

RIVER IRWELL
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT
CHAPTER FOUR - RIVER CROAL SUB-CATCHMENT



NRA

*National Rivers Authority
North West Region
September 1994*



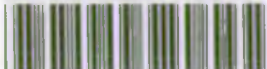
ENVIRONMENT AGENCY

NATIONAL LIBRARY &
INFORMATION SERVICE

HEAD OFFICE

Rio House, Waterside Drive,
Aztec West, Almondsbury,
Bristol BS32 4UD

ENVIRONMENT AGENCY



099754

Nottinghamshire Authority
Information Centre
Healthcare
Class No
Accession No AMUK

IRWELL CATCHMENT MANAGEMENT PLAN

CONSULTATION REPORT

CHAPTER FOUR - RIVER CROAL SUB-CATCHMENT

Front Cover photograph : River Croal, Bolton Town Centre

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

RIVER CROAL

CONSULTATION REPORT

CONTENTS

Section	Page No.
Index of Maps	9
River Croal Sub-Catchment Details	10
1. INTRODUCTION	
1.1 Catchment Description	12
1.2 Hydrology	12
1.3 Hydrometric Network	13
1.4 Hydrogeology	14
1.5 Flood Defence	15
1.6 Water Quality	16

2. CATCHMENT USES AND ACTIVITIES

2.1	Flood Defence	17
2.1.1	General	17
2.1.2	Local Perspective	17
2.1.3	Flood Warning	18
2.1.4	Objectives	18
2.1.5	Environmental Requirements	18
2.2	Development	19
2.2.1	General	19
2.2.2	Local Perspective	19
2.2.3	Local Planning Policy	19
2.2.4	Future Development in the Catchment	20
2.3	Potable (Drinking) Water Supply	21
2.3.1	General	21
2.3.2	Local Perspective	21
2.3.3	Supply Objectives and Standards	22
2.3.4	Customer Supply Requirements	23
	Water Quantity	
	Water Quality	
	Groundwater Quality	
2.3.5	Environmental Requirements	23
2.4	Industrial and Agricultural Abstractions	24
2.4.1	General	24
2.4.2	Local Perspective	24
	Industrial	
	General Agriculture	
	Spray Irrigation	
2.4.3	Supply Objectives and Standards	24
2.4.4	Customer Requirements	25
	Water Quantity	
	Water Quality	
2.4.5	Environmental Requirements	25
2.5	Resource Usage	26
2.5.1	General	26
2.5.2	Local Perspective	26
	Surface Water	
	Groundwater	

CONTENTS**Page No.**

2.6	Effluent Disposal	27
2.6.1	General	27
	Continuous Effluents	
	Intermittent Effluents	
2.6.2	Local Perspective	27
	Continuous Effluents	
	Intermittent Effluents	
2.6.3	Environmental Objectives	28
2.6.4	Environmental Requirements	28
	Water Quality	
	Water Quantity	
2.7	Landfill Sites	29
2.7.1	General	29
2.7.2	Local Perspective	29
2.7.3	Objectives	29
2.7.4	Environmental Requirements	29
	Water Quality	
	Water Quantity	
	Physical Features	
2.8	Mineral Extraction	31
2.8.1	General	31
2.8.2	Local Perspective	31
2.8.3	Objectives and Standards	31
2.8.4	Environmental Requirements	31
	Water Quality	
	Water Quantity	
	Physical Features	
2.9	Groundwater Protection	33
2.9.1	General	33
2.9.2	Local Perspective	33
2.10	Fisheries	35
2.10.1	General	35
2.10.2	Local Perspective	35
2.10.3	Environmental Objectives	35
2.10.4	Environmental Requirements	35
	Water Quality	
	Water Quantity	
	Physical Features	

CONTENTS

Page No.

2.11	Conservation	37
2.11.1	General	37
2.11.2	Local Perspective	37
2.11.3	Aquatic Invertebrates	38
2.11.4	Environmental Objectives	38
2.11.5	Environmental Requirements	39
	Water Quality	
	Water Quantity	
	Physical Features	
2.12	Landscape and Heritage	40
2.12.1	General	40
2.12.2	Local Perspective	40
2.12.3	Environmental Objectives	41
2.12.4	Environmental Requirements	41
	Water Quality	
	Water Quantity	
	Physical Features	
2.13	Recreation and Amenity	43
2.13.1	General	43
2.13.2	Local Perspective	43
2.13.3	Environmental Objectives	43
2.13.4	Environmental Requirements	43
	Water Quality	
	Water Quantity	
	Physical Features	
2.14	Angling	44
2.14.1	General	44
2.14.2	Local Perspective	44
2.14.3	Objectives	44
2.14.4	Environmental Requirements	44
	Water Quality	
	Water Quantity	
	Physical Features	

3. CATCHMENT OBJECTIVES

3.1	Flood Defence Objectives	45
3.1.1	General	45
3.1.2	Objectives	45
3.2	Water Quantity Objectives	46
3.2.1	General	46
3.2.2	Objectives	46
	Water Abstraction	
	Surface Waters	
	Local Hydrometric Objectives	
	Groundwaters	
3.3	Water Quality Objectives	48
3.3.1	Water Quality Classification	48
	a) Present Water Quality Classification Objectives	
	b) Future Water Quality Classification Objectives	
3.3.2	EC Directives	49
	a) Directive on Dangerous Substances in Water	
	b) Directive on Urban Wastewater Treatment	
	c) Directive on Water Quality for Freshwater Fish	
	d) Directive on Abstraction of Surface Water for Drinking	
3.3.3	Groundwater Protection Objectives	50
3.4	Physical Features Objectives	52
3.4.1	General	52
3.4.2	Objectives	52
	Development Control	
	Potable Water Supply, Agricultural and Industrial Abstraction	
	Mineral Extraction and Landfill Sites	
	Fisheries	
	Conservation	
	Landscape and Heritage	
	Recreation and Amenity	
	Angling	

4.	CURRENT STATE OF THE CATCHMENT	
4.1	State of Catchment : Flood Defence	54
4.1.1	General	54
4.1.2	Issues Identified	54
	a) Catchment Wide Issues	
	b) Site Specific Issues	
4.2	State of the Catchment : Water Quantity	56
4.2.1	General	56
4.2.2	Local Hydrometric Network	56
	River Level Recording	
	Rainfall Monitoring	
4.2.3	Issues Identified	57
	a) Catchment Wide Issues	
	b) Site Specific Issues	
4.3	State of the Catchment : Water Quality	58
4.3.1	Water Quality Classification	58
	a) Present Water Quality Classification Objectives	
	b) Future Water Quality Classification Objectives	
4.3.2	EC Directives	58
	a) Directive on Dangerous Substances in Water	
	b) Directive on Urban Wastewater Treatment	
	c) Directive on Water Quality for Freshwater Fish	
	d) Directive on Abstraction of Surface Water for Drinking	
4.3.3	Issues Identified	59
	a) Catchment Wide Issues	
	b) Site Specific Issues	
4.4	State of the Catchment : Physical Features	62
4.4.1	General	62
4.4.2	Issues Identified	62
	a) Catchment Wide Issues	
	b) Site Specific Issues	

CONTENTS

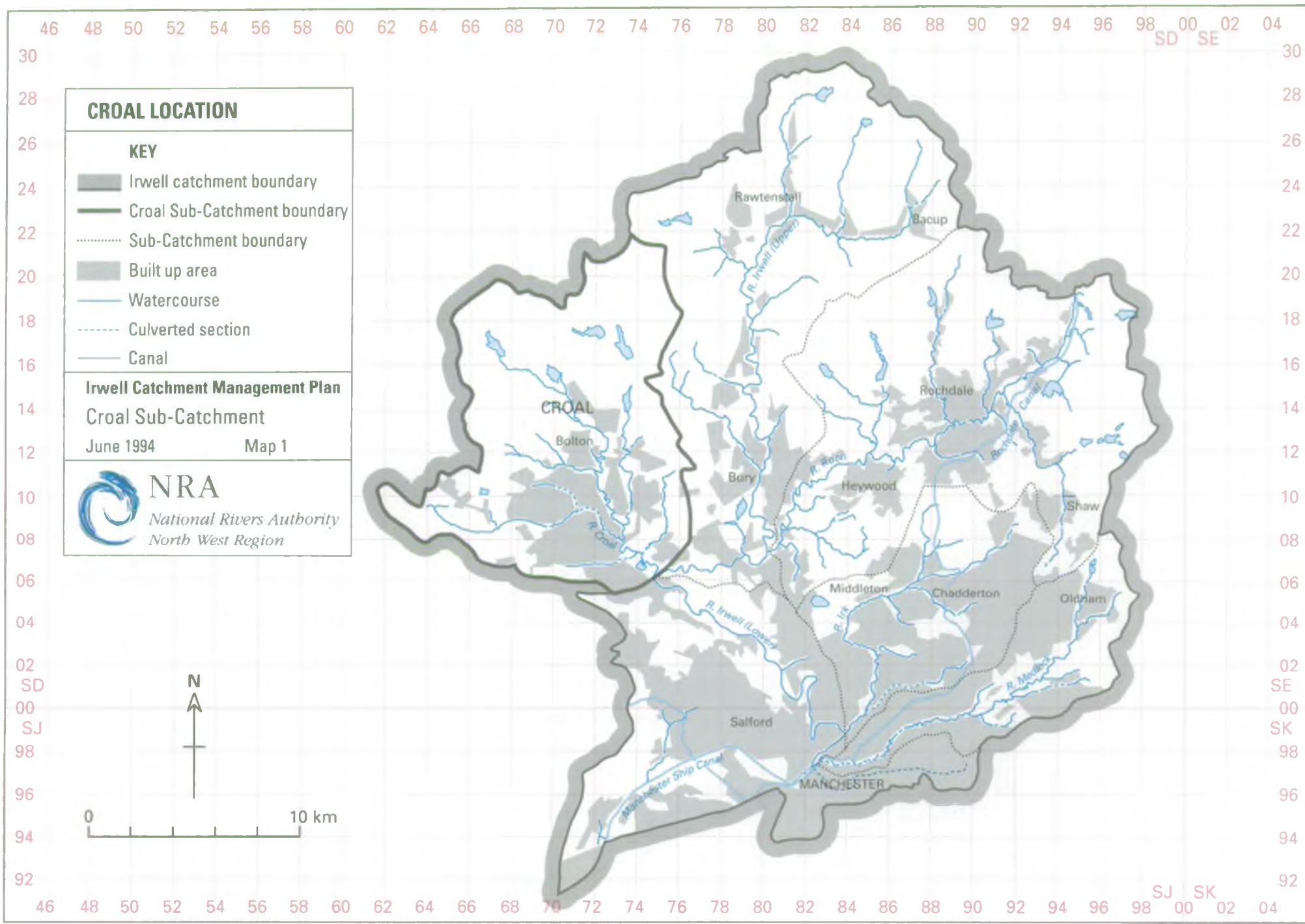
Page No.

5. ISSUES AND OPTIONS

5.1	General	64
5.2	Sub-Catchment Wide Issues	65
5.3	Site Specific Issues	66

INDEX OF MAPS

Map No.	Title	Facing Page No.
1	Croal Location	10
2	Croal Catchment with Infrastructure	12
3	Hydrometric Network	13
4	Summary Geological Map	14
5	River Network	15
6	Licensed Abstractions : Public Water Supply	21
7	Licensed Abstractions : Industrial & Agricultural	24
8	Effluent Disposal	27
9	Landfill Sites	29
10	Fisheries 1 : River Habitat Potential	35
11	Fisheries 2 : Actual Species Present	35
12	Fisheries 3 : Shortfalls in Habitat Potential	35
13	Designated Sites of Conservation Importance	37
14	Landscape and Heritage	40
15	Recreation and Amenity	43
16	Angling	44
17	Flood Defence: River Corridor Land Use Plan	45
18	Flood Defence : Objectives	45
19	Water Quality : Present Classification Objectives	48
20	EC Directive Compliance	49
21	Flood Defence : Flood Risk Areas	54
22	Flood Defence: State of the Catchment	54
23	Flood Defence: Existing Levels of Protection	54
24	Water Quality : State of the Catchment	58
25	Site Specific Issues Location Map	64



RIVER CROAL SUB-CATCHMENT DETAILS (MAP 1)

Area 148 km²

Population 200,000

MAIN TOWNS AND POPULATIONS

Bolton 140,000

Farnworth 24,000

ADMINISTRATIVE DETAILS

District Councils:-

Bolton Metropolitan Borough Council

Blackburn Borough Council

Bury Metropolitan Borough Council (small area)

NRA:- North West Region - South Area

Water Companies:- North West Water Ltd.

Principal Sewage Treatment Works:- Belmont

TOPOGRAPHY

Ground Levels	Min. Level	50 mAOD
	Max. Level	450 mAOD

GEOLOGY

Solid Geology:-	South	-	Carboniferous Coal Measures
	North	-	Alternating Carboniferous Coal Measures & Millstone Grit Series
Superficial Geology:-	Variable	-	Predominantly Glacial Till (Boulder Clay)
			Localised Sand and Peat deposits

WATER RESOURCES

Availability:-

Groundwater - Generally site specific
Surface Water - Good availability

FLOOD PROTECTION

Length of Designated Main River:- 63.19 km.
(maintained by NRA)

Riparian owned debris screens cleaned 17
by the NRA on a best endeavours basis

WATER QUALITY

Length of River in National Water Council Class

1993 Assessment

Class 1A (Very Good)	0.0 km.	Class 3 (Poor)	1.3 km.
Class 1B (Good)	10.3 km.	Class 4 (Bad)	0.6 km.
Class 2 (Fair)	40.1 km.		

FISHERIES

Length of salmonid fishery:- 23 km.
cyprinid fishery:- 10 km.

CONSERVATION

Number of Sites of Special Scientific Interest (SSSI) in the catchment	4 (+ 1 proposed)
Number of SSSI's which are associated with the River Corridor and/or wetland habitats	3 (+ 1 proposed)
Number of Site of Biological Importance (SBI) in the catchment (NB. Blackburn site not available)	50
Number of SBI's which are associated with River Corridor and/or wetland habitats	25

CROAL CATCHMENT WITH INFRASTRUCTURE

KEY

- Catchment boundary
- Watercourse
- - - Culverted section
- Principal Highway
- Motorway
- Railway

Irwell Catchment Management Plan Croal Sub-Catchment

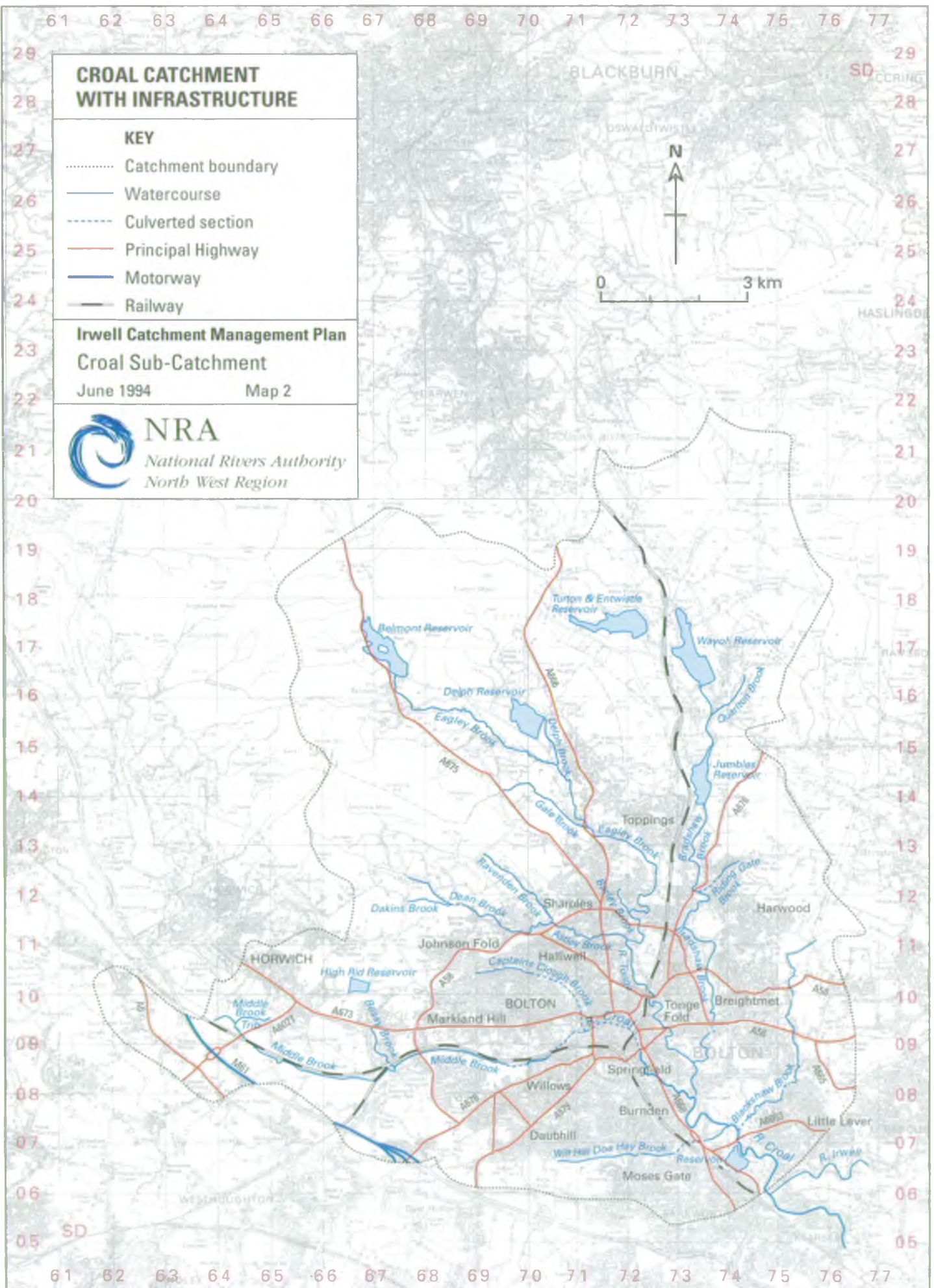
June 1994

Map 2



NRA

National Rivers Authority
North West Region



1. INTRODUCTION

1.1 CATCHMENT DESCRIPTION (MAP 2)

The headwaters of the River Croal rise on Darwen Moor to the NNW of Bolton at an altitude of over 390 metres AOD. It flows in a general south-easterly direction to join the River Irwell between Bolton and Kearsley at Nob End. Its principal tributary, Bradshaw Brook, rises on the moors to the south of Darwen at an altitude of approximately 310 metres AOD, and flows in a southerly direction to join the Croal to the east of Bolton. The catchment covers an area of about 148 square kms.

The Bradshaw Brook arm of the Catchment provides an almost continuous five and a half mile open space link from the River Irwell through Little Lever and Bolton through to the moors around Edgworth and beyond.

1.2 HYDROLOGY

The surface water hydrology of the catchment is controlled by the topography and surface geology.

The whole catchment has been extensively reservoiried and is one of the principal sources of water supply for the Bolton area.

Below the reservoirs on the Croal and Bradshaw Brook, the catchment becomes extensively urbanised and so there is a dramatic contrast between the upland, sparsely inhabited, with an annual precipitation in excess of 1500 mm to the densely populated lowland area where rainfall is a little above 1000 mm per year. The altitude of these urbanised areas falls to just 100 metres.

The actual rainfall for the River Croal Catchment in recent years is:

YEAR	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
RAINFALL (mm)	1356	1409	1613	1510	1652	1332	1341	1247	1564	1341

The long term average calculated by the Met. Office from this Authority's own records from 1961 to 1990 is 1436mm at Entwistle.

HYDROMETRIC NETWORK

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - - Culverted section
- River Gauging Stations
- Rainfall Gauges

Irwell Catchment Management Plan

Croal Sub-Catchment

June 1994

Map 3



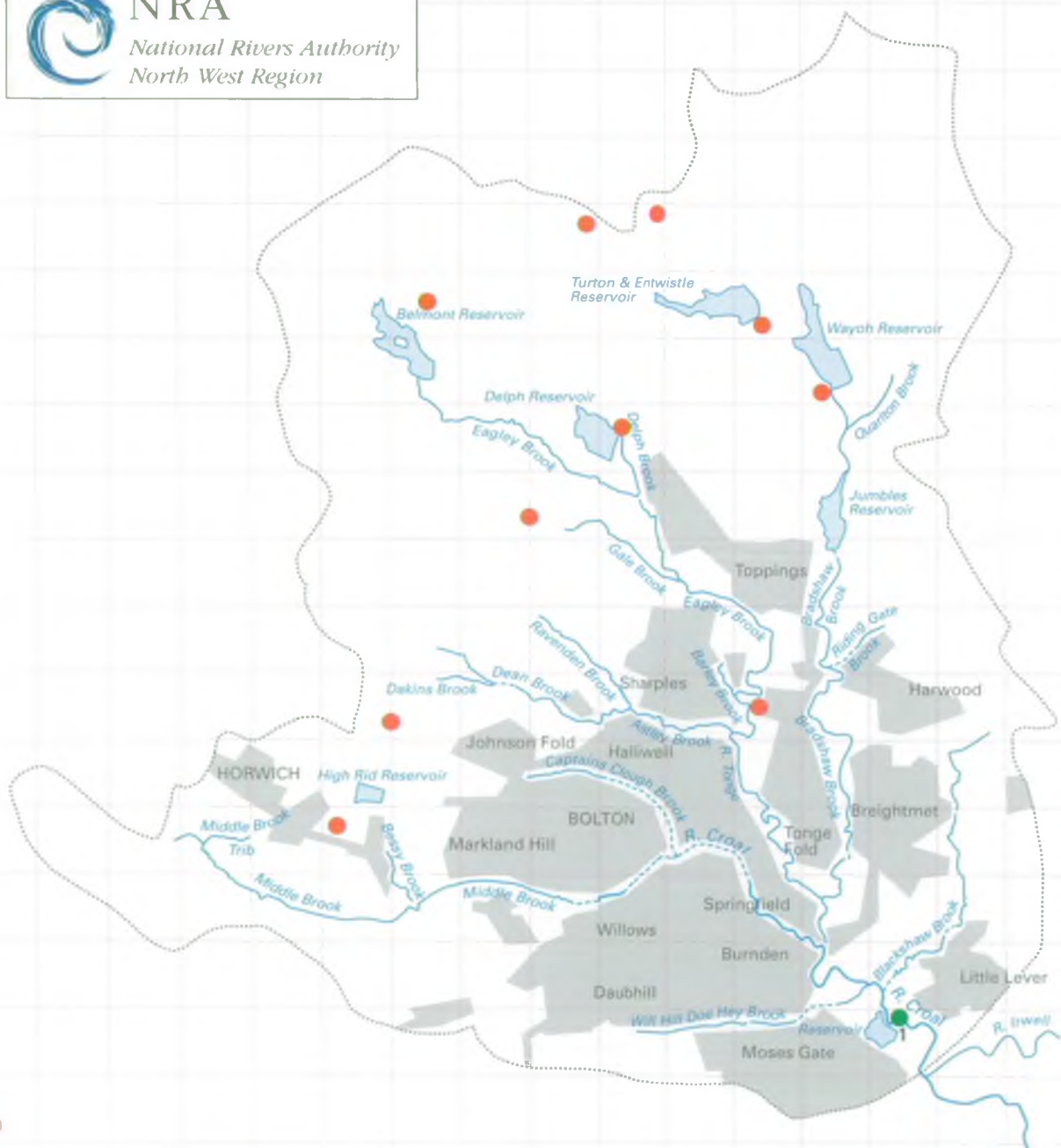
NRA

National Rivers Authority
North West Region

River Gauging Stations
1. Farnworth



0 3 km



1.3 HYDROMETRIC NETWORK (MAP 3)

Hydrometry is defined as the measurement of water. Hydrometric information is used within the NRA by the Licensing, Groundwater and Hydrology Function to enable them to meet their statutory duties relating to the Management of Water Resources, and is also used in flood forecasting and in the design of flood defences. Additionally, Hydrometric information is used to set water quality standards for both rivers and groundwater and to protect and help improve fisheries.

