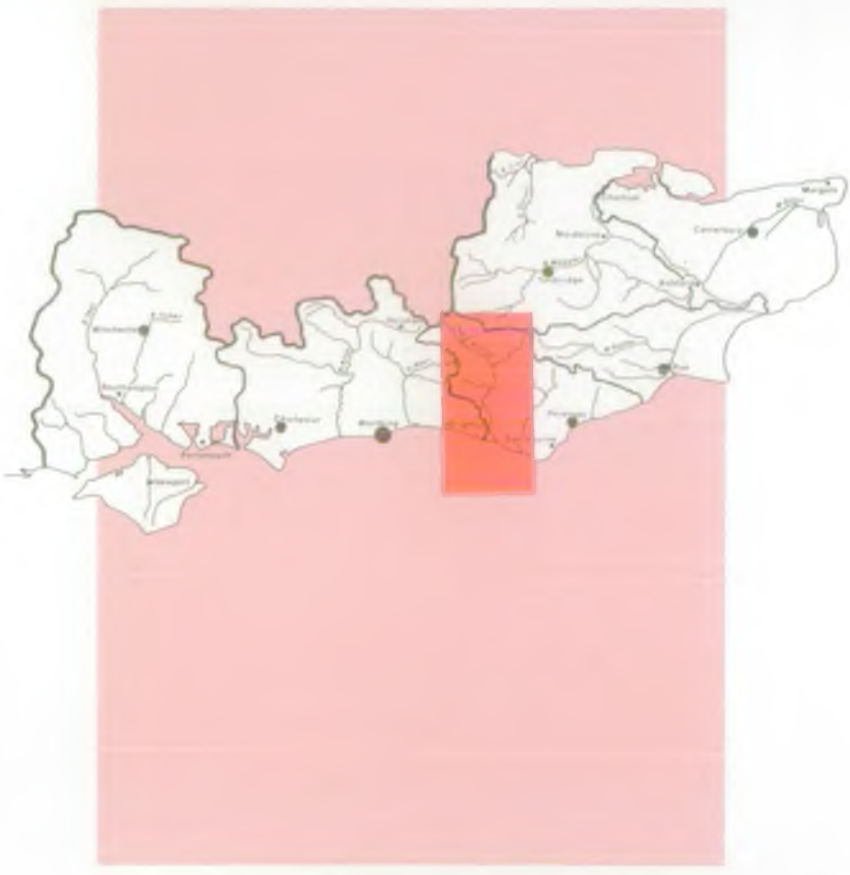
THE RIVER OUSE



NRA

National Rivers Authority

Southern Region

Guardians of the
Water Environment

THE RIVER OUSE

HISTORY

It was the ironstone of the Wealden Clay which gave birth to the iron industry in this country and all the upper tributaries of the River Ouse are characterised by abandoned iron working sites. Iron ore, in the form of nodules and tubular masses, was extracted from the base of the Wadhurst Clay, initially in the Iron Age but later by the Romans and sporadically through the ages until the industry reached its peak in Tudor Times. Only one iron working area was reported in Sussex in the Domesday Book but in 1253 for example, Henry III called on the Sheriff of Sussex to provide the royal army with 30,000 horseshoes and 60,000 nails. Gunfounding gave Sussex its reputation. Prior to about 1540 bronze cannons were widely used and they hurled stone cannon balls. Then in 1543 according to a document in the British Museum, *"the first cast peece that was ever made in the realme of England was made in Buckstede in the County of Sussex by Ralph Hogge, the Quenes gonstone maker and gonfounder of Yron".*

The waterfront, Lewes

The success of the Roman iron industry required good communications links and two of their Wealden roads forded the upper reaches of the Ouse. The London to Lewes Way, which was probably built in the 1st Century, forded the Shortbridge Stream at Piltdown and recrossed the main river at Barcombe. The London to Portslade Way forded the river in its headwaters above Lower Ryelands Bridge.

