RIVER IRWELL
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT
CHAPTER ONE - RIVER IRWELL INTRODUCTION

NRA

National Rivers Authority
North West Region
September 1994

IRWELL CATCHMENT MANAGEMENT PLAN

CONSULTATION REPORT

CHAPTER ONE - RIVER IRWELL INTRODUCTION

Front Cover photograph : River Irwell, Manchester City Centre

This report has been produced on recycled paper in line with NRA policy

NATIONAL RIVERS AUTHORITY

IRWELL CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT

F O R E W O R D

The River Irwell drains most of Greater Manchester and represents one of the major challenges to the NRA. The quality of water in the Irwell and many of its tributaries is a long way short of acceptable. Along the banks are the signs of the part played by this area in the industrial life of the country. There is a legacy of urban dereliction and inadequate infrastructure. Much of the river flows underground through culverts which are liable to block and flood. Too many people see rivers as a convenient dump, leaving the NRA to remove thousands of tonnes of debris each year.

This Consultation Report is part of the Catchment Management planning process and sets out the NRA's vision for the Irwell over the next ten years. We are looking for improvements in water quality that will lead to all rivers achieving at least Class 2. We are looking to tackle the problems of pollution, crumbling structures and poor access. We want to see the amenity value of our rivers realised, extending where we can 'green corridors' into the city.

Catchment Planning brings together in one plan the activities of the NRA in Flood Defence, Water Quality, Fisheries, Conservation and Recreation, and Water Resources. It identifies the issues we want to address, and the options open to us.

We now wish to open the discussion to all those who have an interest in the water environment. The aim is to produce a Catchment Plan which has the broad support of all parties; a balanced plan of action of protection what is good and improving what is poor.

We look forward to receiving views from organisations and individuals who have an interest in the Irwell Catchment.

RIVER IRWELL

CONSULTATION REPORT

CONTENTS

Section		Page No.
Forward		2
Index of Maps		7
River Irwell Catchment Details		8
1.	**INTRODUCTION**	
1.1	The National Rivers Authority	11
1.2	Catchment Management Planning	11
1.3	What is a Catchment?	12
1.4	Form of CMP Consultation Report	12
1.5	Consultation	13
1.6	The Benefits of CMP	13

		Page No.
2.	**DEVELOPMENT OF THE CATCHMENT**	
2.1	The Form of the Catchment	14
2.2	Historical Background	14
2.3	Land Use Planning	14
2.4	Land Use Planning and the Catchment	15
2.5	Existing Planning Policy	15
2.6	Development : Policy Objectives	16
2.7	Development : Policy Directions	16
3.	**CATCHMENT USES AND ACTIVITIES**	
3.1	Flood Defence	18
	3.1.1 Objectives	19
3.2	Water Quantity	20
3.3	Hydrogeology	21
	3.3.1 Groundwater Protection Objectives	21
3.4	Water Quality	23
3.5	Fisheries	23
3.6	Conservation	26
3.7	Landscape and Heritage	28
3.8	Recreation and Amenity	29

Page No.

4. **STATE OF THE CATCHMENT**

4.1 Catchment Wide Issues 30

5. **ISSUES AND OPTIONS**

5.1 General 33

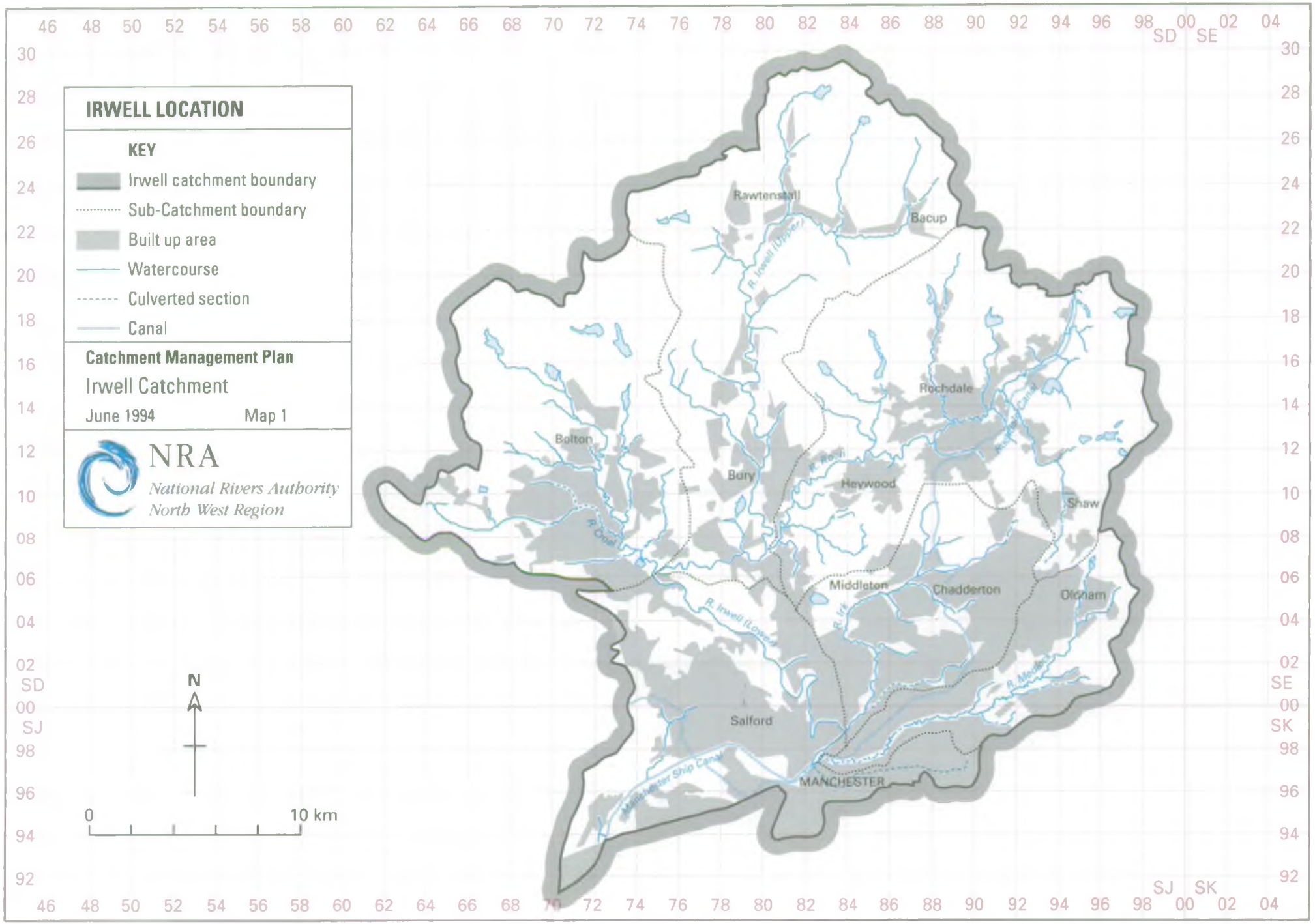
5.2 Catchment Wide Issues 34

APPENDICES

		Page No.
Appendix 1	Glossary	52
Appendix 2	Abbreviations	60
Appendix 3	NWC River Quality Classification	62
Appendix 4	River Ecosystem Classification	63

INDEX OF MAPS

Map No.	Title	Facing Page No.
1	Irwell Location	8
2	Council Boundary Map	15
3	Irwell Rainfall Distribution	20
4	Summary Geological Map	21
5	Red Rose Forest	28


IRWELL LOCATION
KEY
Irwell catchment boundary
Sub-Catchment boundary
Built up area
Watercourse
Culverted section
Canal
Catchment Management Plan
Irwell Catchment
June 1994
Map 1
NRA
National Rivers Authority
North West Region
N
0
10 km
Rawtenstall
Bacup
Rochdale
Bolton
Bury
Heywood
Shaw
Middleton
Chadderton
Oldham
Salford
MANCHESTER
R. Irwell (Upper)
R. Irwell (Lower)
R. Roch
R. Croal
R. Irk
R. Medlock
Manchester Ship Canal
Rochdale Canal
SD
SE
SJ
SK

RIVER IRWELL CATCHMENT DETAILS (MAP 1)

Area

River Irwell (Upper)	186 km²
River Roch	190 km²
River Croal	148 km²
River Irk	78 km²
River Medlock	57 km²
River Irwell (Lower)	134 km²
TOTAL AREA	793 km²

Population 1,533,000

MAIN TOWNS AND POPULATIONS

City of Manchester	434,600
City of Salford	230,900
Bolton	263,800
Rochdale	205,700
Bury	176,700
Oldham	85,600

ADMINISTRATIVE DETAILS

District Councils:-

Manchester City Council
Salford City Council
Bolton Metropolitan Borough Council
Bury Metropolitan Borough Council
Tameside Metropolitan Borough Council
Trafford Metropolitan Borough Council
Oldham Metropolitan Borough Council
Rochdale Metropolitan Borough Council
Blackburn District Council
Rossendale District Council

NRA:- North West Region - South Area

Water Companies:- North West Water Ltd

Principal Sewage Treatment Works:-

Bury	Oldham	Bolton
Rossendale	Royton	Salford
Rochdale	Castleton	Eccles
Belmont	Failsworth	Urmston
Davyhulme		

TOPOGRAPHY

Ground Levels:-

Min. Level 15 mAOD
Max. Level 475 mAOD

GEOLOGY

Solid Geology:-

South - Predominantly Permo-Triassic Sandstone
North -Predominantly Carboniferous Coal Measure & Millstone Grit Series

Superficial Geology:-

Variable - Glacial Till (Boulder Clay) Sand and Peat deposits

WATER RESOURCES

Availability:-

Groundwater - Generally site specific
Surface Water - Good availability

Level Monitoring Stations within the Irwell Catchment:-

Station	Watercourse	NGR
Adelphi	Irwell	SJ 8242 9874
Manchester Racecourse	Irwell	SD 8207 0035
Blackford Bridge	Roch	SD 8069 0774
Farnworth	Croal	SD 7434 0682
Bury Bridge	Irwell	SD 7972 1093
Stubbins	Irwell	SD 7928 1876
Naden	Ding Brook	SD 8500 1750
Scotland Weir	Irk	SJ 8412 9910
London Road	Medlock	SJ 8490 9752
Eccles	Worsley Brook	SJ 7527 9804

Largest Abstraction 173 Ml/d

Average Annual Rainfall 1200 mm

Rainfall ranges from 1554mm at Springs Reservoir near Bolton, to 855mm at Weaste in Salford (Based on 1961-90 Average)

FLOOD PROTECTION

Length of Designated Main River:- (maintained by NRA) 362.54 km.

Riparian owned debris screens cleaned by the NRA on a best endeavours basis 49

WATER QUALITY

Length of River in National Water Council Class

1993 Assessment

Class 1A (Very Good)	9.0 km.	Class 3 (Poor)	133.7 km.
Class 1B (Good)	29.0 km.	Class 4 (Bad)	40.7 km.
Class 2 (Fair)	116.5 km.		

FISHERIES

Length of salmonid fishery:-	96 km.
cyprinid fishery:-	36 km.

CONSERVATION

Number of Sites of Special Scientific Interest (SSSI) in the catchment	9 (+ 1 proposed)
Number of SSSI's associated with River Corridor and/or wetland habitats	7 (+ 1 proposed)
Number of Site of Biological Importance (SBI) in the catchment	213 (excluding Blackburn)
Number of SBI's associated with River Corridor and/or wetland habitats	154

NB Blackburn sites not available.

1. RIVER IRWELL INTRODUCTION

1.1 THE NATIONAL RIVERS AUTHORITY

Established in 1989, the National Rivers Authority (NRA) is the principal agency responsible for safeguarding and improving the water environment in England and Wales. We have statutory responsibilities for water resources, water quality and pollution control, flood defences, flood warning, fisheries, recreation, conservation and navigation.

