local environment agency plan

GRIMSBY/ANCHOLME

DRAFT LEAP

JUNE 1999

ENVIRONMENT AGENCY

ENVIRONMENT AGENCY

key details

Total Area: 1100 km^2

Population:(approximate) 220,000

Main Towns and Populations:

Grimsby	91,000
Cleethorpes	35,000
Brigg	6,000
Barton	9,500
Humberston	5,500
Immingham	11,000
Waltham	6,300
Winterton	5,400
Broughton	5,000
Market Rasen	3,500

Environment Agency Organisation: Anglian Region (Northern Area) Area Office at Lincoln
Tel: 01522 513100
Catchment Office (Lincolnshire) Manby Tel: 01507 328102

Water Utilities Company: Anglian Water Services Ltd

Internal Drainage Boards: Ancholme, Lindsey Marsh Consortium (LOuth, Alford & Skegness)

Length of Statutory Main River: 249 km

Length of Navigable River: 33 km

Length of Coarse Fishery: 73 km

Length of Trout Fishery: 14 km

Length of Tidal Defence: 42 km

Water Quality:

Biological Quality Grades 1997	Grade	Length of River
	'Very Good'	20.4
	'Good''	41.4
	'Fairly Good'	40.7
	'Fair'	23.7
	'Poor'	33.9
	'Bad'	1.3

Chemical Water Quality 1997	Grade	Length of River
	Very Good'	
	'Good'	83.1
	'Fairly Good'	32.2
	'Fair'	35.8
	'Poor'	5.5
	'Bad'	4.8

Integrated Pollution Control Authorisation Sites: 32

Sites of Special Scientific Interest: 35

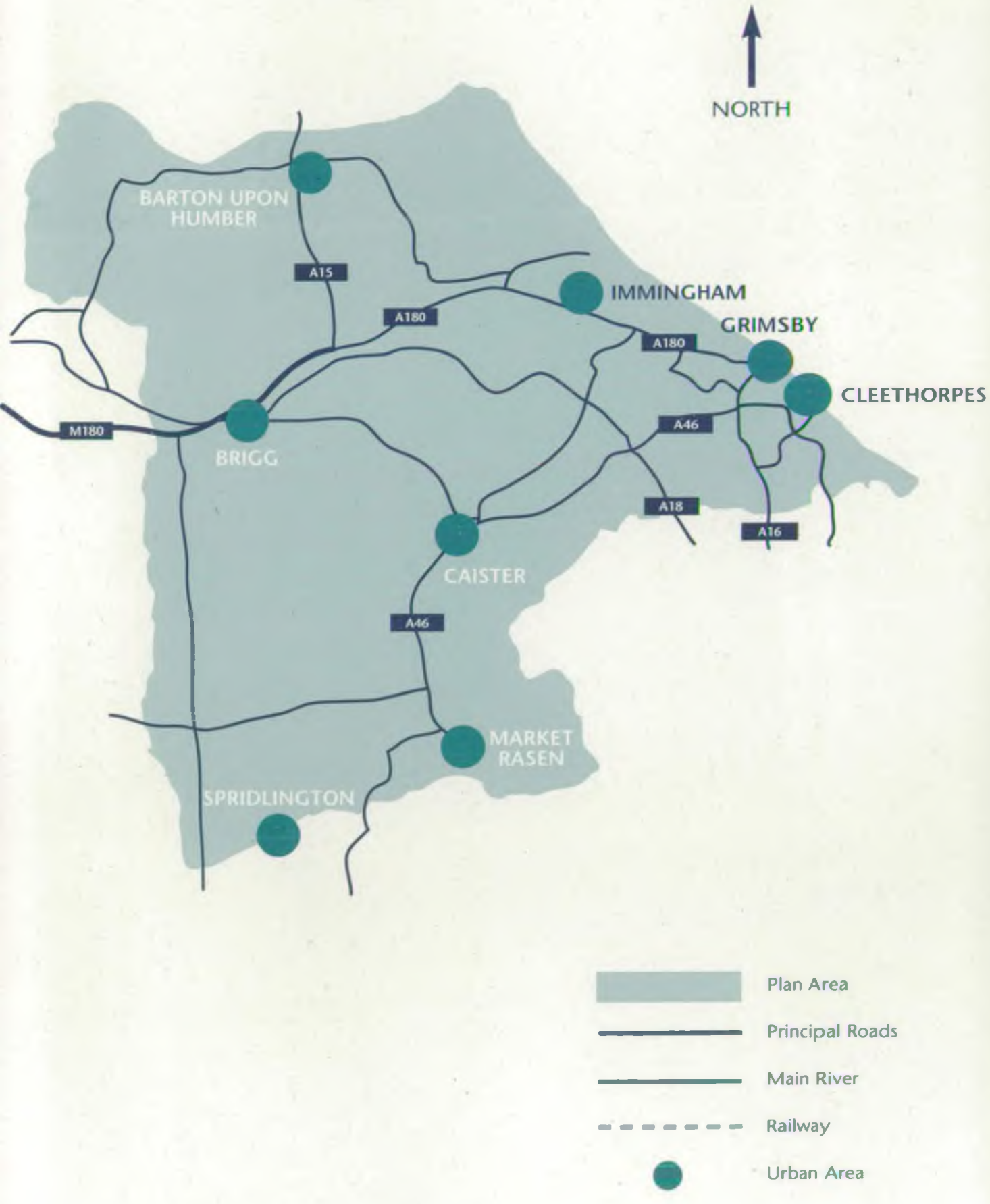
Waste Management Facilities:

Licensed Landfill Facilities	30
Licensed Transfer Stations	18
Licensed Treatment Plants	2
Licensed Scrap Yards	14

Water Resources:

Annual Rainfall (approx): 625 mm
Number of Licensed Abstractions:

Groundwater	86,870 TCMA
Surface water	40,062 TCMA


NORTH
BARTON UPON HUMBER
A15
IMMINGHAM
A180
A180
GRIMSBY
CLEETHORPES
M180
BRIGG
A46
A18
A16
CAISTER
A46
MARKET RASEN
SPRIDLINGTON
Plan Area
Principal Roads
Main River
Railway
Urban Area

your views

Publishing the Draft LEAP marks the beginning of the Consultation Period for the Grimsby/Ancholme area. This document highlights the issues we believe need to be addressed in this area.

We hope that this report will be read by everyone who has an interest in the environment in this locality. Your views will help us finalise the LEAP.

In particular, we want to hear your views on the following:

- **Have we identified the major issues?**
- **Have we identified all the potential options for action to resolve these?**
- **Do you agree with our Vision for the plan area?**
- **Have you any comments on the appearance and contents of the report?**

Please comment in writing to:

The Customer Services Manager
Grimsby/Ancholme LEAP
Environment Agency - Anglian Region Northern Area
Waterside House
Waterside North
Lincoln LN2 5HA

Tel: (01522) 513100 Fax: (01522) 512927

All comments should reach us by 1 October 1999.

Further copies of the publication are also available at the above address.

Please note: The next document in this series will be the Grimsby/Ancholme LEAP due December 1999.

VISION

The Grimsby / Ancholme area has a broad range of water related uses and needs. It has areas of concentrated urban, industrial, and agricultural development protected by both fluvial and tidal defences; conservation areas of national Importance; and the Chalk Wolds, which are an Area of Outstanding Natural Beauty. The diverse nature of this area, presents an opportunity to demonstrate that environment protection and improvement need not compromise wealth generation. The social improvements which both can bring could significantly enhance quality of life for all.

Our vision for this area is to create a pleasant and sustainable environment where people can live and work. This will involve the protection of high quality habitats and, where appropriate, work towards enhancing the environment. We aim to:

- ensure the water resources of the Chalk Aquifer are managed in a sustainable manner and protected from the adverse effects of over-commitment and pollution;

- improve the quality of rivers for the benefit of all uses,

- ensure that important urban, industrial and conservation areas are provided with effective flood defences;

- use initiatives such as Biodiversity Action Plans to realise opportunities for improving conservation value;

- reduce the emissions of potentially harmful releases to the environment from those industrial processes we regulate along the Humber Bank;

- educate the public in the awareness of the sustainable use of resources, particularly in terms of waste minimisation, water conservation and energy reduction.

CONTENTS

1. THE ENVIRONMENT AGENCY

Our aims are:

- to achieve major and continuous improvements in the quality of air, land and water
- to encourage the conservation of natural resources, animals and plants
- to make the most of pollution control and river-basin management
- to provide effective defence and warning systems to protect people and property against flooding from rivers and the sea
- to reduce the amount of waste by encouraging people to re-use and recycle their waste
- to improve standards of waste disposal
- to manage water resources to achieve the proper balance between the country's needs and the environment
- to work with other organisations to reclaim contaminated land
- to improve and develop salmon and freshwater fisheries
- to conserve and improve river navigation
- to tell people about environmental issues by educating and informing
- to set priorities and work out solutions that society can afford

We will do this by:

- being open and consulting others about our work
- basing our decisions around sound science and research
- valuing and developing our employees; and
- being efficient and businesslike in all we do

Introduction - The Environment Agency

The Environment Agency has a wide range of duties and powers relating to different aspects of environmental management. These duties together with those areas where we have an interest, but no powers in, are described in more detail in **Appendices1 and 2**. We are required and guided by Government to use these duties and powers in order to help achieve the objective of sustainable development. The Brundtland Commission defined sustainable development *"as development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*

At the heart of sustainable development are the integration of human needs and the environment within which we live. Indeed the creation of the Agency itself was in part a recognition of the need to take a more integrated and longer-term view of environmental management at a national level. We therefore have to reflect this in the way we work and in the decisions we make.

Taking a long-term perspective will require us to anticipate risks and encourage precaution, particularly where impacts on the environment may have long-term effects, or when the

effects are not reversible. We must also develop our role to educate and inform society as a whole, as well as carrying out our prevention and enforcement activities, in order to ensure continuing protection and enhancement of the environment.

One of the key outcomes of the United Nations "Earth Summit" held in Rio de Janeiro in 1992 was agreement by governments that, in order to solve global environmental problems, local action is crucial. We must all therefore think globally but act locally.

Local Environment Agency Plans

For our part at the local level we are committed to a programme of Local Environment Agency Plans (LEAPs) in order to produce a local agenda of integrated action for environmental improvement. These will also allow us to deploy our resources to best effect and optimise benefit for the local environment for the people who live there.

LEAPs help us to identify and assess, prioritise and solve local environmental issues related to our functions, taking into account the views of our local customers. The outcome of the process is a local programme of integrated action for environmental improvement in order to optimise benefit for the local environment.

LEAPs have evolved from Catchment Management Plans, which were produced by the former National Rivers Authority and build on their success by covering all the Agency's functions.

The LEAP process involves several stages as outlined below.

LEAP Draft Action Plan

The publication of the Grimsby Ancholme LEAP Draft Action Plan marks the start of a three-month period of formal consultation enabling external organisations and the general public to work with us in planning the future of the local environment.

At the end of the consultation period we will produce a Statement on Public Consultation which will summarise the views expressed in the consultation process.

LEAP Plan

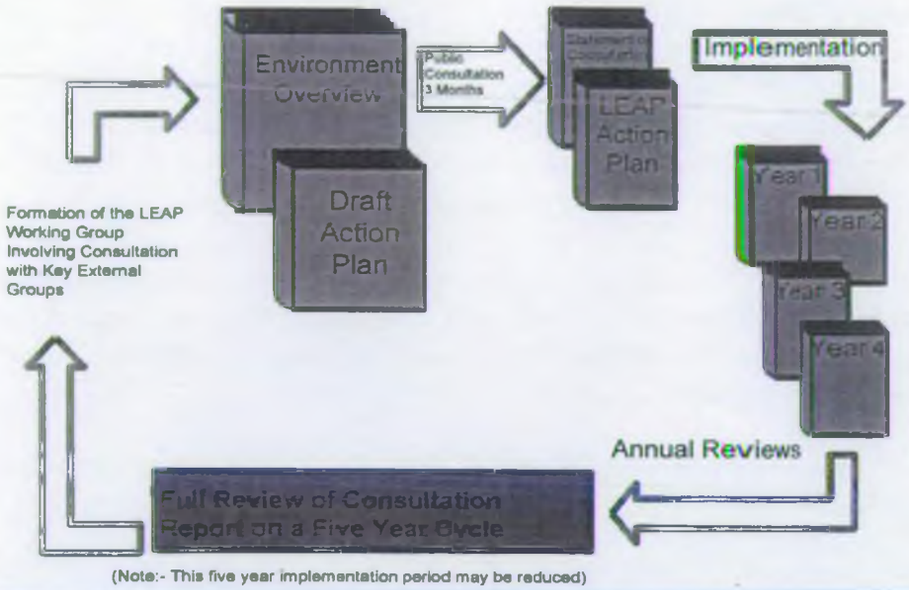
Following the consultation process a final LEAP will be produced (December 1999). This will be a 5-year plan identifying actions, costs and timescales for both the Agency and its partners to resolve the issues identified. Where appropriate, agreed actions will be incorporated into the Agency's annual business plans.

Annual Review

We will monitor implementation of the LEAP and report on progress in a published Annual

Review. The Annual Review will also identify any additional actions needed to maintain progress in light of any changes in the LEAP area and also remove or amend actions where they are no longer appropriate. After five years, or sooner if required, we will carry out a major review of the progress we have made. At this stage we will produce a new LEAP Consultation Draft to reflect these changes to further improve the local environment.

The LEAP Process



Thornton Abbey

2. THE GRIMSBY / ANCHOLME LEAP AREA

The Grimsby Ancholme area is located in the north of the old Lincolnshire County boundary, bounded to the north by the Humber Estuary. The area includes rivers draining off the Chalk Wolds across the coastal plain into the Humber, the largest of which are the Laceby Beck/River Freshney system and the East Halton Skitter Beck and the River Ancholme, whose tributaries rise in the Lincolnshire Limestone outcrop to the west and the Chalk Wolds to the east. The River Ancholme is by far the largest of the area's watercourses with its most distant source at Tealby, flowing some 50 kms to its outfall at South Ferriby.

The area is one of some contrast, both in terms of landscape and the degree of urbanisation/developmentwhich has taken place. The Chalk Wolds are an area of outstanding beauty, rising to some 168 metres above sea level. They consist of rolling countryside with upland rivers, streams and springs. To the east, the stacks and chimneys of the industrial development along the South Humber Bank dominate the skyline of the coastal plain, which have brought economic prosperity to the area. Together with the major urban conurbation of Cleethorpes and Grimsby, development has been closely linked to its proximity to the North Sea as a major route for trade with Europe and beyond, and the fishing and food industry. In contrast to this to the west of the Wolds lies the broad clay vale of the Ancholme Valley, a predominantly rural area with main population centres being the market towns of Brigg and Market Rasen, but including a small part of Scunthorpe at the western extreme of the area.

Despite the industrialised sector of the Humber Bank the vast majority of land use is agricultural, with large fields of productive soils supporting crops of cereal, potatoes, sugar beet and vegetables. Tree and woodland cover is sparse apart from around the edges of the area, for example, Twigmore and Willoughby Woods, Far Wood and Broughton Alder Wood (SSSI's).

The present character of the area has been and continues to be heavily influenced by its use for agricultural purposes. Large areas of fresh and saltwater marshes and meadows abundant with wildlife would once have dominated the historic landscape of the Ancholme Valley. These have been "reclaimed" for agricultural use with the construction of a comprehensive drainage network and the development of field systems. In a similar vein, extensive tidal defences have been constructed to protect the low-lying area of land to the north of Grimsby to facilitate its development for agriculture and in recent decades industrial development. Again, drainage systems to support this have been developed, with lowland water being pumped into watercourses such as the Buck Beck and StallingboroughNorth Beck.

Fluvial and tidal flood defence standards in the plan area generally meet indicative target levels for the land use involved, however there are a number of long term concerns which are currently subject to proposed flood defence improvement schemes. These include works along the River Rase where we are proposing to raise standards by improving the indicative standard of defence (to protect against flooding) from a 1:20 year standard to a 1:75 year standard, and works along the River Freshney at Freshney Bog and along the Ancholme at Brigg Island where we are hoping to provide protection to a 1:100 year standard. Where flood defence standards are provided at the 1:100 year standard, it means that the likelihood of such a flood level being exceeded has only a

1% risk of occurring in any one year. There has been some concern voiced regarding the standard of existing flood defences along rural lengths of the Ancholme, but improvement works cannot be justified using current cost/benefit criteria. The Agency aims to minimise the risk to people and property from flooding for new properties by discouraging future development away from areas where that risk exists

Shortfalls in tidal defences exist along isolated lengths protecting land used predominantly for agricultural purposes, these are being resolved through a tidal defence strategy which we have developed for the Humber Estuary, as a whole. Lengths between Winteringham and South Ferriby have been improved over the last 12 months as part of our Urgent Works Programme and works between Immingham and Grimsby have been scheduled for next year.

In conservation terms habitat diversity along river channels and adjacent corridors is relatively poor. The historical modifications to rivers and steams for land drainage and navigation purposes (Ancholme) have resulted in uniform channel structure and a subsequent loss of diverse plant communities and natural fenland habitat. This is reflected in poor bio-diversity levels although, paradoxically, fish populations in the Ancholme remain excellent. Low flows in most watercourses as a consequence of low annual rainfall, compounded by levels of abstraction exacerbate the impact of this upon flora and fauna. Many of the area's watercourses - most notably the Ancholme, Land Drain and Freshney, suffer from nutrient enrichment. This causes prolific plant growth which can impact dissolved upon oxygen levels in the watercourses and subsequently dependent flora and fauna. These nutrients originate primarily from leachates from agricultural land, from sewage treatment works effluent and from surface water run-off from roads.

