



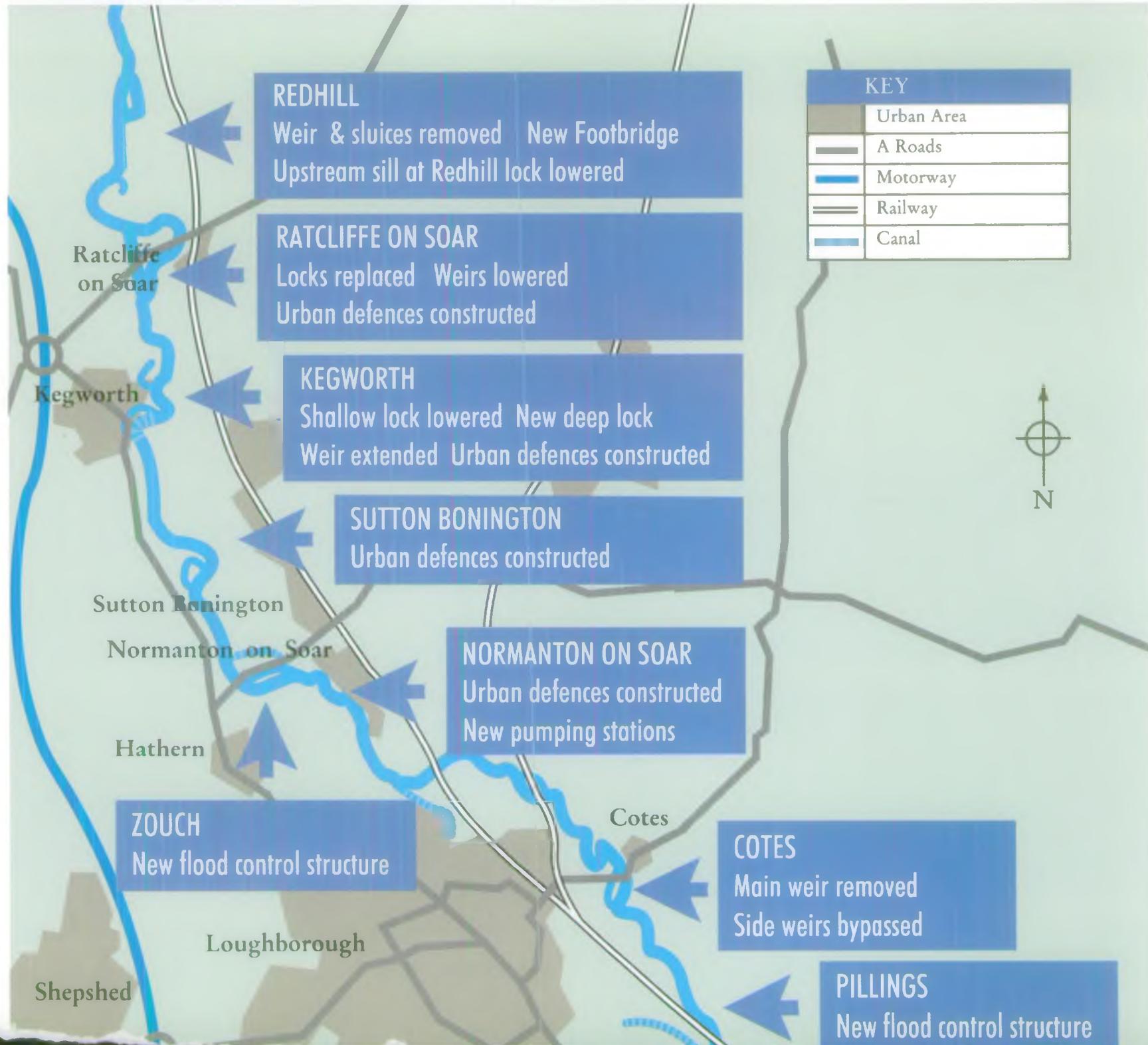
NRA

*National Rivers Authority  
Severn-Trent Region*



THE SOAR VALLEY  
IMPROVEMENT SCHEME







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# INTRODUCTION

## SETTING THE SCENE

The River Soar is 80km (50 miles) long from its source at Copston Magna, in Warwickshire, to its confluence with the River Trent at Redhill in Nottinghamshire. It drains an area of approximately 1,360 km<sup>2</sup> (520 square miles) which is mainly used for agricultural purposes with the exception of the Leicester and Loughborough conurbations. Approximately 76 km of the River Soar is classified as main river. Its major tributaries are the River Sence, River Wreake, River Eye, Rothley Brook, Black Brook and Kingston Brook. The gradient of the river varies from 1 in 550 in the upper reaches to around 1 in 3,090 in the lower reaches.