1.2 CATCHMENT MANAGEMENT PLANNING

Catchment Management Planning (CMP) is a procedure designed to create a consistent framework within which the various responsibilities of the NRA can be identified and applied within a geographical area, called a catchment, in an integrated manner.

To achieve its aims, the NRA must work with or seek to influence central government, local government, industry, commerce, farming, environmental organisations, riparian owners and the general public. Successful management of the water environment requires consideration of a wide range of interests and requirements which may sometimes be in conflict.

The preparation of Catchment Management Plans involves:

- Identification of physical attributes
- Integration of the objectives of all NRA functions within the Catchment.
- Identification of issues and options for addressing them.
- Consultation on the uses, targets, issues and options.
- A phased programme for implementation of The Plan.
- Participation of interested parties in the implementation of the programme.
- Monitoring and reviewing the Plan on a regular basis.

1.3 WHAT IS A CATCHMENT?

A catchment is a discrete geographical unit with boundaries derived from surface water considerations which combine linked aquatic and terrestrial systems. In areas of permeable aquifers, groundwater boundaries may be used instead of topographical catchments. An aquifer is a water bearing rock from which abstractions may be made. The catchment will include the appropriate inland river system, associated groundwater (treated on the basis of input to or export from the surface catchment) and estuarine waters. The size of a catchment will be sufficient to allow adequately for the impact of one use upon another and is expected to range from 200 km² - to allow complex small catchments to be properly addressed - up to 5000 km².

The number of catchments in England and Wales requiring individual CMPs is likely to be in the order of 180. However, this is a preliminary figure at this stage; the NRA is considering whether these catchments are appropriate for CMPs or whether further regrouping or subdivision is necessary.

1.4 FORM OF CMP CONSULTATION REPORT

Three levels of report are produced:

Level 1 PR Summary for wide circulation to the general public. This summarises in plain language The Plan in relation to uses and issues within the Catchment.

Level 2 The Catchment Management Plan for use by NRA staff, NRA Regional Committees and Consultees. This summarises existing uses, identifies problems, explores conflicts and makes proposals for actions. It is self contained, and well illustrated with appropriate maps.

Level 3 Support Documents to be used primarily by NRA staff but available for general release to explain proposals.

1.5 CONSULTATION

The primary need for liaison and consultation during the preparation of the CMP is to endeavour to obtain consensus both internally and externally, to resolve conflicts of use fairly in a public forum and to obtain commitment for action. The NRA will consult those parties which are affected by the plans. Consultees will cover a wide range, including planning authorities, conservation bodies, persons with recreation interests, navigation authorities, water and sewerage undertakers, industry, agriculture, riparian owners, persons with land interests and local people.

In drawing up the CMP, the NRA will endeavour to accommodate the reasonable requirements of all the parties concerned, having due regard to the relative importance of the issues and uses involved. Inevitable difficult decisions will have to be made but what is important is that the Final Plan, which is produced on completion of the Consultation process, is a consensus, seen as:

"An agreed strategy for realising the environmental potential of a catchment within prevailing economic and political constraints".

1.6 THE BENEFITS OF CMP

Internally, CMPs will enable the NRA to

* manage catchments pro-actively rather than reactively;
* respond consistently from a co-ordinated operational strategy for all activities;
* secure and prioritise future resources;
* provide a clear focus for the advice of its Regional Committees.

Externally, CMPs will

* provide a vehicle for communicating the NRA vision and of obtaining commitment;
* ensure that the NRA takes account of the actions of others;
* influence decision making and improvement of the water environment;
* ensure that future programmes for action by the NRA and others are defined and targeted.

2. DEVELOPMENT OF THE CATCHMENT

2.1 THE FORM OF THE CATCHMENT

The network of large river valleys in the Irwell Catchment is one of the most noticeable natural features of the Greater Manchester conurbation. From the moorlands in the north and north east, the Rivers Irwell, Irk and Medlock flow through the centre of Manchester. This is a densely urban catchment and the river valleys radiate outwards from the city centre.

2.2 HISTORICAL BACKGROUND

In early times roads ran along the high ground between the valleys. Settlements developed on these ridges and around the important river crossings. The birth of the industrial revolution saw the development of small factories, mills and some housing in the valleys.

Rapid urban expansion meant built-up areas turned their backs on the river valleys. In many urban parts of the Irwell Catchment the watercourses became neglected backwaters, handy places to site waste tips and sewage works. Increasing problems of pollution, dereliction and decay were passed over for many years. More recently, the river valley's corridors were recognised for their open land value and increasingly, urban forms of development have been steered away from the valley corridors.

2.3 LAND USE PLANNING

The planning system aims to regulate the use of land in the public interest. Good planning ensures the efficient and economic use of land without intruding unduly on other activities or overloading essential services, including water supply and sewerage. Planning decisions made by Local Planning Authorities (LPAs) have to take account of National Government policy guidance, the current Development Plan and any other material considerations. The County Structure Plan, Local Plans and Unitary Development Plans contain policies against which the LPAs consider development proposals.

The NRA is a statutory consultee in the Development Plan process and we offer constructive and critical advice on Policies and Proposals which may have an impact on the water environment. In addition, LPAs are responsible under Town and Country Planning legislation to consult the NRA on certain types of planning applications and have discretionary powers regarding the referral of other matters.

The NRA intends that Catchment Management Plans should positively influence the policies and actions of the LPAs and developers. The NRA will pursue its aims and objectives through the planning process, however the granting of planning permission does not absolve a developer from obtaining any other consents, licences etc. This may include

- Consents to discharge effluent under the Water Resources Act (WRA) 1991
- Licences for Impounding or Abstraction under the WRA 1991
- Consents under the Land Drainage Act 1991 and Byelaws
- Consents under the Salmon and Freshwater Fisheries Act 1975

2.4 LAND USE PLANNING AND THE CATCHMENT

Development within the catchment is of prime concern as new schemes will have an impact on all our duties and responsibilities. It is imperative that the NRA has an effective and efficient input into development within the catchment to ensure that the interests of the water environment are fully protected.

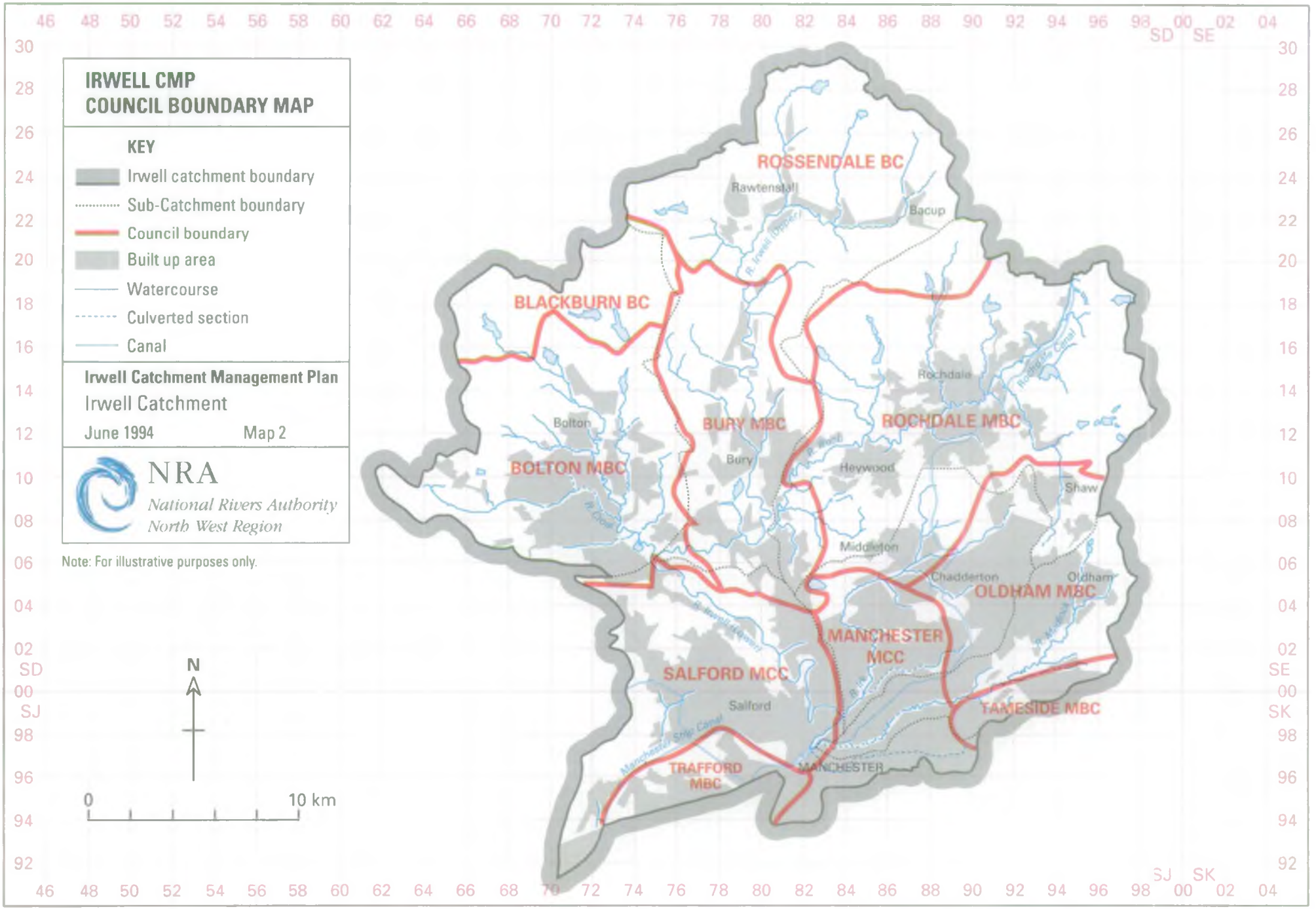
To assist LPAs the NRA have compiled and circulated a table of the types of planning application we want to see and comment on. For certain LPAs, NRA Area Planning Liaison Officers visit Planning Offices on a weekly basis, to check and comment, in some cases instantly, on planning applications of relevance to the Authority. For all other LPAs we request that weekly planning lists are sent to our planning liaison section to ensure that the NRA is aware of all potential development which may affect its interests.

The planning system is also seen as a key tool in advising developers on the need to obtain the necessary NRA licences and consents, prior to the commencement of any site works to ensure an acceptable scheme.

2.5 EXISTING PLANNING POLICY (MAP 2)

The catchment is located mainly within the former County of Greater Manchester, with part of the northern boundary in Lancashire. The catchment covers parts of the Districts of Blackburn, Rossendale Tameside and Trafford, and the Districts of Bolton, Bury, Rochdale and Oldham and the Cities of Salford and Manchester.

The Structure Plan for Lancashire and Greater Manchester still forms the strategic planning framework for the Districts and City Councils. In Greater Manchester this situation will remain until the adoption of the Unitary Development Plans (UDPs). In Lancashire the Structure Plan is currently being reviewed with a Draft consultation document expected in 1994.


IRWELL CMP
COUNCIL BOUNDARY MAP
KEY
Irwell catchment boundary
Sub-Catchment boundary
Council boundary
Built up area
Watercourse
Culverted section
Canal
Irwell Catchment Management Plan
Irwell Catchment
June 1994
Map 2
NRA
National Rivers Authority
North West Region
Note: For illustrative purposes only.
N
0
10 km
ROSSENDALE BC
Rawtenstall
Bacup
BLACKBURN BC
BURY MBC
Bolton
Bury
ROCHDALE MBC
Rochdale
Heywood
Shaw
BOLTON MBC
Middleton
Chadderton
Oldham
OLDHAM MBC
MANCHESTER MCC
SALFORD MCC
Salford
TAMESIDE MBC
TRAFFORD MBC
MANCHESTER
SD
SE
SJ
SK

Strategic Guidance issued for Greater Manchester in October 1989 has been the basis for the preparation of the UDPs. This, like the Structure Plan, emphasises the re-vitalisation of the sub-regional economy and the promotion of urban regeneration. It recognises the need for growth in the conurbation and projects a basic requirement of 41,000 new households to be built between the period 1986-2001. This is expected to take place within the existing urban settlements with limited peripheral development.

