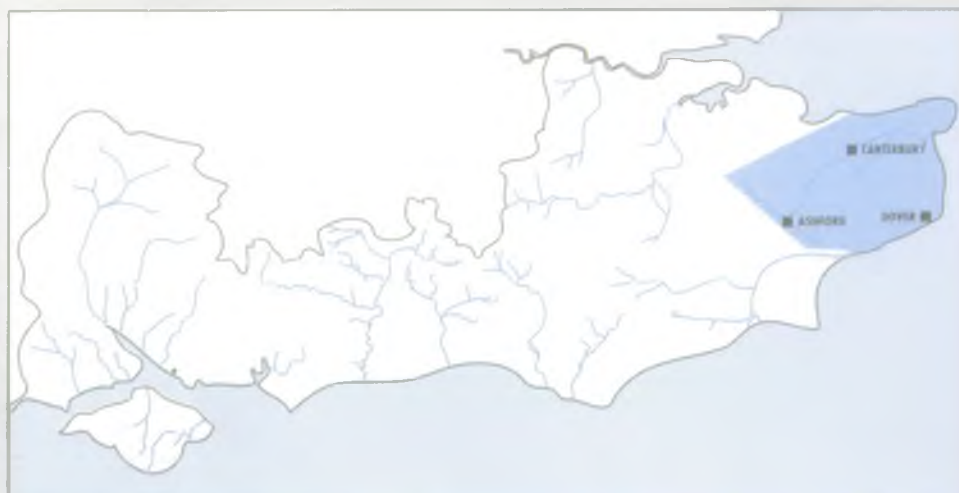


KENTISH STOUR CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

National Rivers Authority
Information Centre
Head Office

Class No

Accession No AM40



NRA

National Rivers Authority
Southern Region

MISSION STATEMENT

The NRA's mission is :

"We will protect and improve the water environment by the effective management of water resources and by substantial reductions in pollution. We will aim to provide effective defence for people and property against flooding from rivers and the sea. In discharging our duties we will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries, and coastal waters. We will be businesslike, efficient and caring towards our employees".

Our Aims are to :

- * Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters, through the control of pollution.
- * Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.
- * Provide effective defence for people and property against flooding from rivers and the sea.
- * Provide adequate arrangements for flood forecasting and warning.
- * Maintain, improve and develop fisheries.
- * Develop the amenity and recreation potential of inland and coastal waters and associated lands.
- * Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.
- * Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.
- * Ensure that dischargers pay the costs of the consequences of their discharges, and, as far as possible, to recover the costs of environment improvements from those who benefit.
- * Improve public understanding of the water environment and the NRA's work.
- * Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.

NRA Copyright waiver

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Published October 1994

ENVIRONMENT AGENCY



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Kentish Stour Catchment Management Plan

Kentish Stour Catchment Management Plan Consultation Report

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Kentish Stour Catchment Management Plan

WHAT IS CATCHMENT MANAGEMENT PLANNING?

The Water Act 1989 established the National Rivers Authority (NRA) as the "Guardian of the Water Environment", a non-departmental government organisation with responsibility for regulating and managing water resources, water quality in coastal and inland waters, flood defence, salmon and freshwater fisheries, water recreation and, in some areas, navigation. An additional duty laid on the NRA was to further conservation of the natural environment, seeking opportunities for enhancement wherever possible.

NRA Regions are defined by river basins catchments - singly, as in the Thames Region (which is divided into sub-catchments), or in geographical groups of individual rivers. With the exception of sea defence and coastal water pollution control, all the NRA's functions are managed within this catchment framework, the need to resolve conflicts arising from differing functional objectives makes it essential to integrate the NRA's planning in the same way.

Catchment Management Plans relate firstly to the Authority's own operations, including that of a statutory regulator controlling the actions of others. However, the Plans also offer an opportunity for input from the public to the development of NRA policy, and for the Authority itself to draw attention to its aspirations for the improvement of the water environment.

The Plans concentrate on topics where the Authority has a direct interest and are focused mainly on the river corridor, although some functions such as water resource management and pollution control inevitably extend over the whole catchment area. Whilst they lack the status of statutory planning documents, it is hoped that Catchment Plans will make a positive input to the Town and Country planning process.

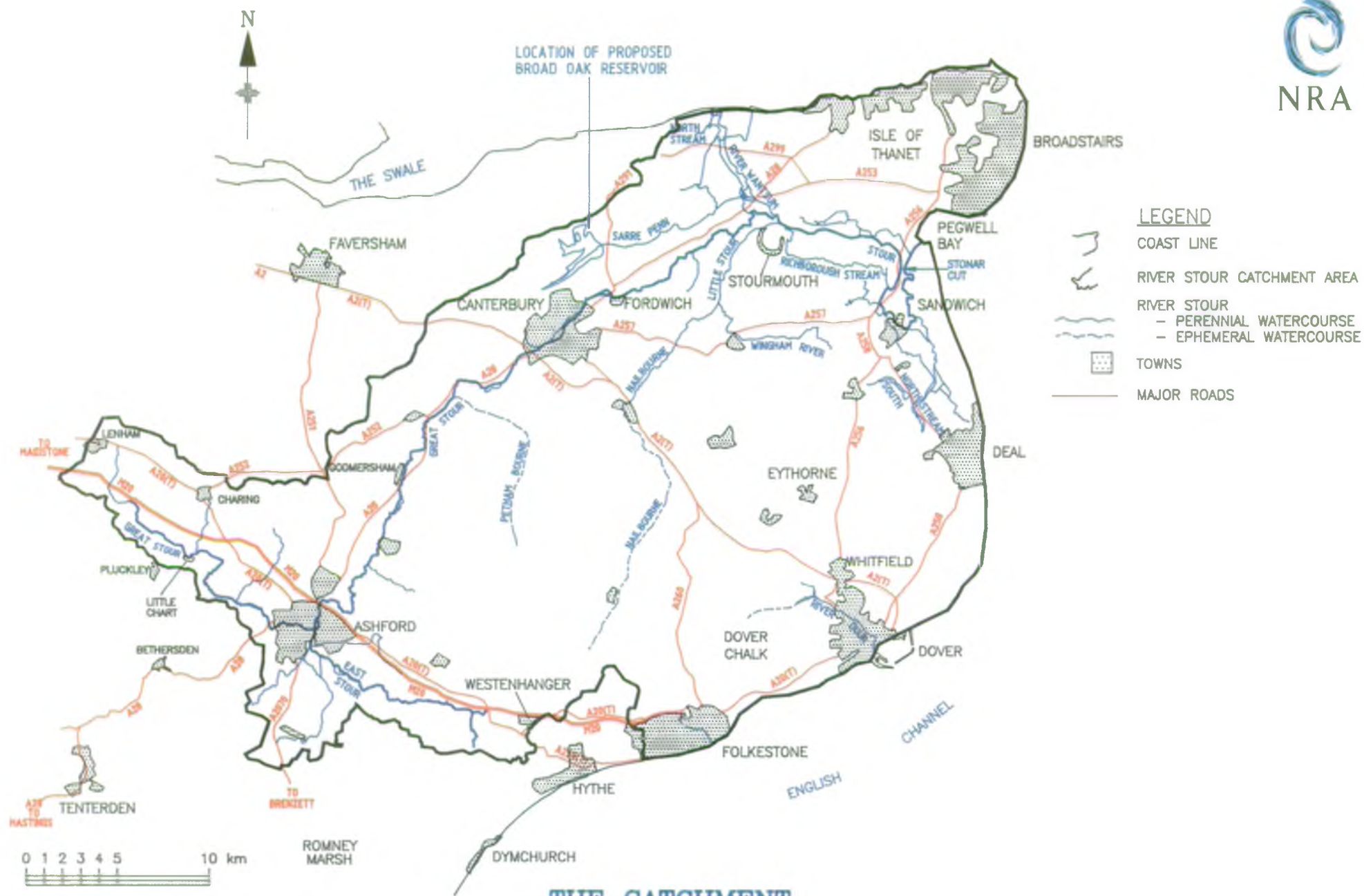
The NRA consults widely with interested organisations and the general public before definitive Catchment Management Plans are published. This Consultation Report is the first stage of the process and will be followed by a Final Report and Action Plan. The NRA will review Catchment Management Plans annually and they will normally be revised at five year intervals.

If you have any comments on this Consultation Report, please write to

The Catchment Planning Coordinator
Guildbourne House
Chatsworth Rd
Worthing
West Sussex
BN11 1LD

The consultation period closes on 1 February 1995.

SECTION A : GENERAL INFORMATION



Kentish Stour Catchment Management Plan

SECTION A : GENERAL INFORMATION

A1. THE CATCHMENT

This Plan covers the Kentish Stour catchment together with the Isle of Thanet, an isolated Chalk block forming the north eastern corner of Kent, and the Dover Chalk block which lies between the Stour catchment and the English Channel.

The River Stour rises as two main tributaries, the Great Stour at Lenham near Maidstone, and the East Stour at Postling near Folkestone. Beyond their confluence at Ashford the river flows north-eastwards in a steep sided valley through the North Downs to the city of Canterbury, where the river has been split into a number of channels which formerly powered mills and pumps. The tidal limit at Fordwich is just downstream of Canterbury, but the narrow embanked estuary extends some thirty three kilometres beyond this point, winding through lowland marshes to the sea at Pegwell Bay.

A further tributary, the Little Stour, drains much of the Chalk block south of Canterbury and joins the tidal Great Stour at Plucks Gutter, some thirteen kilometres downstream of Fordwich. The Chalk in this area is highly permeable and surface flows in the upper catchment are rare, occurring only in response to heavy rainfall. An example is the Little Stour above Littlebourne (known as the Nailbourne), a winterbourne which may extend up to thirty seven kilometres above the permanent source at Bridge when conditions are wet. As a result of subsidence following coal mining the lower reaches of the Little Stour are below high tide level, making it necessary to pump the flow into the Stour estuary.

The population of the catchment is around 450,000, concentrated in Ashford, Canterbury, Folkestone, Dover and the coastal Thanet towns. The main growth area is Ashford, which has prospects of significant commercial and housing development, including the International Freight Terminal for the Channel Tunnel. Away from these population centres agriculture has been highly developed, most intensively on the rich marshland soils of the Stour estuary. This land was first drained in the fifteenth century when it was grazed by sheep and cattle. Grazing remained the predominant land use until the 1950s, when improved drainage and increased mechanisation allowed the production of cereal and root crops. More recently, spray irrigation has enabled vegetable and salad crops to be grown on these fertile soils.

The marshes are a complex system controlled by a network of ditches, sluices and pumps, with the Stour being a source of fresh water in summer and acting as a drain in the winter. The area has great ecological value, which may be damaged by intensive agriculture.

Julius Caesar landed at Richborough when Thanet was truly an island and the River Wantsum a tidal inlet similar to the Swale. Since Roman times the whole area has been reclaimed from the sea and the estuary mouth has moved more than twenty kilometres from Stourmouth to Pegwell Bay. Canterbury was built where Watling Street (now the A2 London/Dover Road) crosses the River Stour at the head of the navigation, but siltation of the river led to Fordwich becoming the main port for east Kent in the ninth century, and it remained an important trading centre until the coming of the railways a thousand years later.

Siltation of the estuary and the northwards growth of a shingle spit from Deal resulted in the successive abandonment of Richborough and Sandwich as significant ports. At the same time land levels had been sinking and much of the marshland is now below high tide level, increasing the risk of flooding. In 1777 Stonar Cut was constructed as a navigable flood relief channel bypassing Sandwich, but its use is strictly controlled to ensure that normal river flows are routed through the town to keep the navigation

Kentish Stour Catchment Management Plan

open.

The threat of flooding is a recurring problem in the upstream reaches, particularly around Ashford and Canterbury. Flood storage reservoirs have recently been constructed on each of the two main tributaries above Ashford, considerably reducing peak flows from the upper catchment, much of which lies on the Wealden Clay and responds rapidly to rainfall. Below Ashford the river is fed largely by Chalk groundwater which does not cause the same peak flow problems.

The Chalk block aquifers of the North Downs have been highly developed for public water supply, and abstraction contributed to the low-flow problems experienced throughout the catchment in the drought of 1989-92. Water demand within the catchment is growing and is forecast to exceed the current reliable yield. Even demand management and mains-leakage reduction will not redress the deficit and it is planned to increase bulk imports of water from the Medway catchment. Construction of Broad Oak Reservoir, which has been under consideration for the last forty years, has been deferred until after the turn of the century. The available groundwater resource has been reduced by high nitrate and chloride levels in Thanet and around Easry, forcing the closure of supply boreholes.

There is a concentration of population along the coast, with most effluent disposal being either to the sea or to estuarine waters. In the upper catchment, where low stream flows provide little dilution in dry summers, treated effluent discharges cause occasional water quality problems.

The ecological value of the catchment is high, the National Nature Reserve at Stodmarsh has been proposed as a Ramsar site (of international importance) and there are many designated conservation sites. A recent initiative has been the launch of the Stour Project by the NRA and Local Authorities, to oversee management of the river corridor from above Ashford to below Canterbury, to promote access to the river, and to encourage public involvement in conservation schemes.

The River Stour supports high quality fisheries - trout are stocked between Wye and Canterbury, and the tidal reaches between Fordwich and Plucks Gutter are valued as a popular competition coarse fishery. Resident native brown trout are found in the Great Stour tributaries, the Little Stour and the River Dour, a small Chalk stream running through Dover.

Following improvements in water quality over the last twenty years the Great Stour has experienced increased runs of sea trout, and even salmon have recently been recorded in the river. The NRA has built fish passes at major obstructions, making most of the Great Stour system accessible to migratory fish.

A range of statistics for the Stour catchment is given in Appendix I at the end of this report.

Kentish Stour Catchment Management Plan

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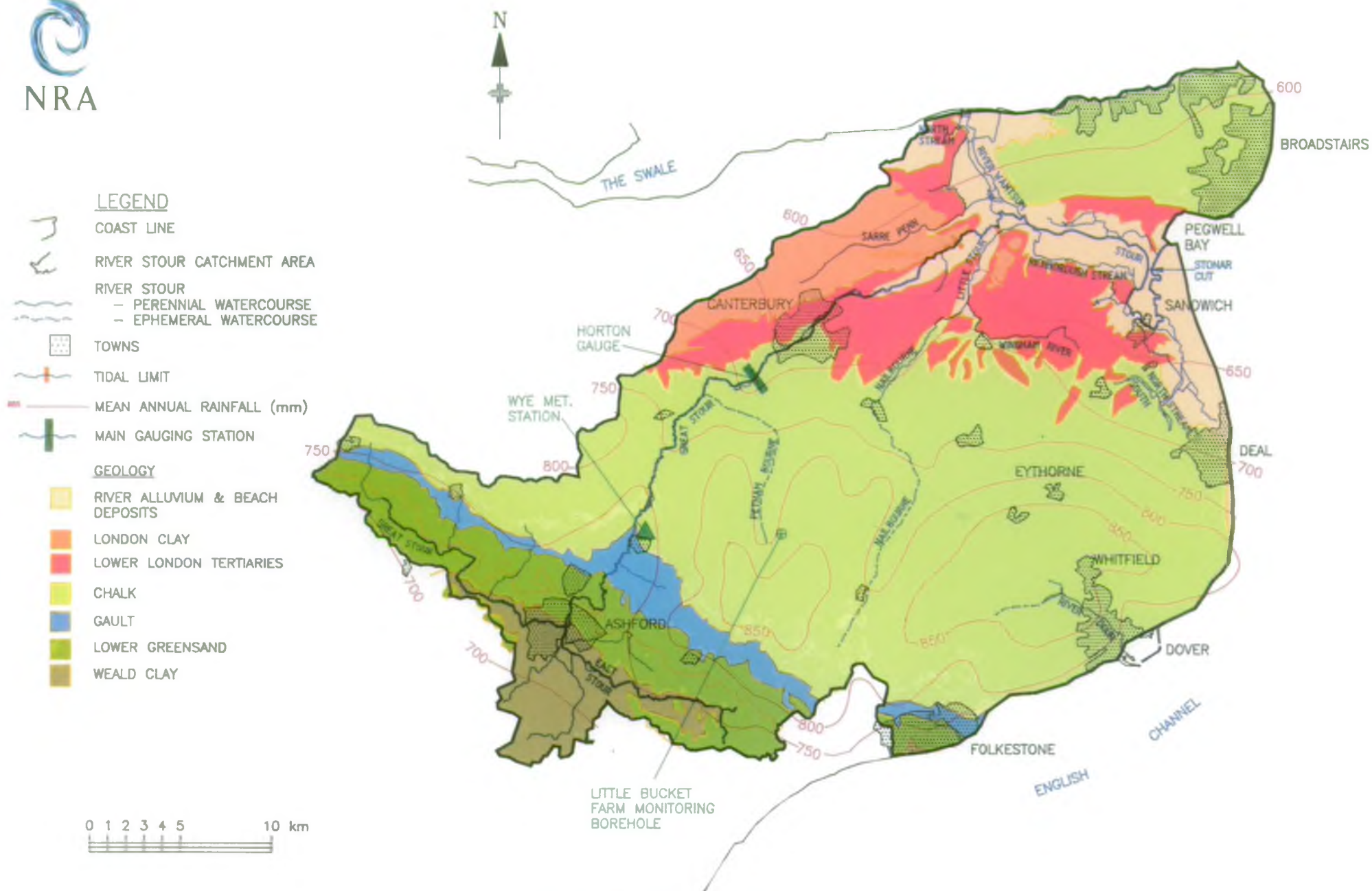
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A2.HYDROLOGY AND RAINFALL



NRA



CATCHMENT HYDROLOGY & RAINFALL

A2. HYDROLOGY AND RAINFALL

A2.1 General

This section considers the natural water resources within the catchment. Sections B1, B2 and B3 consider the use of these resources for water supply.

A proportion of the rainfall which falls on the catchment is lost through direct evaporation and transpiration from plants and trees. The remainder is termed the effective rainfall and is the total water resource available to the catchment, which may be manifest as surface run-off to streams and rivers or as recharge to the groundwater aquifer.

The allocation of rainfall between surface and groundwater is largely dependent on the surface geology. Low permeability clay and silt areas result in high run-off to a strongly developed surface drainage system, whereas porous Chalk and sandstone catchments allow a higher proportion of recharge to groundwater. In the latter case, the surface drainage system is less well developed and a large part of river flow is derived from groundwater as springs or upflow through the river bed.

Surface flows in clay catchments respond rapidly to high rainfall and drought periods, leading to considerable seasonal variation in the water resource available at a river intake. The low-flow yield of such "flashy" catchments can be enhanced by the reservoir storage of water abstracted during periods of high flow.

Aquifers provide natural water storage for a catchment, groundwater systems react to rainfall much more slowly than surface waters and generally provide a more reliable resource during drought periods. However, recovery from drought may also take longer.