The 95 percentile flow at Farnworth Weir is 0.697 cumecs.

The Minimum and Maximum Daily Mean Flows are 0.279 and 67.7 cumecs respectively with a medium flow is 1.65 cumecs at the same site.

SUMMARY GEOLOGICAL MAP: GEOLOGY AT SURFACE (SIMPLIFIED)

KEY

- Catchment boundary
- Watercourse
- Culverted section

Irwell Catchment Management Plan
Croal Sub-Catchment
June 1994 Map 4



NRA

National Rivers Authority
North West Region

--- Geological boundary

Peat at surface

Sandy drift at surface

Clayey drift at surface

Exposed Carboniferous Coal Measures (Westphalian) strata

cw Carboniferous Coal Measures

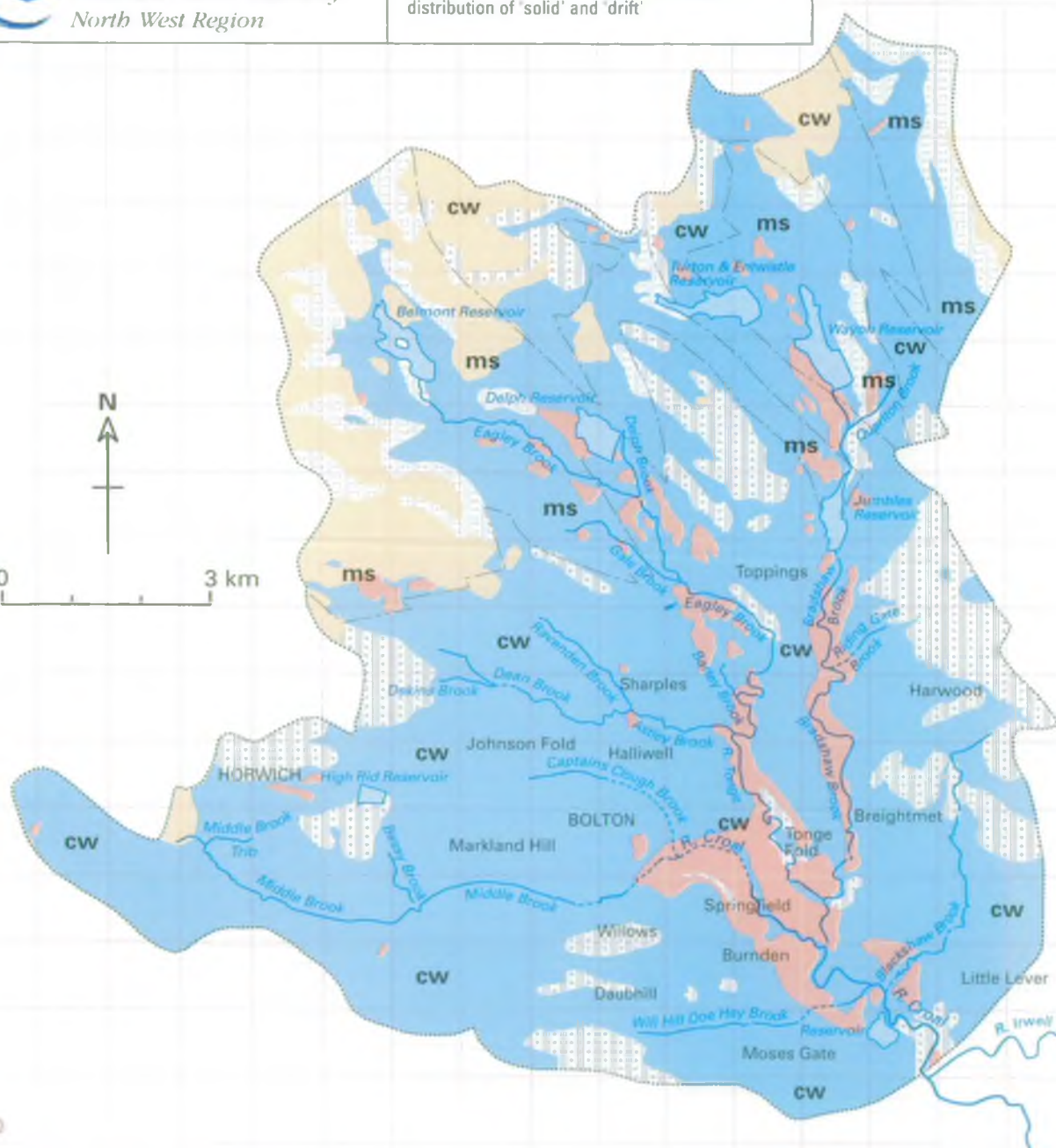
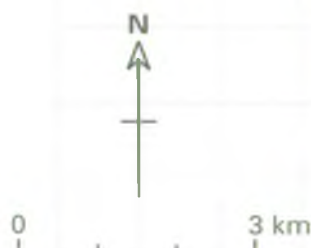
Exposed Millstone Grit series (Namurian)

ms Millstone Grit series

DRIFT

SOLID

Note: For illustrative purposes only. Please refer to published geological maps for detailed distribution of 'solid' and 'drift'



1.4 HYDROGEOLOGY (MAP 4)

The entire catchment is underlain by strata of Carboniferous age. Millstone Grit Series (Namurian) rocks dominate the north whilst younger Coal Measures (Westphalian) strata form the generally lower ground to the south. These both comprise alternating sequence of shales/mudstones, siltstones and sandstones which have been folded and intensely faulted. Thicker coarse grained sandstones occur in the Namurian, whilst numerous coal seams are present in the Westphalian success.

The 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 throughout the Coal Measures can give rise to complex and rapid groundwater flow and can adversely affect groundwater quality.

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. Locally, the drift deposits may include permeable sands and gravels which may act as aquifers in their own right, for example, in central Bolton.

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

RIVER NETWORK

KEY

- Catchment boundary
- Built up area
- Main river
- Ordinary watercourse
- - - Culverted section

Irwell Catchment Management Plan Croal Sub-Catchment

June 1994

Map 5

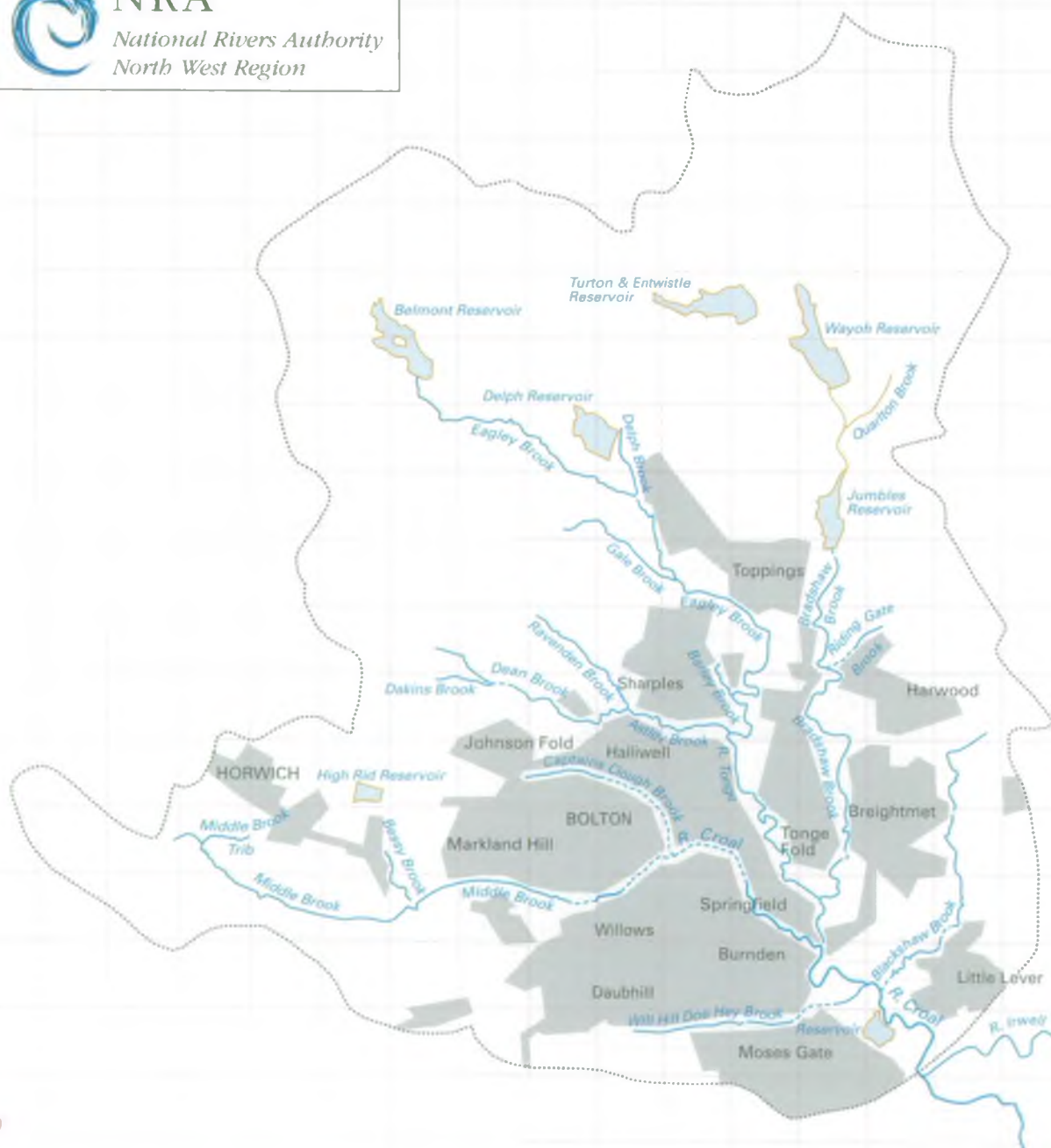


NRA

National Rivers Authority
North West Region

N

0 3 km



1.5 FLOOD DEFENCE (MAP 5)

Flood Defence is generally concerned with ensuring that flood flows in rivers are conveyed with the least possible impact on people and property. This involves the NRA in maintenance of watercourses, construction of new works, development control and flood warning.

Regular maintenance is carried out where necessary in the River Croal Catchment, and includes such items as clearing debris from culverts and bridges, and generally ensuring the maximum flood carrying capacity of the watercourses.

New flood defence schemes are carried out under an agreed programme which covers a ten year period. They must be worthwhile and shown to be value for money, before government and flood defence committee approval is given, and are subject to rigorous financial controls. Generally schemes are carried out to alleviate flooding from watercourses, but may also assist in maintenance activities. Examples of these are:-

- Construction of embankments, retaining walls and flood storage basins - to protect against flooding.
- Silt traps, debris screens and access ramps - to assist with maintenance activities

Development Control is carried out in the River Croal catchment to ensure that new development is discouraged in areas at risk from flooding, and is not allowed to increase the risk elsewhere. Any works carried out on watercourses by others are also subject to control by the NRA.

The NRA operates a Regional Flood Warning service which aims to give the public advanced warning of likely flooding so that appropriate precautions can be taken. When necessary, emergency staff are also deployed by the NRA, to clear blockages to culverts and channels, and provide temporary flood defences using sand bags.

1.6 WATER QUALITY

The River Croal and its major tributaries are classified with regard to water quality. A comprehensive monitoring programme indicates that a number of tributaries are affected by pollution.

Monitoring is also undertaken with regard to the requirements of certain EC Directives and to discharges to the catchment.

Amongst the more significant pollution sources within the catchment are discharges from the sewerage network feeding Bolton STW and the discharge from Belmont STW. These discharges are the responsibility of North West Water Ltd. Significant expenditure has already been made on improvements in particular to the sewerage network and there is a further substantial requirement.

The discharge from the trade effluent treatment plant at Charles Turner & Co. Ltd and contaminated run-off from Hall Lane tip also have significant impact.

Natural acidic run-off in the headwaters, contaminated run-off from farming and drainage from industrial sites have a more localised impact.

Run-off via storm drains from streets and commercial and residential properties does have a significant impact on water quality but is normally considered outside the scope of pollution control. However many storm water drains are contaminated causing widespread localised pollution because domestic foul water is connected to the storm water drainage system rather than the foul water system. Investigation and resolution of such wrong connections can be difficult.

2. CATCHMENT USES AND ACTIVITIES

2.1 FLOOD DEFENCE

2.1.1 General

This use deals with the provision of effective flood defence for people and property against flooding from rivers and watercourses. Normally flooding is a result of extreme climatic conditions, such as very heavy or prolonged rainfall. Flood events are described in terms of the frequency at which, on average, a certain severity of flood is exceeded. This frequency is usually expressed as a return period in years, for example 1 in 50 years.

The effectiveness of flood defences can be measured in terms of the return period up to which they prevent flooding. The target standard for flood defences should be dictated by the type of land use. For instance, urban areas will require more effective defences than say pasture land.

The NRA's duties and powers relating to Flood Defence are detailed in Section 3.1 of Chapter One River Irwell Introduction document

2.1.2 Local Perspective

The River Croal runs from its confluence with Middle Brook south-west of Bolton and flows in an easterly direction to its confluence with the River Irwell. It is fed upstream by Middle Brook and along its length by, Captain's Clough Brook, the River Tonge, Will Hill Doe Hey Brook and Blackshaw Brook. The major tributaries being Middle Brook, River Tonge and Bradshaw Brook.

Middle Brook runs generally in a west to east direction, following the Adlington to Bolton railway line, before it becomes known as the River Croal (or Croal Minor) at Queens Park. From here, the River Croal passes through Bolton Town Centre in culvert and open channel, then turns southwards and passes under the A666 St. Peters Way, to Darcy Lever where the River Tonge joins it. An interesting feature of the River Croal from Queens Park downstream to St. Peters Way, is the stone lined dry weather flow channel which probably dates from the days when the River Croal was used as an open sewer. A significant amount of pioneering silt and debris clearance work has been carried out on this stretch of the River Croal in the past in order to ensure the flood capacity of the river is maintained. If silt and debris is allowed to accumulate within this stone lined channel, then it becomes significantly more expensive to return it to its full capacity, when compared to the costs of regular less extensive maintenance work.

The River Tonge commences at Waters Meeting, where Astley and Eagley Brooks join. From this confluence, downstream to the railway viaduct, the Tonge Valley is the subject of major development proposals to re-generate derelict industrial sites as part of the Bolton City Challenge.

Bradshaw Brook commences at the Jumbles Reservoir outlet, continuing south in a deep valley through Bradshaw and Tonge Fold, before its confluence with the River Tonge in Leverhulme Park.

There is a significant amount of re-development, either currently underway or planned for the immediate future, alongside the River Croal through the town of Bolton. The NRA are successfully pursuing a policy of increased access to the river corridor, as part of the re-development proposals. This will ensure that the river is not hidden from view and forgotten, and will also enable maintenance works to be carried out more efficiently to ensure that the current standard of flood protection is preserved.

Regular, planned inspections of "main river" channels and structures are carried out in order to programme any necessary maintenance works. Such works are carried out in the Croal catchment to safeguard the existing standards of flood protection, particularly in the heavily urbanised area of Bolton. The work includes clearing debris blockages from channels, culverts, bridges and trash screens; and also de-silting and dredging using mechanical plant.

The NRA clears numerous culvert debris screens within the Croal catchment, at a general frequency of at least once per week. Such screens prevent large items of debris becoming trapped in culverts and subsequently causing flooding and structural problems.

2.1.3 Flood Warning

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.

2.1.4 Objectives

Flood Defence objectives are detailed in Chapter One, River Irwell Introduction document, Section 3.1.1.

2.1.5 Environmental Requirements

Environmental Requirements relating to Flood Defence are detailed in Chapter One, River Irwell Introduction document, Section 3.1.

2.2 DEVELOPMENT

2.2.1 General

The relationship between NRA activities and the land use planning system is dealt with in Section 2.3 of Chapter One, River Irwell Introduction document.

2.2.2 Local Perspective

The Catchment is within the South Area of the NRA (North West Region). Any new development may be of concern to the NRA, as proposals may have an impact on all our duties and responsibilities. It is imperative that the NRA has an effective and efficient input in the development of the catchment to ensure developments are implemented with our interests fully taken into account.

2.2.3 Local Planning Policy

The majority of the Croal Catchment is located within the administrative boundary of Bolton Metropolitan Borough Council. The northern rural part is contained within Blackburn Borough Council, with small areas on the eastern boundary within Bury Metropolitan Borough Council.

The Greater Manchester Structure Plan First Alteration 1986 forms the Strategic Planning framework for these Districts and Cities, until the adoption of their respective Unitary Development Plans (UDP's). Each Local Planning Authority had progressed beyond the Deposit stage of UDP preparation (March 1994). Salford, Manchester and Bolton are awaiting Inspector Reports following their Public Inquiries. Trafford is currently holding their Public Inquiry and the Bury Public Inquiry is earmarked for October 1994.

The main UDP emphasis within the Catchment is centred on:

- Protecting and improving the environment,
- Securing growth and development of the Local and regional economy,
- Promotion of urban regeneration.

The well-established Greater Manchester Green Belt Policy boundary has strictly limited outward growth of the Catchment's main urban areas and there is a strong planning policy tradition in this area for protection the open character of river valleys.

The Croal/Irwell Valley local plan has been of prime importance, in the past 10 years, in helping to bring about improvements, especially in the northern half of the Catchment from Kearsley through the Irwell into the heart of Salford. The Plan has placed a strong commitment on the protection of open land in the river valleys as a primary way to achieve environmental improvements such as land reclamation, informal recreation and public access and protection of areas of ecological importance.

2.2.4 Future Development in the Catchment

The watercourses within the Catchment have been noted for their landscape, wildlife, open land and recreational importance through the preparation of the Development Plans. This will continue to be encouraged by the NRA up to adoption of the Plans and will be used as recommendations in the determination of planning applications. The CMP must support the overall economic and environmental improvements and seek to reduce adverse environmental conditions new development may cause.

The NRA through the planning system will seek to discourage development in areas at risk from flooding, achieve water quality improvements and promote the conservation of the water environment. The main targets of the NRA's policy directions to be pursued through the planning system are detailed in Section 2.7 of Chapter One, River Irwell Introduction document.

LICENSED ABSTRACTIONS: PUBLIC WATER SUPPLY

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - Culverted section
- Surface Water Sources
- Groundwater Sources

Irwell Catchment Management Plan Croal Sub-Catchment

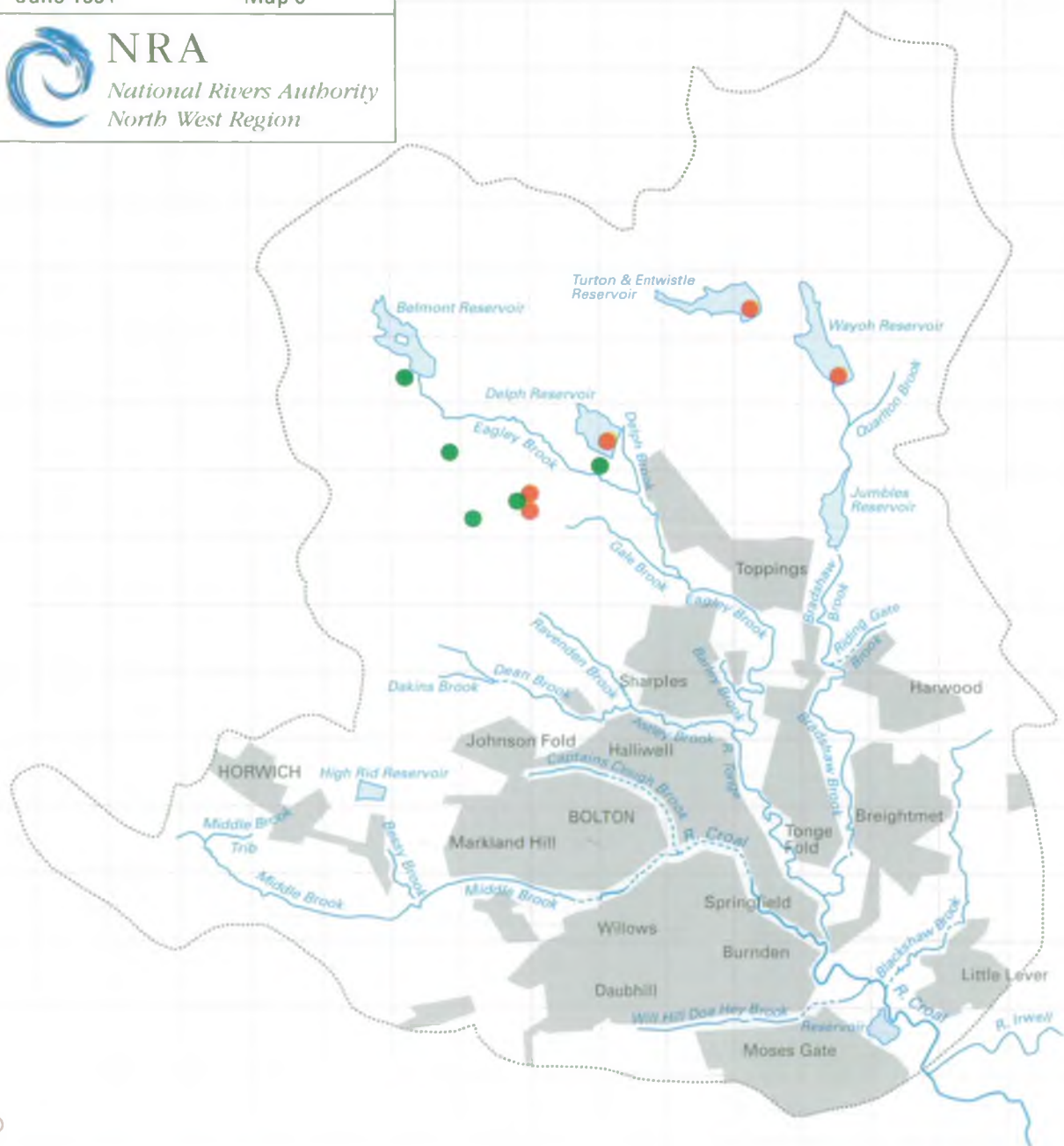
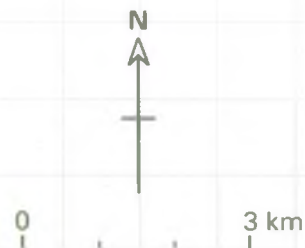
June 1994

Map 6



NRA

*National Rivers Authority
North West Region*



2.3 POTABLE (DRINKING) WATER SUPPLY (MAP 6)

2.3.1 General

This use relates to the abstraction of water for potable supply use. The principal abstractor is the statutory water company (NWW Ltd.) though there are small domestic abstractions, particularly in the upper part of the catchment, which are exempt from licensing requirements.

