard appropriate to land use as well as the Agency's and MAFF's indicative standards.

To control development and other works in rivers or the flood plain such that risk of flooding is not increased.

To provide adequate arrangements for flood forecasting and warning.

To minimise environmental and ecological damage during flood defence maintenance and improvement works, and take the opportunity to create enhancements wherever possible.

2.1.10 Water Abstraction

General

The Environment Agency has a duty to undertake measures to conserve, redistribute or augment water resources and to secure the proper use of water resources.

The Agency has powers to grant Drought Permits and powers to apply to the Department of the Environment to issue Drought Orders to conserve water resources and to designate areas as water protection zones or nitrate sensitive areas.

The Agency controls abstraction and impoundments under a licensing system. Most abstractors are required to apply for and hold an abstraction licence, and are charged for the right to use water in accordance with a tariff based on factors such as, licensed quantity, source and season of abstraction and category of use. A number of licences were granted as "licences of right" upon the implementation of the Water Resources Act 1963. Such licences were based upon evidence of established use and were not necessarily supported by technical appraisal of their impact.

Local Perspective

Map12 shows the distribution of the various licensed surface and groundwater abstractions within the plan area and the purpose of use is indicated by colour coding. In addition to licensed abstractions, the use of surface and groundwater sources for small unlicensed domestic and agricultural supplies is common in rural parts of the area.

Surface Abstractions

There are 156 licensed abstraction from surface sources within the area. These range from very small abstractions, 180 litres/day for domestic use, to the large volume abstractions, 550 megalitres/day, for water power generation purposes. The total volume of water which is licensed to be abstracted on a daily basis from all surface sources within the plan area is 9 290 megalitres approximately.

The licences for surface abstractions can be broken down into the following categories, with percentage figures of the total daily licensed volume for the plan area.

No of Licences	Type	Percentage
32	Industrial (all uses)	86.7%
10	Water Supply	3.1%
11	Hydro Power	9.7%
4	Fish Farms	0.1%
99	Other (inc domestic & agriculture)	0.4%

2.1.10 Water Abstraction

Groundwater Abstractions

Groundwater may be abstracted from water bearing strata (aquifers) by means of wells or boreholes.

There are 124 licensed abstractions from groundwater sources within the plan area, which range from 180 litres/day for domestic and general agricultural purposes to 15 megalitres/day for industrial purposes. The total volume of water licensed which is licensed to be abstracted on a daily basis from all groundwater sources within the plan area is 50 megalitres approximately.

The licences for groundwater abstractions can be broken down into the following categories with percentage figures of total daily licensed volume for the plan area.

No of Licences	Type	Percentages
14	Industrial (all uses)	61.9%
6	Water Supply	35.6%
104	Other (inc domestic & agriculture)	2.5%

Whilst surface sources of the plan area, rather than groundwater, have the greatest demands made on them in order to satisfy the needs of licensed abstractors, the Sherwood Sandstone aquifer of the Furness area has a number of licensed abstractions and as a result of historical abstraction by North West Water Ltd and its predecessors and other industrial users the water level in the aquifer has been drawn down significantly below sea level. This poses a serious risk of saline intrusion into the aquifer. As a result of this no more groundwater licences are being granted in this area until such times as the levels recover sufficiently.

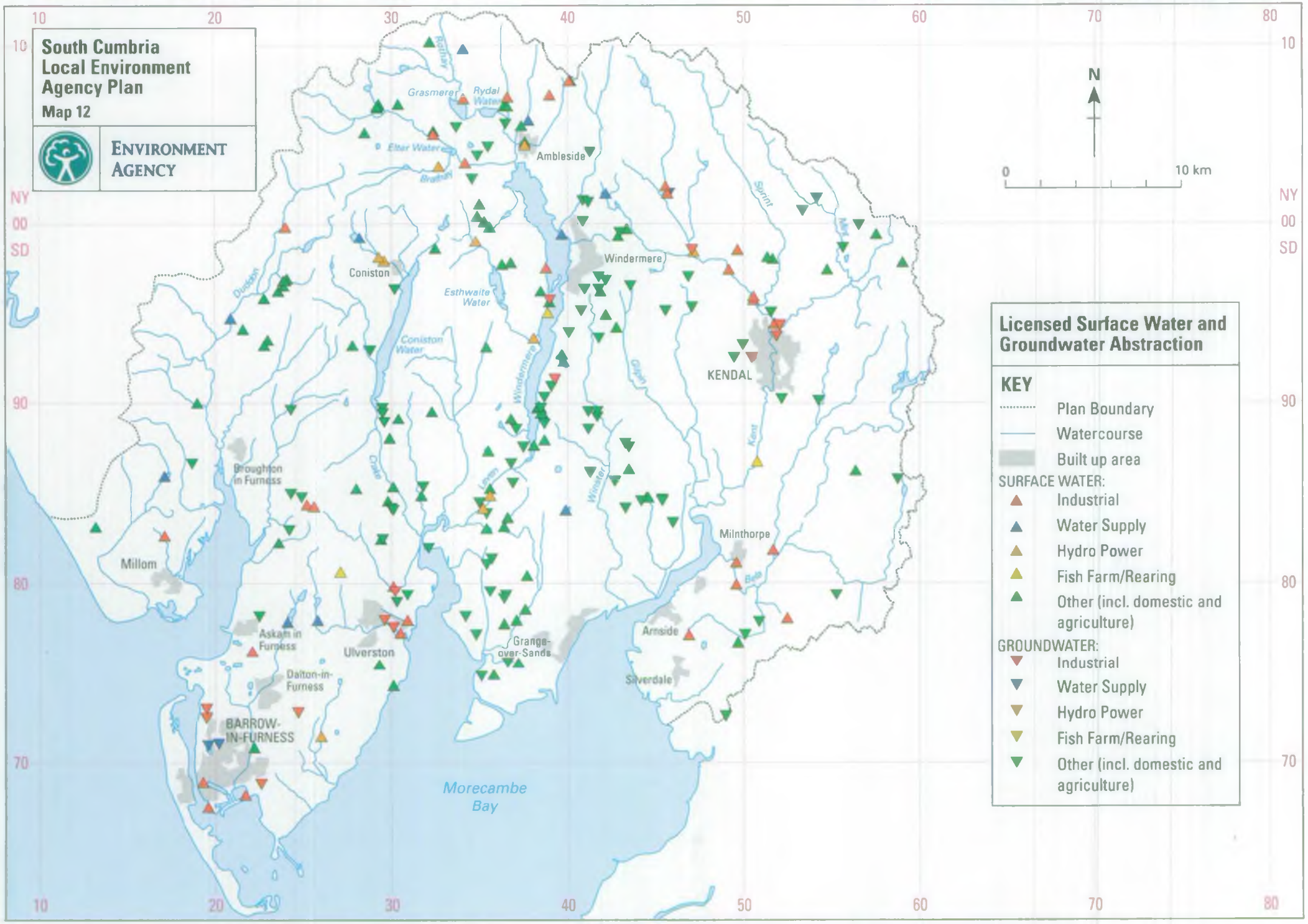
North West Water Licensed Abstractions for Public Water Supply

North West Water Ltd have a total of 16 abstraction licenses within the plan area. These range from an individual property supply of 2 500 litres/day to 205 megalitres/day from Windermere. The Windermere abstraction is carefully controlled by reference to flows in the River Leven at the Agency's flow measuring station at Newby Bridge. The water which is abstracted from Windermere is pumped to the Watchgate treatment plant north of Kendal and then sent south via the Haweswater Aqueduct. The area can benefit from the NWW Ltd trunk aqueducts with connections to Kendal and a pipeline to the Barrow area. In response to the drought of 1995/96, all NWW Ltd licences are being re-visited in association with the company to find ways of reducing the environmental impact of the abstractions.

Water Abstraction Objectives

To ensure resources are managed to safeguard the environment, to protect other surface and groundwater uses and current abstractors.

To ensure all surface water sources abstracted for public drinking water supply comply with the EC Directive on the quality of water abstracted for this use.


South Cumbria Local Environment Agency Plan
Map 12
ENVIRONMENT AGENCY
N
0
10 km
Licensed Surface Water and Groundwater Abstraction
KEY
Plan Boundary
Watercourse
Built up area
SURFACE WATER:
Industrial
Water Supply
Hydro Power
Fish Farm/Rearing
Other (incl. domestic and agriculture)
GROUNDWATER:
Industrial
Water Supply
Hydro Power
Fish Farm/Rearing
Other (incl. domestic and agriculture)
Grasmere
Rydal Water
Ambleside
Elter Water
Brathay
Coniston
Esthwaite Water
Coniston Water
Windermere
Duddon
Crake
Leven
Winster
Gilpin
Sprint
Kent
Bela
KENDAL
Milnthorpe
Arnside
Silverdale
Grange-over-Sands
Ulverston
Broughton in Furness
Millom
Askam in Furness
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
NY
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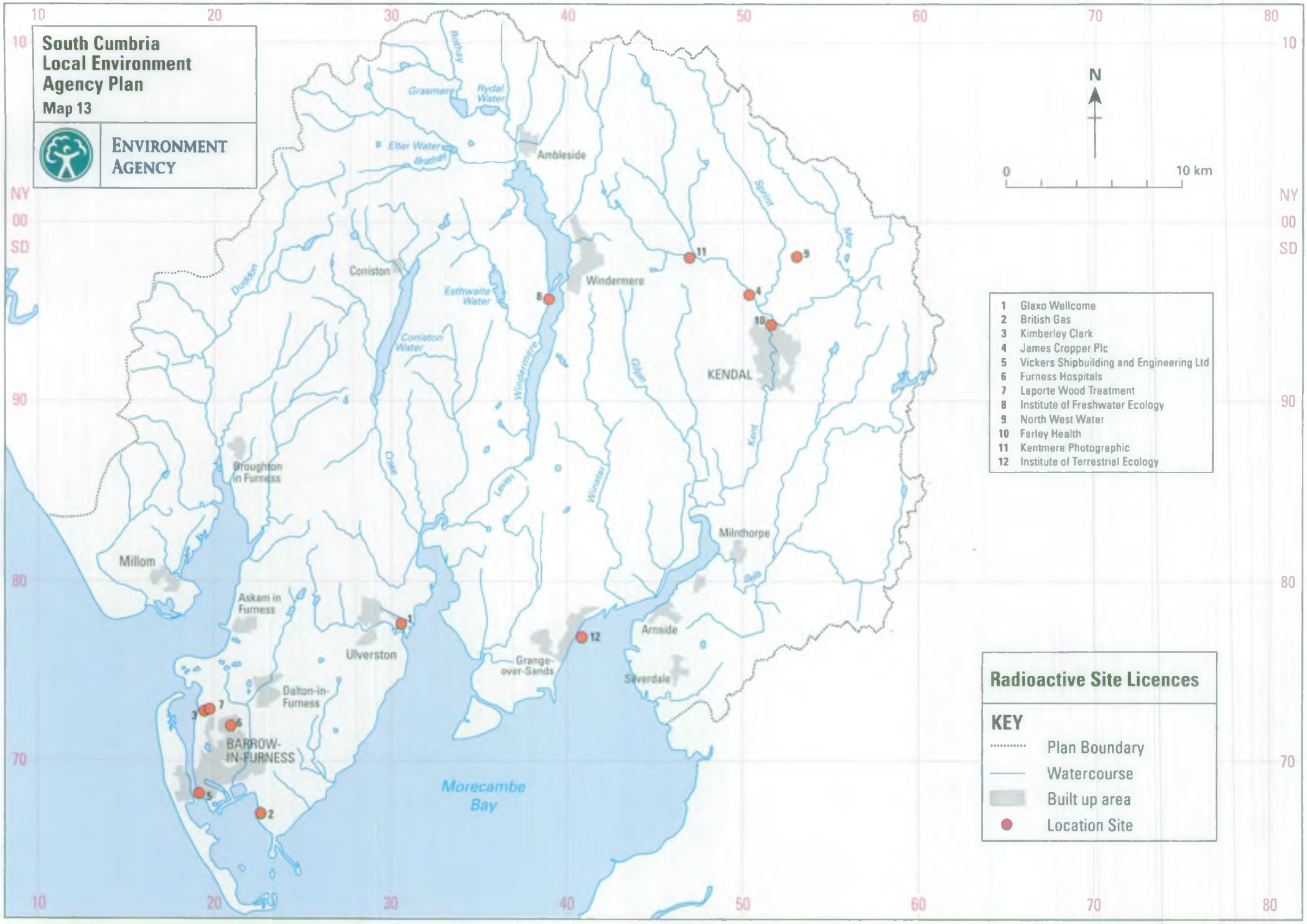
SD
10
20
30
40
50
60
70
80
90


South Cumbria
Local Environment
Agency Plan
Map 13
ENVIRONMENT AGENCY
N
0
10 km
Grasmere
Rydal Water
Elter Water
Bradda
Ambleside
Rothay
Coniston
Dudden
Esthwaite Water
Coniston Water
Windermere
Brathay
Crake
Leven
Winster
Gilpin
Sprint
Mint
Kent
KENDAL
Milnthorpe
Bela
Arnside
Silverdale
Grange-over-Sands
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
1 Glaxo Wellcome
2 British Gas
3 Kimberley Clark
4 James Cropper Plc
5 Vickers Shipbuilding and Engineering Ltd
6 Furness Hospitals
7 Laporte Wood Treatment
8 Institute of Freshwater Ecology
9 North West Water
10 Farley Health
11 Kentmere Photographic
12 Institute of Terrestrial Ecology
Radioactive Site Licences
KEY
Plan Boundary
Watercourse
Built up area
Location Site

2.1.11 Storage Use and Disposal of Radioactive Material

General

The Agency is the principal regulator in England and Wales under the Radioactive Substances Act 1993. This statute is concerned with the storing, use and disposal of radioactive substances and in particular, the regulation of radioactive waste.

Radioactive substances are present in the environment as a result both of natural processes and of human technological developments. The uncontrolled and incautious use of these substances can pose both immediate and long-term hazards.

The Agency is the Competent Authority for a number of EC Directives on the shipment of radioactive substances and sealed sources between EU Member States. We also regulate shipments of radioactive waste into, out of, or through England and Wales.

The major nuclear establishments are licensed to operate by the Nuclear Installation Inspectorate (NII), but discharges from them are authorised by us. These discharges arise from the day-to-day operations at the sites. Site operators are required to ensure that numerical discharge limits are met and also to employ the best practicable means (BPM) to minimise the radioactive content of discharges.

The Agency authorises discharges from non-nuclear sites such as hospitals, universities, research centres and manufacturing sites. These are generally less significant than the discharges from nuclear sites.

Sites have been assessed and permission granted by us on the basis that the use of radioactive materials is justified and that operators are prepared to abide by conditions to safeguard human health and protect the environment. The permissions take the form of:

- certificates of registration for keeping and using radioactive materials; and
- certificates of authorisation for the accumulation and disposal of radioactive waste.

Local Perspective

There are twelve registrations and four authorisations in the area covered by the LEAP, and the twelve sites these relate to are shown on Map 13. Of the authorisation the following types can be identified.

One nuclear licensed facility. This is Vickers Shipbuilding and Engineering Ltd at Barrow where nuclear submarines are constructed. It is worth noting that the largest nuclear licensed facility in the UK - BNFL Sellafield - lies just outside the LEAP area, to the North.

One hospital - Furness Hospital at Barrow.

Two research establishments - The Institute of Freshwater Ecology by Lake Windermere and the Institute of Terrestrial Ecology at Grange-over-Sands.

2.1.12 Recreational Use of Water

General

The Agency's recreational duties cover three areas:-

a) to take account of recreation in the performance of all the Agency's functions, except pollution control

b) to ensure that land or water in the Agency's control is made available for recreational purposes

c) a general duty to promote the use of inland and coastal waters and associated land for recreational purposes

The Agency is currently developing its recreation strategy and the extent to which the Agency assumes a key role in the promotion of water related recreation activity depends on this national policy together with the provision of local funding.

Local Perspective

Windermere and Coniston Water together with smaller lakes such as Esthwaite Water, Rydal Water, Grasmere and Elterwater lie within the LEAP area and the valleys of many of the rivers and their tributaries are also visited for their recreational and scenic qualities.

The area caters for the recreational demands of residents, day visitors and longer stay tourist and this is of considerable economic importance. However, such demand can lead to conflicting pressures both between recreation users (both active and passive) and with conservation needs.

There are several major contributors to recreation provision and management within the plan area. For example, much of the LEAP lies within the Lake District National Park whose policies have generally shaped recreation development and who have (*inter alia*) produced management plans for Windermere and Coniston. The former is to be reviewed following resolution of the 10mph speed limit issue.

The Agency's land ownership is limited to a few operational bases which support its other functions. However, it does lease the fishing rights to Coniston and these are available free to the public providing valid rod licences are held.

Canoeing

The Agency is not responsible for navigation on any water body within the plan area.

There is no public right of navigation on most of the waters and all of the non tidal rivers in the area and where this is so, the owners's permission is required to canoe. A public right of navigation exists on Windermere and Coniston Water. Canoe access agreements exist in the area. These arrangements have been brought into being by agreement between the British Canoe Union and relevant landowners and fishery interests.

2.1.12 Recreational Use of Water

The Agency recognises that its main role in this area is likely to be in the bringing together of landowning, canoeing and fishing interests where all parties are keen to further the multiple use of waters and minimise conflict.

Other Active Water Based Recreation

Swimming sailing, wind-surfing water ski-ing, power boating and sub-aqua are the other main water based activities together with angling which is dealt with under the fisheries section.

Informal Recreation

The Agency and its predecessor, the NRA, have worked in partnership with South Lakeland District Council and other local bodies to provide informal recreation facilities. These have included improved access to flood embankments together with signposting and information provision for the Cumbria Coastal Way. The Agency is currently a member of the group chaired by SLDC examining Kendal Riverside Regeneration.

Sustrans are an organisation who promote sustainable transport for all and who have received £42.5M to create a National cycle network. The Agency supports this initiative in principle and will assist in the development of the route on sites where capital works are being undertaken for other Agency purposes.

Objectives

Where appropriate, to maintain, improve and create facilities for recreation at locations where Agency capital and revenue works are being undertaken.

To maintain waters of sufficient quality and quantity to allow a high standard of recreational experience.

Where appropriate, to take opportunities to promote water related recreation through collaborative activity.

To ensure that recreational work promoted by the Agency is sensitive to other water users and does not damage the environment.

2.1.13 Agriculture

General

Agricultural activity has moulded much of the rural landscape of the country and can also have other wide ranging effects on the environment.

The drive for self sufficiency in food production following World War II promoted intensive production methods.

This led to ecological damage including loss of habitats, reduction in biodiversity and increases in water pollution.

There has also been impacts on the character of landscapes from the loss or degradation of landscape features such as walls, hedges, trees and ponds.

However as the emphasis on production has diminished and recognition of the damage done has increased opportunities to reverse this trend have arisen.

- Set aside to take land out of agricultural production.
- Introduction of the control of pollution (silage, slurry and agricultural fuel oils) and regulations 1991 which set legally enforceable minimum standards for storage facilities.
- Introduction by MAFF of Codes of Good Agricultural Practice for the protection of the environment.
- Promotion of less intensive and more environmentally friendly farming through schemes such as the MAFF habitat creation scheme, environmentally sensitive areas and countryside stewardship. The Countryside Commission, Lake District National Park, English Nature and other bodies also provide grants for specific projects in certain circumstances.

