

**British Coal Corporation**  
**Non Operational Collieries Group (North)**

**Water Management  
Associated with  
Cessation of Coal Mining  
in County Durham.**

# **Contents**

## **1. Introduction**

## **2. Present Water Management**

### **2.1 Water Migration**

### **2.2 Water Control and Monitoring**

### **2.3 Water Management following cessation of Deep Mining**

## **3. Progress**

## **Appendices**

### **Appendix 1**

**Pumping Stations likely to be Operational at end of 1994**

### **Appendix 2**

**Minewater Levels in County Durham**

### **Appendix 3**

**Likely consequences related to cessation of groundwater pumping at Nicholsons, Sherburn Hill and Lumley 6th Pumping Stations**

### **Appendix 4**

**Known Gravity Minewater Discharges in County Durham**

## **1. Introduction**

The County of Durham falls within the administrative area of what was known as the North East Coalfield.

The Durham Coalfield runs from the mouth of the River Tyne southwards for some 45km to the River Tees and 35km inland.

In broad terms, geology divides the coalfield such that the north and west is exposed and the south and east is overlain by unconformable Permian measures. The coal seams dip eastwards from the outcrop to under the North Sea at approximately 1 in 50 before rising again.

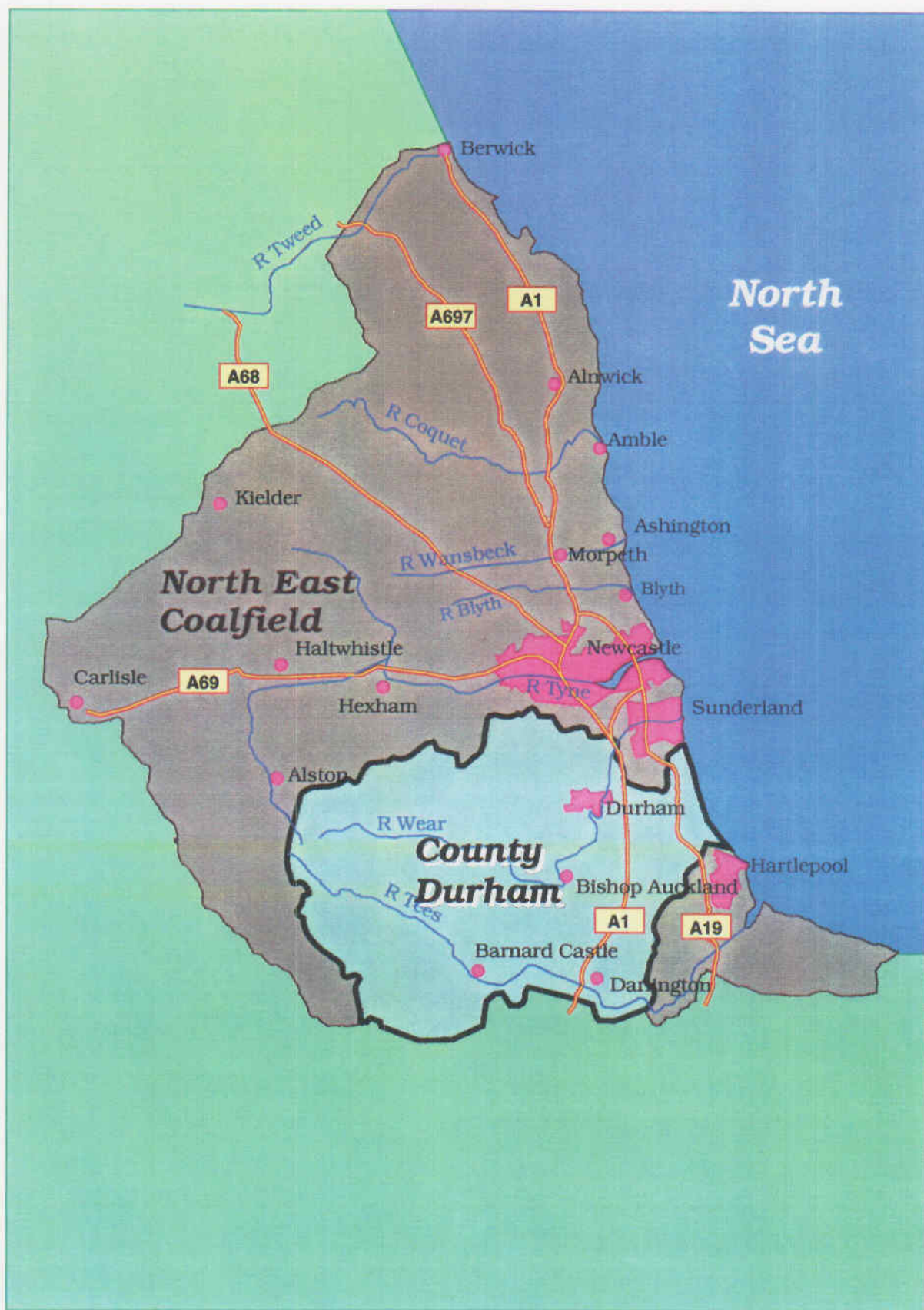
Coal has been associated with the region since Roman times especially at military sites along the Roman Wall and where coal seams outcropped on cliffs, washed by the sea was gathered on the beaches. The first licence to work coal was granted by King Henry III in 1239 but it was the medieval coal merchants and shippers of Newcastle who founded the coal trade which paved the way for the North East's rise to industrial fame and fortune culminating in a peak output of 56 million tonnes in 1941.