There remain however a few isolated lengths of watercourse of conservation value. These include a number of spring fed streams and flushes which emerge from the Chalk Wolds to form tributaries to the Rivers Ancholme and Rase, such as at Elsham Marsh (site of nature conservation importance) and Wrawby Moor SSSI. Such feeders are untypical of the greater proportion of ponded main watercourses, they contain lengths of rapid flow with riffle and pool systems supporting rich chalk stream fauna of regional and national importance. On the coast at Barrow and Barton are flooded and abandoned clay pits, now designated a SSSI, these wetland features support large stands of reedbeds and are noted for the presence of the rare Wainscot moths and for a wintering Bittern population. Immediately adjacent are the Humber Flats and Marshes RAMSAR/SPA sites which support waders and wild fowl on an internationally important scale.

Average annual rainfall in the catchment is 625 mm, supporting two significant aquifers, the Lincolnshire Limestone and Chalk Wolds. The main surface water resource is the River Ancholme.

The Chalk aquifer is regionally important for public water supply and to meet the industrial needs of the Humber Bank; industrial demand is met from both direct abstraction and from public supplies. This aquifer is heavily abstracted and there are concerns over impacts on the fishery and conservation interests which rely upon Chalk springflows. These concerns are particularly acute following periods of low rainfall. The Lincolnshire Limestone aquifer which forms the western boundary of the area yields less water than the Chalk, but provides base flow to the River Ancholme and meets demand for public water supply, industrial, agricultural and spray irrigation.

Water resources are supplemented by two major water resource developments which import water into the area. These are from the Covenham Reservoir, which is fed from the River Lud/Louth Canal and Great Eau system, and from Cadney Reservoir, fed from the Trent/Witham/Ancholme water transfer scheme.

Both aquifers are considered fully committed and no additional water can be licensed. However, with the introduction of water demand initiatives such as metering and leakage control, it is anticipated the combination of groundwater and surface water resources from outside the catchment will be sufficient to meet future forecast demand.

The general chemical quality of watercourses is good to fair, though biologically the picture is less healthy with some 21% being of poor quality (this compares with 6% poor quality chemically).

The Chalk Wolds: Area of Outstanding Natural Beauty

Water is influenced by the quality of surface water run-off from agricultural land and industrial areas. River quality surveys indicate water quality has shown a steady improvement since the 80's. The ability to augment the flow in the river during periods of low flow helps to reduce both the impacts of eutrophication and in the management of saline ingress which occurs into the Ancholme through the tidal structure at South Ferriby.

Water quality is monitored against targets set by the Agency (and legislation). Apart from lengths of the Laceby Beck, which fail these targets - for reasons associated with eutrophic conditions, 3 other watercourses fail to meet their targets. The East Halton Beck is affected by ammonia contamination from agricultural and small industrial sources; the River Freshney is affected by leachate from the Macaulay Lane landfill site and the New Cut in Grimsby is affected by surface water run-off from industrial areas.

The quality of groundwater in the catchment is generally good. However, agricultural

activities within the southern part of the catchment have led to the presence of high nitrate concentrations in surface waters and groundwaters. Nitrate is a chemical of concern in the aquatic environment, it contributes to eutrophication and at elevated levels it has to be removed from raw water by the water undertaker (in this catchment Anglian Water Services Ltd) when it is intended to be used for drinking water purposes. The Government have designated parts of this catchment as Nitrate Vulnerable Zones. Farmers within these areas have a statutory obligation to comply with action programmes based on the MAFF Code of Good Agricultural Practice for the Protection of Water. This means for example, that fertiliser applications must be determined by crop uptake, timing in relation to crop growth, soil conditions etc. As a result a reduction in ground and surface water nitrate levels is anticipated.

Groundwater is also at risk from contamination from the inappropriate disposal of agricultural waste products (such as pesticides and slurry) and spillages of fuels (such as aviation fuel from the Kirton Lindsey MoD site). The proposed development of Macaulay Lane landfill site continues to concern the Agency because of the potential it has to contaminate the chalk aquifer below.

Emissions to the atmosphere from industrial processes are regulated to minimise their impact their impact on the environment. Along the South Humber Bank 32 processes are regulated by the Agency using Integrated Pollution Control authorisations. These include combustion processes, petroleum processes such as oil refinerys, chemical processes and incineration. All emissions meet the prescribed standards set in their authorisations and no release is permitted which will breach Environmental Quality Standards. A further range, of less polluting emissions, are regulated by local authorities who have overall responsibility for managing air quality. Emissions from road traffic have a wide range of environmental effects, geographically direct effects are normally limited in the vicinity of roads however they can react with other pollutants to form smogs.

Industry along the Humber Bank

Locally our understanding of air quality standards is hampered by the lack of air quality monitoring stations. Proposals to construct a new power station at Killingholme, and another to construct a waste incinerator, may raise public concern in the future.

Within this area landfill continues to be the major disposal route for waste disposal with two large co-disposal sites at Immingham and Winterton. These accept a combination of household, commercial and industrial wastes. A third landfill site at Roxby takes inert and domestic waste generated both locally and from Manchester. A number of factory sites along the Humber Bank also have their own 'in-house' industrial waste landfills.

In the search for a more sustainable approach towards waste disposal, innovative schemes are underway for developing soil substitutes from waste materials, establishing wild flower banks on waste peat/compost products, and comparing tree growth rates in different soil substrates. At Winterton Landfill, methane, produced by the normal anaerobic breakdown of waste materials, is being recovered and used in an electricity generation scheme. It is estimated that this electricity is sufficient to power 5000 to 7000 local homes. Similar schemes are hoped to be established at Immingham and Roxby landfills. Recycling of household waste is actively encouraged at Civic Amenity sites within the area which can accept paper, glass bottles, cans, plastics, textiles, oil, car batteries and scrap metal. Licensed waste transfer stations and metal recycling facilities also contribute to the recycling of materials such as cardboard, wood, concrete, brick rubble, scrap metal and vehicle batteries.

Flytipping and the burning of waste remain ongoing issues in this area especially in urban areas such as Grimsby.

Water based recreational use of the area is growing with activities focused along the Humber Bank and Ancholme valley. A wide range of facilities are available including footpaths and marinas and other watersport areas. Angling remains a popular activity locally, despite the perception of falling numbers involved with river angling. The Ancholme is an important fishery and there are growing numbers of recreational fishing lakes, at Toft Newton reservoir near Market Rasen trout are stocked for recreational fishing purposes. The River Ancholme is a designated navigation which has benefited from a range of recent improvements in facilities which have added to its recreational value. The ongoing restoration of Harlam Hill Lock, soon to be completed, will extend its length by some 4kms. Other water-based activities along the Ancholme include canoeing, cruising and rowing.

3. ISSUES AND PROPOSED ACTIONS

In September 1997 the Environment Agency produced a document entitled 'An Environmental Strategy for the Millennium and Beyond'. This strategy is essentially based upon the need to take an integrated approach to the management of the whole environment. In producing this Plan we have therefore used the principal and immediate concerns set out in the *Strategy* to group the Issues and show how LEAPs utilise integrated action for local environmental improvement.

Our principal and immediate environmental concerns in the Grimsby Ancholme area relate to:

•Managing our water resources.

•Enhancing biodiversity.

•Managing our freshwater fisheries.

•Delivering integrated river. -basin management

•Conserving the land.

•Managing waste.

•Regulating major industries

•Improving air quality

•Addressing climate change

The captions shown are used in the Issues section to denote the inter-relationships of issues.

TITLES OF LEAP ISSUES

Managing Our WATER RESOURCES

1a Groundwater abstraction from the "Northern Chalk" aquifer, at times, exceeds available resources.

1b Water quality of the Lower Ancholme is adversely affected by saline intrusion.

Enhancing BIODIVERSITY

2a There has been a significant reduction in the area of, and species associated with, river and wetland habitats.

2b The introduction of invasive alien plants and animal species threaten the ecological diversity of our natural environment.

Managing Our FRESHWATER FISHERIES

3a Fish biomass and species diversity, fall below target levels in some watercourses.

Delivering INTEGRATED RIVER-BASIN MANAGEMENT

4a Members of the public place themselves in danger by swimming in the River Ancholme.

4b Inadequate local sewerage systems in some villages result in localised pollution and may have public health implications.

4c Development on areas of contaminated land has potential to pollute, but provides the opportunity to clean up existing problems.

4d Nitrate concentrations in ground and surface water exceed, or are expected to exceed 50 mg/l.

4e Groundwater resources are threatened by pollution incidents.

4f Routine chemical and biological monitoring indicates poor water quality in a number of watercourses.

4g Nutrient enrichment of watercourses impacts on water quality, affects flora and fauna and other uses of water, such as navigation, amenity and fishing. River ecosystem quality targets can be compromised.

Conserving the LAND

5a Standards of flood protection on lengths of river systems do not meet target standards.

5b At certain locations our flood warning target of two hours prior notice are not met.

5c The standard of protection against flooding from the Buck Beck at Cleethorpes and Barrow Beck at Barrow on Humber is uncertain.

Managing WASTE

6a The illegal disposal of waste poses a risk to health and safety.

6b The storage and illegal fly tipping of tyres forms a pollution risk to the environment.

6c The aesthetic quality of some lengths of watercourse in urban areas is poor.

Presentation of Issues

The boxes at the beginning of each Section set out the Agency's strategic actions and policies that address some of these challenges. The individual Issues reflect local weaknesses against these aims. Our intended approach for dealing with these challenges is set out in the following text and tables, which show:

- The **Title** of the Issue.
- Supporting **background text** to explain the Issue.
- Preferred and alternative **Options** for resolutions of the Issue. (Preferred options where identified are shown in bold italics)
- Responsible **organisations** who will implement the proposed activities, either in a lead role or in partnership with others.
- Comments.

The following points should also be noted:

- Our everyday work commits substantial resources to monitoring and managing the environment. This work is explained briefly at Appendices 1&2.

- Should more Issues become apparent during the Consultation Period, they will be incorporated into the final Action Plan as appropriate.

- The Issues and Options are not presented in any order of priority and the Options are not mutually exclusive.

1. Managing our WATER RESOURCES

Agency Operational and Strategic Actions are to:

- demand a more efficient use of water by the water companies and by industry in general;
- encourage a more efficient use of water by the public and a change in public attitude to water usage;
- promote "best practice" and will work with others in specifying technical approaches or standard methodologies in relation to water resource issues of relevance to the Agency;
- promote the development and sale of low-water-usage domestic appliances, supported by legislative changes, if necessary;
- demand reductions in leakage by the water companies before considering any cases for investment in new reservoirs;
- support the imposition of compulsory selective metering where water supplies are under stress and where meters are economically sensible to install;
- support the voluntary acceptance of water meters when accompanied by other water-saving incentives for the Customer;
- vigorously apply our Groundwater Protection Policy to ensure that the quality and use of our groundwaters is improved;
- examine water transfer schemes carefully to ensure that no environmental damage would result from their introduction;
- not approve the exploitation of new environmental resources until water saving measures have been introduced;
- implement the current programme of alleviating low-flow rivers as quickly as possible;
- seek new legislative powers to reform the use of 'licences of right' to extract water from the environment;
- seek new powers to facilitate the inter-basin transfer of water, and for the open and transparent provision of plans and information relating to such schemes in order to broaden the public debate on these important issues;
- ensure that the practical limitations arising from water supply and treatment are fully considered by providing planning authorities with all information relevant to new housing or industrial developments;
- ensure that the UK's experience and needs are reflected in the scientific and technical discussions within the development of the EC's *Water Framework Directive*;
- ensure that all environmental needs are fully taken into account within the next Asset Management Plans (AMPs) negotiations with the water companies; and,
- research into more efficient methods for the management of water, and into the potential risks for the aquatic environment arising from its mis-management.

Issue 1a Groundwater abstraction from the "Northern Chalk Aquifer", at times, exceeds available resources

Background

The Lincolnshire chalk aquifer is the main source of groundwater in the Plan area, providing important local supplies for public water supply, industrial, agricultural and spray irrigation purposes. The aquifer is heavily abstracted and in all but above average recharge years, its resources are insufficient to enable all licence holders to abstract water to their full entitlement. Although actual abstraction is less than total licensed water quantity, there can be impacts to various degrees on river baseflows, blow wells and other groundwater dependent features. In addition, migration of saline water into the aquifer can occur. Consequently, during periods of average and below average rainfall, there will be impacts on abstractors and on the fishery and conservation interests that rely upon chalk springflows.

Existing management of the aquifer is currently achieved with the assistance of a groundwater model. The groundwater model provides an understanding of the relationship between rainfall, recharge, groundwater levels, saline intrusion, river flows and water abstraction. We will be reviewing and updating this model over a three year period beginning winter 1999, which will result in a better understanding of the aquifer/surface water system and improved water resource management.

In 1995, we entered into a water management agreement with Anglian Water Services (AWS), the largest abstractor in the area. The agreement allows for variations in the actual water quantity abstracted dependent upon the 'health' of the aquifer, to minimise saline intrusion and benefit dependent watercourses.

AWS have also installed and tested a river support borehole on the Laceby Beck. This abstraction, once licensed by the Agency, will be used to support flow in the Laceby Beck/River Freshney during periods of low flow. In addition, AWS have made a bid to The Office for Water Services (OFWAT), through the water industry 5 year investment process, to secure funding for one other river support borehole in the Plan area, at a site to be determined following further investigation and dialogue with us.

Achieving the right balance between abstraction and the needs of the environment is limited by a poor understanding of the relationships between river and groundwater flow, the ecological health of a river and its physical characteristics. The long term ecological implications of the groundwater resource situation are unclear, partly due to a lack of ecological data on impacts. Our staff are developing a methodology (LIFE) which will allow a better assessment to be made of the flow needs of a watercourse which will assist in achieving the right balance between abstraction and the environment. Whilst the methodology is not yet complete, interim proposals within the life of the Plan will be possible.

Effects

Without proper management and understanding of the aquifer resource, groundwater quality along the coast can deteriorate and watercourses/blow wells with their associated flora and fauna, can be impacted to a greater degree than necessary.

Options	Responsibility	Comments	Themes
Enter into a further Water Management Agreement when the current agreement ends (year 2000).	*Agency* *AWS*	*Facilitates:* *better management of water resources; flexible management of abstraction in response to prevailing aquifer condition.*	
Review and further develop groundwater model for the aquifer.	*Agency*	*Improves understanding and ability to manage resource to optimum benefit for water supply/environment.*	
Carry out further field investigations and install a river support borehole if appropriate. Timing may depend upon funding.	*Agency* *AWS*	*Improves understanding of watercourse flow needs.* *Permits a minimum flow to be maintained in a watercourse when required.*	
Apply 'LIFE' study methodology when available.	*Agency*	*Improve holistic understanding of river ecosystem to ensure sustainable long-term management.*	
Do nothing		Reduced costs. Unsustainable management of the chalk aquifer.	

Issue 1b Water quality of the lower Ancholme is adversely affected by saline intrusion

Background

The River Ancholme is used extensively for abstraction for industry, agriculture and public water supply. It can be augmented by transfers of water from the Trent-Witham-Ancholme River Transfer Scheme (TWA), which helps to support a variety of uses within the Plan area in addition to maintaining river levels and minimum flows.

In the lower reaches of the Ancholme, during periods of low flow, saline water can migrate upstream affecting the quality of water available for abstraction, it can result in fish mortalities and adverse changes to the ecological balance of the river. The primary source of this salinity is thought to be ingress through the tidal structure at South Ferriby during lock operations. Water quality samples are taken downstream and upstream of the tidal structure on a regular basis.

We currently manage saline intrusion on the Ancholme at South Ferriby by a combination of measures. These include transferring saline water from the lock/sluices into the West Drain, the management of residual flows, lock operation procedures and the use of bubble curtains (perforated pipework located on the channel bed through which air is pumped).

The inputs, outputs and flows of the Ancholme are not understood sufficiently well to enable us to manage river flows, river transfers and the upstream migration of saline water, efficiently. We are currently reviewing water quality and ecological monitoring data, in order to better define the current extent of the saline intrusion problem.

Effects

Increased salinity will, over time, result in a change in flora and fauna in the affected watercourses. There will be a loss of salt intolerant species and dominance of salt tolerant or brackish water species. Without further understanding of flows in the River Ancholme, the saline intrusion and the resultant impact on water quality and the river ecology will remain difficult to manage.

Options	Responsibility	Comments	Themes
Install a river gauging site on the Lower Ancholme.	***Agency***	***Improves knowledge of river flow for resource assessment and environmental requirements. Dependent upon the regional strategy review of gauging sites.***	
Carry out a hydrological review of flows, discharges and abstractions to / from the Ancholme to improve our management of the existing resource	***Agency***	***Quantitative and qualitative understanding of the overall water balance achieved. Improved reliability of supply to customers.***	
Installation of a continuous salinity monitor linked to telemetry upstream of the bubble curtain.	Agency	Improved early warning system for changes in water quality.	

South Ferriby Lock and Tidal Outfall

2 Enhancing BIODIVERSITY

Agency Operational and Strategic Actions are to:

- play a full part in implementing the EC *Habitats Directive*;
- play a full and active part in delivering the UK's Biodiversity Action Plan by acting as the 'contact point' for 17 species of aquatic animals and plants, and by acting as the 'lead partner', either singly or in collaboration with others, for ten of them;
- ensure that all aspects of the Biodiversity Action Plan are incorporated into the Agency's guidance and become part of its Local Environment Agency Plans;
- implement a series of projects, in partnership with local conservation groups, to deliver biodiversity targets at specific sites;
- allocate specific resources to conservation projects aimed at increasing biodiversity;
- control eutrophication, where feasible, in order to enhance biodiversity;
- improve the management of wetlands for conservation purposes;
- use and promote best environmental practice for the protection and restoration of river habitats;
- develop and set conservation criteria for all of the Agency's environmental licensing activities;
- implement specific projects to restore habitats in rivers and lakes, increase the area of reedbeds and other water plants, and improve river banks;
- ensure that there is no deterioration in the quality of the aquatic environment in particular, and deliver significant improvements in river and still water quality by tackling diffuse pollution of them; and,
- carry out research into the management of species in the aquatic environment in order to meet fully all biodiversity action plan targets.