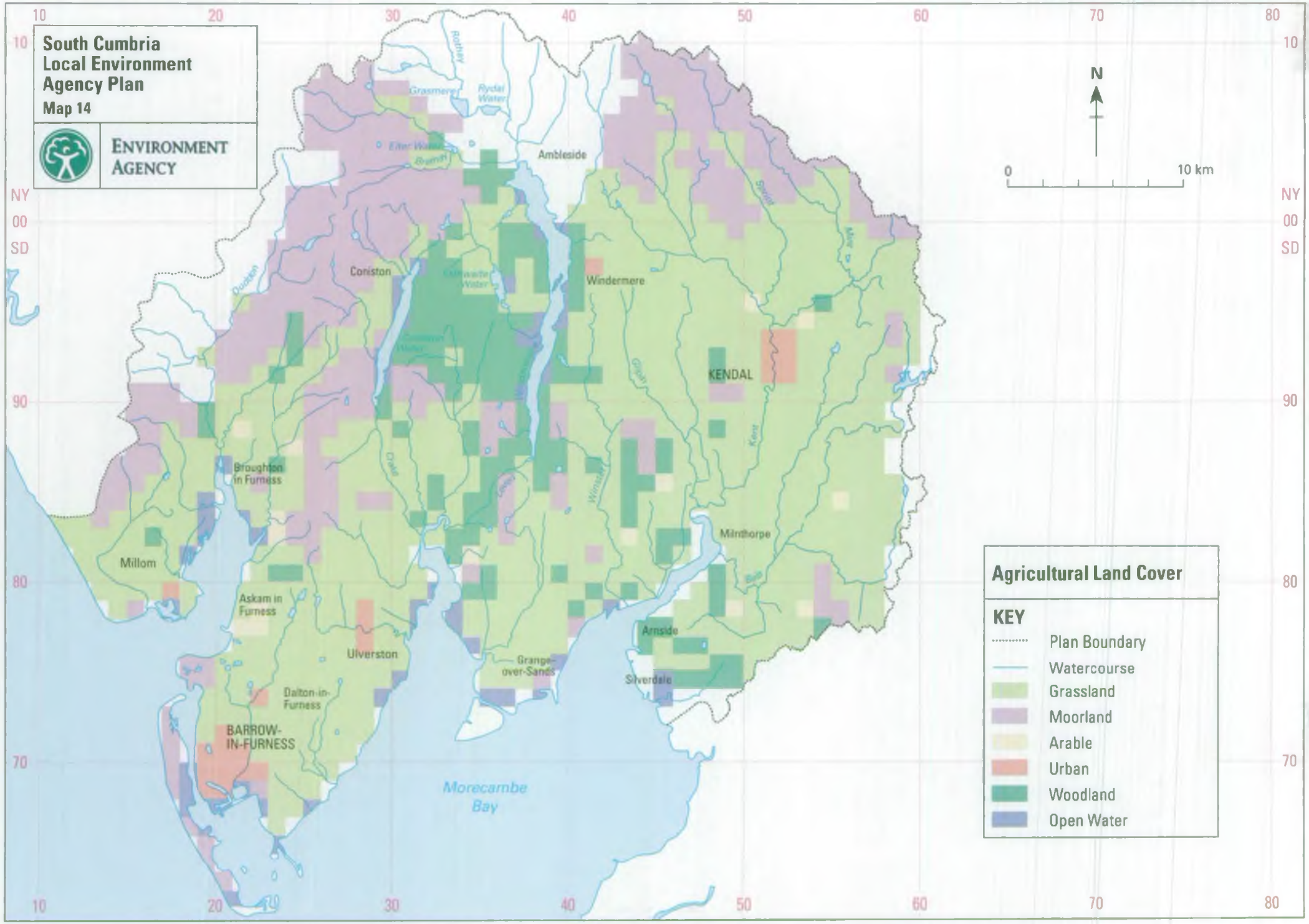
Local Perspective

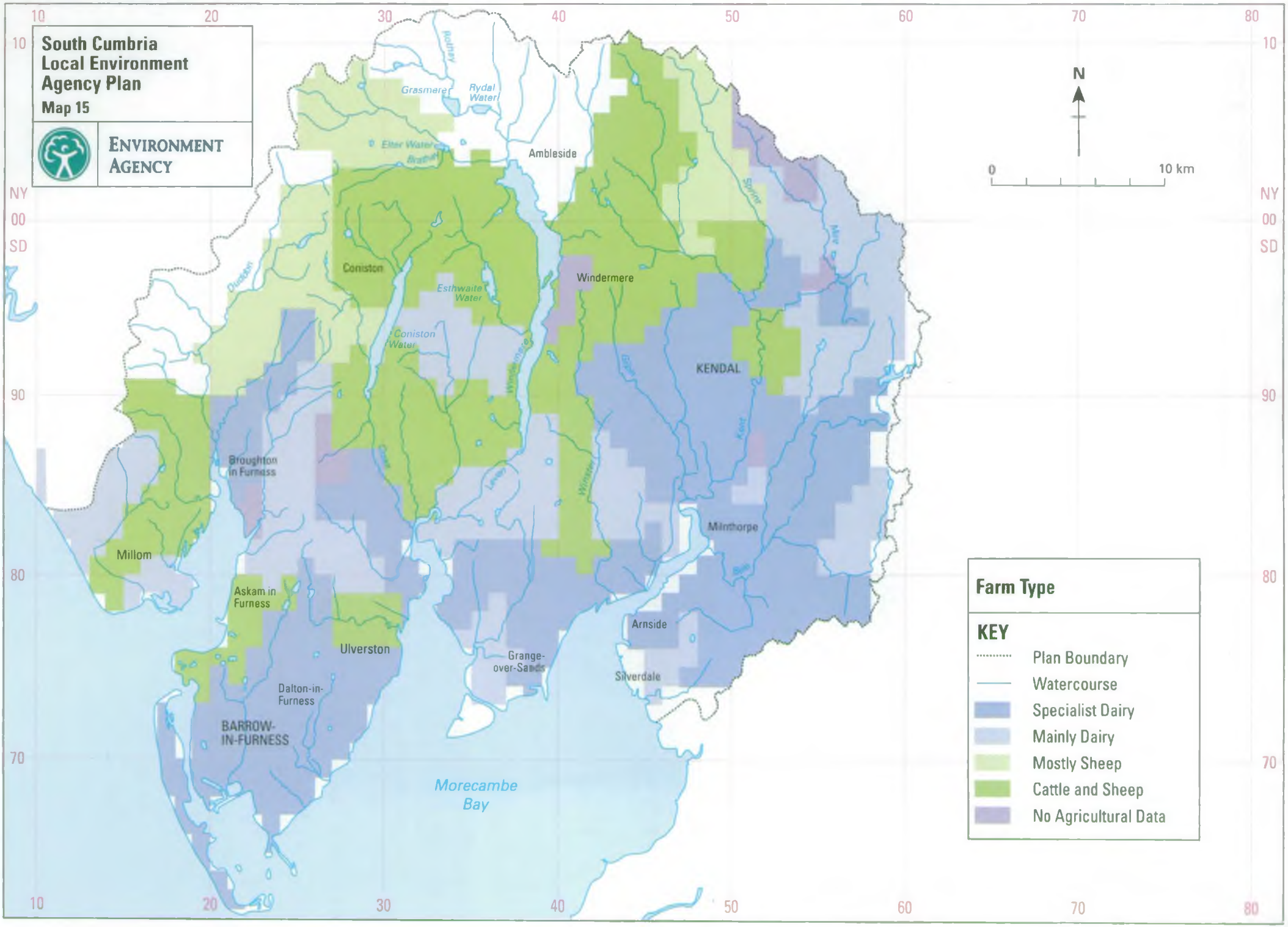
Maps 14 and 15 show the land cover and farm type for the LEAP area. The area is largely used for growing grass to feed cattle and sheep. Dairy farms dominate the southern and eastern parts of the area with cattle and sheep production becoming increasingly prevalent on the higher ground to the north. Sheep production dominates on the very highest land of the Lakeland fells.

In 1995 64.0% of the agricultural land in the LEAP area was grassland.

This figure has remained relatively constant since 1985 although the proportion of grassland over five years in age has grown gradually over this period.

Over the same period the amount of rough grazing has reduced from 33.5% of agricultural land to 30.4%. The amount of farm woodland has increased by 54% between 1985 and 1995 from 1,951ha to 3,005ha, reflecting the change in production priorities outlined above.


South Cumbria
Local Environment
Agency Plan
Map 14
ENVIRONMENT AGENCY
N
0
10 km
Ambleside
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Coniston
Coniston Water
Windermere
Duddon
Crake
Leven
Winster
Gilpin
Sprint
Mint
Kent
Bela
KENDAL
Milnthorpe
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Arnside
Silverdale
Morecambe Bay
Agricultural Land Cover
KEY
Plan Boundary
Watercourse
Grassland
Moorland
Arable
Urban
Woodland
Open Water


South Cumbria
Local Environment
Agency Plan
Map 15
ENVIRONMENT AGENCY
N
0
10 km
Grasmere
Rydal Water
Rothay
Ambleside
Elter Water
Brathay
Coniston
Esthwaite Water
Coniston Water
Duddon
Windermere
Winster
Leven
Gilpin
Kent
Sprint
Mint
KENDAL
Minthorpe
Bela
Arnside
Silverdale
Grange-over-Sands
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
Farm Type
KEY
Plan Boundary
Watercourse
Specialist Dairy
Mainly Dairy
Mostly Sheep
Cattle and Sheep
No Agricultural Data

2.1.13 Agriculture

In addition some set aside was designated for the first time in the LEAP area in 1995 amounting to 0.3% of the agricultural land within the plan.

The total agricultural workforce has dropped by 3% over the 10 years to 1995. In addition there has been a strong shift towards part time farming and part time employment in farming.

There has also been a gradual shift away from dairy (17% reduction in herd size 1985-96) to beef (30.5% increase in herd size 1985-96) although the total number of all cattle has diminished by 14% over the same period. This has been counterbalanced by a 26% increase in the number of sheep and lambs and 157% increase in the number of fowls.

This is reflected in the change in farm types, with a 26% reduction in dairy farms to a total of 381 in 1995 and a corresponding increase of 35% in cattle and sheep farms to a total of 326 in 1995.

The agricultural land classification for the LEAP area is given in the table below.

	Area (km^2)	Percentage	% for Cumbria	% for England
Grades 1 & 2	257	19.4%	1.5%	16.1%
Grade 3	440	33.2%	26.8%	43.6%
Grade 4	417	31.5%	20.7%	12.7%
Grade 5	171	12.9%	39.4%	8.3%
Non-Ag	40	3.0%	9.5%	10.1%
Urban	0	0.0%	2.1%	9.2%
	1,325	100.0%	100.0%	100.0%

2.1.14 Sewage Effluent Disposal

General

This use relates to the disposal of domestic and industrial effluent to the water environment. Discharges of sewage or trade effluent to surface waters require the consent of the Agency. When determining consent application the Agency will set appropriate conditions to protect other uses of the receiving water. In some cases the Agency inherited consents set by predecessor bodies which do not adequately protect other water uses. These are progressively being addressed within the prevailing restrictions, particularly on water company expenditure.

Water company expenditure during the period 1995-2000 has been structured around and "Index of Obligations" jointly agreed by the Department of the Environment (DOE), the Water Services Association (WSA), the Office of Water Services (OFWAT) and the Agency. Priority has been given to meeting existing and new EC and domestic statutory obligations principally Directives concerned with Bathing Waters, Urban Wastewater Treatment and Freshwater Fish. The targeting of the majority of water company expenditure is therefore dictated by Nationally agreed obligations and priorities.

Local Perspective

The major discharger in the LEAP area is North West Water Ltd(NWW Ltd) who operate 71 sewage treatment works (STW's).

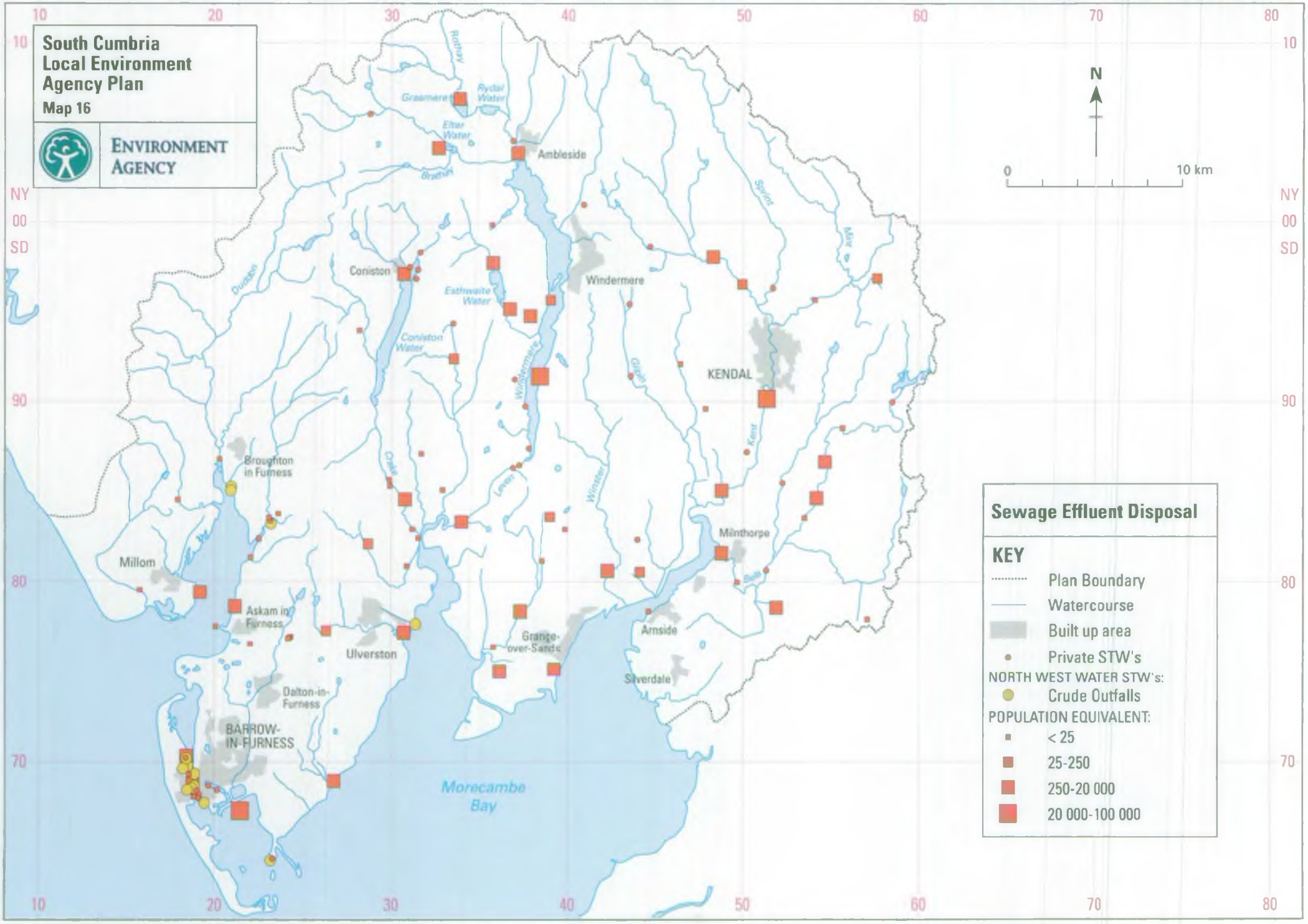
Sizeable sewage works exist at Millom, Barrow, Ulverston, Windermere and Kendal. Others serve small villages and hamlets (see map 16).

Flows to STW's are predominantly of domestic sewage and, in general, effluents from trade premises do not significantly affect the works' performance. Foaming in the River Kent downstream of Kendal sewage treatment works is, however, caused by an unidentified trade effluent and this problem is currently under investigation.

The majority of NWW Ltd STW's in the catchment do not make significant impacts on their receiving water. Some of the exceptions are Kendal, as previously stated, Holme-in-Kendal, Langdale, Grasmere and, in summer, Staveley and Cartmel. These last four are affected by the ingress of clean water into foul sewers, a problem known as 'infiltration'. Nutrients in sewage effluent have been closely linked to the deteriorating trophic status of some lakes in the area. Phosphate stripping has been installed at Hawkshead, Windermere and Ambleside STW's in an attempt to halt the decline in lake quality. This development has been shown to be particularly effective in Lake Windermere.

At Barrow-in-Furness a new STW has recently been commissioned incorporating secondary treatment. Millom STW has recently been improved by adding secondary treatment. These schemes were driven to meet the requirements of the EC Bathing Water and Urban Wastewater Treatment Directives. It is anticipated that the improved situation at Barrow and Millom will lead to water quality improvements in the Duddon Estuary, Walney Channel and Leven Estuary.

The discharge from Ulverston STW discharges 30 minutes after local high water to maximise


South Cumbria
Local Environment
Agency Plan
Map 16
ENVIRONMENT AGENCY
N
0
10 km
Sewage Effluent Disposal
KEY
Plan Boundary
Watercourse
Built up area
Private STW's
NORTH WEST WATER STW's:
Crude Outfalls
POPULATION EQUIVALENT:
< 25
25-250
250-20 000
20 000-100 000
Ambleside
Grasmere
Rydal Water
Rothay
Brathay
Coniston
Coniston Water
Duddon
Eathwaite Water
Windermere
Winster
Gilpin
KENDAL
Kent
Sprint
Mint
Mint
Minthorpe
Bela
Lune
Crake
Leven
Broughton in Furness
Millom
Askam in Furness
Ulverston
Dalton-in-Furness
BARROW-IN-FURNESS
Grange-over-Sands
Arnside
Silverdale
Morecambe Bay
NY
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SD
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30
40
50
60
70
80
90

2.1.14 Sewage Effluent Disposal

dilution and dispersion in the Leven Estuary. Ulverston STW will be upgraded under the provisions of the EC Urban Wastewater Treatment Directive not later than the year 2000. There are also many partially-treated sewage discharges to tidal waters eg Duddon Estuary and Walney Channel which will be upgraded in the future.

The treated sewage effluents from Newbiggin and Askam-in-Furness are subjected to ultra-violet irradiation prior to discharge due to the fact that both discharges are in the proximity of EC Bathing Waters.

There are also a small number of private sewage treatment works in the catchment, many associated with hotels and outdoor leisure centres and some cause significant, but localised, problems by their impact on small watercourses. Because of the rural nature of much of the catchment large areas are not sewered and septic tanks serving individual or small groups of properties are common place. Groups of septic tanks in a restricted area can cause occasional problems in parts of the catchment, for example at The Green near Millom where Black Beck is periodically affected by sewage pollution.

Combined sewer and sewage pumping station overflows occur on most sewerage systems in the catchment. These are subject to Agency consents which aim to limit the frequency of discharge to occasions of heavy rainfall when adequate dilution is available in the receiving watercourse.

Some overflows, particularly on older systems, discharge at more than an acceptable frequency, for example overflows at Roose Bridge, Barrow-in-Furness at two sites in Ulverston, and at Holme-in-Kendal. The discharge of sewage solids from overflows can also cause nuisance or offence.

2.1.15 Industrial Effluent Disposal

General

We are the statutory Authority in England and Wales for regulating the largest and most complex industrial processes. To do this we use a system known as Integrated Pollution Control (IPC). This system considers releases to all environmental media and requires the use of best available techniques not entailing excessive cost (BATNEEC), to prevent the release of particular substances in to the environment or, where this is not practicable, to minimise their release and render them harmless, having regard to the best practicable environmental option.

Two lists of processes have been prescribed by regulations for control: Part A processes are controlled under IPC by the Agency: releases to air from Part B processes are controlled at a local level under a system of Local Authority Air Pollution control. Releases to watercourses from Part B processes, or processes not covered by the regulations are controlled by the Agency under the Water Resources Act.

Local Perspective (see Map 17)

Within the LEAP the Agency regulates six premises under Part A of the Integrated Pollution Control (IPC) regulations. At some of these premises there are more than one authorised process. Releases into air, water, and to landfill are controlled by authorisations issued by the Agency.