## NAVIGATION

Much of the River Soar was canalised 200 years ago and has now become a very popular leisure and recreational waterway linking the Grand Union Canal to the River Trent. Over the years, British Waterways and its predecessors constructed a series of weirs and locks for the purpose of maintaining the required navigable depths. Consequently, the water levels are kept unnaturally high and there is very little freeboard (the difference between general ground levels and the water level in the river). This conflicts with the needs of agriculture for good drainage and hinders the evacuation of flood water.

## FLOODING

Since the late 18th century, the Soar valley has suffered frequent and extensive flooding. Houses, business premises, farms and roads in the valley have all suffered the effects at least once every winter. Inundation of up to one metre in depth has been known to occur across floodplains which are about one kilometre in width. The frequency of flooding and the poor drainage are due in part to the shallow natural gradient of the river, but mainly due to the locks and weirs constructed in the 18th century to facilitate navigation.

Notable floods on the River Soar occurred in 1900, 1910, 1932, 1947, 1961, 1968, 1975 and 1977. Although the majority of these floods caused serious problems both upstream and downstream of Leicester, the city itself has generally been free from flooding from the River Soar due to major flood alleviation works carried out by Leicester Corporation in the late 19th century.

Downstream of Leicester, villages such as Ratcliffe-on-Soar, Sutton Bonington, Kegworth and Quorn as well as properties alongside the River Soar at Thurcaston Road, Leicester all suffered frequent flooding from the river. Most roads linking the towns and villages on either side of the Soar valley were subject to flooding, often several times each year.



# THE SOAR VALLEY IMPROVEMENT SCHEME

## BACKGROUND

In the 1960s, Engineers recognised the need for an improvement scheme but were unable to make any progress due to the complicated nature of the river system. Conflicting requirements affecting considerable lengths of the river made it extremely difficult to formulate and to assess accurately any large scale schemes for reducing flooding in the Soar valley. However, in the 1970s developments in computer technology made it possible to set up a mathematical model of the river between Leicester and the River Trent confluence at Redhill. The former Severn Trent Water Authority (STWA) commissioned Hydraulics Research to make a computer simulation of river flows and of proposed flood protection measures. This was one of the prototype models of the sort which are now in every day use.

## OBJECTIVES OF THE SCHEME

The objectives of the Soar Valley Improvement Scheme were to alleviate flooding of:

- Villages and townships within the Soar valley;
- Roads crossing the valley; and
- Agricultural land, while at the same time improving land drainage.

## LEGISLATION

Due to the fact that the Soar navigation had been set up by an Act of Parliament, and the proposals involved changing navigation levels, Severn Trent Water Authority had to promote a Private Bill in Parliament before proceeding with implementation of the project. Accordingly, a Bill was lodged in November 1981. The Bill, which covered the entire project and not just those where navigation levels were to be changed, was the subject of an inquiry by a Select Committee of the House of Lords, following concerns expressed by conservation bodies. The STWA demonstrated at the Inquiry the careful manner in which it would approach the project and measures it would adopt to minimise adverse impact on the environment. The Bill was finally passed as the Severn-Trent Water Authority Act 1983, receiving the Royal Assent on 1 December 1983.

## THE PREFERRED OPTION

There were a number of ways in which the problems could have been dealt with. The preferred option was selected to give the best balance between economy and the navigational and recreational uses as well as environmental considerations.

Following the feasibility study the preferred option for the levels of flood protection to be provided by the scheme were:

- 100 year return period for approximately 600 properties in Thurcaston Road, Leicester, Ratcliffe-on-Soar, Sutton Bonington, Kegworth, Normanton-on-Soar and Quorn.
- 10 year return period for twelve roads crossing the valley.
- 10 year return period for approximately 2,500 hectares of agricultural land.

## OUTLINE PROPOSALS

The scheme included the following main features:

- Regrading and marginal widening of the River Soar using the dredged material to form low level flood defences without any freeboard.
- Major lowering of the normal water level downstream of Kegworth Weir.
- Construction of new replacement navigation locks.
- Construction of flow control structures.
- Construction of defences for villages at risk from flooding.