Abstraction for other than private domestic use is controlled by licence. Potable sources developed before 1963 were granted Licences of Right under the Water Resources Act 1963. Licences granted since 1963 have been granted on the basis that abstraction does not derogate existing used and users of both ground and surface waters.

The NRA have developed a National Groundwater Protection Policy to safeguard both individual potable sources and groundwater resources in general.

2.3.2 Local Perspective

There are four licensed groundwater sources in the catchment abstracting from the millstone grit series for potable supply. These boreholes are located at Belmont and Springs Reservoirs and are linked to the Springs Reservoir abstraction licence.

Additionally there is a borehole at Longworth Clough used to supplement the compensation flows from Delph Reservoir when necessary.

The minor aquifers of the catchment also provide a number of unlicensed domestic supplies, particularly in the upland areas of the catchment. The NRA is currently gathering data on these sources although lists are far from being complete.

These private supplies will be subject to water quality monitoring and the Local Environmental Health Department should keep registers of all such supplies. These supplies are outside the direct control of the NRA.

There are five major sources used for public water supply (PWS) in the River Croal Catchment. These are all reservoirs, the sources being Entwistle, Wayoh, Delph, Springs and Dingle Reservoirs. These are all concentrated in the North and North Western part of the catchment. The total licensed quantity from these sources is 27,143.6 ml/y which is 84% of the total licensed abstraction in the catchment.

The catchment also contains several reservoired sources for supplying compensation water only. Examples of these are Jumbles, Belmont and Rumworth Lodge Reservoirs. These are operated by NWW Limited under provisions contained in local Water Acts which were inherited in the formation of the regional water authorities in 1974.

2.3.3 Supply Objectives and Standards

The NRA has yet to establish formal policy with regard to supply objectives but the following will be, and in many cases are already being actively pursued:

- To manage water resources to safeguard private water supplies.
- To manage surface water resources to meet future demand.
- To set minimum residual flows (MRF's) and minimum control levels (MCL's) where applicable, to protect environmental river needs.
- To ensure compliance with existing MRF's and MCL's through monitoring and enforcement policy.
- To ensure the best utilisation of water resources in the catchment.
- To conserve, augment and/or redistribute, and to ensure the proper use of water resources, where appropriate, to meet potable water demands to appropriate standards of reliability.
- To encourage efficient water use, including leakage reduction.
- To carry out a review of compensation water requirements to ensure the best utilisation of resources for various users.
- To monitor water quality at the appropriate abstraction point to ensure compliance with EC Directive 75/440/EC.
- To maintain and where necessary improve water quality in accordance with existing river quality objectives and Statutory Water Quality Objectives (SWQO's) established.

In dealing with new applications involving groundwater abstractions, the following objectives will be pursued:

- To manage water resources to safeguard private water supplies.
- To manage groundwater resources where possible to meet future demand.
- To protect aquifers from over commitment and ensure groundwater abstraction does not have an unacceptable effect on surface waters and related environmental interests.
- To ensure the best utilisation of water resources in the catchment.

**CATCHMENT USES AND ACTIVITIES
POTABLE (DRINKING) WATER SUPPLY**

- To conserve, augment and/or redistribute, and to ensure the proper use of water resources where appropriate to meet potable water demands to appropriate standards of reliability.
- To encourage efficient water use including leakage reductions.
- To implement groundwater protection policies.

2.3.4 Customer Supply Requirements

Water Quantity

- To expect availability of resources within the terms specified in the licence.
- To expect no derogation of supplies when issuing new licences.

Water Quality

- To expect compliance with relevant standards set in EC Directive 75/440/EC (surface water Abstracted for Drinking water).

Groundwater Quality

Groundwaters associated with the Carboniferous Millstone Grit and Coal Measures sandstones are typically high in iron. This can also be acute in groundwaters contained in old mine workings. In addition, minewaters often have elevated levels of chloride and sulphide but are generally of low pH (acidic).

2.3.5 Environmental Requirements

Ensure flows do not fall below an ecologically acceptable level, so that there is no adverse impact on aquatic flora and fauna, natural geomorphology and adjacent habitats.

LICENSED ABSTRACTIONS: INDUSTRIAL & AGRICULTURAL

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - - - Culverted section

Industrial

- Surface water abstraction
- Groundwater abstraction

Agricultural – including spray irrigation

- ▲ Surface water abstraction
- ▲ Groundwater abstraction
- ▲ Spring

Irwell Catchment Management Plan

Croal Sub-Catchment

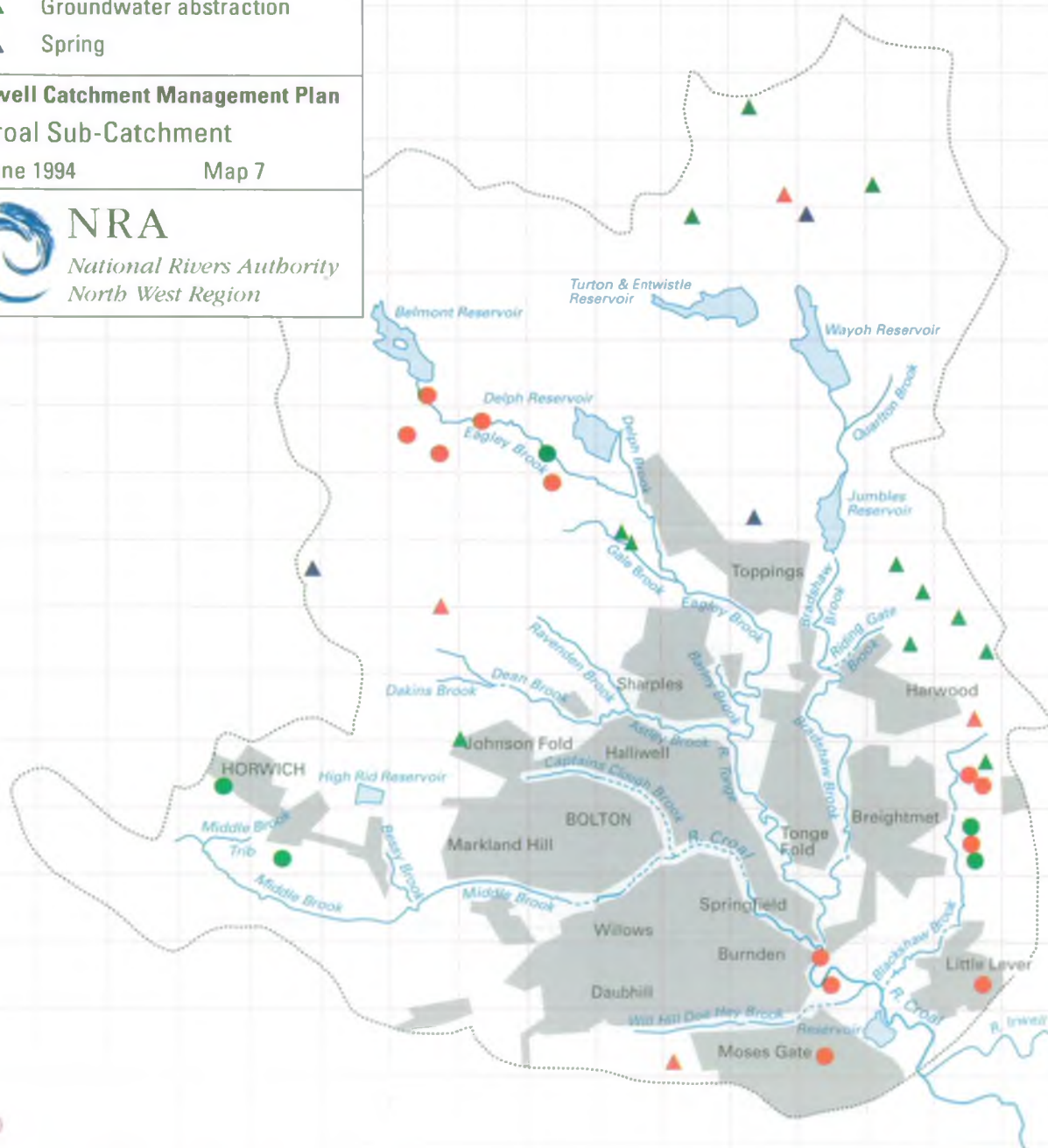
June 1994

Map 7



NRA

National Rivers Authority
North West Region



2.4 INDUSTRIAL AND AGRICULTURAL ABSTRACTIONS (MAP 7)

2.4.1 General

This use relates to the abstraction of water from ground and surface water for industrial and agricultural use including spray irrigation. The majority of such abstractions will require an abstraction licence.

2.4.2 Local Perspective

Industrial

There are 16 licensed abstractions within the River Croal catchment for industrial purposes. The total licensed quantity from these sources is 4449.86 ml/y which is 14% of the total licensed abstraction within the catchment. Of this total 3993.4 ml/y (89.74%) is from surface water sources and 456.4 ml/y (10.26%) is from groundwater sources.

Several major companies within the catchment rely on the rivers and streams within the catchment for their various processes of manufacture, principally paper making and textile production (including bleaching and dyeing).

General Agriculture

There are 13 licensed abstractions for this purpose totalling 29.8 ml/y which is 0.1% of the total licensed abstraction in the catchment. The majority of these licensed abstractions are from spring or borehole sources. There are also sources in the upper reaches of the catchment which are used for general agricultural purposes and are exempt from licensing requirements.

Spray Irrigation

There are six licensed abstractions for spray irrigation purposes within the catchment. Five of these are for golf course irrigation and one for a plant nursery. These abstractions cover three surface sources and three groundwater sources. The total licensed abstraction is 7.3 ml/y which is 0.02% of the total licensed quantity in the catchment.

2.4.3 Supply Objectives and Standards

The NRA has yet to establish formal policy with regard to supply objectives, but the following will be, and in many cases are already being, actively pursued:

- To manage water resources to safeguard direct industrial abstractions.
- To manage water resources where possible to meet reasonable industrial demand.

CATCHMENT USES AND ACTIVITIES INDUSTRIAL AND AGRICULTURAL ABSTRACTIONS

- To set minimum residual flows (MRF's) and minimum control flows (MCL's) where applicable, to protect environmental river needs.
- To ensure compliance with existing MRF's and MCL's through monitoring and enforcement policy.
- To protect aquifers from over commitment and ensure that groundwater abstraction does not have an unacceptable effect on environmental waters.
- To ensure the best utilisation of water resources in the catchment.
- To conserve, augment and/or redistribute, and to ensure the proper use of water resources, where appropriate to meet industrial water demands to appropriate standards of service.
- To encourage efficient water use, including leakage reduction.
- To ensure compliance with licence conditions through monitoring and enforcement policy.
- To implement groundwater protection policies.

2.4.4 Customer Requirements

Water Quantity

- To expect availability of resources within the terms specified in the licence.
- To expect no derogation of supplies when issuing new licences.

Water Quality

- To expect compliance with relevant standards set in EC Directive 75/440/EC (surface water Abstracted for Drinking water).

2.4.5 Environmental Requirements

Ensure flows do not fall below an ecologically acceptable level, so that there is no adverse impact on aquatic flora and fauna, natural geomorphology and adjacent habitats.

2.5 RESOURCE USAGE

2.5.1 General

This section summarises the total licensed and actual abstraction within the catchment compared with the available resource. Licensed and current actual usage have been assessed for the catchment.

The available resource is derived from the average annual rainfall for the period 1961-1990 less the average annual evaporation for the catchment. This provides an estimate of the total surface water resource available but is not derived from a detailed assessment of run-off, groundwater recharge or any time elements.

These totals are compared with the total annual licensed abstraction and the actual average consumptive use in 1992. The purpose of the comparison is to illustrate the scale of water resource development within the catchment.

	AVAILABLE RESOURCES IN AVERAGE YEAR JAN - DEC	LICENSED OR COMMITTED ABSTRACTION	ACTUAL AVERAGE ABSTRACTION 1992
Surface	280 MI/d	124 MI/d	72 MI/d
Groundwater	No data	4 MI/d	0.7 MI/d

2.5.2 Local Perspective

Surface Water:

Water resources availability in the River Croal catchment is more than adequate to meet any existing demand and future development. Any problems that may arise will be on a site specific basis on the minor tributaries.

Groundwater:

In volume terms, the main licensed groundwater abstractions within the catchment are from the Carboniferous Coal Measures and Millstone Grit Series for both industrial use and potable supply. Elsewhere there may be scope for additional abstractions, but this would need to be assessed on an individual basis.

EFFLUENT DISPOSAL

KEY

- Catchment boundary
- Built up area
- Watercourse
- Culverted section

NWW STW

- Small (DWF < 10MI/d)
- Medium (DWF > 10MI/d)
- Large (DWF > 50MI/d)

Sewer overflows

(storm and emergency)

- Location of single overflow
- Concentration of overflows

Non-NWW STW

- Trade effluent discharge

Irwell Catchment Management Plan Croal Sub-Catchment

June 1994

Map 8



NRA

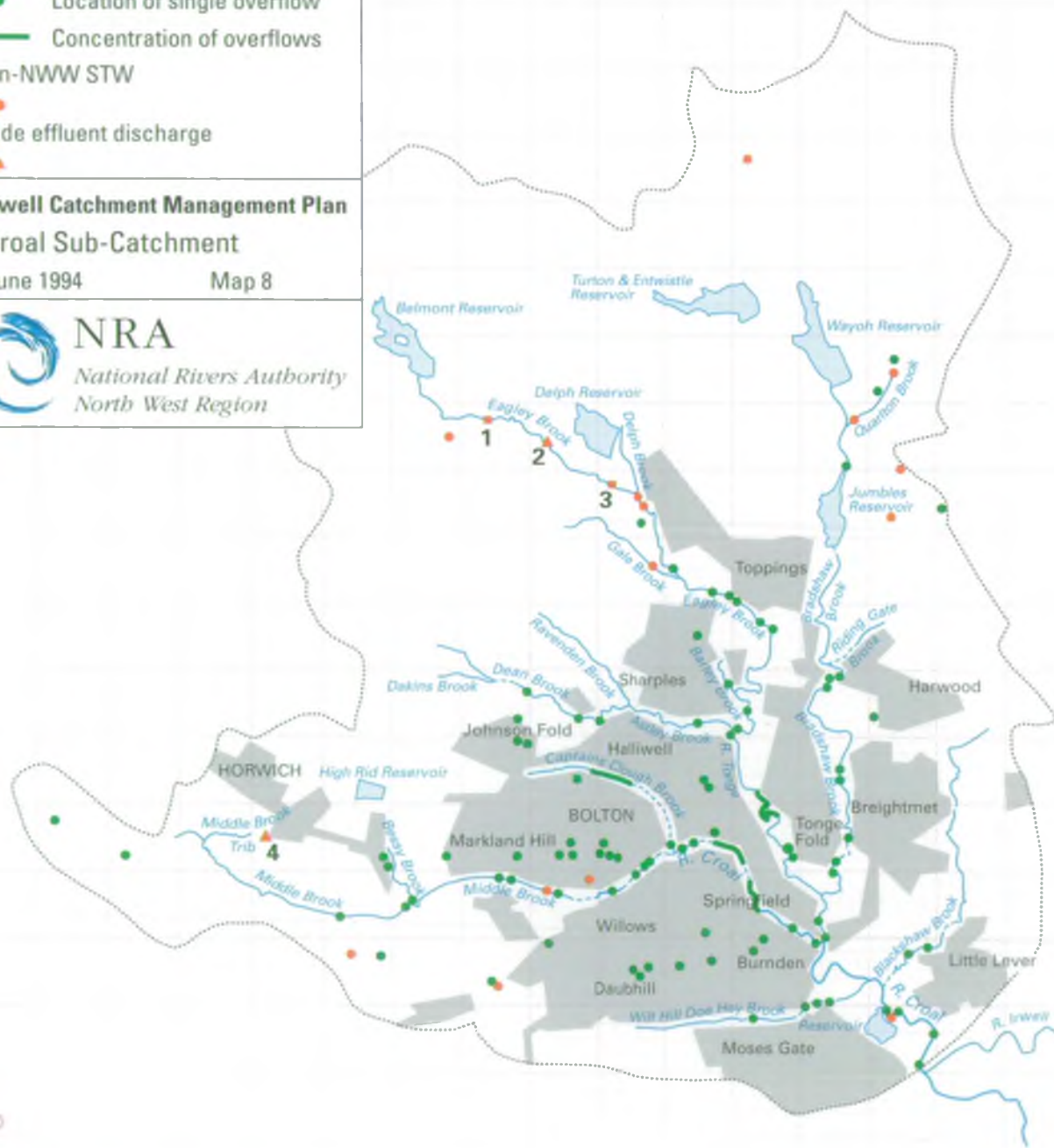
National Rivers Authority
North West Region

Sewage Treatment Works and Industrial Discharges

1. Belmont STW
2. Charles Turner & Co. Ltd.
3. Longworth STW
4. NWW Middlebrook WTP



0 3 km



2.6 EFFLUENT DISPOSAL (MAP 8)

2.6.1 General

This use principally relates to the disposal of domestic and industrial effluents to the river system. Dependent on nature effluents may be discharged continuously or intermittently.

Continuous Effluents

Continuous discharges are of fully treated effluent from sewage treatment works and trade effluent treatment plants.

The more significant sewage treatment works are almost exclusively operated by water companies, in this case North West Water Limited. Such sewage works may receive both domestic and industrial waste. Houses and other premises remote from the established sewerage network may use an individual sewage treatment plant with discharge to watercourse as an alternative to septic tank or cess pit as a means of disposal of foul drainage.

Industrial concerns may also opt to treat their trade waste at their own treatment facility with discharge to watercourse.

The quality of such continuous effluents is controlled by consents issued by the NRA.

In the past this has been the case for all types of continuous effluents. However, discharges from certain prescribed industrial processes are now authorised by HMIP under Integrated Pollution Control (IPC).

Intermittent Effluents

The most significant category of intermittent effluent is that from storm overflows on the sewerage network. Sewage effluent may also be discharged intermittently from the sewerage network in the event of emergency at pumping stations. Both these types of discharge are the responsibility of North West Water Ltd. and the circumstances in which they are permitted to occur are controlled in consents issued by the NRA.

Another category of intermittent effluent is the surface water run-off from urban areas.

2.6.2 Local Perspective

Continuous Effluents

There is one significant North West Water Ltd STW. This is at Belmont. The dry weather flow is 1.2 Ml/d. There is also a small plant operated by NWW at Longworth. The majority of the sewage arising in this catchment is treated at Bolton STW in the Lower Irwell Sub-Catchment.

The only significant industrial discharge is trade effluent from paper manufacture from Charles Turner & Co. Ltd. The consented flow is 5 Ml/d. There is also a minor trade discharge of backwash from North West Water Ltd's Middle Brook drinking Water Treatment Plant (WTP).

There are also a number of small sewage treatment plants operated by others.

The locations of these discharges are shown on Map 8.

Intermittent Effluents

There are over 110 identified storm and emergency sewer overflows within the Croal catchment. Their locations are shown on Map 8.

Surface run-off from the significant urban areas within the catchment is clearly a major intermittent effluent.

2.6.3 Environmental Objectives

- To control continuous and intermittent discharges in such a way as to permit achievement of the water quality objectives for the catchment.

2.6.4 Environmental Requirements

Water Quality:

- No deterioration in water quality upstream of discharges that would increase their impact.

Water Quantity:

- No significant diminution in flows upstream of discharges that would increase their impact.