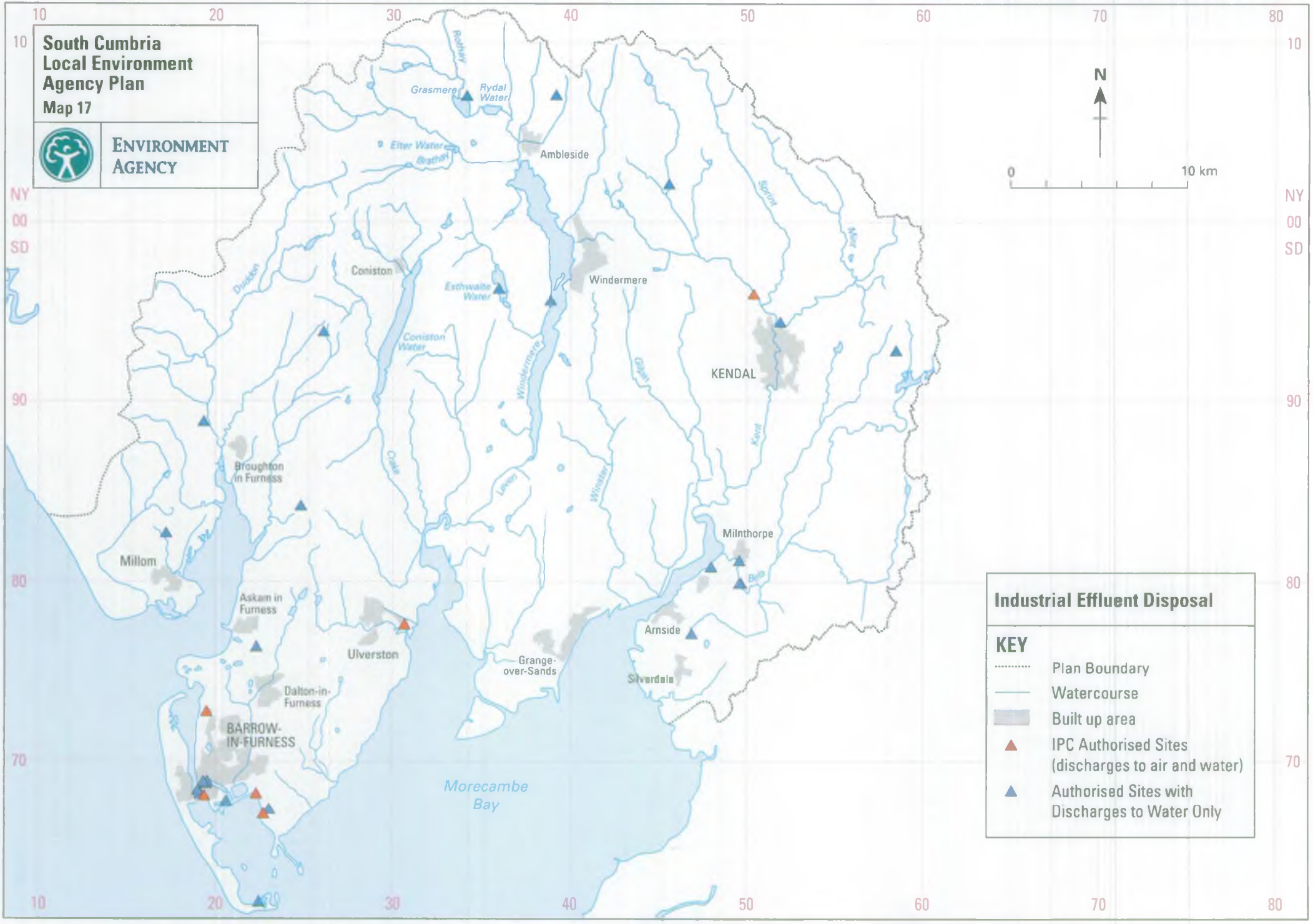
The most significant is the Glaxo Wellcome site at Ulverston which has five authorised processes. The site is a major pharmaceutical manufacturer producing a range of primary antibiotics and antifungal agents. The authorisations cover all activities on the site including the manufacturing processes, the development plant, the waste solvent incinerator and the boilerhouse. The Company are required to monitor releases to air, and the quality around the site and at a control site some distance away (See section 2.2.2 Air Quality).

The Morecambe Bay natural gas terminal at Barrow-in-Furness is another major site regulated by the Agency. It is operated by Hydrocarbon Resources Ltd, a subsidiary company of Centrica (formerly British Gas). The plant is of national strategic importance and can be used to supply approximately one fifth of the UK demand for natural gas.

The site has two authorised processes, one covering the natural gas refining plants, and the second covering the large combustion plant on the site. The authorisation for Refining of Natural Gas covers all the gas processing and odourising at the two terminals, the North and the South Morecambe Terminals, which purify natural gas from the off-shore Morecambe Bay Gas Field, and bring it up to the required specification for domestic and industrial use.

The large combustion plant authorisation covers the power generation plant at the terminals. They can be operated independently to supply the electrical energy requirements of the terminals and off-shore gas platforms.

Also in Barrow-in-Furness is the Kimberley Clark paper mill (formerly Scott's) which has two authorised processes, one for the paper mill operations and one for the boilerhouse which provides all the stream used in the process.


South Cumbria
Local Environment
Agency Plan
Map 17
ENVIRONMENT AGENCY
N
0
10 km
Industrial Effluent Disposal
KEY
Plan Boundary
Watercourse
Built up area
IPC Authorised Sites
(discharges to air and water)
Authorised Sites with
Discharges to Water Only
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Ambleside
Coniston
Esthwaite Water
Coniston Water
Windermere
Duddon
Crake
Leven
Winster
Gilpin
Sprint
Mint
Kent
Bela
KENDAL
Milnthorpe
Arnside
Silverdale
Grange-over-Sands
Morecambe Bay
Ulverston
Broughton in Furness
Millom
Askam in Furness
Dalton-in-Furness
BARROW-IN-FURNESS
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2.1.15 Industrial Effluent Disposal

The boiler house operated by Vickers Shipbuilding and Engineering Ltd in Barrow is regulated by the Agency. It is used to provide the steam used in land based trials on submarine engines.

Roosecote Power Station at Barrow-in-Furness is an independent power station operated by Lakeland Power to supply electricity to the National Grid. It is authorised by the Agency for the operation of the modern gas turbine power plant and has limits imposed on releases to air, and for effluent released to Cavendish Dock.

The boilerhouse operated at the James Cropper Paper Mill in Kendal is regulated by the Agency for releases to air and water. It is used to supply all the process steam and electrical power required by the Paper Mill.

As a result of a long-standing policy of encouraging the discharge of industrial effluent to sewer there are only a limited number of consented trade effluent discharges in inland watercourses. One of these is treated effluent from Henry Cooke's mill at Beetham to the River Bela. There are also consented trade discharges from mineral workings on the catchment and an input from a caged fish farm on Esthwaite Water.

Surface water drainage from industrial estates/premises often discharge direct to a watercourse. These drains can become contaminated by spillages, cross-connections and inappropriate working practices leading to intermittent pollution, for example by oil. Cross connections from domestic households can also cause significant water quality problems such as Mill Beck near Windermere. Mintsfeet Industrial Estate in Kendal has been problematic and pollution prevention campaigns have been carried out to improve the situation.

2.1.16 Hydropower

General

Hydropower is a renewable source of energy which should reduce emissions to the environment. The Agency supports the Government's policy to develop renewable energy sources wherever they have prospects of being economically attractive and environmentally acceptable.

There may be positive and negative effects on the water environment. If an abstraction licence is issued, subject to the rights of existing users there may be limitations incurred on all future applications upstream because all the resource is committed to the hydro power user. There may be benefits for water quality in that some types of turbines increase oxygenation. However, if an impounding licence is required and significant amounts of water stored, the residence time of water is increased causing algal growth and siltation.

The turbines and impounding may act as barriers to fish movement and may lead to fish mortalities as a result of getting caught in the turbines themselves.

Local Perspective

Within the plan area there are ten licensed abstraction to drive turbines. Eight of these are for the generation of electric power, some for public supply but mainly private supplies, and the other two are to power sawmills.

There are also six licensed abstractions to drive water wheels. Four of these are for power generation of which two are demonstration corn mills. The two remaining water wheels are turned for amenity purposes only.

Of the above licensed abstraction not all are in regular use, some are not used at all and others are not used to their full capacity.

There are many mills, some derelict, throughout Cumbria. Some of these have the potential, once restored, to be used for power generation. The owners would, of course, need to apply to the Agency for an abstraction licence. There may be a number of mills with water wheels which could be used for amenity or power generation purposes, which do not have current abstraction licences. Wherever possible the Agency will strive to identify these operations and inform the owners of the need to legitimise them. These will of course be followed up and should the owners take no action then legal proceeding would follow.

Objectives

To facilitate hydropower developments where possible. To oppose hydropower developments which restrict the ability to use upstream resources unless appropriate mitigation can be agreed.

To ensure that discharge is made as close as possible to the point of abstraction and that adequate residual flow for other water users in the derogated section of river.

2.1.16 Hydropower

To ensure hydropower developments do not cause either increased flood risk or adverse effects on water quality.

To ensure structures do not trap fish or impact on fish habitat, or have an adverse effect on the ecology or amenity of the site.

Section 2.2

State of the Local Environment

2.2.1 Introduction

The Environment Agency is currently preparing a State of the Environment Report for the North West Region which will be referenced in future LEAP's.

Much of the information about the state of the local environment is also summarised in the various uses, resources and activities described in Section 2.1 of this plan.

Here we will look at the quality of air and water within the LEAP area. These are areas where the Agency has clearly defined responsibilities and where data is currently available.

Cumbria County Council is also producing a 'Cumbria State of the Environment Report' for the County which is very wide ranging in its approach.

2.2.2 Air Quality

General

Air quality is an indicator of environmental quality. Air pollution can damage flora and fauna, buildings and have significant effects on soils and water. It can also cause serious problems for those with asthma, bronchitis and other respiratory diseases.

Air pollution may be in the form of gas or particulate matter. Its dispersion and dilution depends on climatic conditions. Its impact may be local, especially with regard to particulate matter which will often settle on nearby land or water or may be global for example effecting the ozone layer or the concentrations of greenhouse gases such as carbon dioxide.

The Role of the Agency

The Environment Agency has wide powers, but will need to work closely with others if environmental improvements are to be achieved. The Agency will need to look at partnerships with national and local government, business, industry, and environmental and conservation groups to maximise its influence in securing environmental improvements. This is particularly important with regard to local air quality, where the Agency is only one of a number of regulatory bodies.

The Local Authority has primary responsibility for local air quality.

The Environment Agency has powers to regulate air quality principally by operating a system called Intergraded Pollution Control (IPC) for certain industrial processes which stems from Part I of the Environment Protection Act (EPA90). The processes that are regulated are potentially most polluting industrial processes including large combustion plant, iron, and steel making, the chemical industry, solvent recovery and incineration plants. Nationally there are approximately 2,500 of such licensed processes, of which there are only 12 in the area covered by this LEAP.

The objective of the IPC is to develop an approach to pollution that considers releases to all media from industrial processes in the context of the effect on the environment as a whole. This is to ensure that where releases to the environment cannot be avoided, the release is to the media which offers the Best Practicable Environmental Option.

The Agency also regulates landfill sites and in particular landfill gas which is a product resulting from chemical and biological breakdown at waste sites. This gas is principally a mixture of methane and carbon dioxide. Methane is a greenhouse gas which is flammable/explosive when mixed with air and carbon dioxide is an asphyxiant.

The Role of other Organisations

The **Department of Transport** (Dtp) enforces controls on vehicle manufacturers.

The **Health and Safety Executive** monitors the nuclear industry and issues site licences etc.

The **County Council Structure Plan** contains policies on the need to control pollution and the

2.2.2 Air Quality

County Analyst provides an analytical service for district Council Environmental Health Officers (EHO's).

District Councils environmental health departments regulate air pollution from a large number of industrial premises under Part I of the Environmental Protection Act 1990. These are premises with a lower potential to pollute than those regulated by the Agency. The processes are designated as Part B processes under the Act, but Local Authorities can only regulate releases to air, whereas processes controlled by the Agency are regulated for releases to all environmental media. District Councils also have powers to deal with nuisances from a wide range of non-industrial activities, such as smells from domestic and agricultural premises, smoke from outdoor cable burning, and noise pollution. Many local authorities monitor air quality in their area.

The Police are responsible for controlling emissions from vehicles.

Under the IPC arrangements, the Agency places in the public IPC register the following:-

* application for authorisations;
* representations from statutory consultees;
* authorisations including limits set on releases;
* monitoring information required by conditions of an authorisation:
* any enforcement action or prosecutions taken by the Agency

National Air Quality Strategy

Under Part 4 of the Environment Act 1995 the Government is required to publish a national strategy for air quality including:

* a framework of standards and objectives for the pollutants of most concern
* a timetable for achieving objectives
* the steps the Government is taking and the measures it expects others to take to see that objectives are met.

The strategy was published for consultation in the summer of 1996. We will be working closely with local authorities to help achieve the objectives of the National Air Quality Strategy.

Local Air Quality Management Area

Local authorities will be required to review the present and future air quality against air quality standards and objectives shortly to be prescribed in regulations made by the Government. The standards are likely to reflect advice from, EC and WHO and will take into account potential

risks, costs, and technical feasibility. In addition, the Government will set Air Quality targets which should be achieved throughout the UK by 2005. The strategy will therefore necessitate periodic reviews of air quality. Where standards are not being met or are not likely to be met an air quality management area should be declared, known as a "Designated Area", and an action plan produced to improve air quality. This will require objective assessments together with appropriate monitoring and modelling studies. Hence the need for the Agency to liaise fully with the Local Authority.

Local Perspective

Air quality monitoring is undertaken in this LEAP Area by two local authorities, South Lakeland District Council in Kendal, Windermere, Ambleside and Ulverston, and Barrow Borough Council in Barrow-in-Furness.

Both have some facilities for monitoring sulphur dioxide (SO_2) and nitrogen oxides although data only exists for the past two years. Requirements for local authority air quality monitoring is currently being reviewed by these authorities to meet the new requirements of the Environment Act 1995.

The Local Authority data shows a gradual reduction in levels of SO_2 and no recorded periods where the EC limit of 120µg/m^3 was exceeded. Under Department of the Environment guidance air quality in terms of SO_2 is classified as very good if the peak hourly average remains below 170µg/m^3 over a 24 hour period. All readings were well within this bracket. Smoke levels in Barrow are also well within the EC limit of 40µg/m^3. There is a slight rise in smoke levels in winter probably due to an increase in the use of domestic fires. No smoke level data is available for South Lakeland.

Levels of nitrogen oxides are also within acceptable limits although levels in Barrow show some surprising variation. This may be due to trans boundary pollution being blown in from Belfast.

One site at Finkle Street in Kendal may approach or slightly exceed the guide value for nitrogen dioxide. However all sites were well within the recommended limit value.

South Lakeland District Council also measure benzene concentration at all their sites. Benzene is a carcinogenic chemical for which there are no natural sources. All recorded atmospheric benzene is therefore produced by human activity, principally from vehicle exhausts and petrol. The urban background concentrations appear to be in the range 2.4 ug/m^3 which is well within the DoE recommended standard of 16ug/m^3.

Overall the available data does not indicate any areas of concern. However the number of monitoring sites is limited. In addition there is no data available for certain other air quality indicators such as ozone, carbon monoxide, lead or volatile organic compounds (VOCs).

Glaxo Wellcome at Ulverston also carry out air quality monitoring of sulphur dioxide, nitrogen oxides, and particulates (dust) as a requirement of their planning consent to operate a waste solvent incinerator at the site.

2.2.2 Air Quality

A programme to monitor the ambient air quality outside the Glaxo Wellcome Operations site at Ulverston has been in place since July 1991. The concentration of sulphur dioxide, hydrogen chloride, nitrogen dioxide and suspended particulates are measured in ambient air, at four locations around the Ulverston site and the surrounding area. Two of these locations are adjacent to the factory site with monitoring also carried out at a residential site (Croftlands Infant School) 2.25 km from the factory and at a distant location (Merlewood), some 10 km from the factory.

The concentration of sulphur dioxide, hydrogen chloride and suspended particulates is measured daily; for nitrogen dioxide a diffusion tube method is used which averages the nitrogen dioxide concentration over a 14 day period. The annual averages for the year ending December 1995 are shown in the Table below.

Measured annual average ambient air concentrations of sulphur dioxide, hydrogen chloride, suspended particulates and nitrogen dioxide for the incinerator environmental monitoring programme for 1995.

Substance	Monitoring location (All concentrations are µg/m3)			
	East of factory	West of factory	Distant	Residential
Sulphur dioxide	1.7	5.8	5.8	9.4
Hydrogen chloride	0.7	1.1	0.9	2.4
Suspended particulates	30.6	34.1	31.3	41.6
Nitrogen dioxide	12.9	12.0	13.6	16.0

The measured levels of nitrogen dioxide, suspended particulates and sulphur dioxide are typical of a rural area; measured concentrations of these substances adjacent to the manufacturing site are similar to the concentrations measured at the background site and all show very good standards of air quality.

By comparison the average nitrogen dioxide levels throughout the UK during 1994 were $49\mu g/m^3$, and similarly the average levels for sulphur dioxide were $23\mu g/m^3$. There are wide regional variations, the highest average nitrogen dioxide level of $90\mu g/m^3$ was recorded at a site in London, and the highest average sulphur dioxide level of $57\mu g/m^3$ was recorded in Belfast. (Ref. Air Pollution in the UK: 1994. Prepared by AEA, The National Environmental Technology Centre at the request of the Department Of The Environment.)

2.2.3 Acid Rain

"Acid Rain" is the term commonly used to describe the deposition of man-made acids from the atmosphere. These acids are produced largely by industry and by power stations through the burning of fossil fuels. These acids rise into the atmosphere where they dissolve in water to be deposited in mist, rain, hail or snow.

The impact of acid rain on the natural environment depends on the nature of the soils and rocks on to which it falls. Many soft rocks, such as limestone and chalk neutralise acidity. Therefore, acid rain has little impact in areas underlain by limestone. However, when acid rain falls on hard rocks, such as granite, the acidity is not neutralised and it may have an impact. Many of the underlying rocks in the uplands of the South West Lake District are hard rocks and have a limited capacity to neutralise acid rain. Therefore, during periods of high rainfall, rivers draining such areas may increase in their acidity.

If streams become too acidic there will be a noticeable impact on aquatic life. Mayflies will disappear and fish mortalities may occur. Acid-related mortalities of sea trout and salmon were observed in the River Duddon (and the adjacent River Esk) in June 1980 and again in September 1983. An investigation of the catchment indicated that, at that time, the more acidic tributaries of the catchment had very low densities of salmon and trout fry.

However, since the early 1980's the situation appears to have improved. There have been no further acid-related fish mortalities and there has been an increase in the distribution of acid sensitive invertebrates. Fish populations have increased in some tributaries. These improvements may be due to a decrease in acid deposition. Sulphur dioxide is one of the principle industrial emissions responsible for "acid rain". Emissions of sulphur dioxide fell to half of their 1970 levels by 1993, and the overall trend remains downwards.

2.2.4 Water Quality

Water Quality plays a significant role in determining the variety of uses that a catchment can support. This section explains the criteria used to assess water quality within the catchment and to compare current water quality against quality targets which have been based upon the recognised uses to which a river stretch may be put.

The Environment Agency has a statutory responsibility to monitor controlled waters for pollution through chemical, biological and microbiological sampling programmes. Controlled waters include rivers, streams, lakes, ditches, groundwaters, estuaries and coastal waters. This routine sampling programme allows the general water quality to be categorised and use-related targets to be assessed. The Environment Agency is also the competent authority in England and Wales to implement the requirements of specific European Commission (EC) Directives. Routine monitoring will also ensure that watercourses comply with standards laid down in these directives. Water quality information is available to the public and held on the Water Resources Act Register at the Environment Agency North West regional office in Warrington.