Damselfly

Issue 2a **There has been a significant reduction in the area of and species associated with river and wetland habitats**

Background

Man's influence over the last three hundred years, has had a profound effect upon the wetland habitat and particularly that of the Ancholme valley. Serious attempts to drain the marshes and low fens began in 1635 by Sir John Manson, but as late as 1830, 5-6,000 acres were still flooded each winter. Over the last century intensive agricultural practices have resulted in the land being fully drained to increase its productivity and economic value. One consequence of this has been the loss of environmentally important wetland habitat along with its associated flora and fauna. The habitat of rivers has also been degraded by canalisation and flood defence works which have widening and straightened river channels and by the construction of embankments, thus reducing the frequency of inundation of wetland habitat and the ecological value of river channels and banksides.

Habitats are fundamental to supporting a wide range of dependent fauna and flora and as Local Biodiversity Action Plans are developed, the maintenance and creation of habitat will be a significant factor to their success. Wetland habitats are ecologically sensitive, dependent on water input from surface and groundwaters and susceptible to changes in water quality. Reedbed, natural fen, meadows, wet pasture and floodplain woodland, can support a wide variety of common as well as rare species such as otters, bittern and various species of wading birds.

Chalk streams, fens, reedbed and wet grassland are some of the habitats listed as 'high priority' in the UK Biodiversity Action Plan. The Agency have been given responsibility as a contact point for 'chalk river habitats' and a number of species including otter, water vole and the Atlantic stream crayfish.

Effects

The reduced number of wetland sites throughout this Plan area, along with their fragmented nature has put a great deal of pressure upon species associated with this type of habitat.

(i) General Habitat Enhancement

Options	Responsibility	Comments	Themes
Support management schemes to conserve and enhance existing wetland habitats.	*Agency, IDB, Landowners, Conservation bodies, FWAG*	*Aids the protection of existing wetlands. Potential conflict of resource usage*	
Prepare and implement local Biodiversity Action Plans for river and wetland species and habitats.	*Agency, County Biodiversity Action Plan Groups*	*Focuses conservation work to benefit threatened species and habitats.*	
Collaborate with landowners to consider restoration of wetland habitats.	*Agency, Landowners FWAG, FRCN, Wildlife Trusts*	*Conservation and enhancements of wetland habitats. Benefits endangered species such as otter and water vole.*	
Support and encourage restoration of habitats such as reedbeds, fens and other wetland areas	*Agency, Landowners, RSPB, Wildlife Trusts*	*Enhancement of the wetland habitat resource. Benefits endangered species such and water vole*	
Introduce habitat enhancements during both routine maintenance and capital works	*Agency*	*Furthers conservation in the Catchment, leading to increased biodiversity,*	
Encourage landowners to operate buffer zones/set aside/stewardship.	*Agency, Landowners, Countryside Agency, MAFF, FWAG*	*Increased plant and habitat diversity. Shared costs. Grants/funding may be available from other bodies. Recreation and amenity value enhanced.*	
Encourage farmers to graze embanked watercourses and adjacent grassland with stock on selected sites.	*Agency, Landowners*	*Increases plant species diversity. Reduces maintenance costs for Agency. Conflict of interest between tenant and other river users.*	

Habitat enhancement work – Barton Claypits

(ii) Chalk streams

Chalk rivers form a valuable conservation and amenity resource throughout the Plan area. The term 'chalk rivers', is used to describe all watercourses dominated by groundwater discharge from chalk geology. The chalk influence gives rise to a distinctive hydrochemistry and flow regime, creating characteristic assemblages of plants and animals. Chalk rivers in the Plan area include lengths of the Laceby, Barrow, East Halton, Keelby and Skitter Becks, and the River Rase. Some of these watercourses have been dredged and suffer from low flows (see Issue 1a). Fish species that were historically present, such as Brown Trout are often absent or only present in isolated stretches of river.

We will be undertaking a study to produce a definitive list and definition of chalk rivers in the Plan area and to identify key issues and a preliminary action plan for each river. The ultimate aim is to maintain and protect good sections of chalk river and to restore low quality stretches.

Options	Responsibility	Comment	Themes
Undertake and implement chalk river study for Lincolnshire as part of the "National Habitat Action Plan for Chalk Rivers"	Agency	Increased understanding and identification of chalk rivers, leading to better long term management of the resource.	
Do nothing		Potential loss of chalk river habitat.	

(iii) Water vole

The water vole is found in lowland areas near water throughout the Plan area. Once common and widespread, this species has suffered a significant decline in numbers and distribution. As the lower reaches of rivers become unsuitable for habitation, the distribution of water voles becomes discontinuous and existing sites become isolated and vulnerable. Factors causing the decline include the loss, fragmentation and disturbance of riparian habitats, predation by mink and pollution of watercourses.

Options	Responsibility	Comments	Themes
Undertake study to assess distribution of water vole in the Plan area	***Agency***	***Ensures effective targeting of water vole conservation measures.***	
Help in the preparation and implementation of local Biodiversity Action Plans for the water vole.	***Agency, English Nature, Lincolnshire Wildlife Trust***	***Helps in the protection of the water vole in the Plan area.***	
Restore/improve water vole habitat wherever possible during flood defence works and/or river enhancement schemes.	***Agency***	***Helps to protect the water vole and associated flora/fauna.***	
Do nothing		Possible loss of water vole from Plan area.	

(iv) Otter

The otter was once widespread in the area but underwent a rapid decline in numbers since the 1950s. It is now reduced to only a small fraction of its original population. The decline has been attributed to a number of factors, including disturbance, the destruction of waterside vegetation and bankside habitat features, river engineering works, insufficient prey associated with poor water quality and road deaths.

Work is going on to re-establish otters in the catchment including the construction of two artificial otter holts.

Options	Responsibility	Comments	Themes
Assess the current distribution of otters	*Agency, English Nature, Lincolnshire Wildlife Trust*	*More comprehensive understanding of the current population status of the otter in the Plan area.*	
Help in preparation and implementation of local Biodiversity Action Plans for the otter.	*Agency, County BAP Groups*	*Conservation of the otter.*	
Continue with habitat enhancement schemes.	*Agency, Wildlife Trust, English Nature*	*Conservation of the otter and other species. Fish may suffer from increasing otter populations.*	
Do nothing		A recovery of otter populations will not take place.	

Issue 2b The introduction of invasive alien plants and animal species threaten the ecological diversity of our natural environment

i) Alien Flora

Background

Many introduced plant species are invasive and threaten native communities. Species found to be invasive include the Giant Hogweed, Japanese Knotweed, and Himalayan Balsam. The spread of some invasive plant species may be at a stage when control is still feasible and opportunities to effect control should be taken wherever possible. The sale of exotic species throughout garden centres is thought to be responsible for the spread of certain alien species.

It is important to appreciate that no one single organisation can tackle this issue. Practicalities and resource implications dictate that this is an issue to be tackled by a number of relevant organisations in partnership.

Effects

Species such as Himalayan Balsam are out-competing native species of plant along riverbanks. We aim to develop a more proactive approach to reducing alien plant species in the Plan area.

Options	Responsibility	Comments	Themes
Identify sites where invasive plant species have become established.	***Agency, Landowners and other relevant organisations.***	***Improves knowledge of the extent of certain invasive plant species.***	
Carry out appropriate control measures to destroy invasive plant species at identified sites, where possible.	***Agency, Landowners and other relevant organisations.***	***Halts the spread of invasive species through the Plan area.***	
Publicise the risks associated with the spread of invasive plant species.	***Agency and other relevant organisations.***	***Makes landowners and general public more aware of the threats posed by certain species.***	

ii) Mink

Background

The alien American Mink has established itself along watercourses in Britain since the 1950's. Anecdotal evidence indicates the presence of American mink in some localised areas. The mink has played a significant role in the decline in numbers of the water vole through its predation.

Effects

If mink are present and become established, there may be serious ramifications regarding the long term sustainability of the water vole.

Options	Responsibility	Comments	Themes
Continue the study currently underway to assess the distribution of American mink and water vole.	***Agency, English Nature, Lincolnshire Wildlife Trust***	***Helps in the protection of the water vole and other species in the Plan area.***	
Promote discussions with FRCA regarding the control of mink by landowners.	***Farming & Rural Conservation Agency, Agency, Landowners***	***Helps to protect the water vole.***	
Do nothing		Possible loss of the water vole and other species from the Plan area.	

3. Managing Our FRESHWATER FISHERIES

Agency Operational and Strategic Actions are to:

- secure a more robust funding base for fisheries management by improved marketing and the setting of fair charges to anglers;
- review the economic basis of fisheries management;
- introduce a standard fisheries classification scheme;
- monitor every river fisheries over a five year rolling cycle;
- restore spawning grounds for freshwater fish;
- implement a programme of minimum acceptable flows for rivers;
- develop specific longer-term strategies for salmon, trout and coarse fisheries;
- reduce poaching to a minimum and bring rod licence evasion to under 10%;
- consider the likely costs and benefits of fixed penalty fine schemes for rod licence offences;
- consider the desirability of introducing mandatory rod licence display systems; and,
- research into the factors which affect the viability of our unique freshwater fisheries populations.

Issue 3a Fish biomass and species diversity fall below expected levels in some watercourses

Background

Fisheries survey work indicates the desired standard for fisheries is not being achieved for a number of watercourses in the LEAP area, including the Winterton Beck, River Rase and the Land Drain. The reasons are unclear and require further investigation to identify possible causes and solutions. Limiting factors likely to be involved include low flows, poor habitat and the effect of impoundments

(i) Low flows

Low flow effects, due to droughts and an increase in abstraction demands, have adversely affected many rivers. Low flows, coupled with eutrophication **(see Issue 4g)** and little variation in river gradient result in excessive plant growth during hot periods, low dissolved oxygen levels, siltation and poor habitat.

Flows in spring-fed watercourses on the Northern Limestone, including the Redbourne Beck and Waddingham Beck have been identified as potentially being impacted due to the level of groundwater abstraction at times of low recharge to the aquifer. Environmental baseline studies have been carried out and further studies are planned by AWS, the major abstractor from the limestone resource **(see Issue 1a).** We are planning to develop a water resource groundwater management model for the Northern Limestone beginning winter 2000, to allow for better management of the resource.

(i) Habitat

Past flood defence works and the canalisation of rivers has involved the widening of channels, dredging and the construction of embankments. The resulting riverine habitat can be uniform in nature, providing poor conditions for fish populations.

(ii) Impoundments

Fish need to migrate for many different reasons; examples are for spawning, feeding and predator avoidance. The systems within the Grimsby Ancholme Plan area have a number of weirs, which have the effect of impounding short lengths of water and limiting migration. Changes in flow rates above impoundments can lead to siltation, which can reduce the diversity of invertebrate populations and cover naturally occurring gravels required by some species of fish for spawning.

Many riverine species (e.g. trout, chub and dace) travel considerable distances to spawn, feed and find shelter. Locks and weirs limit these movements to the detriment of the species involved as their mortality rates are higher when migration routes cannot be followed. Difficulties in migration can also impede the rate at which stretches of river are re-populated following incidents such as pollution or low flows.

Options	Responsibility	Comments	Themes
Carry out surveys to identify problem areas.	*Agency*	*Concentrates efforts in selected areas with achievable targets.*	
Reduce abstraction in sensitive areas by encouraging the development of winter storage areas to reduce the need for summer irrigation.	*Agency, FWAG, Licence Holders Landowners*	*Reduces demand on other systems during summer. Provides conservation value. Conflicting interest with public, industry and farming.*	
Reduce diffuse phosphate and nitrate inputs	*Landowners, MAFF*	*Reduces eutrophication/excess weed growth. Conflicting interest with farming.*	
Diversify habitat by creating deeper holes in sections of river bed.	*Agency*	*Provides fish refuge areas. Increases angling value at these sites.*	
Re-profile banks where possible during routine flood defence works to more natural profiles	*Agency*	*Restores river section to a more natural design. Improves ecological, amenity and aesthetic value. May conflict with flood defence needs.*	
Identify key locations and install fish passes at appropriate sites.	*Agency*	*Ensures fish migration takes place when necessary. Increases the sustainability of populations. Improves amenity value.*	
Carry out restocking where appropriate.	*Agency*	*Improves amenity value. Not sustainable.*	

4. Delivering INTEGRATED RIVER-BASIN MANAGEMENT

Agency Operational and Strategic Actions are to:

- manage river-basins in an integrated way, via Local Environment Agency Plans;
- ensure that all waters are of sustainable quality for their different uses;
- deliver a continual improvement in overall water quality;
- provide effective flood defence;
- provide an effective flood warning system;
- increase the numbers of rivers and still waters capable of supporting viable fisheries;
- enhance and conserve inland navigations, as national assets of environmental, economic, social and recreational value;
- secure the most appropriate legislation, management systems and financial arrangements to ensure the sustainability of our navigational waters;
- work with others to improve and develop inland waterways as an integrated network;
- improve river habitat quality, as measured by river habitat surveys;
- improve wetland management;
- improve riverside landscapes;
- improve bathing water quality;
- improve estuarine waters for shellfisheries;
- increase the number of Agency-owned sites available for public recreation; and,
- work with local authorities to maximise the conservation and recreational use and value of our river-basins.

Issue 4a Members of the public place themselves in danger by swimming in the river Ancholme

Background

During warm periods and school holidays, children have been observed jumping into the watercourses from structures and bridges and swimming in the rivers. This is a particular problem along the River Ancholme. Such individuals put their own lives at risk and can cause an obstruction to boat traffic using the navigation.

There are inherent dangers from weeds, underwater structures and debris, as well as undercurrents, which can endanger even the strongest swimmers. There are also the health risks associated with waterbourne illness such as Weils disease.

Effects

If children are allowed to continue to swim in the watercourses around the structures, then there is a real danger that someone may be seriously injured or even lose their life due to their irresponsible actions.

Options	Responsibility	Comments	Themes
Identify specific areas where the problem is the most severe.	***Agency***	***Swimmers may simply relocate to other areas.***	
Publicise the dangers of swimming in rivers to the public (particularly children).	***Agency, Local Authorities, Local Schools***	***Makes more people aware of dangers. Difficult to get an effective message across.***	
Erection of warning signs along main river sections and tributaries to dissuade members of the public from swimming in the local watercourses.	Agency	Makes more people aware of dangers. Proliferation of signs can lead to visual impacts. Existing signs are often ignored.	

Issue 4b Inadequate local sewerage systems in some villages result in localised pollution and may have public health implications

Background

Traditionally sewage treatment in rural areas has mainly relied upon each dwelling having individual septic tanks. The overflow from such tanks are designed to drain into the soil via a below ground soakaway. In poorly drained areas with clay soils, or where the water table is high, common practice was to drain the tanks to the nearest watercourse.

Where such watercourses run through the centre of villages, the pollution and smell nuisance resulted in the watercourses being piped-in and buried. In such cases, the piped watercourse became known as the 'village drain' or the local council maintained 'sewer' and many.

Current legislation enables applications to be made to AWS for the provision of a first time sewerage scheme. Applications are considered by AWS and assessed against certain technical and economic criteria. Where a duty exists to provide a sewerage scheme, the expenditure is planned. An application has been made for Kirkby cum Osgodby and at the time of writing, We are aware that AWS have accepted Brigg Road, South Kelsey.

Effects

This problem manifests itself in terms of localised pollution, smells and public health concerns. The effects are worst during periods of dry weather and low dilution flows.

Options	Responsibility	Comments	Themes
Requisition of first time sewerage schemes for villages affected.	***Anglian Water Services, Property Owners Local Authorities Agency***	***Improves water quality by the provision of an adequate sewerage infrastructure.***	
Individual householders to provide suitable sewage disposal facilities.	Property Owners Agency Local Authorities	*Improves water quality by the provision of an adequate sewerage infrastructure.*	
Co-operative investment in package treatment plants.	Property Owners Agency	*Improves water quality by the provision of an adequate sewerage infrastructure.*	

Issue 4c **Development on areas of contaminated land has potential to pollute, but provides the opportunity to clean up existing problems**

Background

The Agency favours the beneficial re-use of contaminated land in preference to the development of greenfield sites, provided that pollution is not caused. Many sites have been cleaned up with the help of derelict land grants, but serious problems are experienced with 'orphan' sites where the owner is not known, or the resale value of the cleaned-up site is less than the probable remediation costs.

The Environment Act 1995 has now been passed and new legislation is expected to come into force in 1999. It will introduce a specific legal framework for dealing with contaminated land with new duties and powers assigned to local authorities and the Environment Agency. A number of sites in the Grimsby Ancholme Plan area are seriously contaminated namely:

Normanby Park, Scunthorpe. Reclamation here should reduce the amount of calcite pollution and high pH levels emanating from the site into the Winterton Beck. As the site is reclaimed slag and other contaminated waste, materials will be removed off site to the Conesby Quarry landfill site. This will result in the reduction of calcite precipitation and high pH levels in the Winterton Beck.

Waters Edge, also known as the Britag Site was previously occupied by an agro-chemical works, which has left contamination that threatens to pollute the Humber Estuary and the underlying chalk aquifer. A scheme for remediation of this site is now likely to progress since funding is currently being sought.