Of the total coalfield area, of which Durham comprises nearly 50%, some 3,500 square kilometres, plus another 330 square kilometres undersea, are associated with known, unrecorded and suspected coal workings.

It is estimated that, 1,870 square kilometres, or 54% of this total, are thought to contain workings less than 30 metres from the surface.

In addition, there are in excess of 20,000 recorded mine entries.





## **2. Water Management**

### **2.1 Water Migration**

The main source of minewater in the North East is the percolation through the superficial deposits of either fresh (rainwater, snowmelt) or sea water into the sedimentary strata overlying mine workings and then via strata fractures induced by mining into the workings.

Initially, there were many shallow drift mines along the western edge of the exposed coalfield each pumping its own make of minewater to the surface. The majority of these were connected to the newer collieries to the east. Many of the connections were unrecorded with numerous barriers being robbed and trespass workings common.

In addition many interconnections were made during the Second World War to provide alternative means of egress in the event of bomb damage.

Upon Nationalisation in 1947, many of these shallow drift mines and collieries were operational, each dealing with only its own minewater or plus some small feeder from a nearby abandoned mine.

As the shallow part of the coalfield was the first to be worked, it also became the first to be exhausted and abandoned.

As these mines closed, their abandoned workings filled with water before overflowing to the next working Colliery to the east.

Further closures resulted in migrating feeders becoming larger as the water combined and passed down the line to the next working Colliery.

As a result of this situation, a decision was made to protect all working collieries from migrating feeders with a barrier of pumping stations leaving each mine to deal only with its own internal minewater feeders.

The route of minewater to the coast, if allowed, would be through numerous connections to the former pumping stations at Murton and Horden and from there direct to the interconnected former working collieries, Easington and Vane Tempest /Seaham.