General Quality Assessment Scheme and River Quality Objectives

The Environment Agency uses two principal schemes for the reporting and management of river water quality: the General Quality Assessment (GQA) scheme and the River Quality Objectives (RQOs) scheme. How these schemes are operated will be outlined in this section, but further details can be found in Appendix 5

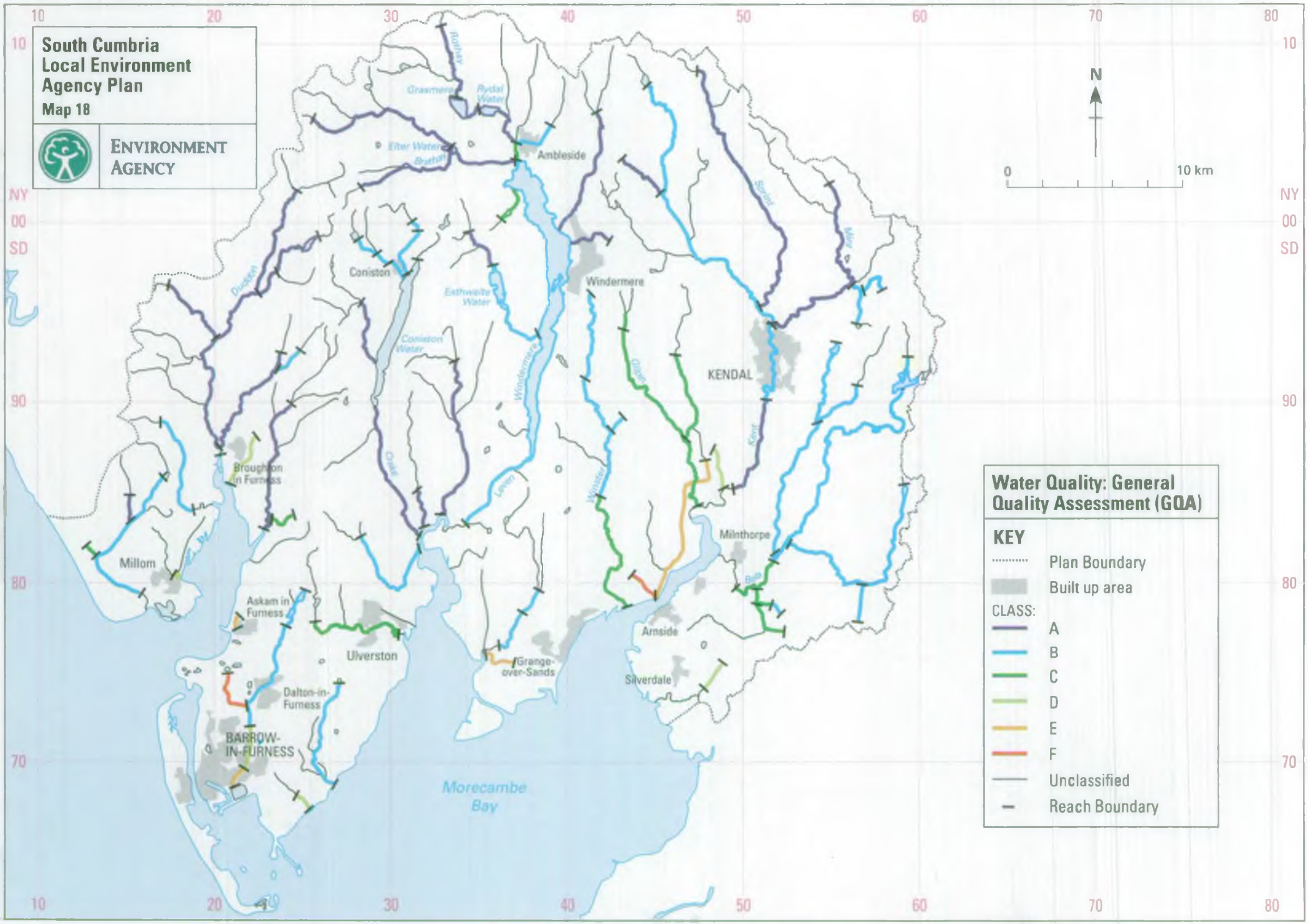
General Quality Assessment

The GQA scheme is used to make periodic assessments of the quality of river water in order to monitor geographical trends and changes over time. The scheme as presently envisaged will comprise four components - general chemistry, biology, nutrients and aesthetics - each providing a discrete "window" upon which the quality of river stretches is assessed. The general chemistry component of the GQA scheme is currently used, and comprises six tiered grades defined by standards for dissolved oxygen, BOD and total ammonia. The remaining windows are still under development and will be applied when available.

An overview of water quality in the catchment can be seen on Map 18

Every five years a national survey is carried out of the quality of rivers, canals and tidal waters in England and Wales. Key stretches (i.e. stretches receiving significant discharges or stretches of significant flow) are monitored at strategic sampling points. The last national survey was completed in 1995, the results of which will be compared to the previous national survey in 1990. The result will be a published document similar to the one following the 1990 survey.

A comparison of GQA classes for watercourses in the South Cumbrian LEAP area based on chemical data for 1990 (using 1988-90 data) with those for 1995 (using 1993-1995 data) is shown below (water quality criteria for the GQA classes is given in Appendix 5


South Cumbria
Local Environment
Agency Plan
Map 18
ENVIRONMENT AGENCY
N
0
10 km
Water Quality: General Quality Assessment (GQA)
KEY
Plan Boundary
Built up area
CLASS:
A
B
C
D
E
F
Unclassified
Reach Boundary
Ambleside
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Coniston
Duddon
Esthwaite Water
Coniston Water
Crake
Windermere
Leven
Winster
Gilpin
KENDAL
Sprint
Mint
Kent
Bela
Milnthorpe
Arnside
Silverdale
Grange-over-Sands
Ulverston
Broughton in Furness
Millom
Askam in Furness
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
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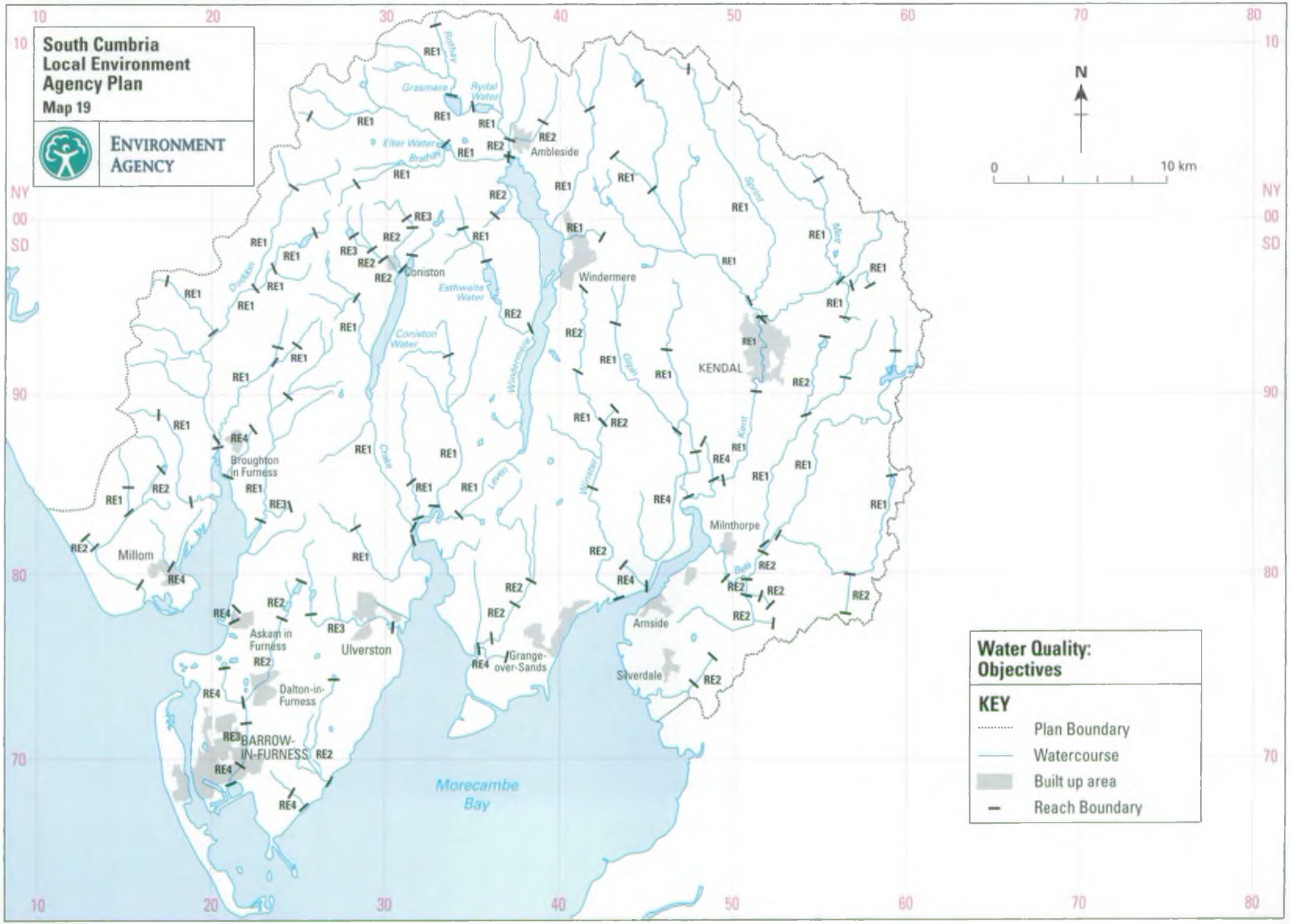
South Cumbria
Local Environment
Agency Plan
Map 19
ENVIRONMENT AGENCY
N
0
10 km
Water Quality:
Objectives
KEY
Plan Boundary
Watercourse
Built up area
Reach Boundary
Ambleside
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Coniston
Coniston Water
Esthwaite Water
Duddon
Windermere
Crake
Leven
Winster
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Ulverston
Broughton in Furness
Millom
Askam in Furness
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
NY
00
SD
RE1
RE2
RE3
RE4

2.2.4 Water Quality

GQA Class		km		%	
		1990	1995	1990	1995
A	Good	160.6	158.6	37.1	36.7
B	Good	36.3	190.3	8.4	44
C	Fair	28.7	57.2	6.6	13.2
D	Fair	19.2	10.7	4.5	2.5
E	Poor	0.5	11.3	0.1	2.6
F	Bad	0.9	4.5	0.2	1
Unclassified		186.4	0	43.1	0
TOTAL		432.6	432.6	100.0	100

The table shows that there has been a significant increase in the percentage of good quality water in 1995 compared to 1990. In 1995, 80.7% of the length of the classified stretches in the LEAP area is classified as water of good quality compared to 45.5% in 1990; 96.4% is classified as water of good to fair quality; and only 3.6 % is classified as water of poorer quality. However, it should be noted that since 1990, due to increased monitoring, the total length of classified water in the catchment has increased.

Tidal waters and estuaries are presently still classified using an old classification method called the National Water Council (NWC) scheme. This scheme considered dissolved oxygen levels, aesthetic quality and biological quality and placed water quality in one of four classes. Summary data for 1995 is shown below:

Class		km	%
A	Good	101.1	84.6
B	Fair	17.8	14.9
C	Poor	0.6	0.5
D	Bad	0.0	0.0
TOTAL		119.5	100.0.

The table above shows that 99.5% of the LEAP areas classified estuaries are of good or fair quality with only one 0.5% being of poor quality. This stretch is Carter Pool and is only 0.6km in length and does not benefit from a large dilution of saline water like the other estuaries which has the effect of reducing high biochemical oxygen demand and ammonia levels and also increases dissolved oxygen levels. There are no stretches of estuary which can be classed as having bad water quality.

River Quality Targets

The Agency also has strategic use related targets known as River Quality Objectives (RQO) which have been set for all rivers and provide a basis for planning the maintenance and improvement of river quality. The water classification scheme used to set RQO planning targets is known as the River Ecosystem Classification scheme. The scheme establishes a defined level of protection for aquatic life and comprises of 5 classes which reflect the chemical quality requirements of communities of plants and animals living in our rivers.

2.2.4 Water Quality

Descriptions of the River Ecosystem Classes are given below.

RE1 Water of very good quality suitable for all fish species
RE2 Water of good quality suitable for all fish species
RE3 Water of fair quality suitable for high class coarse fish populations
RE4 Water of fair quality suitable for coarse fish populations
RE5 Water of poor quality which is likely to limit coarse fish populations

A more detailed outline of the scheme and the quality criteria from which these classes are derived can be seen in Appendix 5 Further use related target schemes are still under development but include: Special Ecosystem; Abstraction for Potable Supply; Agricultural/Industrial Abstraction and Watersports.

Every classified stretch in the South Cumbrian LEAP area has been set a River Ecosytem objective. These objectives are immediately effective in order to prevent deterioration of present water quality. These objectives have been incorporated into map 19 and are designated for the lifetime of the plan.

EC Directive Water Quality Objectives

The following EC Directives contain standards which have implications for water quality in the catchment:

1) **The Dangerous Substances Directive (76/464/EEC)** which is concerned with controlling pollution caused by discharges of certain substances considered harmful to the aquatic environment. The Directive established two lists of substances. List I contains substances regarded as particularly dangerous because of their toxicity, persistence and bioaccumulation. Discharges of List I substances must be controlled by Environmental Quality Standards (EQSs) issued through Daughter Directives. List II contains substances which are considered to be less dangerous but which still can have a deleterious effect on the aquatic environment. Discharges of List II substances are also controlled by EQSs. Compliance with the directive is achieved if the annual mean concentration of a substance meets it's EQS in the receiving water downstream of a discharge.

2) **The Bathing Water Directive (76/160/EEC)** which sets mandatory total and faecal coliform standards for designated waters that are used for bathing. The objectives of the directive are to improve or maintain the quality of bathing water for amenity reasons and to protect public health. Although the Agency implement the sampling and analysis pursuant to the Directive it does not have any responsibilities for public health.

3) **The Freshwater Fisheries Directive (78/659/EEC)** is concerned with ensuring that water quality in designated stretches of water is suitable for supporting fisheries. This Directive contains two sets of quality standards, one at levels to support a cyprinid fish population (i.e. coarse fish) and another set at stricter levels to support a salmonid fish population (e.g. salmon and trout). There are two sets of standards for each fishery type, imperative (I) standards, which must be achieved and guideline (G) standards which

Member States should aim to achieve. All the stretches in the South Cumbrian LEAP area have been designated as Salmonid fisheries

4) **The Surface Water Abstraction Directive (75/440/EEC)** ensures that surface water abstracted for use as drinking water meets certain standards and is given adequate treatment before entering public water supplies. The Directive sets out imperative standards which must be achieved, and guideline standards which Member States should aim to achieve. Surface waters are divided into 3 categories A1, A2 and A3 which reflects the method of treatment received to meet the required water quality for potable supply.

5) **The Urban Waste Water Treatment Directive (91/271/EEC)** lays down minimum standards for the provision of sewerage collection systems and sewage treatment. The Directive specifies secondary treatment for all discharges serving population equivalents greater than 2000 by the year 2000, but provides for higher standards of treatment for discharges to "sensitive" areas. Sensitive areas are those where waters are used for surface water abstractions; where the nitrate concentration exceeds the standards in the Surface Water Abstraction Directive (75/440/EEC); where surface waters are or may become eutrophic in the near future; or where more stringent treatment is required to fulfil the requirements of other EC Directives. Discharges below a population of 2000 must also receive "appropriate" treatment by 2005 as defined in a guidance note.

Map 20 shows the EC Directive monitoring points and designated areas for the South Cumbrian LEAP area, as well as the state of the catchment in terms of compliance with the Directive standards..

State of the Environment

General

Having set River Ecosystem targets it is now possible to assess the current state of the LEAP area against these targets.

The assessment has been made using data from the routine water quality sampling programme. A three year period (1993 - 1995 calendar years) has been used to assess compliance with RE targets. The random variation associated with routine sampling has been considered and statistical confidence limits calculated for the water quality data.

The state of the catchment in terms of compliance with Rivers Ecosystem targets is shown in Map 21.

Failures to meet Targets and Issues Arising.

The failure to meet objectives are considered as follows:

1) Failures to meet River Ecosystem targets

2.2.4 Water Quality

2) Failures to comply with EC Directives

Failure to meet River Ecosystem targets have been grouped under the following headings:

RE Failures to be subjects of targeted investigations

The following stretches have failed to RE targets due to a number of factors including the lack of rural sewerage, eutrophication and the impact of farming activity and are to undergo investigations

Quicksands Pool (Leighton Moss to the Freshwater Limit)
Witherslack Main Drain (Bridge House to the Freshwater Limit)
Silecroft Beck (John Bull Inn to Haverigg Pool)
Blelham Beck (Blelham Tarn to Lake Windermere)
Black Beck (Peat House Beck to Freshwater Limit)

Impact due to Low Flows and Drought Conditions

The failure of the following stretches to meet their RE target has been attributed to low flow drainage ditches having a deleterious effect on oxygen levels in the River Winster and the abstraction of flows for the Lancaster Canal causing BOD problems in Peasey Beck

River Winster from Helton Tarn to the Freshwater Limit
Peasey Beck from above Killington to the River Bela
Goldmire Beck from Genn Haume to Mill Beck

Impact of NWW Ltd Sewage Treatment Works (STWs) and Sewerage Systems

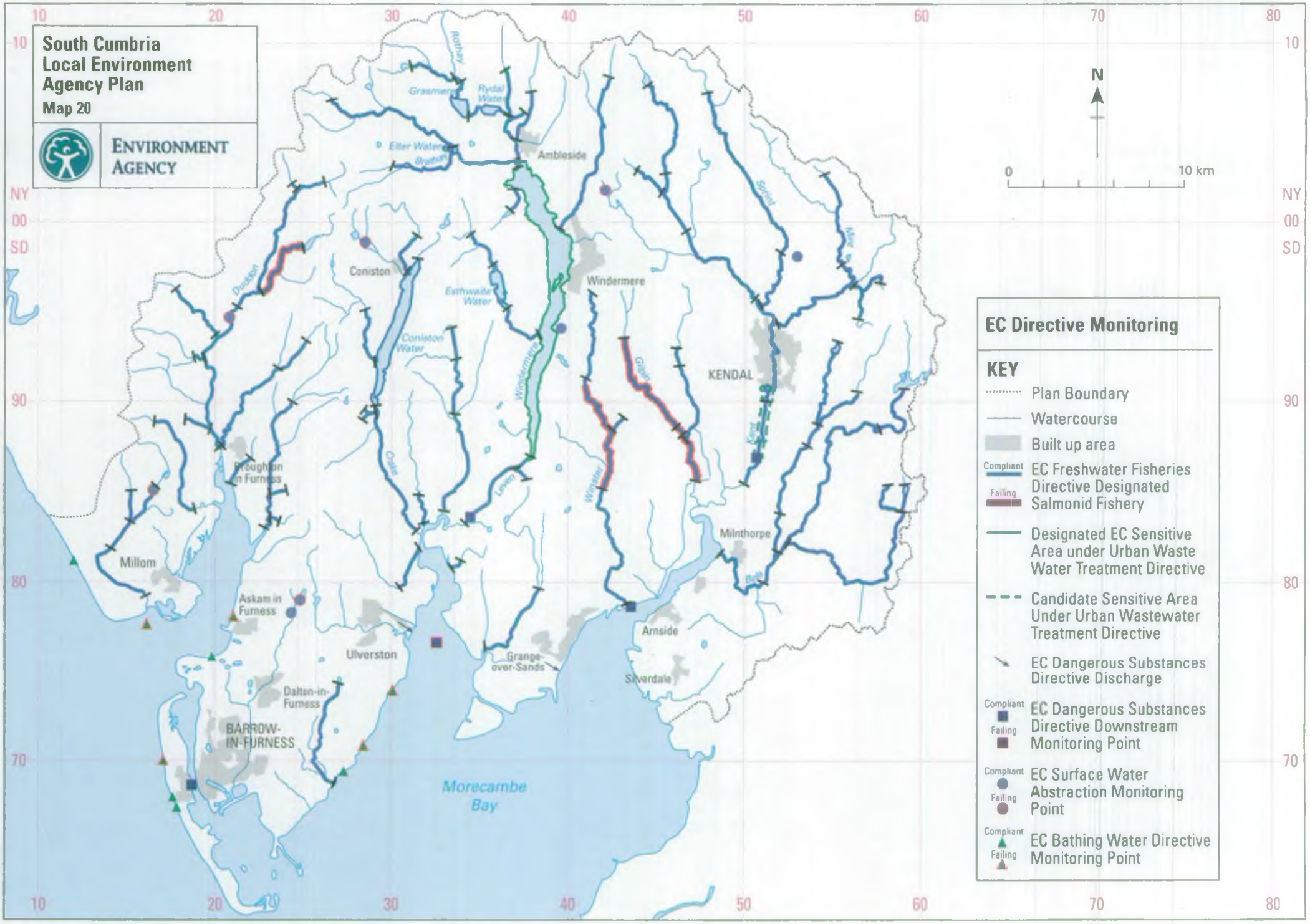
The impact of discharges from NWW Ltd STWs are responsible for non-compliance with RE targets for six classified stretches:

Meatop Marsh Drain from at Meathop STW to Witherslack Main Drain
River Rothay from Ambleside STW to the River Brathay
Holme Beck from Holme STW to the river Bela
Mill Beck from Furness Abbey to the freshwater limit
Blea Beck from Askam STW to the freshwater limit
Salthouse Pool from Furnace Beck to freshwater limit

Failures due to NWW Ltd's activities will be put forward for proposed improvement under AMP 3 which is their capital investment programme for beyond the year 2000. Schemes which remain to be addressed under AMP 2 from 1995 to 2000 are outlined in Appendix 6

Failures Due To Acid Rain

The following failures have failed to meet RE targets on pH alone which has been attributed to acid stress caused by acid rain. These have been addressed as issues and are being investigated