The Saxons used the river for transport and in Norman times the small town of Seaford became established. This had developed at the river's mouth which had been diverted eastwards by a shingle spit extending across the Bay from the west. Such shingle banks, which are a common feature of the Sussex coastline, are created by "longshore drift", a process by which sand and shingle are moved continuously from West to East by the action of wind and tides. Seaford declined as a port in the 14th and 15th centuries due to silting up of the river's mouth which had made it inaccessible to the large ships being built at that time. In 1539 a man-made cut was made to take the river directly to the sea, where the new exit was appropriately named Newhaven. The Ouse from Lewes to its source was known as the Middewinde, the

last evidence for this name being lost earlier this century when Midwyn Bridge was re-named Lindfield Bridge. From Lewes to the sea it was 'The Great River of Lewes', pronounced Looze, from which the modern Ouse derived its present name.

During Medieval times Lewes was the main port, with Cliffe Bridge providing the most downstream crossing point for road traffic from Pevensey, Seaford, Hailsham and Uckfield. It was not until 1784 that a lower crossing was established when a drawbridge was built at Newhaven.

Evidence of embanking dates from medieval times. The Bill of Sewers was passed by Parliament in the time of Henry VIII. Organised drainage of the Lewes and Laughton Levels was financed by a rate known as the "scot" (the origin of the expression "scot free"). The scot per acre ranged from 4d to 1s 6d.

In 1767, John Smeaton the famous engineer (and builder of the Eddystone Lighthouse), was commissioned to advise on land drainage in the lower Ouse valley. Major straightenings and bank raisings were carried out, but his full proposals were never implemented. As the demand for improved transport systems increased, the Ouse was improved under Acts of 1790 and 1791. These created two bodies:– The Company of Proprietors of the River Ouse Navigation, and The Trustees of the Newhaven and Ouse Lower Navigation, which improved the river for the navigation by barges up to 50 km inland. The Upper Ouse Navigation finally extended some 35 km and 18 locks above Lewes, but the development of the railway network in the middle of the 19th century brought an end to the undertaking. Ironically the bricks for Balcombe railway viaduct were carried in the barges from Newhaven. The original names of Inns set up to cater for barges still survive; The Anchor at Barcombe, The Sloop at Freshfield and The Horse and Barge at Piltdown.

COURSE AND GEOLOGY

The River Ouse is the second largest of the Sussex rivers, draining some 430 sq km to the point where it breaches the chalk escarpment of the South Downs at Lewes, but with an overall catchment area to its mouth of some 664 sq km. The main river is approximately 62 km long including a tidal length from Barcombe to Newhaven of 21 km. The total non-tidal channel length, including the River Uck and other tributaries is 252 km.

The headwater areas are characterised by deeply incised stream lines, and the topography is a mixture of gently undulating slopes in the Vale of Sussex and more hilly areas of the High Weald in the North. The main Ouse rises at Slaugham from the springs of the Tunbridge Wells Sands some 90 m above sea level. Apart from a faulted area of Weald Clay in the west of the upper catchment, the whole of the headwaters area is floored

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with the editorial assistance of the
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Based upon the ORDNANCE SURVEY maps with the
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Ardingly Reservoir


Balcombe Viaduct


Fish Pass at Fletching


Anchor Inn Sluices, Barcombe


Sewage Works, Barcombe


The main weir, Barcombe Mills


Fish Ladder, Barcombe Mills


Southease Bridge


View towards Lewes from Southease Bridge


Newhaven Harbour

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by Hastings Beds, the Tunbridge Wells Sand predominating. The impermeable areas are mainly confined to the Wadhurst Clay, the Grinstead Clay and the Weald Clay.

The tributaries of the Upper Ouse include the Northlands Wood Stream, the Ardingly and Shell Brooks (which have now been impounded below their confluence to create Ardingly Reservoir), the Cockhaise Brook, draining the Horsted Keynes area, the Scrase Bridge Stream, the Sheffield Stream, the Pellingford Brook, the Searles Stream and the Shortbridge Stream draining the Maresfield area.