LANDFILL SITES

KEY

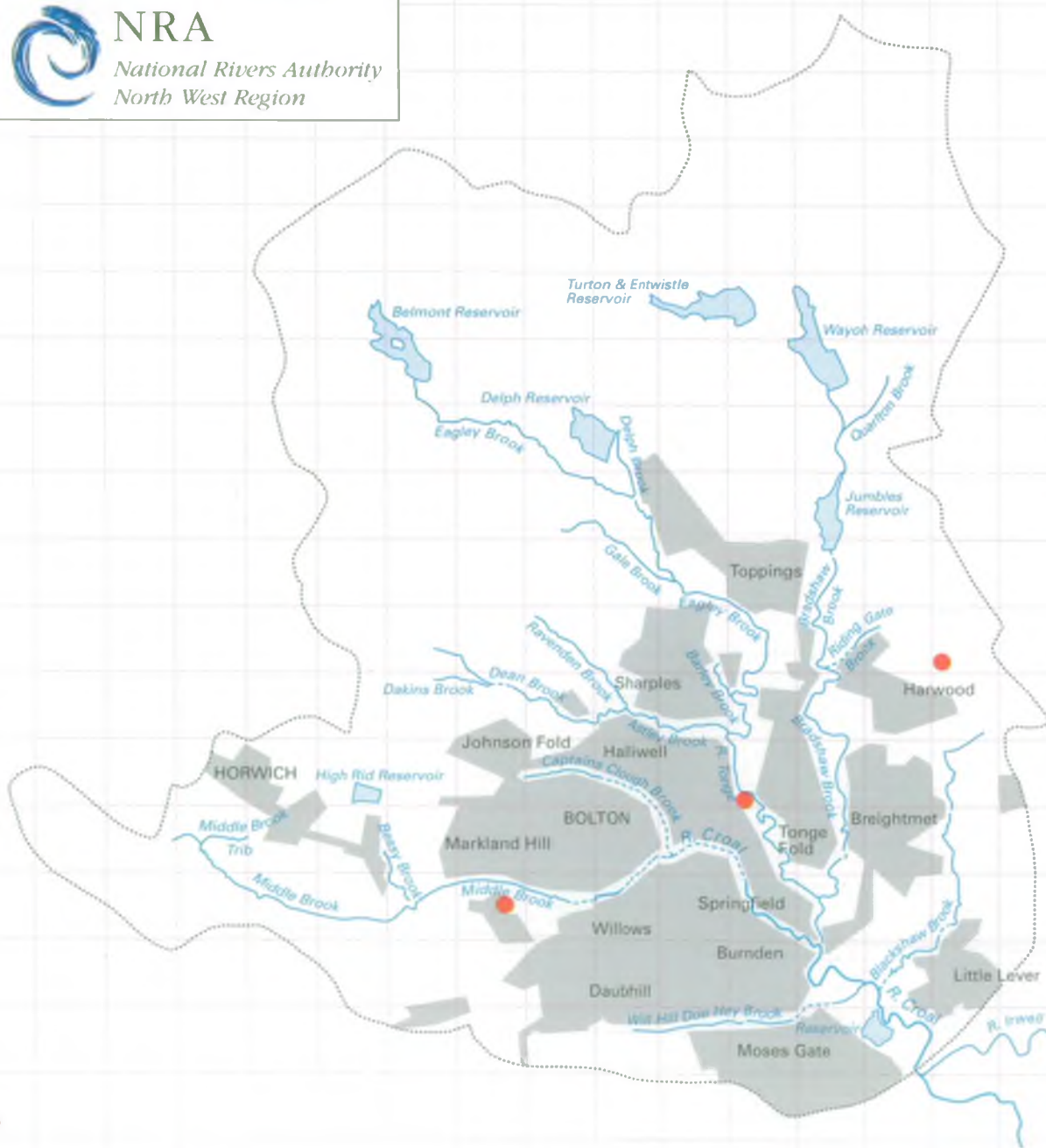
- Catchment boundary
- Built up area
- Watercourse
- - - Culverted section
- Operational licensed landfill sites

Irwell Catchment Management Plan
Croal Sub-Catchment
 June 1994 Map 9



NRA

National Rivers Authority
North West Region



2.7 LANDFILL SITES (MAP 9)

2.7.1 General

The NRA is a statutory consultee on Waste Disposal matters. It is also a statutory consultee of Planning Authorities under the Town and Country Planning Acts. A valid planning permission is the means by which aftercare provisions, including surface water drainage and flood protection measures where appropriate, on closed landfill sites can be regulated. The Waste Disposal Licence relates to the operational phase of any site.

It is recognised that a wide range of waste disposal operations require a Waste Disposal Licence. These include scrap yards, transfer stations, incinerators, waste storage, etc. Often the greatest threat to groundwater quality is posed by landfill activities.

2.7.2 Local Perspective

Each site is considered on an individual basis, the location of a site must not pose an unacceptable risk to water resources.

A waste disposal licence for a site must specify engineering measures to be taken so as to minimise the potential for any leachate generated to escape. In addition, a monitoring regime designed to confirm the integrity of the containment structure must be specified.

2.7.3 Objectives

- To ensure landfill activity does not compromise water quality or water resources and proceeds in accordance with advice given in the Groundwater Protection Policy.
- To safeguard existing standards of flood protection to land and property downstream of surface water discharge points from landfill sites.

2.7.4 Environmental Requirements

Water Quality:

- Compliance with EC Directives on dangerous substances discharged to groundwaters.
- Implementation of the NRA Groundwater Protection Policy.
- Prevention of pollution of controlled waters.
- Appropriate monitoring of effects on surface and groundwaters.
- No deterioration of groundwater or surface water quality.

Water Quantity:

- No detriment to the availability of water resources.
- Minimise loss of unsaturated zone cover to aquifers.

Physical Features:

- Minimise the occurrence of slipping.
- Maintenance of the integrity of the river channel adjacent to landfill sites.
- Restoration of all sites to an acceptable environmental standard taking into account the opportunities for conservation, recreation and amenity.
- Any necessary flood defence works should be carried out in an environmentally sensitive manner.
- Safeguard features of the water environment which are of ecological or landscape value.

2.8 MINERAL EXTRACTION

2.8.1 General

Mineral extraction can affect both groundwater quality and quantity. It can restrict recharge to an aquifer and divert flow. In addition, purification which occurs as water percolates through the unsaturated zone cannot occur if that zone has been removed by excavation. Subsequent use of mineral extraction sites for landfill also proposes a significant threat to groundwater quality.

2.8.2 Local Perspective

Mineral workings are difficult to quantify within the River Croal Catchment. Underground workings for coal are both numerous and extensive. Other minerals may also have been worked underground locally, albeit on a small scale. Many such workings are not recorded.

Surface mineral workings are likely to be widespread, and also largely unrecorded. The most common types of clay are marl pits, sand and gravel pits, hard rock (sandstone) quarries at outcrop areas and occasional shale pits. Many, if not most, of such old workings may have long since been filled in often with waste from a variety of sources.

2.8.3 Objectives and Standards

Wherever possible water resources must be preserved and protected. Mineral workings must be operated under the guidance given within the NRA's "Policy and Practice for the Protection of Groundwater".

2.8.4 Environmental Requirements

Water Quality:

- No deterioration of groundwater or surface water quality.

Water Quantity:

- Minimise loss of unsaturated zone cover to aquifers.
- No detriment to the availability of water resources.

Physical Features:

- Minimise the occurrence of slipping.
- Maintenance of the integrity of the river channel adjacent to extraction sites.
- Restoration of all sites to an acceptable environmental standard taking into account the opportunities for conservation, recreation and amenity.
- Safeguard features of the water environment which are of ecological or landscape value.

2.9 GROUNDWATER PROTECTION

2.9.1 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.

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.

2.9.2 Local Perspective

There are only a limited number of groundwater sources used for public water supply within the Croal 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 more remote from the mains water distribution system, and associated with minor aquifers, for example, the Carboniferous Sandstones.

CATCHMENT USES AND ACTIVITIES GROUNDWATER PROTECTION

When available 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 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 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".

FISHERIES 3: SHORTFALLS IN HABITAT POTENTIAL

KEY

- Catchment boundary
- Built up area
- Watercourse (not surveyed)
- - - Culverted section
- At or above habitat potential
- Below habitat potential

Irwell Catchment Management Plan Croal Sub-Catchment

June 1994

Map 12



NRA

National Rivers Authority
North West Region

N

0 3 km



FISHERIES 2: ACTUAL FISH SPECIES PRESENT

KEY

- Catchment boundary
- Built up area
- Watercourse (not surveyed)
- - - - - Culverted section
- Species of the trout zone
- Species of the minnow zone
- Only marginal species present
(eg. sticklebacks, bullhead,
minnow, stone loach)
- No fish present

Irwell Catchment Management Plan

Croal Sub-Catchment

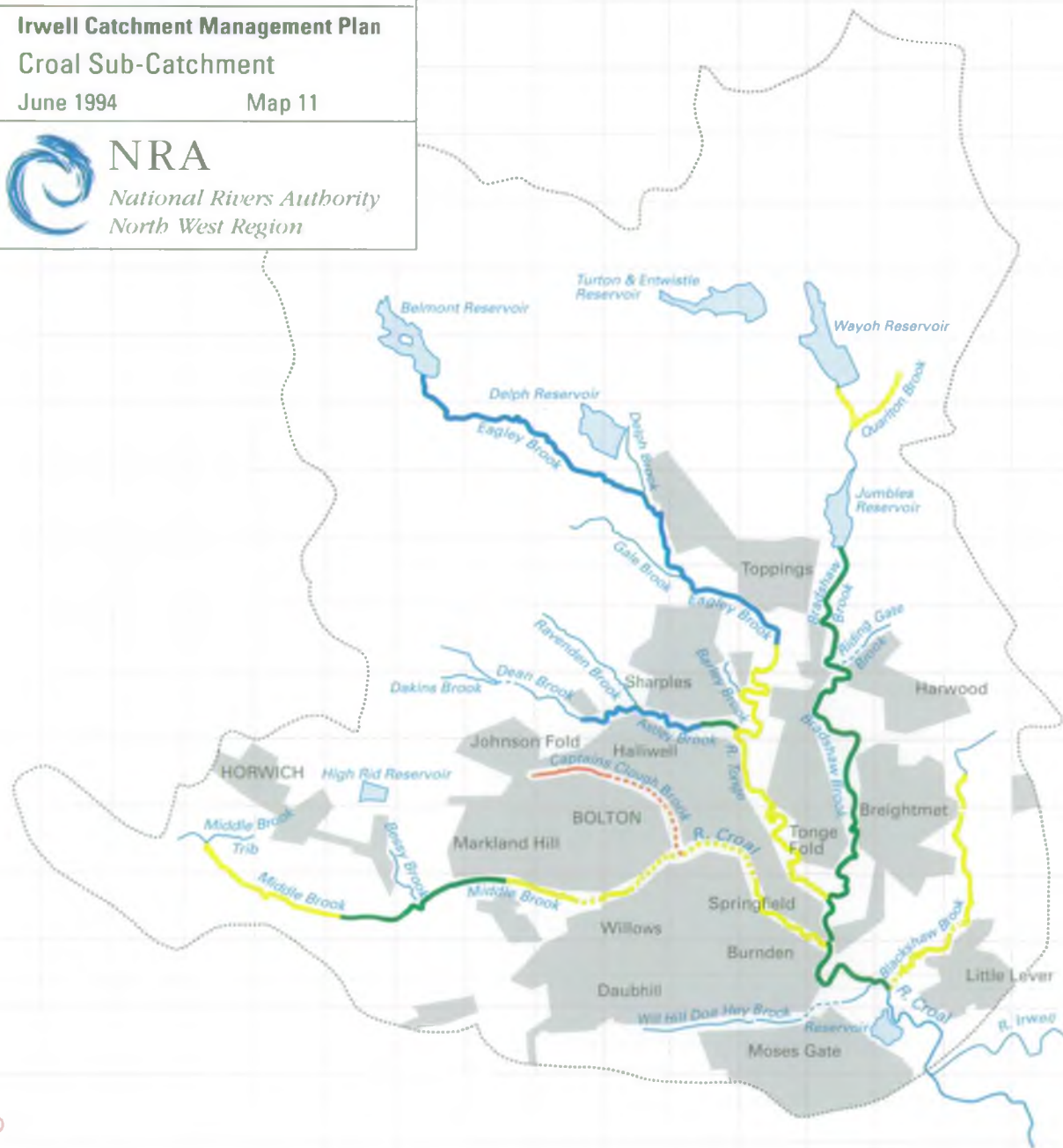
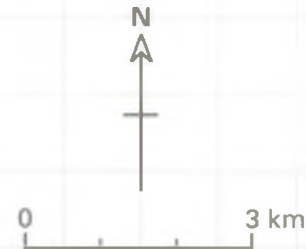
June 1994

Map 11

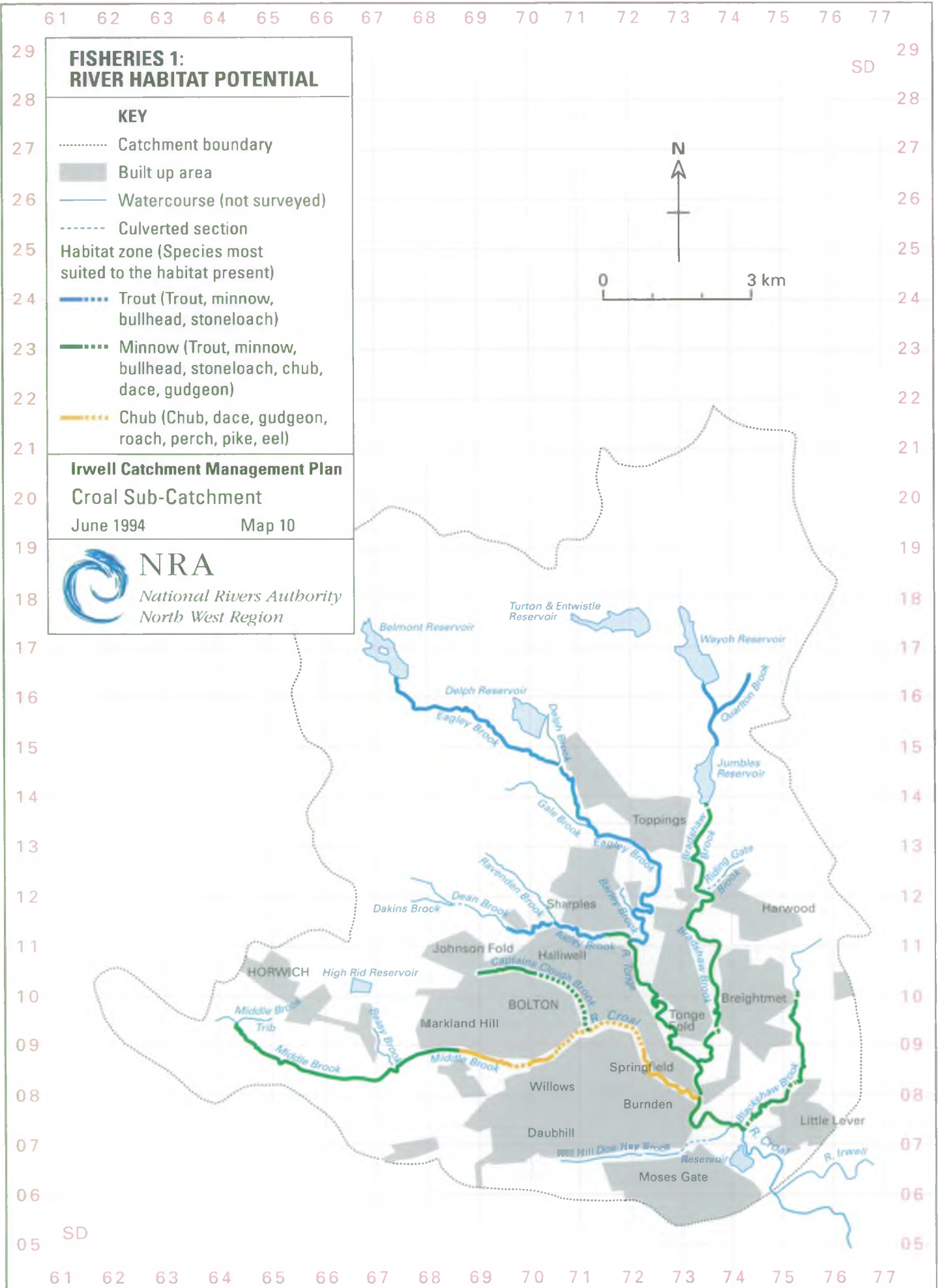


NRA

National Rivers Authority
North West Region



*National Rivers Authority
North West Region*



2.10 FISHERIES (MAPS 10,11 & 12)

2.10.1 General

The use covers Game Fisheries, that is, the maintenance of breeding populations of salmonid fish species, namely brown trout in this catchment, and Coarse Fisheries, that is, the maintenance of breeding populations of coarse fish species.

The NRA has duties to maintain, improve and develop fisheries and to further the conservation of fish species. Fish populations are affected by the quality and quantity of water as well as by the availability of suitable physical habitat features. Fish are, therefore, important indicators of the overall health of the river.

2.10.2 Local Perspective

The NRA undertake fish population surveys on all rivers within a three year rolling programme. The results of these surveys can be summarised by the use of three coloured maps. The first map (Map 10) indicates the habitat potential or 'expected species' according to Huet's classification of rivers (1952)*. This is compared to a second colour map (Map 11) indicating the actual species present, (from the results of the survey), which enables the third map (Map 12), showing the shortfalls in habitat potential, as far as species composition is concerned, to be drawn. The data collected on the fish populations can be used to help classify and establish objectives for the river.

The River Croal catchment should, by its physical nature, be a salmonid fishery in its upper reaches and a mixed fishery in its lower reaches. However, due to organic pollution in the lower reaches of Eagley Brook, in stretches of Middle Brook and in Blackshaw Brook, pollution intolerant species were absent, according to a survey carried out in 1992-93. Resewerage work that has been completed should change this situation in the near future.

* Huet, M. (1952), *Biologie, Profils en Long et en Travers Des Eaux Courantes* Bulletin Francais De Pisciculture 175,41-53.

2.10.3 Environmental Objectives

The overall objective is to sustain a natural fish population appropriate to the catchment.

2.10.4 Environmental Requirements

Water Quality:

- River stretches suitable for brown trout are to be maintained within the limits for pollutants as specified in the EC Fisheries Directive (78/659/EC) for salmonid fish, or by future SWQO's, whichever is appropriate.

- The remaining river stretches downstream to the demarcation points to be maintained within the limits for pollutants as specified in the same EC Directive but for coarse fish species, or by future SWQO's, which ever is appropriate.

Water Quantity:

- A variable flow regime where the monthly average reflects the natural flow conditions in the river. The natural mean monthly flow not to decline below the historic monthly Q90 except during drought conditions.

Physical Features:

- A diversity of natural river features to ensure a variety of habitat to maximise the production of fish populations including riffle/pool sequences and weed beds for feeding, spawning etc.
- The presence of bankside vegetation to provide adequate shade and cover.
- To ensure that river maintenance operations have a minimal deleterious impact on fish populations and enhance river habitat diversity where practical.

DESIGNATED SITES OF CONSERVATION IMPORTANCE

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - - - Culverted section
- Site of Biological Importance (SBI)
- Site of Special Scientific Interest (SSSI)
- ▨ Proposed SSSI
- Site of Local Wildlife Importance designated by Bolton Wildlife Project and highlighted in Phase 1 habitat survey
- Ancient Woodland

Irwell Catchment Management Plan
Croal Sub-Catchment
 June 1994 Map 13



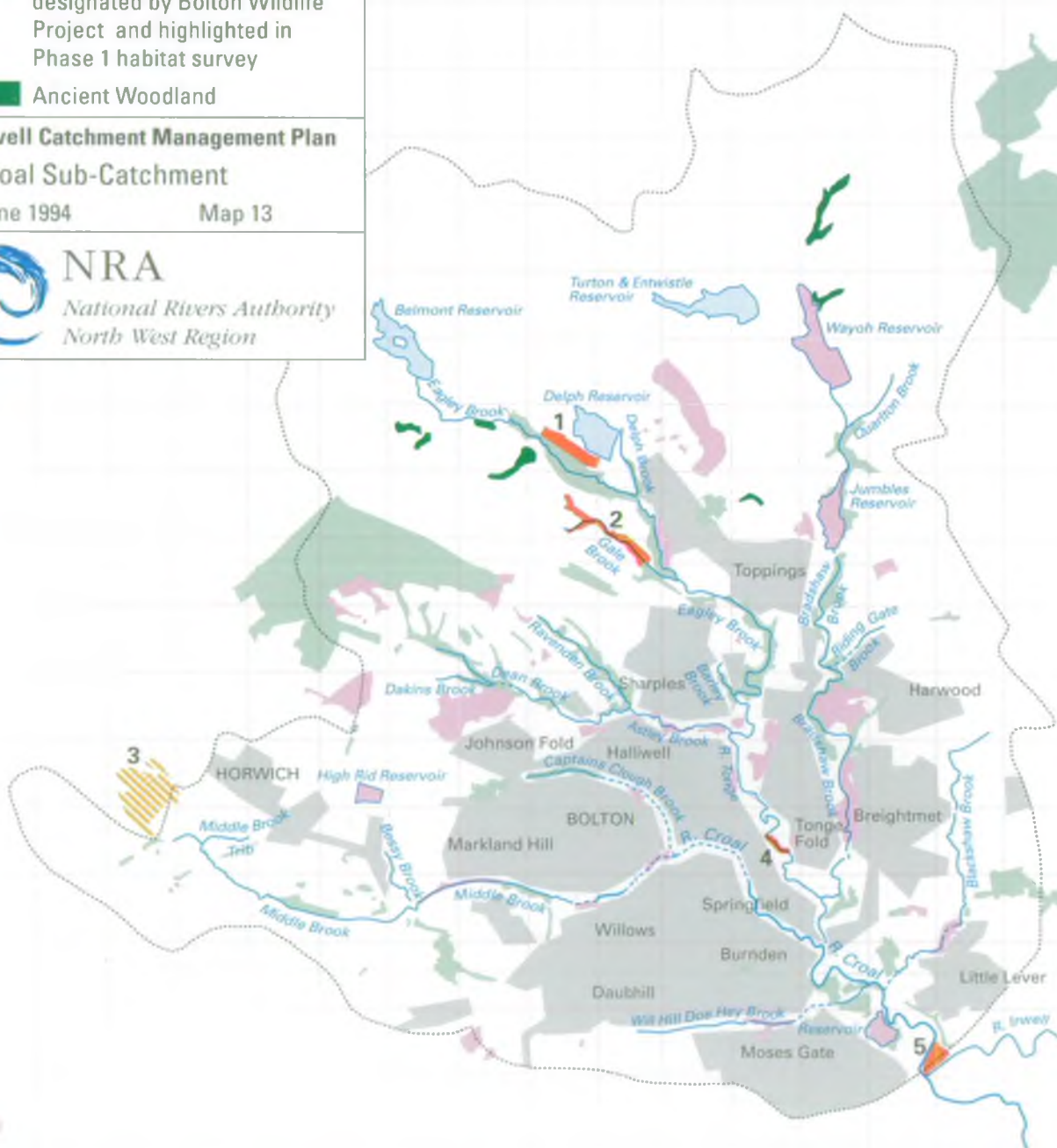
NRA
 National Rivers Authority
 North West Region

SSSI's

1. Oak Field
2. Gale Clough and Shooterslee Wood
3. Red Moss (proposed)
4. Tonge River Section
5. Nob End

N

0 3 km



2.11 CONSERVATION (MAP 13)

2.11.1 General

This use relates to the conservation and enhancement of wildlife, natural beauty and geomorphological features in the river corridors. Conservation covers both designated sites and the wider countryside associated with rivers and the water environment.

2.11.2 Local Perspective

The Croal Sub-Catchment has contrasts in its character, which affects the ecology and conservation interest of its river corridors. The northern and north western sections of the catchment are largely upland and open. Here the tributaries of the River Croal frequently flow through steep wooded cloughs and wooded valleys with a diverse range of habitats. The southern part of the catchment is more low-lying and is densely populated as part of the Metropolitan Borough of Bolton. Watercourses and their corridors in this area have often been constrained by urban developments which have affected their character and in some areas led to their channelisation. The Croal, the major watercourse, is largely open and is protected by policies such as the River Valley Policy and Green Belt policy which seeks to retain the River Valley as open land for wildlife, recreation and amenity purposes.

The conservation value of the river corridors in this sub-catchment is highlighted by the numbers of designated sites of conservation interest associated with them.