South Cumbria
Local Environment
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Map 20
ENVIRONMENT AGENCY
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10 km
Ambleside
Grasmere
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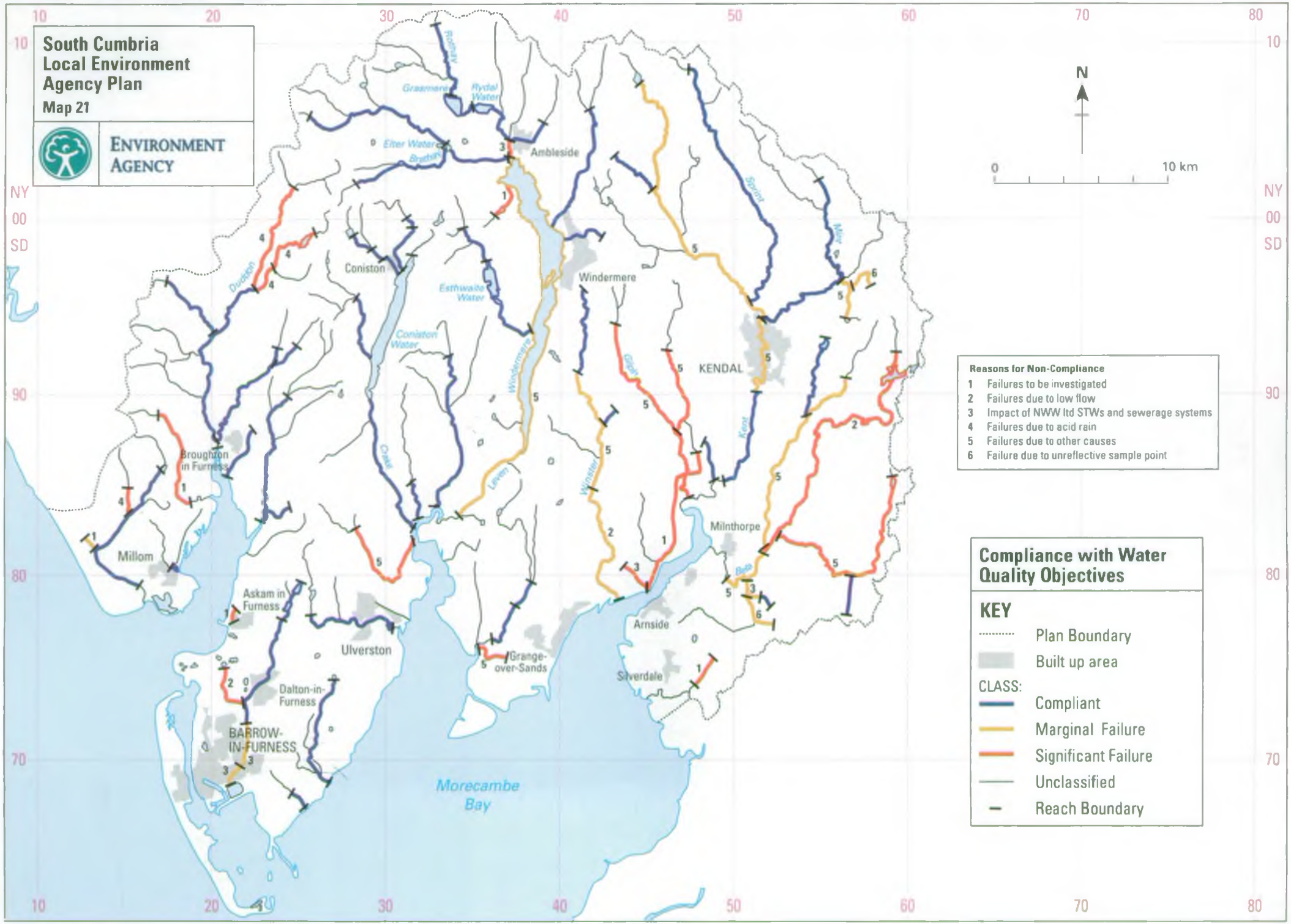
Compliant
Failing
EC Freshwater Fisheries Directive Designated Salmonid Fishery
Designated EC Sensitive Area under Urban Waste Water Treatment Directive
Candidate Sensitive Area Under Urban Wastewater Treatment Directive
EC Dangerous Substances Directive Discharge
EC Dangerous Substances Directive Downstream Monitoring Point
EC Surface Water Abstraction Monitoring Point
EC Bathing Water Directive Monitoring Point


South Cumbria
Local Environment
Agency Plan
Map 21
ENVIRONMENT AGENCY
N
0
10 km
Reasons for Non-Compliance
1 Failures to be investigated
2 Failures due to low flow
3 Impact of NWW ltd STWs and sewerage systems
4 Failures due to acid rain
5 Failures due to other causes
6 Failure due to unreflective sample point
Compliance with Water Quality Objectives
KEY
Plan Boundary
Built up area
CLASS:
Compliant
Marginal Failure
Significant Failure
Unclassified
Reach Boundary
Ambleside
Grasmere
Rydal Water
Rothay
Elter Water
Brathay
Coniston
Esthwaite Water
Coniston Water
Duddon
Crake
Windermere
Leven
Winster
Gilpin
KENDAL
Kent
Sprint
Mint
Bela
Milnthorpe
Arnside
Silverdale
Grange-over-Sands
Ulverston
Broughton in Furness
Millom
Askam in Furness
Dalton-in-Furness
BARROW-IN-FURNESS
Morecambe Bay
NY
00
SD

as an operational project and by involvement at a national level through the Agency's responsibility for aerial emissions.

Tarn Beck from QSL Tarn Head Moss to Long House Gill
Tarn Beck from Long House Gill to Duddon
Whitecombe Beck from QSL Hallbeck to Haverigg Pool
Duddon from QSL Gaitscale Gill to Tarn Beck

Failures Due to Other Causes

The following stretches have all failed to meet RE objectives, although their actual chemical quality is in reality more reflective of the target class. These stretches are not issues since failure has arisen through atypical high fliers in the data set which in the majority of cases have been exacerbated by lower than normal flows in the drought of 1994 and 1995.

River Name	Stretch Name	Upstream NGR	Downstream NGR	Target RE Class	Current RE Class
River Kent	Mint to Kendal STW	SD 5170 9440	SD 5141 9012	1	2
River Kent	QSL at Linfmell Beck to Mint	SD 4475 7700	SD 5170 9440	1	2
River Winster	Near Wood Farm to Helton Tarn	SD 4120 9150	SD 4190 8480	1	2
Stainton Beck	QSL Crakeshall Gill to Libby McNeil	SD 5660 9110	SD 5182 8180	1	2
Lupton (Blea) Beck	QSL Wyndhammere Tarn to Peasey Beck	SD 5920 8540	SD 5327 8209	1	2
River Gilpin	QSL Low End of Crook to FWL	SD 4320 9350	SD 4720 8550	1	3
Chapel Beck	QSL Chapel Bridge to Gilpin	SD 4630 9260	SD 4668 8789	1	3
River Leven	Brathay to FWL (Low Wood Bridge)	NY 3720 0360	SD 3450 8360	1	2
Windermoor Main Drain	QSL at Cat Bridge to Foreshore	SD 3680 7510	SD 3520 7550	4	5
Newland Beck	QSL Broughton Beck to FWL (Foreshore)	SD 2830 8270	SD 3150 8170	1	2
River Bela	Libby McNeill to Henry Cooke Ltd	SD 5180 8180	SD 4974 8002	2	3
Flodder Beck	QSL Coft Foot to Mint	SD 5640 9430	SD 5618 9662	1	2

2.2.4 Water Quality

The following stretches have failed to meet RE targets due to their classification being calculated using a sampling point which does not reflect the water quality in these watercourses.

River Name	Stretch Name	Upstream NGR	Downstream NGR	Target RE Class	Current RE Class
Holme Beck Trib 10	QSL at M6 to Holme Beck	SD 5280 7750	SD 5079 7893	2	3
Grayrigg Beck	QSL Blackett Bottom to Flodder Beck	SD 5760 9670	SD 5653 968	1	2

Failures to Comply with EC Directives

Bathing Water Directive

There are ten designated bathing waters in the South Cumbrian LEAP area. These are at Bardsea, Aldingham, Newbiggin, Walney Biggar Bank, Walney Sandy Gap, Walney West Shore, Roan Head, Askam-in-Furness, Haverigg and Silecroft. Five of these bathing waters failed to comply with the directive in 1996 in terms of faecal and total coliforms. These were Bardsea, Aldingham, Walney West Shore, Askam-in-Furness, and Haverigg. The reasons for failure can be seen in Appendix 7

Concern over the number of unexpected failures to comply with the Bathing Water Directive standards at the designated sites in the South Cumbrian LEAP area has resulted in a Bathing Water Project to be undertaken. This will consist of extensive survey work and will identify microbiological inputs from all possible local inputs to each bathing water. Additional data such as temperature, pH and conductivity, current and antecedent weather conditions, tidal range and state to assess any possible overlying causes will be collected. The project will also involve North West Water Ltd. and private trade effluent dischargers who will take concurrent effluent samples for comparison with Agency data. Dye tracing surveys will also be undertaken to identify the impact of local discharges on designated sampling sites.

Dangerous Substances Directive

There was only one failure to meet List I environmental quality standards during 1995 in the South Cumbrian LEAP area. This was for cadmium on the River Leven Estuary upstream of Carter Pool (North of Chapel Island). Only three samples were collected during 1995 as there were no known inputs. Non-compliance with the EQS at this site can be attributed to one high result of 13.5µg/l. Due to the limited sampling this is not classified as a failure under the directive.

This year a trade discharge to sewer containing cadmium has been identified by North West Water Ltd. This will come under control of a trade effluent consent to sewer and possibly an Authorisation under IPC.

2.2.4 Water Quality

These measures should prevent future problems, although monitoring has been increased in 1996 and a limited catchment survey will be undertaken to ensure that there are no other inputs of cadmium into the estuary.

Surface Water Abstraction Directive

There were five failures in the LEAP to meet surface water abstraction directive requirements.

Baystone Bank Reservoir

The failing determinants for this site were phenol and hydrocarbon oils which both failed on one occasion. There are no point source inputs of these determinants in the vicinity of the site, although it is possible that diffuse inputs from agricultural activities may influence compliance. It is possible that reported exceedances of the hydrocarbon oils standard may be due to the presence of naturally occurring substances in the water.

River Duddon

The failing determinants for this site were phenol and hydrocarbon oils which both failed on one occasion. Once again there are no known inputs of these determinants in the vicinity of the site.

Harlock Reservoir

The failing determinant for this site was iron which failed on one occasion. There are no known inputs of iron to this reservoir and the failure can be attributed to weathering of the underlying haematite.

Dubbs Reservoir

The failing determinant for this site was iron which failed on one occasion. There are no known inputs of iron to this reservoir.

Levers Water Reservoir

The failing determinant for this site was copper which failed on one occasion. This is due to contamination through natural enrichment.

Although these sites have all failed specified standards laid down in the directive, the results are considered to be atypical and not reflective of water quality problems associated with abstraction at these sites.

Freshwater Fish Directive

There are four stretches out of 76 in the LEAP area which have failed to meet the standards laid down in the Freshwater Fish directive.

2.2.4 Water Quality

Tarn Beck from Head of Seathwaite Tarn to the River Duddon.

This stretch has failed to meet the pH standard laid down in the directive on all 12 samples taken throughout the year. This catchment has been identified as having acidified watercourses due to acid rain.

River Gilpin from Low End of Crook to PTC River Pool
River Gilpin from PTC River Pool to Tidal Limit at Sampool Bridge

Both these stretches failed to meet dissolved oxygen standards laid down in the directive. The first site sampled prior to the confluence with the River Pool failed on two occasions and the second site at Sampool bridge failed on one occasion for dissolved oxygen and on one occasion for pH. The River Gilpin tends to be slow moving and canalised in places reducing the amount of aeration and mixing in the watercourse. This would be exacerbated by low flows due to drought conditions during 1995.

River Winster from Bowland Bridge to Slate Hill.

This stretch failed to meet the dissolved oxygen standards laid down in the directive on two occasions. The sample point is situated by the tidal gates where there has been a build up of weed and rotting vegetation which could account for low dissolved oxygen levels.

Failures to meet dissolved oxygen standards for these sites all occurred during the dry summer months in 1995

Urban Wastewater Treatment Directive

There are two stretches in the South Cumbria LEAP area which have been associated with sensitive area status.

Designated Sensitive Areas

The only designated area is Windermere lake from Waterhead to Newby Bridge. This was identified in 1993 as a sensitive area on the basis of it's eutrophic status. The qualifying discharge is Windermere STW which had nutrient removal installed in 1992. The effect of this has been a dramatic improvement in water quality and trophic status of the lake. However, the lake will continue to be designated as sensitive to protect Arctic Char populations.

Proposed Sensitive Areas

The River Kent from Kendal STW to the tidal limit is a proposed sensitive area. This was put forward for designation as a sensitive area in 1997 based on data collected between 1994 and 1996. However, a recent review of this data does not support sufficient criteria for the designation to be pursued in 1997. However, monitoring will continue and the impact from Kendal STW, which is the qualifying discharge, will continue to be assessed for possible inclusion in the next round of designations in 2001.

2.2.4 Water Quality

South Cumbrian Lakes

A two year study has been carried out to enable lake management strategies to be developed for a number of lakes in the South Cumbria LEAP area (Grasmere, Coniston, Elterwater and Esthwaite). This included an investigation of riverine nutrient inputs and flows to the lakes, nutrients and metals in the lakes sediments and surveys to provide nutrient physico-chemical data on the lakes water column.

One of the success stories for the South Cumbrian lakes is Windermere. Phosphate stripping on Windermere STW in March 1992 has resulted in a phosphate reduction of nearly 70%. The impact of a reduction in phosphate has been very positive with reduced phytoplankton and algal production and hypolimnetic deoxygenation has ceased. Expert opinion (Institute of Freshwater Ecology) have observed improved spawning success of Arctic Char in the south basin of the lake and have attributed the reduction of threats to char survival and recruitment to the installation of phosphate stripping at Windermere STW. On a cautionary note, it is important to remain vigilant and to continue phosphate stripping at the works to prevent any future deterioration in the lake.

The findings of the lake project can be seen in appendix 8

Future Proposals

Following this detailed study of the lakes it is now important to investigate the long term changes of vulnerable lakes using modern techniques such as sediment core analysis, which will allow a determination of historical inputs. Continuous automatic monitoring will also be employed to act as a sentinel and additionally will confirm current water quality. This can then be used as a basis for long-term planning.

Appendices

Appendix 1 - Scheduled Ancient Monuments

Parish	Monument No	Title	Grid Ref
Bootle	50	Bootle Fell, cairns 1000yds (910m) E of Low Kinmont	SD 124 893 SD 125 892 SD 125 893 SD 125 896 SD 125 897 SD 125 899 SD 127 893 SD 127 894
Bootle	51	Bootle Fell, groups of cairns	SD 129 886 SD 129 889 SD 131 886 SD 131 892 SD 131 893 SD 132 893 SD 133 888 SD 133 889 SD 133 891 SD 133 892 SD 133 895
Bootle	52	Bootle Fell, Little Grassoms cairns	SD 136 886 SD 137 886 SD 139 886
Bootle	300	Seaton nunnery (site of)	SD 106 898
Millom	360	Millom Castle (ruined portions)	SD 171 813
Millom	424	Hodbarrow Beacon	SD 180 783
Millom Without	100	Sunkenkirk Circle, Swinside Fell	SD171 882
Millom Without	402	Duddon Furnace	SD 197 883
Millom Without	425	Lacra Old Kirk and terraces	SD 147 814 SD 149 811
Millom Without	23733	Stone circle W of Great Knott, Lacra	SD 1498 8132
Millom Without	23734	Stone circle and funerary cairn 440m SW of Great Knott, Lacra	SD 1492 8097
Millom Without	23735	Stone circle 410m SSW of Great Knott, Lacra	SD 1501 8096
Millom Without	23736	Two stone circles, a stone avenue and a stone alignment at Great Knott, Lacra	SD 1513 8124 SD 1505 8119
Millom Without	23737	Giant's Grave standing stones, Kirksanton	SD 1361 8110

Appendix 1 - Scheduled Ancient Monuments

Parish	Monument No	Title	Grid Ref
Ulpha	125	Cairns on Rough Crag one mile (1600m) SE of Birkesthwaite	SD 187 965 SD 188 967 SD 188 965 SD 188 966 SD 188 968 SD 189 966 SD 190 966
Ulpha (Eskdale)	247	Roman road Wrynose Bottom to Hardknott Ford	NY 2141 0114 NY 2163 0128 NY 2233 0146 NY 2257 0151 NY 2263 0149 NY 2272 0150 NY 2283 0146 NY 2386 0109 NY 2461 0169 NY 2463 0170 NY 2464 0171 NY 2499 0199 NY 2515 0193 NY 2656 0230
Ulpha	392	Settlement in field system N of Crosbythwaite	SD 190 956
Waberthwaite	127	Corney Fell, group of cairns 400 yds (370m) S of Charlesground Gill	SD 132 922
Waberthwaite	128	Corney Fell, group of cairns 400yds (370m) E of Buckbarrow Bridge	SD 128 906 SD 129 907 SD 130 904 SD 130 905 SD 131 905 SD 132 905 SD 133 907
Waberthwaite	129	Cairns SE of High Kinmont	SD 127 904 SD 127 905 SD 127 906
Waberthwaite	130	Stone circle and cairns N of Whitrow Beck	SD 133 938 SD 134 943 SD 134 944 SD 136 945
Waberthwaite	23779	High cross shaft in St John's churchyard	SD 1003 9510
Aldingham (Urswick)	213	Camp N of Appleby Slack	SD 285 749
Aldingham	323	Gleaston Castle	SD 261 715
Aldingham (Urswick)	27658	Concentric stone circle on Birkrigg Common	SD 2923 7396

Appendix 1 - Scheduled Ancient Monuments

Parish	Monument No	Title	Grid Ref
Aldingham	27682	Moat Hill, motte and bailey castle and earlier rigwork	SD 2778 6896
Aldringham	27683	Moat Farm moated site	SD 2781 7004
Aldringham	27687	Romano-British farmstead and associated enclosure W of Scales Haggs, 300m NNE of Scales Green Farm	SD 2766 7247
Aldringham (Urswick)	27690	Round cairn on Appleby Hill	SD 2891 7434
Aldingham (Urswick)	27691	Round cairn on Birkrigg Common, 600m NW of High Sunbrick Farm	SD 2853 7444
Aldingham (Urswick)	27692	Round cairn on Birkrigg Common, 520m NW of High Sunbrick Farm	SD 2835 7431
Arnside	325	Arnside Tower	SD 459 768
Beetham	149	Earthwork in Dallam Park	SD 493 808
Beetham	327	Beetham Hall (curtain wall and uninhabited portion)	SD 499 791
Beetham	328	Hazelslack Tower	SD 477 788
Blawith and Subberthwaite (Kirkby Ireleth)	90	Settlement and cairns on Heathwaite Fell	SD 255 875 SD 255 869 SD 256 879 SD 256 863 SD 250 886 SD 257 865 SD 254 884 SD 262 860 SD 251 883 SD 258 869 SD 253 878 SD 257 879 SD 252 877
Blawith and Subberthwaite (Lowick)	92	Two ring cairns on Gawthwaite Moor	SD 264 857 SD 264 850
Broughton West	156	Settlement on the Hawk	SD 240 922
Cartmel Fell (Crook)	489	Winster potash pit	SD 412 922
Colton	400	Stony Hazel finery forge	SD 335 897 SD 335 898
Colton	401	Stott Park bobbin mill, Finsthwaite	SD 373 882