A2.2 Local Perspective

The Great Stour and East Stour rise on the Weald Clay and Lower Greensand and their upper reaches tend to be flashy, with rapid run-off and high peak flows in response to rainfall. Below their confluence at Ashford the River Stour flows north-east across the North Downs Chalk outcrop where groundwater makes a significant contribution to baseflow, with the result that seasonal extremes of flow in the lower reaches are less marked. Typical river flows are illustrated by the hydrograph from Horton gauging station, which is at the downstream margin of the Chalk.

The head of tide is reached at Fordwich, downstream of Canterbury, but the river runs a further thirty three kilometres before reaching the sea and only the lower reaches are brackish. Below Fordwich the Stour Marshes drain to the tidal Stour in winter, but are fed with freshwater from the river during the summer months. Above Sandwich there are abstractions for public water supply and for industrial cooling water.

The Nailbourne / Little Stour catchment is to the south of the Great Stour and lies largely on the Chalk outcrop. Much of the Nailbourne is ephemeral and surface flows appear only when groundwater levels in the Chalk are high. The borehole at Little Bucket Farm (see plan) is typical of this Chalk catchment, showing a seasonal variation in level of the order of 10 metres. Well Chapel Springs on the Nailbourne mark the upstream limit of perennial flow in most years, but in the summer of 1990, following a prolonged drought, virtually the whole course of the Little Stour was dry. Public water supply abstractions along the Nailbourne and Little Stour Valley are known to affect surface flows, their

Kentish Stour Catchment Management Plan

influence is considered in Section B1.

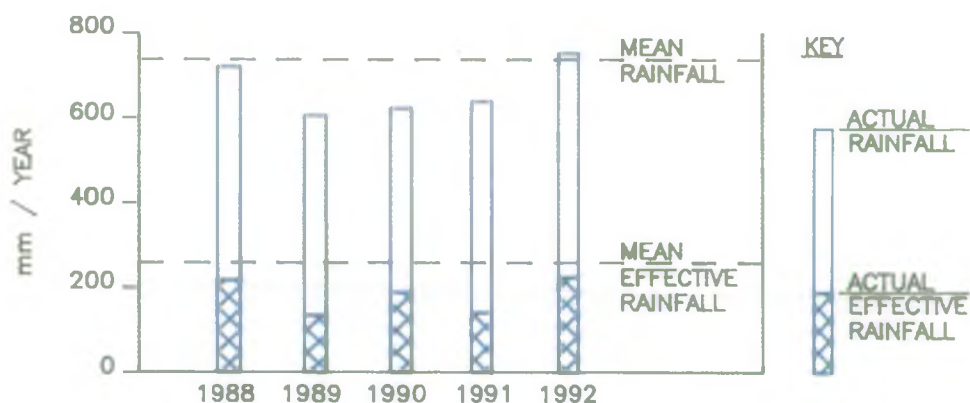
The Isle of Thanet is an independent Chalk block separated from the rest of the Chalk by Tertiary and Recent deposits in the Lower Stour valley. The Thanet Chalk does not support any significant streams and most of its water resource is either abstracted for public supply or appears as springs flowing directly into the sea.

The River Dour, running through Dover, is the only surface stream within the Dover Chalk Block, which lies to the south of the Little Stour catchment and drains to the English Channel. The river runs for five kilometres through the Lydden Valley before the perennial source is met at Temple Ewell, but flows are significantly influenced by groundwater abstraction for public supply. A major coastal spring known as Lydden Spout discharges from the cliffs to the west of Dover.

A2.3 Meteorological Considerations

Mean annual rainfall over the Stour catchment varies from below 600mm on the Isle of Thanet to over 850mm on the North Downs. The diagram illustrates annual and effective rainfall totals calculated for the Wye meteorological station; groundwater levels at Little Bucket Farm over the last five years, and river flows at Horton gauge for a typical year (1989).

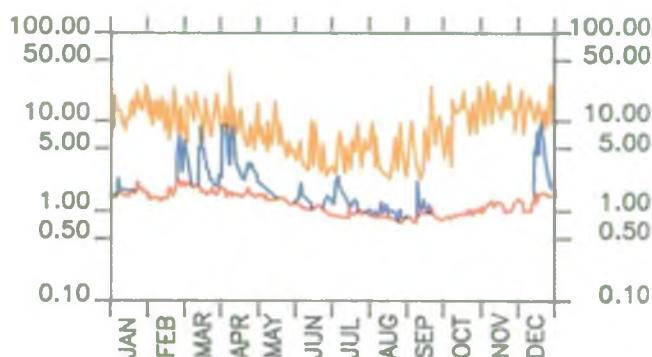
Heavy rainfall over the latter part of 1987 and early in 1988 raised groundwater levels to a twenty year high. However, rainfall totals were less than average during each of the next four years and the groundwater level fell to near minimum from 1989 to 1991. Effective rainfall was very low, particularly in the winter of 1988-89, reducing the flow of the Great Stour to its lowest recorded level in 1989. In late 1992 and early 1993 increased rainfall ended a prolonged drought period, restoring surface flows and groundwater levels.



Annual Rainfall Record from Wye Station at TR049470
Actual Evapotranspiration Data from MORECS Database

DAILY FLOW HYDROGRAPH (m^3s^{-1})

Max. and min. daily mean flows from 1964 to 1992 with an example yearly hydrograph (1989)



GREAT STOUR AT HORTON

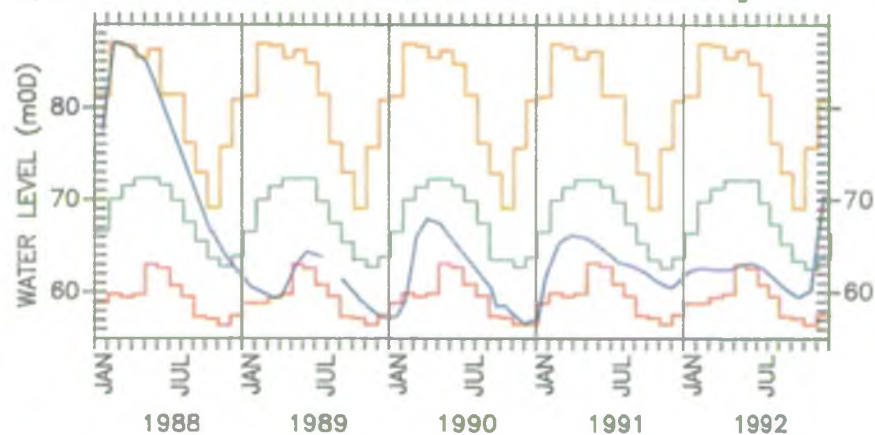
Site name : LITTLE BUCKET FARM, WALTHAM

National grid reference : TR 1225 4690

Aquifer : CHALK AND UPPER GREENSAND

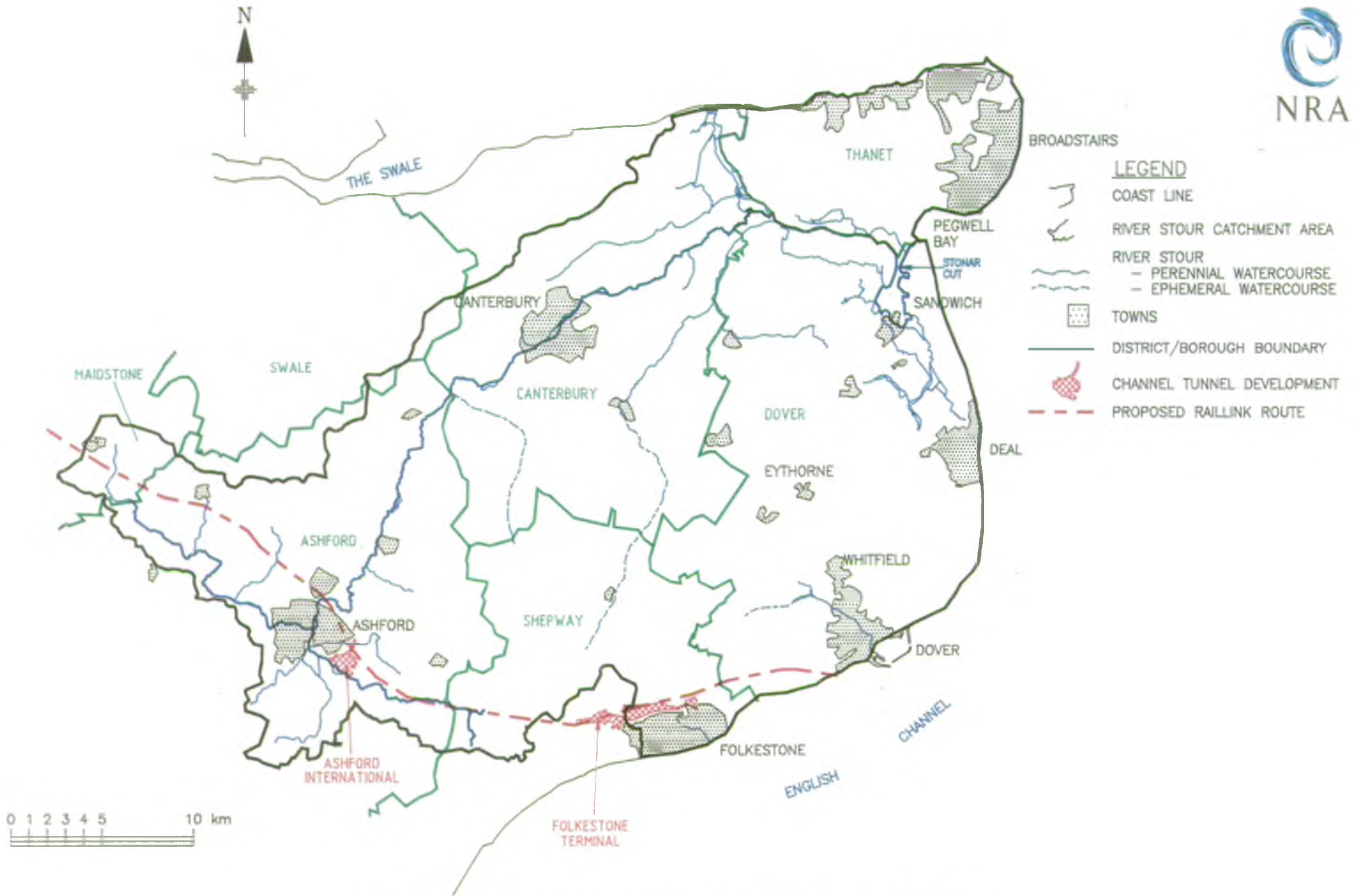
Well number : TR14/9

Measuring level : 87.33



Actual groundwater levels 1988-1992. This can be compared to long term Max, Min and Mean values calculated from years 1971 to 1992.

HYDROMETRIC DATA



INTERACTIONS WITH PLANNING AUTHORITIES

A3. FUTURE DEVELOPMENT

A3.1 General

The NRA is consulted regularly on planning matters falling within its terms of reference, both in the preparation by Local Authorities of statutory plans and in connection with individual applications for planning consent. Recent guidance from the Department of the Environment has strengthened links with the NRA, but ultimate planning control remains with the Planning Authorities. Catchment Management Plans are complementary to the statutory Plans, by stating clearly the NRA's vision it is hoped that they will make a positive input to the formal planning process.

In taking decisions regarding particular developments, provisions under the Town and Country Planning Act 1990 require planning authorities to have regard to relevant development plans. Section 54A of the Planning and Compensation Act 1991 specifically states that "decisions are to be in accordance with the plan, unless material considerations indicate otherwise".

The plan framework required by the 1991 Act requires the preparation in non-metropolitan areas of the following plans:

- i) County Structure Plan. This provides the broad strategic planning framework and should ensure that the provision for development is realistic and consistent with national and regional policy.
- ii) District or Local Plan. This plan sets out detailed policies and specific proposals for the development and use of land, it should be in general conformity with the Structure Plan.
- iii) Minerals Local Plan. The exploitation of mineral resources within a catchment can impact upon it in a number of ways. The extraction of sands and gravels from a river valley can have a significant effect on the river corridor and flood plain. Mining can be a source of pollution either during operation, or following closure and flooding of the mine. Finished mineral workings can provide important conservation or amenity sites, but can also be a further cause of concern if they are used for solid waste disposal. The Mineral Locals Plan should cover these points in some detail, indicating areas where provision is made for mineral workings and the disposal of mineral wastes, as well as those where mineral resources are to be safeguarded for future working. The plans should set out development control criteria and requirements for the restoration and aftercare of such sites.
- iv) Waste Local Plan. The 1974 Control of Pollution Act places a duty on a Waste Disposal Authority to licence disposal sites and ensure that they do not endanger public health, cause water pollution or serious detriment to local amenity. The 1990 Environmental Protection Act introduced stricter controls on the closure and aftercare of waste disposal sites. Waste disposal operators must acquire a certificate of completion from the Waste Disposal Authority before handing back a disposal licence and exonerating themselves from any further legal responsibility for a site.

The Waste Disposal Authority may include waste disposal policies in the Minerals Local Plan or prepare a separate Waste Local Plan, which should examine land use implications and identify suitable locations for further facilities.

Within the development plans outlined above provision should be made for the needs of the National Rivers Authority, and those of the utility companies responsible for water supply, sewerage, electricity, gas and telecommunications. The Town and Country Planning (Development Plan) Regulations 1991

Kentish Stour Catchment Management Plan

require Local Authorities to consult a number of bodies, including the NRA, so as to resolve non-contentious points and minimise objections before a plan is put on deposit.

A3.2 Local Perspective

Housing and Employment

The Stour catchment is situated wholly in the County of Kent and comprised the Dover and Thanet Districts with parts of five other Districts and Boroughs. The strategic planning context is provided by the Kent Structure Plan which was approved in 1990. In June 1992 Kent County Council published a Consultation Draft Third Review of the Structure Plan which looks forward to 2011 and makes the following provision for new housing :-

Structure Plan Area	1991-1996	1996-2001	1991-2001
Thanet	1800	1700	3500
Canterbury	1000	1300	2300
Dover	1700	1700	3400
Folkestone/Hythe	1800	1800	3600
Ashford	3500	4500	8000

NB: These figures are provisional and relate to structure plan areas which are not necessarily consistent with District and Borough boundaries.

The structure plan review provides space for additional employment in categories A2-B1 (offices, research and development and light industry) and B2-B8 (general and special industry, warehousing and distribution).

Structure Plan Area	Land assigned for New Employment (Ha)		
	1991 to 2001		
	A2-B1	B2-B8	Total
Thanet	6	9	15
Canterbury	3	5	8
Dover	8	14	22
Folkestone/Hythe	6	9	15
Ashford	25	25	50
TOTAL	48	62	110

Ashford is the main area for housing and employment growth in the Stour catchment and land has been made available, particularly in the southern sector of the town. Much of the growth is expected to be associated with the proposed Channel Tunnel freight terminal, but elsewhere in the catchment the Tunnel may reduce port activity, with adverse effects on Dover and Folkestone. The East Thames Corridor Development area is on the northern margin of the Stour catchment and where environmental constraints do not apply economic development will be encouraged.

A3.2.2 Waste Disposal

The Structure Plan Review identifies an urgent need for new waste disposal facilities as there is currently less than five years' permitted tipping capacity available. Landfill will continue in the short term, but revised planning policies emphasise the importance of environmental constraints, particularly the protection of aquifers. The Structure Plan states that wherever domestic waste has to be disposed of by landfill, locations will be sought on impermeable geological strata. A Waste Local Plan is being prepared.

A3.2.3 Minerals

The Structure Plan Review recognises that minerals currently exploited in Kent are relatively extensive (other than flint gravels) and recommends their continued supply. The South East Region will continue to rely on imports of aggregates.

B1.PUBLIC WATER SUPPLY



LEGEND

- COAST LINE
- RIVER STOUR CATCHMENT AREA
- RIVER STOUR
 - PERENNIAL WATERCOURSE
 - EPHEMERAL WATERCOURSE
- TOWNS
- RESOURCE AREA BOUNDARY
- RESOURCE AREA NUMBER
- TIDAL LIMIT
- WATER COMPANY BOUNDARY
- PRIMARY GAUGING STATION

LICENSED SOURCES

SURFACE WATER	GROUNDWATER
☐ >5MI/d	⊕ > 5MI/d
▣ 1-5MI/d	⊗ 1-5MI/d
■ < 1MI/d	• < 1MI/d

AQUIFERS

- CHALK
- LOWER GREENSAND
- LOWER LONDON TERTIARIES

PUBLIC WATER SUPPLY

B1. PUBLIC WATER SUPPLY

B1.1 General

This section considers the provision of public water supplies from both surface and groundwaters. Abstractions are operated by Water Companies controlled by licences from the NRA, which stipulate maximum allowable annual and daily volumes. The mean licensed abstraction is the average daily abstraction allowable under the annual licence. Private groundwater supplies for domestic use are also included here, although these are generally very small and not significant from the resources standpoint.

Water supply sources in use before 1963 were granted Licences of Right under the Water Resources Act (1963). Since then, new sources have been licensed on the basis that abstraction neither adversely affects existing sources nor impairs the natural environment. Licences issued after 1963 may carry conditions such as Prescribed Flows or water levels, requiring abstraction to cease once the river falls below the prescribed value. In practice, the NRA increases the Prescribed Flows (PFs) controlling new abstractions in steps as more licences are granted, so as to protect both the Minimal Residual Flow (MRF) of the river and the rights of existing licence holders (MRFs are set to protect flows for other uses). PFs are set to control abstractions but do not control river flows.

Compensation flows may also be included in licence conditions, requiring the release of water from groundwater or reservoir sources to augment low river flows.

At times of extreme water shortage Water Companies may apply to the DoE for a Drought Order to relax abstraction licence conditions or the level of service they provide to their customers. This may allow, for example, the temporary reduction of Prescribed Flows, an increased abstraction rate, reduction in mains pressure or even periodic closure of the supply. The terms of a Drought Order usually require the Water Company to introduce demand reduction measures, such as hose-pipe bans, at the same time.

B1.2 Local Perspective

Lack of water resources to meet future demands is one of the main issues in this catchment, and a number of resource developments and transfers have been considered by the NRA and the water supply companies. The Chalk aquifers have been highly developed over the last hundred years and most of the catchment's resources are used within its boundaries - indeed, demand is so high that bulk supplies of water are imported from the Medway catchment to the west.

The total licensed abstraction from the catchment for public water supply is 265 Ml/d, over 95% of which is from groundwater sources.

Kentish Stour Catchment Management Plan

Table B1.1 Mean Licensed & Actual Abstractions for Public Water Supply

Resource Area	Mean Licensed Abstraction Ml/d			Actual Abstraction 1989 (% of Licensed)		
	Surface	Ground	Total	Surface	Ground	Total
9 Stour Marshes	5	30	35	*	66	*%
10 Gt Stour	-	48	48	-	88	88%
11 Upper Gt Stour	-	8	8	-	52	52%
12 Little Stour	-	67	67	-	66	66%
13 Thanet Chalk	-	26	26	-	32	32%
14 Dover Chalk	-	81	81	-	46	46%
	5	260	265	*	62	62%

* Actual figures are not given where they can be attributed to a single source, but are included in catchment totals.

