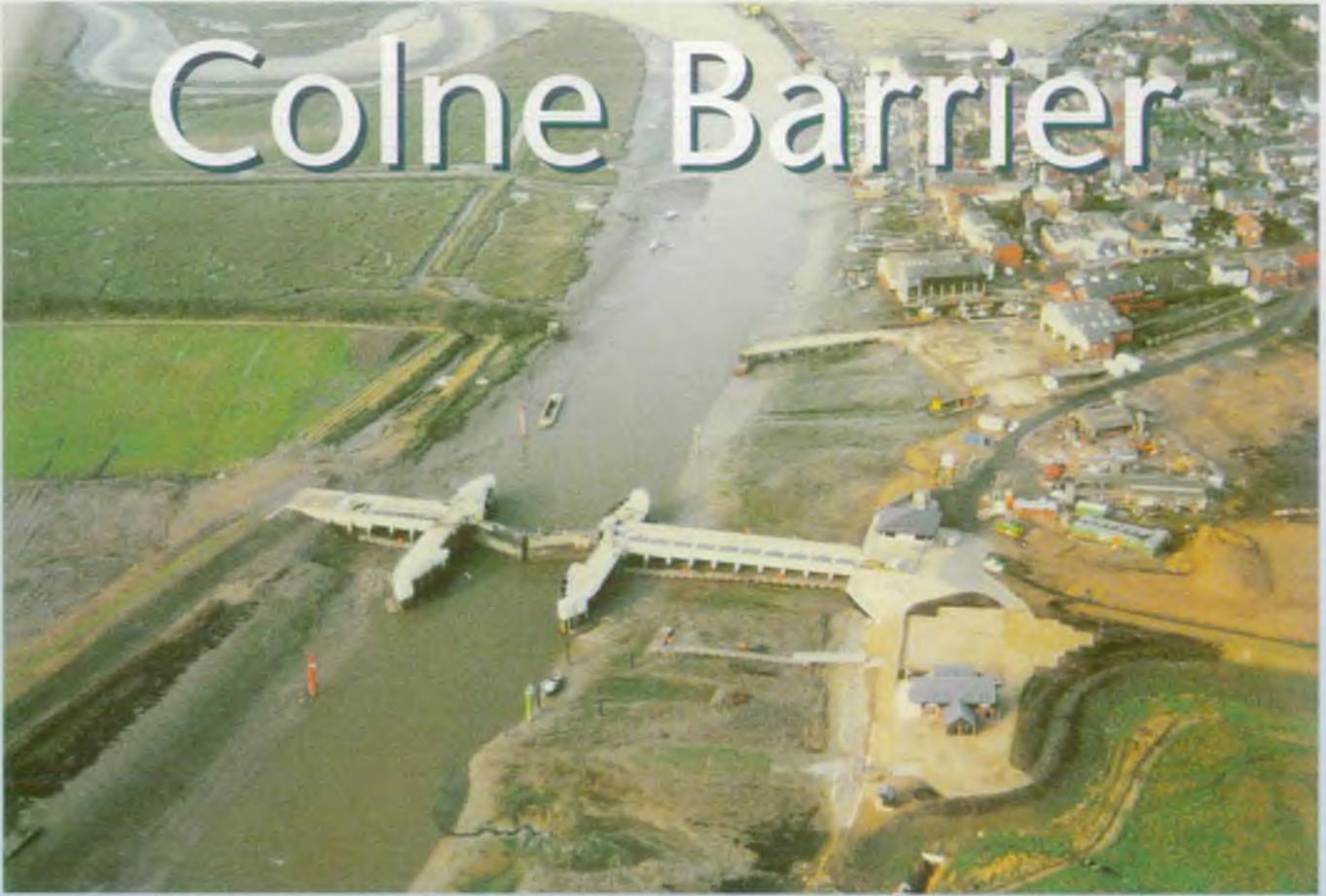


Colne Barrier



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Wivenhoe Waterfront (looking upstream from the barrier site)



The Aims

The Colne Barrier has been built to improve tidal defence of the riverside residential, commercial and industrial areas of Colchester and to provide a new defence for Wivenhoe and Rowhedge which used to be at risk from flooding by high tides.