## ENVIRONMENTAL AND ECOLOGICAL CONSIDERATIONS



STWA and its successor the NRA consulted widely with local and national organisations from the inception of the scheme. Detailed negotiations took place with the Nature Conservancy Council, the Countryside Commission, the Leicestershire and Rutland Trust for Nature Conservation and the Royal Society for the Protection of Birds. These resulted in the incorporation of features into the scheme necessary to allay anxieties about various areas of conservation and to further the conservation of other localities at the request of the NCC. All possible measures were taken to safeguard as far as possible wildlife habitats in areas affected by the scheme.

All the proposals included measures to minimise the impact on the environment and to enhance it where opportunities existed. At Lockington Marshes for example, the main drainage structure incorporates a penstock for release of flood waters into the marshes behind the flood defence in order to maintain the water quality in the marshes. Lakes and ponds were also created where feasible.

## FINANCIAL APPROVAL AND COMMENCEMENT

The Soar Valley Improvement Scheme was approved and financed by the Severn-Trent Regional Flood Defence Committee. Contributions have been made by the Ministry of Agriculture, Fisheries and Food in the form of Grant Aid.

The scheme which commenced in 1984 proposed works along the River Soar from its junction with the River Trent up to its confluence with the River Wreake at Cossington.

By 1988, the agricultural scene in England & Wales had changed considerably such that the expected agricultural benefits of the scheme would not be as high as forecast. A financial reappraisal of the works still to be constructed, concluded that the proposals upstream of Quorn were no longer economically viable.

A decision was therefore taken by the Regional Flood Defence Committee on 21 July 1989 to carry out works only as far upstream as Quorn.

## THE SCHEME IN DETAIL

Implementation of the Scheme commenced in January 1984 with the project being divided into a number of phases:

### Thurcaston Road, Leicester

Flood defences have been constructed on both banks of the River Soar upstream of Thurcaston Road Old Bridge in Leicester to protect industrial property.

### Sawley to Redhill

An earth embankment flood defence has been constructed along the south bank of the River Trent between the railway crossing at Sawley and the mouth of the River Soar. The defence continues on the west bank up to Redhill Weir. A flap controlled outlet from the Site of Special Scientific Interest at Lockington Marshes was incorporated in the flood defence. This structure also has a penstock for flooding the marshes with river water to provide dilution of the marsh water if required due to the reduced frequency of flooding.



### Redhill to Ratcliffe-on-Soar

The weir at Redhill was removed thus dropping the water levels upstream to the same level as the water downstream, and the upstream sill at Redhill lock was lowered. Redhill lock is maintained by British Waterways only as a check point, as boats can proceed through the lock without having to change level. A new footbridge was constructed close to the original weir and footbridge at Redhill lock. A floating boom has been provided immediately upstream of the footbridge to safeguard navigation users from getting trapped underneath it. The river channel upstream has also been widened and regraded to ensure sufficient draft for navigation.

This reach of river featured up to 80 moorings constructed of old scaffold tubes and timber. These had grown in number over the years and the planning authority was unable to have them removed or modified. These moorings were replaced with floating moorings with arrangements for moored boats to "ride" with changing levels without capsizing. It was also possible to move the flood defences away from the river banks in order to avoid a restricted outlook for the pleasure craft which use the river.

## Ratcliffe-on-Soar to Kegworth



At Ratcliffe-on-Soar earth embankments approximately 1.5 metres (4.9 feet) high have been constructed alongside the village boundary to prevent the frequent flooding of the village. Landscaping including tree planting was incorporated into the scheme.

The weirs at Ratcliffe were lowered by approximately 800mm (2.67 feet) and a new footbridge constructed. A new lock was constructed at Ratcliffe alongside the old lock to match lowered water levels. The old lock was backfilled and converted into a picnic area.

The channel has been regraded and widened at narrow sections with the dredged material being spread on both banks to an average height of 0.48 metres (1.57 feet) above the existing ground level. Care was taken to conserve reed beds where their presence did not inhibit navigation and, where necessary, shallows were provided for replanting.



## Kegworth to Zouch



At Kegworth the “Shallow Lock” was lowered and a new “Deep Lock” was constructed to replace the existing deep lock. In the latter case, British Waterways funded and constructed the approaches to the new lock. Both the river and canal bridges were underpinned, the channel regraded between Kegworth Bridge and Kegworth Weirs and the length of the main weir was increased by 35 metres.