# Durham Coalfield Diagrammatic Section

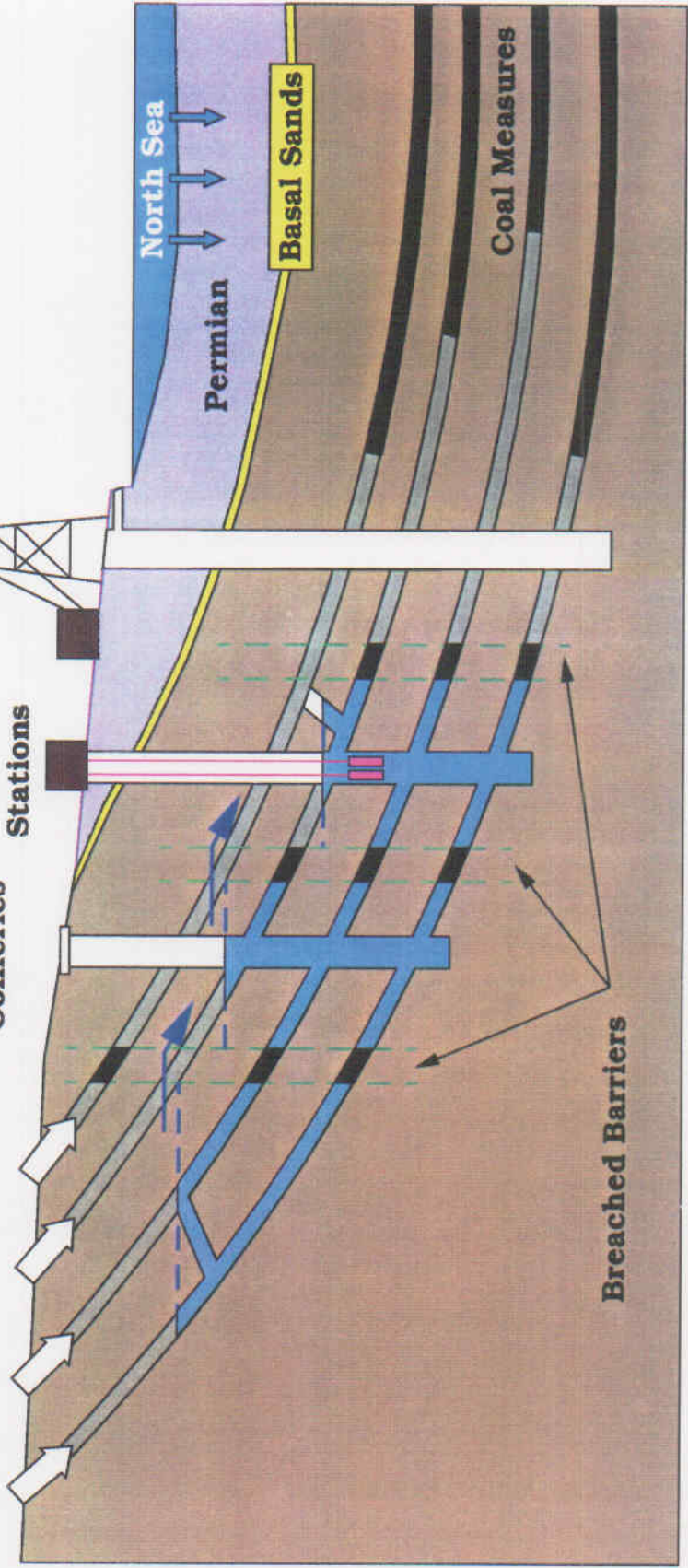
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