The barrier scheme has achieved these aims with minimum disturbance to the natural environment, while allowing commercial and recreational activities to continue on the river.

The Barrier

The barrier has been built across the Colne on the downstream side of Wivenhoe. There are two gate piers either side of the navigation channel which may be closed by a pair of mitre gates similar to those used in locks on rivers and canals. This design keeps the overall height and size of the structure to the minimum and careful detailing reduces its visual impact on the surrounding area. To avoid problems of siltation or scouring in the river, the approach structures have sluices so that the distribution of the tidal flow in the river remains unchanged except when the barrier is closed.

The barrier is 130 metres wide with a navigation opening 30 metres wide, with 10 side sluices on the Wivenhoe side and three on the Fingringhoe side.

Flood Defence Banks

Earth banks have been built to connect the barrier structure to high ground on both sides of the river valley. The earth was taken from an area downstream of Ballast Quay, on the Fingringhoe side of the river.

Buildings

The control building on the Wivenhoe side has a shipping control room for the Colchester harbour master and a barrier operation control room for Agency staff. The electric-hydraulic operating plant is housed in a basement below the control rooms.

Downstream of the barrier, a new clubhouse with a launching ramp, car and dinghy parks has been built for Wivenhoe Sailing Club.

Barrier Operation

The barrier gates are usually open, so that navigation and the normal ebb and flow of the tide are unrestricted and are closed only to exclude high surge tides. The number of high surge tides varies from year to year, but on average four closures are expected each year.

View of barrier from upstream - high tide



How it Works

The primary source of power is 11KV mains electricity supplied to a transformer in the control house compound. A bank of batteries is continuously charged by the mains, so that control, communications, navigation, safety and security systems cannot be interrupted by power failure. There is a standby diesel-electric generator in the control house basement, ready to start up if the barrier has to be operated during a power cut.



The gates are moved by hydraulic rams, supplied with high pressure oil by two electric powered hydraulic pumps, one on standby in case of failure of the duty pump. Movement of the rams is controlled by electric powered valves in the hydraulic mains laid in ducts across the barrier and under the navigation channel.

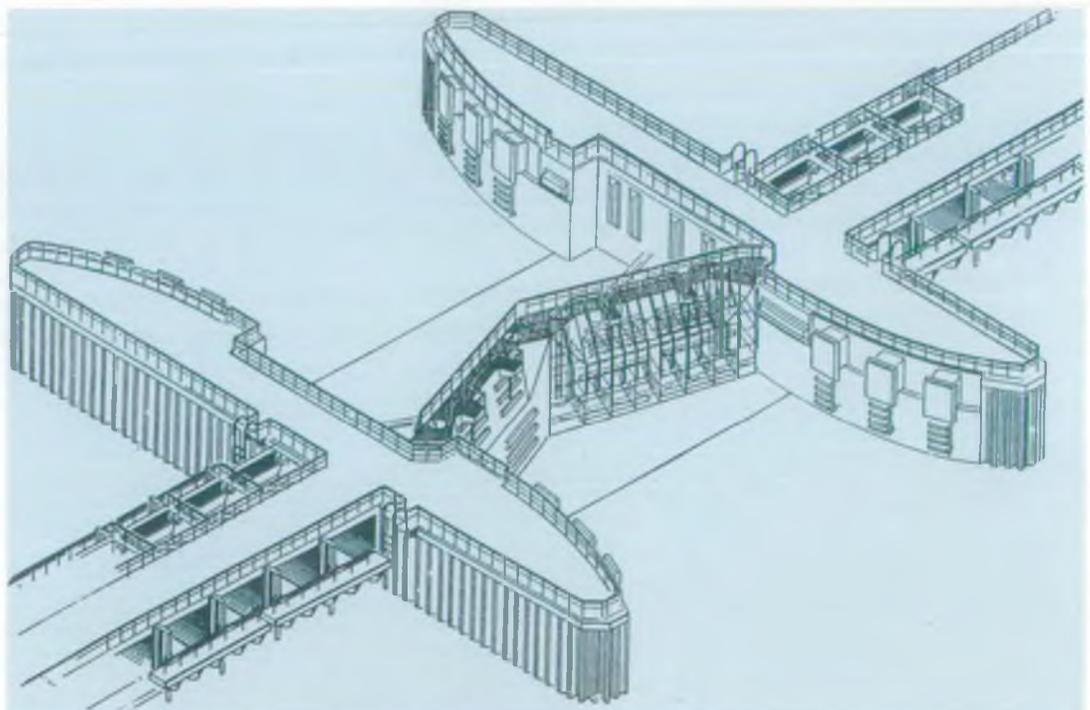
The operation of the valves is normally controlled by a small computer, programmed to shut the gates automatically in sequence after initiation by the barrier controller. Closure of the mitre gates takes seven minutes, and of the whole barrier about 10 minutes. Closure is monitored at the console in the control room and the controller can, if necessary, over-ride the automatic sequence.