Macaulay Lane, Grimsby, former landfill site. A bentonite cut-off wall has been installed around the northern and eastern boundaries of the site to prevent leachate migrating into the River Freshney and other surface waters. The problems related to this site currently involve many functions of the Agency. The fundamental issue is on-going, with discussions between the developer and interested parties taking place concerning the piling/foundation works of the development and the potential of such development to pollute groundwater resources.

Grimsby Former Gaswork Site. Previously a coal gasification works, this site was redeveloped as a gas service centre in 1975 and then demolished in 1998. A proposal for redevelopment of this site is under consideration. Some remediation work has been done to remove sources of contamination. Further work will continue so that the site is suitable for its proposed use as industrial units. The fundamental issue (as per Macaulay Lane) is on-going, with discussions between the developer and interested parties taking place concerning the piling/foundation works of the development and the potential of such development to pollute groundwater resources.

Effects

Contaminated land is defined as land which represents an actual or potential hazard to health or the environment as a result of current or previous use.

Options	Responsibility	Comments	Themes
Remediate specific sites in conjunction with redevelopment schemes	***Polluters*** ***Local Authority Agency***	***Remediation is carried out in tandem with future development.*** ***Funding is made available through sites having improved resale value.***	
Identify sites which fall under the definition of contaminated land. ***Issue remediation notices where appropriate*** ***Remediation of contaminated sites where appropriate.***	***Local authority*** ***Local Authority Agency. (for special sites).*** ***Local Authority Agency***	***Will identify the scale of the problem.***	

Issue 4d Nitrate concentrations in ground and surface water exceed, or are expected to exceed the EC Drinking Water Standard

Background

In the middle of the catchment where the limestone and chalk aquifer outcrops, groundwater is highly vulnerable to diffuse sources of pollution. Agricultural practices within this part of the catchment, such as the use of fertilisers, has led to the presence of high concentrations of nitrate in groundwaters.

High levels of nitrate have been associated with health concerns. To ensure nitrate levels in drinking water do not exceed the 50 mg/l limit, water supply companies, where necessary, blend high nitrate water with low nitrate water or treat it by other means to ensure its safety for consumption.

A number of areas, including parts of the Grimsby and Ancholme catchment, have been designated as Nitrate Vulnerable Zones (NVZs) and Nitrate Sensitive Areas (NSAs) by the Ministry of Agriculture, Fisheries and Food. Both schemes aim to reduce nitrate levels in soils through changes in farming practice and thus reduce the amount of excess nitrate leached to the water environment following crop uptake. The more stringent NSA scheme is/was voluntary and offered funds to compensate farmers for making such changes. These programmes ran for five years from the application date. The final date for receipt of applications under the scheme was September 1998. Those made in 1998 will therefore expire in 2003.

The NVZ Scheme is compulsory and is governed by the Action Programme for Nitrate Vulnerable Zones (England and Wales) Regulations 1998. This Scheme must be followed by farmers in certain areas, where agricultural nitrate concentrations exceed, or are at risk of exceeding, 50 mg/l . It lays down rules linked to the MAFF "Code of good Agricultural Practice for the Protection of Water". Since 19th December 1998, the Environment Agency has had the task of assessing farmers' compliance with the NVZ Regulations.

Effects

Agricultural practices have caused nitrate concentrations to exceed EC drinking water limit of 50 mg/l.

Options	Responsibility	Comments	Themes
Introduction of regulations to require farmers to follow action programmes	***Farmers, Agency (to enforce the action programmes)***	***The amount of nitrate leaching through soil into ground and surface water should be minimised. Should improve nutrient management by farmers. Should be economic benefits for making maximum use of nutrients applied Farmers will have to change practices e.g. maintaining records of nitrate input from both organic and inorganic sources. A disadvantage is that no compensation will be given to farmers.***	

Issue 4e Groundwater resources are threatened by pollution incidents

Background

The groundwater resources of the Lincolnshire Limestone and Wolds are extensively used for public water supply. Any pollution of this resource can be extremely difficult and expensive to remediate.

Two significant pollution incidents have impacted on groundwater in this area:

- Leakage of hydrocarbons from Kirton Lindsey MOD site has caused significant local contamination of groundwater with the potential to impact upon water being abstracted for public supply. Investigation and monitoring of the incident is ongoing. Removal of the spilled material is difficult and a considerable cost has been incurred by the MoD in dealing with this incident. Pollution prevention measures have been reviewed at the base as a result of this incident.

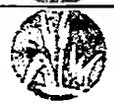
- Inappropriate disposal of agricultural products can cause significant contamination of groundwater. Anglian Water Services' public water supply (PWS) borehole at Goxhill, which abstracts water from the underlying chalk aquifer, has been shown to have pesticide concentrations which exceed the EC Drinking Water standard. A chalk pit used for the disposal of agricultural waste, upgradient of the PWS borehole, has been identified as the most likely source of contamination. Although the water supplied to the public met the required standard following blending, abstraction at the impacted borehole has ceased.

Both ground and surface water can be impacted upon from other sources. Concentrated industrial developments in parts of the Plan area poses an increased risk of pollution to the water environment. In a number of areas, including Killingholme Airfield and industrial estates at Elsham Wold, Wilton Road (Humberston), Manby Road (Immingham) and Kiln Lane (Stallingborough), there have been significant pollution incidents.

Effects

The pollution of ground and surface waters threatens water supplies, dependent flora and fauna and other uses.

Incidents which cause groundwater contamination can result in significant expenditure by the responsible party depending on the seriousness of the pollution. Investigations can require the drilling of a large number of monitoring boreholes and an extended period of water sample analysis. This, in addition to the cost of any clean-up works and possible legal expenses and fines, results in a potentially large 'bill' which could have been avoided by taking appropriate pollution prevention measures.

Options	Responsibility	Comments	Themes
To protect the environment by reducing the number of pollution incidents by pollution prevention initiatives.	*Site owners* *Agency*	*Is also a good waste minimisation initiative.* *Economic benefits.* *Protects valuable groundwater resources.* *Cost effective*	
Planning authority to promote pollution prevention by the planning process	*Local planning authorities*	*Pollution prevention measures are incorporated into the infrastructure of development which means that there should be reduced costs.* *May delay development.* *Understanding groundwater flow is an imprecise science.*	
Goxhill PWS borehole: *Review options for isolating the source of contamination.* *Install treatment plant at affected borehole.* *Relocate abstraction to another location in the area.* *Do nothing.*	 *Agency, Landowner* *AWS* *AWS, Agency*	 *Reduces the level of further contamination which may enter chalk aquifer.* *Water meets appropriate standards.* *Removes threat of pesticide contamination.* *Natural attenuation may be sufficient to dissipate pollution.* *Other AWS source may be affected.*	
MoD Site: *Investigate the distribution of contamination.* *Select appropriate remediation strategy.*	 *Landowner/ consultants*	 *Identifies impact of the pollution* *Protects the PWS.*	

Ongoing National Initiatives:
New Groundwater Regulations recently implemented will help reduce the risk of groundwater pollution by bringing a wider range of potentially polluting substances under our control. These include substances such as pesticides, sheep dip, solvents, hydrocarbons, mercury, cadmium and cyanide.

Issue 4f **Routine chemical and biological monitoring indicates poor water quality in a number of watercourses.**

Background

The Agency assesses water quality against a series of targets and objectives which have been set to provide a defined level of protection for aquatic life and other uses. The River Ecosystem (RE) scheme **(see Appendix 3)** provides, on a national basis, a set of chemical and biological water quality targets which the Agency uses as a basis for setting consents to discharge and in undertaking other water quality planning activities. Biological quality targets are also set locally based on historical use-related chemical parameters.

A number of river stretches in the Plan area fail to achieve their chemical RE target class. **Map 1 (overleaf)** shows stretches of river which have not met the target class, identifying failures as being marginal or significant.

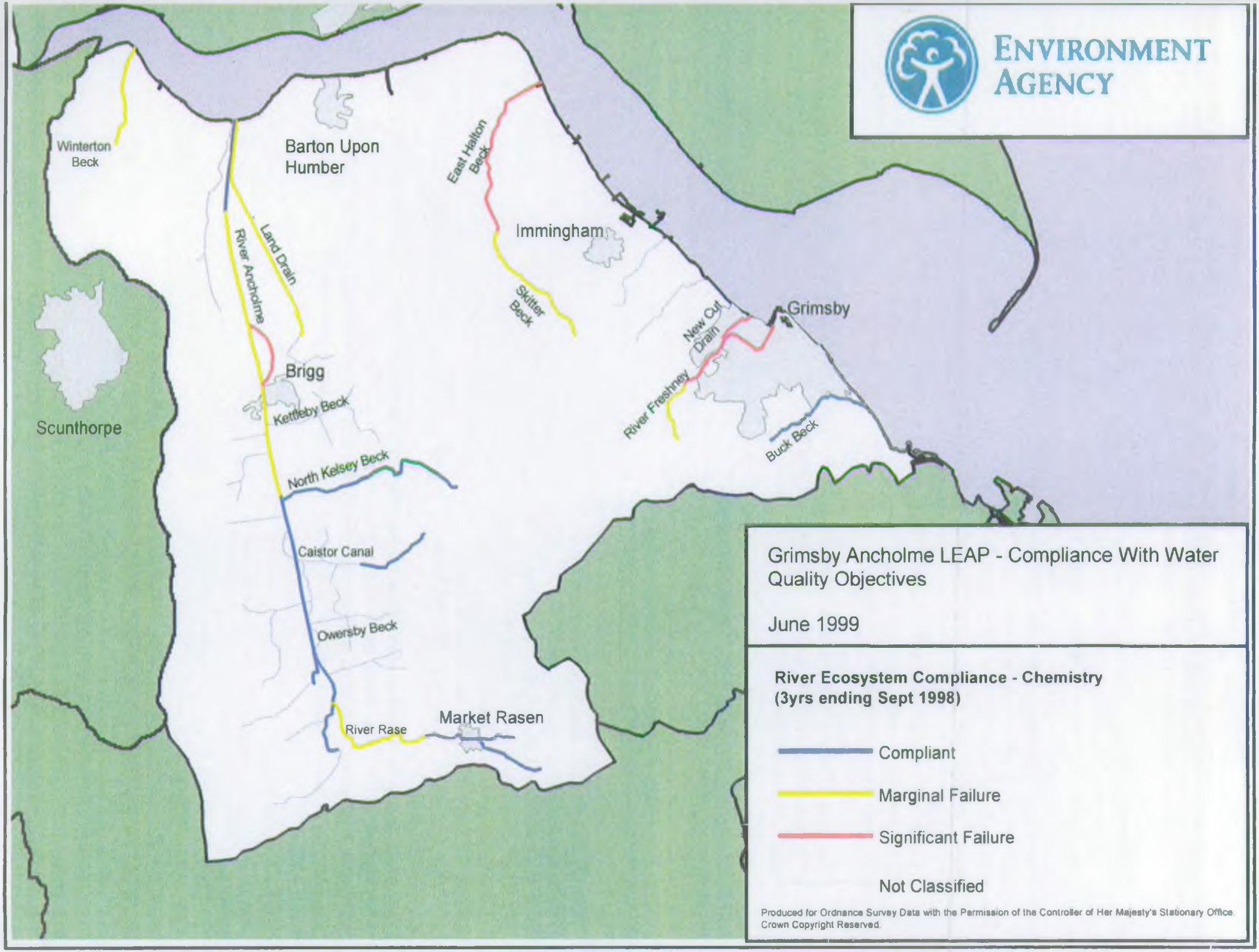
Long term WQOs for watercourses representing what we perceive as realistic and sustainable are proposed in **Appendix 4**. These will form the basis for future SWQOs for those watercourses which are classified.

Marginal Failures

Marginal failures are those failures in water quality where we are statistically uncertain as to whether a failure really exists. These include the following stretches:

Skitter/East Halton Becks – Headwaters…Ulceby Station
Laceby Beck – Welbeck Springs…Laceby STW
Winterton Beck – B1430 Rd Br…Humber
Rase- Bully Hill…Rase South Branch
Rase – Market Rasen STW…Ancholme
Ancholme – N Kelsey Beck…Coal Dyke End
Ancholme – Coal Dyke End…Saxby Pump
Land Drain – Headwaters…East Drain
East Drain/East Weir Dyke - Old Ancholme…Humber

These cannot be related to effluent discharges or specific pollution sources and may be due to low flows (1995-97), eutrophic effects or other unknown factors. It is not intended to commit additional resources to these failures at this time although routine monitoring will continue and action will be taken should failures change from being marginal to significant.



ENVIRONMENT AGENCY

Grimsby Ancholme LEAP - Compliance With Water Quality Objectives

June 1999

River Ecosystem Compliance - Chemistry (3yrs ending Sept 1998)

- Compliant
- Marginal Failure
- Significant Failure
- Not Classified

Statistically Significant Failures

1) Skitter Beck/East Halton Beck

This river system drains a predominantly agricultural area north of Grimsby, its catchment includes the South Humberside Airport and the redundant North Killingholme airfield.

Downstream of Ulceby the Beck fails its RE Target. It is believed to be adversely affected by ammonia contamination, probably from industrial/agricultural activities (including the Killingholme Airfield Industrial Estate). Upstream water quality suffers biologically from a combination of low flows and surface water run-off.

Options	Responsibility	Comments	Themes
Trace sources of polluting discharges.	*Agency*	***Illegal discharges found and stopped – improving water quality.***	
Proactive pollution prevention campaign	*Agency*	***Industrial/Agricultural/Domestic property owners made aware of potential problems. Incidents less likely to occur.***	
Take appropriate enforcement action	*Agency*		

2) Laceby Beck /River Freshney

The headwaters of the Freshney is a "chalk stream" reputed in the not so distant past to have supported a native brown trout population but which today suffers from low flows. Downstream of Laceby it is ponded in nature with a weir in Grimsby maintaining its level whilst preventing the migration of saline water inland. The lower stretches suffer excessive weedgrowth in summer months, attract litter, and become aesthetically unattractive **(Issue 6c).**

Upstream lengths of this watercourse fail biological water quality targets and downstream of Littlecoates road bridge it fails both chemical and biological targets. The reasons for these failures are associated with low flows, eutrophication (see following issue), intermittent discharges from sewer overflows and leachate pollution from Macaulay Lane landfill site **(Issue 4c).**

Options	Responsibility	Comments	Themes
Improve sewer overflows	*AWS*	*Scheduled for improvement as part of AMP3 process*	
Reduce leachate contamination from landfill site	*LAs* *Developer*	*Improvements being progressed. Current data suggests the remediation scheme is having the desired effect.* *Liaison between the Agency, North East Lincs are in hand regarding the proposed redevelopment of this site.*	
Increase flows in the Laceby Beck by augmentation	AWS Agency	This is being considered as an option though in some respects it may not be considered a sustainable solution.	

3) Old River Ancholme

The Old River Ancholme is a small watercourse that follows the course of the old river downstream of Brigg, receiving waters from surrounding agricultural land and Brigg sewage treatment works.

The length between Brigg and Worlaby fails its target both in terms of chemistry and biology. The reason for this failure is uncertain, we know that the quality of sewage effluent from Brigg STW is "good" and meets its consent standards. Biological evidence suggests the presence of organic pollutants, these may be farm related or may derive from surface water drainage sources.

Options	Responsibility	Comments	Themes
Investigate further	*Agency*	*Will improve our understanding of the issue*	

4) New Cut Drain

The New Cut Drain in Grimsby serves a predominately industrial and residential catchment with a large proportion of hardstanding drainage. The drain outfalls into the Humber adjacent to the Pyewipe waste water treatment works. It has little amenity value. Historical data has shown high BOD results which caused failure of its water quality target class.

Work to de-sludge the Drain was completed at the end of 1996 and this has led to marked improvements in the quality of samples taken, to the extent that it now comfortably meets its biological target. It is anticipated that once the historic data falls out of the 3 year data set for meeting the RE target, the watercourse will become compliant. No further action is therefore anticipated other than ongoing monitoring.

Options	Responsibility	Comments	Themes
Monitor water quality	*Agency*	*To ensure remediation works already complete secure their objectives*	

Other Failures

5) Land Drain

The Land Drain is a typical fenland drain, long and straight with a symmetrical channel. As with the Old Ancholme it drains a predominantly agricultural area including water from the edge of the chalk wolds escarpment. Historically this watercourse has suffered from saline intrusion but this has been largely overcome by a change in the management procedures of saline water at the downstream end.

The Land Drain marginally fails to meet its chemical quality target, but intermittently fails its biological target on a catastrophic scale. The reasons for this are unclear, again there is some evidence of organic pollutants - possibly linked to agriculture.

Options	Responsibility	Comments	Themes
Investigate further	*Agency*	*Will improve our understanding of the issue*	

6) Caddle Beck

The Caddle Beck flows from the village of Keelby eastward toward the coast and ultimately into the Stallingborough Main Drain. The upper sections of the Beck demonstrate poor biology with intermittent and sometimes catastrophic failure to achieve its biological target. The cause of this is uncertain however there are indications of it being impacted by sewage discharges.

Options	Responsibility	Comments	Themes
Undertake improvements to Keelby STW	*Anglian Water Services*	*Works identified as part of AMP3 process will hopefully resolve this problem.*	

ISSUE 4g **Nutrient enrichment of watercourses impacts on water quality, affects flora and fauna and other uses of water, such as navigation, amenity and fishing. River ecosystem quality targets can be compromised.**

Background

We have adopted an integrated approach to the management of the environment, as set out in its Environmental Strategy 1997. This approach has highlighted the need for specific strategies to address the environmental impacts and risks associated with certain issues. These include aquatic eutrophication, where human activities cause water to be enriched by nutrients, giving rise to adverse effects on both the ecology and the legitimate uses of water. The quality of many watercourses is adversely affected by eutrophication. The freshwater sections of the Laceby Beck/River Freshney and the New and Old River Ancholmes demonstrate effects of eutrophication.