The River Uck is the largest tributary. It rises in the High Weald and finds its way to the main river at Isfield by way of Uckfield. Other tributaries of the middle Ouse are the Longford and Bevern Streams which spring from the South Downs escarpment and flow north and east through the Weald clay before joining the non-tidal river. The Clayhill Stream flows to the river from the east and is also floored by Weald Clay. At Barcombe, an old tributary, the Iron River is now occupied by a 16 ha (40 acre) bankside storage reservoir and all that remains of its lower reaches is the Andrews Stream, one of five parallel channels taken by the Ouse at this point.

Below Barcombe, the river is tidal and flows through the South Downs escarpment to emerge onto the coastal flood plain. Lewes is a classic example of a "gap" town, utilising the strategic benefits of a narrow, steep sided valley. Tributaries of the lower Ouse include the North End Stream, Norlington Stream and Paper Mill Cut which outfall through tidal flaps and are subject to tidelock. The Winterbourne at Lewes is, as its name suggests, an ephemeral chalk stream which rises in the Lewes Road Valley in the winter months once rain has recharged the groundwater. The major tributary of the lower Ouse is the Glynde Reach which was closed to tidal influence in 1973 by the construction of a weir and pumping station at Beddingham.

WATER QUALITY

The continuing development of central Sussex, based on good road and rail links to London has resulted in some fourteen sewage works in the upper Ouse catchment, three others on the River Uck and a number of small works on the Bevern and Longford Streams. The two principal works are Scaynes Hill, which serves Haywards Heath and Lindfield, and Uckfield Sewage Treatment Works. These are two of the largest works in Sussex. The NRA sets stringent conditions on the quality and quantity of all permitted effluents to ensure that the river is protected to the appropriate standard. These standards are known as Environmental Quality Objectives and the River Ouse has an objective of class 1B (high water quality suitable for game and high class fisheries) except for a 3.5 km stretch between Scaynes Hill and Sheffield Park which has an objective of Class 2 (suitable for reasonably good coarse fisheries). This stretch is also protected by an EC Directive for Cyprinid Fisheries which requires a quality encompassed by the top of Class 2. The Cockhaise Brook above Holywell is unusual in having an objective of Class 1A; this stream is a source of water for domestic supply and the objective of 1A (water of high quality, suitable for potable supply

abstraction, game and other high class fisheries and of high amenity value) recognises its special need for protection.

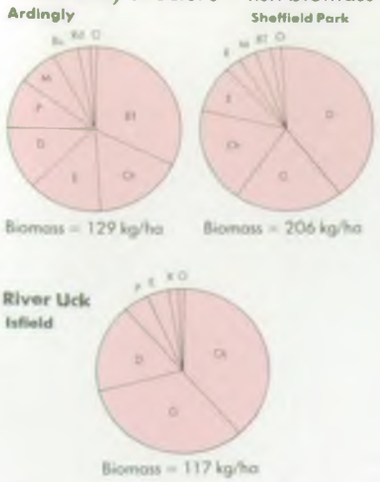
The main discharges to the tidal Ouse are from Lewes Sewage Treatment Works and Newhaven West Sewage Treatment Works. Effluent from Newhaven and Seaford will soon be discharged from a long sea outfall for which the NRA will set consent conditions. These will ensure that the quality of coastal waters is protected and that designated bathing beaches meet the standards set by the EC Directive.

FISHERIES

The upper tributaries of the Ouse and the main river above its confluence with the Shell Brook have a typical pool and riffle topography. Many of the streams on the High Weald are naturally acidic and aquatic invertebrate communities are impoverished, but they support populations of strikingly coloured, small brown trout. Other species of fish include brook lamprey, stone loach, minnow and bullhead.