The Environment

Study of the impact of the barrier on the natural and built environment during the design stages concluded that there would be no significant effects on the estuary's wildlife and conservation interests. Because the barrier will not be closed for long periods - only a few hours at each closure - there is not likely to be any threat to the aquatic environment or local fisheries nor any significant changes to the tidal patterns downstream of the barrier. The socio-economic effects are positive because the barrier has removed the threat of £60 million worth of damage due to tidal flooding.

The barrier has to be a substantial structure, to do its job of holding back tidal flood water up to 8m deep. However, the barrier does not intrude above the required flood protection level so its visual effect is minimised.

Pleasure craft use the river at Wivenhoe and Wivenhoe Sailing Club have for many years held races on the reach where the barrier now stands. Following agreement with the Club, a new clubhouse has been built downstream of the barrier, so that races may be sailed clear of the barrier.



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Public Inquiry/ Planning Approvals

Consultations and investigations were carried out to ensure that the barrier was the best option in terms of the environment, cost and effectiveness. A Public Local Inquiry was held in 1990 and planning approval was obtained in early 1991. An Environmental Statement was submitted as part of the planning application and to the public inquiry.

Questions and Answers

During the design and construction of the scheme many questions have arisen about it - here are some of those raised most often:



Q1 WHAT IS A SURGE BARRIER?

A. A surge barrier is built to prevent high surge tides from reaching the river upstream. Like the Thames Barrier, the Colne Barrier is designed to resist the highest tide likely to occur once in a 1,000 years. The barrier gates are normally open so that river traffic and the ebb and flow of the tide will continue, and will only be closed when a high surge tide is forecast.

Q2 WHAT CAUSES SURGE TIDES?

A. Low pressure areas moving from the North Atlantic area into the North Sea can cause a surge of water to raise levels above normal predicted high tides. The accompanying high winds cause increased wave action which can be damaging to tidal defences.

Q3 WHAT ARE THE BENEFITS TO THE COMMUNITY?

A. 500 homes and 600 acres of land, including 250 acres of industrial and commercial land, have been safeguarded against floods.

Q4 WHY DO WE NEED A BARRIER?

A. A lot of the land upstream of the barrier site is low lying. The waterfronts of Wivenhoe and Rowhedge used to have no flood defences and were at risk from local but serious flooding. Further upstream in Colchester, the Hythe Marshes and Roman River, large areas of low-lying land are protected by riverside defences. Many of these were not secure against extreme tides. The Agency studied the various options for flood defence (either a barrier or some form of raising and extending the present defences) and found that a barrier just downstream of Wivenhoe was best in terms of costs, benefits and minimising environmental impact. Furthermore, without a barrier, Rowhedge and Wivenhoe could not feasibly be protected since floodwalls along the waters edge (up to 2 metres high) would make an unacceptable intrusion into their access to and from the river.





View of the barrier from upstream - low tide

Q5 WHY JUST DOWNSTREAM FROM WIVENHOE?