B1.2.1 Surface Water Sources

The only surface water abstraction for public supply from the River Stour is in the freshwater tidal reaches at Plucks Gutter, operated by Southern Water Services under a temporary licence which was renewed in 1992. Abstraction is controlled by a Minimum Residual Flow (MRF) set to protect estuary water quality, the requirements of marsh feeding and the provision of cooling water for Richborough power station. Between September and December 1989 river flows dropped below the MRF and no abstraction was permitted at Plucks Gutter.

There are no public water supply reservoirs within the catchment, but two groundwater sources close to the river directly affect surface flows. These are subject to MRF-related conditions requiring the discharge of 36 Ml/d of groundwater to augment the river at times of low flow, but as water recycles rapidly through the river bed there is little net benefit. During the drought of 1989-92 Drought Orders were granted each year to overrule this compensation requirement.

New abstraction licences are controlled by MRFs set for the Great Stour at Wye, Horton and Plucks Gutter, and for the Little Stour at West Stourmouth. During the drought summer of 1990 natural flows fell to between 60% and 70% of these MRF values.

The development of surface water resources is one of the major issues for the Stour catchment. Proposals for a pumped storage reservoir at Broad Oak, in the sub-catchment of the Sarre Penn to the north of Canterbury, were turned down at Public Inquiry in 1979. Revised proposals have been considered by the joint promoters (Southern Water Services, Mid Kent Water and Folkestone and Dover Water), but it is unlikely that the scheme will be needed before 2010.

B1.2.2 Groundwater Sources

Chalk sources account for over 95% of the licensed public groundwater supply, with the remainder coming from Lower Greensand in the upper catchment. There are major groundwater abstractions across the Chalk outcrop, many being Licences of Right under the 1963 Water Act. In a number of cases the reliable yield of these sources is significantly below the licensed total, due either to the limitations of the boreholes and related plant or to the character of the aquifer itself, and the volume actually taken in 1989 was only 62% of the licensed total, even though there was a water supply shortage at this time.

The reliable yield (for a 1-in-50 year drought) for some groundwater sources in this catchment, estimated from 1989-92 drought data, is significantly less than the figure estimated from the 1976 drought. This is because the 1989-92 drought resulted from a succession of dry winters which failed to replenish the aquifer, whereas the 1976 event was primarily a summer drought and the main impact was on river flows.

Several groundwater sources within the Thanet Chalk Block are no longer operating. Dane, Tivoli, Linksfield and Rumfield boreholes have been shut down due to high concentrations of nitrate in the groundwater, and Whitehall and Minster "A" have closed for other operational reasons, reducing Thanet abstraction in 1989 to 32% of the licensed total. Sea-water intrusion due to over abstraction has contaminated Thanet groundwater in the past, but this problem can be avoided by careful management of the aquifer.

The perennial source of the Nailbourne in a non-drought year is at Well Chapel Springs. It is thought that Barham Pumping Station, seven kilometres upstream of the Springs, and two smaller licensed abstractions (Worlds Wonder and Ottinge) reduce the volume and duration of ephemeral flows in the Nailbourne. The flow regime of the River Dour is similarly affected by groundwater abstraction from its winterbourne reaches. Within Dover the River Dour is largely canalised or culverted and is of limited conservation interest, but the upper 3km of the perennial stream supports a population of wild brown trout and has high amenity value.

Saline mine water discharged from Tilmanstone coal mine between 1906 and 1973 has contaminated the groundwater for a distance of more than 5km downstream of the mine, preventing the use of Eastry PWS pumping station and the loss of its 10MI/d licensed yield.

B1.3 Supply Requirements

Water Resources

- Protection of existing abstractions
- Protection of the environment from over-abstraction

Surface Water Quality

- Within the limiting values defined for D2 Category Treatment (EC Council Directive 75/440/EEC) as set out in the Surface Water (Classification) Regulations 1989.

Kentish Stour Catchment Management Plan

Kent Groundwater Management Policy

In view of the heavy demand on limited resources the NRA has formulated a Kent Groundwater Management Policy which underpins its control of groundwater abstraction in this area. The policy objectives are:-

- * To secure a basis for sustainable management of groundwater resources
- * To maintain a balance between public water supply requirements and other lawful interests
- * To preserve the character of spring fed streams and achieve a progressive enhancement of the river environment

With some exceptions (eg the interception of coastal discharges) the Policy states a presumption against further consumptive abstraction from the Chalk and other designated aquifers.

Groundwater Protection Policy

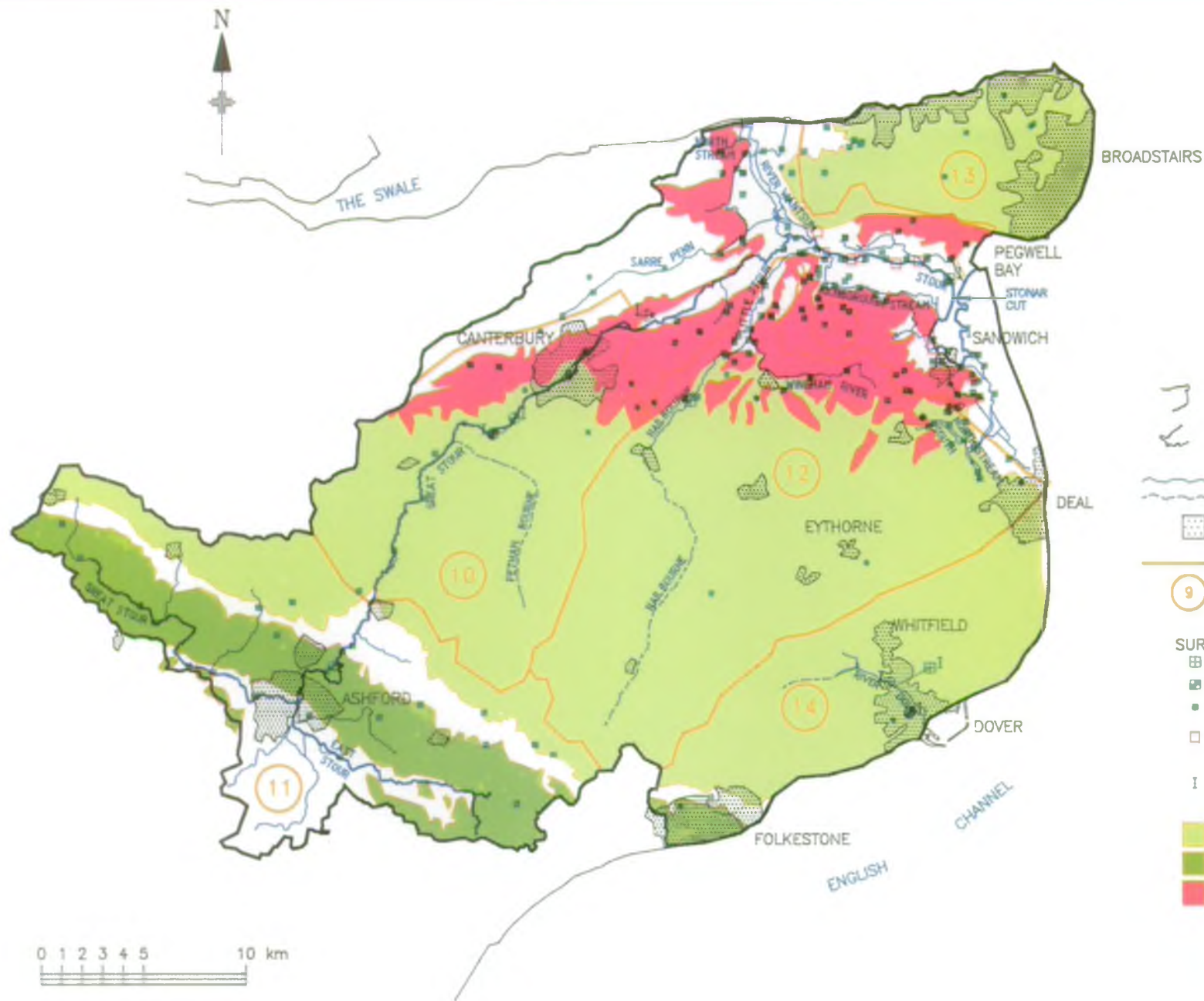
"Policy and Practice for the Protection of Groundwater" (NRA, 1992) reviews all potential impacts, eg. contaminated land, diffuse pollution and the physical disturbance of aquifers and groundwater flow. Its application depends on the circumstances of each case, but the document gives guidance on the risk in relation to the nature of the aquifer and cover material, and the proximity of the hazard to a groundwater supply source. The vulnerability of the groundwater resource is considered in the following terms:-

- ° Nature of the soil cover (high, intermediate or low leaching potential; high leaching potential soils are further sub-divided according to the physical processes controlling water movement through them).
- ° Nature of any drift cover.
- ° The value of the bed-rock as an aquifer (major, minor, non-aquifer).

Three zones of protection are defined around each groundwater supply source as follows:-

- Zone One - Within the 50 day groundwater travel-time horizon to the supply source.
- Zone Two - Between 50 and 400 days groundwater travel-time to the supply source.
- Zone Three - Within the source catchment area but more than 400 days groundwater travel-time to the supply source.

B2.WATER SUPPLY FOR INDUSTRY AND AGRICULTURE



LEGEND

COAST LINE

RIVER STOUR CATCHMENT AREA

RIVER STOUR

- PERENNIAL WATERCOURSE
- EPHEMERAL WATERCOURSE

TOWNS

RESOURCE AREA BOUNDARY

9

RESOURCE AREA NUMBER

LICENSED SOURCES

SURFACE WATER

- ⊞ > 5MI/d
- ⊞ 1-5MI/d
- < 1MI/d

GROUNDWATER

- ⊕ > 5MI/d
- ⊕ 1-5MI/d
- < 1MI/d

□ AUTHORIZED LOCATIONS FOR ABSTRACTION TO STOUR MARSHES

I DENOTES INDUSTRIAL ABSTRACTIONS

AQUIFERS

CHALK

LOWER GREENSAND

LOWER LONDON TERTIARIES

INDUSTRIAL & AGRICULTURAL ABSTRACTION

B2. WATER SUPPLY FOR INDUSTRY AND AGRICULTURE

B2.1 General

This section deals with surface and groundwater supplies abstracted for industrial and agricultural purposes. Industrial abstractions include all licensed supplies for industrial process uses, cooling water and gravel washing. Agricultural abstractions include all supplies for spray irrigation and general agricultural use.

B2.2 Local Perspective

Abstraction details for each of the six resource areas comprising this catchment are given in Table B2.1. Actual abstraction in a typical year (1989) is listed as a percentage of licensed abstraction. Data from individual sources are confidential, so totals are not shown where they can identify a single source. The most significant abstractions are in the tidal reaches of the Great Stour, providing irrigation to the Stour Marshes and cooling water to Richborough Power Station. These interests are protected by the MRF at Plucks Gutter.

Table B2.1 Mean Licensed & Actual Abstraction for Industry & Agriculture

Resource Area	Mean Licensed Abstraction Ml/d			Actual Abstraction 1989 (% of Licensed)		
	Surface	Ground	Total	Surface	Ground	Total
9 Stour Marshes	145	10	155	*	38	*%
10 Gt Stour	1	7	8	<1	85	73%
11 Upper Gt Stour	1	3	4	7	52	42%
12 Little Stour	1	4	5	37	66	66%
13 Thanet Chalk	<1	<1	1	*	5	*%
14 Dover Chalk	14	3	17	*	*	18%
	162	27	190	4	47	7%

* Actual figures are not given where they can be attributed to a single source, but are included in catchment totals.

Richborough Power Station accounts for over 50% of the total licensed abstraction in this category, but the whole flow is returned to the estuary. This use will accept water with up to 500 mg/l chloride, which is charged for at a reduced rate for brackish waters. Twenty four industrial licences account for over half of the remaining licensed abstraction, most of which is for gravel washing or cooling water, and is non-consumptive. Discounting the Richborough abstraction, which is intermittent and non-consumptive, actual abstraction for industrial uses in 1989 was only some 40% of the licensed total.

Traditionally, the Stour Marshes have been fed by river water during the summer months to retain water levels in the ditches. Marsh feeding is via a network of sluices which, around the top of each tide, allow relatively fresh water to flow from the tidal Stour by gravity. Such gravity fed supplies are not licensable and inflow rates are not monitored. However, since 1984, gravity feeding has been supplemented during

droughts by water pumped to Chislet Marsh from a permanent installation at Mile Sluice. As part of this scheme the NRA is licensed to operate temporary pumps at seven further locations to enable other marsh areas to be fed.

Agricultural irrigation on the marshes is achieved either by maintaining a high water table in the soil, or by spray irrigation under licence. The mean marsh feeding rate over the summer to satisfy this use has been estimated as 25 Ml/d, with a peak-day water demand three times as great.

High water levels maintained to contain livestock also benefit conservation objectives, but there is a conflict of interest in some areas where the levels required for effective wet fencing are higher than the optimum for subsoil irrigation and the drainage of arable land.

Over two hundred abstraction licences have been issued for agricultural use, the majority for spray irrigation from surface or groundwater sources, with over fifty being within the marsh areas. Most of the recent surface water licences have been linked to MRF settings on the Stour at Wye, Horton or Plucks Gutter, or to local flow and level conditions. New spray irrigation licences for direct abstraction from marsh ditches are issued subject to a condition that they will lapse after five years if adequate storage has not been provided.

B2.3 Supply Requirements

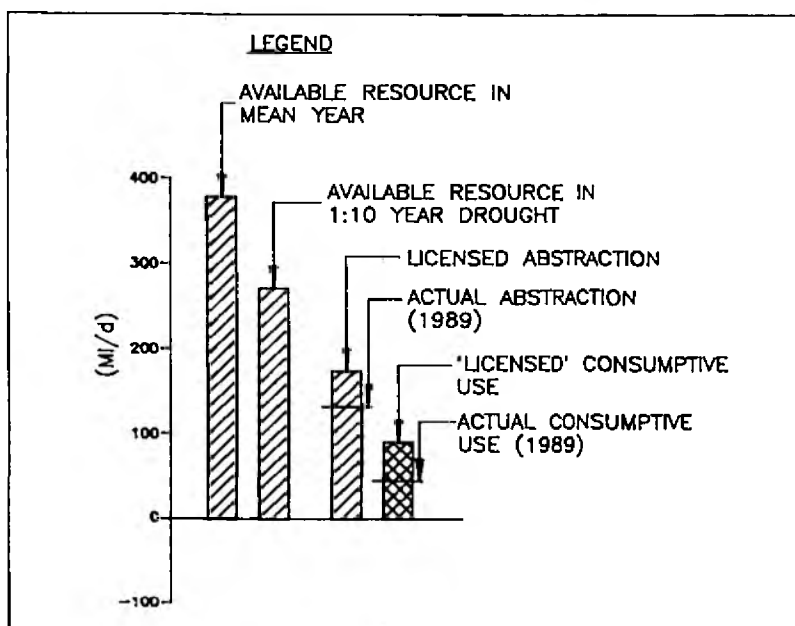
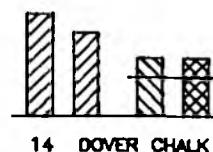
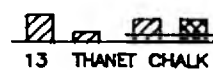
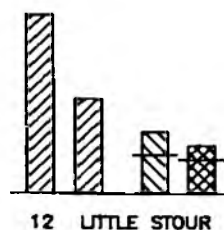
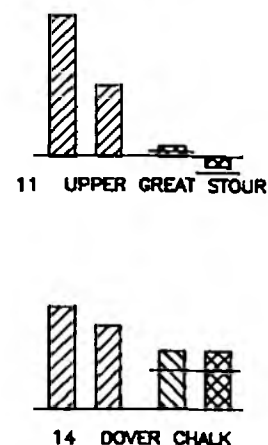
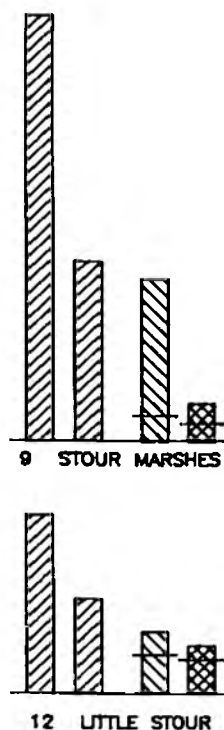
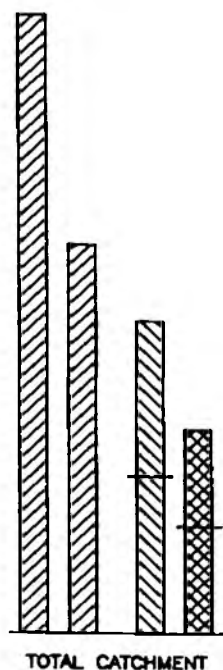
Water Resources

- New agricultural licences to specify prescribed MRFs, winter abstraction and storage.
- Presumption against new licences for consumptive use of Chalk groundwater (see Kent Groundwater Management Policy in Section B1.3)

Water Quality

- Water quality guidelines for agricultural irrigation have been published by ADAS, the agricultural advisory service of MAFF.
- ADAS Central Veterinary Laboratory has published guidelines for the quality of water to be used by livestock.
- The Food and Agricultural Organisation of the United Nations (FAO) classifies water with moderate salinity (0.7 - 3.0ds/m) or chloride concentrations (140 - 350mg/l Cl⁻) as having restricted use for irrigation. NRA guidelines recommend that irrigation water should contain no more than 100mg/l to 500mg/l Cl⁻ depending on the tolerance of the crop.

B3.USE OF THE WATER RESOURCE



Resource Area	"Licensed" Consumptive Use (% of Resource)	
	Mean Year	1:10 Year Drought
9 Stour Marshes	9	21
10 Great Stour	9	16
11 Upper Great Stour	-8	15
12 Little Stour	27	50
13 Thanet Chalk	84	225
14 Dover Chalk	81	143
Overall Catchment Balance	33	65

USE OF THE WATER RESOURCE

B3. USE OF THE WATER RESOURCE

B3.1 General

This section compares the overall use of water within the catchment with the available resource. The catchment is divided into resource areas defined on the basis of size and common characteristics and used for water resources assessment purposes. The available water resource for each area is defined as its annual effective rainfall and any inflow from an upstream resource area, and may be available as surface water or groundwater. Mean-year and 1:10 year drought annual resource figures have been assessed for the catchment. These are compared with the total annual licensed abstraction and the estimated actual abstraction for a typical year (1990).

In some cases abstracted water is returned directly to the river with minimal losses (eg cooling waters and gravel washing). Some of the water abstracted to supply customers within a catchment may be returned to the river via effluent discharges, and this can make a significant contribution to the maintenance of river flows.