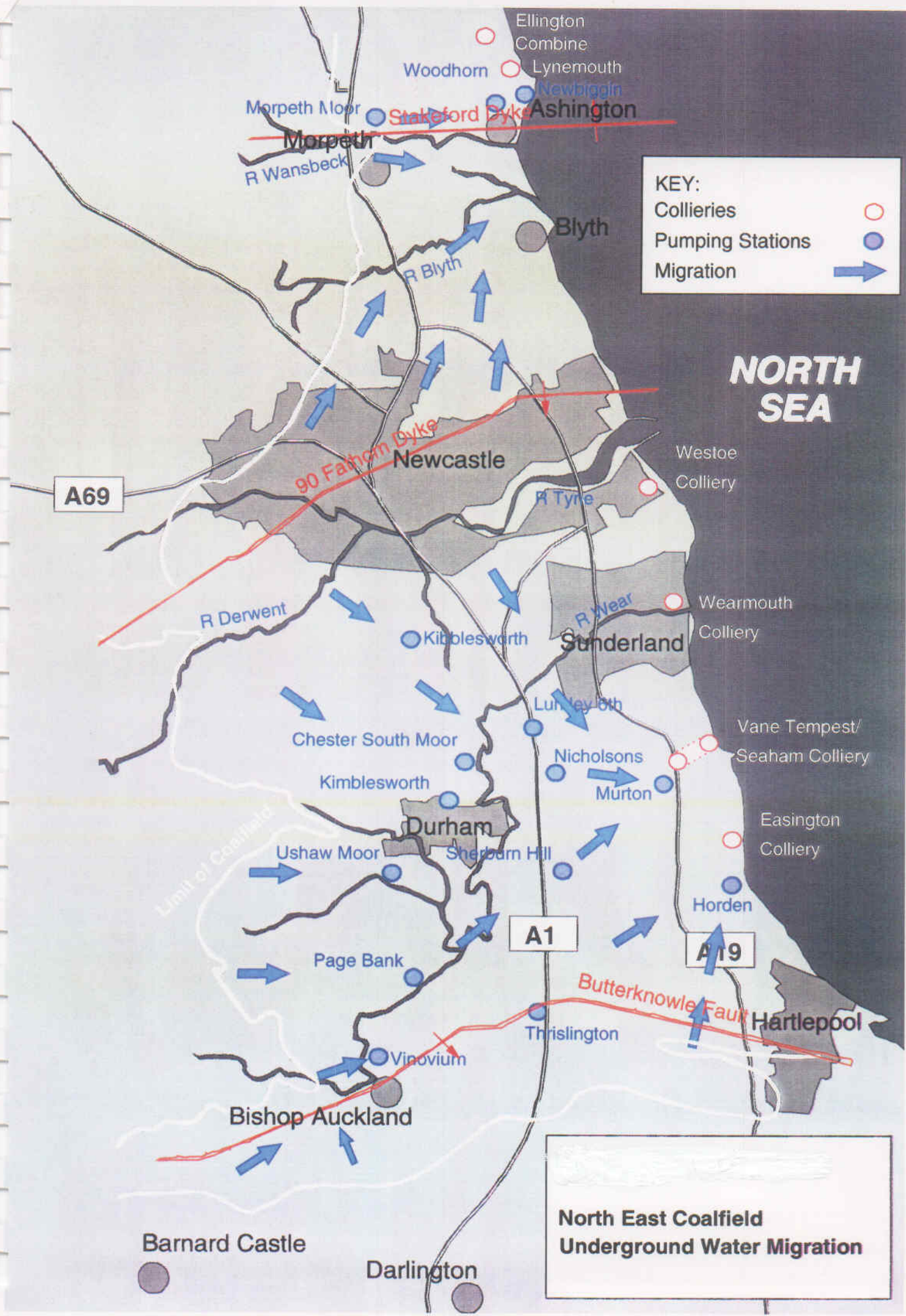
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Working  
Collieries