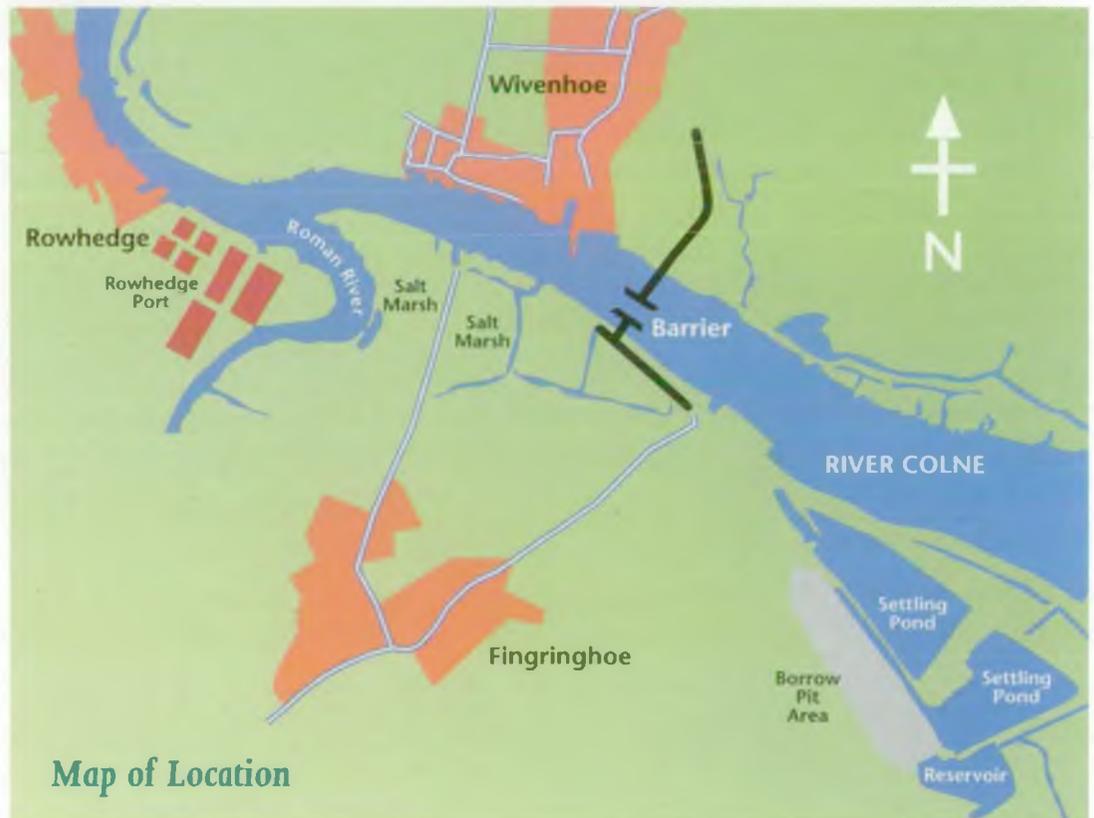
A. The location of the barrier was considered from a number of points of view. To protect the greatest number of people and properties it should be downstream of Wivenhoe. To keep costs down, it should be as far upstream as possible. To minimise interference and risk to large ships it should be on a length of river which is straight for about 200 metres either side of the barrier and where ingoing and outgoing vessels do not pass each other. The chosen site is the only one that satisfies this requirement. It should be far enough downstream so that, if there is heavy rain and a high discharge of water from the River Colne and Roman River when the barrier is closed, there is a sufficient area of river upstream of the barrier to contain this flow without causing flooding. This required it to be at Wivenhoe or further downstream. All these points led to the selection of the site where the barrier now stands.

Q6 HOW OFTEN WILL IT CLOSE?

A. The number of high surge tides varies from year to year but on average it will close four times a year. In some years it may be more, in others less.

Q7 WHO CONTROLS THE BARRIER?

A. The Anglian Region of the Environment Agency controls, operates and maintains it. The necessary powers have been given under an Order from the Ministry of Agriculture, Fisheries and Food, under the Thames Barrier Act, which extends to all rivers in Essex. This gave us powers to build the barrier and will allow us to close it to prevent flooding, for maintenance or in an emergency, for instance to contain pollution. Navigation through the barrier is controlled by the harbour master from a new combined harbour office and Environment Agency control building at the barrier.