A number of watercourses in particular are of high ecological value. These include Bradshaw Brook, Eagley Brook and its tributaries, Astley Brook, Dean Brook and its tributaries, Ravenden Brook and Gale Brook. Gale Brook forms part of an SSSI for much of its length; a section of the River Tonge bank in Bolton is a geological SSSI; the headwaters of Middle Brook rise within a peatland proposed SSSI, and wetland habitats associated with the upper section of Eagley Brook are designated as an SSSI.

These require sensitive management to retain and conserve their existing high conservation value.

The remaining rivers and their corridors have some features of conservation value associated with them, but would benefit from enhancement to improve their value as wildlife corridors, for example, River Tonge, River Croal.

In addition a Habitat Survey of Bolton was carried out in 1989, and this highlighted a further 30 sites of Local Wildlife importance, many of which are associated with the aquatic environment.

The number and extent of culverted sections has fragmented the riverine environment and led to a loss of open water and river valley habitats. This is partly under the sites of the many old waterpowered mills which occur throughout the catchment. There are particularly long stretches of culverts along the Croal through Bolton Town Centre, most of Captains Clough Brook and parts of Will Hill Doe Hey Brook, Blackshaw Brook and Riding Gate Brook.

Redevelopment of a site containing a culvert presents a good opportunity to open up the watercourse to create an attractive water feature. This would remove a barrier to fish and wildlife and restore continuity in the riverine environment.

Opening up culverts as part of river restoration schemes may be possible in certain circumstances. The most suitable sites are those which run through uncontaminated green space with scope for the reintroduction of meanders. Other sites may be too deep and involve removal of too much spoil.

A small number of the watercourses have been visited and/or partially surveyed by the NRA, but it is hoped to produce a more detailed overview of the sub-catchment's conservation value using aerial photographs, more detailed site visits and surveys using a Conservation Classification Scheme developed nationally for the NRA.

2.11.3 Aquatic Invertebrates

In general the Croal system accommodates a higher invertebrate diversity than the other Irwell sub-catchments with a variety of organisms present at most sites including some pollution sensitive species. There is, however, some reduction in diversity in, and downstream of, Bolton city centre, reflecting changes in water quality.

2.11.4 Environmental Objectives

The overall objective is to retain or recreate natural rivers within open, continuous river corridors, which are as wide as possible with a diverse range of habitats and physical features for people and wildlife.

This is to be achieved by:-

- retention of existing features of conservation interest
- actively promoting the enhancement of the river corridor, wherever possible/ desirable
- seeking effective mitigation for any loss of conservation features
- safeguarding the special conservation interest for which sites have been designated.

2.11.5 Environmental Requirements

Water Quality:

- Water quality not to deteriorate to a level such that sites of high conservation value lose their general aquatic interest. For example, Gale Brook, Bradshaw Brook and Ravenden Brook.
- Water Quality improvements at some sites would enhance on existing conservation value, for example, Eagley Brook and Astley Brook.

Water Quantity:

- A variable flow regime where the monthly average flow reflects the established or natural flow conditions in the river. The mean monthly flow not to decline below the established monthly Q90 except under drought conditions.
- Maintain the hydrological link between the river and its flood plain where appropriate. The water table to be maintained at a high level where possible but particularly where wetlands occur. Spate flows should be allowed to inundate certain wetlands.
- Spate flows to naturally cleanse the river channel.

Physical Features:

- The maintenance and enhancement of the diversity of natural river features such as meanders, earth cliffs, areas of erosion/deposition, pool/riffle sequences and the presence of aquatic vegetation and marginal (water's edge) vegetation.
- The maintenance and enhancement of a diversity of river corridor habitats including marsh, ponds, fringe/overhanging vegetation, bankside trees and hedges, species-rich bank vegetation, grassland and woodland. In addition, the conservation of the features which give rise or contribute towards the specific features of the designated conservation areas.
- The channel cross section to be appropriate for the river flow regime.

LANDSCAPE AND HERITAGE

KEY

- Catchment boundary
 - Built up area
 - Watercourse
 - - - - - Culverted section
 - Special Landscape Area
 - Conservation Area (Built environment)
 - Woodland Tree Preservation Order
 - Scheduled Ancient Monument
- Note: Only designated sites near to watercourses drawn on map are shown

Irwell Catchment Management Plan Croal Sub-Catchment

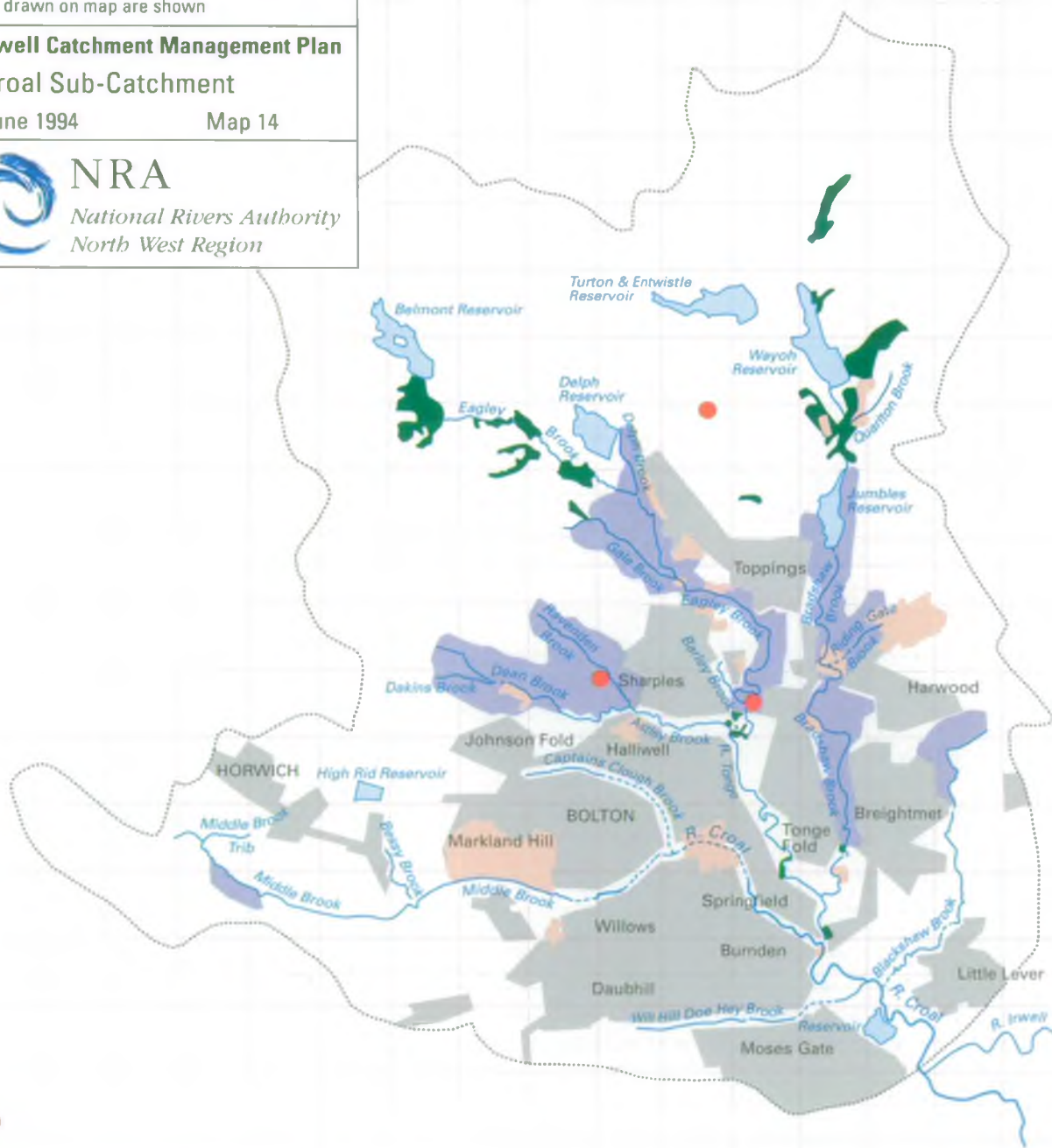
June 1994

Map 14



NRA

National Rivers Authority
North West Region



2.12 LANDSCAPE AND HERITAGE (MAP 14)

2.12.1 General

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 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 designated sites, for example, Areas of Outstanding Natural Beauty, Schedule Ancient Monuments as well as locally valuable sites.

2.12.2 Local Perspective

The Croal Sub-Catchment contains a number of distinct river valleys with visually diverse landscapes from upland moors of the Pennine foothills to the north, to low lying farmland intersected by sandstone ridges. The river valleys are generally of one character with high amenity value.

The river character will be influenced by past and present land-use and the extent of channelisation works. Within developed areas the river will generally be physically restrained in terms of bank reinforcement, channel straightening and deepening.

Of the 63km of "main river", 32.5km runs through developed areas. Several sections of river run through very narrow corridors of open space, for example, Astley Brook. The most channelised and culverted section of "main river" is the Croal as it runs through Bolton.

The Croal river valley has been separately identified for conservation and enhancement under the Croal-Irwell Valley Plan. The upper reaches of the Croal and its tributaries are protected by 25 Areas of Special Landscape Value and/or Green Belt, with proposals to extend the Green Belt. Bradshaw Brook maintains a high amenity value into the built up area.

Local Planning Authorities have identified the need to promote tree and hedgerow planting to conserve and improve woodlands, and to re-establish a countryside character where appropriate. The river valleys are described as open character with a high amenity value.

Wooded Cloughs are a feature of the Croal tributaries - especially Eagley Brook, Dean Brook and Bradshaw Brook. In the catchment area from Bolton northwards, 14km of "main river" are lined by woodland on one or both banks. South of Bolton, only 2km are woodland lined.

The archaeological interest of the Greater Manchester area is complex with many potential sites still undiscovered.

The Croal Sub-Catchment contains three Scheduled Ancient Monument sites, two of which are adjacent to "main river". A characteristic of the sub-catchment is the very high number of built conservation areas.

The NRA hope to support riverside regeneration initiatives including renovation of significant or historical buildings especially if they include the provision of riverside walkways and use of local or natural materials.

2.12.3 Environmental Objectives

The overall objective is to conserve and enhance the natural beauty of rivers and to conserve their heritage value.

This is to be achieved by:

- retention of existing landscape character and features
- seeking effective mitigation for any loss of landscape quality
- liaison with Local Planning Authorities and the Countryside Commission to discuss assessment and enhancement of river landscape quality
- liaison with Local Planning Authorities to ensure that high quality river landscapes are adequately protected across planning authority boundaries
- supporting initiatives to conserve heritage features
- liaison with the County Archaeological Unit for NRA capital and heavy maintenance schemes

2.12.4 Environmental Requirements

Water Quality:

- To be aesthetically acceptable, that is, water to be free from surface films, extraneous floating material, discolouration and unpleasant odours.
- Not to deteriorate to a level such that sensitive heritage sites lose their interest.

Water Quantity:

- A flow regime which reflects the natural or established flow conditions in the river.
- The water table to be maintained so as not to damage sensitive heritage sites.

Physical Features:

- To be in keeping with the local landscape character. In general to conserve and promote a diversity of natural features within the river valley and along the river corridor.
- Historic features and landscape types to be conserved, with restoration and interpretation as appropriate.

RECREATION AND AMENITY

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - Culverted section
- P Car park
- V Visitor centre
- C Caravan site
- G Golf course
- A Arboretum
- Established park and recreational area
- - - Major footpath
- Still water used for boating
- Still water used for fishing
- Still water conserved for wildlife

Irwell Catchment Management Plan

Croal Sub-Catchment

June 1994

Map 15



NRA

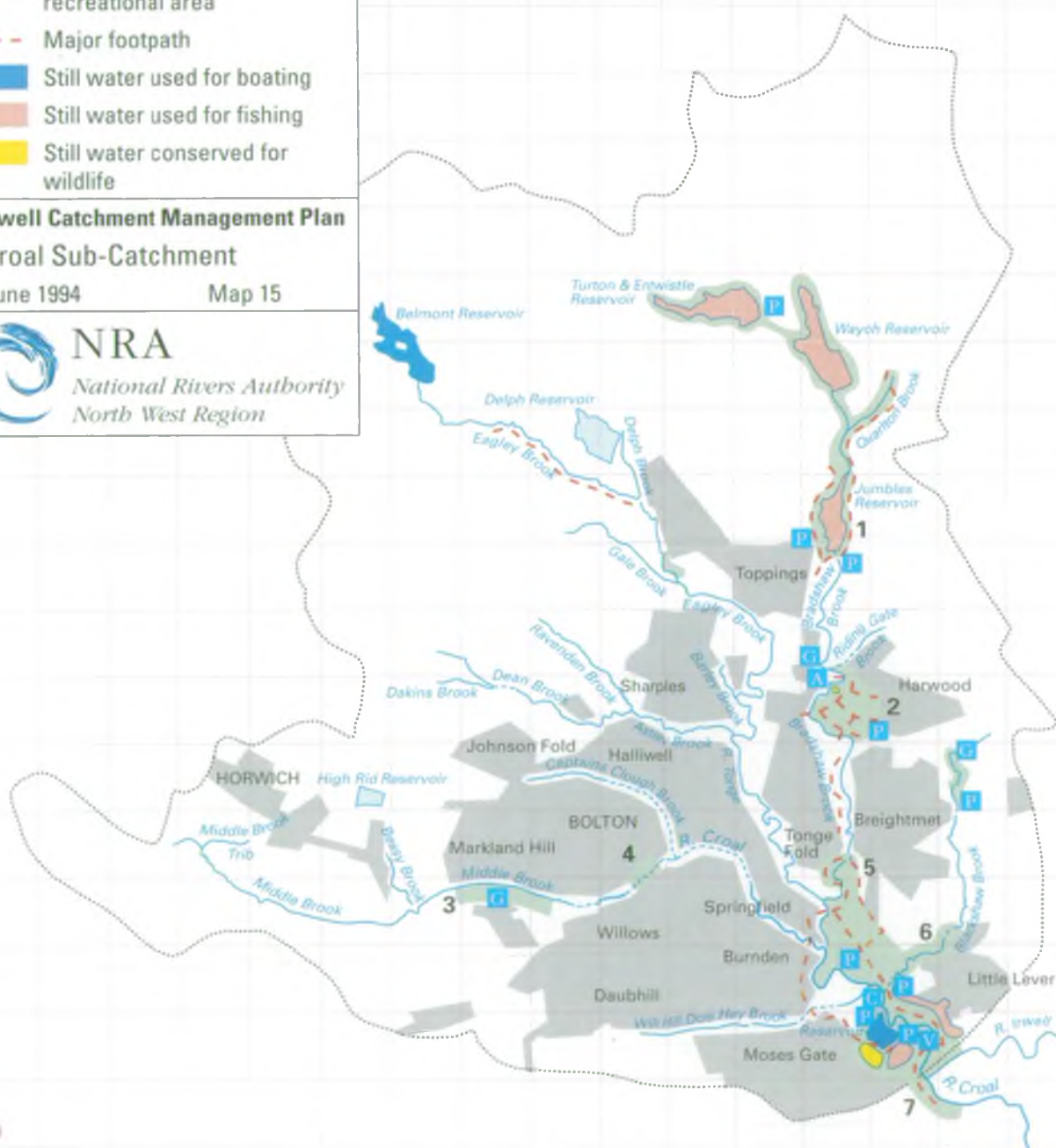
National Rivers Authority
North West Region

Established Recreational Areas

1. Jumbles Country Park
2. Longsight Park
3. Haslam Park
4. Queens Park
5. Livershulme Park
6. Moses Gate Park
7. Kearsley Park

N

0 3 km



2.13 RECREATION AND AMENITY (MAP 15)

2.13.1 General

This use deals with those sports such as canoeing, where intimate contact with the water occurs and also general waterside recreation such as walking, bird watching.

2.13.2 Local Perspective

There are several well established areas of public open space, still waters and parkland sites which offer a wide range of formal and informal recreational amenities. These include an excellent right of way network - way marked footpaths and bridleways which meet the need of different users, horse riding, cycling, bird watching, angling, boating, canoeing and other water activities.

Many of the recreational sites are managed by a warden service which is involved in actively promoting amenity and recreational pursuits.

2.13.3 Environmental Objectives

To obtain suitable water quality levels, water resources and physical river conditions, so as to provide a suitable environment for the types of recreational and amenity pursuits required by the local population and visitors to the catchment.

2.13.4 Environmental Requirements

Water Quality:

- Minimum requirement being the protection of the amenity value of the watercourse.
- Water to be free from surface films and extraneous floating material and unpleasant odour.

Water Quantity:

- Basic flow regime including the operation of transfer and augmentation schemes, to minimise detriment to recreation and amenity.

Physical Features:

- Maintenance of existing footpaths.
- Maintenance of existing access points.
- Enhancement of available facilities.
- Promotion of increase in available facilities

ANGLING

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - Culverted section
- Formal fishing
- Informal fishing

Irwell Catchment Management Plan
Croal Sub-Catchment
 June 1994 Map 16

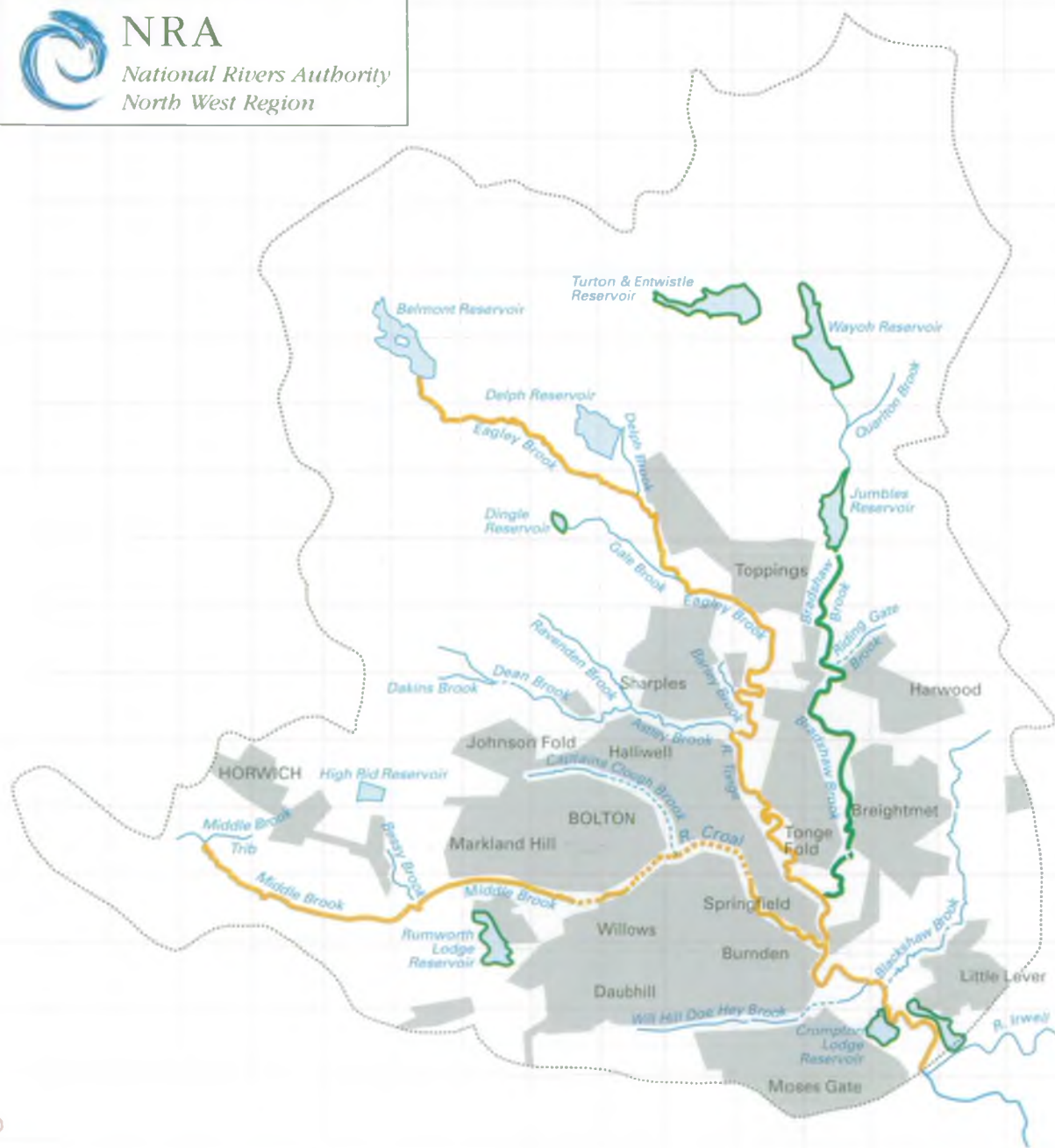


NRA

National Rivers Authority
North West Region



0 3 km



2.14 ANGLING (MAP 16)

2.14.1 General

The use of the river specifically relates to the use of the catchment by pleasure anglers.

2.14.2 Local Perspective

Currently angling is carried out throughout the catchment where there is good sport available for fly fishing in particular. Three of the reservoirs are also fished which provide the angler with mixed coarse and game fishing. The Bolton-Bury canal cut-off is also a popular coarse fishery.

2.14.3 Objectives

- To provide suitable and safe conditions for successful angling within the catchments.

2.14.4 Environmental Requirements

Water Quality:

- To be of sufficient quality to comply with the basic amenity use of the water body.
- To be aesthetically acceptable in order to enhance angling, that is, water to be free from surface films and extraneous floating material, discolouration and unpleasant odours.
- To comply with appropriate water quality objectives for fisheries.

Water Quantity:

- A variable flow regime where the monthly average reflects natural flow conditions in the river. The natural mean monthly flow not to decline below the historic monthly Q90 except in drought conditions.

Physical Features:

- The maintenance of sufficient access points for angling.
- The maintenance of a mixture of open water as well as instream and bankside vegetation.