Abandoned  
Collieries  
Pumping  
Stations

Abandoned Drift Mines





Ellington  
Combine  
Woodhorn  
Lynemouth  
Newbigin  
Ashington

Morpeth Moor  
Stakeford Dyke  
Morpeth  
R Wansbeck

Blyth

**NORTH  
SEA**

**A69**

90 Fathom Dyke  
Newcastle

Westoe  
Colliery

Sunderland

Wearmouth  
Colliery

Vane Tempest/  
Seaham Colliery

Easington  
Colliery

Durham

Horden

**A1**

**A19**

Butterknowle Fault

Hartlepool

Thrislington

Bishop Auckland

Barnard Castle

Darlington



## 2.2 Water Control and Monitoring

The pumping stations were sited at closed collieries on the water migration routes, picking up local feeders to prevent overflows, and dealt with three quarters of all minewater pumped in the Coalfield.

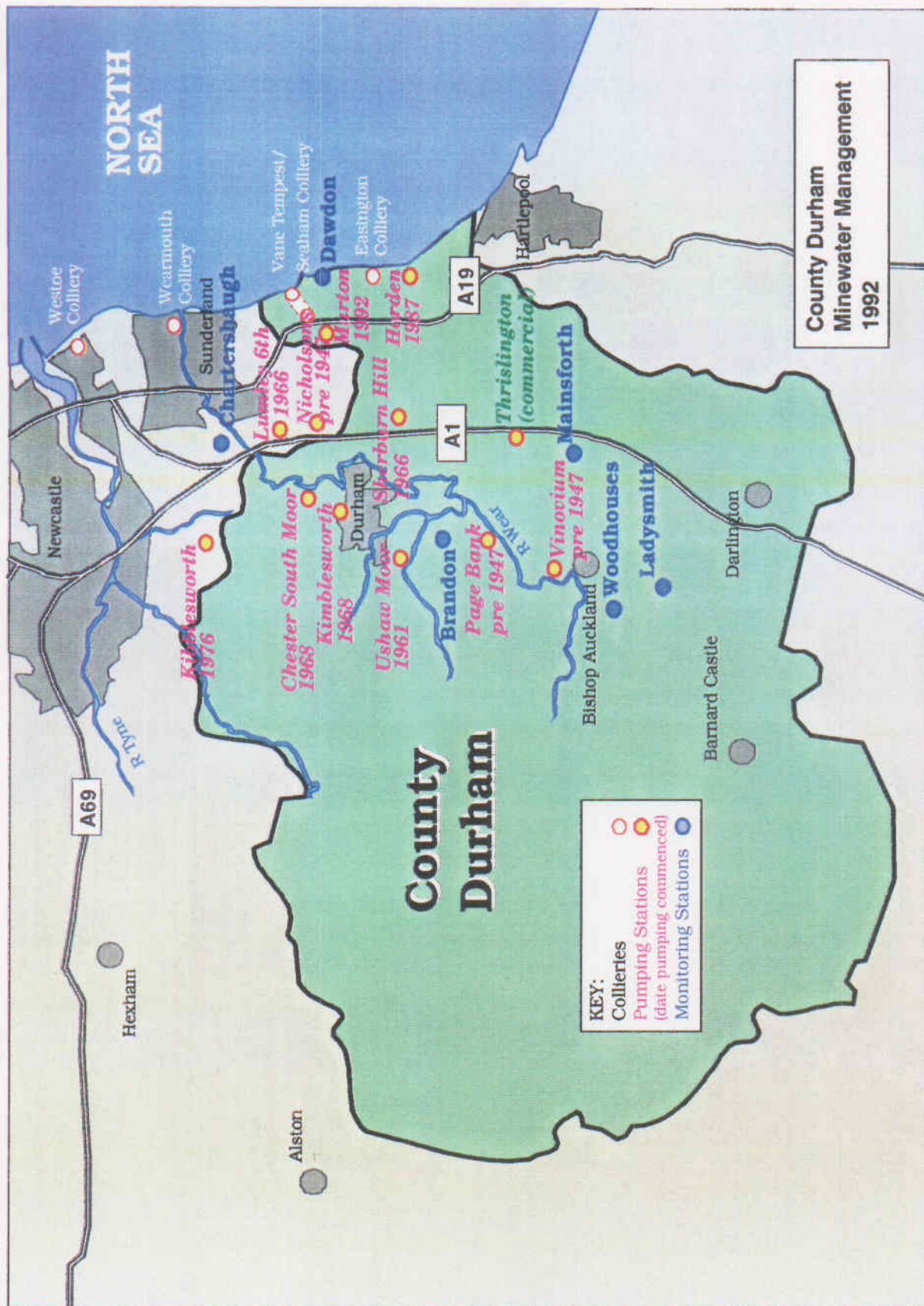
In 1992 there were 11 of these pumping stations in Durham, 8 of which eventually discharged water into the River Wear, protecting two former operational Collieries, Easington and Vane Tempest/Seaham.

The former Westoe and Wearmouth Collieries have no external connections and are thus divorced from migrating feeders.

Durham Pumping Stations	Mean Rate of Pumping over 24 Hours 1992/93 gpm
Chester South Moor	1,492
Horden	4,369
Kibblesworth	4,220
Kimblesworth	1,518
Lumley 6th	322
Murton	254
Nicholsons	386
Page Bank	1,694
Sherburn Hill	1,206
Ushaw Moor	1,212
Vinovium	3,025
Total Pumping Stations	19,698
Total to River Wear	10,855

Durham Collieries	Mean Rate of Pumping over 24 Hours 1992/93 gpm
<b>Protected</b>	
Easington	4,775
Vane Tempest /Seaham	Negligible make, filling old workings
<b>Divorced</b>	
Wearmouth	455
Westoe	3,869







British Coal Corporation  
North East Group  
Underground Water  
Stage 1 (Present Position 1993)



There are 6 monitoring stations situated in Durham.