Appendix 1 - Scheduled Ancient Monuments

Parish	Monument No	Title	Grid Ref
Colton	439	Newby Bridge	SD 369 863
Colton	535	Nibthwaite furnace	SD 295 883 SD 294 885
Coniston	58	Cairns and enclosure on The Rigg, Banishead	SD 277 961 SD 277 962 SD 277 963 SD 278 963 SD 278 965 SD 281 966 SD 284 966 SD 285 968 SD 285 967
Coniston	59	Cairns on Foul Scrow	SD 292 981
Coniston (Dunnerdale-with-Seathwaite)	243	Roman road in Wrynose Bottom	NY 272 025 NY 276 026 NY 277 027 NY 278 027
Coniston	418	Mill and dwelling on River Brathay 600ft (180m) SW of Fell Foot Farm	NY 298 031
Coniston	419	Bloomeries in Water Park	SD 303 955 SD 302 957
Coniston	500	Settlement on Greenbury Beck 400yds (370m) S of Fell Foot Farm	NY 298 028
Coniston	542	Coniston copper mines	SD 285 987
Crook	299	Tower of ruined church of St Catherine	SD 449 946
Crook (Cartmel Fell)	489	Winster potash pit	SD 412 922
Dunnerdale-with-Seathwaite	73	Cairns on Kiln Bank 1/6 to 1/2 mile (270m-800m) SSE of Far Kiln Bank Farmhouse	SD 212 935 SD 215 937 SD 212 935 SD 216 932 SD 214 936 SD 216 933
Dunnerdale-with-Seathwaite (Coniston)	243	Roman road in Wrynose Bottom	NY 272 025 NY 276 026 NY 277 027 NY 278 027
Fawcett Forest	5	Settlement below Lamb Pasture	NY 532 019
Grange-over-Sands	442	Castlehead Bridge, Grange	SD 422 797

Appendix 1 - Scheduled Ancient Monuments

Parish	Monument No	Title	Grid Ref
Haverthwaite	506	Backbarrow ironworks	SD 355 845
Hawkshead	85	Round barrow 1/4 mile (400m) SW of Thompson Ground	SD 337 981
Hawkshead	420	Hawskshead Hall Gatehouse	SD 349 988
Hincaster	528	Hincaster tunnel horse path	SD 509 850 SD 513 852
Hugill	187	Settlement near High Borrans	NY 438 101
Hutton Roof (Kirkby Lonsdale)	192	Scalford settlement near Kirkby Lonsdale	SD 582 789
Kendal	443	Miller Bridge	SD 517 926
Kendal	444	Nether Bridge	SD 516 919
Kendal	445	Stramongate Bridge	SD 517 931
Kendal	23703	Castle Howe motte and bailey	SD 5129 9238
Kendal	23704	Kendal Castle and associated earthworks, and earlier ringwork	SD 5220 9241
Kentmere (Lakes)	483	High Street, Roman road	NY 490 244 NY 430 086
Kentmere	23701	Millrigg Romano-British enclosed hut circle settlement	NY 4607 0250
Kentmere	23702	Romano-British enclosed stone hut circle settlement and Romano-British farmstead NW of Tongue House Barn	NY 4516 0688
Kirkby Ireleth (Blawith and Subberthwaite)	90	Settlement and cairns on Heathwaite Fell	SD 255 875 SD 255 869 SD 256 879 SD 256 863 SD 250 886 SD 257 865 SD 254 884 SD 262 860 SD 251 883 SD 258 869 SD 253 878 SD 257 879 SD 252 877
Kirkby Ireleth	91	Cairn and ring mound on Long Moor, W of Gill House Beck	SD 252 830 SD 251 827

Appendix 1 - Scheduled Ancient Monuments

Parish	Monument No	Title	Grid Ref
Kirkby Lonsdale (Hutton Roof)	192	Scalford settlement near Kirkby Lonsdale	SD 582 789
Lakes	211	Settlement on W slope of The Tongue, Troutbeck Park	NY 420 067
Lakes	264	Roman road up Wrynose Pass	NY 278 028 NY 288 032
Lakes (Kentmere)	483	High Street, Roman road	NY 490 244 NY 430 086
Lakes	13567	Ambleside Roam fort, assocaited vicus and Roman Road	NY 3726 0350
Lakes	22547	Medieval shieling 640m N of Troutbeck Park Farm	NY 4202 0632
Lakes	22548	Southern round cairn on N end of The Tongue, Troutbeck Park	NY 4247 0761
Lakes	22549	Northern round cairn on N end of The Tongue, Troutbeck Park	NY 4250 0763
Lakes	22551	Round cairn 200m SSW of Bluegill Fold	NY 4274 0779
Lakes	22552	Round cairn 250m SSW of Bluegill Fold	NY 4273 0773
Lakes	22553	Low Kingate concentric stone circle	NY 4163 0591
Lakes	22554	Three round cairns 70m E of Rydal Beck	NY 3663 0817
Lakes	22555	Round cairn 180m E of Rydal Beck	NY 3676 0805
Lakes	22556	Round cairn on Dunmail Raise	NY 3272 1171
Lakes	22557	Moot mound at Fell Foot Farm, Little Langdale	NY 2986 0318
Lakes	22558	Round cairn 60m E of Hagg Gill	NY 4273 0675
Lakes	22559	Round cairn 80m E of Hagg Gill	NY 4273 0664
Lakes	22560	Round cairn 75m E of Hagg Gill	NY 4271 0659
Lakes	22561	Round cairn 15m E of Hagg Gill	NY 4258 0603
Lakes	23628	Medieval shieling 100m W of Trout Beck	NY 4227 0811
Lakes	23629	Medieval shieling 150m W of Trout Beck	NY 4222 0818
Lakes	23630	Medieval shieling 70m W of Trout Beck	NY 4230 0850
Levens	94	Earthwork 700yds (640m) N of Levens Bridge	SD 497 858

Appendix 1 - Scheduled Ancient Monuments

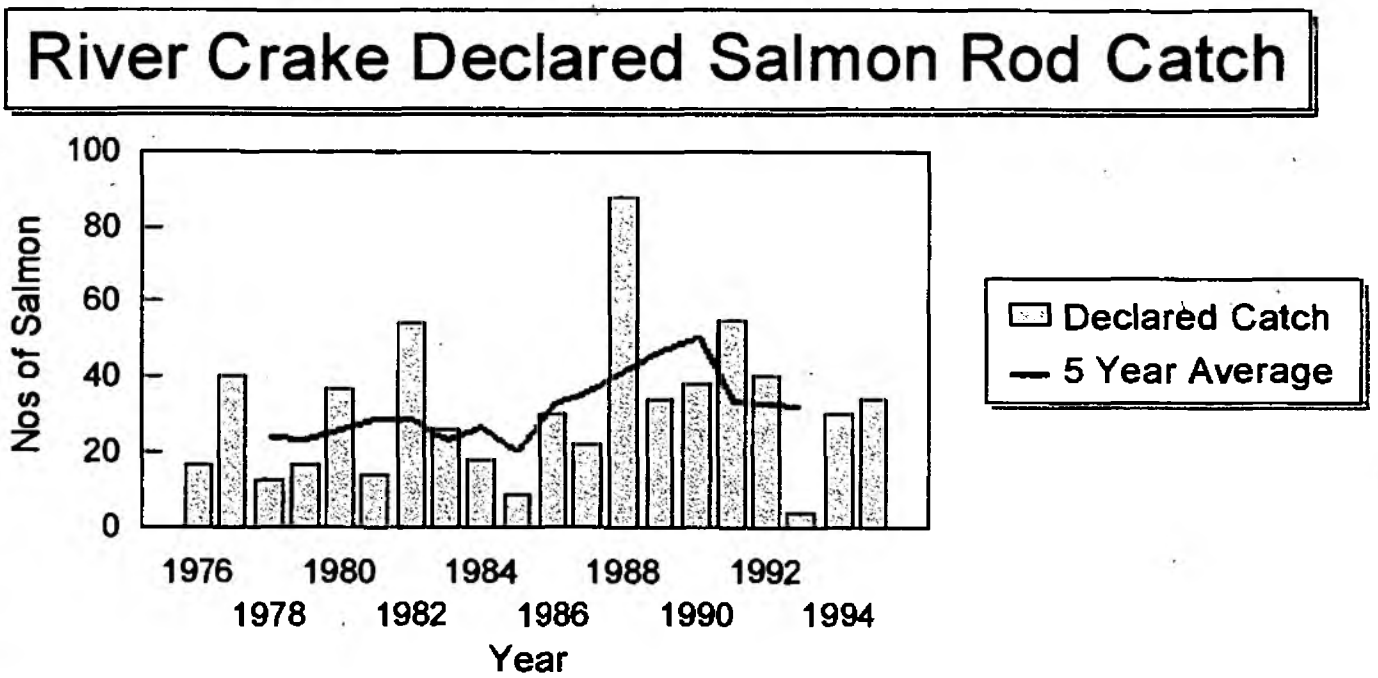
Parish	Monument No	Title	Grid Ref
Levens	95	Levens Park, round barrows and medieval settlements, including Temple of Diana	SD 505 861 SD 506 862 SD 505 859 SD 506 859 SD 506 858 SD 503 853 SD 504 855
Levens	447	Levens Bridge	SD 496 852
Lower Allithwaite	296	Cartmel Priory (parts of)	SD 380 788
Lower Allithwaite	304	Cartmel Priory Gatehouse	SD 379 787
Lower Allithwaite	355	Wraysholme Tower	SD 383 754
Lower Allithwaite	426	Frith Hall	SD 338 797
Lower Allithwaite	13444	Kirkhead Cave	SD 3910 7565
Lower Holker	356	Peter Hill, Cark	SD 366 764
Lowick (Blawith and Subberthwaite)	92	Two ring cairns on Gawthwaite Moor	SD 264 857 SD 264 850
Lowick	96	Knapperthaw stone circle	SD 280 842
Natland	273	Watercrook Roman fort and civil settlement	SD 514 907
Natland (Stainton)	23684	Castlesteads small multivallate hillfort on The Helm	SD 5307 8873
Over Staveley	305	Tower of ruined chapel of St Margaret	SD 473 982
Over Staveley	543	Elfhow potash pit	NY 473 001
Pennington	111	Eller Barrow, round barrow	SD 265 774
Pennington	362	Castle Hill	SD 257 777
Pennington	450	Devil's Bridge SW of Horrace	SD 258 796
Sedgwick	490	Sedgwick aqueduct	SD 514 870
Stainton	384	Packhorse bridge at the Post Office	SD 525 859
Stainton (Natland)	23684	Castlesteads small multivallate hillfort on The Helm	SD 5307 8873
Strickland Roger	366	Burneside Hall, pele tower and gatehouse	SD 510 959

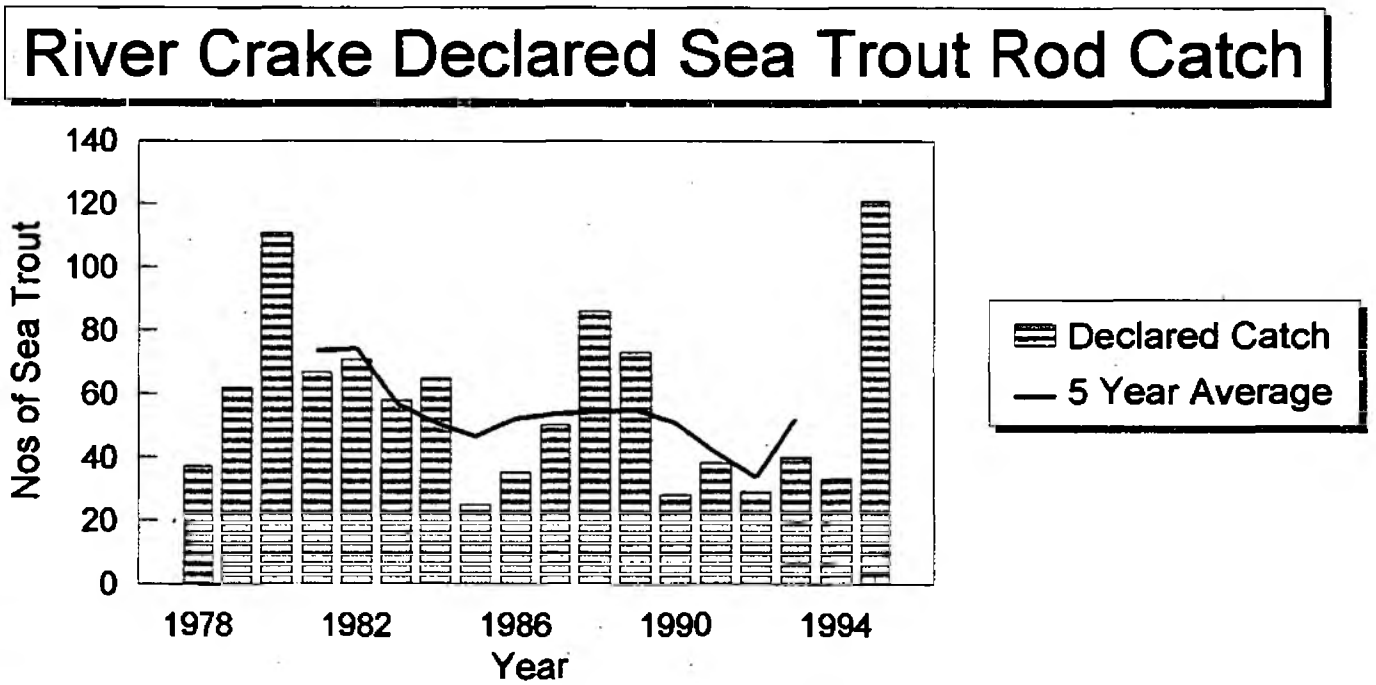
Appendix 1 - Scheduled Ancient Monuments

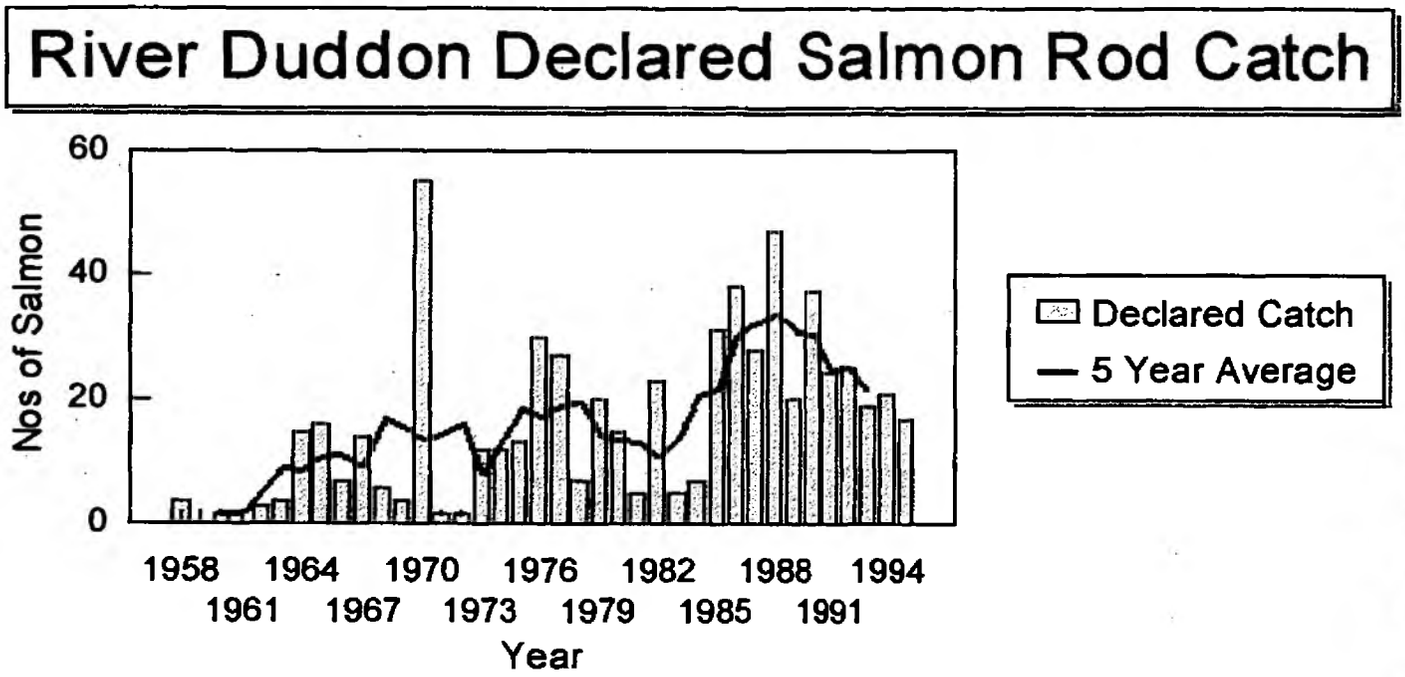
Parish	Monument No	Title	Grid Ref
Torver	120	Dike,circles and cairns on Bleaberry Haws	SD 264 947 SD 268 938 SD 264 946 SD 265 947 SD 268 944 SD 268 949
Torver	121	Cairns on Throng Moss 700ft (210m) SW of the reservior	SD 279 922
Underbarrow and Bradleyfield	19	Settlement 440yds (440m) N of Cunswick Hall	SD 484 938
Upper Allithwaite	432	Wilkinson's monument, Lindale	SD 418 804
Urswick (Aldingham)	213	Camp N of Appleby Slack	SD 285 749
Urswick (Aldingham)	27658	Concentric stone circle on Birkrigg Common	SD 2923 7396
Urswick	27681	Prehistoric enclosed hut circle settlement, an associated enclosure, and a bowl barrow NNE of Appleby Slack	SD 2884 7452
Urswick	27684	Romano-British enclosed hut circle settlement 660m SE of Holme Bank	SD 2759 7340
Urswick	27685	Romano-British farmstead on Little Urswick Crags	SD 2602 7409
Urswick	27686	Romano-British farmstead E of Little Urswick Crag	SD 2609 7403
Urswick	27688	Palisaded hilltop enclosure, a slight univallate hillfort, and a dewpond at Skelmore Heads, 280m E of Woodside Farm	SD 2742 7517
Urswick	27689	Long barrow N of Skelmore Heads, 300m NE of Woodside Farm	SD 2742 7540
Urswick (Aldingham)	27690	Round cairn on Appleby Hill	SD 2891 7434
Urswick (Aldingham)	27691	Round cairn on Birkrigg Common, 600m NW of High Sunbrick Farm	SD 2853 7444
Urswick (Aldingham)	27692	Round cairn on Birkrigg Common, 520m NW of High Sunbrick Farm	SD 2835 7431
Whitwell and Selside	4	Settlement on Dry How pasture	NY 519 028
Whitwell and Selside	398	Medieval settlement 700m SE of Bannisdale Low Bridge	NY 548 006

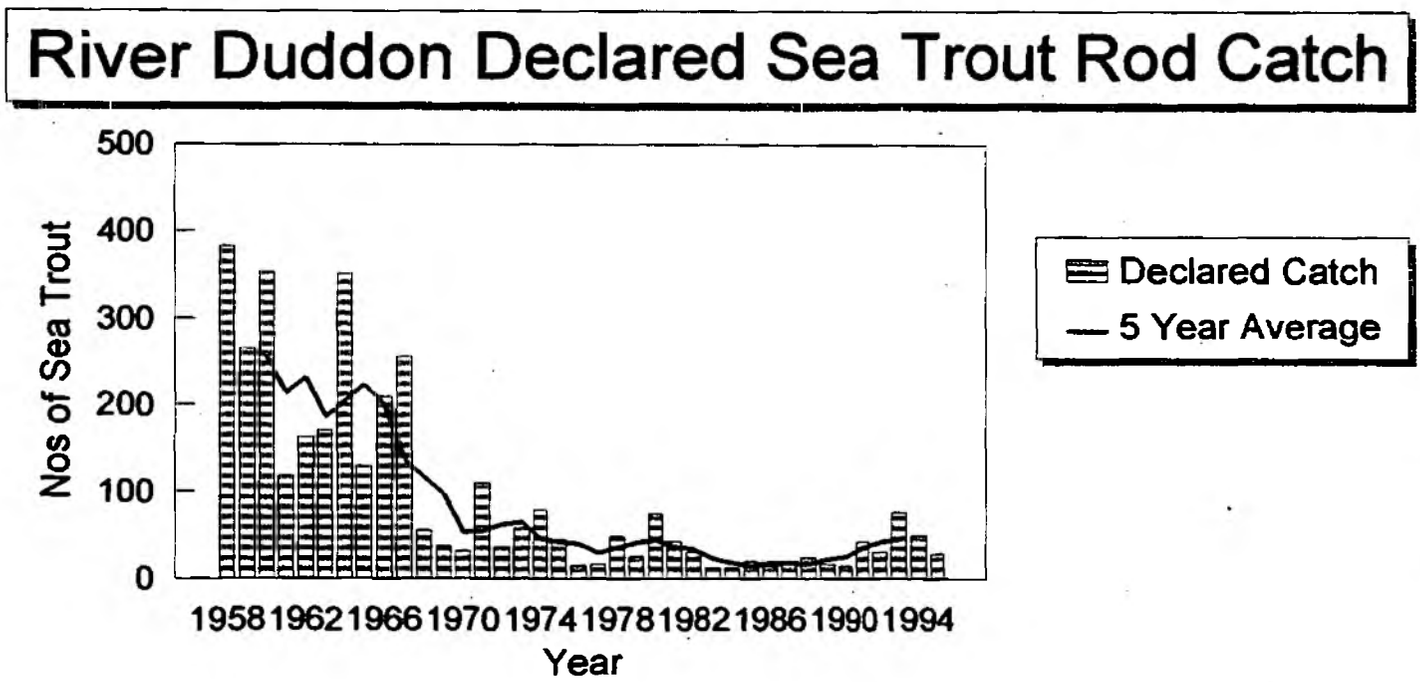
Appendix 1 - Scheduled Ancient Monuments