The difference in volume between the water abstracted from a catchment and that returned constitutes the "consumptive use". The theoretical figure has been assessed for each resource area by subtracting the total consented discharge from the total licensed abstraction. Actual consumptive use has been assessed using actual abstraction and discharge data for a typical year, in this case 1990.

B3.2 Local Perspective

In a typical Chalk catchment the environmental requirement for water is such that no more than 20% of the mean annual effective rainfall may be available to support sustainable abstraction. In the case of the Stour, where much of the catchment lies on Chalk, over 50% of the mean annual resource is allocated for licensed abstraction, indicating a high rate of development. Consented effluent discharges returned to the catchment amount to over half the volume of water abstracted, making the net use approximately 25% of the resource, but in a 1 in 10 year drought the available resource is halved and is equal to the environmental requirement.

The large groundwater abstractions at Chilham, Godmersham and Chartham in the Stour Valley have a marked effect on river flows during the summer period. Seasonal management of abstraction from these sources, in conjunction with new or existing sources at a distance from the river, may improve the low flow problem.

The groundwater resource of the Thanet Chalk block is heavily developed for public supply, but the licensed yields are unsustainable in a drought year. Coastal observation boreholes are needed to monitor the ingress of sea water if the abstraction rate is too high, and several sources are closed at present due to their high nitrate content. In 1989 for example, actual use was only a third of the licensed total.

The major discharge of treated effluent from Canterbury STW helps to restore river flows in the downstream reaches, but use of the water resources of the Great Stour in the summer months is restricted by the need to maintain fresh water in the estuary to feed the Stour Marshes and Richborough Power Station.

Licensed consumptive use in the Little Stour resource area is a quarter of the mean and half of the drought resource. Chalk groundwater for public supply represents the bulk of the abstraction, most of

Kentish Stour Catchment Management Plan

it being exported from the resource area. Abstraction is considered likely to reduce both the period and rate of flow in the ephemeral Nailbourne, and the rate of flow in the Little Stour, and may also reduce flow rates in the Wingham River tributary.

The Dover Chalk resource area is also highly developed for public water supply. Flows in the upper reaches of the River Dour have been reduced by abstraction, leaving the river prone to pollution, particularly from urban run-off, which may significantly reduce river water quality.

The forecast growth in water demand for the Kent Area for the twenty years to 2011 could be as high as 15%. As the NRA is anxious to reduce this figure, the whole of the Stour catchment is designated a high priority area for abstractors to implement demand management measures.

In line with its Water Resource Strategy the NRA has licensed a new intake on the River Medway at Yalding to enhance the yield of Bewl Water Reservoir. This is the first major resource enhancement for Kent, and a proportion of the yield could be transferred to the Stour Catchment to meet shortfalls in the Ashford and Thanet areas, releasing sources in East Kent to reinforce the supply to Folkestone and Dover. The NRA has also proposed a groundwater management scheme which would enhance low flows in the Stour and Little Stour, as well as meeting public water supply objectives. This strategy is being considered by the water companies.

A new sewage works at Richborough is proposed to serve Ramsgate, Deal and Sandwich, discharging 24 Ml/d of treated effluent to the tidal freshwater river Stour. This will replace existing estuarine and sea outfalls and recycle effluent as a water resource within the Stour system. A further proposal is to divert 10 Ml/d of treated sewage effluent from the Herne Bay area to the Sarre Penn system at Grove Ferry via an enlarged May Street STW.

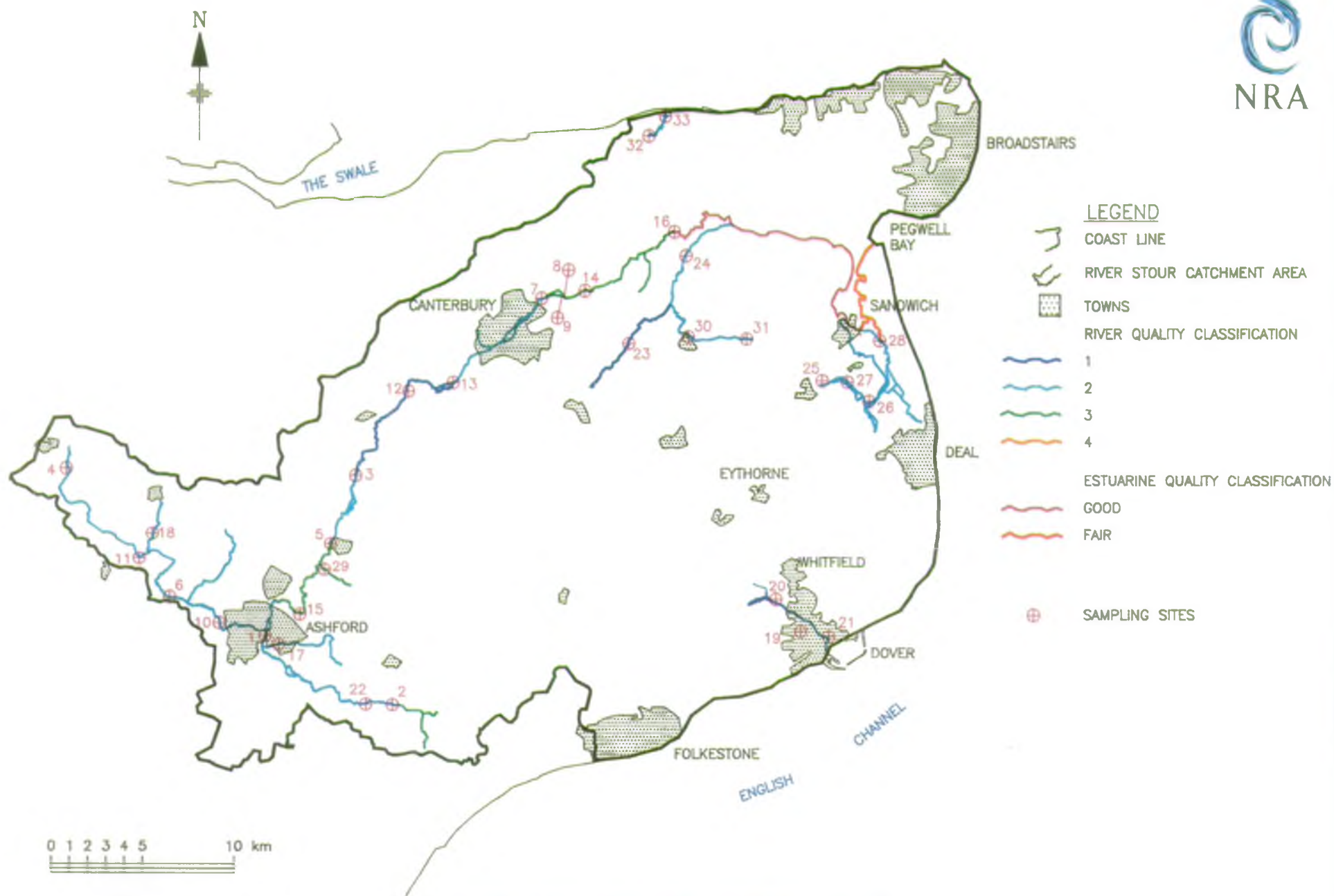
B3.3 Overall Supply Objectives

- To maintain and develop the hydrometric monitoring network.
- To ensure that future resource developments do not damage the river flow regime or ecology of the catchment.
- Where possible, to secure measures for the benefit of the catchment within new licence agreements.
- To develop an Environmentally Acceptable Flow Regime for the Stour Estuary, taking into account the water quality requirements of Richborough Power Station, marsh feeding, and the water environment.
- To encourage the operation of seasonal resource management schemes to improve surface flows during the summer.
- To encourage water consumers to adopt water saving measures.
- To encourage water companies to meet leakage targets and to manage demand.
- To encourage the development of winter storage for spray irrigation.

Kentish Stour Catchment Management Plan

- To maximise the effectiveness of the marsh feeding system within the constraints of the policy agreed with the NFU.
- To encourage the linking of resources to optimise resource usage.
- To return suitably treated effluent to the catchment for reuse.
- To consider the effects of possible climate change in long term water resource planning.

B4.WATER QUALITY



WATER QUALITY CLASSIFICATION

B4. WATER QUALITY

B4.1 Water quality objectives and assessment

The NRA uses two schemes for reporting river water quality and setting targets, General Quality Assessment (GQA) and Water Quality Objectives (WQO), which have replaced the National Water Council (NWC) classification.

The GQA scheme objectively classifies river water quality and is used to assess geographic and temporal trends. It comprises four components, each of which looks at a different aspect of river water quality:-

- * General Chemistry
- * Nutrients
- * Aesthetics
- * Biology

Currently, only the General Chemistry criteria have been defined.

The WQO scheme sets statutory water quality targets for controlled waters, designated by Notice by the Secretary of State for the Environment after consultation with the NRA and other interested parties. Until this procedure is invoked the NRA will set informal River Quality Objectives (RQOs) by translating existing NWC targets to their WQO equivalents. The scheme is based on the requirements of recognised river uses which include:-

- * River Ecosystem
- * Special Ecosystem
- * Abstraction for Potable Supply
- * Abstraction for Industry or Agriculture
- * Watersports

The first phase of implementation of the WQO/RQO scheme will be restricted to the River Ecosystem assessment described in The Surface Waters (River Ecosystem) (Classification) Regulations 1994 (DoE). Five Classes are proposed, based on water chemistry, with an additional "Unclassified" designation for waters where insufficient data are available to apply the scheme. For each river reach a target River Ecosystem (RE) Class will be set, which will include the date by which it should be achieved (eg RE2 1997). Standards for uses other than River Ecosystem are still being developed.

The targets set as WQOs will be confined to what is practical and achievable within their time limits, bearing in mind committed investment for water quality improvement. Progressively higher WQOs may be set as existing WQOs expire, or the NRA may propose "visionary" non-statutory objectives where water quality improvements cannot be achieved in the shorter term.

Kentish Stour Catchment Management Plan

B4.2 Local Perspective

Table B4.1 and the map show routine NRA sampling points and General Quality Assessment (River Ecosystem) river water quality achieved in 1992.

Table B4.1 - Surface Water Sampling Points and GQA Status (1992)

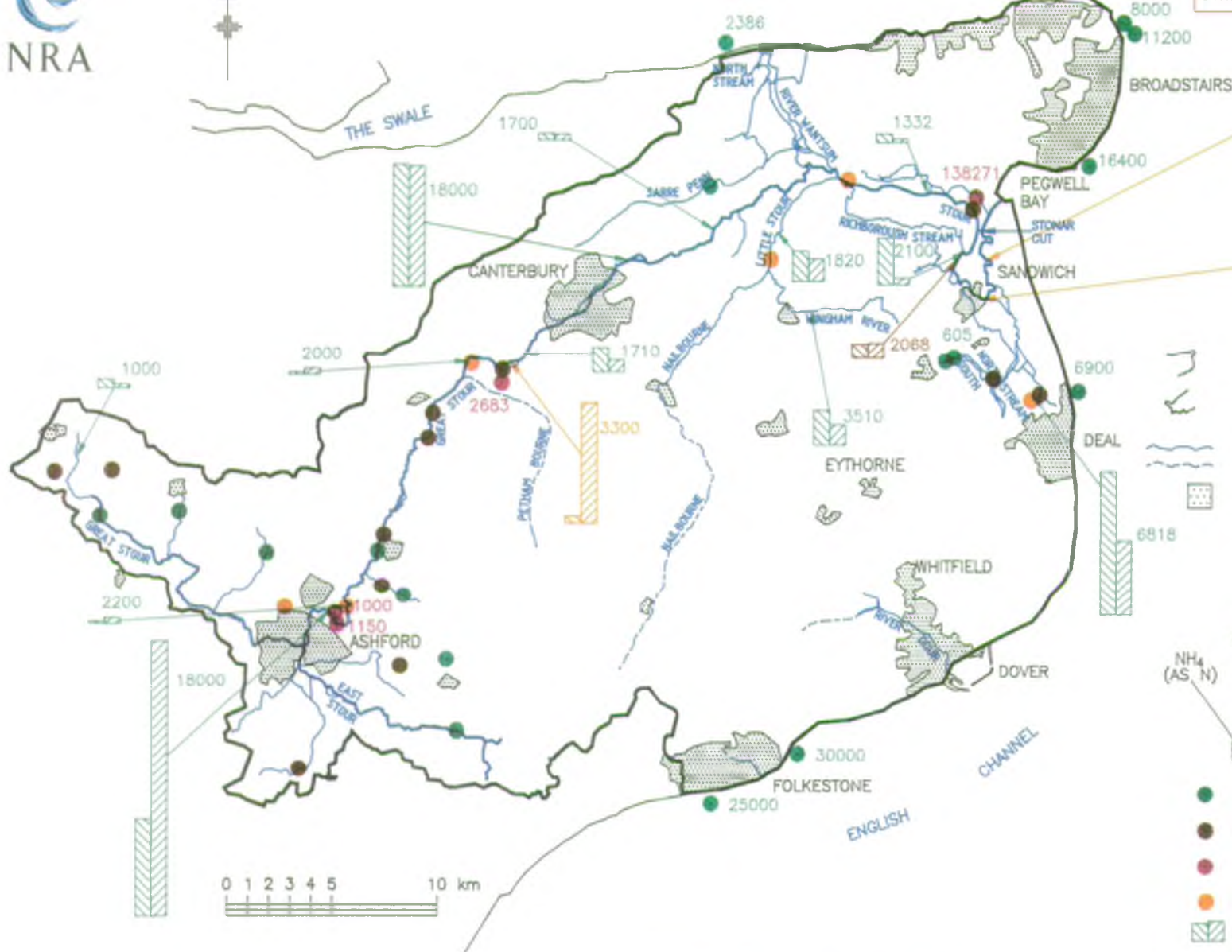
Map Ref No	River	Sample Point	Grid Ref	GQA Class	Length Km
1	East Stour	Torrington Road	TR 013 417	3	10.8
2		Aldington Road	TR 082 381	2	0.5
3	Great Stour	Godmersham Br	TR 062 504	2	4.4
4		D/S Lenham STW	TQ 904 508	3	0.1
5		Wye Br	TR 048 469	2	5.6
6		Rippers Cross	TQ 960 438	3	5.1
7		Vauxhall Br	TR 163 598	2	5.8
8		Whitemill Br	TR 176 600	2	1.1
9		Blackmill Bridge	TR 174 599	2	8.6
10		Bucksford	TR 987 424	2	0.6
11		Little Chart	TQ 944 459	3	8.5
12		Shalmsford St Br	TR 091 549	2	7.2
13		Horton Br	TR 115 553	3	5.5
14		Bretts Br	TR 187 602	2	0.9
15		Longport Br	TR 032 430	3	1.9
16	Stour, Tidal	Grove Ferry, LW	TR 235 632	2	6.0
17	Aylesford Stream	Newtown Road	TR 020 413	2	4.9
18	Charing Stream	Westwell Road, Leacon	TQ 951 474	4	5.2
19	Dour	A2 D/S Paper Mill	TR 305 427	1	0.5
20		Kearsney	TR 291 437	1	3.6
21		Pencester Gdns	TR 320 417	2	2.5
22	Horton Priory Dyke	Railway Br	TR 086 381	3	0.3
23	Little Stour	Littlebourne Br	TR 211 574	3	6.4
24		Blue Br	TR 242 620	2	6.3
25	N/S Streams (Lydden)	Eastry	TR 317 554	5	0.1
26		Hacklindge	TR 342 543	3	1.7
27		Ham Br	TR 330 554	4	1.4
28		New Cut Junction	TR 348 576	3	5.5
29	Spiders Castle Dyke	U/S Stour Conf	TR 045 453	2	2.3
30	Wingham River	A257 Wingham	TR 243 578	5	5.9
31		Durlock	TR 275 577	6	6.0
32	Brook Farm Stream	D/S Herne Bay STW	TR 222 680	2	2.1
33		Holiday Camp Road	TR 230690		
					127.3

B5.EFFLUENT DISPOSAL



NRA

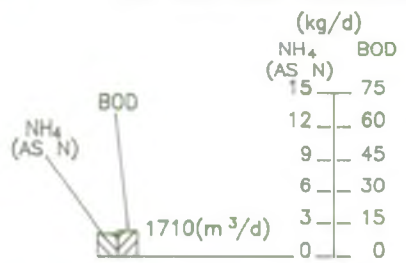
THESE ARE MAJOR DISCHARGES
IN TERMS OF DAILY POLLUTANT
LOADINGS AND ARE SHOWN AT
1/20th SCALE COMPARED TO THE
OTHER DISCHARGES



LEGEND

- COAST LINE
- RIVER STOUR CATCHMENT AREA
- RIVER STOUR
 - PERENNIAL WATERCOURSE
 - EPHEMERAL WATERCOURSE
- TOWNS

DAILY POLLUTANT LOADING FROM THE MOST SIGNIFICANT DISCHARGES



- PUBLIC SEWAGE TREATMENT WORKS
- PRIVATE SEWAGE TREATMENT WORKS
- COOLING WATER DISCHARGE
- PROCESS EFFLUENT DISCHARGES
- PUBLIC SEWAGE TREATMENT WORKS (Consent >1000m³/d)
- PRIVATE SEWAGE TREATMENT WORKS (Consent >1000m³/d)
- PROCESS EFFLUENT (Consent >1000m³/d)

EFFLUENT DISPOSAL

Kentish Stour Catchment Management Plan

B5. EFFLUENT DISPOSAL

B5.1 General

This section considers the disposal of domestic, industrial and agricultural effluent to the river system and its groundwater. The volumetric and quality conditions to be met by a discharge are set out in a specific discharge consent calculated in relation to the quality objective of the receiving water. It follows that if there is any subsequent deterioration in upstream water quality or diminution of river flow below the values used in calculating the consent, then downstream uses could be put at risk.

B5.2 Local Perspective

As a large proportion of the catchment's population lives in coastal towns about two thirds of the sewage effluent is discharged to the sea. Outfall locations and consented or estimated flows are shown on the plan.

There are 22 public and 13 private sewage treatment works within the Stour catchment, 15 of which discharge more than 50 m³/d of treated effluent (equivalent to a population of 300 people). The two major sewage effluent discharges to freshwater are from Ashford and Canterbury; the town of Sandwich also discharges treated effluent and untreated sewage to the lower Stour estuary. Many of the small sewage works, particularly in the Upper Catchment, discharge to streams with low summer flows and may cause river quality problems when there is insufficient dilution during drought periods. This was the case in 1990 when the National River Quality Survey reported several classification failures. However, data from 1992, when stream flows were higher, indicate improved water quality.