The Agency has highlighted the importance of eutrophication as a national water quality issue by publishing a document that sets out proposals for a strategy to manage aquatic eutrophication in England and Wales (December 1998).

Effects

As a consequence of eutrophication, water quality and aquatic communities sensitive to nutrient enrichment are adversely affected giving rise to changes in dissolved oxygen concentration. This in turn can lead to fish mortalities, excessive plant growth of certain species and a reduction in ecological diversity. Recent problems with duckweed growth on the River Ancholme has been particularly acute, making angling difficult and causing problems for boats through overheating engines caused by blocked cooling inlets.

Options	Responsibility	Comments	Themes
Gather/review data from rivers which show symptoms of eutrophication. *Continue chemical/biological monitoring* *Gather other information on the effects of nutrient enrichment*	*Agency*	*Increased understanding of the potential for the eutrophication process.* *Will help identify particular problem areas.*	
Investigate benefits of reducing phosphates in other discharges.	*Agency* *Anglian Water Services*	*Assess requirement for nutrient reduction.*	
Encourage buffer zones on riparian land.	MAFF Agency Landowner	Reduces environmental impact. Enhances habitat and plant diversity. Potential conflicts of land use interest.	
Do nothing		Continued impacts of eutrophication.	

Eutrophic conditions in the Ancholme at Harlam Hill Lock

5. Conserving the LAND

Agency Operational and Strategic Actions are to:

- influence the Town and Country Planning Systems to prevent inappropriate developments in areas at risk of flooding and increasing flood risk elsewhere;
- implement the Flood and Coastal Defence policy as advised by MAFF and the Welsh Office;
- secure an adequate level of investment in flood defence;
- provide flood plain surveys to local planning authorities;
- discourage inappropriate development in flood plains;
- work with nature to reduce coastal flooding;
- develop new methods to survey and manage flood defences;
- report regularly on the state of flood defences;
- identify the state and extent of the problem of soil erosion;
- develop a soil erosion alleviation strategy, including guidance on best practice;
- work with local authorities to identify, and report on the extent of, contaminated land;
- regulate identified 'special' contaminated land sites effectively;
- research into the specific risks and remediation needs of contaminated land;
- measure the effectiveness of steps taken to reduce nitrates in designated nitrate vulnerable zones; and,
- develop methods for monitoring the 'state' and quality of soil with respect to its potential pollution.

Dredging of the Ancholme in Brigg

Issue 5a **Standards of flood protection on lengths of river systems do not meet target standards**

Background

Our principal aim for flood defence is to reduce the risk of flooding to protect people and property and provide warning systems. Flood defences are provided for in a number of ways including the exclusion of development from the floodplain, the construction of raised defences and the provision of flood storage reservoirs. Flood defence improvements will normally only be carried out by ourselves if a scheme can be designed which meets specific cost / benefit, environmental and technical criteria. Whatever is done a residual risk of flooding always remains.

Recent studies have identified current standards of defence below the target standard at the following:

River Rase. High flows in the River Rase caused flooding of properties in 1981 and 1993. Investigations have identified those events greater than a 1 in 20 year return period will cause flooding in the future. A flood protection scheme involving flood storage upstream of Market Rasen on both the north and south branches of the River Rase is being promoted to provide protection against flood events up to a 1 in 75 year return period.

River Ancholme. Agricultural land alongside the Ancholme and its tributaries is at risk from flooding during events above a 1 in 5 year return period. The town of Brigg, which has been identified as a major growth area in the North Lincolnshire Local Plan, is also at risk from higher return period events. A feasibility study carried out in 1997 concluded that under MAFF's project appraisal guidelines, flood defence improvements to Brigg urban area could be justified but that improvements to agricultural areas could not.

We have commissioned a further study to review alternative methods of funding works in the Ancholme valley and possible partnerships in the promotion of those works. A report on this review is imminent.

River Freshney. A feasibility study carried out in 1997 identified that some urban areas in Grimsby are at risk of flooding from events greater than 1 in 20 years return period. An improvement scheme incorporating wall and embankment raising together with flood storage on an existing wetland habitat site is the preferred option for increasing the standard of protection to 1 in 100 years. Subject to the necessary agreements and approvals being obtained the improvements will be included in the Agency's capital programme.

Options	Responsibility	Comments	Themes
Promote improvement scheme for the River Rase at Market Rasen.	*Agency, MAFF*	*Will raise the standard of flood defence to properties in Market, Middle and West Rasen.*	
Complete funding review for Ancholme valley improvements. *Promote works in partnership with others.*	*Agency, Other Partners*	*Should raise the standard of flood defence in Brigg and to agricultural land in the Ancholme valley. Possible environmental improvements.*	
Promote works to improve flood defences in Brigg urban areas only.	*Agency, MAFF*	*Would raise standards of flood defence to Brigg.*	
Promote works to improve flood defences on the River Freshney.	*Agency, MAFF*	*Will raise standards of flood defence to properties in parts of Grimsby. May create opportunities for environmental enhancement.*	
Undertake asset surveys to identify any deficiency in standards	*Agency*	*Improve understanding of current standards of flood defence*	
Agree appropriate development strategies with local authorities.	*Agency*	*Forward planning of development can reduce long term costs of providing defences and their maintenance costs.*	

Issue 5b **At certain locations our flood warning target of two hours prior notice is not met**

Background

The role of the Agency with respect to flood warning and forecasting is:

- to monitor rainfall, river and tidal conditions
- to forecast and monitor floods
- to interpret the impact of floods
- to take reasonable steps to alert those at risk.

To fulfil this role, we must ensure that there are:

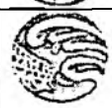
- accurate and reliable hydrometric data on rainfall and river flows
- accurate and reliable forecasts of flood flows and levels
- clear assessments of flood defence standards, flooding thresholds and flood risk areas
- effective flood warning dissemination systems and methods to alert and warn the public when there is a risk of flooding
- flood warning plans and associated public information to ensure the public is aware of flood risks and flood warning arrangements.

The flood event of Easter 1998 has raised a number of questions, nationally and locally, which we will have to address with respect to, not only our flood warning and dissemination procedures and systems, but also other related activities, such as the production of flood risk maps, Floodplain Policy and scheduled surveys of flood defence assets.

Our aim is to give the public 2 hours prior notice of the likelihood of flooding, and we have as a corporate objective – 'to improve the successful receipt of flood warnings to achieve a 80% success rate for property flood warnings where a flood forecasting system exists by the year 2001.'

Effects

Whilst effective and timely flood forecasting and warning will not prevent flooding from occurring, it does help provide those affected, time to minimise the damage it will cause.

Options	Responsibility	Comments	Themes
Review flood warning thresholds and procedures for the catchment	*Agency*	*Will improve service of flood warnings.*	
Complete previously planned improvements to river flow gauging and river level monitoring.	*Agency*	*Will improve data upon which to base flood warning decisions.*	
Improve flow forecasting models for strategic main rivers.	*Agency*	*Will improve data upon which to base flood warning decisions.*	
Review requirements for additional raingauge and river flow gauging.	*Agency*	*Will improve data gathering.*	
Review flood warning system for the area.	*Agency*	*Will provide more timely flood warnings for residents.*	
Revise and re-issue flood warning leaflets for affected areas.	*Agency*	*Removes any public uncertainties of responsibilities during flood events.*	
Revise warning system for boats using the Ancholme.	*Agency*	*Will improve service of flood warnings.*	
Extend flood warning dissemination service to all areas affected by flooding.	*Agency*	*Will provide flood warning to more residents.*	

A number of ongoing National strategic initiatives are relevant to this issue:

- To review the Agency's policy on flood warning dissemination
- To review the effectiveness of the Agency's flood warning methods
- To improve inter-agency co-ordination of flood emergency planning
- To review technical developments to enhance flood forecasting and warning
- To review/implement the recommendations of the independent review of the Easter floods
- The Agency has published an Action Plan for England and Wales, based upon the recommendations of the independent Review Report.

Other associated actions to improve the management of flood events include:

Options	Responsibility	Comments	Themes
To clarify and develop operational procedures and responsibilities with other organisations.	*Agency, District Councils, Police, Emergency Services*	*Improves flood warning and prevention.*	
To review the system of river patrols and field condition monitoring.	*Agency*	*Improves operational handling of flood events.*	
To simplify and improve Agency flood warning procedures.	*Agency*	*Enables better management of flood events.*	
Review Anglian Regional Telemetry System.	*Agency*	*Will improve flood warning and prevention.*	
Review Flood Warning dissemination (5 year Plan)	*Agency*	*Will improve management of flood events.*	
Review the programme to produce (Section 105) flood risk maps.	*Agency*	*Will improve understanding for ourselves and Planning Authorities of areas at risk of flooding.*	

Issue 5c **The standard of protection against flooding from the Buck Beck at Cleethorpes and Barrow Beck at Barrow on Humber is uncertain.**

Background

Buck Beck. In the late 1970's, Buck Beck was the subject of a comprehensive flood defence improvement scheme. The scheme involved a new tidal outfall, embankment raising and bridge improvements and provided protection to a 1 in 100 year return period standard. Approximately 100 hectares of urban area within Cleethorpes and Humberston lie below the design flood level.

Buck Beck relies on gravity discharge to the North Sea during low tide periods and storage within the embanked channel during tide lock. Beach levels at and beyond the tidal outfall have risen by 500mm since the early 1980s resulting in similar increases in retained water levels within the beck. The impact of the continued rise in retained water levels on the standard of protection against flooding is uncertain.

Barrow Beck. The flood defences along Barrow Beck protect a largely agricultural area against flooding. Barrow Beck discharges through a gravity outfall to the River Humber via Barrow Haven, a 1km long embanked tidal channel. Siltation within the tidal channel is increasing retained water levels in the Barrow Beck, impairing drainage of adjacent low lying land.

Effects

The standard of flood protection provided to urban areas adjacent to Buck Beck and to agricultural land within the Barrow Beck catchment may be below the target indicative standard.

Options	Responsibility	Comments	Themes
Carry out investigations to determine the impact of siltation on standards of service and compare with indicative standards. If required, seek to promote any necessary improvements in the long term plan.	***Agency, MAFF***	***Potential reduced flood risks.***	
Do nothing.		Uncertainty over standard of protection provided will continue.	

6. Managing WASTE

Agency Operational and Strategic Actions are to:

- provide a high quality waste regulation service;
- develop an overall database of waste arisings and disposals;
- measure the effectiveness of taxation to reduce waste and to encourage its re-use and recycling;
- obtain information on fly-tipping and devise means of combating it;
- implement the 'producer responsibility' regulations;
- develop life-cycle assessment methodologies for dealing with waste;
- encourage and inspire industry to develop new and improved techniques for the management of special and other industrial wastes;
- ensure achievement of national waste strategy targets for the reduction of waste disposed of to landfill;
- ensure achievement of national targets for the recovery, recycling and composting of municipal waste;
- combat organised crime, at national and international level, involving the illegal trading in waste;
- research into the technical needs of successful waste management, including best practice and best practicable environmental options;
- secure high quality management of radioactive waste in industry;
- ensure that any proposals for solid radioactive waste disposal will provide the necessary high level of protection for man and the environment; and,
- commission research into the potential effects of wastes entering the environment, including the potential effects of radioactive wastes.

Tyres stored at Hibaldstow

Issue 6a The illegal disposal of waste poses a risk to health and safety

Background

Fly tipping is the illegal deposit of waste on land not licensed to receive it. It has the potential to damage both the environment and human health and impacts on the visual amenity of the area.

Most fly tipping incidents are associated with household waste being dumped either by the householder or others acting on their behalf. The practice of fly-tipping large quantities of industrial waste is relatively infrequent. There is anecdotal evidence to suggest that fly-tipping has increased following introduction of the landfill tax.

One notable fly-tipping hot spot is in the vicinity of Waltham/Holten le Clay where flytipping has been occurring at varying degrees of severity for a number of years. Over the last year, we have received several complaints regarding fly-tipping incidents at the Waltham Airfield and have endeavored to combat this issue by conducting surveillance initiatives by enforcement staff.

Recently an agreement has been signed between the Local Government Association and the Environment Agency in respect of response to incidents of fly-tipping in England and Wales. This protocol identifies removal of fly-tipped litter/waste from public land and watercourses as the responsibility of the local authority. We will take enforcement action when fly-tipping activities are of a commercial size scale.

It should be noted that if waste has been tipped onto private land, it is the landowner's responsibility to deal with it. Indeed, if he has not taken any measures to try and prevent tipping on his land there may be a degree of legal culpability.

Effects

As the number of incidents increases so does the cost to the Agency, the taxpayer and landowner, of removing the illegal deposit. We attempt to reduce the frequency of fly-tipping by adopting a proactive enforcement policy.

Options	Responsibility	Comments	Themes
Increase monitoring – particularly in 'hot-spots' (e.g. electronic surveillance and increased number of visits)	*Agency*	*Should reduce fly-tipping, particularly at known 'hot-spots'.*	
Improve waste disposal facilities (e.g. longer opening hours)	*Waste Disposal Authority* *Site Operators* *Local Planning Authorities* *Agency*	*Opening facilities for a longer period of time will allow people to dispose of waste in the appropriate manner.*	
Limit opportunities for fly-tipping (e.g. blocking access)	*Waste Operators* *Landowners* *Agency*	*Should reduce the number of incidents in the catchment* *Additional costs for the waste operator with no results guaranteed.*	
*Work to the 'Memorandum of Understanding' with Local Authorities**	*Local Authorities* *Agency*		

* The recently agreed 'Memorandum of Understanding' details who is responsible for different fly-tipping incidents.

Issue 6b The storage and illegal fly tipping of tyres forms a pollution risk to the environment

Background

A proposed EC Directive on The management of landfill sites is likely to ban the disposal of whole tyres to landfill by the year 2003 and shredded tyres by the year 2006. The number of tyres in use is forecast to increase by as much as 60% by the year 2021. The Agency is concerned that illegal tyre dumping may increase. A recent report published by us has looked into how this serious environmental threat should be tackled by addressing the usage of tyres and their impact on the environment. We consider that more effort is needed to increase the lifetime of tyres, to reduce environmental impacts during their use and to provide a range of sustainable ways of recovering them as a resource at the end of their lives.

A local problem associated with tyre storage is at Hibaldstow Airfield. The storage of tyres at the site commenced illegally during 1989 by a company who alleged they were storing them prior to carrying out a recycling scheme. The former Humberside County Council licensed the activity as a waste disposal operation in October 1990. The original licence holder went into liquidation during 1991 and the licence was transferred to another party who erected a building and installed machinery in order to process/shred the tyres on site. It is

estimated that over a million tyres were stored at the facility. The company continued to process and receive more tyres until operations ceased in 1992 when a fire destroyed the building and plant. The company then ceased trading leaving the responsibility and liabilities for the site to the landowners.

Since 1992, tyres have been removed off site and used as leachate drainage layers at landfill sites within the Plan area. There now remains approximately 80,000, mainly commercial (lorry), tyres left on site.

Effects

The accumulation of stockpiled and illegally dumped tyres are a fire risk. Illegal deposits compromise land use and can have aesthetic impacts. Uncontrolled burning of tyres produces substances which can harm the environment i.e. affect air and water quality and contaminate soil and vegetation. Black smoke and other substances such as volatile organic compounds, dioxins and polycyclic aromatic hydrocarbons are released into the atmosphere. Phenols, polycyclic aromatic hydrocarbons and metals including zinc and iron can leach into groundwater and rivers. Water used to control the fire or rainfall causes these pollutants to be washed into the ground or runoff into nearby watercourses.

The site at Hibaldstow is located on a Major Aquifer catchment zone of the Hibaldstow Public Water Supply Abstraction and is therefore particularly sensitive. The site poses a potential risk to the environment and harm to human health should a fire occur.

Options	Responsibility	Comments	Themes
Tyres to be removed from Hibaldstow Airfield to a suitable waste disposal or recycling facility immediately.	***Landowners***	***Risks to the environment will be minimised. The labour intensive nature of this option might make it financially prohibitive.***	
Enforcement action to be taken against landowners.	Local Authority	*Risks to the environment will be minimised. The labour intensive nature of this option might make it financially prohibitive.*	
Seek other uses of waste tyres i.e. recycling, re-use or energy recovery.	***Agency Local Authority Tyre users Tyre manufacturers***	***Could reduce the environmental impact of tyres. Any residual tyres will remain a risk.***	

Issue 6c **The aesthetic quality of some lengths of watercourse in urban areas is poor**

Background

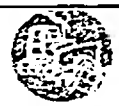
In urban areas such as Grimsby (River Freshney) and Brigg (River Ancholme), the general accumulation and dumping of litter along watercourses is visually and environmentally unacceptable. There is an added risk of flooding where such debris causes blockages to culverts and weed screens.

Aesthetic concerns have been raised by the local community with regard to excessive weed growth in river channels. The weed growth of Main rivers is managed by the Agency according to flood defence needs. In choosing a method and timing for its removal we seek to balance the needs of flood defence against other river uses including conservation interests.

The responsibility of litter clearance lies under 'riparian rights' based on common law. Recently an agreement has been signed between the Local Government Association and the Environment Agency in respect of response to incidents of fly-tipping in England and Wales. This protocol identifies removal of fly-tipped litter from watercourses, if on public land, as the responsibility of the local authority. In the past we have joined local authorities and local groups in litter clearance initiatives and will continue to work in partnership to combat all matters raised in relation to this issue.

Effects

Litter accumulation and excessive weed growth adversely affects many watercourses. Recreational use of the waterway, including angling and boating, may be compromised.