FLOOD DEFENCE: OBJECTIVES

KEY

- Catchment boundary
- Built up area
- Main river
- - - Ordinary watercourse
- - - Culverted section
- ▶ Construct access ramps for river maintenance
- Maintenance
- Improvement Works

Irwell Catchment Management Plan Croal Sub-Catchment

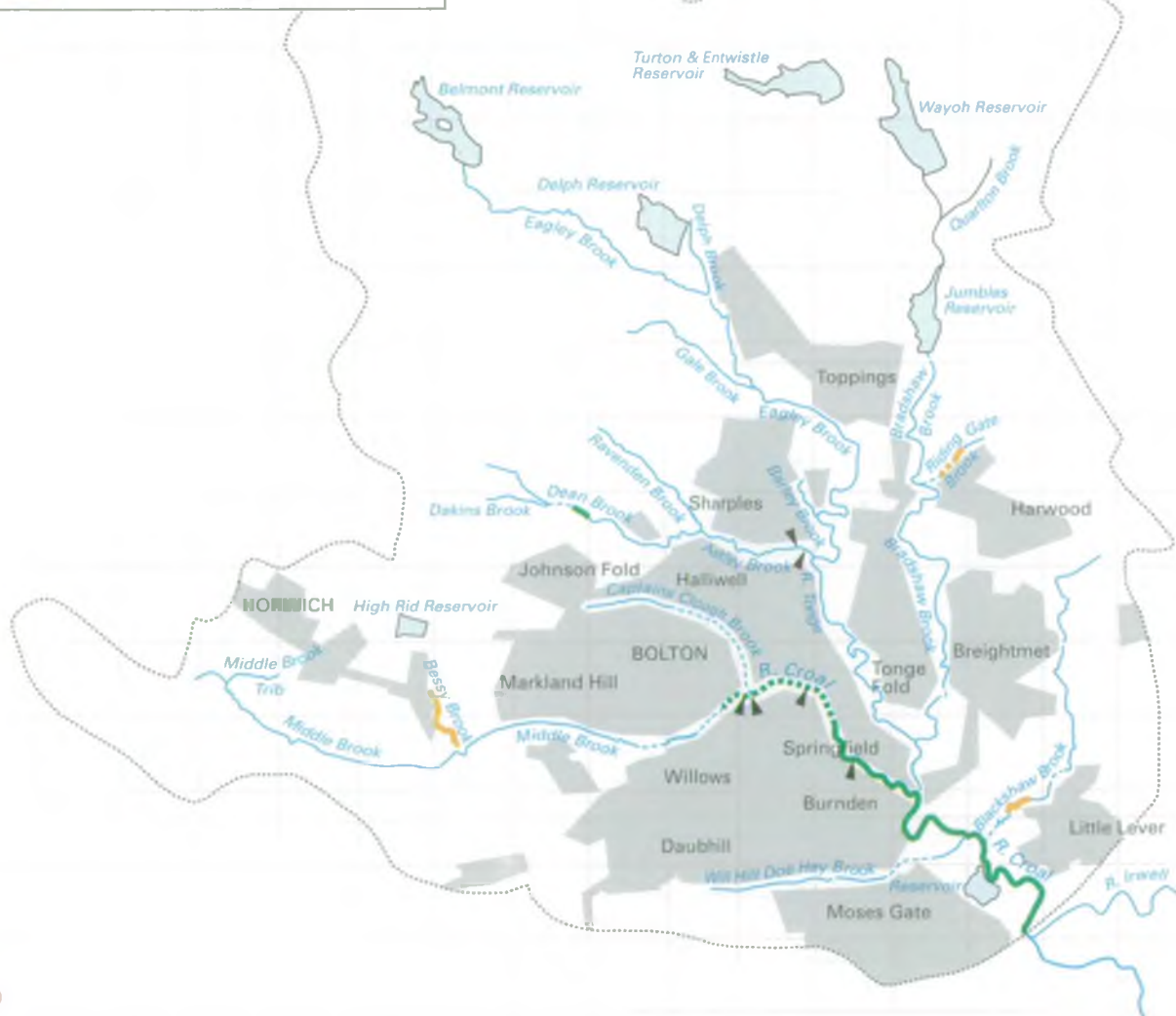
June 1994

Map 18



NRA

National Rivers Authority
North West Region



FLOOD DEFENCE: RIVER CORRIDOR LAND USE PLAN

KEY

- Catchment boundary
- Built up area
- Main river
- Ordinary watercourse
- - - Culverted section
- Urban
- Semi - urban
- Rural

Irwell Catchment Management Plan Croal Sub-Catchment

June 1994

Map 17



NRA

National Rivers Authority
North West Region

N

0 3 km



3. CATCHMENT OBJECTIVES

3.1 FLOOD DEFENCE OBJECTIVES (MAPS 17 & 18)

3.1.1 General

The need for Flood Defence works is assessed using a number of criteria, which results in a benefit/cost figure. If the scheme cost is greater than the benefits accrued (which include flood damage, transport disruption, emotional stress, etc.) then it is likely that no scheme can proceed.

Target Standards for flood protection when carrying out maintenance or improvement works, can generally be defined in the following manner (Map 17):-

RIVER CORRIDOR LAND USE CLASSIFICATION

Classification	Definition	Target Standard of Protection (Years)
Urban	Medium to High density urban development containing both residential and non-residential property.	25 - 100
Semi-urban	Low density urban developments or rural communities, mixed with agricultural land.	10 - 25
Rural	Predominantly agricultural land, ranging from grass land to arable farming.	1 - 10

The Flood Defence objectives identified on the map are areas where it is considered likely that future works may be carried out (Map 18).

3.1.2 Objectives

In addition to the requirements identified on the map the following general requirements are also considered objectives for the catchment:

- Ensure provision of suitable access for maintenance of the river channel and flood defences.
- Maintenance regime which encourages ecological diversity, whilst maintaining flood defence levels of service.
- Co-operation with others responsible to ensure river corridors are free from rubbish and other imported debris.
- Operation of flood defence structures to ensure protection of all identified uses.

3.2 WATER QUANTITY OBJECTIVES

3.2.1 General

This section considers the requirements for both meeting existing and future abstraction water demand in the catchment and for minimum residual flows (MRF's) and minimum control levels (MCL's) to protect in-river needs.

3.2.2 Objectives

Water Abstraction

The NRA has yet to establish formal policy with regard to supply objectives but the following targets will be considered, and in many cases are already being actively pursued:-

- a) To meet all reasonable demands to the Authority's stated levels of service within quality criteria described in the Authority's Water Quality Objectives.

The use-related levels of service are as follows:-

Public Water Supply:

- risk of hosepipe ban restrictions not greater than 1 year in 10
- need for voluntary savings of water not greater than 1 year in 20
- risk of standpipes not greater than 1 year in 100.

Spray Irrigation:

- risk of restriction not greater than 1 year in 12.

- b) To set MRF's and MCL's to protect the in-river needs.
- c) To ensure the best utilisation of water resources and the efficient use of water within the catchment.

Surface Waters:

In sub-catchments where there is significant water abstraction, minimum flow and level controls are necessary to ensure the resource is not over-committed in dry or drought years at the expense of other water users. Provisionally a general MRF equivalent to the 90 percentile flow (that flow which is exceeded 90% of the time) may be used as a target flow at points on the river. In retained water level reaches MCL's are also set to ensure minimum depths of water.

In some sub-catchments MRF's at specific locations may be required to provide dilution for effluent discharges.

Local Hydrometric Objectives:

The hydrometric information gathered in the Croal catchment has two principal uses within the NRA. Firstly, to provide warning of potential flooding further downstream in the Irwell flood plain by monitoring levels and rainfall in this upper catchment. Secondly, to provide river level information for water quality management for this urban and industrialised catchment.

Short term, there are local needs to provide river levels and rainfall information for specific projects - usually for setting water quality and licensing conditions.

Groundwaters:

In dry/drought summer conditions, spring flow discharges from groundwater aquifers to sustain surface water flows. Areas which require particular protection from any long term groundwater level decline need to be specified. General protection from long term level decline is required over the whole area to protect existing uses and users of groundwater.

WATER QUALITY: PRESENT CLASSIFICATION OBJECTIVES

KEY

- Catchment boundary
- Built up area
- 1A
- - - 1B
- 2
- Reach boundaries
- - - Unclassified watercourse
- - - Culverted section
- Watercourse

Irwell Catchment Management Plan Croal Sub-Catchment

June 1994 Map 19



NRA

National Rivers Authority
North West Region



0 3 km



3.3 WATER QUALITY OBJECTIVES (MAP 19)

Objectives relating to water quality can be categorised as relating to domestic UK classification schemes or arising from EC Directives.

3.3.1 Water Quality Classification

a) Present Water Quality Classification Objectives - National Water Council (NWC) Classification

The NWC system of water quality classification was established in the 1970's. Inland watercourses are classed as 1A, 1B, 2, 3 or 4 in descending order of quality.

Class 1A and 1B watercourses could support a game fishery other factors being favourable whereas Class 4 waters are so grossly polluted as to be likely to cause nuisance.

Watercourses are assigned to Class on the basis of the chemical parameters, dissolved oxygen, Biochemical Oxygen Demand (BOD) and ammonia with due regard to the results of monitoring of benthic invertebrate fauna.

In 1979 stretches of watercourse throughout England and Wales were defined and targets, Long Term Objectives (LTOs) or River Quality Objectives (RQOs), in terms of the NWC Classification system assigned to them.

The minimum target assigned was achievement of Class 2 quality which should support a coarse fishery. The target achievement date was 2010 with an emphasis on eliminating Class 4 watercourses by 2000. Incorporated within this is the policy of no deterioration in the quality of controlled surface waters. Some amendments have been made to the stretch definitions since 1979 and these are included for the purposes of this report.

There are 18 defined classified reaches within the Croal Catchment and they are shown together with their NWC objectives on Map 19.

b) Future Water Quality Classification Objectives - Statutory Water Quality Objectives (SWQOs)

Proposals have been made in recent years for a system of legally binding targets based on the uses to which a watercourse could legitimately be put. These will supersede the NWC Long Term Objective targets. Statutory Water Quality Objectives involve classification systems of water quality required for different types of use and for use in assessing compliance for that use.

EC DIRECTIVE COMPLIANCE

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - Culverted section
- Discharge with consent condition for List I Dangerous Substance
- River monitoring point for List I Dangerous Substance
- Discharge with consent condition for List II Dangerous Substance
- River monitoring point for List II Dangerous Substance
- Abstraction for the purpose of Surface Water Abstraction Directive
- Freshwater Fish Directive – salmonid fishery

Irwell Catchment Management Plan Croal Sub-Catchment

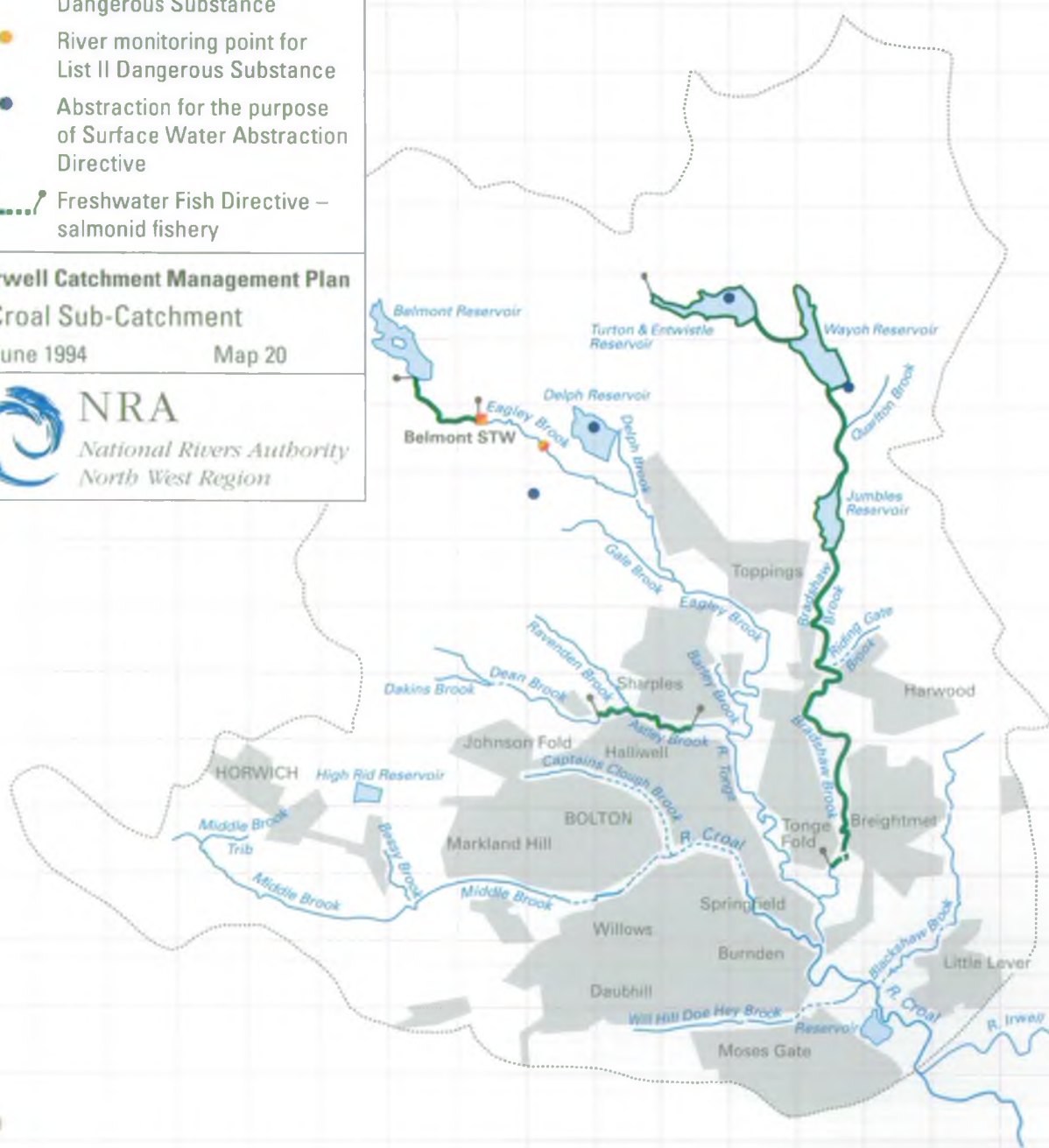
June 1994

Map 20



NRA

National Rivers Authority
North West Region



To date only the River Ecosystem classification system has been fully developed. The regulations defining the system received legal status on the 10th May 1994. Objectives under this classification system will be set for stretches of watercourse in the near future. It is possible to relate the NWC Long Term Objective targets to the River Ecosystem classification system. It is envisaged that River Ecosystem objectives will be applied to stretches in a manner that where the water companies are affected no additional expenditure by them will be required over that which would have been required with the previously pertaining NWC Long Term Objective. Otherwise a direct translation will largely apply.

Classification systems for other uses are likely to follow.

3.3.2 EC Directives (Map 20)

Four Directives issued by the EC have direct implications for water quality in the Croal Catchment.

a) Directive on Dangerous Substances in Water

The Directive provides a framework for measures to control water pollution caused by discharges of certain dangerous substances sub-divided under List I and List II. Member States are required to take steps to eliminate pollution by List I substances and reduce pollution by List II substances.

In the UK Environmental Quality Standards have been established for concentrations of these substances in watercourses. Limits for discharges containing the substances have been set accordingly with regard to the dilution available.

The locations of river monitoring points and of discharges with consent conditions for Dangerous Substances in the Croal Catchment are shown on Map 20.

b) Directive on Urban Wastewater Treatment

The Directive specifies requirements for the collection and treatment of industrial and domestic wastewaters at sewage treatment works and for treatment of wastewater from certain sectors of industry prior to direct discharge to watercourse.

The interpretation in the UK will mean that all significant inland STW will almost certainly already comply with all the requirements relating to treatment.

However the requirement that collecting systems (the sewerage network) shall be designed, constructed and maintained in accordance with best technical knowledge not entailing excessive costs specifically regarding the limitation of pollution of receiving waters due to storm (and emergency) overflows presents very significant objectives to be met. Over 110 overflows have been identified within the Croal catchment with regard to this requirement.

With regard to direct discharges from the specified sectors of industry standards for the appropriate level of treatment are currently being developed. It is, however, unlikely that any of the direct discharges of industrial effluent within the Irwell Catchment will be affected by this requirement.

c) Directive on Water Quality for Freshwater Fish

The Directive sets Environmental Quality Standards for stretches of freshwater designated as suitable for either salmonids (salmon and trout) or cyprinids (coarse fish).

There are three designated stretches within the Croal Catchment. They are all of salmonid designation and are shown on Map 20.

d) Directive on Abstraction of Surface Water for Drinking

Amongst other requirements this Directive specifies standards for the quality of water abstracted for use as drinking water.

Four abstractions have been identified in the Croal Catchment for the purposes of this Directive and these are shown on Map 20.

3.3.3 Groundwater Protection Objectives

In December, 1992 the NRA issued its Groundwater Protection Policy. 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 recover. Therefore, preventing groundwater contamination is a major objective of the NRA. The Authority would like this policy to be viewed by all those whose activities may compromise groundwater quality, as a guide to assist and influence future planning and strategy decisions. The document outlines the concept of vulnerability, that is the designation of areas of land where certain activities can have an appreciable affect on groundwater quality in an aquifer system and where pollution could quickly enter groundwater. It deals, in particular with:-

- waste disposal land
- disposal of slurries and sludge to land

**CATCHMENT OBJECTIVES
WATER QUALITY**

- physical disturbance of aquifers affecting quality and quantity
- contaminated land
- diffuse pollution and unacceptable activities in high risk areas

It is important to note that the definition of "controlled water" provided by the Water Resources Act, 1991 included groundwater. Therefore, statutory Quality Objectives for groundwaters will be developed by the NRA in the future.

3.4 PHYSICAL FEATURES OBJECTIVES

3.4.1 General

This section considers the general requirements for the physical features of the rivers and associated land of the catchment.

From the uses identified in Section 2 Physical Features Objectives have been defined as follows.

3.4.2 Objectives

Development Control

- Retain, recreate and enhance open green corridors along watercourses with a variety of features for people and wildlife. Effective river corridors should be continuous, and as wide as possible, to allow the free movement of wildlife and full enjoyment of their recreational potential.
- There should be no increase in flood risk as a result of development. No development in areas where the existing level of flood protection is considered below the target standard required for the type of development proposed.
- Ensure there are no new obstacles to the potential migration of fish.

Potable Water Supply, Agricultural and Industrial Abstraction

- Provide control structures and ensure efficient resource management. Promote winter storage facilities.
- Promote the use of soakaway/recharge drainage systems for proposed development.

Mineral Extraction and Landfill Sites

- All sites to be restored to an acceptable environmental standard and the creation of aquatic habitats promoted.
- Safeguard features of the water environment which are of conservation or landscape value.
- Safeguard the unique physical character and natural topography of the river valleys and flood plains.
- Maintain the integrity of the river channel adjacent to extraction sites.

Fisheries

- Endeavour to provide and maintain a diversity of natural river features to ensure variety of habitats to maximise the production of future fish populations.
- Maintain bankside vegetation to provide adequate shade and cover.
- Provision of fish passes around weirs and other obstructions to potential fish migration.

Conservation

- Promote the conservation and enhancement of healthy rivers with a diversity of natural geomorphological features, such as meanders, with areas of erosion and deposition, earth cliffs, undercut banks, pools, riffles, shoals, bars and islands.
- Protect and enhance the range of wildlife and semi-natural habitats found within the river corridors including flood plain habitats, old channels, marsh, ponds, marginal and overhanging vegetation, bankside trees and hedges, uncultivated buffer strips, species rich grassland and woodland.
- Promote less intensive farming in river corridors through initiatives such as countryside stewardship.

Landscape and Heritage

- Further, enhance and promote the natural beauty of the water environment.
- Safeguard those manmade features of the riverine environment that are of archaeological, historic, aesthetic or conservation value. For example, weirs, stone walls, mill races and old industrial buildings.

Recreation and Amenity

- Promote the potential of open river corridors for informal recreation.
- Promote the creation and linking up of footpaths along and to watercourses.

Angling

- Endeavour to provide sufficient access and maintain mixture of open water together with instream and drainable habitats.
- Safeguard the variety of still waters in the catchment including the reservoirs, mill lodges and ponds which are also of ecological and historic interest.