- ◆ Dawdon
- ◆ Chartershaugh
- ◆ Brandon 'A'
- ◆ Mainsforth
- ◆ Ladysmith
- ◆ Woodhouses

The majority of the Durham monitoring stations are used for keeping check on a settled water regime with known outlets and overflows. The purpose of these stations is to detect changes in the existing flowpaths.

The present water management strategy has resulted in a controlled ground water regime.

The area to the south of the Butterknowle Fault is known, from the monitoring stations, to be static. Within this zone there is one pumping station remaining in operation for the benefit of Steetley Thrislington Quarry works. The present agreement has no provisions for a review by British Coal until termination in the year 2000. British Coal maintain the equipment and pay all charges including power which is then reclaimed from Steeley Quarries plus administration cost.

In North West Durham, there are no working mines and underground water now issues to the surface at numerous points with no known discharge problems.

### **2.3 Water Management following cessation of mining**

Following the closure of Easington and Vane Tempest \ Seaham Collieries, pumping at all the Durham Pumping Stations is not required from a British Coal operational viewpoint.

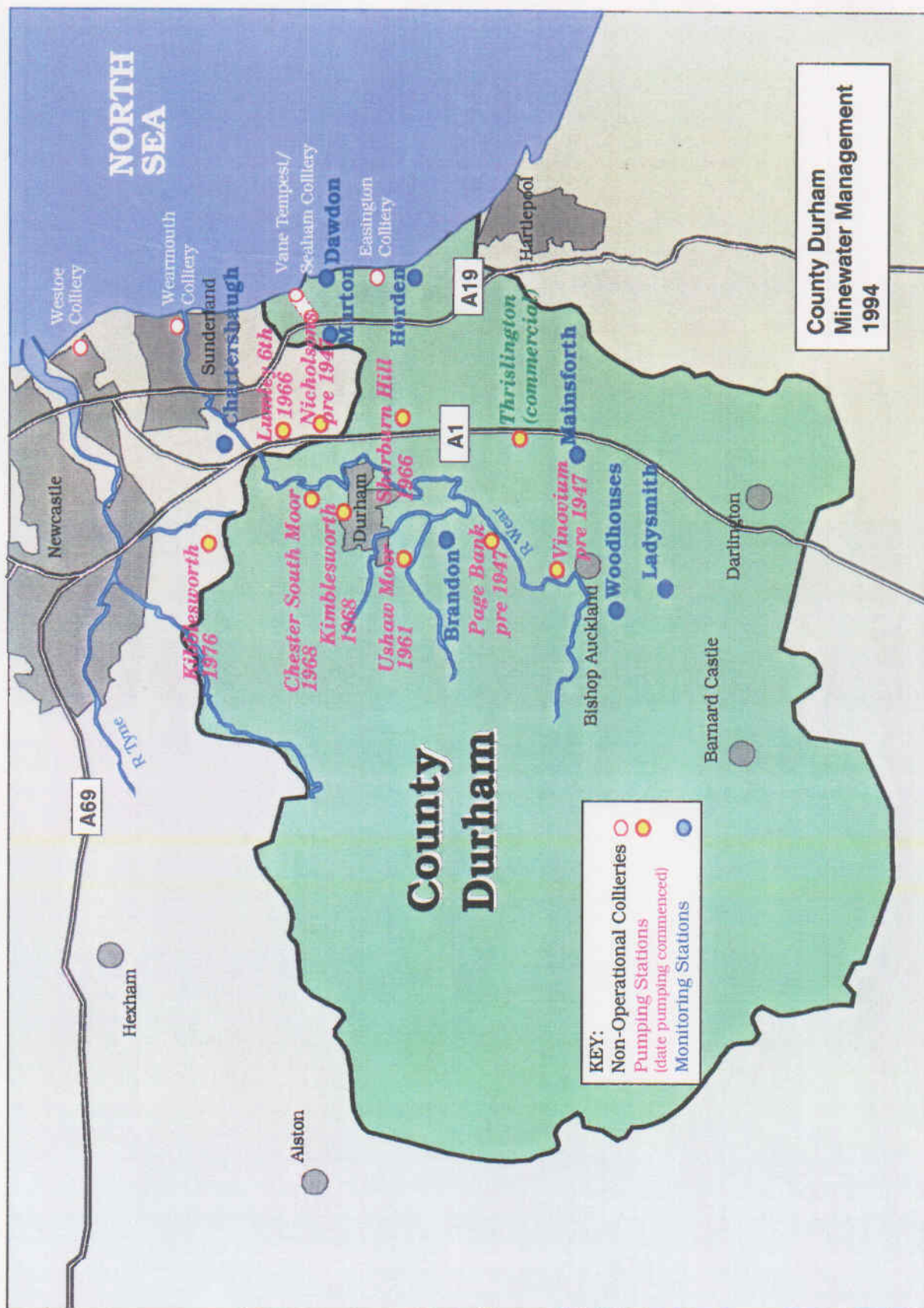
Minewaters throughout the Durham Coalfield, currently controlled by these pumping stations, will, upon cessation of pumping rise to natural water table level, subject to issues to surface from mine outlets etc.