Below Ardingly trout are replaced as the dominant species by fast water cyprinids such as dace, chub and gudgeon. In the past, fish populations below Scaynes Hill have been influenced by the quality of effluent. In the 1970s fish biomasses were artificially high, at around 400 kg/ha, due to

Community structure – fish biomass



Key
BT Brown Trout, Bu Bullhead, Ch Chub, D Dace, E Eels, G Gudgeon, M Minnows, O Other, P Perch, R Roach, Rd Rudd

the fertilising effects of the sewage effluent. Continuing urban development in the early eighties resulted in deteriorating river water quality and fish biomasses fell to around 150 kg/ha. Extensive improvements to the sewage treatment works, which were completed in 1989, have resulted in a greatly improved effluent so that fish stocks now appear to be well balanced and stabilising.

The river downstream from Gold Bridge (at Newick) has a lower gradient and hold species characteristic of slow flowing and still waters such as bream, roach and carp. Coarse fish are successful well into the tidal section though the limit of their range varies between Hamsey in summer and Lewes in winter, depending on salinity. The lower tidal section supports excellent stocks of mullet, flounders and bass.

The Ouse is renowned for the size of its sea trout which average 2–2.5 kg (4.5–5 lbs). Exceptional specimens reach 7.5 kg (16.5 lbs). Some adult sea trout enter the tidal river as early as May and June, depending on rainfall and flow, and attract a little angling attention between Hamsey and Barcombe.

The main spawning migration generally takes place at the end of the fishing season when large numbers of sea trout run upstream. Many of the fish show a preference for the tributaries which spring from the scarp face of the South Downs, but redds are cut in the gravels of all the headstreams which the sea trout can freely reach.

HYDROLOGY

The River Ouse provides the Mid-Sussex Water Company with its major sources of supply, comprising abstractions from the reservoir at Ardingly, Cockhaise Brook at Holywell and the Ouse at Barcombe. These abstractions are licensed by the National Rivers Authority and are subject to conditions which ensure that the water environment is protected and that the water resources are used effectively. Abstractions may be restricted at times of unusually dry weather.

At Ardingly the 86 ha (189 acre) reservoir is fed by the Shell and Ardingly Brooks which drain a catchment area of 2,590 ha (5,690 acres). The reservoir has a capacity of 4,770 Ml (1,050 million gallons). Some water is abstracted directly to the Shell Brook pumping station and this may not exceed 4.5 Ml/d. A compensation flow must be maintained in the Shell Brook below the reservoir to ensure that there is always 0.9 Ml/d in the Brook and 13.6 Ml/d in the main river below the Shell Brook confluence. The main role of the reservoir is to store water at times of surplus and release it at times of shortage so that more water is available for abstraction at times of low flow at Barcombe Waterworks, 23 km downstream. Whilst releases are taking place, the river benefits from augmentation flows between Ardingly and Barcombe. At Barcombe, abstraction may only take place when the river flow is greater than 18.2 Ml/d. A bankside storage reservoir of 16 ha (40 acres) forms part of the Barcombe Scheme.

The abstraction on the Cockhaise Brook supplies a small water treatment works on the river bank. Again, stream flows are protected by licence conditions.

In addition to the abstractions for public supply, there are a number of smaller licensed abstractions for agricultural purposes.

The National Rivers Authority monitors river flows using "Crump" gauging weirs on the Ouse and Shell Brook at Ardingly, on the main river at Gold Bridge and on the various channels of the Ouse at Barcombe. There are also level recorders at several points on the river system.

FLOOD DEFENCE

The Flood Defence Department of the National Rivers Authority is responsible for improving land drainage and protecting people and property from flooding.

River maintenance work is carried out routinely and includes hand weed cutting, bush trimming and removal of obstructions, chiefly in the upper catchment. There are automatic sluices at Anchor Weir and at Isfield Mill on the River Uck, but the sluices replacing derelict lock gates at Lindfield, Sheffield Park (Bacon Wish Lock) and Fletching are all hand operated. Flood relief sluices are associated with fixed weirs at Sutton Hall and Barcombe are also adjusted manually.