Options	Responsibility	Comments	Themes
Remove litter	*Local authority*	*Will improve general aesthetics.*	
Carry out collaborative litter removal programmes.	*Local authority*	*Will improve general aesthetics.*	
Remove large fly-tipped debris and carry out annual weed clearance initiatives	*Agency*	*Will remove debris from river channels which could otherwise compromise flood defences.*	
Increase public awareness and disposal facilities.	*Local authority* *Agency* *Local community*	*Could reduce litter problems.*	
Consider "ad hoc" complaints on weed growth on a case by case basis	*Agency* *Drainage authority*	*Could yield aesthetic improvements*	

Other environmental concerns in the Plan area for which we have not identified any specific Issues relate to: the regulation of **Major Industry**, addressing **Climate Change** and improving **Air Quality**. Ongoing actions undertaken by ourselves with respect to these are set in the following tables.

7. Regulating MAJOR INDUSTRIES

Agency Operational and Strategic Actions are to:

- continue the efficient and effective delivery of Integrated Pollution Control;
- implement the requirements of the EC Directive on Integrated Pollution Prevention and Control;
- implement the relevant requirements of the Control of Major Accident Hazards Directive;
- Develop practical working relationships with fellow regulators, particularly the Health and Safety Executive;
- Develop pollution prevention control tools including projects relating regulation to emission, efficiency and economic benefits;
- encourage the use by industry of BS 7750/ ISO 14001 accreditation;
- encourage registration under the EU Eco-Management and Audit regulations;
- pay special attention to the needs of small and medium-sized enterprises;
- maintain and expand the Chemical Release Inventory;
- introduce Operator and Pollution Risk Appraisal;
- play a full and active part in the EU Network for the Implementation and Enforcement of Environmental Law;
- ensure that radioactive releases from nuclear sites which result in exposures to individual members of the public are well within accepted limits;
- ensure that the total potential impact of releases from nuclear sites are environmentally acceptable;
- develop and implement toxicity based consenting methods for releases from complex industrial sites;
- ensure improvements are made to the quality of discharges to estuarine and coastal waters;
- implement the requirements of the EC Urban Waste Water Treatment Directive;
- research into effective means of ensuring that disinfectant and sterilisation techniques are safe for the environment; and,
- develop and implement tools to assess risks, costs, benefits and options in relation to the major industrial pressures on the environment.

Emissions to the atmosphere from industrial processes are regulated to minimise their impact their impact on the environment. Along the South Humber Bank 32 processes are regulated by the Agency using Integrated Pollution Control authorisations. These include combustion processes, petroleum processes such as oil refinerys, chemical processes and incineration. All emissions meet the prescribed standards set in their authorisations and no release is permitted which will breach Environmental Quality Standards. A further range, of less polluting emissions, are regulated by local authorities who have overall responsibility for managing air quality. Emissions from road traffic have a wide range of environmental effects, geographically direct effects are normally limited in the vicinity of roads however they can react with other pollutants to form smogs.

The concentration of industrial and food manufacturing operations along the South Bank of the Humber is sufficiently high that the Agency is treating it as a Zone Of Industrial Pollution Sources (ZIP). A ZIP is an area with a high density of industrial premises or processes that have a potential to release material into the environment, but not an area with an established specific issue. For industrial processes regulated by ourselves in such zones, we will complete wider assessments to identify (and quantify if possible) any additive or synergistic issues, specifically with regard to air quality. In undertaking this assessment we will consider all processes present, including those regulated by local authorities. Work on the South Humberside ZIP is underway and an initial report is expected around the end of the year.

8. Improving AIR QUALITY

Agency Operational and Strategic Actions are to:

- Help the Government deliver its Air Quality Strategy;
- Ensure emissions from the major industrial processes to the atmosphere are reduced;
- Ensure specific emissions of sulphur dioxide and oxides of nitrogen, which contribute to acid rain, are reduced;
- Discourage the use of solvents in industry, which contribute to the production of ozone, the major photochemical pollutant; and
- Set an example in reducing emissions from vehicles by reducing our own mileage and increasing the use of public transport.

The Government intends to produce a general strategy for air quality based on clear standards and targets. These standards will be supported by a framework for local air quality management based on Air Quality Management Areas. These standards will:

- require periodic review of air quality by all local authorities;
- provide for the establishment of Air Quality Management Areas in those places where air quality targets are unlikely to be met;
- place powers and obligations on local authorities and other relevant bodies to prepare plans for remedying air quality problems;
- secure the effective co-ordination of all activities which can influence air quality improvement in the most cost-effective manner in those areas where it is most needed.

The Environment Act 1995 extends the responsibilities of local authorities to monitor air quality in their areas and where necessary draw up air quality management plans to mitigate against breaches of air quality standards. This may involve traffic management planning in conjunction with the regulation of prescribed Part A and Part B processes.

The Agency in its regulation of Part A processes, will be required to participate in the setting and achievement of such local standards.

Locally our understanding of air quality standards is hampered by the lack of air quality monitoring stations. Proposals to construct a new power station at Killingholme, and another to construct a waste incinerator, may raise public concern in the future.

9. Addressing CLIMATE CHANGE

Agency Operational and Strategic Actions are to:

- Help to ensure that the Government's greenhouse gas emission reduction targets are met;
- develop methods to improve our estimates of the emission of methane into the atmosphere from landfill sites;
- promote tax incentives to reduce energy production from burning fossil fuels;
- set an example by reducing our own energy and fossil fuel consumption;
- invest in research to predict the likely effects of climate change on the environment of England & Wales, and how to manage them;
- provide improved mapping of low lying coastal areas at risk from sea level changes;
- develop techniques to identify changes in plant life, using remote sensing techniques, to measure the effects of different weather patterns in sensitive areas; and
- contribute our knowledge and expertise to national and international forums dealing with climate change.

10. Humber Estuary Related Issues

A number of issues which have implications and overlap with the Grimsby/Ancholme Plan area are being addressed in our Humber Action Plan these are summarised below.

Cleethorpes Bathing Waters

Historically Cleethorpes Bathing Waters did not meet the relevant EC Standard for Bathing Waters. However following the commissioning of Anglian Water's Sewage Treatment Works at Newton Marsh, Cleethorpes there have been significant improvements to water quality and bathing waters currently meet the standards of the EC Bathing Water Directive

There is however continued evidence of background contamination which is giving us some cause for concern. In partnership with North East Lincolnshire Council and AWS we are investigating these sources of contamination. AWS have brought forward their Grimsby Pyewipe treatment scheme by 18 months to remove a further potential source of background contamination affecting the bathing waters.

Tidal Defences

Standards of defence along the coastline between Winterton and Grimsby generally meet target standards however there remain isolated stretches which do not.

There are a number of issues with implications for tidal defences and flood defence standards – the structural integrity of defences, coastal erosion, rising sea levels, the changing morphology of the Humber Estuary. Because this length of coastline is an integral part of the whole Estuary we have undertaken to manage it in an integrated manner.

We have made considerable progress in the development of a long term strategy for flood defences for the whole of the Estuary. To achieve this a number of actions have been initiated notably an Estuary Shoreline Management Plan which will act as the basis for the decision making process is being developed and an investigation into the geomorphology of the Estuary has been started. This will result in our having a much better understanding of the processes which shape the Estuary.

In the short term urgent works have been completed recently between Winteringham and South Ferriby, and next year works are scheduled between Immingham and Grimsby.

The Protection of Inter-tidal Habitat

The estuary is renowned for its bird population, which it supports throughout the year, particularly during migratory passage and as winter residence. The intertidal mud flats and marsh provide sources of food, safe roosts and breeding sites for the birds. The protection of these is essential to maintaining the conservation status of the estuary and its important bird populations. We are actively seeking opportunities to enhance such habitats as part of or flood defence and conservation work

Recreational Potential

There are real needs and opportunities to develop increased public access to the Estuary and its linked watercourses as well as improving rights of ways along adjoining river banks. Recreational improvements should not adversely affect other interests such as conservation and landowners.

We are committed to improving recreational facilities on land we own and recognise this is best achieved through partnership, to maximise funding opportunities. We also do work in our own right identifying opportunities to enhance recreation within the capital programme for flood defence works.

4. A BETTER ENVIRONMENT THROUGH PARTNERHIP

Introduction

The growing population and society's drive to create wealth and improve standards of living have increased the use of natural resources and waste production. Together these place the environment under increasing pressure.

In the Plan area, intensive farming practices, mineral extraction and urban development have impacted significantly on flora and fauna. Increasing demand for water to meet public water supply needs and for agricultural use add to these pressures.

Whilst we have powers to deal with some aspects of environmental concern (See Appendix 1) these are not comprehensive and in many areas we must rely on working with others to protect the environment and minimise potential threats. These threats and major partnership initiatives are set out below:

Urban development can have a potentially adverse impact upon the environment. It can result in:

(i) an increased risk/occurrence of flooding as a consequence of changes to surface water drainage

(ii) an increased risk to surface and groundwater quality from both treated and untreated effluent discharges

(iii) increased pressure upon the sewerage infrastructure

(iv) an increased demand for water for industrial use and for public water supply

(v) a loss of habitat due to land take

(vii) increased levels of waste produced

(vii) a risk to air quality

(viii) a risk to flora and habitats as a consequence, directly or indirectly, of remedial flood defence works and/or water quality problems

The responsibility for regulating changes in land use lies with local planning authorities. Through the development plan process, which sets out the framework for land use change, and the implementation of development control, local councils decide on the location of new development, the redevelopment of existing areas and changes of use of land or buildings. We liaise closely with planning authorities in our role as a consultee, along with developers, and advise on proposals which are relevant to us.

Local authorities also have a statutory responsibility to carry out periodic reviews of air quality in their areas. These reviews will form the basis for Local Air Quality Management Plans, assessing air quality problems and targeting areas for improvement. The Agency will liaise with local authorities in the Plan area on the development of air quality management plans.

We are responsible for regulating the treatment, keeping and disposing of wastes arising from industrial, household and commercial uses. By far the greatest portion of such waste (70% nationally) is sent to landfill. However, regardless of how well landfill sites are located and engineered, they still have the potential to release pollutants into surface and groundwaters, soil and air. There are 30 active landfill sites and a large number of closed/historic landfill sites in the Grimsby Ancholme Plan area, some of which have caused pollution problems in the past or have the potential to pollute. Recent proposals for new landfill sites in the Plan area, for example at Kirton Lindsey, have also caused public concern. We will continue to work with local authorities in advising them on the strategic Waste Local Plans, and with site operators to minimise the risks that landfill sites pose to the environment.

The following policy issues are particularly relevant to the Grimsby Ancholme Plan area and we will encourage their inclusion in local authority development plans where appropriate:

Policies which:

- Resist development that would adversely impact upon air quality;
- Encourage the reclamation and re-use of contaminated land where appropriate remediation measures have been put in place;
- Locate development in areas where adequate water resources are available or where it can be made available without detriment to the water environment;
- Reduce the demand for water;
- Seek to protect floodplains and prevent development which would create an unacceptable increase in the risk of flooding on site or elsewhere;
- Prevent developments which would prejudice coastal defences;
- Protect, enhance and restore river corridors and coastal margins;
- Ensure that adequate foul and surface water drainage infrastructure is available to serve new developments;
- Ensure that effective pollution prevention measures are incorporated within development schemes;
- Retain, improve and restore public access where appropriate;
- Promote water recreation and navigation whilst balancing recreational needs with nature conservation;
- Seek to reduce the amount of waste created;
- Ensure that the disposal of waste does not have an adverse effect on any watercourse or groundwater.

Agricultural land use

Economic and commercial pressures on farmers to be more efficient, increase productivity and improve product quality have resulted in agricultural practices that may impact on the environment. These impacts can have both local and wider ranging implications:-

(i) the use of fertilisers, pesticides and farm-derived waste can impact on both surface and groundwater quality. Pesticide contamination requires expensive remediation and fertilizers contribute to nutrient enrichment which impacts on the ecological balances of watercourses.

(ii) soil quality can be affected by the use of pesticides, which may indirectly kill soil organisms and compaction from farm machinery, which can damage soil structure. Changing agricultural practices such as the removal of hedgerows have accelerated soil erosion and this can affect water quality in terms of increasing sediment loading, damage habitat by the deposition of silt on gravel beds and impact on drainage by blocking drainage pipes and culverts. Topsoil run-off can also carry other pollutants into rivers.

(iii) river maintenance works and lowering of water levels to ensure effective land drainage, have a marked effect upon flora and fauna

(iv) abstraction of water for irrigation affects both water levels and quality

(v) ploughing land close to watercourses can cause large quantities of sediment to run-off following periods of heavy rain. The increased popularity of outdoor pig rearing exacerbates this problem.

<u>Genetically Modified Organisms</u>

We have three principal interests in this subject:

* the safe regulation of their industrial use within contained systems,
* safeguarding the environment with respect to the growing of GM crops for food, particularly in the aquatic environment,
* the potential use of GM plants to decontaminate land, or for use as environmental tracers.

We endorse the precautionary approach of English Nature involving a properly conducted programme of research and testing into the use of GMOs.

In recognising the need for a sound regulatory system covering the media of land, air and water we will continue to make our scientific expertise available to the government and other interested bodies.

In working to minimise potential risks involved, the Agency works with the agricultural community and other organisations such as MAFF, the Farming and Wildlife Advisory Group and the Countryside Commission to:

- encourage the adoption of initiatives such as the Code of Good Agricultural Practices for the Protection of Water, Soil and Air
- promote Stewardship schemes such as the creation of wet grassland to improve habitat diversity
- promote countryside access schemes
- encourage the construction of winter storage reservoirs as an alternative source of water for spray irrigation
- implement the new Groundwater Regulations to help prevent pollution of groundwater by controlling discharges or disposals of certain dangerous substances (e.g. pesticides, sheep dip)

We will also

- adopt more environmentally sensitive practices in our own flood defence and land drainage works
- be proactive in educational and awareness campaigns disseminating relevant literature to farmers giving advice on how they can practice in a more environmentally friendly way.

Industrial Activity

Potentially polluting industrial emissions come in the form of:

(i) discharges made after treatment directly to surface and tidal waters

(ii) effluents discharged to foul sewers

(iii) discharges to the atmosphere

(iv) discharges such as waste to landfill sites and sewage sludge to land

(vii) accidental spillages/discharges causing contamination of land and ultimately surface and groundwaters

Industrial abstraction of water from watercourses may also impact on downstream water quality.

The responsibility for monitoring and authorising these discharges lies with both the Agency which issues permissions and consents where appropriate, with the sewerage undertaker and in the case of some industrial emissions to air, the Local Authorities.

As part of our regular contact with industry and commerce, we work with them to pre-empt and minimise risks involved, generally to our mutual benefit and using our enforcement powers where necessary. By adopting good waste reduction practices, industry and commerce have an opportunity to improve their business performance. Many individual companies have successfully introduced waste minimisation practices, and remove hazardous material (e.g. mercury in domestic batteries) from the waste stream. Similarly improvement conditions to IPC authorisations have yielded considerable reductions in environmental emissions along the South Humber Bank. We continue to be proactive with respect to waste management practices involving others and ourselves in Local Agenda 21 initiatives.

We are under a duty to prevent or minimise emission of all prescribed substances from industrial processes, which are subject to regulation under the IPC system, and to render harmless emissions from IPC processes. Power stations are subject to Agency regulation as they are sources of sulphur dioxide (coal-fired stations only) and nitrogen oxides, as well as other pollutants. They also have the potential to affect local air quality.

Locally, a gas fired and potentially water cooled power station has recently been proposed at Killingholme, and west of the plan area at Flixborough there are proposals by Glandford Power Station to burn meat and bonemeal produced by the rendering of cattle carcasses as a substitute fuel. Both proposals have potential environmental impacts for this area and we will work with the local authorities and companies involved to ensure that they do not pose a risk to air quality, water resources or the local environment.

The Agency will in partnership with industry:

- seek improvements in the quality of industrial emissions and reduce the risk of accidental discharges to the environment
- encourage waste recovery techniques such as recycling, composting and energy production
- improve awareness of waste recycling/minimisation opportunities by publicity and education
- promote and implement waste reduction and minimisation processes

Local Agenda 21 and Educational Initiatives

Local Agenda 21

Agenda 21 is a global action plan for the 21st century produced at the Rio Earth Summit in 1992. It brings together economic, environmental and social concerns into a 'blueprint' for a more sustainable way of life for everyone, recognising that environmental problems at all levels have their basis in local activities, it emphasises the need for local action in the message 'Think Globally, Act Locally'. Local authorities across the world were seen as the focus of promoting and encouraging local community action and were charged with producing a Local Agenda 21 (LA21).

The process in the UK has taken a variety of forms. Many Local Agenda 21 groups have been involved in the development of local state of the environment reports, (such as those for Lincolnshire) and sustainability indicators to help identify issues of local importance. These issues can then be developed into action plans and projects to deliver improvements.

We are obliged, under statutory guidance on sustainable development, to assist the Local Agenda 21 process by providing for appropriate consultation with local communities involved in LA21 initiatives. We should also seek to develop a close and responsive relationship with local communities on matters related to our own functions.

In the Grimsby Ancholme Plan Area, we are involved in the forums set up by County, District and Unitary Authorities in response to the LA21 initiative. Examples of specific projects or groups we are involved in include the Lincolnshire Environment Forum.

Education and Awareness

One of the ways in which we can bring about environmental improvement and protection is by enhancing public awareness through education. Damage is often caused, not through malicious intent to harm the environment but through carelessness and a lack of awareness.

We believe it should have an involvement in education at all levels. It is important to direct education to all aspects of our society not just education through schools and colleges.