Table B5.1 Major Consented Discharges in the Catchment

Discharge	Consented Flow Ml/d	Average Daily Load BOD (Kg)	
		BOD	Ammonia (N)
<u>STW (Inland)</u>			
Ashford STW	18,000	56.34	32.22
Canterbury STW	18,000	68.22	13.68
Chartham STW	1,710	7.05	1.45
Dambridge STW	3,510	11.82	2.03
Gaffendens STW	2,100	7.56	5.29
Lenham STW	1,000	4.22	1.05
Minster STW	1,332	3.94	1.06
Westbere STW	170	6.19	1.12
<u>Industrial (Inland)</u>			
Betteshanger	6,818	445.68	17.04
Bretts Conning	2,200	3.81	0.33
Bretts Deanery	2,000	3.40	0.26
Chartham Paper	3,300	69.13	0.82
<u>Industrial (Tidal)</u>			
Bulwarks PS	1,200	383.60	43.20
Pfizer	2,730	2949.20	251.60

Industrial process effluent discharges are generally restricted to the Great Stour around Ashford and at Chartham, and to the lower estuary around Sandwich. They include gravel washings, treated paper-making effluent and untreated wastes (to the estuary) from the pharmaceutical industry. By far the largest discharge (authorised by HM Inspectorate of Pollution) is for cooling water from Richborough power station.

A sewage disposal scheme is being built to replace the sea outfalls currently serving Ramsgate, Deal and Sandwich with a new treatment plant discharging to the Stour estuary at Richborough. Similarly, May Street STW is being extended to treat sewage from Herne Bay and Kingshall for discharge to the North Stream (part of the Sarre Penn system), allowing the effluent to be re-used as part of the freshwater resource rather than losing it to the sea. Following a successful pilot scheme, approval has been given for a treatment plant for pharmaceutical wastes to discharge to the Stour estuary at Richborough.

B5.3 Environmental Requirements

Water Quality

- No deterioration in upstream water quality beyond that used in setting the consent.
- Continued monitoring of surface waters and effluent discharges to ensure compliance with consents.

River Flow

- No diminution of the flow regime below that used in setting the consents (normally Annual Q95 or Q50 river flows).

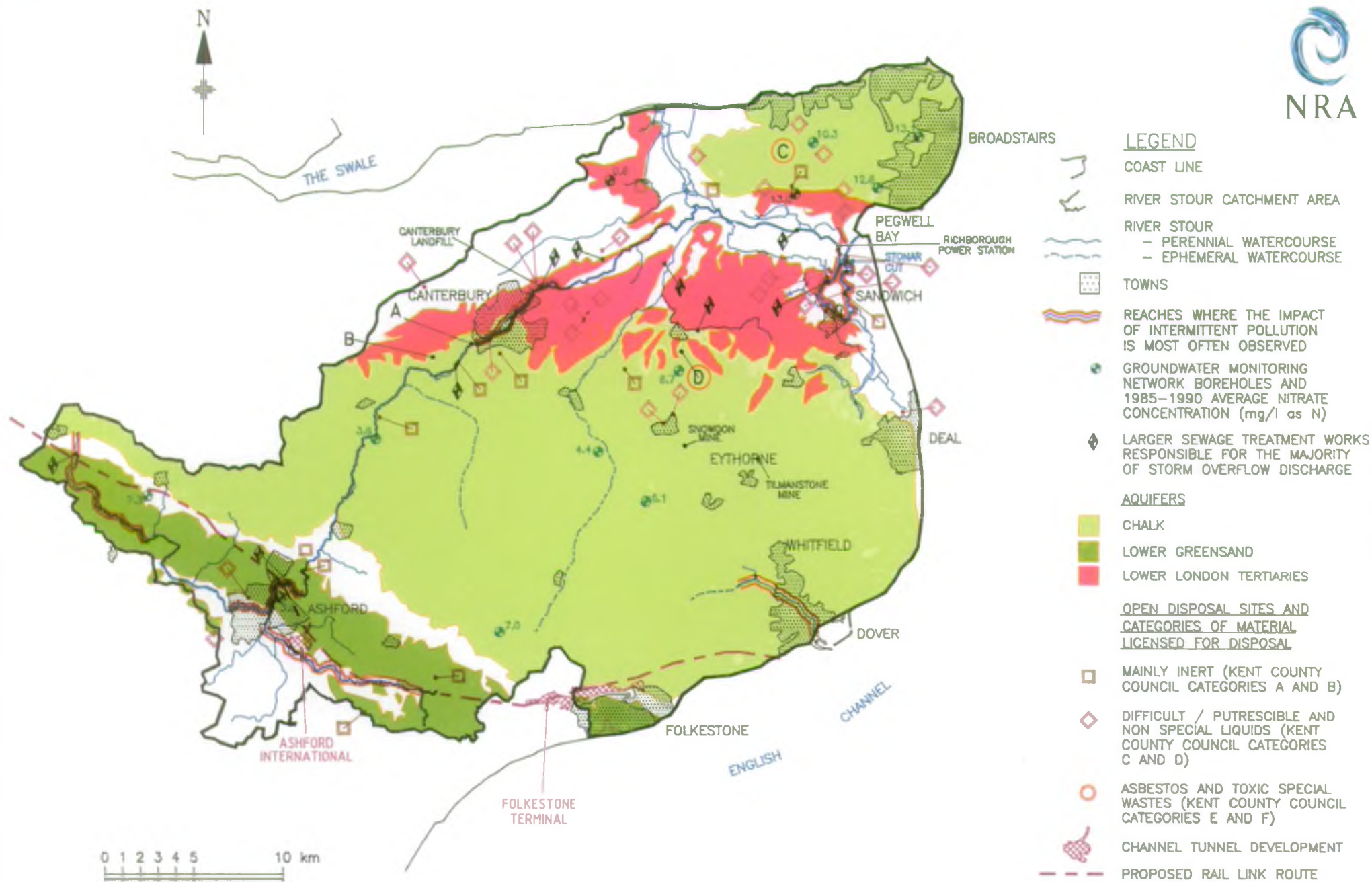
River Topography

- Outfalls should be sited so as to achieve good effluent mixing with the receiving water.

B6. INTERMITTENT AND DIFFUSE POLLUTION



NRA



INTERMITTENT AND DIFFUSE POLLUTION

B6. INTERMITTENT AND DIFFUSE POLLUTION

B6.1 General

This section considers the wide range of pollution inputs to the catchment which are not covered by formal discharge consents, which fall into three main categories:

- 1) Occasional unconsented discharges from point sources.
- 2) Intermittent consented point source discharges.
- 3) Diffuse inputs.

The main source of intermittent pollution in rural catchments is accidental discharges from agricultural sources, such as leaks of silage liquor or cattle slurry, which may have a high BOD and ammonia content and can cause significant pollution, particularly where the outfall is to a small stream offering limited dilution. Elsewhere, accidental pollution may result from traffic accidents, industrial spillages, or from plant failure at effluent treatment works.

The second category includes storm overflows from public sewers or sewage treatment works, which are accepted as being necessary to prevent the system being overwhelmed at times of heavy rainfall. A storm water storage facility is often included at a sewage works to retain the most heavily contaminated initial flow for later treatment, but storm water outfalls can represent a significant pollutant load to a river system and care must be taken that overflow levels are correctly set. Most storm discharges are unconsented at present, particularly in rural areas, but an increasing number is coming within the control of the NRA.

Another problem arises from discharges from landfill sites and mine tailings, which may or may not operate under NRA consent. The NRA is a statutory consultee for planning applications and shares with HMIP and the Waste Regulation Authorities the duty to ensure that the development of such sites does not cause water pollution. However, most closed sites and some which are currently operating, are subject to little control and can pollute surface or groundwater resources.

Agricultural activities frequently result in diffuse pollution of the water environment. High nitrate concentrations are a particular concern in many catchments, caused by fertiliser applications and the ploughing of fallow land. Farmers are encouraged to follow the MAFF Codes of Good Agricultural Practice for the Protection of Water, and to seek free advice on pollution control from the NRA or the MAFF Agricultural Development Advisory Service (ADAS).

Together with nitrates, pesticides (fungicides, herbicides, insecticides etc) are of concern as their concentration in drinking water is constrained by EC Directive 75/440/EEC which sets standards for surface water intended for abstraction for drinking water. A significant source of herbicide contamination has been non-agricultural uses such as weed control on roadsides and railway lines, but these are increasingly coming under control.

The NRA Groundwater Protection Policy, which was issued in 1992, is discussed in Section B1.3.

Kentish Stour Catchment Management Plan

B6.2 Local Perspective

Many pollution incidents in this rural catchment result from farm waste discharges, which are a particular problem in the smaller tributaries. There are also problems of accidental discharges from the concentration of light industry around Ashford, to the extent that a permanent oil interceptor has been installed at Cobb Wood industrial estate. The estuary downstream of Sandwich suffers similar problems and the NRA is concerned that the use of oil emulsion as a fuel for Richborough Power Station should not cause pollution, as this oil derivative mixes readily with sea water.

Stormwater overflows on combined sewerage systems and at sewage treatment works are an unfortunate necessity, but are acceptable if sewer capacities are adequate for normal flows, the overflow weirs are set correctly and measures are taken to prevent the discharge of unsightly solids. The larger treatment works responsible for the majority of storm overflows are shown on the map. Consented stormwater discharges are found throughout the catchment and occasionally cause pollution (as may surface-water run-off from mines and railway sidings), when they may be the subject of prosecution by the NRA.

Transport developments across the catchment have caused a number of problems in the past: siltation of the upper reaches of the Great Stour resulted from construction work on the M20 motorway, and sea water (used to pump sand from offshore) draining from the site of the Channel Tunnel terminal at Cheriton contaminated streams in the Folkestone area. The NRA is working with the developers to avoid similar problems during construction of the Channel Tunnel rail link.

Average groundwater nitrate concentrations for 1984-92 are shown on the map. The MAC of 11.3 mg/l (as N) for drinking water, set by EC Directive 80/778/EEC, is exceeded in the Thanet Chalk block, but elsewhere values are lower, reflecting less intensive agriculture. An NRA proposal to designate the Thanet Chalk block as a Nitrate Sensitive Area under the 1989 Water Act was rejected by the Department of the Environment pending the introduction of a specific EC Directive on the subject.

Recorded pesticide concentrations in surface and groundwaters are below the MAC required by EC Directive 80/778/EEC (0.1 micrograms per litre for individual pesticides and 0.5 micrograms per litre (one part in two thousand million) in total). Mean concentrations of 'Drins (insecticides) and Triazines (herbicides) are shown below.

Table B6.1 Average Pesticide Concentrations in 1990 (ng/l)

Map Site	Triazines micrograms per litre	Drins
A	0.212	0.013
B	<0.020	<0.010
C	0.053	<0.020
D	0.058	<0.020

From 1906 to 1983 saline groundwater was pumped from the Kent coalfield and discharged to soakaways on the Chalk. Snowdon colliery closed in 1983 and groundwater quality in this area has largely recovered, but discharges from Tilmanstone resulted in a plume of contamination extending over 5 kilometres from the mine, forcing the closure of a major groundwater public supply source at Eastry.

Kentish Stour Catchment Management Plan

Active landfill sites across the catchment are shown on the plan. Some of these and a number of closed sites are located on the Chalk aquifer, and one disused site where problems have been identified is Canterbury tip. This site is being investigated, but the impact of others in the catchment has not been fully assessed.

B6.3 Environmental Requirements

Water Quality

- Continued monitoring of surface and groundwater quality.
- Monitoring of high risk sites (eg. waste disposal sites and farms) to assess their impact on surface and groundwater quality.
- Implementation of the NRA National Groundwater Protection Policy.
- To encourage the early reporting of pollution incidents to the NRA.
- To maintain emergency procedures to eliminate or mitigate the impact of accidental discharges.
- Compliance with EC Directives on the Discharge of Dangerous Substances, Abstraction for Water Supply and the protection of Fisheries.

River Flow

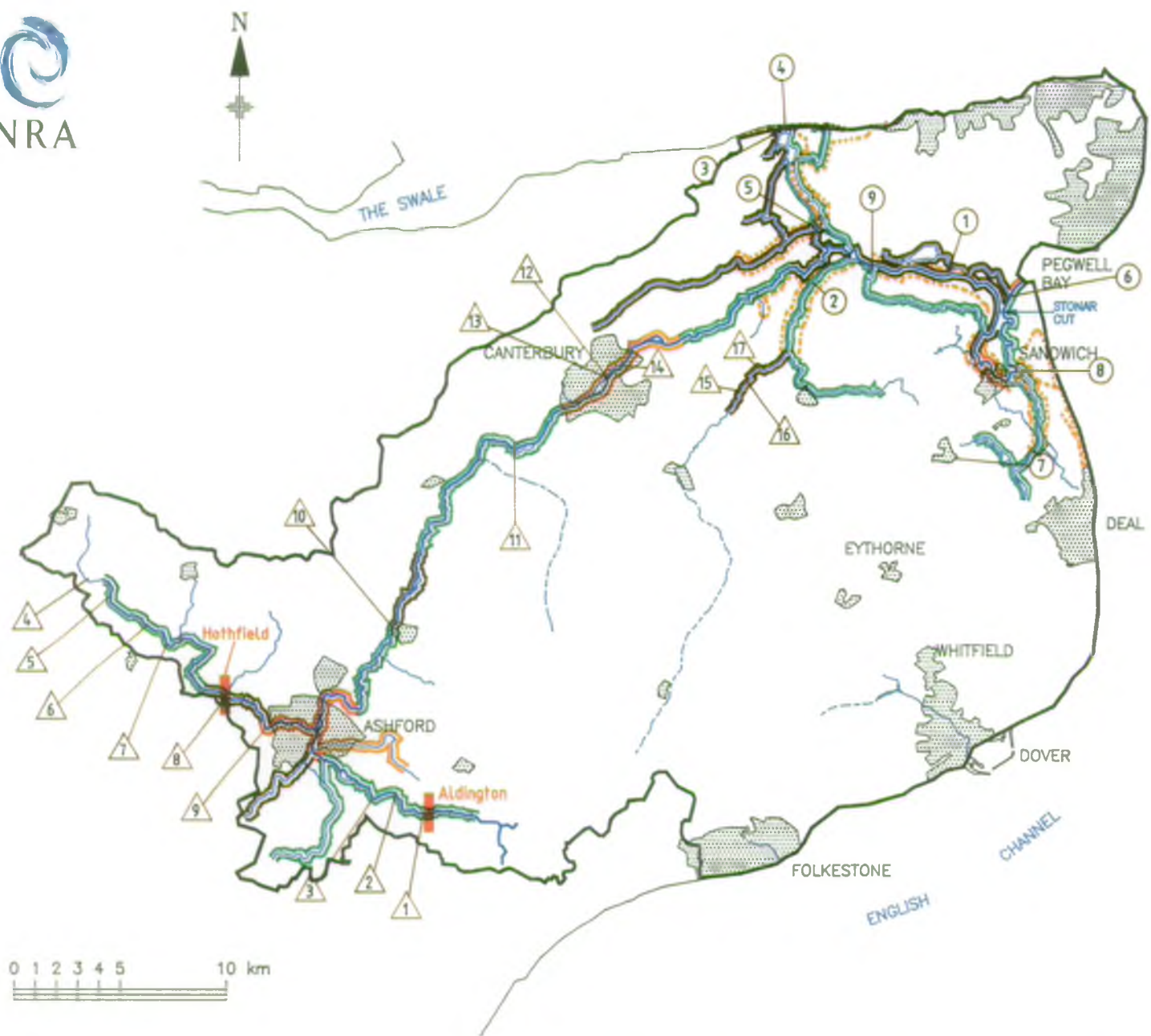
- Basic flow regime to reduce the impact of intermittent and diffuse pollution.

River Topography

- Provision of an uncultivated bankside buffer strip to attenuate diffuse pollution from overland run-off.

Kentish Stour Catchment Management Plan

B7.FLOOD DEFENCE AND LAND DRAINAGE



0 1 2 3 4 5 10 km

LEGEND

COAST LINE

RIVER STOUR CATCHMENT AREA

RIVER STOUR

— PERENNIAL WATERCOURSE

— EPHEMERAL WATERCOURSE

BROADSTAIRS

TOWNS

RIVER STRUCTURE

PRIVATE MILL

EMBANKMENT

FLOOD STORAGE AREAS

LAND USE ALONG MAIN RIVER SECTIONS

— FLOOD PROTECTION CATEGORY

A
B
C
D
E

SEE TABLE B7.1 FOR LAND USE CATEGORIES

RIVER STRUCTURES

- | | |
|---|------------------------------|
| 1 | MINSTER PUMPING STATION |
| 2 | STOURMOUTH PUMPING STATION |
| 3 | RECLIVER PUMPING STATION |
| 4 | NORTHMOUTH SLUICE |
| 5 | SARRE PUMPING STATION |
| 6 | KINGFISHER SLUICE |
| 7 | HACKLINGE NCB PUMP |
| 8 | BLACK SLUICE PUMPING STATION |
| 9 | ASH LEVEL PUMPING STATION |

PRIVATE MILLS

- | | |
|----|--|
| 1 | EVEGATE MILL |
| 2 | HANCOCK'S MILL / FLOOD STREET |
| 3 | SWANTON MILL |
| 4 | BURNT MILL |
| 5 | FIELD MILL |
| 6 | SWALLOW MILL |
| 7 | LITTLE CHART MILL |
| 8 | WORTON MILL |
| 9 | BUXFORD MILL |
| 10 | WYE MILL |
| 11 | CHARTHAM PAPER MILL |
| 12 | EAST KENT MILL / DEAN'S MILL /
HOOKER'S MILL (ONE SITE OWNED BY
CANTERBURY B.C.) |
| 13 | ABBOTT'S MILL / BURNT MILL (ONE SITE
OWNED BY CANTERBURY B.C.) |
| 14 | BARTON MILL (OWNED BY DALGETY) |
| 15 | ICKHAM MILL |
| 16 | LITTLEBOURNE MILL |
| 17 | WICKHAMBEAUX MILL |

FLOOD DEFENCE AND LAND DRAINAGE

B7. FLOOD DEFENCE AND LAND DRAINAGE

B7.1 General

Flood defence relates to the provision of effective defence for people and property and land against flooding from rivers and the sea, and to land drainage for agricultural purposes within river valleys.

Flooding is a natural hazard resulting from extreme climatic conditions such as high winds or very heavy rainfall, and the severity of a flood is described in terms of its statistical frequency over a long period of time. This is expressed as a return period such as 1 in 50 years and the effectiveness of flood defences is measured in the same terms, indicating the frequency with which they can be expected to be overtopped. Different land uses (housing, industry, agriculture etc) vary in their sensitivity to flooding and MAFF indicative targets for their defence are shown on Table B7.1.

For the purposes of management, certain reaches of the river are formally designated as Statutory Main River. Here, the NRA has special powers under the Water Resources Act (1991) to carry out flood defence and land drainage works, and to control the actions of others to protect these interests. Any proposal that could interfere with the bed or banks, or obstruct the flow in the river, requires formal consent from the NRA. Under the Land Drainage Act the NRA also has a general duty to oversee, and powers to control, significantly obstructive works on any watercourse. The criteria for designation of Main River are currently under review.