Parish	Monument No	Title	Grid Ref
Windermere	23683	Slight univallate hillfort on Allen Knott	NY 4144 0104
Aldringham	27693	Enclosure castle known as Gleaston	SD 2615 7144
Colton	27708	Stott Park Bobbin Mill, Two Ponds	SD 3720 8820
Lakes	27748	Lead mine at Greenhead Gill, Grasmere	NY 3497 0863

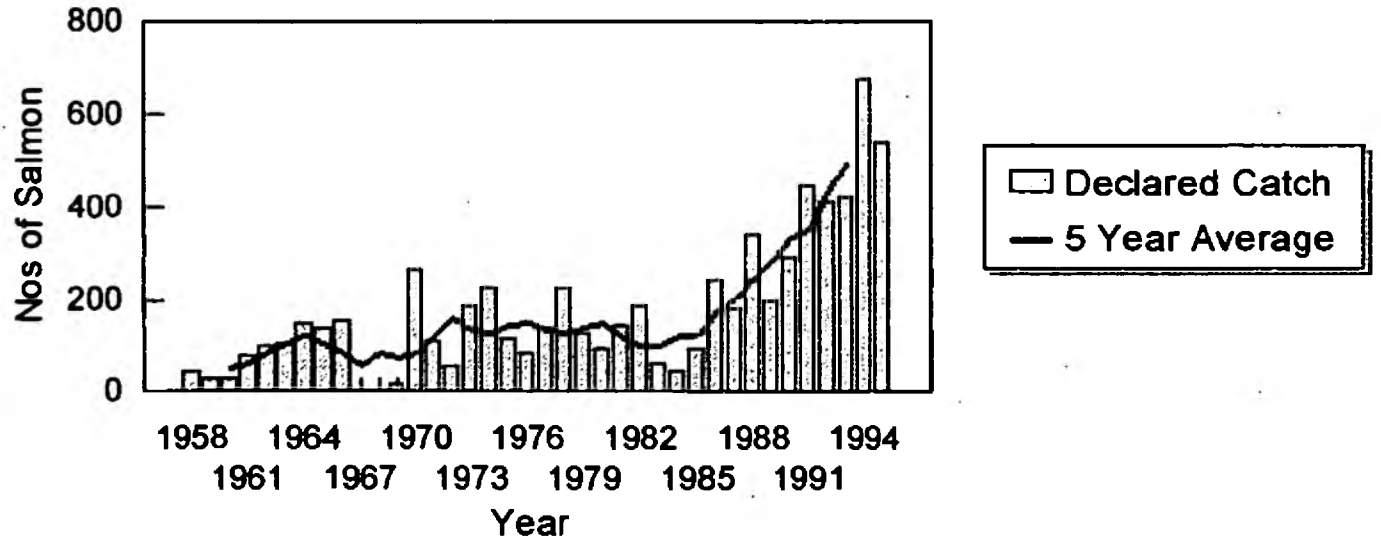

River Crake Declared Salmon Rod Catch
Nos of Salmon
100
80
60
40
20
0
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
Year
Declared Catch
5 Year Average


River Crake Declared Sea Trout Rod Catch
Nos of Sea Trout
140
120
100
80
60
40
20
0
1978
1982
1986
1990
1994
Year
Declared Catch
5 Year Average

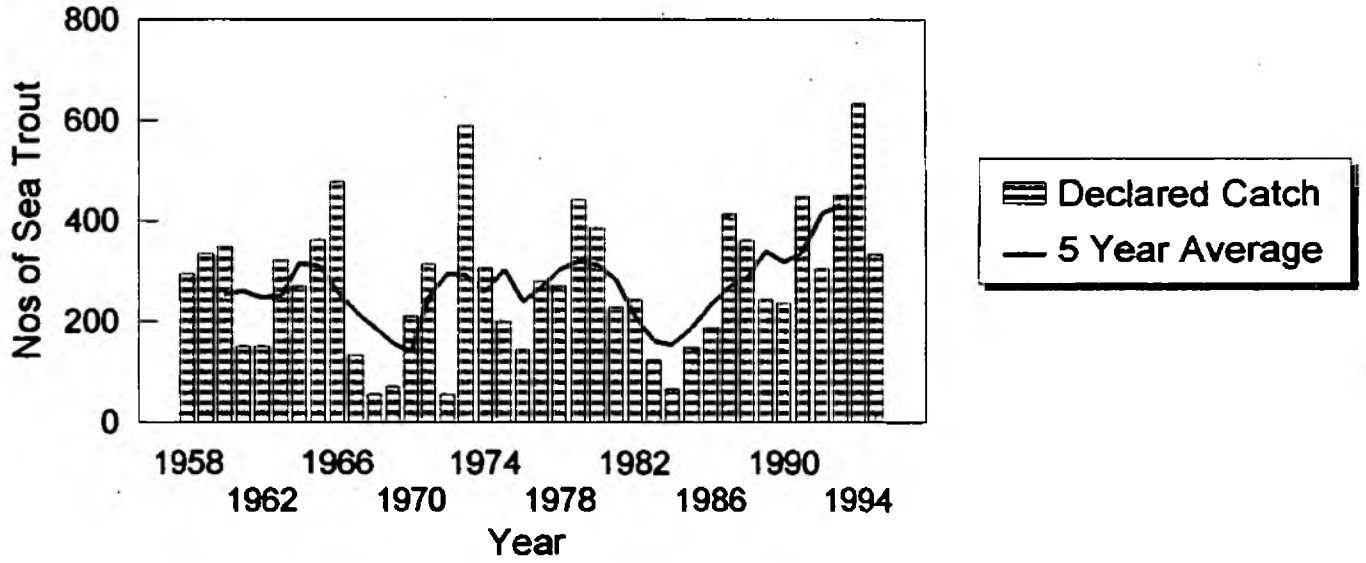

River Duddon Declared Salmon Rod Catch
60
40
20
0
Nos of Salmon
1958 1964 1970 1976 1982 1988 1994
1961 1967 1973 1979 1985 1991
Year
Declared Catch
5 Year Average

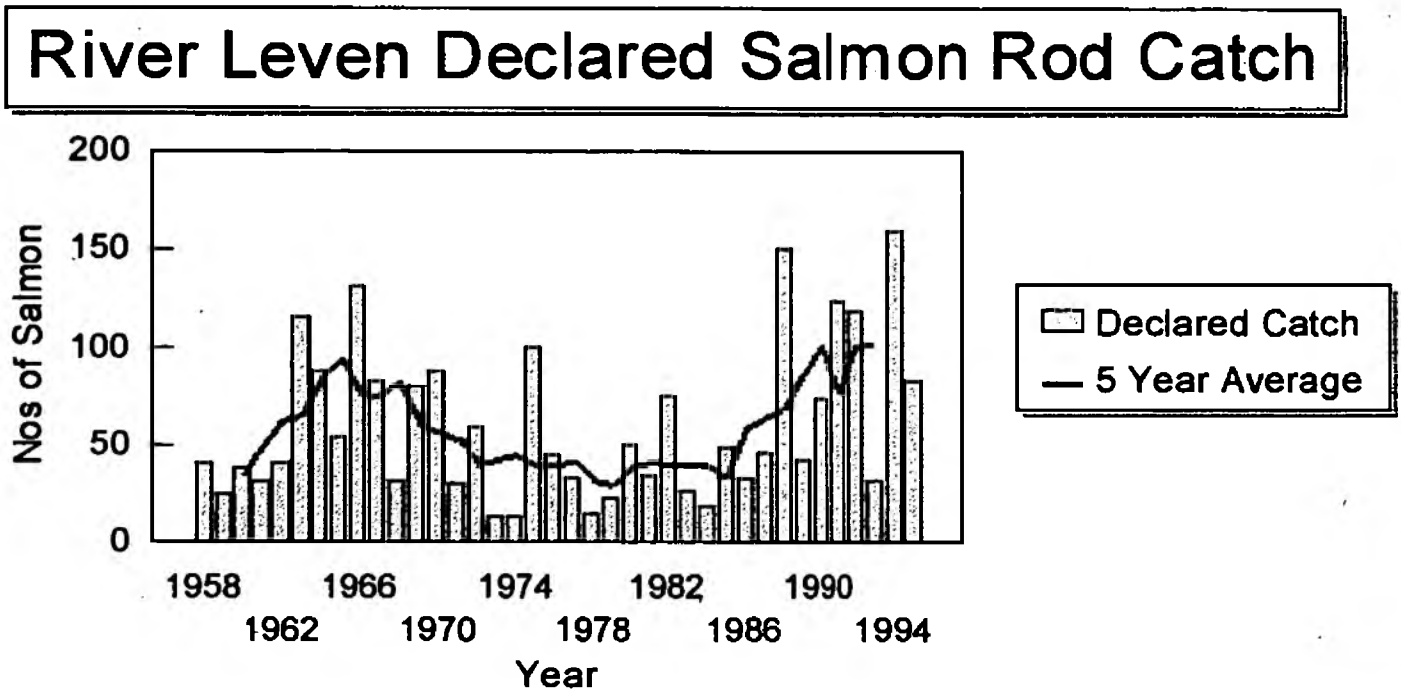

River Duddon Declared Sea Trout Rod Catch
500
400
300
200
100
0
Nos of Sea Trout
1958 1962 1966 1970 1974 1978 1982 1986 1990 1994
Year
Declared Catch
5 Year Average

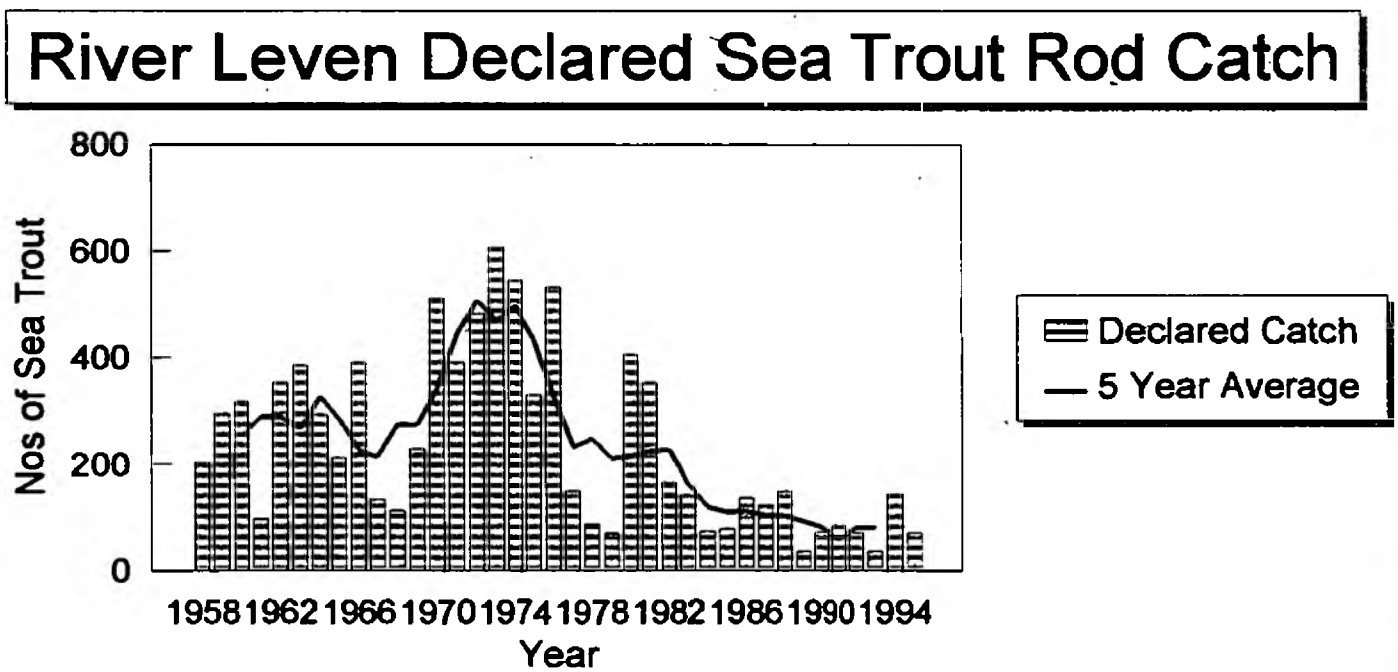
River Kent Declared Salmon Rod Catch



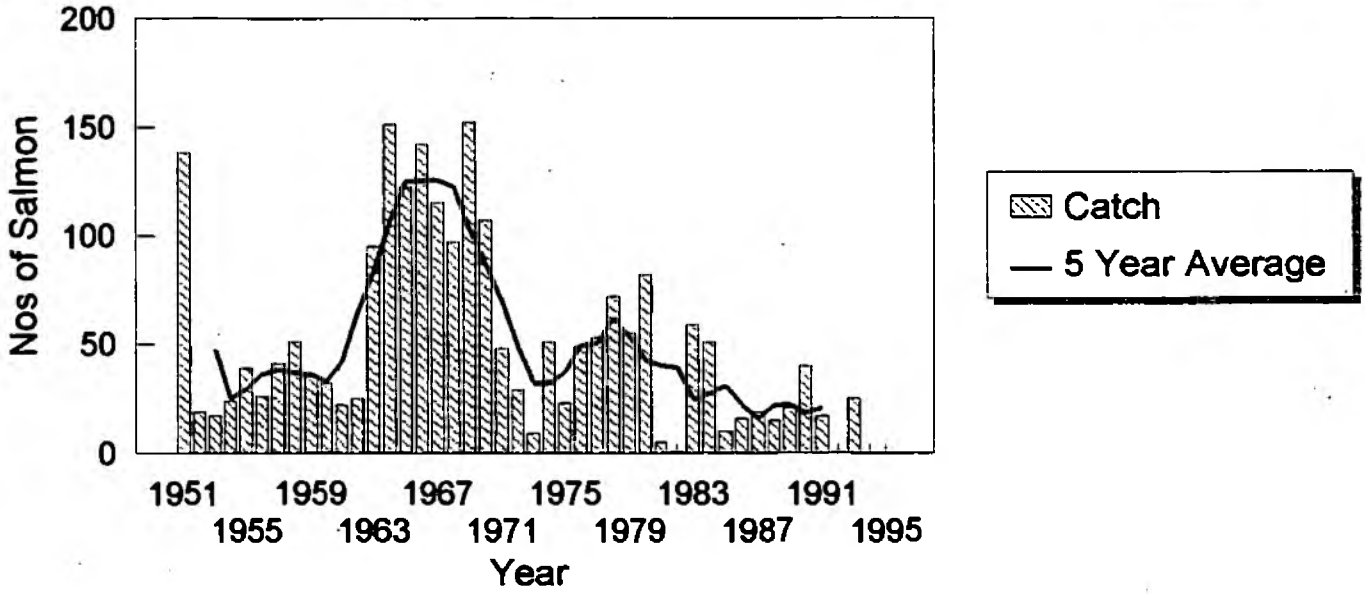
River Kent Declared Sea Trout Rod Catch



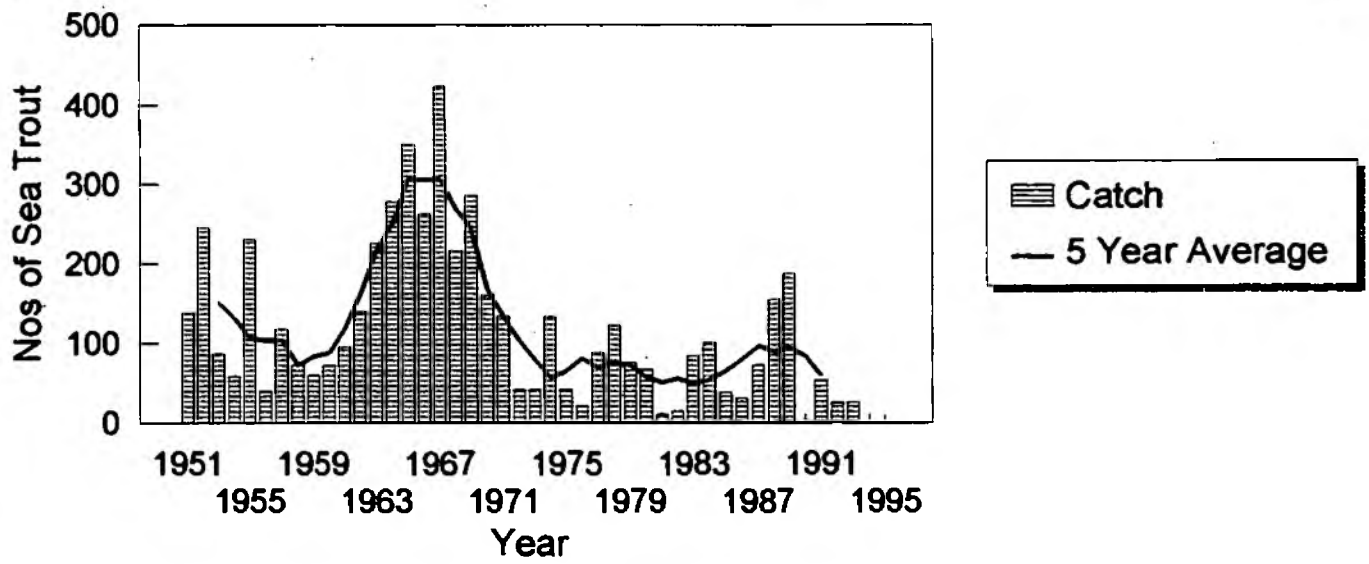

River Leven Declared Salmon Rod Catch
Nos of Salmon
200
150
100
50
0
1958
1962
1966
1970
1974
1978
1982
1986
1990
1994
Year
Declared Catch
5 Year Average

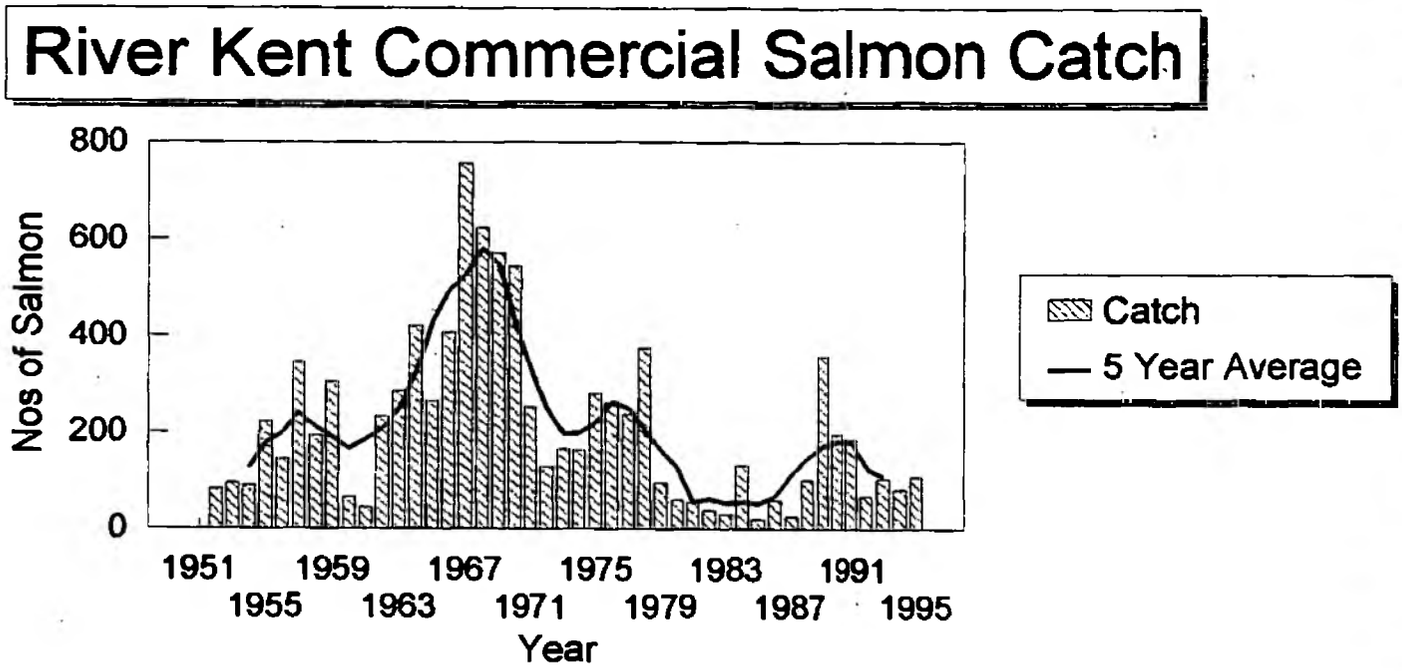

River Leven Declared Sea Trout Rod Catch
Nos of Sea Trout
800
600
400
200
0
1958 1962 1966 1970 1974 1978 1982 1986 1990 1994
Year
Declared Catch
5 Year Average