Our education strategy 'Green Shoots', considers education into the next century, and outlines the following actions:

- to help educate young people through teaching aids and other initiatives
- to improve understanding of environmental issues, through links with education, work placements and an awards scheme
- to work with industry and produce marketing campaigns to promote prevention of pollution rather than its remediation
- to foster public awareness of environmental issues to encourage responsibility for the environment and its challenges, and
- to build on established and create new international relationships to further sustainable development

Environmental education is a central means of furthering our commitment to sustainable development. Education provides industry, commercial interests and the public with an awareness of, and hopefully an impetus to address environmental issues; this is vital to achieving a sustainable society. Education in its broadest sense means personal awareness, experience and interest developed over a period of time, whether at home, school, college or university, at work, or in the wider community. We hope to see environmental topics dovetail into the national curriculum and are committed to provide information to 'A' level and university students.

Biodiversity Action Plans

In June 1992, at the Earth Summit in Rio, the United Kingdom and over 150 other countries signed the Convention on Biological Diversity. The UK response to this commitment was launched in January 1994 with "Biodiversity: The UK Action Plan" and guidance was given on the production of Local Biodiversity Action Plans. The purpose of Local Biodiversity Action Plans is to focus resources to conserve and enhance biodiversity by means of local partnerships, taking account of national and local priorities.

A Local Biodiversity Action Plan is both a product and process. It identifies where action needs to be taken to implement targets for habitats and species and it specifies appropriate mechanisms. Such plans also have a key role in monitoring progress of the conservation of biodiversity in the long term.

A local Biodiversity Action Plan "Framework" has been prepared by the Wildlife Trust for Lincolnshire. In keeping with Local Agenda 21, the formulation of Local Biodiversity Action Plans, should not be undertaken by a single organisation. Delivering the biodiversity targets will require inputs from central and Local Government, conservation organisations, land managers, members of the public and ourselves.

The conservation of biodiversity will be a key indicator of the successful implementation of sustainable development in the area.

We will:

- support and encourage the development and implementation of Local Biodiversity Plans and assist in the identification of targets and priorities

Appendix 1

Duties, powers and interests of the Environment Agency

The Environment Agency has a wide range of interests in the areas of water management, waste management and pollution prevention and control. Whilst many of these interests are supported by statutory duties and powers, much of our work is advisory, with the relevant powers resting with other bodies such as Local Planning Authorities. For example we are not responsible for:-

- noise problems (except if it is to do with our work)
- litter (unless it is restricting the flow of a river)
- air pollution arising from vehicles, household areas, small businesses and small industry
- collecting waste in your local area
- planning permission
- environmental health
- food hygiene

These are all dealt with by your local planning authority who will contact us if necessary.

We are not responsible for the quality or supply of drinking water at the tap or for treating sewage waste, although we regulate discharges from sewers and sewage treatment works.

The following table summarises our duties, powers and interests and their relationship to land-use planning:

Agency Duty	The Agency has powers to:	The Agency has an interest (but no powers) in:	Partnership
Water Resources: The Agency has a duty to conserve, redistribute, augment and secure the proper use of water resources.	• Grant or vary water abstraction and impoundment licences on application. • Revoke or vary existing licences to reinstate flows or levels to surface-waters or groundwater which have become depleted as a result of abstraction, and are subject to a liability for compensation. • Secure the proper use of water resources through its role in water-resources planning, the assessment of reasonable need for abstractions and promotion	• The more efficient use of water by water companies, developers industry, agriculture and the public and the introduction of water-efficiency measures and suitable design and layout of the infrastructure.	The Agency is committed to water-demand management and will work closely with water companies and developers, local authorities and relevant organisations to promote the efficient use of water. The Agency acknowledges that new resources may be needed in the future and supports a twin-track approach of planning for water resource development alongside the promotion of demand-management measures. The Agency seeks to influence

Agency Duty	The Agency has powers to:	The Agency has an interest (but no powers) in:	Partnership
	of more efficient use of water resources. • Monitor and enforce abstraction and impoundment licence conditions.		planning decisions for new development by encouraging the inclusion of water-conservation measures in new properties, particularly in areas where water resources are under stress, and by ensuring that planning authorities allow for the lead time for resource development.
Flood Defence The Agency has a duty to exercise general supervision over all matters relating to flood defence throughout each catchment.	•Control, through Land Drainage consents, development or construction of a structure that would affect the flow of an ordinary watercourse (Water Resources Act, 1991 Section 109, Land Drainage Act, 1991 Section 23). •Produce flood risk maps for all main rivers under S105 of Water Resources Act 1991. •Undertake works to main rivers using permissive powers. •Issue flood warning relating to main river to the public, local authorities and the police. •Consent mineral workings within 16 metres of main rivers.	•Granting of planning permission throughout a catchment but especially floodplains where development can significantly increase flood risk. This permission is granted by Local Planning Authorities. •Installation of surface water source control measures e.g. flood attenuation structures. •Supervising the maintenance of ordinary watercourses which is a Local Authority remit, but may impact on main rivers. •Installations of buffer zones which reduce flood risk and have significant environmental benefits. •Urban and rural land use and measures that can reduce flood risk or the need for watercourse maintenance.	As a statutory consultee on planning applications within main-river floodplains, the Agency offers advice based on knowledge of flood risk. It also advises on the environmental impacts or proposed floodplain development. The Agency will encourage best practice, including source-control measures and common standards, among Local Authorities and riparian owners to protect and enhance the environment. The Agency works with the civil authorities to prepare flood-warning dissemination plans and supports their endeavours to protect communities at risk.
Water Quality The Agency has a duty to monitor, protect, manage and, where possible, enhance the quality of all controlled waters including rivers, groundwaters, lakes, canals, estuaries and coastal waters through the prevention and control of pollution.	•Issue discharge consents to control pollution loads in controlled waters. •Regulate discharges to controlled waters in respect of water quality through the issue and enforcement of discharges consents. •Prosecute polluters and recover the costs of clean-up operations.	•The control of runoff from roads and highways. This is a Highway Agency duty. •The greater use of source-control measures to reduce pollution by surface-water runoff. •Prevention and education campaigns to reduce pollution incidents.	The Agency will liaise with Local Authorities, developers, the Highways Agency, industry and agriculture to promote pollution prevention and the adoption of source-control measures As a statutory consultee on planning applications, the Agency will advise Local Planning Authorities on the water-quality impact of proposed developments.

Agency Duty	The Agency has powers to:	The Agency has an interest (but no powers) in:	Partnership
Air Quality The Agency has a duty to implement Part 1 of the Environment Protection Act 1990.	•Regulate the largest technically complex and potentially most polluting prescribed industrial processes such as refineries, chemical works and power stations including enforcement of, and guidance on, BATNEEC and BPEO. •Have regard to the government's National Air Quality Strategy when setting standards for the releases to air from industrial processes.	•The vast number of smaller industrial processes which are controlled by Local Authorities. •Control over vehicular emissions and transport planning.	The Agency provides data on IPC processes and advice on planning applications to Local Authorities. The Agency is willing to offer its technical experience to Local Authorities on the control of air pollution The Agency wishes to liaise with Local Authorities in the production of their Air Quality Management Plans. The Agency will advise and contribute to the government's National Air Quality Strategy
Radio-active Substances The Agency has a duty under the Radioactive Substances Act 1993 to regulate the use of radioactive materials and the disposal of radioactive waste.	•To issue certificates to users of radioactive materials and disposers of radioactive waste, with an overall objective of protecting members of the public.	•The health effects of radiation.	The Agency will work with users of the radioactive materials to ensure that radioactive wastes are not unnecessarily created, and that they are safely and appropriately disposed of. The Agency will work with MAFF to ensure that the disposal of radioactive waste creates no unacceptable effects on the food chain. The Agency will work with the Nuclear Installations Inspectorate to ensure adequate protection of workers and the public at nuclear sites. The Agency will work with the HSE on worker-protection issues at non-nuclear sites.
Waste Management The Agency has a duty to regulate the management of waste, including the treatment, storage, transport and disposal of controlled waste, to prevent pollution of the environment, harm to	•Vary waste management licence conditions. •Suspended and revoke licences. •Investigate and prosecute illegal waste management operations	•The siting and granting of planning permission for waste management facilities. This is conducted by the waste industry and Local Planning Authorities. The Agency, as a statutory consultee on planning applications, can advise on	The Agency will work with waste producers, the waste-management industry and local authorities to reduce the amount of waste produced, increase reuse and recycling and improve standards of disposal.

Agency Duty	The Agency has powers to:	The Agency has an interest (but no powers) in:	Partnership
public health or detriment to local amenities.		such matters.	
Contaminated Land The Agency has a duty to develop an integrated approach to the prevention and control of land contamination ensuring that remediation is proportionate to risks and cost-effective in terms of the economy and environment.	•Regulate the remediation of contaminated land designated as special sites. •Prevent future land contamination by means of its IPC, Water Quality and other statutory powers. • Report on the state of contaminated land.	•Securing with others, including Local Authorities, landowners and developers, the safe remediation of contaminated land.	The Agency supports land remediation and will promote this with developers and Local Authorities and other stakeholders.
Conservation The Agency will further conservation, wherever possible, when carrying out water-management functions; have regard to conservation when carrying out pollution-control functions; and promote the conservation of flora and fauna which are dependent on an aquatic environment.	•The Agency has no direct conservation powers, but uses its powers with regard to water management and pollution control to exploit opportunities for furthering and promoting conservation.	•The conservation impacts of new development. These are controlled by Local Planning Authorities. •Protection of specific sites or species, which is a function of English Nature. The Agency does, however, provide advice to Local Authorities and developers to protect the integrity of such sites or species. •Implementation of the UK Biodiversity Plan for which it is the contact point for 12 species and one habitat.	The Agency supports action to sustain or improve natural and man-made assets so that they are made available for the benefit of present and future generations. Many development schemes have significant implications for conservation. The Agency will work with developers, Local Authorities, conservation bodies and landowners to conserve and enhance biodiversity.
Landscape The Agency will further landscape conservation and enhancement when carrying out water-management functions; have regard to the landscape when carrying out pollution-control functions; and promote the conservation and enhancement of the natural beauty of rivers and associated land.	•The Agency must further the conservation and enhancement of natural beauty when exercising its water-management powers and have regard to the landscape in exercising its pollution-control powers.	•The landscape impact of new development, particularly within river corridors. This is controlled by Local Planning Authorities.	The Agency produces River Landscape Assessments and Design Guidelines which it uses when working with Local Authorities and developers to conserve and enhance diverse river landscapes.
Archaeology	•The Agency must promote	•Direct protection or	The Agency will liaise with

Agency Duty	The Agency has powers to:	The Agency has an interest (but no powers) in:	Partnership
The Agency has a duty to consider the impact of all of its regulatory, operational and advising activities upon archaeology and heritage, and implement mitigation and enhancement measures where appropriate.	its archaeological objectives though the exercise of its water-management and pollution-control powers and duties.	management of sites or archaeological or heritage interest. This is carried out by LPAs, County Archaeologists and English Heritage.	those organisations which have direct control over archaeological and heritage issues to assist in the conservation and enhancement of these interests.
Fisheries The Agency has a duty to maintain, improve and develop salmon, trout, freshwater and eel fisheries.	•Regulate fisheries by a system of licensing. •Make and enforce fisheries byelaws to prevent illegal fishing. •Promote the free passage of fish and consent fish passes. •Monitor fisheries and enforce measures to prevent fish-entrainment in abstractions. •Promote its fisheries duty by means of land-drainage consents, water abstraction applications and discharge applications.	•The determination of planning applications which could affect fisheries.	Many development schemes have significant implications for fisheries. The Agency will work with anglers, riparian owners, developers and Local Authorities to protect fisheries.
Recreation The Agency has a duty to promote rivers and water space for recreational use.	•The Agency contributes towards its recreation duty through the exercise of its statutory powers and duties in water management.	•Promotion of water sports. This is carried out by the Sports Council and other sports bodies.	
Navigation The Agency has a duty to maintain (with others), the Ancholme navigation.	• Improve, conserve and operate the Ancholme navigation • Regulate navigation by a system of licensing. • Enforce navigation legislation		The Agency will work with British Waterways, the Ports and other navigation authorities and navigation users to improve the navigations generally as valuable environmental, recreational, commercial and heritage resources.

Appendix 2 : The Routine Work of the Environment Agency

On a day-to-day basis, the Agency carries out a huge environmental monitoring and regulatory operation, most of which is to achieve statutory requirements. The aim of regulation is to balance the needs of people and the environment. The Agency works to:-

- save, redistribute and improve river, lake, reservoir and underwater supplies
- prevent and control pollution of air and water
- reduce the risk of harm from contaminated land and bring it back into use
- make sure waste is dealt with safely and legally
- make sure radioactive materials are kept, used and disposed of safely
- make sure flood risks are not created or exacerbated.

Regulating the environment takes place through licensing. The Agency manages licences for abstraction of water from rivers and boreholes, releases to air and water, the carrying and disposal of waste and to carry out work in, over, under or near a watercourse. Within the Plan Area we manage over 360 water abstraction licences, 66 consented discharges, 64 waste management licences, 32 authorisations under Integrated Pollution Control for processes which make releases to air and 52 permits for radioactive materials and waste.

We monitor the environment to ensure that pollution is controlled and resources are adequately protected. We regularly monitor the quantity and quality of rivers, estuaries and the sea and check emissions from the processes we regulate. Results are reported on a public register, which can be inspected at the Agency's main offices. We run a 24-hour service for receiving reports of and responding to flooding and pollution incidents and emergencies in the air, water or on land. We also work with others to reduce the risk of harm from contamination and to bring land back into good use.

We work to minimise waste and prevent pollution through advice and education, including national campaigns, and through working with other environmental regulators. When necessary, we are prepared to enforce environmental legislation in a tough way. Those who show little regard for the law and who cause blatant and persistent damage to the environment can expect to be prosecuted.

The Agency also has the role of reducing risk to people and the environment from flooding by providing effective defences. Protecting life is our highest priority and to meet this aim we provide a flood forecasting and warning service and discourage development in flood-risk areas. We also manage over 250 km of fluvial flood defences and aim to protect and improve the natural environment by promoting flood defences that work with nature.

We are responsible for maintaining, improving and developing fisheries. We regulate fisheries by issuing licences for rod angling and net fishing. We carry out improvements to fisheries by improving the habitat and fish stocks and providing advice to fishery owners. The Agency seeks to ensure that wildlife, landscape and archaeological heritage are protected both in any work we carry out and also in work carried out by others.

Our principal aim for recreation is to protect, improve and promote the water environment for recreational use. We do this by protecting existing use and creating opportunities in the course of our work and by maximising the use of Agency owned sites for recreation.

Appendix 3

River Ecosystem Classifications

(1) Class	(2) Dissolved Oxygen % saturation 10 %ile	(3) BOD (ATU) mg/l 90 %ile	(4) Total Ammonia mg N/l 95 %ile	(5) Un-ionised Ammonia mg N/l 95 %ile	(6) pH lower limit as 5 %ile; upper limit as 95 %ile	(7) Hardness mg/l $CaCO_3$	(8) Dissolved Copper µg/l 95 %ile	(9) Total Zinc µg/l 95 %ile	Class Description
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	Water of very good quality suitable for all fish species
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	Water of good quality suitable for all fish species
RE3	60	6.0	1.3	0.021	6.0 - 9.0	≤ 10 > 10 and ≤ 50 > 50 and ≤ 100 > 100	5 22 40 112	30 700 1000 2000	Water of fair quality suitable for high class coarse fish populations
RE4	50	8.0	2.5	-	6.0 - 9.0	≤ 10 > 10 and ≤ 50 > 50 and ≤ 100 > 100	5 22 40 112	30 700 1000 2000	Water of fair quality suitable for coarse fish populations
RE5	20	15.0	9.0	-	-	-	-	-	Water of poor quality which is likely to limit coarse fish populations

APPENDIX 4

Long Term Water Quality Objectives

Anglian Region inherited two different systems for setting river quality objectives. One was based on the National Water Council (NWC) classification and the second a regionally derived Use-related classes, which included salmonid and coarse fisheries and various types of amenity use. The majority of these objectives were consulted upon locally and set in the late 1970s/early 1980s.

To provide for a smooth transition to the new RE system the Agency has developed a protocol to merge both of these systems using a process of neutral translation. This relates the threshold standards for the relevant determinands in the new and old schemes.

The long-term quality objectives presented in this consultation report are largely derived from this neutral translation. However, for a limited number of stretches a review of historic data and an evaluation of both the chemical and biological characteristics of the river, indicates that the historic long-term objectives did not reflect the natural characteristics/land use in the vicinity of the river and/or these characteristics have changed over time.

The following Tables provide full details of our proposals for long-term and interim RE objectives for all classified and non-classified stretches within the catchment.

TABLE B : PROPOSED WQOs FOR NON-CLASSIFIED STRETCHES

Although these stretches are non-classified, and therefore will not have RE targets set on a statutory basis, for water quality management puposes the Agency intends to consult on proposals for RE targets.