Map of Location



Q8 HOW LONG DID IT TAKE TO BUILD & HOW MUCH DID IT COST?

A. Construction started in Autumn 1991 and completion was late in 1993. Construction works have cost £14.5 million.

Q9 WHY DIDN'T THE AGENCY JUST IMPROVE THE OLD DEFENCES?

A. We could have, but it would have been very expensive to rebuild most of the river walls in Colchester. We would have had to raise the floodwalls by about 0.6 metre, making them very high and intrusive. Most importantly we would not have been able to protect Rowhedge and Wivenhoe.

Q10 HAS IT AFFECTED SAILING?

A. Strongest ebb and flow tides are just over 2 knots in the main channel. This is acceptable to powered craft but sailing dinghies may have difficulty at some states of tide and wind. To relieve this, a new clubhouse with dinghy park and slipway have been built for Wivenhoe Sailing Club just downstream of the barrier, so that races can be sailed clear of the barrier.

Q11 DOES THE BARRIER AFFECT CURRENTS, WATER LEVELS AND SEDIMENTS IN THE RIVER?

A. The barrier has a central navigation opening 30m wide and sluices across the mudbanks on both sides. These have been built to maintain the same distribution of flow across the width of the river and to cause minimum changes in the currents. The barrier will not increase high tide levels in the river downstream, so downstream flood defences will not be affected. Some local minor changes in river bed levels may occur on the mudbanks near the barrier but overall there will be no significant changes. The Agency has agreed with English Nature and Colchester Port Authority to monitor tide and river bed levels to check that no serious changes are taking place. Information received so far indicates that the barrier is having little effect on the river.

Q12 DO WE STILL NEED THE DEFENCES UPSTREAM OF THE BARRIER IN COLCHESTER?

A. The earth walls protecting the marsh areas in the Colne and Roman River valleys will still be maintained, but will not need to be raised. A short length of the defences in the Hawkins Road area of Colchester where ground levels are particularly low will need to be retained, and this has been rebuilt. Further minor works may be necessary at other places, near Hythe Bridge for example, where ground levels are low.

Q13 WHAT ABOUT PUBLIC SAFETY?

A. The barrier will be opened for public access only when Environment Agency staff are on hand to ensure safety. The barrier



has become a popular venue for guided tours since its completion. Schools, in particular, find such visits interesting and informative.

Floating gangways are moored along the upstream and downstream faces of all the sluices so any small boat that drifts onto them will be safe and the crew can, if necessary, get to the shore.



Q14 HOW WILL IT AFFECT COMMERCIAL SHIPPING?

A. The barrier is closed infrequently and for as short a time as possible. Closures are co-ordinated with the harbour master to minimise interference with river traffic. Navigation through the barrier has been found to present no significant problem to ships.

Q15 WHAT HAPPENS IF A SHIP HITS IT?

A. It is important that the barrier still works under all foreseeable circumstances and it has been designed to minimise the risk of ships hitting it. In addition it has been designed to withstand a very large ship hitting it at a speed of 5 knots.

Q16 WILL IT AFFECT THE ENVIRONMENT?

A. Environmental studies have shown that the barrier should have no permanent effect on the natural environment. The Environment Agency has already started a ten year programme to monitor any changes in the tides, the saltings and mudflats and the wildlife in the estuary.