Strategic Guidance also seeks to improve the environment of the river valleys. This re-emphasises existing Structure Plan and Local Plan policies which have sought to conserve the open character and landscape quality of the area. The general value of the river valleys in open land terms, has been identified throughout the catchment as an accessible source of new recreational land in urban areas as well as providing valuable green chain which create a link of open land to the surrounding open countryside. To achieve environmental improvements in the urban areas, built development has been rigorously controlled in recent years to ensure refuges for wildlife, to protect recreational land and sites of natural history and highlight areas for refurbishment to reduce dereliction.

2.6 DEVELOPMENT : POLICY OBJECTIVES

The planning system has been successful in bringing about improvements in the quality of the Catchment. Initiatives such as the Croal/Irwell Valley Local Plan have instigated derelict land improvements and the protection of areas of valuable river valley corridors. The planning system in the future will be used to achieve water quality improvements and conservation of the natural environment. This will be vital in improving the quality of the Catchment. Consultation through the Development Plan system is currently promoting our concerns and new development will be controlled where appropriate, to secure our objectives.

2.7 DEVELOPMENT : POLICY DIRECTIONS

The overall NRA guidance notes for the methods to protect the water environment through Development Plans has already been issued to each Planning Authority in the Catchment. Within this, the major aims for future development in the Catchment are as follows: -

Flood Defence:

To discourage new buildings and land raising in areas at risk from flooding

- by ensuring new development is not at risk from flooding and does not put other areas at risk where it could endanger life or damage property
- by ensuring work which is needed to reduce the risk of flooding created by a new development is paid for by the developer and not the public.
- by encouraging continuous unobstructed areas adjacent to watercourses to ensure essential maintenance, access or flood flows.

Water Quality:

To protect and improve the quality of the Catchments, surface waters and groundwaters

- by ensuring new development complies with the NRA's Groundwater Protection Policy document.
- by ensuring new development is served by satisfactory arrangements for the disposal of foul sewage, trade effluent and surface water.
- by encouraging, where there are sewage treatment capacity problems, new development to be phased to coincide with improved infrastructure.
- by ensuring appropriate development complies with the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991.
- by ensuring leachate and drainage is monitored from contaminated land sites.

Water Resources:

To protect surface waters and groundwaters from derogation arising from development including the redevelopment of derelict and contaminated land.

Conservation and Enhancement of the Water Environment:

To protect from development areas of aquatic value and important elements of the water environment

- by highlighting the areas of the water environment which are or have the potential to be of value.
- by discouraging forms of development which would have an adverse impact on nature conservation, wildlife, landscape and heritage or fisheries, recreation and amenity.

3. CATCHMENT USES AND ACTIVITIES

3.1 FLOOD DEFENCE

The NRA has a duty to exercise a general supervision over all matters relating to Flood Defence. The principal watercourses in the catchment have a formal designation of "main river" and under the Water Resources Act 1991, the NRA has powers to regulate works on these watercourses. The NRA's powers to directly regulate works on "ordinary watercourses" are less extensive and generally contained within the Land Drainage Act 1991.

Although the responsibility for watercourse maintenance rests with the riparian owner, the NRA has discretionary operational powers to carry out, where required, maintenance and improvement works on "main rivers". Similar discretionary operational powers on "ordinary watercourses" are vested mainly in Local Authorities, with the NRA having limited supervisory and default powers. The nature of flood defence works carried out under these powers means that this can have an impact on other river uses - notably fisheries and conservation. Consultations are carried out, and where feasible, methods are devised so that the target standard of flood protection can be achieved whilst providing significant habitat enhancements.

The following are features of flood defence within the catchment:

- There are 363 km of "main river", of which a major percentage pass through heavily urbanised areas such as Manchester, Salford, Bolton, Bury and Rochdale.

- The NRA carry out regular, planned inspections of "main river" channels and structures in order to programme any necessary maintenance works. Such works are carried out to safeguard the existing standards of flood protection, particularly in the heavily urbanised areas.

- The NRA regularly clears debris from channels, culverts, bridges and debris screens; and also carries out de-silting and dredging works using mechanical plant.

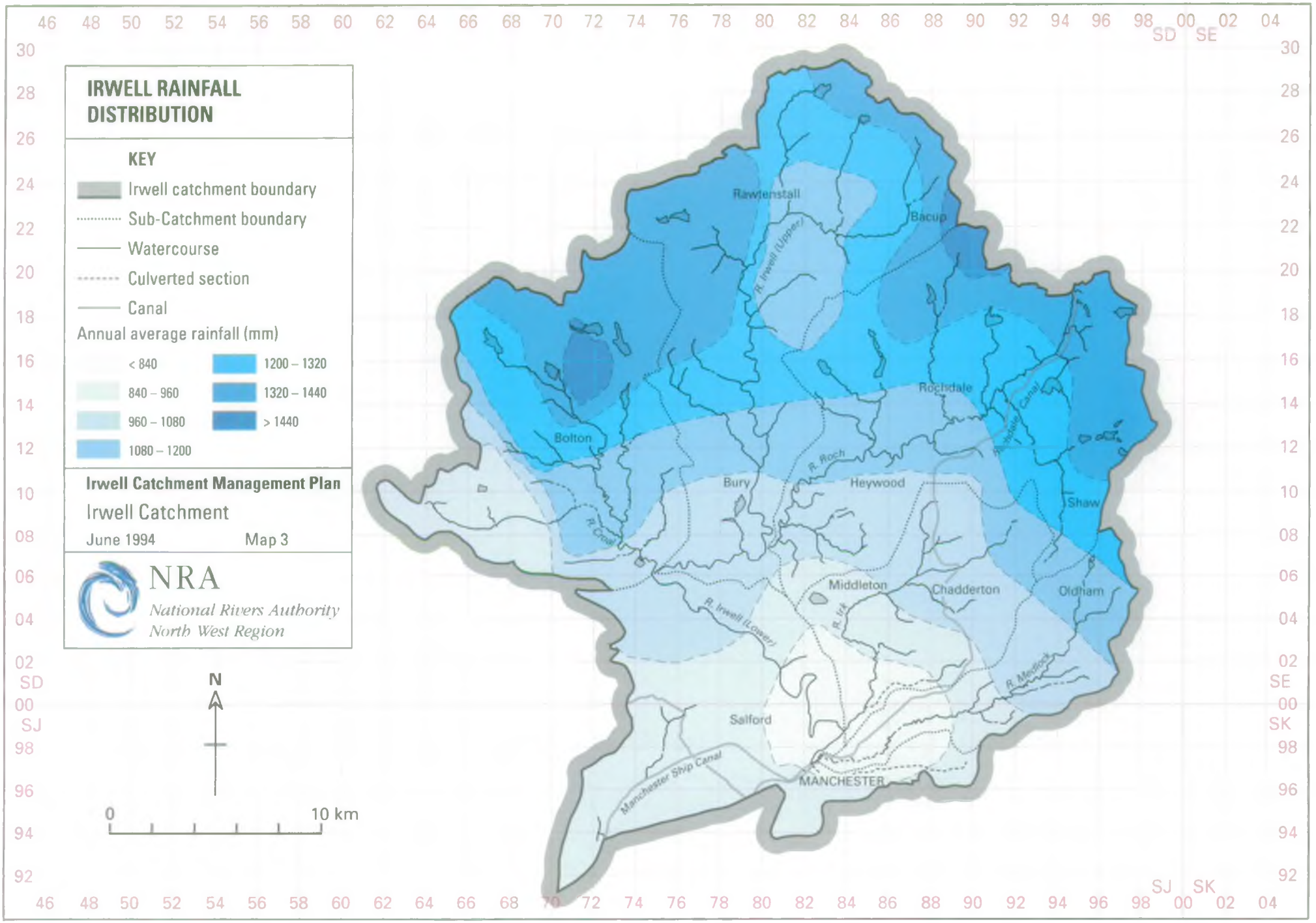
- The NRA attempt to persuade riparian owners to fully accept their responsibilities for the many dilapidated riverside structures, and to prosecute where appropriate, cases of illegal tipping of rubbish in watercourses.

- The NRA provides information and advice to the Police and Local Authorities for the purpose of giving them sufficiently advanced warnings of likely flooding in known flood risk areas. Forecasts of high river levels are based on rainfall and river level data collected from outstations by the Regional Telemetry System.

3.1.1 Objectives

Key features of future NRA strategy in relation to flood defence:

- to provide effective flood defence to a standard appropriate to the land use, where this is economically viable
- to provide adequate arrangements for flood forecasting and warning
- to carry out planned maintenance works as necessary to safeguard existing standards of flood protection
- to carry out emergency re-active, or debris clearance works as necessary or in accordance with information received via the flood warning system, or via the general public
- in order to ensure that effective flood defences are provided and that the existing standard of flood protection is not reduced, the NRA will seek to influence and control new and re-development, and make known and understood the flood risk that exists. Opportunity would also be taken to improve access to the river channel for maintenance activities where possible
- to persuade riparian owners to fully accept their responsibilities for dilapidated riverside structures, and also to prosecute where appropriate, cases of illegal tipping of rubbish in watercourses
- to carry out new flood defence works in accordance with the Medium and Long Term Plans agreed by the Flood Defence Committee
- flood defence works to be carried out in an environmentally sensitive manner
- to ensure that river maintenance operations have a minimum deleterious impact on fish populations and enhance river habitat diversity where practical
- to identify opportunities for the enhancement of environmental, recreational and amenity facilities when undertaking flood defence works


IRWELL RAINFALL DISTRIBUTION
KEY
Irwell catchment boundary
Sub-Catchment boundary
Watercourse
Culverted section
Canal
Annual average rainfall (mm)
< 840
840 – 960
960 – 1080
1080 – 1200
1200 – 1320
1320 – 1440
> 1440
Irwell Catchment Management Plan
Irwell Catchment
June 1994
Map 3
NRA
National Rivers Authority
North West Region
N
0
10 km
Rawtenstall
Bacup
R. Irwell (Upper)
Rochdale
Rochdale Canal
Bolton
R. Roch
Bury
Heywood
Shaw
R. Croal
Middleton
Chadderton
Oldham
R. Irwell (Lower)
R. Irk
R. Medlock
Salford
Manchester Ship Canal
MANCHESTER
SD
SE
SJ
SK
46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 00 02 04
30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00 98 96 94 92

3.2 WATER QUANTITY (MAP 3)

3.2.1 Role and Aims

The NRA has a duty to undertake measures to conserve, redistribute or augment water resources and to secure the proper use of water resources.. It also has a duty to make arrangements, where practical, with water undertakers for securing the proper management and operation of water resources and associated works.

The NRA has powers to apply to the DOE to issue drought orders to conserve water resources; designate areas as water protection zones and nitrate sensitive areas.

The NRA controls abstraction and impoundments under a licensing system. Abstractors are charged for the right to use water in accordance with a tariff based on factors such as licensed quantity, source and season of abstraction and category of use.

Water Resources covers the availability of raw water for:

i) Public Water Supply

ii) Industry

iii) Agriculture (including Spray Irrigation)

iv) Environmental Needs, (including rivers, springs and wetlands) - either by identifying new resources or protecting existing ones.

The Water Resource aim of the NRA is to:

Assess, manage, plan and conserve water resources and to maintain and improve the quality of water for all those who use it.