The drainage of low-lying land may be the legal responsibility of Internal Drainage Boards. An IDB is responsible for drainage channels ditches within its area, up to the point where they discharge to Main River.

The nature of flood defence works carries the risk of conflict with other river uses - notably fisheries and conservation. This is resolved by consultation and, where feasible, flood protection targets are met using methods with the least environmental impact.

Residential and commercial development and urbanisation increase the amount and rate of surface water run-off into a river, and hence the risk of flooding. Development in the flood plain is a particular problem as it places additional properties at risk of flooding and reduces the flow attenuation properties of the undeveloped land, leading to higher river levels upstream and higher flows downstream of a development. For this reason development in a catchment requires careful consideration, particularly if it is in the flood plain.

Kentish Stour Catchment Management Plan

Table B7.1 Indicative Standards of Protection (MAFF)

Band	Current Land Use	Indicative Return Period (Yrs)	
		Tidal	Non Tidal
A	High density Urban Areas	200	100
B	Medium density Urban (may include some agricultural)	150	75
C	Low population density ; few properties at risk; highly productive agricultural land	50	25
D	General Arable farming isolated properties	20	10
E	Low population density; low productivity agriculture; grassland	5	1

(These MAFF standards are indicative and do not represent an entitlement or minimum level to be aimed at).

B7.2 Local Perspective

Areas of Ashford, Canterbury and Fordwich have been prone to flooding in the past and the town of Ashford has grown substantially in recent years, leading to increased urban run-off and higher river flood peaks. Notable floods occurred in 1973, 1979, 1985 and 1988, and local problems followed a major storm in October 1987 which blew some 2,500 trees into the river, causing blockages and floods. In anticipation of the impact of development connected with the Channel tunnel, two flood storage schemes have been built by the NRA at Hothfield on the Great Stour and at Aldington on the East Stour. These have been successful, operating about twice a year and significantly reducing peak flows in the river.

Following completion of the flood storage scheme a major residential and commercial development has been proposed in the river valley to the south east of the town. Although this development includes extensive flood storage provision it impinges on the flood plain; it is important that such proposals should not compromise the effectiveness of existing flood defence works.

Land subsidence in the East Kent coalfield has caused permanent local flooding at Stodmarsh (which is now a wetland National Nature Reserve), lowering the land below high tide level at Stourmouth and around Hacklinge. This makes it necessary for the NRA to pump the whole flow of the Little Stour into the estuary and for British Coal to operate a pumped land drainage scheme on the North and South Streams. Under an agreement with British Coal responsibility for this pumped drainage will pass to the NRA.

The river system includes many privately-owned mill leats and sluices, particularly in Canterbury, and coordinated action is essential to reduce flood risks at times of high flow. Rapid opening and closing of sluices can flush fish out of channels, leave them stranded, or damage other stream fauna and flora; it is important that control structures should be operated carefully to avoid such problems.

Much of the lower Stour area is prone to tidal flooding, particularly when surge conditions cause extreme high tides (as was the case in January 1953, when there was widespread damage and loss of life). Coastal sea defences protect the low-lying land to the west and south of the Isle of Thanet, and recently strengthened embankments prevent flooding from the Stour estuary downstream of Grove Ferry, but the riverside car parks in Sandwich flood regularly and some housing in the town is still at risk.

The flood risk in the estuary is increased when high river flows coincide with high tides. A relief channel is provided by Stonar Cut, which was constructed in 1777 to bypass Sandwich and a 10km loop of the estuary. Gates in the Cut are opened to allow the passage of floods, but their operation at other times is strictly controlled under an Act of Parliament of 1776 to maintain a flow and prevent siltation in the navigable river through Sandwich.

B7.3 Environmental Requirements

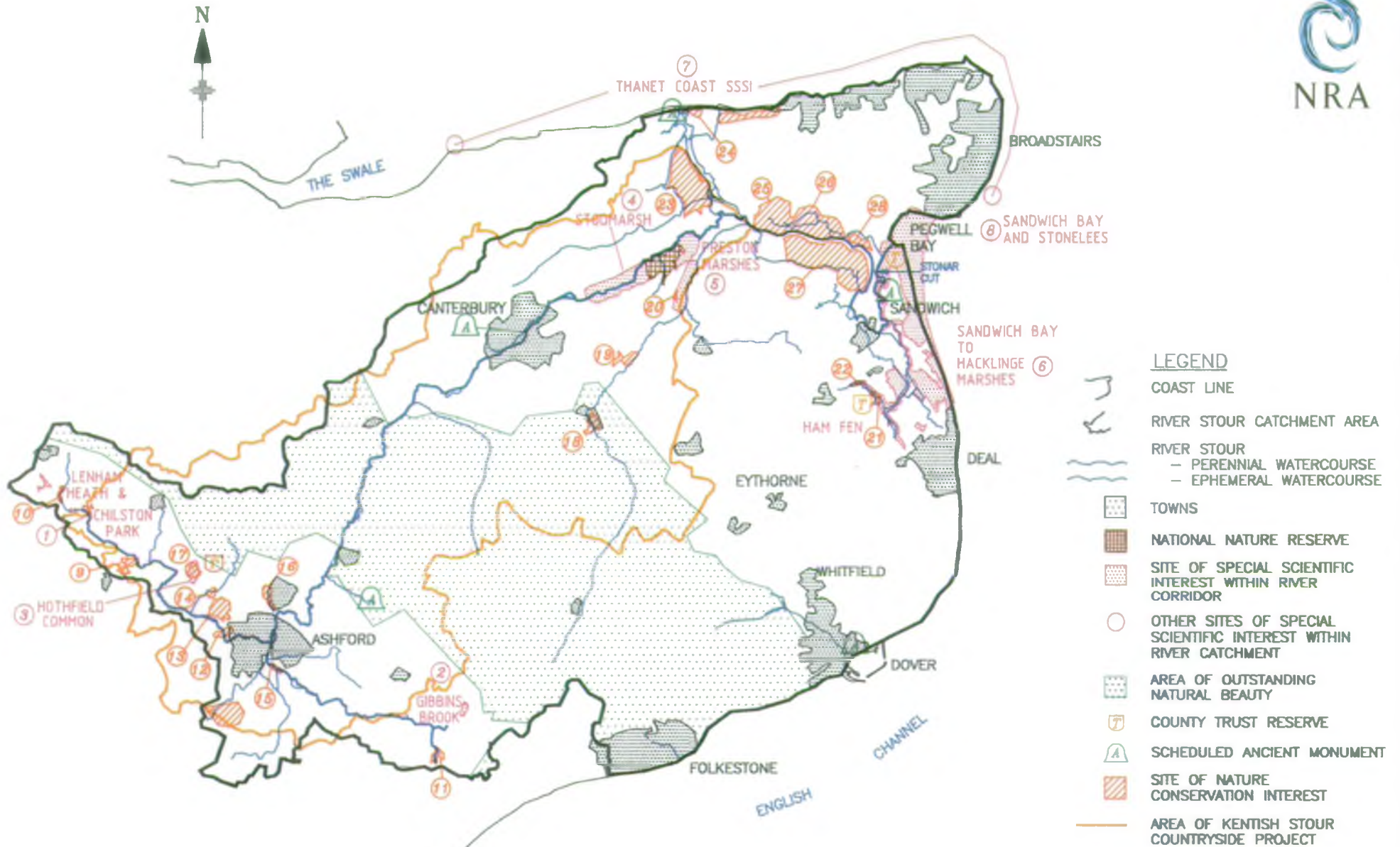
River Topography

- Inspect and maintain control structures and embankments to ensure their continued effectiveness.
- Resist development in the flood plain unless measures are taken to ensure that flood risk is not significantly increased.
- Design river channels to need the minimum of maintenance.

River Management

- Manage aquatic weed to maintain the appropriate flood defence standard.
- Manage bankside trees to prevent obstruction of the river channel.
- Maintain channel water levels and the water table in adjacent land at a level appropriate to land use.
- Carry out flood defence works with sensitivity and in accordance with the NRA's environmental responsibilities.

B8.LANDSCAPE AND CONSERVATION



CONSERVATION

BB. LANDSCAPE AND CONSERVATION

BB.1 General

This use relates to the protection of the flora, fauna and ecology of the river corridor and includes both organisms which depend on the river itself and those which exploit the river banks. A healthy river and adjacent corridor is characterised by diverse and abundant wildlife communities which enhance the overall quality of the landscape.

Rivers have been managed and used by man for thousands of years, shaping their character in relation to his use of the land. However, the pace of change is accelerating and recent measures such as realignment, the removal of bankside trees and wetland drainage have significantly altered this environment.

The NRA's conservation duties are set in Sections 16 and 17 of the Water Act 1991, and require the Authority, whilst carrying out its own functions or exercising its regulatory powers, to further the conservation of flora, fauna, geological and physical features of special interest, and the enhancement of natural beauty. Consideration must also be given to impacts on the man-made environment including buildings, sites and objects of architectural or historic interest.

Many statutory and voluntary bodies have conservation roles and responsibilities; these include English Nature, the Countryside Commission, English Heritage, County Councils, Local planning authorities, the National Trust, County Wildlife Trusts and the Royal Society for the Protection of Birds (RSPB)

BB.2 Local Perspective

The Great Stour and East Stour tributaries flow to their confluence at Ashford through a rural landscape with open fields and scattered woods, although intensive cultivation leaves the river corridor with little ecological interest. The upper Stour supports two SSSIs - Hothfield Heath and valley bog reflects the change in geology from Chalk to the acidic Greensand, Lenham Heath SSSI is close to the source of the Stour and is noted for its damp unimproved pastures and associated woodland.

From Ashford to Canterbury the river runs in a broad valley through the North Downs, giving the Stour many of the characteristics of a Chalk stream. Grazing pasture is the predominant land use in this section, with the river corridor forming a prominent feature in the overall landscape. The river here is generally of high ecological value with good fisheries and diverse invertebrate communities.

Downstream of Canterbury the river is slow moving and most of this section is influenced by the tide. Arable farming is the predominant land use, although subsidence following coal mining has produced extensive marshes and wet pastures of high conservation value. Amongst these, Stodmarsh National Nature Reserve and SSSI is a significant wetland on the banks of the Stour between Fordwich and Plucks Gutter. Similar areas of open water, extensive reed beds and wet pastures are found on the Preston Marshes SSSI on the Little Stour, and in the Sandwich Bay SSSI. The diversity of habitats in the latter site is considerable, with littoral and estuarine formations, mudflats, shingle, saltmarsh and brackish ditches.

The river corridor below Canterbury forms a prominent landscape feature and is particularly important for birds, including nationally rare species such as Cetti's Warbler. Otters, which require undisturbed dense vegetation, have also been recorded here.

Kentish Stour Catchment Management Plan

The marshes of the lower Stour are mainly used for agriculture and contain no scheduled sites. Nevertheless the drainage ditches are of ecological interest, particularly those in the remnant areas of old grazing pasture on the Ash Levels and Gosshall Marshes. As with the scheduled sites upstream, these features rely on a high water table.

The Stour Countryside Project was established in September 1992 and is sponsored by Kent County Council, the Countryside Commission and the NRA, with support from Ashford Borough Council and Canterbury City Council. The overall aim is to conserve and enhance the character and amenity of the Stour Valley for the benefit of the public. The Project provides conservation and landscape advice, practical landscape management and coordination of voluntary effort. Issues of local importance are highlighted and positive change implemented through campaigns focused on the management of hedgerows and the riverside habitat. A similar project on the River Medway has been very successful.

B8.3 Environmental Requirements

Water Quality

- Waters should comply with the minimum standards for amenity protection and aesthetic criteria and comply with the levels of List I and List II substances in EC Directive 76/464/EEC.

River Flow

- To conserve the natural characteristics of the river a variable flow regime is required, with the monthly averages reflecting the natural flow pattern.
- Seasonal spate flows to inundate wetlands and to achieve natural cleansing of the river channel.

River Topography

- Maintain margins of trees or wetland vegetation and encourage such vegetation in areas where it is currently lacking.
- Maintain and enhance natural river features such as submerged and emergent vegetation, meanders and pool: riffle sequences.
- Maintain channels of an appropriate cross-section for the flow regime.
- Manage access to the river for livestock, to control excessive trampling.
- Control public access to avoid ecological damage.
- Avoid damage to archaeological sites.

River Management

- Operate sluices and weirs to maintain channel water levels and protect adjacent wetland habitats from drying.
- Maintain ditches in a way which encourages rather than diminishes ecological diversity.

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- Encourage autumn weedcutting to maintain channel capacity for winter flows whilst minimising loss of vegetation by scouring.
- Carry out river corridor surveys to determine the conservation value and requirements of river reaches.
- Co-operate with local authorities and riparian landowners to ensure that banks and surrounding areas are free from rubbish and litter.
- Encourage the application of land-use grant schemes to enhance wetlands and provide an uncultivated buffer strip adjacent to the river.
- Recognise the importance of Sites and Monuments Records maintained by Local Authorities..

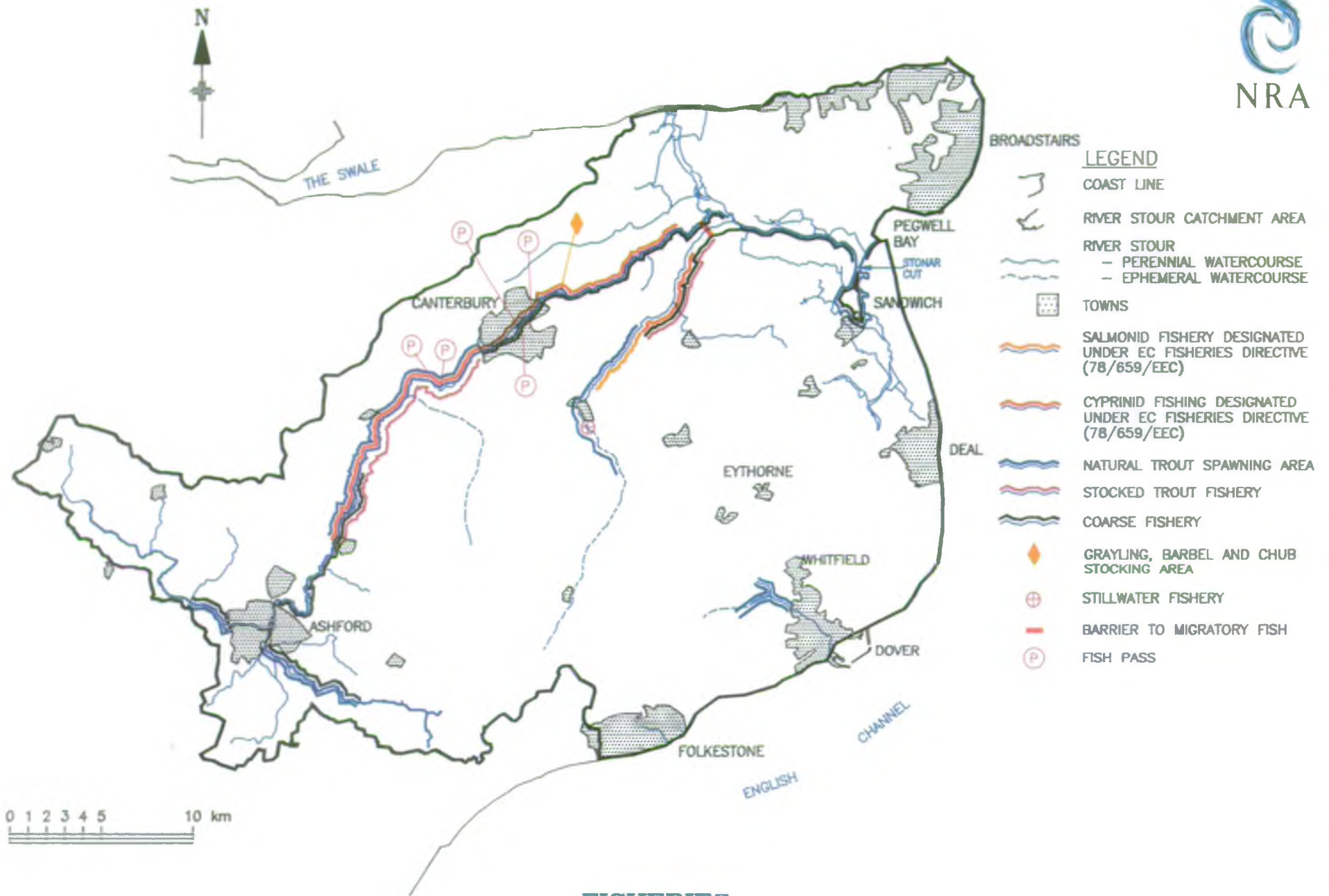
Kentish Stour Catchment Management Plan

Table B8.1 - Schedule of Designated Sites

Map Ref No.	Name	Designation	Reasons for Designation
1	Lenham Heath & Chilston Park	SSSI	Open water, reedbeds, scrub & alder carr, rich & varied flora & fauna
2	Gibbins Brook	SSSI	
3	Hothfield Common	SSSI	
4	Stodmarsh	SSSI & NNR	
5	Preston Marshes	SSSI	
6	Sandwich Bay & Hacklinge Marshes	SSSI	
7	Thanet Coast	SSSI	
8	Sandwich Bay & Stonelees	SSSI	
9	Little Chart Mill	SSSI	
10	Burnt Mill Pond, Charing Heath	SNCI	Pond, Woods Pond, Heath Wood
11	Haringe Brooks Wood	SNCI	
12	Great Stour, Ashford to Fordwich	SNCI	
13	River Great Stour, Godington	SNCI	
14	Hothfield Lake	SNCI	
15	South Willesborough Dykes	SNCI	
16	Bybrook	SNCI	
17	Hothfield	SNCI	
18	River Nailbourne	SNCI	
19	Littlebourne Pasture	SNCI	
20	Seaton Pits & Wenderton	SNCI	
21	Ham Fen	SSSI, KTNC	
22	Worth Mill Wood, Fenderland	SNCI	
23	Chisler Marshes & Sarre Penn	SNCI	
24	Reculver to Plum Pudding Island	SNCI	
25	Monkton Marshes	SNCI	
26	Minster Station Environs	SNCI	
27	Ash Levels/South Richborough	SNCI	
28	Richborough Pasture	SNCI	

Note: SSSI Site of Special Scientific Interest
 LNR Local Nature Reserve
 SAM Scheduled Ancient Monument
 SNCI Site of Nature Conservation Interest
 KTNC Kent Trust Nature Conservation
 NNR National Nature Reserve

B9.FISHERIES



FISHERIES

B9. FISHERIES

B9.1 General

This use relates to the maintenance of sustainable populations of indigenous freshwater and migratory fish. Game fish (also referred to as Salmonids) and coarse fish (Cyprinids) are protected under the EU Fisheries Directive (78/659/EEC) which sets water quality criteria in designated freshwater reaches to protect fish life. Additional reaches may be designated periodically, or existing reaches upgraded.