After serious flooding of Malling and Lewes in 1960, a major scheme of embanking and widening the river was carried out between Newhaven and Lewes. The river is now designed to carry a peak flood of 170 cumecs (3,230 mgd) without causing flooding to the town.

At Barcombe Mills, where the old locks and a series of weirs maintain a high head of water, there is a sub-atmospheric siphon with a capacity of about 45 cumec (850 mgd). When operating, this maintains a fairly stable upstream water level which prevents flooding upstream.

There are gauging weirs on the four other river channels at Barcombe Mills. The total capacity of the weirs and the siphon is 3,500 cumecs.

In the lower reaches of the river there are land drainage schemes benefitting the Glynde and Rodmell marshes. The two largest levels, Rodmell and Ranscombe Brooks, are pump-drained.

Maintenance of flood banks and protection against erosion are important on the lower Ouse, which being a man-made channel has fast flows on the ebbing tide. Drains and streams from the brooklands of the flood plain are all protected from saline incursion by tidal flaps, which must be maintained.

A speed limit of 5 knots along the tidal section is also enforced by the National Rivers Authority.

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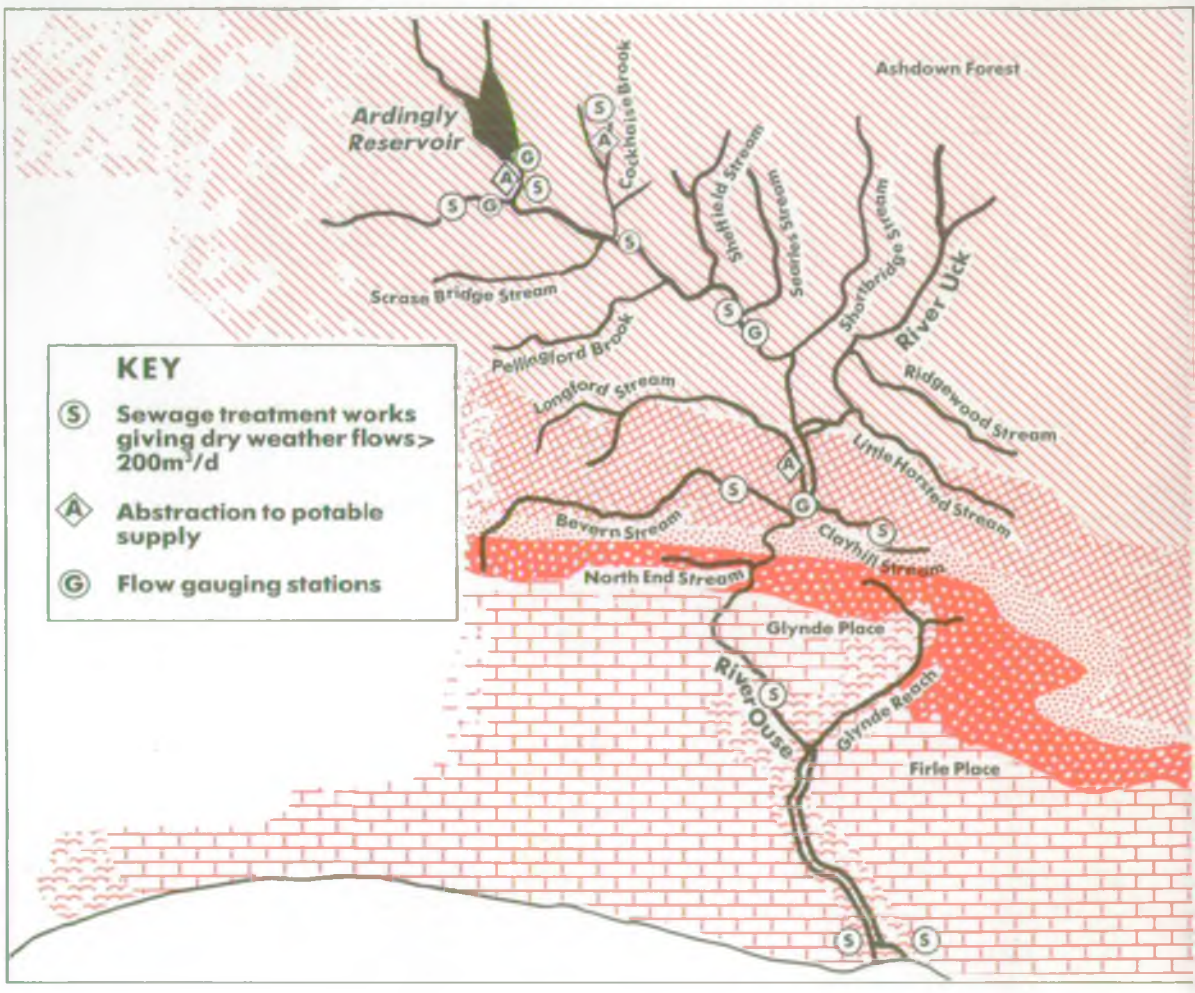
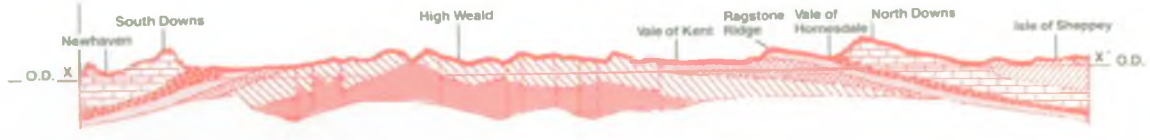
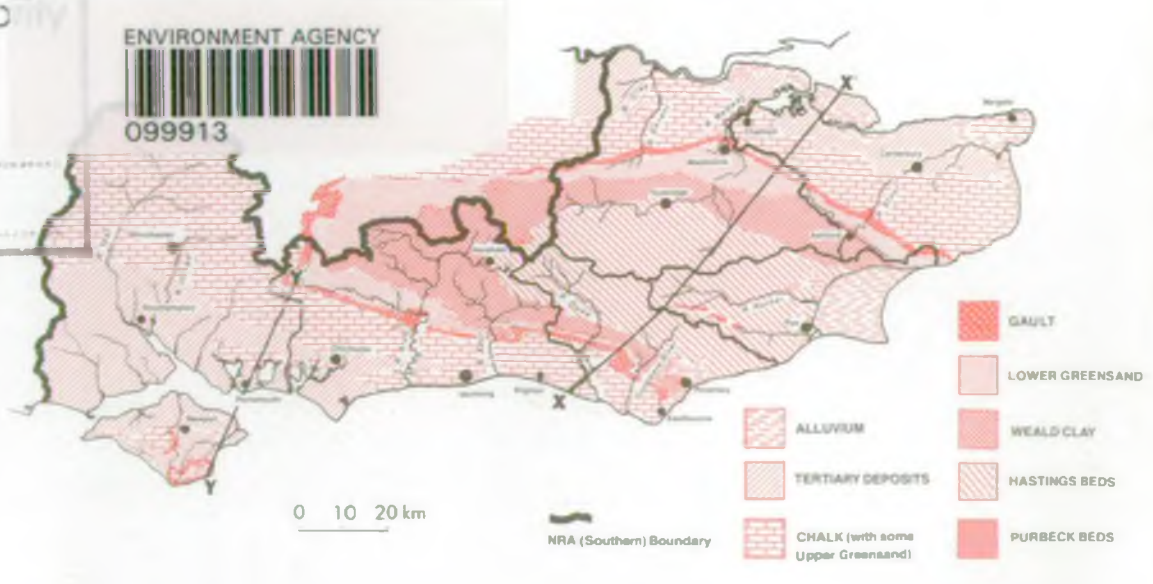


Sections showing the general relations of the rocks along the lines X–X', drawn on the map



Vertical Scale about ten times the Horizontal



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October 1991