The Region will maximise the use of the water resource available, whilst avoiding derogation either to existing abstractive rights or environmental interests. The latter include wetland sites, ecological regime of rivers and the management of the flow regime for all purposes.

Operational work in Water Resources includes data collection and storage. A network of river gauging stations throughout the Irwell Catchment is monitored to determine long term trends, low flows and short term (day to day) information and the effects of abstraction and rainfall.

3.3 HYDROGEOLOGY (MAP 4)

The western part of the catchment is underlain by Permo-Triassic sandstone and marl whereas the Irwell and its tributaries rise on the higher ground formed by strata of Carboniferous Millstone Grit Series (Namurian) and Coal Measures (Westphalian) strata. These both comprise alternating sequence of shales/mudstones, siltstones and sandstones. They tend to be only gently folded but have been affected by faulting. Thicker coarse grained sandstones occur in the Namurian, whilst shales/mudstones predominate in the Westphalian succession. The latter also contains a number of coal seams.

The Carboniferous sandstones tend to act as individual "minor" aquifer units separated by lower permeability shales/mudstones. Groundwater movement is generally by fissure flow. The presence of old coal workings in the Coal Measures can give rise to complex and rapid groundwater flow and can adversely affect groundwater quality.

The Permo-Triassic sandstone forms an extensive major aquifer which extends and thickens southwards below Manchester, down to Stockport and west through to Liverpool.

Much of the area is covered by drift deposits, principally glacial till (boulder clay). However, this tends to be absent on the higher ground to the north and east. Permeable sands and gravels occur within the drift, mainly associated with the flood plain of the River Irwell. These may act as minor aquifers in their own right.

Depending on the nature and thickness of the drift deposits, the underlying solid aquifers may be in hydraulic continuity with surface watercourses.

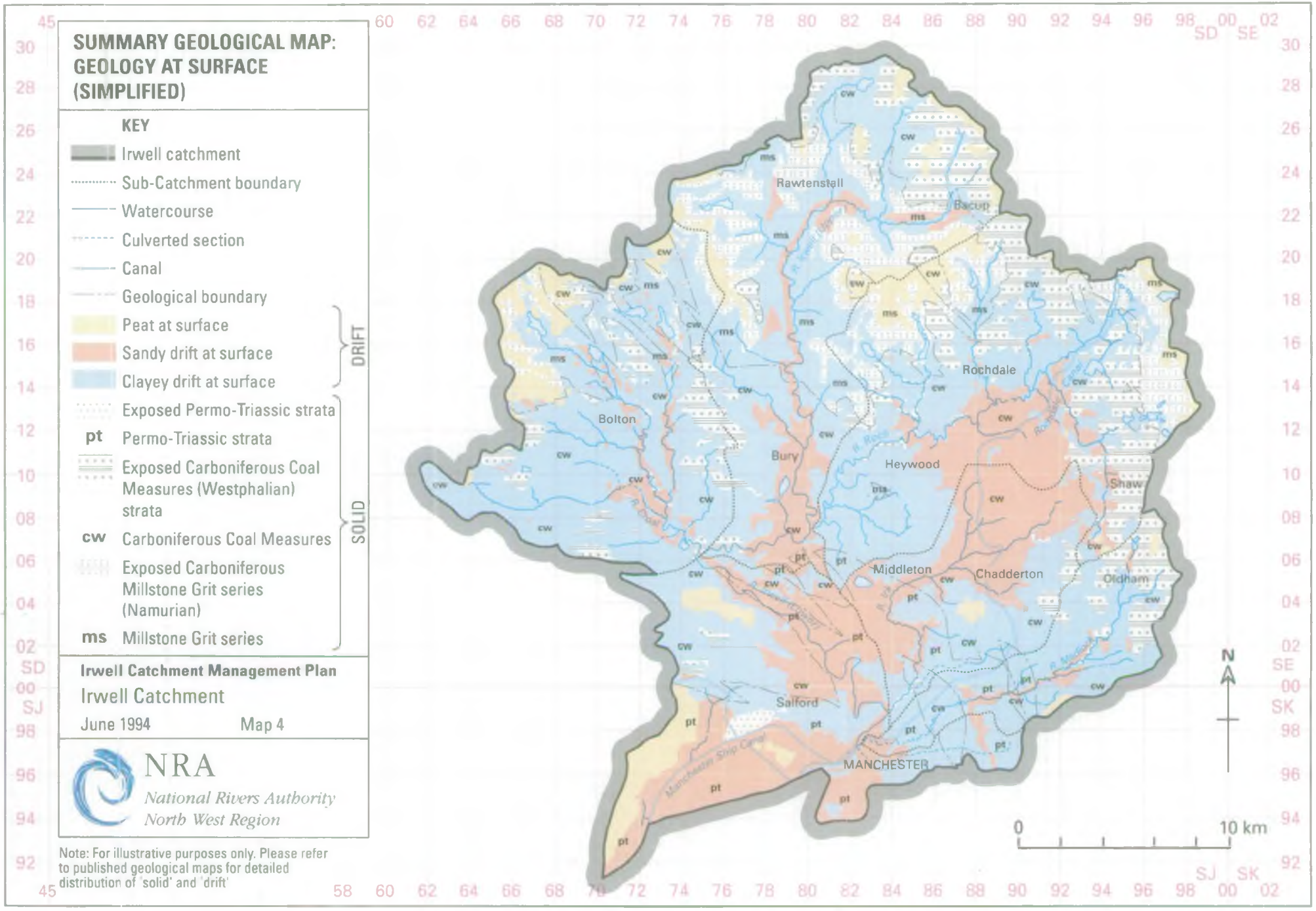
3.3.1 Groundwater Protection Objectives

General

Groundwater is a vital natural resource and under particular threat from the effects of human activity. Once polluted, groundwater is often difficult and very expensive to remediate. Therefore, preventing groundwater contamination is a major objective of the NRA.

The Authority's "Policy and Practice for the Protection of Groundwater" sets out a national framework for the protection of both groundwater resources in general and sources (abstractions) in particular from the potential polluting effects of mans activities.

The policy classifies groundwater vulnerability according to the nature of the overlying soil cover, the presence and nature of any drift cover, the nature of the strata and the depth to the water table.


SUMMARY GEOLOGICAL MAP: GEOLOGY AT SURFACE (SIMPLIFIED)
KEY
Irwell catchment
Sub-Catchment boundary
Watercourse
Culverted section
Canal
Geological boundary
DRIFT
Peat at surface
Sandy drift at surface
Clayey drift at surface
SOLID
Exposed Permo-Triassic strata
pt Permo-Triassic strata
Exposed Carboniferous Coal Measures (Westphalian) strata
cw Carboniferous Coal Measures
Exposed Carboniferous Millstone Grit series (Namurian)
ms Millstone Grit series
Irwell Catchment Management Plan
Irwell Catchment
June 1994 Map 4
NRA
National Rivers Authority
North West Region
Note: For illustrative purposes only. Please refer to published geological maps for detailed distribution of 'solid' and 'drift'
Rawtenstall
Bacup
Rochdale
Bolton
Bury
Heywood
Shaw
Middleton
Chadderton
Oldham
Salford
MANCHESTER
Manchester Ship Canal
N
0
10 km
SD
SE
SJ
SK

It considers groundwater resources in terms of major, minor and non-aquifer, depending on their ability to yield water and support groundwater abstractions. However, it emphasises the need to protect all groundwater, whether or not currently developed. The policy uses the concept of protection zones around sources of supply (wells, springs and boreholes) based on either distance or time of travel.

The first phase of groundwater protection zone delineation has now been completed for 86 North West Water Limited, public supply sources within the Region. The timetable for completion of zoning around the other public supply, industrial and other licence sources in the North West has yet to be determined.

Local Perspective

There are only a limited number of groundwater sources used for public water supply within the Irwell Catchment associated with the Millstone Grit Series. However, these are not due to be subject to the zoning exercise in the immediate future.

Furthermore, it should be borne in mind that many private groundwater sources, both licensed and unlicensed are used for potable purposes. These are usually in areas remote from the mains water distribution system, and associated with minor aquifers for example the Carboniferous Sandstones.

When available the source protection zone maps will be held in the NRA Regional Head Office at Richard Fairclough House, Warrington. The definition of zones is based on a wide range of variables and incorporates subjective judgement. In view of the need for frequent updating and amendment of these zones their general issue is not considered to be appropriate. Groundwater vulnerability maps intended to provide a simplified interpretation of the vulnerability and source protection across the catchment area and which take account of known hydrogeological conditions and variations will be produced in due course. The National Policy document contains a series of Policy Statements setting out the NRA's approach to dealing with various types of development/land use activity, depending on the groundwater vulnerability.

These activities include:

Groundwater abstraction
Waste disposal to land.
Disposal of slurries and sludge to land.
Physical disturbance of aquifers.
Contaminated land.
Diffuse pollution

The underlying philosophy is, "Prevention is Better than Cure".

3.4 WATER QUALITY

The NRA has statutory responsibilities under the Water Resources Act 1991 relating to the quality of controlled waters. Controlled waters include groundwaters as well as surface watercourses. The NRA is also the competent authority in the UK to undertake the obligations of certain EC Directives relevant to water quality. These duties are satisfied by a number of activities.

The chemical quality of, and the aquatic life supported by, all significant watercourses are monitored on a regular basis in a routine programme.

Pollution is controlled at source by a number of means:

- the discharge of effluent to watercourse is permitted only with the consent of the NRA. Controls on the impact of the effluent on the receiving water are included in the consent

- inspections of farm and industrial sites are undertaken and where pollution or the risk of it is identified remedial measures are pursued

- in the consultation process of local authorities, HMIP and waste regulation authorities NRA advice includes the water pollution control requirements to be contained in planning permissions, Integrated Pollution Control (IPC) Authorisations and waste management licences respectively

- the NRA is also consulted by North West Water Ltd. on the ongoing programme of sewerage improvements

The NRA provides a 24 hour response to pollution incidents.

Routine monitoring of the River Irwell catchment indicates significant lengths to be polluted and of poor aesthetic quality.

A major source of pollution throughout the catchment are discharges from North West Water Ltd. sewage treatment works and from the sewerage networks associated with them. Significant capital investment has already been made on improvements but very substantial further expenditure is required.

Discharges of trade effluent direct to river after treatment rather than to sewer generally have more localised impact. There are a relatively large number of direct trade effluent discharges in the Lower Irwell Sub-Catchment.

Ochreous land drainage and run-off from contaminated land areas has a very marked impact on the River Roch Sub-Catchment and widespread localised impact elsewhere.

Other sources of pollution having localised impact are natural acidic run-off in the headwaters, run-off from farming operations, motorways and industrial sites and discharges from small sewage treatment plants.

Storm run-off from streets and domestic and commercial properties does have significant influence although is normally considered outside the scope of pollution control. Storm drains contaminated with domestic foul water do have significant localised impact which is pursued within pollution control.

In considering the River Irwell in Sub-Catchments it is apparent that particularly the Lower Irwell is affected by the poor quality of other Sub-Catchments draining to it.

3.5 FISHERIES

The National Rivers Authority has a statutory duty to maintain, improve and develop fisheries. The fisheries function, therefore has certain objectives to satisfy in order to meet its obligations. These include the protection and conservation of salmon, trout, freshwater fish, eel and where appropriate, coastal fisheries; the regulation of fisheries through the enforcement of a series of licences, orders, byelaws and consents; the formulation of policies, not only to maintain, improve and develop fisheries, but to restore and rehabilitate damaged fisheries and to provide an efficient and effective fisheries customer service.

In order to fulfil this statutory duty and our objectives, it is necessary to constantly monitor the fishery status of rivers, inland waters, estuaries and, where appropriate, coastal waters.