The distribution of fish is influenced by geographical parameters, principally bed gradient, river flow and the quality of the water, making them an important indicator of the overall health of a river.

B9.2 Local Perspective

B9.2.1 Game Fisheries

Only the Little Stour between Bridge and Littlebourne is designated as a salmonid fishery under the EC Freshwater Fisheries Directive, although wild brown trout populations are found throughout the catchment upstream of the tidal limit and are supplemented by stocking for angling. In the past the river was noted for its Fordwich Trout (sea trout) which were reputed to grow to 12kg and were the subject of a Charter of Henry II (1154-1189). The run of sea trout in recent years has been small, but has increased since 1980 when Canterbury STW was enlarged and river water quality improved. Since then juvenile salmon have also been found upstream of Canterbury, indicating that the adult fish are now able to penetrate to their spawning grounds. The NRA intends to improve these runs by providing fish passes at obstructions. Two structures have been built in Canterbury, another at Chartham Paper Mill, and others are planned to make the river fully accessible from the sea to Ashford.

Migratory trout and salmon are prevented from entering the Little Stour by the pumping station which lifts water from the non-tidal river into the estuary. However, sea-trout are known to enter the River Dour through the tidal flap valve at its outfall to Dover Harbour.

Trout spawning gravels in the upper reaches of the Great Stour have become badly silted as a result of construction of the M20 motorway, when surface water with a high sediment load was discharged to the river. Reduced flushing action during the drought of recent years has contributed to this problem, as have the flood-control barrages which reduce peak flows and have increased siltation as far downstream as Wye.

B9.2.2 Coarse Fisheries

The middle and lower reaches of the Rivers Stour and Little Stour support good populations of coarse fish and are designated as cyprinid fisheries under the EC Freshwater Fisheries Directive. Most species of coarse fish can be found throughout the catchment, but roach dominate upstream of Canterbury and bream below. Other varieties include perch, dace, gudgeon, tench, pike, eels, rudd and stone loach. Flounders and mullet penetrate the estuary and eels are fished commercially in the tidal reaches and marsh drains.

NRA fish survey data suggest that the population of coarse fish downstream of Canterbury is lower than might be expected, with more eels and fewer fish of other species. Factors which might account for this include the impact of low flows, reduced habitat diversity and the removal of nutrients from the river

Kentish Stour Catchment Management Plan

resulting from improved sewage treatment. Coarse fish in these reaches tend to shoal in the deeper water, especially in winter. Further studies are under consideration to examine these phenomena.

B9.3 Environmental Requirements

Water Quality

- Water quality in designated reaches to comply with EC Fisheries Directive (78/659/EEC).

River Flow

- Sufficient flow to conserve fish populations and allow fish movements within the catchment.

River Topography

- Provide and maintain fish passes at obstructions to ensure the free passage of fish. All barriers should be passable at low river flows.
- Maintain and develop diverse natural river features to ensure a variety of spawning and feeding areas.
- Maintain a mixture of open and dense vegetation on the stream bank and in the channel, to provide shade and cover.

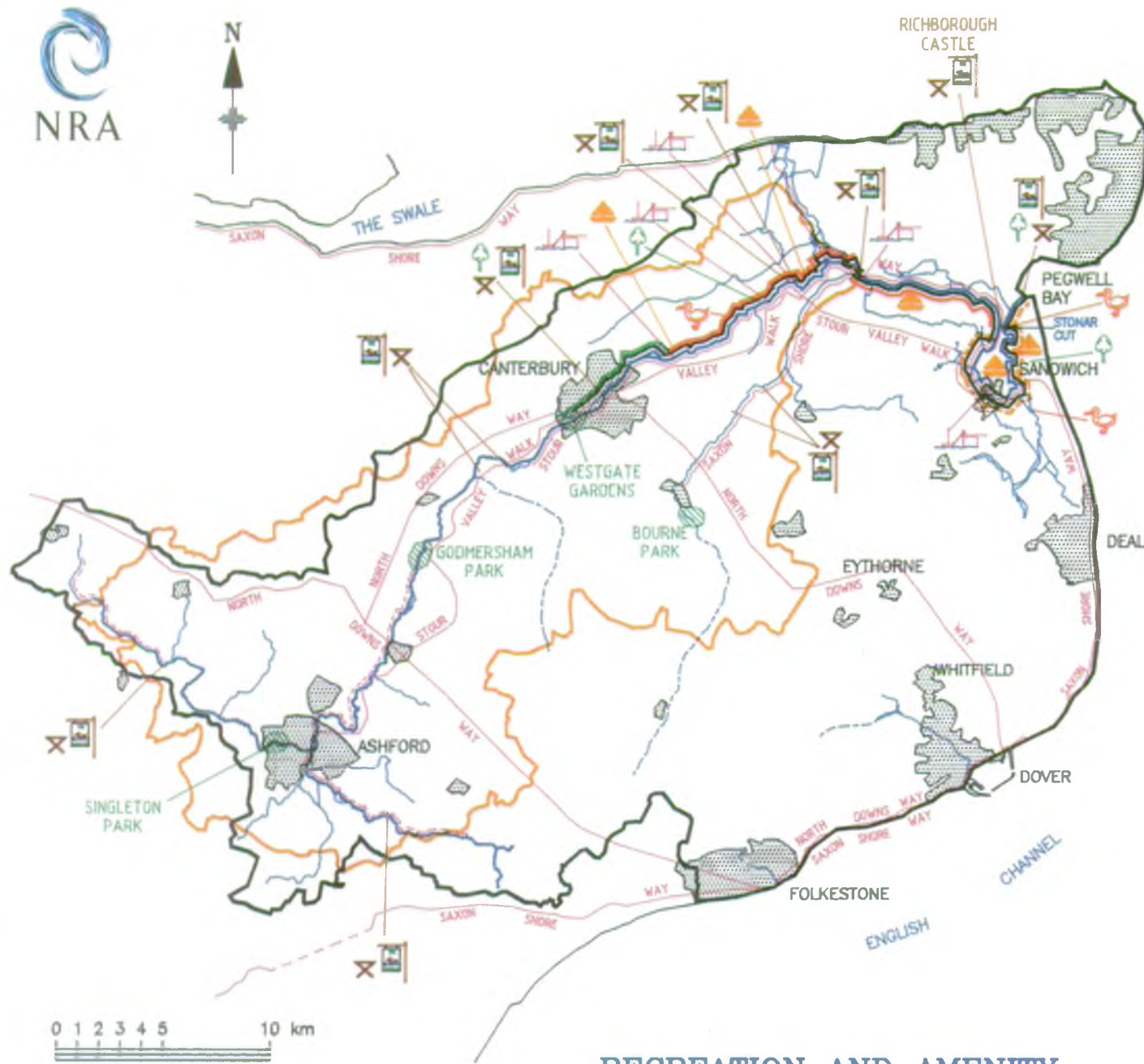
River Management

- Where fish stocking is required, use appropriate species and numbers of fish.
- Maintain high quality spawning gravels in reaches where salmonid fish breed.
- Avoid rapid fluctuations in water levels where this may endanger fish.
- Fisheries management operations to be consistent with conservation objectives.

B10.RECREATION AND AMENITY



N



LEGEND

COAST LINE

RIVER STOUR CATCHMENT AREA

RIVER STOUR

- PERENNIAL WATERCOURSE
- EPHEMERAL WATERCOURSE

TOWNS

CONTINUOUS FOOTPATH IN REACH

INTERMITTENT FOOTPATH IN REACH

PARKLAND

SAILING / BOATING

BIRDWATCHING

NATURE RESERVE

PICNIC SITES

RIVERSIDE PUBLIC HOUSES

AREA OF KENTISH STOUR COUNTRYSIDE PROJECT

CANOEOING

MOORING \ BOAT YARD

PUBLIC RIGHT OF NAVIGATION UNDER SANDWICH PORT AND HAVEN COMMISSIONERS

NAVIGATION CONDUCTED UNDER HIGH SEAS RIGHTS WITH NO KNOWN NAVIGATION AUTHORITY

NAVIGATION TAKES PLACE UNDER NO KNOWN RIGHT OF AUTHORITY

RECREATION AND AMENITY

B10. RECREATION AND AMENITY

B10.1 General

This section considers activities such as walking, canoeing, swimming, boating, fishing and bird watching, which attract people to the river corridor. The principal areas of concern are access, aesthetic acceptability and, in the case of immersion sports, the possible health risk.

The Recreation and Amenity duties of the NRA are set out in Section 8 of the Water Act 1989, which empowers the NRA to conserve and enhance the natural beauty and amenity of inland and coastal waters and associated land, as well as the use of such waters and land for recreational purposes. The NRA is required to have regard to the desirability of preserving public freedom of access, and may actively promote the development of recreational and amenity where it is considered desirable.

Also included here are commercial and recreational navigation. In tidal waters there is usually a public right of navigation, but such rights do not exist in non-tidal stretches of water unless they have been established through historical usage, by dedication from the riparian owners or by statute. The extent of freshwater navigation rights is limited, there may be restrictions on the parts of rivers which can be used and the type of craft, and there is usually no right to land as the banks above tidal limits are privately owned.

B10.2 Local Perspective

Apart from local footpaths and parkland in Ashford, public access to the upper and middle reaches of the Stour is limited or intermittent. In Canterbury the river is accessible at Westgate Gardens and in the city centre, where boats and canoes are available for hire. Below Canterbury the Saxon Shore Way follows the river to Sandwich, but in places it has been made impassible by erosion of the bank separating the river channel from flooded gravel workings and by flooding caused by coal mining subsidence.

The expansion of Ashford will increase demand for recreation in this area. The Countryside Commission and Kent County Council seek to promote access and recreation in the countryside, an initiative which is supported by the NRA through the Stour Countryside Project (see also section B8). Two new waymarked footpaths are being developed, the Stour Valley Walk and the Elham Valley route, and the possibility of expanding the riverside footpath network in and around Ashford is being explored. Fishing is also expected to become more popular, with demand being met at Singleton Lake (Ashford Borough Council) and at still-waters managed by angling clubs. At present the catchment is lightly used for immersion sports, although canoeing is practised in the tidal reaches and wind surfing, swimming and water-skiing occur in the estuary at Pegwell Bay. Below Sandwich a perception of poor water quality and the obvious presence of industrial and sewage outfalls give rise to complaints from recreational users.

Angling interest is concentrated downstream of Ashford, with coarse fishing predominating upstream of Wye and downstream of Fordwich, and stocked trout fisheries in the middle reaches. Trout fishing is also practised on the Little Stour. The tidal river above Plucks Gutter is nationally renowned as a coarse fishing match venue, in 1990 over 90 block licences were issued for fishing matches at Grove Ferry.

There is no public right of fishing on the tidal reaches of the Great Stour as this privilege was given to the monks of Canterbury, and later to the Mayor, Jurats and Freemen of Fordwich, by a number of

Kentish Stour Catchment Management Plan

pre-Magna Carta grants dating back to a charter of King Canute in 1023. The Franchise of Fordwich granted by Henry II defines the riparian interest as

"... the lands on both sides of the river as far as a man being in a boat at high water can draw an axe of seven pounds weight called a Taper Axe upon the land. ...".

These ancient rights, which are now exercised by the Fordwich United Charities and let to Canterbury and District Angling Association, were upheld by the courts in 1984 when a riparian owner was restrained from denying anglers access to the river.

The NRA is not the navigation authority for the River Stour - there is a public right in the tidal reaches, with the Sandwich Port and Haven Commissioners regulating navigation from the sea to Richborough Castle. Canoes and rowing boats are permitted within Canterbury City, boating is popular downstream of Fordwich, and moorings at Grove Ferry, Plucks Gutter and Sandwich are used by some 400 pleasure craft each year. Richborough Wharf is commercial with some 650 ship movements annually for the transport of oil, stone and gravel.

The Port of Sandwich has always suffered from siltation problems and it is a condition of the 1776 Act of Parliament that Stonar Cut (which is a flood relief channel) is operated to preserve a flushing flow in the river through the town. Lack of water below Richborough Wharf restricts the passage of larger vessels (drawing up to 3.3m) to high tide only, and dredging is required to maintain the channel. There is concern that siltation resulting from a reduction in freshwater flow could restrict navigation even further.

B10.3 Environmental Requirements

Water Quality

- Waters to be free from surface films floating litter, discolouration or unpleasant odours.
- Waters to be aesthetically acceptable to participants.

River Flow

- A basic flow regime to minimise detriment to recreation and amenity

River Topography

- Maintenance of existing footpaths and access points.
- Sympathetic management and renovation of riverside artifacts
- Maintenance of launching points, mooring facilities and storage areas for equipment.

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River Management

- Clear signposting of footpaths, access rights and recreational features.
- Provision of countryside interpretation information.
- Promotion of recreation to be consistent with conservation.

SECTION C : TARGETS

RIVER FLOW TARGETS

Critical river flow requirements are identified from the needs of river USES and summarised in this section.

- The flow regime should reflect the natural pattern of seasonal flow variation to conserve the characteristics of the river.
- The natural flow regime should not be altered in a way which significantly inhibits the migration of salmonid fish.
- There should be no diminution of flows below those assumed in setting effluent discharge consents.
- Additional minimum residual flows should be set for reaches of the river as the basis for Prescribed Flows and to control future abstraction licences. In particular cases consideration may be given to varying existing licences by including a new prescribed flow control.

WATER QUALITY TARGETS

The following general water quality targets are considered to be appropriate for the catchment :-

- Individual reaches to meet their target River Quality Objective class.
- The conservation and amenity value of the river corridor to be maintained.
- The NRA Groundwater Protection Policy to be implemented
- The NRA water quality monitoring programme for the catchment to be maintained.
- Designation to be sought under the EC Freshwater Fisheries Directive for reaches where significant game or coarse fisheries occur.

RIVER TOPOGRAPHY TARGETS

Overall River Topography Targets for the catchment are derived from those for individual catchment uses, but may vary widely in scale. The intention here is to identify broad objectives rather than points of detail.

- Maintain river structures to ensure their continued effectiveness in relation to the Flood Defence Target Levels of Protection shown in Table B7.1
- Ensure that river structures are passable to migratory fish at Q95 flows.
- Maintain the width and depth of river channels at a size appropriate to the flow regime.

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- Where consistent with the requirements of effective flood defence, conserve natural river features such as bankside trees, emergent vegetation, meanders and pool:riffle sequences.
- Promote the development of a buffer strip of uncultivated bankside vegetation to enhance the conservation and landscape value of the river corridor, and to attenuate the effects of siltation, nutrient enrichment and pollution resulting from run-off from adjacent land.
- Control excessive trampling of the river bank by livestock.
- Control new development, especially within the flood plain, to prevent significantly increased flood risk.
- Ensure that river maintenance work and new developments are compatible with the conservation duties of the NRA.
- Maintain the integrity of river banks and channels adjacent to mineral extraction sites.
- Restore waste disposal and mineral extraction sites to an acceptable environmental standard when operations are complete.
- Maintain access to the river for recreational users, consistent with the objectives of conservation.

RIVER MANAGEMENT TARGETS

River management targets are derived from those of individual uses and summarised in this section. The intention is not to provide a maintenance schedule but to indicate the major river management issues.

- Determine the ecological value of river reaches, and the management prescription needed for this to be conserved and enhanced.
- Ensure that environmental objectives are taken into account in river management programmes.
- Maintain channels and river banks to meet flood defence objectives in a way which encourages ecological diversity.
- Manage water levels to reduce flood risks, whilst maintaining fisheries and conserving wetland habitats.
- Maintain in-channel features to benefit wildlife conservation and fish stocks.
- Encourage Local Authorities, riparian owners and other interests to keep river banks and surrounding areas free from litter.
- Manage in-stream vegetation to control water levels, having regard to the needs of fisheries and nature conservation.
- Manage bankside trees to prevent obstruction of the watercourse.
- Operate sluices in a way which avoids fisheries problems.

SECTION D : CATCHMENT ISSUES



NRA

N

LEGEND

COAST LINE

RIVER STOUR CATCHMENT AREA

RIVER STOUR

— PERENNIAL WATERCOURSE
— EPHEMERAL WATERCOURSE

TOWNS

HOTHFIELD FLOOD STORAGE RESERVOIR

ASHFORD INTERNATIONAL

ALDINGTON FLOOD STORAGE RESERVOIR

FOLKESTONE TERMINAL

0 1 2 3 4 5 10 km

CATCHMENT ISSUES

ISSUES IDENTIFIED

- 2 GROUNDWATER NITRATE CONCENTRATIONS IN THANET CHALK BLOCK EXCEED THE MAXIMUM ADMISSABLE VALUE FOR PUBLIC WATER SUPPLY
- 3 DISCHARGES OF SALINE WATER PUMPED FROM FORMER SNOWDON AND TILMANSTONE COAL MINES HAVE CONTAMINATED THE CHALK AQUIFER
- 4 AN ENVIRONMENTALLY ACCEPTABLE FLOW REGIME NEEDED FOR PLUCKS GUTTER
- 7 GROUNDWATER ABSTRACTION FOR PUBLIC SUPPLY INCREASES THE TIME WHEN THE EPHEMERAL NAILBOURNE IS DRY
- 8 GROUNDWATER ABSTRACTION FOR PUBLIC SUPPLY SIGNIFICANTLY REDUCES FLOW IN THE LITTLE STOUR, RIVER DOUR AND WINGHAM RIVER
- 9 SURFACE AND GROUNDWATER POLLUTION FROM DISUSED REFUSE DISPOSAL SITE AT CANTERBURY
- 10 CHANNEL TUNNEL DEVELOPMENT AND PROPOSED RAILLINK ROUTE — CARE MUST BE TAKEN TO MINIMISE PROBLEMS OF DISRUPTION TO SURFACE DRAINAGE, CHANNEL SILTATION AND RIVER POLLUTION
- 11 CROP DAMAGE DUE TO EXCESS SALINITY OF IRRIGATION WATERS REPORTED FROM MINSTER AND CHISLET MARSHES
- 14 STONAR CUT OPENED DURING HIGH FLOWS TO PREVENT FLOODING BUT THIS REDUCES SCOURING FLOW THROUGH SANDWICH AND MAY LEAD TO INCREASED SILTATION
- 16 CONSTRUCTION OF HOTHFIELD AND ALDINGTON RESERVOIRS REDUCED FLUSHING FLOWS DOWNSTREAM AND INCREASED RISK OF SILTATION ABOVE WYE
- 17 POTENTIAL FOR CONFLICT BETWEEN NEEDS OF LAND DRAINAGE AND WILDLIFE CONSERVATION
- 20 COARSE FISHERY NOT DESIGNATED UNDER EC FRESHWATER FISHERIES DIRECTIVE

BROADSTAIRS

CHISLET MARSHES

MINSTER MARSHES

PEGWELL BAY

STONAR CUT

SANDWICH

CANTERBURY

SARRE POOL

LITTLE STOUR

WINGHAM RIVER

ASH LEVELS

NAILBOURNE

PETMAR BOURNE

WYE

WYKE

ASHFORD

WYKE

WYKE

WYKE

WYKE

WYKE

WYKE

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SECTION D : CATCHMENT ISSUES

ISSUES IDENTIFIED

1. There is an increasing demand for water for public supply in south east England, but the groundwater resource of this catchment has been developed to such an extent that the NRA operates a presumption against licensing further abstractions.
2. Groundwater nitrate concentrations in the Thanet Chalk block exceed the maximum admissible value for public water supply. The loss of this resource is particularly important as most Thanet groundwater drains direct to the sea and could be abstracted without significant impact on surface water flows.
3. Discharges of saline water pumped from the former Snowdon and Tilmanstone coal mines have contaminated the Chalk aquifer, making parts of it unsuitable for supply. Chloride concentrations may exceed 500 mg/l and the contamination could take over 30 years to disperse.
4. River flow criteria recommended for the lower reaches of the Stour include targets for summer marsh feeding, fish migration, navigation and water supply to Richborough Power Station. An Environmentally Acceptable Flow Regime is needed for Plucks Gutter, formally incorporating these flow requirements.
5. The demand for water for marsh feeding is increasing steadily and is not fully met in a drought year.
6. Groundwater abstraction for public supply from the upper and middle reaches of the Great Stour significantly reduces river flows, particularly in late summer and at times of drought.
7. Groundwater abstraction for public supply increases the time when the ephemeral Nailbourne is dry.
8. Groundwater abstraction for public supply significantly reduces flows in the Little Stour, River Dour and Wingham River, contributing to water quality failures due to lack of dilution for effluents and urban run-off.
9. Surface and groundwater pollution is known to arise from the disused refuse disposal landfill site at Canterbury. Similar problems may occur at other operating and disused sites.
10. Care must be taken in the design and construction of the Channel Tunnel Rail Link to minimise the problems of disruption to surface drainage, channel siltation and river pollution which were experienced during construction of the M20 motorway and the Channel Tunnel.
11. Crop damage due to excess salinity of irrigation waters has been reported from the Minster and Chislet Marshes. There is a need to ensure that the tidal outfall structures of land drainage channels exclude sea water efficiently.