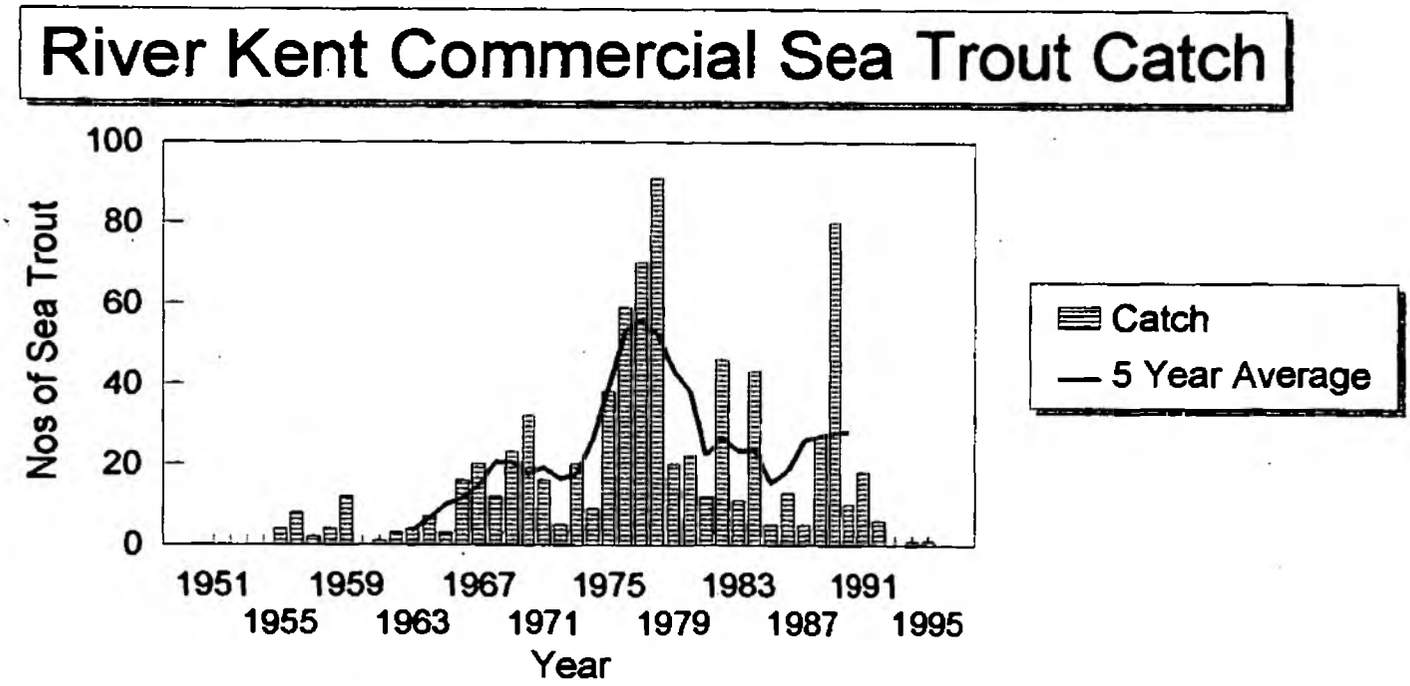
River Duddon Commercial Salmon Catch



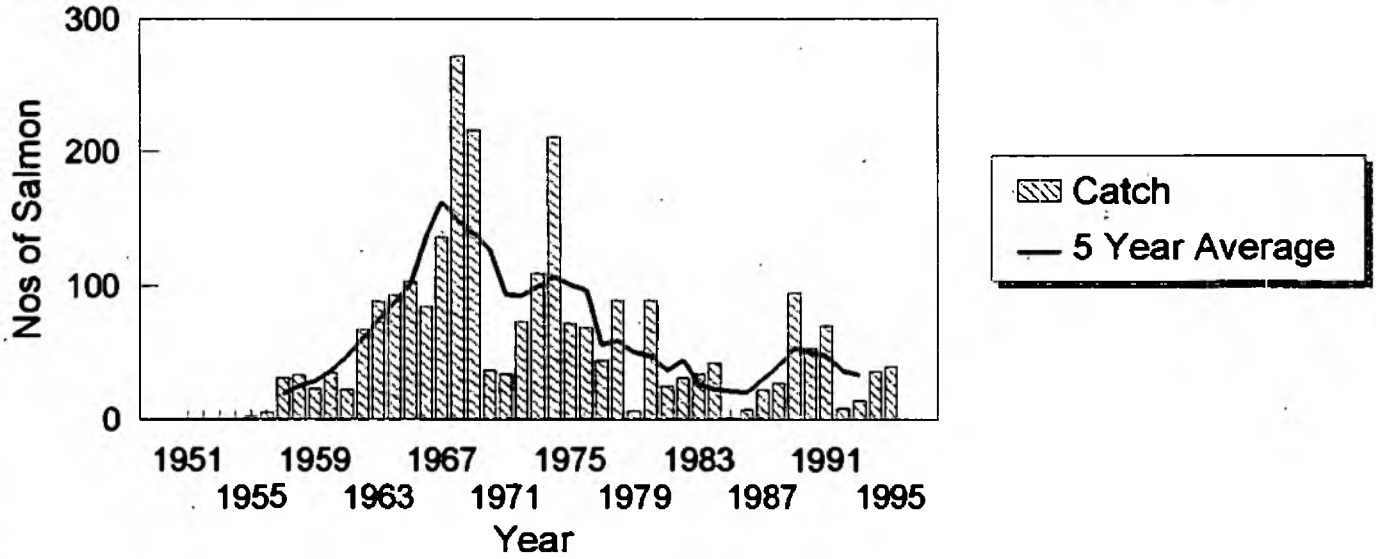
River Duddon Commercial Sea Trout Catch



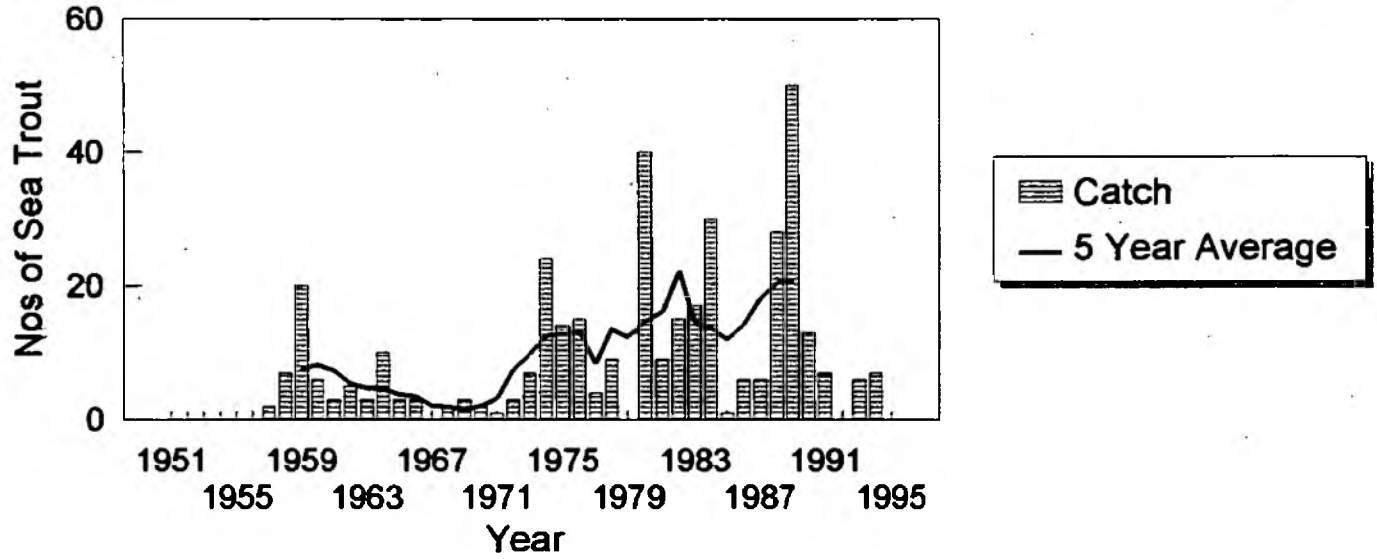

River Kent Commercial Salmon Catch
800
600
400
200
0
Nos of Salmon
1951
1955
1959
1963
1967
1971
1975
1979
1983
1987
1991
1995
Year
Catch
5 Year Average


River Kent Commercial Sea Trout Catch
100
80
60
40
20
0
Nos of Sea Trout
1951
1955
1959
1963
1967
1971
1975
1979
1983
1987
1991
1995
Year
Catch
5 Year Average

River Leven Commercial Salmon Catch



River Leven Commercial Sea Trout Catch



Appendix 4 - Flood defence standards of service land use bands

Land Use Band	Description of Typical Land Use
A	A reach containing the urban elements of residential and non-residential property distributed over a significant proportion of its length, or densely populated areas over some of its length. Any agricultural influence is likely to be over-ridden by urban interest. Amenity uses such as parks and sports fields may be prominent in view of the flood plains's proximity to area of population density. Band A = 50 or more house equivalents/km.
B	Reaches containing residential and/or non-residential property either distributed over the full length of the reach or concentrated in parts but characterised by lower densities than Band A. Band B = 25 to 49.99 house equivalents/km.
C	Limited numbers of isolated rural communities or urban fringe at risk from flooding, including both residential and commercial interests. Band C = 5 to 24.99 house equivalents/km.
D	Isolated, but limited number of residential and commercial properties at risk from flooding. Agricultural use will probably be the main customer interest with arable farming being a feature. In undeveloped pockets of largely urban use, amenity interests may be prominent. Band D = 1.25 to 4.99 house equivalents/km.
E	There are likely to be very few properties and major roads at risk from flooding in these reaches. Agricultural use will be the min customer interest with either extensive grassland or, where the flood plain extent is small, arable cropping being the most common land use. Amenity interests are likely to be limited to public footpaths along or across the river. Band E = 0.01 to 1.24 house equivalents/km.

Appendix 5 - Comparison of water quality criteria for general quality assessment and river ecosystem schemes

General Quality Assessment Scheme: Water Quality Criteria

GQA Grade	Dissolved Oxygen % Saturation	BOD (ATU) mg/l	Total Ammonia mgN/l
	10 percentile	90 percentile	90 percentile
A	80	2.5	0.25
B	70	4.0	0.6
C	60	6.0	1.3
D	50	8.0	2.5
E	20	15.0	9
F*	-	-	-

* Quality which does not meet the requirements of grade E in respect of one or more determinands.

River Ecosystem Classification: Water Quality Criteria

RE Class	Dissolved Oxygen % Saturation	BOD (ATU) mg/l	Total Ammonia mgN/l	Un-ionised Ammonia mgN/l	pH	Hardness mg/l CaCO3	Dissolved Copper µg/l	Total Zinc µg/l
	10 percentile	90 percentile	90 percentile	95 percentile	Lower limit at 5 percentile Upper Limit at 95 percentile		95 percentile	95 percentile
RE1	80	2.5	0.25	0.021	6.0 - 9.0	<10 >10 and <50 >50 and <100 >100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6.0 - 9.0	<10 >10 and <50 >50 and <100 >100	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6.0 - 9.0	<10 >10 and <50 >50 and <100 >100	5 22 40 112	3.020e+10
RE4	50	8.0	2.5		6.0 - 9.0	<10 >10 and <50 >50 and <100 >100	5 22 40 112	30 200 300 500
RE5	20	15.0	9.0			<10 >10 and <50 >50 and <100 >100	5 22 40 112	30 200 300 500

Appendix 6 - Asset management plan (AMP2)

North West Water Ltd's capital expenditure programme will address the following continuous and intermittent discharges in the first quinquennium (1995 to 2000)

Location	Intermittent / Continuous (I/C)
Barrow/Walney	C
Ulverston	C
Barrow High (Roosecote Sands)	I
Barrow High (Salthouse Pool)	I
Barrow High (Salthouse Pool)	I
Barrow High (Roosecote Sands)	I
Ulverston	I
Ulverston	I

Appendix 7 - Reasons for EC Bathing Water Quality Directive Failures

Bardsea

The Agency is examining a number of sources including sewage effluents, industrial effluents, and other water courses to the estuary, which may have led to the failure of the EC Bathing Water Directive at Bardsea. The main discharges are from North West Water Ltd (Ulverston STW) and Glaxo Wellcome. Discussions have been held with Glaxo Wellcome and a programme of improvements has been agreed which will be being implemented before the start of the 1997 bathing season. The Agency will continue to monitor the effects of the changes, and consider further measures if found to be necessary.

Aldingham

There are a number of inputs which may have contributed to the failures. These include a RBC and soakaway system serving a large nursing home, a surface water drain and public toilets which will be investigated to assess their impact.

Walney West Shore

Significant amounts of sewage litter have been found on the Walney beaches throughout the bathing water season. This fact, combined with high tides, suggests that the exceedances are an effect of the numerous crude discharges to the Walney channel rather than the new secondary treatment works at Barrow. Small local inputs, especially around Walney West Shore are not believed to be the dominant cause of failure, but they may be affecting compliance. A toilet block on Walney West shore has recently been inspected, but it proved to be not having an impact. Further investigations will identify all the inputs along the western and eastern shores of Walney and dye tracing surveys carried out on a spring tide will determine whether inputs to Walney channel impact Walney West shore beaches.

Askam-in-Furness

The failure of Askam-in-Furness to meet Bathing Water standards has been attributed technical problems with the UV disinfection system at Askam STW which has been operating below desired dose rates. The first exceedance at the works coincided with a reduced UV dose rate of $10mWs/cm^2$. NWW Ltd are to remedy the disinfection problems at Askam STW in preparation for the 1997 bathing water season.

Haverigg

Haverigg bathing beach is in a sheltered bay of Haverigg Pool. Haverigg Pool is contaminated with coliforms from domestic sewage inputs and intermittent farm pollution, which may be responsible for non-compliance with the directive. Pollution control staff will carry out a catchment campaign identifying and remediating point sources of farm and domestic sewage pollution. Additionally, the high level of rich organic sediment around the beach, which is disturbed during storm conditions, will be sampled to determine their coliform content and therefore their possible influence on bathing waters.

Mixing and dilution in the bay around Haverigg is also reduced due to the freshwater inputs from Haverigg Pool sitting on top of the saline water of the sea which could increase the likelihood of coliform contamination on the beach. There is no suggestion that the new secondary treatment works at Millom is causing the failure.

Appendix 8 - The Lakes Project

Grasmere

The main findings of the study on Grasmere were that the sediments, water column and main outflow all show signs of eutrophication, particularly in the south and east basins due to the impact of Grasmere STW. A short to medium term plan has been drawn up aimed towards achieving a water quality nearer to that which existed prior to the sewage treatment works becoming operational. This incorporates a desktop study to evaluate preferred options for sewage disposal. This issue is discussed on page 25

Coniston

The data collected shows that despite high nutrient loadings into the lake, particularly from Coniston STW, there was no evidence of nutrient enrichment compared to other more productive lakes, and no single significant nutrient source could be identified as the cause of algal blooms. The sediments were found to be copper-enriched as a result of past mining activity in the area and any future eutrophication could cause problems by releasing this copper into the lake. Short term and long term plans have been drawn up aimed at preventing any deterioration of water quality.

Elterwater

The study on Elterwater has highlighted hyper-eutrophication of the inner basin which Langdale STW discharges into. This has resulted in a reduction in water quality leading to total deoxygenation of deep water in the inner basin. The sediments on the lake bed are also heavily enriched in orthophosphate which will continue to cause problems for sometime following the removal of the sewage input.

Esthwaite

There are still concerns over nutrient levels in Esthwaite Water despite phosphate stripping being introduced at Hawskshead STW in 1986. Other inputs such as the contribution from the fish farm are currently being assessed and modelled for their relative contributions and impact. This will provide the basis for long term management.

Further details on the Lakes Project can be obtained from the Chertsey Hill office.

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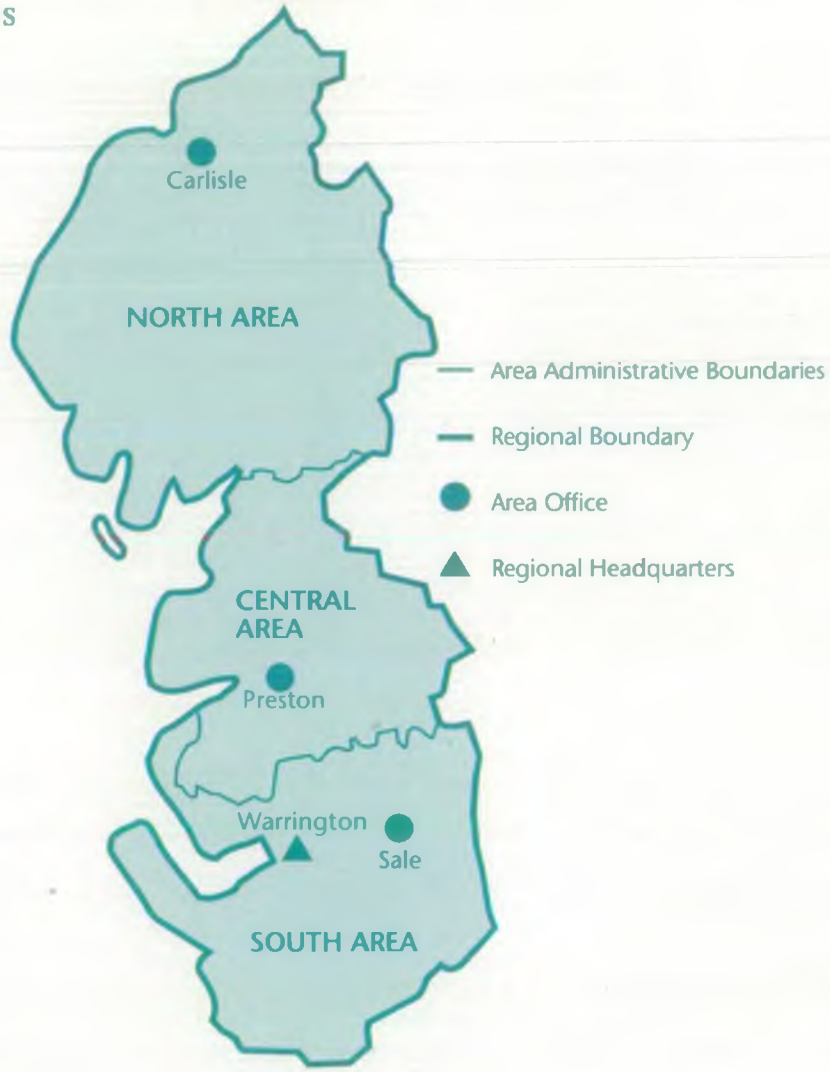

For general enquiries please call your local Environment Agency office. If you are unsure who to contact, or which is your local office, please call our general enquiry line.

ENVIRONMENT AGENCY GENERAL ENQUIRY LINE

0645 333 111

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

ENVIRONMENT AGENCY EMERGENCY HOTLINE

0800 80 70 60

ENVIRONMENT AGENCY

NW-3/97-1K-C-AXNY

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