Within the southern area of the North West Region, strategic fish population surveys are carried out within a three year rolling program. This enables continual monitoring of the status of the rivers, in order that the effects of any changes in water quality, or any other problems can be identified thus allowing the appropriate management action to be taken.

The River Irwell, because of its physical nature, and quality, was a prime salmon river up until last century. Due to the construction of the Manchester Ship Canal, industrialisation, and deterioration in water quality, many tributaries and river stretches have very few fish or are devoid of fish altogether.

Recently, there have been general improvements in the overall water quality throughout many areas within the catchment. There have, therefore, been improvements in the numbers and quality of fish present in many river stretches, due to natural recolonisation over the last decade. This is particularly true for large areas of the Upper Irwell Sub-Catchment, where natural breeding populations of brown trout are common as far downstream to the confluence with the River Roch. However, due to the severity of the widespread pollution of the past, many areas are still devoid of fish, in spite of the improved water quality, because few or no fish are present to act as a pool for natural recolonisation. A good example of this is the River Medlock Sub-Catchment where a 'pump priming' exercise is being carried out, which involves the stocking of appropriate fish species and the monitoring of their success.

3.6 CONSERVATION

The NRA has statutory duties to further, enhance and, where possible, promote the conservation and natural beauty of the aquatic environment. These duties relate to all waters and land under the NRA's control and apply to wildlife, geological and physical features.

The NRA also has the duty to protect areas formally designated as being of high conservation value and which have statutory protection, for example SSSI's.

The NRA helps to protect valuable sites, which are designated but do not have statutory protection, for example, sites of biological/wildlife importance (SBI's, SWI's), local nature reserves (LNR's) and ancient woodlands (AW's).

A large part of conservation work involves protecting non-designated habitats and features within river corridors. This includes physical and geomorphological features such as: actively meandering channels with areas of erosion and deposition, earth cliffs, shoals, riffles and pools, river and bankside vegetation.

Conservation duties apply to all functions of the NRA and the activities of third parties, through consultations and consents.

The NRA NW Region has an Ecology Section with responsibility for promoting conservation. They do this in a number of ways: by advising other functions; by objecting or placing conditions onto unsympathetic developments or proposals; negotiating with local authorities and developers; gathering data that can be used to defend and promote river habitats and taking opportunities to enhance rivers through, for example, river restoration schemes.

In addition information from biological monitoring, specifically routine macro-invertebrate surveys, is used to provide a measure of the ecological quality of a river and the effects of river management.

There are a range of environmental initiatives to improve the catchment area which the NRA support. These include the Mersey Basin Campaign and Streamcare, the Community Forest initiative (Map 5) and the LIVIA Project. There are also schemes such as the Countryside Commission's Countryside Stewardship Scheme which can be promoted to improve riverside habitats.

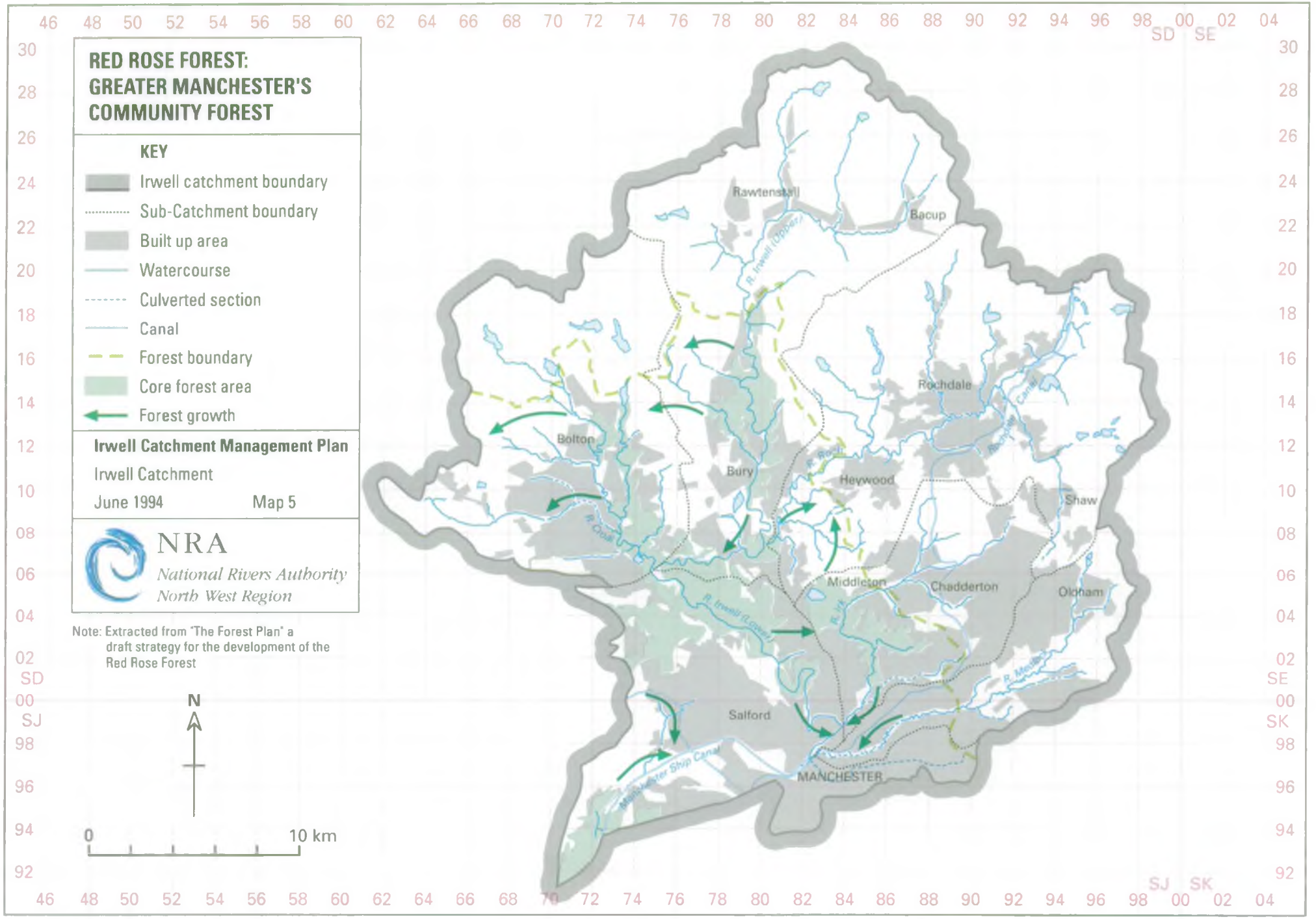
There are several rivers of very high conservation value within the catchment. They are generally most unspoilt near the high open moorland that forms a large part of the catchment. There are important valleys, cloughs and wetlands associated with a number of rivers. The catchment is notable for the large number of reservoirs, old mill lodges and ponds which are of conservation value.

In the urban areas the green corridors associated with many of the watercourses are often the only open space left for people and wildlife.

The rivers of the catchment are of a distinct character. Many of them are constrained within stone walls. Most of them flow over a steep stony bed which is often physically diverse and of high ecological value. Their river corridors contain a variety of semi-natural habitats.

However a large number of watercourses have been seriously degraded and fragmented by ever expanding urban development. Significant lengths have been culverted underground. Valleys have been infilled. Floodplains have been tipped. There has been building to the waters edge, into river banks and to the tops of valleys. There are severe pollution problems.

The NRA aim to retain or recreate attractive, healthy rivers within continuous, open river corridors with a diverse range of habitats and physical features.


RED ROSE FOREST:
GREATER MANCHESTER'S
COMMUNITY FOREST
KEY
Irwell catchment boundary
Sub-Catchment boundary
Built up area
Watercourse
Culverted section
Canal
Forest boundary
Core forest area
Forest growth
Irwell Catchment Management Plan
Irwell Catchment
June 1994
Map 5
NRA
National Rivers Authority
North West Region
Note: Extracted from "The Forest Plan" a draft strategy for the development of the Red Rose Forest
N
0
10 km
Rawtenstall
Bacup
Rochdale
Bolton
Bury
Heywood
Shaw
Middleton
Chadderton
Oldham
Salford
MANCHESTER
SD
SE
SJ
SK

3.7 LANDSCAPE AND HERITAGE (MAP 5)

The NRA has a statutory duty to promote the conservation and enhancement of natural beauty for inland and coastal waters and for land associated with such waters.

There is also a statutory duty to have regard to the desirability for protecting and conserving buildings, sites and objects of archaeological, architectural or historic interest.

These duties cover nationally important areas and sites, for example, Areas of Outstanding Natural Beauty, National Parks, Scheduled Ancient Monuments as well as locally valuable areas and sites.

Opportunities for enhancement of natural beauty are taken up via the activities of third parties (through negotiations with local authorities and developers) and as part of the NRA's capital and maintenance programmes.

The NRA will consult with the county archaeologist for all capital and heavy maintenance work to ensure the protection of heritage sites.

The value of open land within the river valleys has been identified throughout the catchment as an important landscape resource for a predominately urban area. Upper river sections are generally designated as Special Landscape Areas, that is, of county level importance.

Watercourses in the catchment are characterised by stone walls which along with riverside mills and conservation areas (built environment) highlight the importance of the areas past on the current landscape.

Woodland cover along the river valleys is generally low. Several local authorities have identified the need for tree planting which will be promoted by the Red Rose Community Forest initiative. In contrast, several steep-sided tributaries are continuously wooded (some are Ancient Woodland sites). These represent a landscape largely untouched by man, a characteristic which should be protected.

The NRA aims to retain or recreate attractive rivers within continuous, open river corridors.

3.8 RECREATION AND AMENITY

Over the last fifty years there has been a rapid increase in leisure demand for watersports and outdoor recreation. The water environment forms an important component of many leisure pursuits.

The NRA's principal aim in relation to recreation is to develop the amenity and recreational potential of inland and coastal waters and associated lands. To carry out this aim there are specific objectives which include the maintenance, development and improvement of the recreational use of NRA sites; to take account of recreational proposals relating to any NRA function and to promote the use of water and associated land for recreational purposes.

In all of its work the recreation function follows the Code of Practice on Conservation, Access and Recreation. To achieve this it requires an efficient balancing of costs and benefits within an integrated system of catchment management, taking the needs of all users and functions into account.

The operational duties and activities of the NRA can impinge on the recreational uses of water, and associated land, and create opportunities for incorporating facilities for new or improved recreational use. These activities will include flood defence work and schemes for water resources, water quality and flow monitoring and schemes undertaken for fisheries and conservation. For example, creating canoe slalom facilities when constructing bypass channels or weirs; creating facilities for anglers and walkers; providing open spaces in urban areas which can be used by the public for informal recreation.

Within the Irwell Catchment there are many areas of amenity and recreation activity which include, walking, orienteering, canoeing, horse-riding and angling. There are areas within the catchment which are highly industrialised or urbanised resulting in generally low amenity value and recreation interest, except where there are pockets of open space available for informal recreational pursuits. In contrast to this there are also large areas available for amenity and recreation including walkers e.g. The Irwell Valley Way, canoe courses e.g. Burrs Mill at Ramsbottom, along with other facilities including various Country Parks, Nature Reserves, picnic sites, golf courses, sports grounds etc.

4. STATE OF THE CATCHMENT

4.1 CATCHMENT WIDE ISSUES

Issue CW1 Development Control

New development and development pressures can have a significant impact on the water environment and all NRA functions. New developments can themselves create a flood risk downstream or exacerbate an existing flood risk. The NRA attempts to minimise such impacts but only has limited powers to impose conditions on development through the planning liaison process.

Also affected will be any new major road schemes which may have impacts on the water environment and all NRA functions.

Proposals to culvert watercourses, infill valleys, build into river banks, build right to the top of the bank or valley top or tip in the floodplain, all seriously degrade and constrict the river corridor and lower the public perception of a rivers value.