FLOOD DEFENCE: EXISTING LEVELS OF PROTECTION

KEY

- Catchment boundary
- Built up area
- Main river
- - - Ordinary watercourse
- - - Culverted section
- 1 - 10 Years
- 10 - 25 Years
- 25 - 100 Years

Irwell Catchment Management Plan

Croal Sub-Catchment

June 1994

Map 23

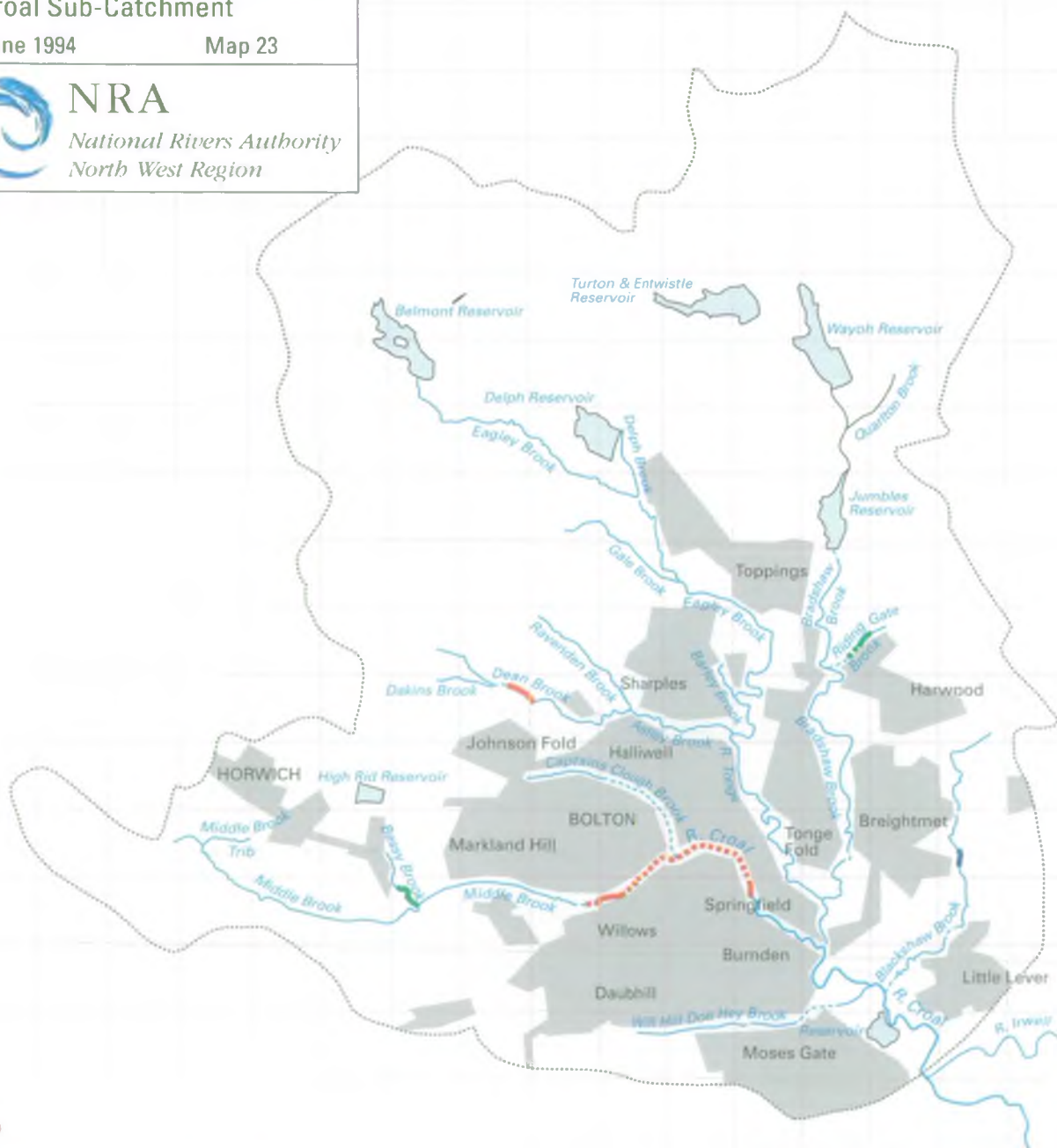


NRA

National Rivers Authority
North West Region

N

0 3 km



FLOOD DEFENCE: STATE OF THE CATCHMENT

KEY

- Catchment boundary
- Built up area
- Main river
- Ordinary watercourse
- - - Culverted section
- Weir/W.L. Control structure
- River Gauging Station
- Riparian owned debris screen, cleaned by NRA on a best endeavours basis

Irwell Catchment Management Plan Croal Sub-Catchment

June 1994

Map 22

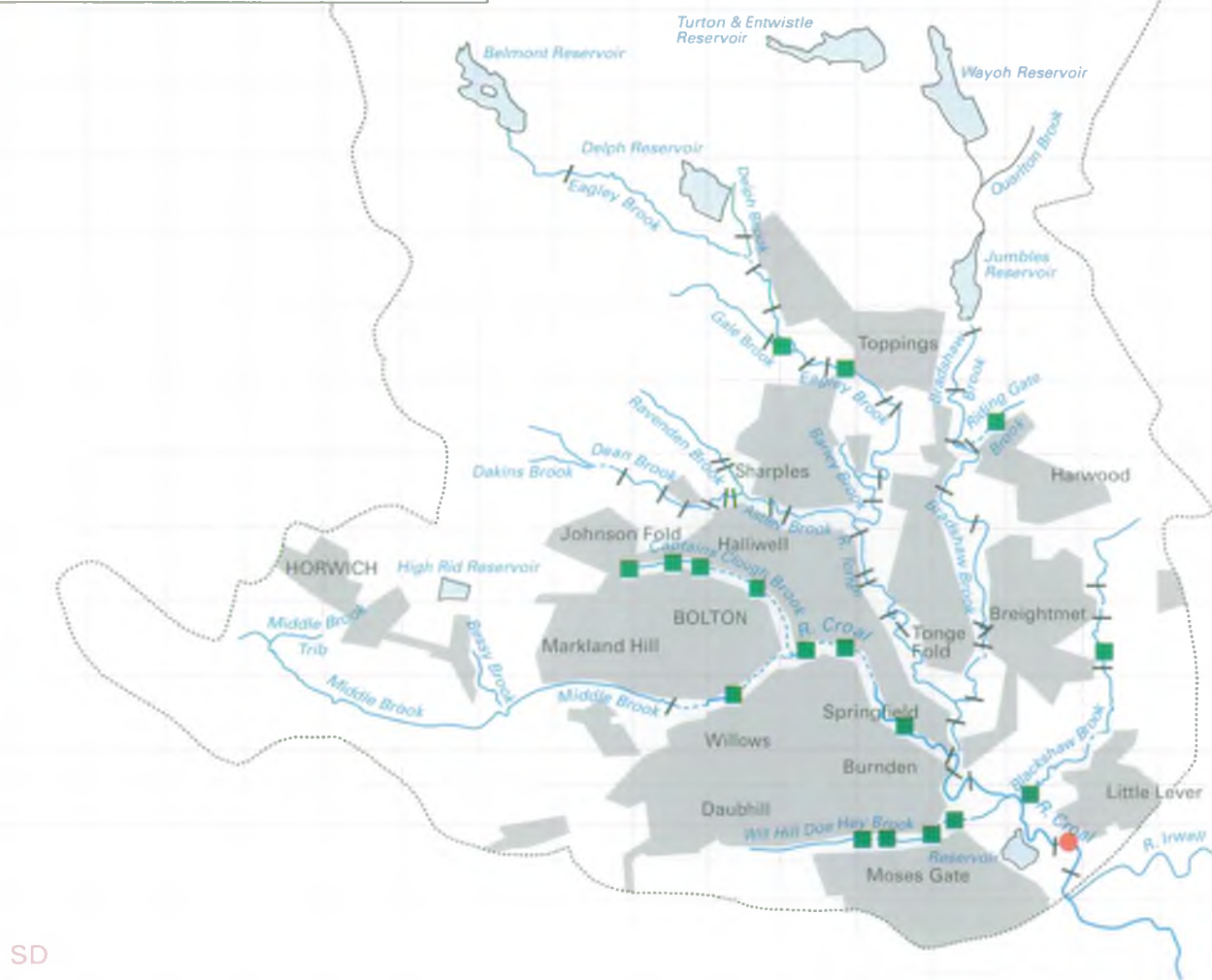


NRA

*National Rivers Authority
North West Region*

N

0 3 km



FLOOD DEFENCE: FLOOD RISK AREAS

KEY

- Catchment boundary
- Built up area
- Main river
- Ordinary watercourse
- - - Culverted section
- Flood risk areas

Irwell Catchment Management Plan Croal Sub-Catchment

June 1994

Map 21



NRA

National Rivers Authority
North West Region

N

0 3 km



4. CURRENT STATE OF CATCHMENT

4.1 STATE OF CATCHMENT : FLOOD DEFENCE (MAPS 21, 22 & 23)

4.1.1 General

A recent review of all known potential flooding problems in the catchment has been undertaken and the results have been used when compiling the Issues and Options Section, and producing a map showing Flood Risk Areas. This information is the best available at this time, and no guarantee can be given to its accuracy or completeness, due to insufficient data available. The flood risk areas shown may be larger in extent during more extreme events than those considered, therefore, putting additional property at risk.

Having identified the need for, and standard of, future flood defence works required, it is possible to assess the condition of the existing flood defences within the catchment against these targets.

4.1.2 Issues Identified

a) Catchment Wide Issues

Catchment Wide Issues Nos. 1 - 17 are dealt with in full in Section 4, Chapter One, River Irwell Introduction document. Issue CW18 is dealt with in Section 4.2.3 of this document.

b) Site Specific Issues (Map 25)

Issue SS5 Bessy Brook, Lostock

An existing culvert beneath Bessy Brook Estate is of inadequate size to convey sufficient flow capacity to provide this area with the required level of protection.

Issue SS9 Astley Brook (Dean Brook), Bolton

A capital scheme was completed in 1976 on Dean Brook involving the diversion of the brook around Victoria Lake. This was carried out to ensure that large boulders brought down under flood flows are transported by the stream beyond Barrow Bridge where previous blockages had occurred. Continued maintenance is now required to remove shoals which have been encouraged to form further downstream, where it is easier to remove the debris.

Issue SS14 Riding Gate Brook, Bradshaw

This stretch is culverted beneath the Conservative Club on Lee Gate Road, and a restaurant car park. Due to its inadequate size, and a number of service crossings it is prone to debris blockage.

Issue SS17 Middle Brook, Bolton

Along this stretch through the town centre of Bolton, there are many service crossings of varying sizes, these have been the cause of flooding in the past due to debris becoming entangled on these pipes.

Issue SS18 Middle Brook, Bolton

Through the town centre of Bolton the bed of Middle Brook runs in a deep walled channel and is formed in stone. The bed was hidden for years by the build up of silt and debris, but through continued maintenance, has been returned to its original condition and is now a feature of the area. In order that this can be retained, regular scheduled maintenance is required on this reach.

Issue SS22 River Croal, Bolton

Between the River Tonge and River Irwell confluence, general maintenance works are required on the River Croal.

Issue SS25 Blackshaw Brook - Hall Lane Tip to the River Croal

An existing culvert beneath Bury New Road alters in diameter midway through its length. Because of this sudden reduction in size it is prone to blockage caused by debris becoming trapped at this point.

Issue SS28 Access Ramps

Under the 'Urban Channel Access' scheme, it is proposed to provide access ramps at the following locations:-

- on the River Croal at Casablanca Mill, Bolton
- Water Street, Bolton
- Chorley Street, Bolton
- on Astley Brook at Waters Meeting, Bolton
- Tippings Road, Bolton

4.2 STATE OF THE CATCHMENT : WATER QUANTITY

4.2.1 General

Objectives and targets need to be set in relation to meeting existing and future demand for water abstraction in the catchment for potable water supply, industrial and agricultural uses. In addition targets will be set, where appropriate, for minimum residual river flows and minimum control levels to protect other water uses and users within the catchment.

The present conditions in the catchment are assessed by considering the resource usage and river flow/river level conditions.

The current status of the catchment is then obtained by comparison of present conditions with use-related targets.

4.2.2 Local Hydrometric Network

River Level Recording:

In the River Croal Sub-Catchment there is one level monitoring station at Farnworth Weir, north east of Farnworth. The records from the Farnworth Weir Station date from 1948, which includes both river level and flows for floodwarning and water quality management.

Rainfall Monitoring:

The Croal catchment is served by 10 rain gauges recording daily totals only and one Primary River Level Station.

Most of the rain gauges are observed by NWW Limited staff with the NRA carrying out maintenance on an annual visit or when informed of damage by the observers.

The Primary River Level Station is situated at Farnworth and has a long record. The station has telemetry and is interrogated daily. Additionally the station is visited weekly to ensure that it functions correctly.

A river level recording station did record levels on Eagley Brook at Longworth Clough but was terminated during the early 1980's because of excessive maintenance costs.

4.2.3 Issues Identified

a) Catchment Wide Issues

Catchment Wide Issues Nos. 1 - 17 are dealt with in full in Section 4, Chapter One, River Irwell Introduction document.

Issue CW18 Rainfall Information

There is a need for more rainfall information within the Croal Catchment that can be remotely interrogated to give details of rainfall amounts and intensities. The provision of tipping bucket raingauges with loggers that are linked to the Regional Communication Scheme would satisfy these needs.

b) Site Specific Issues (Map 25)

Issue SS1 and SS16 Belmont Reservoir and Rumworth Lodge Reservoirs

Reservoir compensation requirements in excess of reliable yield at Belmont and Rumworth Lodge Reservoirs.

WATER QUALITY: STATE OF THE CATCHMENT

KEY

- Catchment boundary
- Built up area
- Complies with objective class
- Fails objective class
- Reach boundaries
- Unclassified watercourse
- Culverted section
- Watercourse

Irwell Catchment Management Plan Croal Sub-Catchment

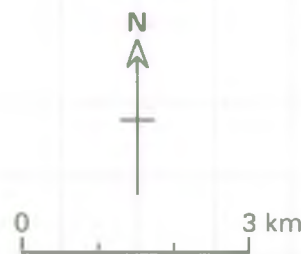
June 1994

Map 24



NRA

National Rivers Authority
North West Region



4.3 STATE OF THE CATCHMENT : WATER QUALITY (MAP 24)

The routine chemical and biological sampling programme of the NRA is used to assess compliance with the targets set.

4.3.1 Water Quality Classification

a) Present Water Quality Classification Objectives National Water Council (NWC) Classification

This assessment of compliance with the Long Term Objectives is on the basis of the NWC class derived for the calendar year 1993. Of the 18 reaches in the Croal Catchment eight fail to meet their Long Term Objectives. This is illustrated on Map 24. The implications in terms of lengths of classified watercourse are tabulated below. The reasons for failure are raised as Issues for this Plan:

Class	1993 NWC	LTO
1A	0.0	3.3
1B	10.3	26.3
2	40.1	22.7
3	1.3	-
4	0.6	-

Lengths in Km

b) Future Water Quality Classification Objectives Statutory Water Quality Objectives (SWQOs)

No targets set as yet.

4.3.2 EC Directives

a) Directive on Dangerous Substances in Water

List I

The most recent reports made to the Department of the Environment on compliance with Environmental Quality Standards for List I substances were on data for the calendar year 1993.

No failures of compliance were reported.

List II

The most recent reports made to the Department of the Environment on compliance with Environmental Quality Standards for List II substances were on data for the calendar year 1992.

Data for 1992 for chromium in Eagley Brook downstream of Belmont STW exceeded the Environmental Quality Standard.

b) Directive on Urban Wastewater Treatment

NRA North West Region undertook an assessment exercise in 1993 of all identified storm and emergency overflows on sewerage networks within the region. Within the Croal Catchment of the 110 plus overflows identified, over 30 were highlighted as unsatisfactory with regard to their impact on the receiving watercourse. Their effect is raised under several issues for this Plan.

c) Directive on Water Quality for Freshwater Fish

The most recent reports on compliance made to the Department of the Environment were on the basis of data from the calendar year 1992.

No failures of compliance with Environmental Quality Standards were reported.

d) Directive on Abstraction of Surface Water for Drinking

No reports on compliance have yet been made to the Department of the Environment.

4.3.3 Issues Identified

a) Catchment Wide Issues

Catchment Wide Issues Nos. 1 - 17 are dealt with in full in Section 4, Chapter One, River Irwell Introduction document. Issue CW18 is dealt with in Section 4.2.3 of this document.

b) Site Specific Issues (Map 25)

Issue SS2 Eagley Brook - Belmont Reservoir to Belmont STW.

Failure to achieve the present water quality classification objective for the classified reach. This reach is affected by natural acidic run-off, and it is this run-off which has caused the failure of this stretch to meet the objective. It is also felt that the actual water quality objective may be unrealistic due to the nature of the surrounding environment.

Issue SS3 Eagley Brook - downstream of Belmont STW

Exceedence of the EQS for an EC List II Dangerous Substance (Chromium) has been identified as being persistent within the final treated effluent produced by Belmont STW. The source is trade effluents.

Issue SS4 Eagley Brook - Belmont STW to Charles Turner Co. Ltd.

The failure to achieve the objective for this reach has been attributed to the coloured effluent discharged from Belmont STW. The organic load of the effluent is also perceived to have a significant impact.

Issue SS6 Eagley Brook - Charles Turner Co. Ltd. to Astley Brook.

The failure to achieve the objective for this reach has been directly attributable to the organic input discharged via the Charles Turner Co. Ltd. effluent treatment plant and the impact of the upstream reach.

**Issue SS7 Eagley Brook - downstream of Eagley to Astley Brook
River Tonge - Astley Brook to Bradshaw Brook.**

Poor fishery can be attributed directly to water quality for some reaches.

Issue SS8 Astley Brook - Smithills Dean Road to the A666.

Failure to achieve the present water quality classification objective for the classified reach. Significant impact has been caused as a consequence of farm drainage problems within this stretch, although it is felt that this stretch may have an unrealistic objective.

Issue SS12 Bradshaw Brook - Wayoh Reservoir to Jumbles Reservoir inlet.

Failure to achieve the present water quality classification objective for the classified reach. There are several potential reasons why this stretch fails to meet the objective. Farm drainage, which is suspected to be entering the Billy Brook tributary, also excessive organic inputs being discharged via unsatisfactory sewer overflows and septic tanks along Quarlton Brook are amongst these.

Issue SS13 Bradshaw Brook - Wayoh Reservoir to Jumbles Reservoir inlet.

Lack of fishery due primarily to poor water quality.

Issue SS19 Captains Clough - Doffcocker Lodge to Middle Brook.

The failure to achieve the objective for this reach has been directly attributable to the organic input discharged via several unsatisfactory sewer overflows. It is also felt that the objective may be unrealistic for part of the reach.

Issue SS20 Captains Clough Brook.

There is a lack of fishery due primarily to poor water quality.

Issue SS21 Middle Brook - River Croal.

There is a sporadic fishery within Middle Brook which has probably been due to intermittent water quality problems in the past.

Issue SS23 Blackshaw Brook - Red Bridge to Hall Lane Tip.

The failure to achieve the objective for this reach has been attributable to the organic input discharged via the unsatisfactory sewer overflow at Darcy Lever Old Hall, and also the organic contamination arising from foul and storm water drainage from Bradley Fold Industrial Estate. The objective for this stretch may also be unrealistic.

Issue SS24 Blackshaw Brook - Hall Lane Tip to the River Croal.

The failure to achieve the objective for this reach has been attributed to the release of chromium from Hall Lane Tip.

Issue SS26 Blackshaw Brook.

There is a lack of fishery within the brook which is due primarily to poor water quality.

4.4 STATE OF THE CATCHMENT : PHYSICAL FEATURES

4.4.1 General

The industrial history of the area means that long lengths of river have been re-routed, culverted or restrained within walls and behind weirs. Many of the valleys have been developed or tipped, often to the waters edge. There are large numbers of reservoirs mill lodges and ponds.

A striking range of natural, physical and geomorphological features persist. Substantial sections of river valley remain undeveloped some areas of flood plain have retained their natural character. Many of the watercourses are actively meandering over a steep stony bed.

Issues that relate to the physical features of the rivers and associated land have been identified.

4.4.2 Issues Identified

a) Catchment Wide Issues

Catchment Wide Issues Nos. 1 - 17 are dealt with in full in Section 4, Chapter One, River Irwell Introduction document. Issue CW18 is dealt within Section 4.2.3 of this document.

b) Site Specific Issues (Map 25)

Issue SS10 Astley Brook - A666 to Eagley Brook, Dean Brook

Dean Brook has a concrete-lined channel. An un-natural concrete bed is a very hostile, featureless environment. It has no habitat value and may be a barrier to the free movement of fish. The removal of the artificial channel would lead to the establishment of a natural stony bed with the subtle variety in habitat required by fish and other riverine species.

Issue SS11 River Tonge - Astley Brook to Bradshaw Brook

The continued development along the River Tonge, where valuable river corridor is being lost without any enhancement or mitigation. The Tonge Valley in inner Bolton has been allocated for new employment areas and redevelopment of existing ones, but is not protected by the River Valley Policy. There have been proposals to infill lodges, build to the top of the bank and valley top and tip in the flood plain. Although this has degraded and restricted the river corridor there have not been suitable retention and mitigation measures.

Issue SS15 Middle Brook - Red Moss to Heaton Bridge

Landfill Threats to Red Moss. Red Moss is a proposed SSSI as the best example of a relict bog in Greater Manchester. Proposals to infill this area with domestic waste led to a Public Enquiry. The final decision has not been made.

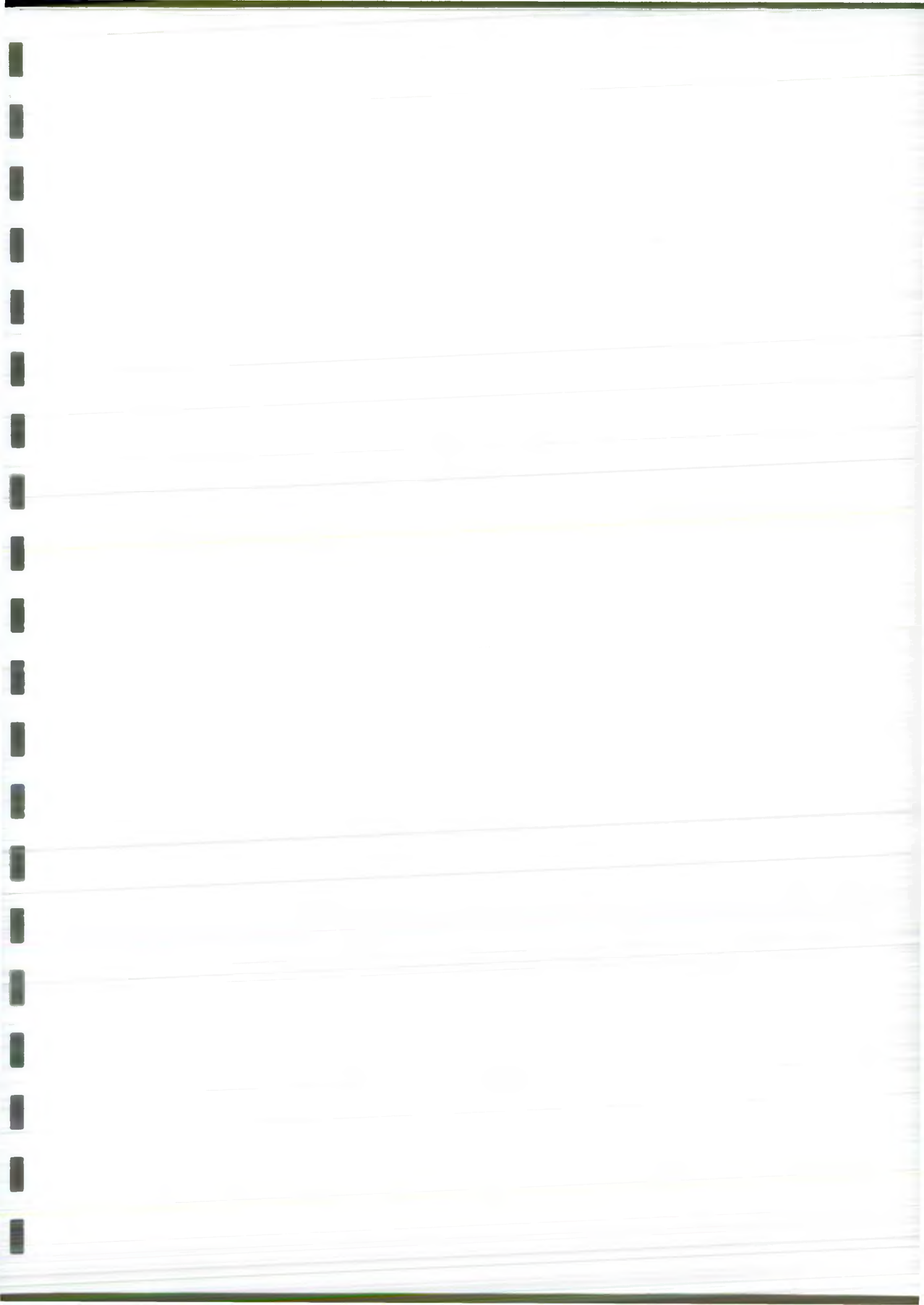
Issue SS16 Middle Brook - Rumworth Lodge SBI

Proposals by NWW Ltd. to reduce compensation flows from Rumworth Lodge SBI. Alterations in the water levels in Rumworth Lodge may result in the reduction of its conservation value. Reduction in compensation flows from the lodge may also have a detrimental impact on Middle Brook and its corridor.

Issue SS27 Disjointed countryside management and public access policy along the Upper Croal and most tributaries

Although there is a Croal-Irwell Valley Warden service the tributaries are not included. There is no co-ordinated countryside management and public access policy for the whole sub-catchment to bring together the various interests who are restricted to specific sites, areas or disciplines. There is a need to create interconnected public walkways and linear parks and enable a more informed and strategic response to development proposals.