The village of Kegworth is now protected by flood defences consisting mostly of earth embankments. Landscaping including tree planting was incorporated into the scheme.

Between Kegworth Weir and Devils Elbow the river was regraded and the towpath along the right bank was modified to incorporate a flood defence. Similar regrading continued upstream to Zouch with a flood defence being constructed along the south side of Rempstone Road to protect both the road and fields to the north from flooding.

Other flood defences were constructed on the western side of Sutton Bonington to protect the village and to protect a small number of properties at Zouch.



### Zouch to Cotes

Regrading and widening of the channel has taken place in this reach, although the length of river through the Site of Special Scientific Interest at Loughborough Meadows was excluded for ecological reasons. The SSSI is the largest remaining example of alluvial flood meadows in Leicestershire and is dependent on the annual inundation of flood water.



At Normanton-on-Soar a flood defence along the western side of the village has reduced flood risk while two new pumping stations enable all the land south of Normanton and east of the River Soar to be drained effectively.

A radial gated flow control structure has been installed at Zouch. Under normal operation the radial gate remains closed and water passes over the adjacent weir. During flood conditions the gate is slowly raised by counter balance weights to allow water through the structure. The approach channel to the structure has floating booms across it to prevent boats from being drawn in. A flashing light has been installed to warn navigation when the flood gate is in operation. An emergency mooring has also been provided upstream of the structure for use by boat users in an emergency.





### Cotes to Quorn

Dredging and widening of the channel has taken place with several areas receiving special treatment for environmental reasons.

At Pillings, a steel radial gate structure, similar to that at Zouch, has been constructed to enhance the flood discharge capacity at this location. As at Zouch, there is a floating boom at the entrance to the approach channel to ensure the safety of navigation users.

At Quorn flood defences of varying construction have been provided to suit the particular stretches of bank. Landscaping has also taken place where appropriate.



## CONSULTATION

Extensive consultations were carried out with the following groups and organisations:

- British Waterways and through them the various local and national navigational bodies.
- County, District and Parish Councils whose areas were covered by the project.
- Nature Conservancy Council (now English Nature) and through it the RSPB.
- Local Nature Conservation Trusts (Leicestershire & Rutland and Nottinghamshire).
- English Heritage.
- Country Landowners Association.
- Countryside Commission.
- National Farmers Union.
- Angling and Rambling Associations.
- Landowners and Occupiers.
- Canoe Union.
- British Horse Society.

## CONSULTANTS AND CONTRACTORS

During the design and construction of the scheme the following organisations, consultants and contractors were engaged (in alphabetical order):

- Birch Brothers
- British Waterways
- Christiani & Neilsen
- Clugston
- Costain
- Donald Willetts
- Sir William Halcrow & Partners
- Hydraulics Research
- Laurence Gould
- Lewin Fryer & Partners
- Lilley Construction
- Linpave
- Mac Donald & Partners
- Martyn Crowson
- Middlesex Polytechnic
- Midland Construction
- Midland Oak
- Millers (formerly Charles Gregory)
- Miller Buckley
- North Midland Construction
- Paul John Construction
- Shank & M'Ewan
- Tarmac Construction
- Tilbury Construction

## THE FUTURE

### MAINTENANCE

River maintenance and surveillance of the flood defences are essential to ensure that all of the benefits of the improvement works are achieved. On the River Soar the main aspects are:

- Ensuring that the design river capacity is maintained.
- Ensuring that the flood defences are at the design levels.
- Ensuring that the flow control structures at Pillings and Zouch operate effectively.

NRA staff are available around the clock to ensure that defences work properly.

## KEY FACTS

- Number of Properties Protected to a 100 year return period: 600
- Area of Agricultural Land Protected to a 10 year return period: 2,500 hectares
- Number of roads protected to a 10 year return period: 12
- Length of Hard Defences 2 km
- Length of Soft Defences 32 km
- Total Cost of Scheme: £10 million
- Scheme Commenced: January 1984
- Scheme Completed: October 1995



ENVIRONMENT AGENCY

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*Severn Catchment below River Teme confluence  
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**LOWER SEVERN AREA OFFICE:**

Riversmeet House, Newtown Industrial Estate,  
Northway Lane, Tewkesbury GL20 7JG  
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*Severn Catchment down to and including  
River Teme confluence:*

**UPPER SEVERN AREA OFFICE:**

Hafren House, Welshpool Road, Shelton,  
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*Trent Catchment down to and including  
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