Issue CW2 Lack of Survey Information

There is a general lack of survey information on watercourses within the Irwell Catchment which affect all aspects of NRA activities. This makes the planning of works and the discharge of the NRA's function difficult and inefficient.

Issue CW3 Flood Defence General Maintenance

There is a continued requirement for general works to maintain standards of flood protection and avoid flooding from culvert and channel blockages.

Issue CW4 Flood Defence Standards of Service

There is a need to assess the standards of service presently provided on main rivers within the Catchment, so that maintenance or improvement works can be planned to give maximum value for money.

Issue CW5 Access Problems

Access to river corridors for maintenance and improvement works is generally inadequate and needs to be addressed. This should be done selectively to ensure that public and maintenance access does not detrimentally affect conservation interests.

The potential for informal recreation has not been realised on many watercourses.

Issue CW6 Culverted Sections and Bridges

Due to the generally urban nature of the river corridor, there are many culverts (some with associated debris screens) and bridges which can become blocked by floating debris and the build up of silt, thus reducing the standard of flood protection. Extensive culverted sections also have an impact on the water environment, due to fragmentation of the river corridor and the loss of aquatic and river valley habitats.

Issue CW7 Instream structures such as culverts and weirs

Many culverts and weirs are impassable to the upstream and downstream migration of fish.

Issue CW8 Urban decay and riverside dereliction

The legacy of the Industrial Revolution means that urban decay in and adjacent to watercourses is a problem, and can result in an increased flood risk.

Urban dereliction and old waterside mill buildings associated with the watercourses lowers the publics perception of a rivers value and can encourage activities such as fly tipping.

Issue CW9 Litter and rubbish problems in and near rivers

Urban areas within the Catchment generally suffer from litter and rubbish in and near rivers, which can pose a flood risk. Debris also detracts from the visual amenity value of the riverside areas and is a hazard to wildlife.

Issue CW10 Main River

A long term review of main river is required to improve the effectiveness of limited resources to provide and maintain agreed standards of service.

Issue CW11 Failure to achieve present water quality classification objective

Objectives were assigned to defined reaches of watercourse in terms of the NWC water quality classification system in 1979. The results of the classification assessment for the year 1993 indicate many reaches in the catchment currently fail to achieve the objectives assigned to them.

Issue CW12 Aesthetic deterioration due to sewage litter

Significant amounts of debris of sewage origin can be seen on the bed and banks over substantial lengths of watercourse through the catchment. It is released from sewers via overflows. Properly designed overflows can significantly reduce this.

Issue CW13 Aesthetic deterioration due to domestic foul wastes incorrectly connected to surface water drains

Many of numerous storm water drains in the catchment are contaminated because domestic foul water from sinks, washing machines etc. have been drained to these rather than the foul sewer. Although the impact is localised it is widespread in occurrence.

Issue CW14 Protection and enhancement of wildlife habitats, natural and geomorphological features within river corridors.

Threats to wildlife and natural habitats can arise from encroachment into river corridors and natural floodplains, channelisation, alterations to water levels/flow regulation, changes in agricultural practice and river works.

Loss of reservoirs, old mill lodges and ponds represents a loss of a valuable conservation, amenity and historic resource and can lead to destructive changes in the flow regime of watercourses.

Much of the catchment is degraded by urban development, therefore, there are many opportunities for restoration and enhancement such as recreation of meanders.

Issue CW15 Protection of archaeological features within river corridors

Threats to features of Archaeological interest, both recorded and unrecorded and lack of specialised knowledge of their whereabouts and importance.

Issue CW16 Alien Pest Species

Alien pest species such as Himalayan Balsam, Japanese Knotweed, Giant Hogweed and introduced crayfish species. These out-compete native species and are extremely invasive.

Issue CW17 Failure of Aquatic invertebrate communities to achieve diversity and richness consistent with river habitat, and quality objectives.

Aquatic invertebrates depend for their existence on both good habitat and suitable water quality. As a result they provide an excellent measure of man's impact on a river, but they are also an important component of the aquatic ecosystem as a whole. They act as a food supply for fish and other aquatic life and also provide a means of assimilating material such as dead leaves and detritus into the system. It is therefore important to protect and enhance the invertebrate community through improvements in water quality and the protection of habitat wherever possible.

5. ISSUES AND OPTIONS

5.1 GENERAL

This section of the plan considers options to address the catchment wide issues. The options as presented are the initial thoughts of the North West Region of the NRA and do not constitute policy statements. Comments on the issues and options are invited together with any new ideas/suggestions.

Wherever possible the body responsible for carrying out each option has been identified. In some cases this is identified as someone other than the NRA. However, the options as presented are intended as a plan to facilitate improvements to the water environment for the benefit of all users. Obviously this will entail many bodies and individuals working together to fulfil the aims and objectives as detailed in this Catchment Management Plan.

5.2 Catchment Wide Issues

ISSUE NO: CW1	Development Control The impact that development and development pressures have on the water environment for all NRA functions		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Promote green corridors for rivers and encourage enhancement of river corridor features in UDP's, Structure and Local Plans. Include relevant policies in structure UDP's and Local Plans. Seek opportunities for "Planning Gain" where practical.	NRA/Planning Authorities	Protection and enhancement of water environment, landscape, and recreational use as appropriate.	Number of Local Authorities to consult with using limited staff resources.
2. Object to/place conditions on unsympathetic development proposals	NRA/Planning Authorities.	Retention of natural and heritage features and the existing riverside character. Retention of recreational use as appropriate.	Cost implications for Developers/Riparian owners.
3. Work to ensure the DOE circular 30/92 on Development and Flood Risks is applied by Planning Authorities.	NRA/Planning Authorities/ Developers	Maintain existing standards of flood protection and ensure development at acceptable risk.	
4. Improve liaison with Planning Authorities and Developers and highlight problems of re-developing existing sites in flood risk areas.	NRA/Planning Authorities/ Developers/ Riparian Owners	Ensure NRA requirements are considered at an early stage.	**Cont'd....**

DOE Circular 30/92 - Guidance from DOE to Planning Authorities on developments and flood risk.

ISSUE NO: CW1 Cont'd.	Development Control The impact the development and development pressures have on the water environment for all NRA functions		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
5. Set up NRA Project Teams to manage input to new roads/bypasses and major projects.	NRA	Ensure optimum protection/enhancement of wildlife, natural beauty and heritage is provided for.	
6. Continue to influence Local Authority or individual application decisions.	NRA/ Local Authority	Ensure that the water environment is protected against the impact of development.	Possible conflict with economic development of land.
7. Negotiate with and persuade developers to retain physically diverse features and valuable habitats within development sites.	NRA/Developers	As above	Limited powers to ensure policy carried out, especially if planning permission granted.
8. Resist development in areas draining to a sewage treatment works with capacity problems until adequate capacity is available.	NRA/NWW Ltd Local Authority	Maintain existing water quality and prevent deterioration.	Cost to NWW Ltd and possible customers. Possible conflict with Development Plans.
9. Encourage Planning Authorities to apply the NRA's Groundwater Protection Policy in considering new development proposals.	NRA	Ensure groundwater is not at risk from contamination from new development.	

DOE - Department of the Environment
UDP - Unitary Development Plan

ISSUE NO: CW2	Lack of survey information on some watercourses.		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Collection of sufficient total zinc and dissolved copper data.	NRA	Permit full assessment of compliance with the River Ecosystem Use classes in order to assess compliance with statutory water quality objectives in the future.	
2. Update existing land survey information in a planned manner.	NRA	Basic physical information used to assist with regulatory activities, flood defence and planning works.	
3. Carry out ad-hoc land survey work as and when required.	NRA	Updates existing information	Does not completely address lack of survey information.
4. Continue to provide River Corridor Surveys prior to Flood Defence river maintenance/capital schemes	NRA	Protect nature conservation and landscape interests of river corridor.	Incomplete and ad hoc record.
5. Provide additional River Corridor Survey information in a planned manner.	NRA	Provide more informed and strategic basis for decision making.	
6. Organise survey of threatened riverine species such as otters and water voles. Identify potential habitats, and ways of improving them, and obstructions to future colonisation.	NRA/Wildlife Groups	Ability to implement habitat improvement strategy in expectation of water quality improvements. Encourage declining species.	
7. Stimulate survey of bat roosts along rivers particularly under bridges	NRA/Local Bat Groups/Wildlife Trusts/English Nature	Avoid damage or obstruction to habitat of declining and protected species.	Reliance on volunteers.

ISSUE NO: CW3	Flood Defence General Maintenance		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Dredging or de-silting with heavy plant. Hand maintenance work e.g. tree cutting, weed clearance, grass cutting etc.	NRA/Riparian Owner	Maintenance of existing standard of flood protection. Avoidance of flooding due to culvert and channel blockages. Opportunities to further and enhance conservation.	Possible short term disruption of recreation and amenity uses. Possible short term reduction in water quality. Possible impact on wildlife habitats, natural beauty and heritage features.
2. Provide machine access ramps at suitable locations.	NRA/Riparian owners/ Developers	Existing standard of flood protection maintained. Avoidance of flooding due to culvert and channel blockages.	Cost justification and difficulty in locating suitable sites.

ISSUE NO: CW4	Flood Defence Standards of Service		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Undertake standards of service survey in accordance with NRA national guidelines.	NRA	Resources targeted at areas with highest potential for flood damage.	Difficulty in classifying all watercourses according to flood risk due to lack of information.
2. Continue to allocate resources using current systems	NRA	Lowest cost option	Current systems rely on local knowledge and tend to be subjective.

ISSUE NO: CW5	**Access Problems** **Inadequate access to and along watercourses for maintenance activities, improvement works, recreation and amenity.**		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Enforce flood defence byelaws and ensure working areas alongside main rivers are not prejudiced in future.	NRA	Maintains and improves access to river corridors.	Difficulty in "policing" all main rivers.
2. Encourage Local Authorities to adopt a similar stance on ordinary watercourses.	NRA/Local Authorities	As above.	Difficulty in "policing" ordinary watercourses. Local Authorities often unaware of legislative powers.
3. Selectively improve public access to watercourses and encourage extending linear parks whilst ensuring there is no reduction in conservation interest.	NRA/Local Authorities/ Landowners/ Ramblers Associations/ Warden Services.	Improve public perception of value of water environment. Allow more people to enjoy rivers and their corridors.	Land take, maintenance, security of riverside properties.

ISSUE NO: CW6	Culverted Sections and Bridges. Risk of culverts and bridges blocking. Clearance and maintenance of debris screens. The number and extent of culverted sections and resulting fragmentation of river habitat.		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Carry out culvert inspections. Clear blockages where possible.	NRA/Riparian owners	Existing standard of flood protection maintained. Avoidance of flooding due to culvert blockages.	Maintenance costs.
2. Clear debris screens when necessary or where available resources allow.	NRA	As above	Maintenance costs.
3. Enforce clearance of debris screens by Riparian owners.	NRA	As above	Difficult to trace some owners. Implications of failure if cannot trace.
4. Promote policy that existing culverts within new developments should be opened up on an opportunist basis.	NRA/Developers/ Planning Authority	Continuity in river corridors. Opportunities and enhance conservation. Free movement of fish. Possible improvement of flood protection.	Restricts available land for development
5. Identify possible river restoration schemes to open up culverts within areas of open space.	NRA	As above.	Often prohibitive scale of removing infill material.
6. Object to new culverting of watercourses except for access purposes and under special circumstances.	NRA/Developers/ Local Authority	Maintain existing flood defence standards and existing river corridor features.	Increased land take.