Footpaths should be sited so as to cause minimum potential disturbance to conservation interests. Some sensitive habitats such as wetlands and steep woodlands should be walked around, rather than through. Moreover a path too close to the bank top may be eroded by the river. Eroding earth banks are vital to species such as sandmartins. A need to revet them would be avoided by siting the footpath further from the bank top.



SITE SPECIFIC ISSUES LOCATION MAPS

KEY

- Catchment boundary
- Built up area
- Watercourse
- - - Culverted section
- SS20 ■ Stretch of appropriate issue
- SS28 ● Location of appropriate issue

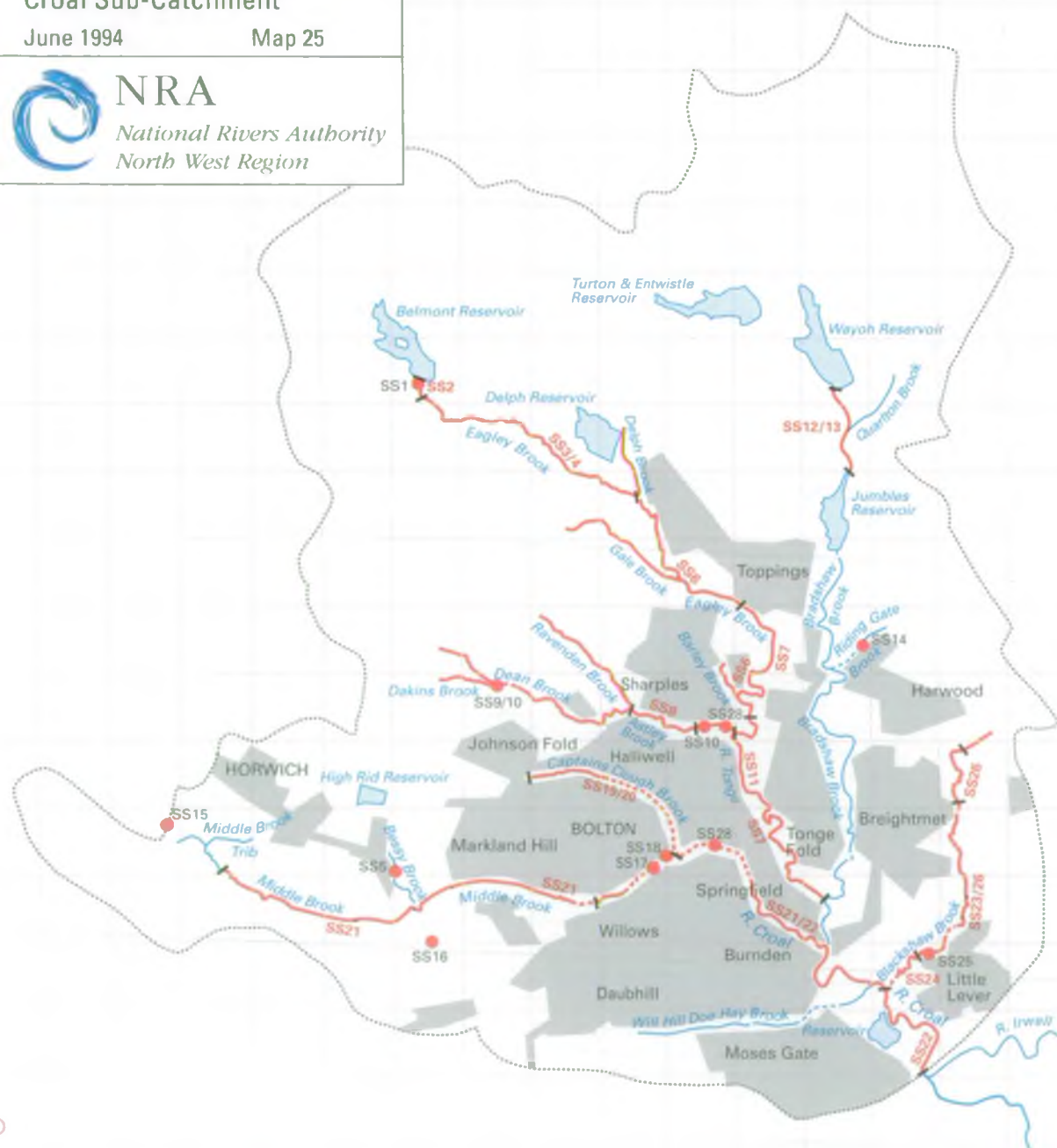
Note: SS27 includes most tributaries

Irwell Catchment Management Plan
Croal Sub-Catchment
 June 1994 Map 25



NRA

*National Rivers Authority
 North West Region*



5. ISSUES AND OPTIONS (MAP 25)

5.1 General

This section of the plan considers options to address the following 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. They should be considered together with the Catchment Wide Issues 1 - 17 for the River Irwell catchment in Chapter One River Irwell Introduction document Section 4.

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

Catchment Wide Issues 1 - 17 for the River Irwell Catchment are dealt with in Chapter One River Irwell Introduction document (Section 4). There is an additional issue which relates specifically to the Croal Sub-Catchment:

ISSUE NO: CW18		Requirement for more rainfall information.		
OPTIONS	Responsibility	Advantages	Disadvantages	
1. Install extra raingauges.	NRA	Improvements to flood warning and water resources management.	Incomplete rainfall monitoring network.	
2. Maintain existing raingauge network.	NRA	Maintains consistent record.		

5.3 SITE SPECIFIC ISSUES (MAP 25)

ISSUE NO: SS1	Belmont Reservoir. Compensation requirement in excess of reliable yield.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Reduce compensation flows all year round.	NRA	Maintains higher water levels in reservoir. Retain/enhance conservation value. Benefits to recreation.	Impact on downstream abstractors, water quality and fishery potential.
2. Vary compensation flows - lower in winter, higher in summer.		Maintain water quality during times of low flow.	Low levels may have detrimental impact on reservoir.

ISSUE NO: SS2	Eagley Brook - Belmont Reservoir to Belmont STW. Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Revision of present water quality classification objective to account for the impact of natural acidic run-off which causes the failure. 2. Attempt to achieve reduction in the impact of natural acidic run-off.	NRA NRA to establish means and funding.	Recognition of best achievable class without expenditure on modification of natural systems. Achievement of present water quality classification objective. Possible improvement to fishery potential.	Apparent relaxation of water quality standards. Difficulty in establishing means and funding. Modification of natural system could affect present ecological balance.

ISSUE NO: SS3	Eagley Brook - downstream of Belmont STW Exceedence of the Environmental Quality Standard for an EC List II Dangerous Substance (Chromium).		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Reduction in the chromium load from Belmont STW.	<p>NRA to monitor water quality and enforce recently introduced consent conditions.</p> <p>NWW Ltd to continue trade effluent control measures on Belmont Bleaching and Dyeing Co. Ltd.</p>	<p>Compliance with EC List II Dangerous Substance EQS.</p> <p>Improvement to fishery potential.</p>	<p>Cost to NWW Ltd and Belmont Bleaching and Dyeing Co. Ltd. and possibly customers.</p>

EC - European Community
EQS - Environmental Quality Standard
STW - Sewage Treatment Works

ISSUE NO: SS4	Eagley Brook - Belmont STW to Charles Turner Co. Ltd. Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Combination of the following:</p> <ol style="list-style-type: none"> 1. Reduction in colour load from Belmont STW. 2. Evaluation of impact of organic load from Belmont STW and reduction as appropriate. 	<p>NRA to continue to pursue appropriate reduction. NWW Ltd to pursue trade effluent control of Belmont Bleaching and Dyeing Co. Ltd and/or provide treatment at the STW to effect reduction.</p> <p>NRA to undertake evaluation, review consent conditions and promote need for capital expenditure by NWW Ltd amongst other regulatory influences as appropriate.</p> <p>NWW Ltd to undertake works as appropriate.</p>	<p>Achievement of the present water quality classification objective.</p> <p>Improvement to aesthetic and amenity value and fishery potential.</p> <p>Achievement of present water quality classification objective. Possible improvement to fishery potential.</p>	<p>Cost to NWW Ltd (and possibly customers) and/or Belmont Bleaching and Dyeing Co. Ltd. (and possibly customers).</p> <p>Possible cost to NWW Ltd and customers.</p>

STW - Sewage Treatment Works

Achievement of the present water quality classification objective for this reach has additional advantages for the downstream reach of Eagley Brook. The downstream reach is considered under Issue SS6.

ISSUE NO: SS5	Bessy Brook, Lostock. Risk of flooding due to inadequate sized culvert beneath Bessy Brook Estate.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Provide additional culvert.	NRA/Riparian Owner.	Improves existing level of flood protection.	Scheme cost. Some environmental impact.
2. Replace existing culvert with new culvert of adequate size.	NRA/Riparian Owner	Improves existing level of flood protection.	Scheme cost may exceed benefits.
3. Improve channel capacity by raising existing defences.	NRA/Riparian Owner	Improves existing level of flood protection.	Scheme cost. Implementation problems. Some visual and environmental impact.

ISSUE NO: SS6	Eagley Brook - Charles Turner Co. Ltd. to Astley Brook Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Reduction in the organic load from Charles Turner & Co. Ltd trade effluent treatment plant.	NRA to assess requirements and negotiate phased improvements. Charles Turner & Co. Ltd to undertake necessary works.	Achievement of the present water quality classification objective. Improvement to the aesthetic and amenity value and fishery potential.	Cost to Charles Turner & Co. Ltd and possibly customers.

Achievement of the present water quality classification objective will also require improvement in the upstream reach of Eagley Brook. The upstream reach is considered under SS4.

ISSUE NO: SS7	Eagley Brook - downstream of Eagley to Astley Brook River Tonge - Astley Brook to Bradshaw Brook. Poor fishery.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Stocking of appropriate fish species and monitoring of fish populations.	NRA	Development of Fisheries.	Possible loss of stocks due to intermittent or sporadic pollution.
2. Natural colonisation and monitoring	NRA	Less Cost	Timescale may be unrealistic if there are very few fish in feeder tributaries.

ISSUE NO: SS8	Astley Brook - Smithills Dean Road to the A666. Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Sustained reduction in the impact of farm drainage.	NRA to monitor water quality, promote good practice and enforce remedial works. Farm operators to adopt good practice and undertake remedial works.	Possible achievement of present water quality classification objective. Improvement to aesthetic and amenity value and fishery potential.	Cost to farm operators.
2. Revision of present water quality classification objective.	NRA	Recognition of best achievable class without expenditure on inputs normally outside the scope of pollution control such as urban run-off. Sustained improvements under Option 1 would still be required to achieve the revised objective.	Apparent relaxation of water quality standards.

ISSUE NO: SS9	Astley Brook (Dean Brook), Bolton. Continued maintenance to brook to remove shoals.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Continued maintenance of gravel trap.	NRA	Maintains existing level of flood protection.	Maintenance costs. Disposal problem, as site of biological interest (SBI).
2. Regrade channel such that gravel deposited at more acceptable site.	NRA	Maintains existing level of flood protection. Easier deposition of material.	Scheme cost may exceed benefits. Possible conflict with interests of fisheries. Loss of good channel habitat.

SBI - Site of Biological Interest

ISSUE NO: SS10	Astley Brook - A666 to Eagley Brook, Dean Brook. Dean Brook in concrete lined channel.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Remove concrete channel - reinstate more natural river corridor features.	NRA/riparian owner/local authority	Improve river in area of high conservation and landscape interest. Will prevent potential disposal of gravel in surrounding areas of high conservation interest.	

ISSUE NO: SS11	River Tonge - Astley Brook to Bradshaw Brook. Continued development along River Tonge, where valuable river corridor is being lost without any enhancement/mitigation.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Seek to get Tonge River Valley protected by inclusion in River Valley Plan for Bolton.	NRA/Planning Authority	Protection of nature conservation and landscape interests, by sympathetic development proposals.	Less land available for development

ISSUE NO: SS12	Bradshaw Brook -Wayoh Reservoir to Jumbles Reservoir inlet. Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Evaluation of potential pollution sources including Billy Brook (farm drainage) and Quarlton Brook (sewer overflows and septic tanks) and pursuance of appropriate remedial measures.	NRA	Achievement of present water quality classification objective. Improvement to aesthetic and amenity value and fishery potential	

ISSUE NO: SS13	Bradshaw Brook - Wayoh Reservoir to Jumbles Reservoir inlet. Lack of fishery due primarily to poor water quality.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Stocking of appropriate fish species as and when prevailing water quality allows, and monitoring of fish populations.	NRA	Development of Fisheries	Possible loss of stocks due to intermittent or sporadic pollution.
2. Natural colonisation and monitoring	NRA	Less Cost	Timescale may be unrealistic if there are very few fish in feeder tributaries.

ISSUE NO: SS14	Riding Gate Brook, Bradshaw Risk of flooding to conservative club, restaurant and residential properties.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Install improved debris screen.	NRA/Riparian Owner.	Improves existing level of flood protection.	Scheme cost. Improved level of protection remains below target level. Debris blockage still possible.
2. Provide flood storage areas upstream of Conservative Club culvert.	NRA/Riparian Owner	Improves existing level of flood protection.	Scheme costs. Insufficient areas for flood storage available.
3. Provide additional culvert.	NRA/Riparian Owner	Improves existing level of flood protection.	Scheme cost may exceed benefits. Disruption to owners and local habitats.
4. Replace existing culvert with new culvert of adequate size.	NRA/Riparian Owner	Improves existing level of flood protection.	Scheme cost may exceed benefits.

ISSUE NO: SS15	Middle Brook - Red Moss to Heaton Bridge Landfill threat to Red Moss, proposed SSSI peat land.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. NRA submitted evidence to the Public Inquiry on the landfill applications. The situation will be reviewed when that decision is announced.	NRA	Protection of best example of relict bog in Greater Manchester.	

SSSI - Site of Special Scientific Interest

ISSUE NO: SS16	Middle Brook - Rumworth Lodge SBI Proposals by NWW Ltd. to reduce compensation flows.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Reduce compensation flows all year round.	NWW Ltd/NRA	Maintain higher water levels in Lodge - retain/enhance conservation value.	May have water quality implications on Middle Brook.
2. Vary compensation flows: lower in winter higher in summer.	NWW Ltd/NRA	Maintain water quality during times of lower flow.	Low summer levels may have detrimental ecological impact in Rumworth Lodge.

SBI - Site of Biological Importance

ISSUE NO: SS17	Middle Brook, Bolton Risk of flooding upstream of Bolton Town Centre due to possible blockage.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Divert services.	NRA/Public utilities.	Improves existing level of flood protection.	Scheme cost and possible disruption to services.
2. Remove service crossings as they become redundant.	NRA/Public Utilities.	Improves existing level of flood protection.	Continue risk of flooding.

ISSUE NO: SS18	Middle Brook, Bolton. Continued maintenance to channel.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Repair and maintain stone-lined channel as necessary.	NRA/Riparian Owner.	Flood conveyance of channel ensured. Loose stone debris prevented from causing obstructions elsewhere. Ease of pedestrian access for inspections. Channel feature of some local cultural and architectural interest retained.	Maintenance and repair costs. Loss of improved fishery stretch.
2. Require landowners to repair channel.	Riparian Owners	As above.	Maintenance and repair costs
3. Return dry weather flow channel to a more natural meandering state.	No specific responsibility. Could be carried out as joint venture (NRA/ Bolton MBC/ EC/Central Government.	Over long term (outside timescale of this plan), repair and maintenance costs might be reduced. Provision of more natural channel with increase in wildlife habitats and physical characteristics. Creation of fishery.	High cost of engineering works. Problems with structural integrity of retaining wall foundations. Channel feature of some local cultural and architectural interest lost.

EC - European Community
MBC - Metropolitan Borough Council

ISSUE NO: SS19	Captains Clough Brook - Doffcocker Lodge to Middle Brook Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>1. Reduction in the organic and debris load from unsatisfactory sewer overflows.</p>	<p>As a requirement of the EC Urban Wastewater Treatment Directive.</p> <p>NRA/NWW Ltd are in the process of agreeing the improvements required for satisfactory performance.</p> <p>NWW Ltd to undertake capital works.</p>	<p>Possible achievement of the present water quality classification objective.</p> <p>Improvement to the aesthetic and amenity value and fishery potential.</p>	<p>Cost to NWW Ltd and possibly customers.</p>
<p>2. Revision of the present water quality classification objective for the culverted section of the reach from downstream of Mortfield Lodge to the Middle Brook confluence.</p>	<p>NRA</p>	<p>The current objective may be achieved for the part of the reach above Mortfield Lodge as a result of Option 1. However on the culverted section it may not as a result of pollution sources normally outside the scope of pollution control such as urban run-off.</p>	<p>Apparent relaxation of water quality standards.</p>

EC - European Community

ISSUE NO: SS20		Captains Clough Brook. Lack of fishery due primarily to poor water quality.	
OPTIONS	Responsibility	Advantages	Disadvantages
1. Stocking of appropriate fish species as and when prevailing water quality allows, and monitoring of fish populations.	NRA	Development of Fisheries	Possible loss of stocks due to intermittent or sporadic pollution.
2. Natural colonisation and monitoring	NRA	Less Cost	Timescale may be unrealistic if there are very few fish in feeder tributaries.

ISSUE NO: SS21		Middle Brook - River Croal Sporadic fishery.	
OPTIONS	Responsibility	Advantages	Disadvantages
1. Stocking of appropriate fish species and monitoring of fish populations.	NRA	Development of Fisheries.	Possible loss of stocks due to intermittent or sporadic pollution.
2. Natural colonisation and monitoring	NRA	Less Cost	Timescale may be unrealistic if there are very few fish in feeder tributaries.

ISSUE NO: SS22	River Croal, Bolton. General maintenance works required between Bolton and confluence with the River Irwell.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Culvert and channel inspections. Repairs/ maintenance of dry weather flow channel on Croal and Middle Brook. Culvert clearance works. General debris clearance. Dredging or de-silting with heavy plant. Hand maintenance work, e.g. tree cutting, weed clearance, grass cutting, etc.	NRA/Riparian Owner.	Maintains existing level of flood protection. High cost of major channel reinstatement avoided by frequent maintenance (particularly on Croal). Avoidance of flooding due to culvert and channel blockages. Opportunities to further and enhance conservation.	Possible impact on recreation and amenity uses in the short term. Possible short term reduction in water quality. Some environmental impact.

ISSUE NO: SS23	Blackshaw Brook - Red Bridge to Hall Lane Tip Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
<p>Combination of the following:</p> <p>1. Reduction in the organic and debris load from the unsatisfactory sewer overflow at Darcy Lever Old Hall.</p> <p>2. Elimination of the organic contamination arising from foul and storm drainage associated with Bradley Fold Industrial Estate.</p>	<p>As a requirement of the EC Urban Wastewater Treatment Directive.</p> <p>NRA/NWW Ltd to agree the improvements required to achieve satisfactory performance.</p> <p>NWW Ltd to undertake capital works.</p> <p>NRA to monitor water quality and pursue elimination of contamination.</p> <p>Bury Estates to undertake remedial measures on the storm and private foul drainage.</p> <p>NWW Ltd to undertake remedial measures on public foul sewer.</p>	<p>Possible achievement of the present water quality classification objective.</p> <p>Improvement to the aesthetic and amenity value and fishery potential.</p> <p>Possible achievement of the present water quality classification objective.</p> <p>Improvement to the aesthetic and amenity value and fishery potential.</p>	<p>Cost to NWW Ltd and possibly customers.</p> <p>Cost to Bury Estates.</p> <p>Cost to NWW Ltd and possibly customers.</p> <p>Cont'd.</p>

EC - European Community

ISSUE NO: SS23 Cont'd.	Blackshaw Brook - Red Bridge to Hall Lane Tip Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
3. Continued monitoring for recurrence of domestic wrong connection problems and pursuance of remedial action as appropriate.	NRA	Possible achievement of the present water quality classification objective Sustained improvement to the aesthetic and amenity value.	
4. Revision of the present water quality classification objective.	NRA	The current objective might not be achieved by the above options because of sources such as urban run-off normally outside the scope of pollution control.	Apparent relaxation of water quality standards.

ISSUE NO: SS24	Blackshaw Brook - Hall Lane Tip to the River Croal. Failure to achieve the present water quality classification objective for the classified reach.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Elimination of chromium input from now inoperative Hall Lane Tip.	NRA to continue to monitor water quality. Bolton MBC to complete remedial measures under DOE funding.	Achievement of the present water quality classification objective and improvement to the aesthetic and amenity value and fishery potential.	Cost to DOE

DOE - Department of the Environment.
MBC - Metropolitan Borough Council

ISSUE NO: SS25	Blackshaw Brook, Bolton. Risk of flooding due to culvert beneath Bury New Road.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Replace existing culvert with new culvert of adequate size.	NRA/Riparian Owner.	Improves existing level of flood protection.	Scheme cost may exceed scheme benefits.
2. Improve channel capacity by raising existing defences.	NRA/Riparian Owner	Improves existing level of flood protection.	Scheme costs and risk of larger flooded area if blockage occurs, and defences overtopped. Some visual and environmental impact.

ISSUE NO: SS26	Blackshaw Brook Lack of fishery due primarily to poor water quality.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Stocking of appropriate fish species as and when prevailing water quality allows, and monitoring of fish populations.	NRA	Development of Fisheries.	Possible loss of stocks due to intermittent or sporadic pollution.
2. Natural colonisation and monitoring	NRA	Less Cost	Timescale may be unrealistic if there are very few fish in feeder tributaries.

ISSUE NO: SS27	Disjointed countryside management and public access policy particularly along the Upper Croal and most tributaries.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Co-ordinate the creation of a comprehensive policy for whole sub-catchment.	NRA/Local Authorities/ Rights of Way Officers/ Countryside management services/Bolton Wildlife Project/LWT Croal Irwell Valley Project Committee.	Improve recreational and wildlife value of river corridors. More strategic and informed response to development control.	Resource implications.

LWT - Lancashire Wildlife Trust

ISSUE NO: SS28	Access Ramps Provide access ramps on the River Croal and on Astley Brook at Bolton.		
OPTIONS	Responsibility	Advantages	Disadvantages
1. Locations have been identified for the provision of access ramps.	NRA	Reduced cost of maintenance due to improved access.	Scheme cost.

National Rivers Authority North West Region

Regional Headquarters, P.O. Box 12, Richard Fairclough House, Knutsford Road, Warrington. WA4 1HG. Tel: 01925 653999 Fax: 01925 415961
All enquires to: South Area Office, 'Mirwell', Carrington Lane, Sale. M33 5NL. Tel: 0161 973 2237 Fax: 0161 973 4601