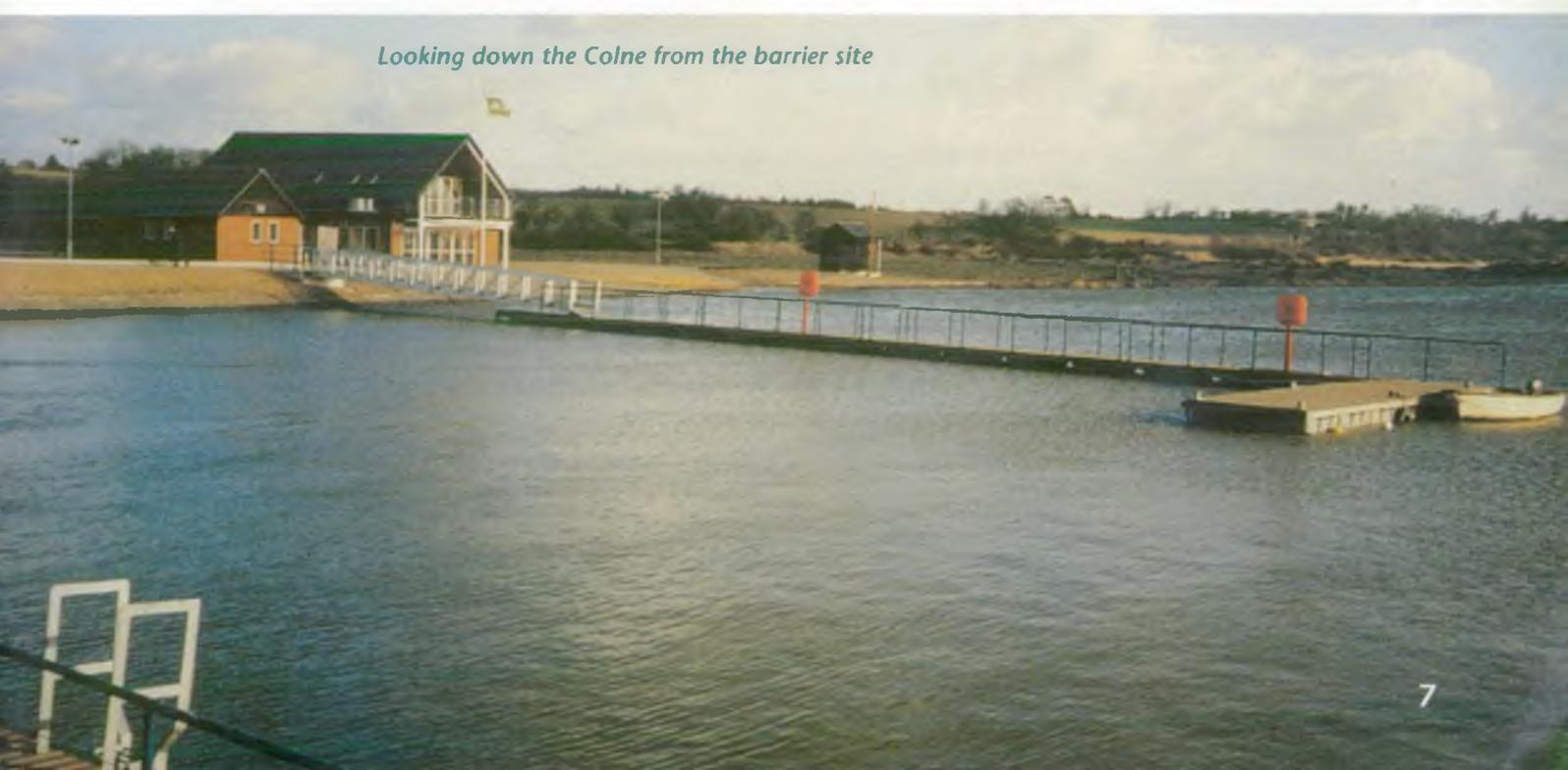
Q17 WHAT ABOUT FUTURE DEVELOPMENT UPSTREAM OF THE BARRIER?

A. The barrier defends the land upstream against flooding from all surges up to those likely to be exceeded only once in a 1,000 years. Existing agricultural areas will benefit from this protection. No development may take place on these areas without the approval of the local planning authority.

Q18 CAN THE BARRIER COPE WITH THE "GREENHOUSE EFFECT"?

A. An additional 250mm has been added to the barrier height to take account of sea level rise. Also the structure is designed so that it can be raised easily if a greater rise occurs. The current forecast for global sea level rise by the Intergovernmental Panel on Climate Change is 650mm by the end of the next century.

Looking down the Colne from the barrier site



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