ISSUE NO: CW7	Instream structures such as culverts and weirs		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Provision of fish passes over weirs and similar structures.	Riparian landowners/ NRA/ Local Authority	Free migration of fish throughout the catchment. Migration to spawning ground not normally available. Improved fish stocks.	Cost
2. Flows within culverts to allow fish passage e.g. by modification of bed within culvert.	NRA/Local Authority	Free movement of fish up and downstream	Cost. Possible reduction of flood defence standard.
3. Leave as obstacles		No cost	Restriction of fish movements Loss of potential stock improvements.

ISSUE NO: CW8	Urban decay and riverside dereliction		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Persuade owners to repair decaying structures. Repair structures where debris could be transported into culverts and cause blockages. Negotiate improvements with developers. Liaise with Local Authorities on plans for specific sites.	NRA/Local Authorities/ Developers/ Riparian Owners	Ensure that dilapidated structures do not pose a flood risk. Ensures maximum flood defence benefit and amenity value.	Difficulty in tracing landowners and enforcing legal responsibilities. Maintenance and/or Scheme costs.
2. Support riverside regeneration initiatives including renovation of significant/historic buildings. Support initiatives promoting sympathetic enhancement works such as riverside walkways.	Local Authorities/ Voluntary Sector/ Mersey Basin Campaign/ NRA	Increases value of river as focal point Attractive setting promotes positive economic regeneration and respect for riverine environment.	Scheme costs. Difficult to get consensus of opinion on way forward with different interests being considered.
3. Promote the use of appropriate materials, which respect the landscape setting, for the repair and construction of river walls, bridges and other structures associated with the river.	NRA/Landowners /Developers/ Local Authority.	Maintain and improve aesthetic appearance of rivers.	Cost implications.

ISSUE NO: CW9	Litter and rubbish problems in and near rivers		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Ensure that rubbish is not dumped in rivers by using enforcement powers. Raise public awareness of consequence of rubbish dumping.	NRA/Local Authority	Flood protection standards maintained. Increase in visual amenity.	Cost to Local Authority.
2. To clear rubbish which may pose a flood risk.	NRA/Local Authority	Flood protection standards maintained. Increase in visual amenity.	Maintenance costs
3. Design Schemes to discourage fly-tipping using fencing etc.	Local Authority	Supports work of other functions particularly Flood Defence	Can cause difficulties of access.
4. Installation of fine mesh screens. Installation of debris screens.	Mersey Basin Campaign Central Catchment Group/ NRA/ DOE/Local Authorities	Large amounts of waterborne litter and rubbish would be removed from rivers, with a resultant increase in visual amenity.	Increased obstruction to flow with increased flood risk. Restriction of fish movement. Maintenance costs. Increased liability for screen owners.
5. Continue to fund work of WATERWATCH and STREAMCARE (part of Mersey Basin Campaign)	NRA/Mersey Basin Campaign/ Riparian Owners	Improves visual appearance and improves respect for waterways.	Cost implications.

DOE - Department of the Environment

ISSUE NO: CW10	Main River Review of "main river" lengths to reflect the land use of protected areas.		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Amend main rivers to suit changing needs.	NRA	Improve effectiveness of limited resources in providing and maintaining flood defence standards.	Need for liaison with MAFF, RFDC and other bodies before implementation. Results will probably not be realised in the timescale of this plan.
2. Retain existing main river schedules	NRA	Least impact on resources	Scarce NRA flood defence resources will continue to be poorly targeted.

MAFF - Ministry of Agriculture Fisheries & Food
RFDC - Regional Flood Defence Committee

ISSUE NO: CW11	Failure to achieve the present water quality classification objective		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Pursuance of the water quality improvements necessary for achievement.	NRA to monitor water quality and pursue and enforce improvements. Parties responsible for pollution to undertake necessary remedial measures. Responsible parties likely to include NWW Ltd/District Councils/ Industrial Site Operators/Waste Site Operators/ Farm Operators and Individual Householders.	Achievement of the present water quality classification objective and possibly improvement to the aesthetic, amenity and fishery value.	Cost to responsible parties.
2. Revision of the present water quality classification objective where this is not achieved.	NRA	Avoidance of expenditure on inputs normally outside the scope of pollution control.	Apparent relaxation of water quality standards.

ISSUE NO: CW12	Aesthetic deterioration due to sewage litter.		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Reduction in debris load released from unsatisfactory sewer overflows.	As a requirement of the EC Urban Wastewater Treatment Directive NRA/NWW Ltd to agree improvements required to achieve satisfactory performance. NWW Ltd to undertake capital works.	Improvement to aesthetic and amenity value.	Cost to NWW Ltd and possibly customers.

EC - European Community

ISSUE NO: CW13	Aesthetic deterioration due to domestic foul wastes incorrectly connected to surface water drains.		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Investigation and remedial measures to re-direct wrong connections to foul sewer.	NRA to establish responsibility at point of discharge NWW Ltd/District Councils/private drainage owner to investigate source of wrong connection. NWW Ltd/private drainage owner/ householder to undertake works to redirect drainage.	Improvement to aesthetic and amenity value.	Cost to NWW Ltd/ District Councils/ private drainage owner. Cost to NWW Ltd/ private drainage owner/householder.

ISSUE NO: CW14	Protection and enhancement of wildlife habitats, natural and geomorphological features within river corridors		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Safeguard and conserve existing sites of conservation interest (both designated and non-designated) against threat of development, e.g. encroaching into river corridors.	NRA/GMCU/EN/ Local Authority/ Riparian Owner/ Wildlife Trusts	Diversity of habitats promotes wide range of wildlife. Increases landscape and amenity value	Possible conflict with third party developments.
2. Maintain database of sites of conservation interest, areas of open spaces etc.	NRA/Local/ Authorities/EN Warden Services/ Wildlife Trusts	Easier to avoid damage if know where sites are.	
3. Maintain database of RIGS sites	NRA/LWT/ Manchester Museum	Help make more informed decisions.	Baseline surveys and designations at early stage in Greater Manchester
4. Encourage low intensity farming within river corridors by promoting schemes such as countryside stewardship	NRA/ Landowners/ Countryside Commission/ Wildlife Trusts/ FWAG	Maintain and improve interest of existing sites.	Economic implications for landowners. Time consuming.
5. Negotiate with and persuade developers to retain valuable habitats within development sites.	NRA/Developers	As above	Limited powers to ensure policy carried out, especially if planning permission granted.
6. Seek opportunities to enhance river corridor for conservation landscape and amenity.	NRA/Local Authorities/ Riparian Owners/ Warden Services/ Prospective Developers	Increase value of river corridor for wildlife and people to enjoy.	Possible conflicts with developers interests. Cost implications NRA not a landowner in this area.

Cont'd..

ISSUE NO: CW14 Cont'd.	Protection and enhancement of wildlife habitats, natural and geomorphological features within river corridors		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
7. Object to proposals to drain, infill or develop on old lodges, ponds and reservoirs.	NRA/Local authorities/ Wildlife Trusts	Retain features of ecological, amenity and historical values.	Loss of land for development
8. Encourage positive management of old lodges, ponds and reservoirs for conservation, amenity and fisheries as appropriate.	NRA/Landowners /Groundwork Trusts/Wildlife Groups/Angling Clubs/Local Authorities.	Ensure future of sites of ecological, amenity and historical value.	Costs of continued maintenance.
9. Promote schemes to leave an uncultivated buffer strip along the bank top or rural or semi- rural watercourses.	NRA/Landowners /Countryside Commission/ Wildlife Trusts/ FWAG	Improve wildlife value of rivers. Buffer against diffuse pollution.	Less land for agriculture. Time consuming.
10. Identify areas with potential for restoration and determine costs.	NRA	Provide basis for decision making.	
11. Undertake restoration schemes (if identified and cost effective)	NRA/Local Authorities/ Riparian Owners/ Warden Service/ Prospective Developers	Increase value of river corridor for wildlife and people to enjoy.	Possible impact on developers interests. Cost implications. NRA not a landowner in this area.

Note: Geomorphological features include meandering channel gravel bed and shoals, ox-bows, earth cliffs and river terraces.

EN - English Nature
FWAG - Farming & Wildlife Advisory Group
GMCU - Greater Manchester Countryside Unit
LWT - Lancashire Wildlife Trust
RIGS - Regionally Important Geological/Geomorphological Sites
UDP - Unitary Development Plan

ISSUE NO: CW15	Protection of archaeological features within river corridors.		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Maintain database of Scheduled ancient monuments sites.	NRA/English Heritage/ Local Authorities/ GMAU.	Easier to avoid damage if know where sites are	
2. Ensure liaison with appropriate county archaeologists for all NRA heavy maintenance and capital works.	NRA/County Archaeologists.	Expert information	Costs.

GMAU - Greater Manchester Archaeological Unit

ISSUE NO: CW16	Alien Pest Species		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Systematic treatment programme for control and eradication of Himalayan Balsam, Japanese Knotweed, Giant Hogweed.	NRA/Riparian owner	Increase habitat diversity for wildlife. Improve bank stability.	Scale of problem. Cost to riparian owner.
2. Ensure NRA activities do not encourage spread of alien pest species.	NRA/Riparian owner	As above.	
3. Object to proposals for the farming of crayfish.	NRA/MAFF/ Local Authorities	Protect populations of the native crayfish in the North West by preventing further spread of alien crayfish and crayfish plague.	

Note: It is an offence under Section 14(1)(b) of the Wildlife and Countryside Act (1981) to release alien crayfish into the wild.

MAFF - Ministry of Agriculture Fisheries and Food

ISSUE NO: CW17	Failure of Aquatic invertebrate communities to achieve diversity and richness consistent with river habitat, and quality objectives		
OPTIONS	**Responsibility**	**Advantages**	**Disadvantages**
1. Achievement of water quality objectives.	NRA/Parties responsible for pollution	Improvement of aquatic ecosystem.	Cost to Parties responsible for pollution.
2. Retain and, where possible, enhance aquatic habitats	NRA	As above	

APPENDICES

APPENDIX 1

GLOSSARY

1. ABSTRACTION LICENCE

Licence to abstract water. The maximum annual, daily, and hourly abstraction rates are set within the terms of the licence.

2. ACTUAL ABSTRACTION

Annual actual abstraction totals are shown in the plan, expressed in terms of megalitres per day. Individual actual abstractions are returned to the NRA each year. This data is confidential.

3. ANCIENT SEMI-NATURAL WOODLAND

Woodlands that have been intact since 1600 AD and are reasonably natural.

4. AQUIFER

Water bearing rock from which abstractions may be made.

5. BED

Bottom of river

6. BEDROCK

Solid rock outcropping at surface, i.e. no drift cover.

7. BENTHIC

Bottom of body of water

8. CHANNEL

Along which a river flows.

9. CLIFF

River Cliff or Earth Cliff - outside edge on natural bend of river where water flows rapidly and undercuts river bank causing a 'cliff'.

10. CONFLUENCE

Point where two, or more, rivers meet.

11. CLOUGH

A small steep sided river valley.

12. COUNTY STRUCTURE PLANS

Statutory document produced by County Council outlining strategy for development over a 10-15 year timescale.

13. CULVERT

A man-made structure e.g. pipe, carrying a watercourse underground.

14. CYPRINIDS

The carp family of fish comprising some 200 freshwater species.

15. DETRITUS

Worn down matter.

16. DEPOSITION

Where a river flows more slowly it may deposit gravel/sand/silt in its channel - often on the inside edge of bends or meanders.

17. DIFFERENT UNITS FOR FLOW MEASUREMENT

m^3/s	Cubic metres per second
l/s	Litres per second
Mld	Megalitres per day
mgd	Millions of gallons per day

Conversion Table

m^3/s	Mld	mgd
0.012	1	0.224
0.06	5	1.12
0.12	10	2.24
0.24	20	4.48
0.6	50	11.2
1.2	100	22.4

18. DISTRICT LOCAL PLANS

Statutory document produced by District or Borough Council to implement strategy for development set out in County Structure Plan. Specific land use allocations are identified.