It is anticipated that these issues may be from low level shafts in Haugh lands along the banks of the Rivers Tyne and Derwent, and the beach tunnels from the shafts of the South Durham coastal collieries.

In January 1993, Consultants for the National Rivers Authority produced a report, with the benefit of groundwater modelling, indicating, in addition to predicted discharges to the River Tyne and the Coast, that the upper reaches of the River Wear would also be subject to discharges of mine water

Discussions with the N.R.A. indicate that, on the basis of the predicted timing of the water table rebound, discharges to the upper reaches of the River Wear were of the most importance.

Predictions (Wardell Armstrong) on discharge quality identify the area between Durham and Chester le Street as where the highest concentrations of ferruginous water into the River Wear are most likely to occur. The water quality at the coastal outlets is also likely to be susceptible to high concentrations of iron.







### 3. Progress

It was agreed, following technical discussions, by the National Rivers Authority to cease pumping at all coastal collieries, including Westoe and Wearmouth, in the Durham Coalfield and at Horden and Murton pumping stations.

LOCATION	CESSATION OF PUMPING
Vane Tempest / Seaham Colliery	No Pumping Operations
Easington Colliery	October 1993
Murton Pumping Station	December 1993
Westoe Colliery	February 1994
Horden Pumping Station	March 1994
Wearmouth Colliery	April 1994

Investigations have shown that water levels in these collieries could be controlled in the future, if necessary, by renewed pumping.

The following shafts have been left open for water monitoring / potential future pumping / gas venting :

- ◆ Westoe Crown
- ◆ Wearmouth 'B'\*
- ◆ Easington South
- ◆ Horden South
- ◆ Hawthorn

\*Shaft filled and fitted with Gas venting equipment. Water can be monitored within 45 metres of the surface.

The minewater adits at Dawdon and Easington have been made secure for possible future natural drainage outlets. This could not be accomplished at Horden as the adit is inaccessible.

With respect to the outlying pumping stations an investigation programme was agreed with the N.R.A. to enable accurate predictions to be made converging flow routes for minewater to move from the west of the Durham Coalfield to the coastal collieries where overflow can occur to the sea. The programme is intended to observe, through monitoring (quality and quantity), how the cessation of pumping at selected stations within the county affect the overall water regime and to give time for further study. Thus, if necessary, the ability to construct active anti pollution measures to deal with the initial flows at selected locations could be fully assessed.

This includes the construction of 11 observation boreholes fitted with automatic recorders. These have also been fitted on the pumping stations.

In line with the "Memorandum of Understanding" a document priding technical information to assist in assessing the likely consequences related to cessation of groundwater pumping at Nicholsons, Sherburn Hill and Lumley 6th Pumping Stations was presented to the N.R.A. (Appendix 3).