- SI=Spray Irrigation, LW = Livestock Watering

Watercourse	Stretch	Long-term RE target (short-term target)	Additional (locally derived) use related RQOs
BROCKLESBY DRAIN	HEADWATERS...NEW BECK DRAIN	RE2	LW
NEW BECK DRAIN	NEW BECK DRAIN	RE4	LW
SKITTER BECK TRIB	ULCEBY STW...SKITTER BECK	RE5	
CADDLE BECK/.STALL NOTH BECK	KEELBY STW...HUMBER	RE4	LW
NORTH KILLINGHOLME MAIN DRAIN	LINDSEY OIL REFINERY...O/F TO SEA	RE5	
SOUTH KILLINGHOLME DRAIN/EXTENSION	CONOCO OIL REFINERY...O/F TO SEA	RE5	
OLD FLEET DRAIN	HEADWATERS...O/F TO SEA	RE4	LW
NEW CUT DRAIN	HEADWATERS...RAILWAY	RE4	
SIR ROLAND WINNS DRAIN	LAKE...WEST DRAIN	RE4	LW
WEST DRAIN/ANCHOLME	CASTLETHOPRE MILLS ....HUMBER	RE3	SI LW
OWMBY BECK	OWMBY...ANCHOLME	RE3/RE2	
SEGGIMOOR BECK	U/S GLENTHAM...HARLAM HILL	RE3	
WILLINGHAM BECK	TEALBY BECK...RASE SOUTH BRANCH	RE4	
RASE SOUTH BRANCH	WILLINGHAM BECK...RASE	RE3	SI
BLACK DYKE	A15 RD BR...WADDINGHAM BECK	RE2	SI LW

Watercourse	Stretch	Long-term RE target (short-term target)	Additional (locally derived) use related RQOs
BLACK DYKE	WADDINGHAM BECK...ANCHOLME	RE3	SI LW
SOUTH KELSEY DRAIN	CAISTOR STW...NETTLETON BECK	RE2	LW
REDBOURNE CATCHWATER DRAIN	WOOFHAM FARM..REDBOURNE OLD RIVER	RE3	
REDBOURNE OLD RIVER	REDBOURNE...ANCHOLME	RE4	
NORTH KELSEY BECK	CAISTOR SPRINGS...CUTLEY BECK	RE2	SI LW
CUTLEY BECK	SOURCE...CHERRY VALLEY DYKE	RE3	LW
CUTLEY BECK	CHERRY VALLEY DYKE...NORTH KELSEY BECK	RE4	
SCAWBY CATCHWATER	HIBALDSTOW STW...ANCHOLME	RE3	LW
SKEGGER BECK	BARNETBY LE WOLD STW...KETTLEBY BECK	RE3	SI LW
KETTLEBY BECK	SKEGGER BECK...ANCHOLME	RE3	SI LW
SCAWBY BROOK	B1207...ANCHOLME	RE3	
OLD RIVER ANCHOLME	POOL END...COAL DYKE END	RE3	SI LW
BLACK DYKE (BRIGG)	BRIGG STW...OLD ANCHOLME	RE5	

TABLE A : PROPOSED WQOs FOR CLASSIFED STRETCHES

- SI=Spray Irrigation, LW = Livestock Watering, PI = Potable abstraction (via impoundment)
- Italicised entries indicate that short-term targets have been proposed

Watercourse	Stretch	Long-term RE target (short-term target)	Additional (locally derived) use related RQOs
SKITTER/EAST HALTON BECKS	*HEADWATERS...ULCEBY STATION*	*RE3 (RE4)*	*LW*
SKITTER/EAST HALTON BECKS	*ULCEBY STATION...HUMBER*	*RE3 (RE5)*	*LW*
NEW CUT DRN	*RAILWAY...SEA OUTFALL*	*RE5 (None)*	-
LACEBY BK	*WELBECK SPRINGS...LACEBY STW*	*RE2 (RE3)*	*SI LW*
LACEBY BK	*LACEBY STW...A1163 LITTLECOATES RD BR*	*RE3 (RE5)*	*SI LW*
LACEBY BK	*A1136 LITLECOATES RD BR..TILTING GATE WEIR*	*RE3 (RE5)*	
BUCK BK	WALTHAM...SEA OUTFALL	RE4	LW
WINTERTON BECK	*B1430 RD BRIDGE...HUMBER*	*RE2 (RE3)*	*SI LW*
ANCHOLME	SPRIDLINGTON...TOFT NEWTON	RE2	SI LW
ANCHOLME	TOFT NEWTON...SNITTERBY CARR	RE3	PI SI LW
RASE	*BULLY HILL..RASE STH BRANCH*	*RE1 (RE2)*	*LW*
RASE	RASE STH BRNCH...MARKET RASEN STW	RE2	LW
RASE	*MARKET RASEN STW...ANCHOLME*	*RE2 (RE3)*	*LW*
ANCHOLME	SNITTERBY CARR...CAISTOR CANAL	RE3	PI LW
NETTLETON BECK/CAISTOR CANAL	SOURCE... END	RE2	SI LW
CAISTOR CANAL	NORTH END...ANCHOLME	RE3	LW

GLOSSARY OF TERMS

Abstraction	The removal of water from any source, either permanently or temporarily, usually by pumping.
Abstraction Licence	A statutory document issued by the Environment Agency to permit removal of water from a source of supply. It can limit the quantity of water taken daily etc.
Aesthetic	Beauty and taste
Agenda 21	A comprehensive programme of worldwide action to achieve a more sustainable pattern of development for the next century. UK Government adopted the declaration at the UN Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro in 1992.
Algae	Microscopic (sometimes larger) plants, which may be floating or attached. Algae occur in still and flowing water.
Ammonia	A chemical compound found in water often as a result of pollution by sewage effluents. It is widely used to determine water quality. Ammonia detrimentally affects fish.
AMP (Asset Management Plans)	Means by which the water undertakers plan the work required and capital expenditure necessary for improvements and maintenance of the water supply, sewage treatment works and sewerage systems. AMPs are drawn up through consultation with the Environment Agency and other bodies to cover a five year period. AMPs have to be agreed by DoE and OFWAT.
AMP3	An acronym for the second Asset Management Plan produced by the Water Companies for the Office of Water Services (OFWAT). It sets out the water industry investment programme for the period 1995 to 2000.
Aquifer	A permeable geological stratum or formation that is capable of both storing and transmitting water in significant amounts.
Area of Outstanding Natural Beauty (AONB)	Dessignated by the Countryside Commission under the National Parks and Access to the Countryside Act 1949 to conserve and enhance the natural beauty of the landscape, mainly through planning controls.
Augmentation	The addition of water by artificial input. (Usually to "top up" low flows in summer by either groundwater pumping or via reservoir release.)
Base Flow	That part of the flow in a watercourse made up of groundwater and discharges. It sustains the watercourse in dry weather.
Biodegradation	The breakdown of materials by the action of micro-organisms.
Bio-diversity	Diversity of biological life, the number of species present.
Biomass	Total quantity or weight of organisms in a given area or volume - e.g. fish biomass is measured as grammes per square metre (gm^{-2}).
Blow-Well	Pond/lake formed by artesian waters bubbling to the surface.
Borehole	Generally a small diameter bored hole which is used to exploit an aquifer. Synonymous with the term well.
Bubble Curtain	A perforated pipe laid across the river and secured to the bed. Compressed air passes through the pipe such that bubbles form a 'curtain' in the water column. The curtain

	helps to prevent the passage of the heavier saline water from one side of the curtain to the other by a circulatory/mixing action.
Buffer Zone (strip)	Strip of land 10-100m wide, alongside rivers which is removed from intensive agricultural use and managed to provide appropriate habitat types.
Catchment	The total area from which a single river system collects surface run-off.
Chemical Oxygen Demand	A measure of the total amount of chemically oxidisable material present in liquid.
Coarse Fish	Freshwater fish other than salmon and trout.
Coastal Plain	Low-lying land adjacent to the coast.
Co-disposal	The landfilling of both industrial and household wastes together in such a way that benefit is derived from biodegradation processes to produce relatively non-polluting products.
Controlled Landfill	Where wastes are deposited in an orderly planned manner at a site licensed under the Control of Pollution Act 1974.
Controlled Waste	Industrial, household and commercial waste, as defined in UK legislation. Controlled waste specifically excludes mine and quarry waste, wastes from premises used for agriculture, some sewage sludge and radioactive waste.
Controlled Waters	All rivers, canals, lakes, groundwaters, estuaries and coastal waters to three nautical miles from the shore, including the bed and channel which may for the time being be dry.
Cyprinid fish	Coarse fish eg.Roach, Dace and Bream.
Dangerous Substances	Substances defined by the European Commission as in need of special control. This is because they are toxic, accumulate and concentrate in plants and animals, or do not easily break down into less dangerous substances. They are classified as List I or List II.
Demand Management	Activities to manage the amount of water required from a source of supply; includes measures to control waste and/or to discourage use.
Development Plans	(Local Plans, Structure Plans) - Planning documentation which makes provision for the control of the use of land through structure plans, local plans and the grant or refusal of planning permission.
Diffuse Pollution	Pollution from widespread activities with no one discrete source. eg. acid rain, pesticides, urban run-off etc.
Diffuse Source	Pollution from non-point sources.
EC Bathing Beach	Beach which meets criteria defined by EC Directive concerning the quality of bathing waters.
EC Regulation	European Community legislation having legal force in all member states.
EU Directive	A type of legislation issued by the European Union which is binding on Member States in terms of the results to be achieved but which leaves to Member States the choice of methods.
Ecology	The study of relationships between an organism and its environment.
Ecosystem	A functioning, interacting system composed of one or more living organisms and their effective environment, in biological, chemical and physical sense.
Effluent	Liquid waste from Industry, agriculture or sewage treatment plants.
Emission	A material which is expelled or released to the environment. Usually applied to gaseous or odorous discharges to atmosphere.

Ephemeral Flow	River flow which dries at some times of the year (eg winterbournes).
Euthrophication	The enrichment of water by nutrients, especially nitrogen and/or phosphorous, which cause: accelerated growth of algae and high plant life: changes in the ecological balance and deterioration in water quality.
Fauna	Animal life.
Fish Biomass	A measure of the quality of a fishery as found in terms of surveys, weight by area ie g/m^2.
Flood Defences	Anything natural or artificial that protects against flooding, to a designed return period.
Flood Plain	This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
Flora	Plant life.
Fluvial	Relating to the freshwater river.
Fluvial Defence	Structure providing protection from flooding from rivers.
Fly Tipping	The illegal dumping of rubbish/material in places such as hedgerows, lay-bys, fields even on streets and in parks.
Gas Migration	The movement of gas from the wastes within a landfill site to adjoining strata, or emission into the atmosphere.
Gas Movement	The movement of gas solely within the wastes within a landfill.
Groundwater	May refer to all subsurface water as distinct from surface water. Generally groundwater is considered to be that water which is below the zone of saturation and contained within porous soil or rock stratum (aquifer).
Groundwater Protection Policy	Environment Agency policy which controls activities having the potential to pollute ground water resources.
Habitat	The customary and characteristic dwelling place of a species or community.
Hydrocarbons	Compounds of hydrogen and carbon which react in the presence of sunlight and oxides of nitrogen to produce photochemical oxidants.
Hydrogeology	The study of the occurrence and movement of groundwater and the interaction with geology.
Impermeable	Used to describe materials, natural or synthetic, which have the ability to resist the passage of fluid through them. It is usually expressed as the coefficient of permeability. This property is not absolute, and a cut-off coefficient of permeability of 10^{-9} m/sec for water is often used to describe a landfill liner material as impervious. The coefficients of permeability of materials for gases are likely to be greater.
Impounded	The holding back of water behind a dam. Strictly a structure which raises water levels above their "normal" height. May need a licence and/or Land Drainage Consent from the Environment Agency.
Inert Materials	Materials that will not physically or chemically react or undergo biodegradation within the landfill.
Inert Waste	Category of waste which includes material which will either not decompose, or will decompose very slowly. Materials in this category would include waste from the construction industry; such as hardcore, soil, stone and glass.
Integrated Pollution Control	An approach to pollution control in the UK which recognises the need to look at the environment as a whole, so that solutions to particular pollution problems take account of potential effects upon all environmental media.
Internal Drainage Boards (IDBs)	Authorities responsible for dealing with land drainage within a district. They are

	primarily concerned with agricultural land drainage but also may be involved with water supply to their district for agricultural purposes.
IPC Authorisation	An authorisation issued by Her Majesty's Inspectorate of Pollution prescribed by the Environmental Protection Act 1990 covering certain operation of processes .
Landfill	The engineered deposit of waste into or onto land in such a way that pollution or harm to the environment is minimized or prevented and, through restoration, to provide land which may be used for another purpose.
Landfill Gas	A by-product of the digestion by micro-organisms of putrescible matter present in waste deposited in landfill sites. The gas is predominantly methane (64%) together with carbon dioxide (34%) and trace concentrations of other vapours and gases.
Leachate	Liquor formed by the act of leaching.
Local Agenda 21	At the Earth Summit in Rio de Janeiro in June 1992, world leaders signed a global environment and development action plan called Agenda 21. The majority of Agenda 21 cannot be delivered without the commitment and cooperation of local government. Each local authority is encouraged to adopt its individual Local Agenda 21 - its own sustainable development strategy at the local level, involving partnerships with other sectors, such as the Environment Agency, businesses, community and voluntary groups.
Main River	The watercourse shown on the statutory 'Main River maps' held by Environment Agency and MAFF. The Agency has permissive powers to carry out works of maintenance and improvement on these rivers.
Nitrate Vulnerable Zone (NVZ)	An area where nitrate concentrations in sources of public drinking water exceed, or are at risk of exceeding the limit of 50 mg/l laid down in the 1991 EC Nitrate Directive, and where compulsory, un-compensated agricultural measures will be introduced from 1996 as a means of reducing those levels.
Nutrient	Substance providing nourishment for plants and animals eg nitrogen, phosphorus.
Organic	Generally any substance containing carbon as part of its chemical make-up.
Outcrop	The total area over which a particular rock unit occurs at the surface whether visibly exposed or not.
Outfall	The point at which a river discharges to a downstream source eg estuary, sea; it may also include an outfall structure to prevent sea waters backing up the system.
Part A Process	Processes prescribed for Integrated Pollution Control (IPC). IPC regulates those processes with the greatest potential for serious pollution to the three environmental media. Part A processes are regulated by the Environment Agency.
Part B Process	Processes regulated under the local authority air pollution control system and are those with less serious potential to pollute.
Particulates	Fine solid particles found in the air or in emissions.
Permeability	The ease at which liquids (or gases) can pass through rocks or a layer of soil.
Pesticides	Substances used to kill pests, weeds, insects, fungi, rodents etc.
Potable Water	Water of a suitable quality for drinking.
Public Water Supply	The supply of water by companies appointed as Water Undertakers by the Secretary of State for the Environment under the Water Industry Act 1991.
Reach	A length of a river.
Return Period	Refers to the frequency of a rainfall or flooding event. Flood events are described in terms of the frequency at which, on average, a certain severity of flow is exceeded. This frequency is usually expressed as a return period in years, eg. 1 in 50 years.

Riffle	A shallow area in a river where the substrate is composed of gravel and the flow is faster.
Riparian Owner	Owner of riverbank and/or land adjacent to a river. Normally owns riverbed and rights to midline of channel.
River Corridor	The continuous area of river, river banks and immediately adjacent land alongside a river and its tributaries.
Saline Intrusion	Salt water is heavier than freshwater and will therefore tend to sink to the bottom of a watercourse. Once salt water has entered a watercourse it is difficult to remove other than by flushing with high flows during floods. It can have profound effects on the ecology of a river.
Saline Waters	Water containing salts.
Saltmarsh	Expanses of herbaceous plants in the supratidal zone.
Sea Defences	Anything natural or artificial that prevents ingress of land by the sea.
Sewage	Liquid waste from cities, towns and villages which is normally collected and conveyed in sewers for treatment and/or discharge to the environment.
Sewerage	System of sewers usually used to transport sewage to a sewage treatment works.
Siltation	At low velocities water will deposit the material being carried in suspension. The slower the velocity the finer the material deposited. A deposit of clays and silt is very difficult to remove naturally as it requires turbulent and high velocities.
Site of Special Scientific Interest (SSSI)	A site given a statutory designation by English Nature or the Countryside Council for Wales because it is particularly important, on account of its nature conservation value.
Special Landscape Area (SLAs)	Area of special landscape quality, designated by the County.
Special Protection Area (SPA)	Statutory protected habitats for wild birds under EC Regulations.
Special Waste	Category of waste which includes material with any of the following properties:- dangerous to life as defined in the regulations, or with a flash point of 21°C (or less), or a prescription-only medicine.
Statutory Water Quality Objectives (SWQO)	Methods of classifying waters and targets for individual waters that have been given statutory force through the issue of Regulations by the Secretary of State under the Water Resources Act 1991.
Surface Water	Water collecting on and running off the surface of the ground.
Sustainability	Returning the contents of a landfill site to the environment in a controlled manner, at a rate which the environment can accept without harm, generally using pro-active measures over a limited timescale to diminish polluting capability, in a way which does not leave a long term legacy of active monitoring and management.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Sustainable Management	The interpretation of the principles of sustainable development at a local/regional level within the boundaries of national and international political, economic and environmental decisions.

S105 Surveys	Section 105 of the Water Resources Act 1991 allows for Standards of Service, Assets and Flood Risk Surveys.
Urban run-off	Rainfall from towns and cities that is carried off by streams and rivers.
Washlands	Extensive semi-natural area of flood plain adjacent to a river, where water is stored in time of flood. Structures can be added to control the amount of water stored in
Waste Minimisation	Reducing the quantity and/or hazard of waste produced.
Watercourse	A stream, river, canal or channel along which water flows.
Water Environment	Estuaries, coastal waters, rivers, streams, lakes, ponds, aquifers, springs.
Water Resource	The naturally replenished flow of recharge of water in rivers or aquifers.
Water Transfer Scheme	An infrastructure provided to transfer water from one river system to another.
Weir	A dam built across a river to raise upstream levels.
Wetland	An area of low lying land where the water table is at or near the surface for most of the time, leading to characteristic habitats.
Winter Storage Reservoir	Reservoirs built by farmers to store water during the winter months when it is "plentiful" for re-use during the summer.

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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

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