19. DRIFT

Superficial deposits covering solid rock. Often deposited by rivers or by former glaciation in the form of boulder clay, peat or sands and gravels.

20. DROUGHT ORDER

Order, issued by the Secretary of State under which

i) variations to the terms of abstraction licences and/or
ii) reductions in the levels of service to consumers are sanctioned.

21. EFFECTIVE RAINFALL

Total rainfall minus actual evapotranspiration (direct evaporation plus transpiration).

22. EPHEMERAL FLOW

River flow not present throughout the entire year.

23. EVAPO-TRANSPIRATION

The loss of moisture from a soil by evaporation and plant transpiration.

24. FAUNA

Animals

25. FISSURE

Cleft or split

26. FLORA

Plants

27. FLUVIAL

Adjective of rivers.

28. GEOMORPHOLOGICAL FEATURES

These include meandering (winding) channel, gravel beds and shoals, ox-bows, earth cliffs and river terraces.

29. HECTARE

Unit of area equal to 2.471 acres.

30. HYDRAULIC CONTINUITY

The relationship between groundwater and surface water flow.

31. INVERTEBRATE

Animal without a back bone.

32. IMPOUNDMENT RESERVOIR

Surface water storage area formed by construction of a dam across a river or stream.

33. LEACHATE

Liquid containing material in solution.

34. LIVIA

Lower Irwell Valley Integrated Action

35. LOAD

Material carried by a river either in suspension or as dissolved material.

36. LOGGER

Electronic Data Store

37. MAIN RIVER

A watercourse designated by the Secretary of State and shown on a main river map. Includes any structure or appliance for controlling or regulating the flow of water into, in or out of the channel, being a structure or appliance situated in the channel or in any part of the banks of the channel (other than a structure or appliance vested in or controlled by an internal drainage board).

38. MEAN LICENSED ABSTRACTION

In this Plan, the mean licensed abstraction is the maximum annual abstraction within the terms of the licence, expressed in terms of megalitres per day (Mld).

39. MEDIAN FLOW

When flows are arranged in descending or ascending order, the median is the middle datum.

40. MINIMUM CONTROL LEVEL (MCL)

Predetermined level below which abstraction is not permitted.

41. MINIMUM RESIDUAL FLOW (MRF)

A minimum flow setting at a gauging station, relating to the flow requirements for downstream river reaches.

42. NATURAL FLOW REGIME

The natural flow record prior to the influence of man, i.e. with no abstraction from or discharge to the catchment.

43. OCHRE

Iron based orange discolouration.

44. OPERATION ALBION

Flood Warning Scheme for fluvial events.

45. OPERATION NEPTUNE

Flood Warning Scheme for coastal and tidal events.

46. OX-BOW

Over-exaggerated natural bend or meander in a river reflecting the shape of a horse shoe.

47. PERENNIAL FLOW

River flow present throughout the entire year.

48. PERMETHRIN

Pesticide predominantly used within the wool/carpet manufacturing industry.

49. PHYSIOGRAPHICAL

The natural physical processes of the river.

50. POOL

A deep, slowing flowing section of a river or stream.

51. POTABLE WATER SUPPLY

Water supplied for domestic use including human consumption.

52. PRECIPITATION

The total amount of waterwhich falls as rain, hail, or snow expressed as mm or inches of rainfall over a specified period.

53. PRESCRIBED FLOW

A flow setting at a gauging station, incorporated into an abstraction licence, such that abstraction must cease once the flow recorded at the gauging station reduces below this flow. Prescribed flows are set at or above the Minimum Residual Flow setting at the gauging station.

54. PRIMARY GAUGING STATION

A permanent flow gauging installation included in the National Surface Water Archive.

55. PUMPED STORAGE RESERVOIR

Surface water storage area, as above, with natural inflow supplemented by a pumped inflow from a separate source, typically a nearby river.

56. Q90

Flow that is exceeded for 90 per cent of the flow record.

57. Q95

Flow that is exceeded for 95 percent of the flow record.

58. RETURN PERIOD

The frequency within which, on average, an event of a certain severity may be expected to return (expressed in years).

59. RIFFLE

A shallow, but fast flowing part of a river or stream.

60. RIPARIAN

Of, or on, the banks of a river

61. RIVER CORRIDOR

Stretch of river, its banks and the land close by.

62. SALMONIDS

A family of fish which includes the non-migratory and migratory forms of Salmon (Salmo salar) and the Brown Trout and Sea Trout (Salomo trutta).

63. SHOAL

Sand and/or gravel deposit at edge or within river channel.

64. STRATA

Layer of rock

65. TELEMETRY

Data collected via telephone network.

66. TERRACE

Raised level, cut out of hillside by river action.

67. TIPPING BUCKET

A type of rain-gauge which collects and measures the amount of precipitation

68. TOPOGRAPHY

Description of a place, including its features.

69. TOTAL RAINFALL

Rainfall as measured by a raingauge.

70. TRANSFER STATION (Waste Disposal)

A licensed depot where controlled waste is stored and sorted for disposal or recycling.

71. TRANSPIRATION

The emission of water vapour by living plants into the atmosphere.

72. V-NOTCH

A 'V' shaped measuring weir or notch with sides that form an angle with its apex downwards, used to measure water flow.

73. WATER TABLE

The surface of a body of groundwater within underground strata. The water table will fluctuate as a result of natural or artificial causes.

APPENDIX 2

ABBREVIATIONS

AOD	-	Above ordnance datum.
AW	-	Ancient Woodland
CMDC	-	Central Manchester Development Corporation
CPRE	-	Council for the Preservation of Rural England
CSO	-	Combined Sewer Overflow
DOE	-	Department of the Environment
DOT	-	Department of Transport
DWF	-	Dry Weather Flow
EC	-	European Community
EIFAC	-	European Inland Fisheries Advisory Commission
EN	-	English Nature
EQS	-	Environmental Quality Standard
FWAG	-	Farming & Wildlife Advisory Group
GMAU	-	Greater Manchester Archaeological Unit
GMCU	-	Greater Manchester Countryside Unit
GMWDA	-	Greater Manchester Waste Disposal Authority
HMIP	-	Her Majesty's Inspectorate of Pollution
IPC	-	Integrated Pollution Control
LNR	-	Local Nature Reserve
LTO	-	Long Term Objective
LPA	-	Local Planning Authority
LWT	-	Lancashire Wildlife Trust
MAFF	-	Ministry of Agriculture Fisheries and Food
MAOD	-	Metres above ordnance datum
MBC	-	Metropolitan Borough Council
MCC	-	Manchester City Council

MSCC	-	Manchester Ship Canal Company
NWC	-	National Water Council
NWWA	-	North West Water Authority (Predecessor of NWW Ltd)
NWW Ltd	-	North West Water Limited
RE	-	River Ecosystem
RIGS	-	Regionally Important Geological/Geomorphological Sites
QSL	-	Quality Survey Limit
RFDC	-	Regional Flood Defence Committee
RQO	-	River Quality Objective
SBI	-	Site of Biological Importance
SMR	-	Sites and Monuments Records.
SSO	-	Storm Sewer Overflow
SSSI	-	Site of Special Scientific Interest
STW	-	Sewage Treatment Works (also referred to as Waste Water Treatment Works
SWQO	-	Statutory Water Quality Objectives
SWI	-	Site of Wildlife Importance
UDP	-	Unitary Development Plan
WDA	-	Waste Disposal Authority
WQO	-	Water Quality Objectives
WRA	-	Water Resources Act
WWTW	-	Waste Water Treatment Works

APPENDIX 3

NWC RIVER QUALITY CLASSIFICATION

RIVER CLASS	QUALITY CRITERIA	REMARKS	CURRENT POTENTIAL USES
1A Good Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 80% 2) 95 percentile Biochemical Oxygen Demand not greater than 3 mg/l 3) 95 percentile Ammonia not greater than 0.4 mg/l 4) Where the water is abstracted for drinking water, it complies with requirements for A2. 5) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures are unavailable).	1) Mean Biochemical Oxygen Demand probably not greater than 1.5 mg/l 2) No visible evidence of pollution	1) Water of high quality suitable for potable supply abstractions. 2) Game or other high class fisheries 3) High amenity value
1B Good Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 60%. 2) 95 percentile Biochemical Oxygen Demand not greater than 5 mg/l. 3) 95 percentile Ammonia not greater than 0.9mg/l 4) Where water is abstracted for drinking water it complies with the requirements for A2. 5) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures are unavailable).	1) Mean Biochemical Oxygen Demand probably not greater than 2 mg/l 2) Mean Ammonia probably not greater than 0.5 mg/l. 3) No visible evidence of pollution. 4) Water of high quality which cannot be placed in Class 1a because of the effect of physical factors such as canalisation, low gradient or eutrophication.	Water of less high quality than Class 1a but usable for substantially the same purposes.
2 Fair Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 40%. 2) 95 percentile Biochemical Oxygen Demand not greater than 9 mg/l. 3) Where water is abstracted for drinking water it complies with the requirements for A3. 4) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures are unavailable.)	1) Mean Biochemical Oxygen Demand probably not greater than 5mg/l 2) Water showing no physical signs of pollution other than humic colouration and a little foaming below weirs.	1) Waters suitable for potable supply after advanced treatment. 2) Supporting reasonably good coarse fisheries. 3) Moderate amenity value.
3 Poor Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 10%. 2) Not likely to be anaerobic. 3) 95 percentile Biochemical Oxygen Demand not greater than 17 mg/l. This may not apply if there is high degree of re-aeration.		Waters which are polluted to an extent that fish or absent or only sporadically present. May be used for a low grade abstraction for industry. Considerable potential for further use if cleaned up.
4 Bad Quality	Waters which are inferior to Class 3 in terms of dissolved oxygen and likely to be anaerobic at times.		Waters which are grossly polluted and are likely to cause nuisance.
X	DO greater than 10% saturation		Insignificant watercourses and ditches which are not usable, where the objective is simply to prevent nuisance.

EIFAC - European Inland Fisheries Advisory Commission - have set standards to protect freshwater fisheries. Requirements of A2, A3 - as specified in the EC Directive on Abstraction of Surface Water for Drinking.

APPENDIX 4 RIVER ECOSYSTEM CLASSIFICATION

The Surface Waters (River Ecosystem) (Classification) Regulations 1994, SI 1994 No. 1057, prescribe a system for classifying the quality of rivers and canals, to provide the basis for setting statutory water quality objectives (WQOs) under Section 83 of the Water Resources Act 1991 in respect of individual stretches of water.

The River Ecosystem Classification comprises five hierarchical classes, in order of decreasing quality: RE1, RE2, RE3, RE4 and RE5. The criteria which samples of water are required to satisfy are set out, for ease of reference, in the Table below.

Class	Dissolved Oxygen % saturation 10 percentile	BOD (ATU) mg/l 90 percentile	Total Ammonia mg N/l 90 percentile	Un-ionised Ammonia mg N/l 95 percentile	pH Lower limit as 5 percentile; upper limit as 95 percentile	Hardness mg/l Ca CO_3	Dissolved Copper ug/l 95 percentile	Total Zinc ug/l 95 percentile
RE1	80	2.5	0.25	0.021	6.0 - 9.0	≤ 10 >10 and ≤ 50 >50 and ≤ 100 >100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6.0 - 9.0	≤ 10 >10 and ≤ 50 >50 and ≤ 100 >100	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6.0 - 9.0	≤ 10 >10 and ≤ 50 >50 and ≤ 100 >100	5 22 40 112	300 700 1000 2000
RE4	50	8.0	2.5	-	6.0 - 9.0	≤ 10 >10 and ≤ 50 >50 and ≤ 100 >100	5 22 40 112	300 700 1000 2000
RE5	20	15.0	9.0	-	-	-	-	-

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