Water quality is critical for the irrigation of horticultural crops and bacteriological contamination may make them unsuitable for market unless they are processed.

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(Increasing demands for spray irrigation may require the use of potentially brackish or bacterially contaminated water. It is the responsibility of the farmer to ensure that he uses water suitable for irrigation and that his produce is wholesome. It may be necessary for farmers to monitor water quality more closely, to process crops before sale, or to restrict irrigation to less sensitive crops).

12. There is a need to ensure that future development does not increase flood risks. The flood defence scheme for Ashford was designed to allow for some urban growth, but additional development is being proposed which, if permitted, could reduce the level of flood protection provided for existing property in the town.
13. There is concern regarding the standard of protection against tidal flooding provided by the Stour estuary embankments. The risk of flooding may be increased in the future by sinking land levels, the settlement of flood embankments and a rise in mean sea level caused by climate change.
14. Stonar Cut sluice is opened at times of high flow to prevent flooding, but this reduces scouring flows through Sandwich and may lead to increased siltation, with the need for dredging to maintain the navigation.
15. Private sluices in the catchment need to be operated correctly during flood events to minimise both flood risk and detriment to fisheries.
16. The construction of Hothfield and Aldington flood storage reservoirs has resulted in reduced flushing flows downstream and increased the risk of siltation of the river above Wye.
17. In marshland areas, particularly Hacklinge Marshes and the Ash Levels, there is potential for conflict between the needs of land drainage and wildlife conservation.
18. The bankside habitat of both the East Stour and Great Stour above Ashford is generally poor, with a lack of marginal vegetation in areas of intensive farming.
19. There is a potential conflict over the water level requirements of arable and stock farming, fisheries and wildlife conservation, particularly in the marshland areas.
20. Neither the coarse fishery between Ashford and Wye nor the trout fishery between Wye and Canterbury has been designated under the EC Freshwater Fisheries Directive.
21. Conflict between conservation, angling and other interests may become more significant as recreational use of the river increases.
22. Many public footpaths in the catchment are obstructed or are poorly maintained. In places the bank separating the river channel from adjacent still waters has been destroyed, making footpaths impassable. Public access to the river is poor in parts of the catchment. (These issues are being addressed by the Stour Countryside Project).
23. Changes in the abundance, species composition and shoaling behaviour of the of fish population downstream of Canterbury are reported to make the coarse fishery less attractive, especially to match anglers.

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24. Some river structures are impassable to salmon and sea trout migrating upstream to their spawning grounds.

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SECTION E : MANAGEMENT OPTIONS

The management options in this section represent the ideas of the of the NRA at the time this Consultation Report was prepared, but do not constitute NRA policy as this will not be finalised until the public consultation process is complete.

Comments on these options and suggestions for new ideas are invited.

Management Options identify the agencies with an interest in the issue concerned, recognising that some functions are outside the specific responsibility of the NRA. The final choice of management action will involve many interests working together to fulfil the common strategy represented by the River Catchment Management Plan.

Table of Management Options

Issue Ref. No. 1	Shortfall of water resources to meet increasing demands		
Management Options	Responsible Bodies	Pros	Cons
Implement demand management and reduce leakage.	Water Companies	Conserve resource, lessen environmental impact of abstraction, delay capital investment	Cost
Import bulk water supplies from other catchments.	NRA, Water Companies	Rational use of water resource	Cost
Construct Broad Oak Reservoir to store winter flows.	Water Companies	Better security of water supplies	Environmental impact, high cost

Abbreviations

The following are used in the Management Proposals and refer to those bodies that are relevant to the particular proposals.

CC	Countryside Commission
EN	English Nature
IDB	Internal Drainage Board
LA	Local Authority
NRA	National Rivers Authority
MAFF	Ministry of Agriculture, Fisheries and Food
NFU	National Farmers Union
RADIS	Rother Area Drainage Improvement Scheme

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Issue Ref. No. 2		Excessive nitrate concentration in Thanet groundwater	
Management Options	Responsible Bodies	Pros	Cons
Investigate blending drinking water to meet nitrate limits.	Water Companies	Meets EC Regulation	Cost
Designate Thanet a Nitrate Sensitive Area.	NRA, DoE, MAFF	Safeguards water resource	Impact on agriculture, long delay before groundwater quality improved
Issue Ref. No. 3		Chalk aquifer contaminated by saline mine water	
Allow natural recovery (may take 30 years or more)		Low Cost	Delay before water available
Accelerate recovery by pumping contaminated water to waste.	NRA, Water Companies	Releases water for use	Cost
Provide advanced treatment for contaminated water.	Water Companies	Water available for supply	Cost
Issue Ref. No. 4		Abstraction at times of low flow can cause environmental problems	
Develop an Environmentally Acceptable Flow Regime for the lower river Stour.	NRA	Rational protection of water environment	Impact on agricultural, PWS and industrial abstractors
Issue Ref. No. 5		Growing demand for water for marsh feeding	
Require abstractors to provide winter storage for summer use.	NRA	Protects Water Environment	Cost to abstractors
Continue to maximise the effective use of available water by managing resources in accordance with the agreed policy.	NRA, IDB's, Farmers		
Develop a management plan which apportions resources fairly and assigns costs to beneficiaries.	NRA, IDB's, Farmers		

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Issue Ref. No. 6	River flow in the Great Stour significantly reduced by abstraction for public water supply		
Management Options	Responsible Bodies	Pros	Cons
<p>In accordance with the Kent Area Groundwater Management policy:-</p> <p>Reduce abstraction from boreholes.</p> <p>Make abstraction seasonal, linking the licences with those for other sources.</p> <p>Relocate boreholes to less sensitive sites.</p> <p>Investigate the potential for low-flow river augmentation.</p>	<p>Water Companies</p> <p>Water Companies, NRA</p> <p>NRA, Water Companies</p> <p>NRA</p>	<p>Environmental benefit</p> <p>Rational use of water resource</p> <p>Environmental benefit</p> <p>Better use of water resource</p>	<p>May transfer problem elsewhere, impact on abstractors, Cost</p> <p>Cost</p> <p>Cost</p> <p>Cost, Loss of natural river flow variability</p>
Issue Ref. No 7	Groundwater abstractions cause Nailbourne to dry for a greater length and longer period.		
<p>In accordance with the Kent Area Groundwater Management policy:-</p> <p>Reduce abstraction from existing boreholes.</p> <p>Relocate boreholes to less sensitive areas.</p> <p>Investigate the potential for low-flow river augmentation.</p>	<p>Water Companies</p> <p>NRA, Water Companies</p> <p>NRA</p>	<p>Environmental benefit</p> <p>Environmental benefit</p> <p>Better use of water resource</p>	<p>Cost</p> <p>May transfer problem elsewhere, Cost</p> <p>Cost, loss of natural river flow variability</p>

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Issue Ref. No. 8	Groundwater abstractions significantly reduce flows in the Little Stour, River Dour and Wingham River, causing water quality problems		
Management Options	Responsible Bodies	Pros	Cons
In accordance with the Kent Area Groundwater Management policy:-			
Reduce abstraction from boreholes	Water Companies	Environmental benefit	Cost
Relocate boreholes to less sensitive areas.	NRA, Water Companies	Environmental benefit	May transfer problem elsewhere
Investigate the potential for low-flow river augmentation.	NRA	Better use of water resource	Cost, loss of natural river flow variability
Impose stricter effluent consent conditions.	NRA, Dischargers	Improved river water quality	Cost
Improve control over urban surface water discharges.	NRA, LAs	Improved river water quality	Cost
Issue Ref. No 9	Pollution from Landfill Waste Disposal Sites		
Investigate the impact of landfill sites on the water environment.	NRA, Site operators, Waste Regulation Authority		
Apply NRA groundwater protection policy to all new sites.	NRA, Waste Regulation Authority		
Issue Ref. No. 10	Potential problems from construction of the Channel Tunnel rail link		
Liaise with developers to ensure that risks are minimised.	NRA		
Adopt NRA recommendations for protective provisions in the Union Railway Bill.	Union Rail		

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Issue Ref. No. 11	Irrigation water too saline for crops, or contaminated with bacteria		
Management Options	Responsible Bodies	Pros	Cons
Ensure that tidal outfall structures exclude sea water.	NRA	Improved Control	Cost
Monitor salinity of irrigation water.	Abstractors	Better management of abstractions	Cost
Process crops after harvest to remove bacterial contamination.	Abstractors	Better product	Cost
Where bacterial contamination is a problem, replace spray irrigation with trickle or sub-surface irrigation.	Abstractors	Better, control, reduced demand for water	Cost
Grow crops which are more tolerant, or which are processed or cooked to remove contamination.	Abstractors	Problem circumvented	Impact on agricultural profitability
Issue Ref. No 12.	Danger of increased flood risk following development		
Promote good liaison between the NRA and Planning Authorities to ensure that unsuitable development does not occur	NRA, LAs		
Issue Ref. No 13	Increasing flood risk from the embanked estuary		
Raise and strengthen embankments.	NRA	Solves problem	Need for continuing maintenance, long term cost
Construct a surge barrier to exclude high tides from the estuary.	NRA, DoE	Solves problem	High capital cost, implications for navigation, probable siltation of estuary
Construct a permanent tidal barrage and lock at the mouth of the estuary, open Stonar Cut.	NRA, DoE, Port Commission, Trinity House	Solves problem	High capital cost, implications for navigation, probable siltation of estuary
Investigate more cost-effective tidal flood defences.	NRA		
Do nothing		No cost, delayed investment	Problem may worsen

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Issue Ref. No. 14	Risk of siltation in the Sandwich Reaches		
Management Options	Responsible Bodies	Pros	Cons
Ensure that Stonar sluice is operated in accordance with the 1776 Statute	NRA, Port Commissioners	Maximised river scour	Denies navigational short cut
Issue Ref. No. 15	Operation of private sluices		
Advise owners on the operation of their sluices to minimise flood risks in a way which avoids adverse impacts on fisheries and wildlife.	NRA, IDBs, Owners		
Issue Ref. No. 16	Increased siltation above Wye following flood storage works		
Monitor channel capacity and dredge when necessary	NRA, LA		
Issue Ref. No. 17	Potential conflict between the needs of land drainage and wildlife conservation in marshland areas		
Ensure close liaison between the interests involved and that land drainage operations are carried out in accordance with NRA conservation policy.	NRA, IDBs, Landowners, EN, Wildlife Interests		
Issue Ref. No. 18	Poor Bankside habitat in areas of intensive farming		
Encourage the application of land-use grants to provide a buffer zone adjacent to the river to improve habitat diversity, to attenuate siltation and enrichment of the river from adjacent land, and to enhance the landscape value of the river corridor.	NRA, MAFF, EN, CC, Landowners		

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Issue Ref. No. 19	Conflicting requirements of farming, fisheries and conservation		
Management Options	Responsible Bodies	Pros	Cons
<p>Improve consultation and communication between interest groups whose water management objectives may conflict.</p> <p>Investigate the potential for managing blocks of marshland as separate hydrological units, to enable appropriate water levels to be maintained in different areas.</p>	<p>NRA, Farmers, English Nature, Anglers</p> <p>NRA</p>		
Issue Ref. No. 20	More river reaches could be designated under the EC Freshwater Fisheries Directive		
Review the situation and, where appropriate, designate new reaches.	NRA		
Issue Ref. No. 21	Increasing use of the river may result in conflicts		
Support the work of the Stour Project in encouraging liaison between river users.	Stour Project sponsors, River users		
Issue Ref. No. 22	Restricted public access to the river. Some riverside footpaths obstructed, poorly maintained, or washed out		
<p>Support Stour Project and Local Authority initiatives to improve footpath network and repair damaged sections.</p> <p>Impose and enforce speed limit on powered craft to minimise bank erosion from their wash.</p>	<p>Stour Project, LAs, Landowners</p> <p>NRA, Port Commissioners, Boat owners</p>		

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Issue Ref. No. 23	Changes in the composition, distribution and abundance of the fish population below Canterbury		
Management Options	Responsible Bodies	Pros	Cons
Investigate the fishery and propose a management plan.	NRA, Anglers		
Issue Ref. No. 24	Obstructions to fish migration		
Build fish passes where necessary.	NRA, Landowners	Solves problem	Cost

APPENDIX 1 : STATISTICS FOR THE STOUR CATCHMENT

1. GENERAL INFORMATION

Catchment area 1,080.77 km²

Topography

Maximum Level 205 m AOD

Minimum Level 0 m AOD

Geology

Predominantly Chalk, overlain by Tertiary deposits in the north. Wealden Gault, Greensand and Weald Clay outcrop on the south-west margin of the catchment.

Estimated Catchment Population

Year	Population	Change per decade
1991	452,000	
2001	476,400	+ 5.3%

Districts and Estimated Population (1991)

District	Persons per Ha	Ha in catchment	% area of catchment	Population in catchment
Ashford	2.5	23,600	21.8%	58,300
Canterbury	4.3	25,200	23.4%	107,100
Dover	3.3	32,100	29.7%	105,600
Maidstone	3.5	1,700	1.5%	5,900
Shepway	3.2	14,100	13.0%	45,700
Swale	3.2	600	0.6%	1,900
Thanet	11.8	10,800	10.0	127,200

Note: The population figures are approximate and portray overall trends rather than precise values.

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2. WATER RESOURCES

Resource Areas

	Number	Ha in catchment	% area of catchment
Stour Marshes	9	17,350	16.1%
Great Stour	10	17,120	15.8%
Upper Great Stour	11	23,320	21.6%
Little Stour	12	28,500	26.4%
Thanet Chalk	13	7,610	7.0%
Dover Chalk	14	14,150	13.1%

Rainfall (mm)

	Mean Year	1:10 yr Drought
Mean Annual Total	730	575
Effective Rainfall	246	125

Abstraction (av. daily vol)

Licensed Abstraction	367 Ml/d
Actual Abstraction (1989)	171 Ml/d
Actual as % of Licensed	46.6%

Licensed abstraction from groundwater	309 Ml/d
Percentage from groundwater	84.0%

Percentage in High/Med Loss category	88.0%
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River Flow (cumecs):

	R.Stour	R.Dour
Mean Flow (Q50)	3.34	0.32
95 percentile Flow (Q95)	1.56	0.07

Water Supply Companies serving the catchment

	Area (Ha)	% Catchment
Mid Kent Water Plc	44,200	40.9%
SWS (Kent)	35,700	33.0%
Folkestone & Dover	28,200	26.1%

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3. WATER QUALITY

Length of River in each Quality Class (Km)

Class	Description	Target	Achieved 1990
1A	Good	20.5	38.1
1B	Good	117.7	71.7
2	Fair	28.6	50.0
3	Poor	0.8	7.8
4	Bad	0.0	0.0
TOTAL		167.6	167.6

Length Designated under the EC Freshwater Fisheries Directive (Km)

	Freshwater	Tidal
Cyprinid Designation	26.9	13.9
Salmonid Designation	0.0	4.5

Sewage Discharges

	Number	Consented Vol.(Ml/d)
To rivers	26	52.848
To estuary	4	2.192
To sea	8	102.406

4. FLOOD DEFENCE

Length of Main River (Km) 254.58 (includes tidal lengths)

Length of Coastline (Km)

Schedule 4	80.6
Main Tidal Waters	80.6 (included in Schedule 4)
Sea Defences (NRA)	17.85
Sea Defences (LA)	7.56
Tidal Banks (NRA)	38.05

Internal Drainage Districts (Ha)

River Stour (Kent)	11,914
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5. CONSERVATION

Number of Designated Sites in the Catchment

Type	Total	Water Dependent
Ramsar Sites	2	2 (designated and proposed)
NNRs	2	2
SSSIs	34	29

6. NAVIGATION

Length of navigation (estuary) 32.0 km

APPENDIX 2. GLOSSARY OF TERMS AND UNITS

1:10 YEAR DROUGHT/FLOOD

A drought/flood event with a statistical probability of occurring once in a ten year period (other periods may be specified in a similar way).

ABSTRACTION LICENCE

Licence to abstract water from a surface or underground source. The maximum annual, daily and hourly abstraction rates are set by the licence.

ABSTRACTION - ACTUAL

Individual abstraction records are reported to the NRA each year but under the Water Resources Act 1991 these data are confidential. Actual abstraction figures reported in the Plan are area annual totals expressed in Ml/d.

AONB

Area of Outstanding Natural Beauty, notified by the Countryside Commission.

BOD

Biochemical Oxygen Demand. A measure of the polluting potential.

COARSE FISH

See FRESHWATER FISH, CYPRINIDS, SALMONIDS

CONSUMPTIVE USE

Water which is abstracted but not returned to the catchment, either because it evaporates (as in spray irrigation) or is exported for use in another catchment.

COUNTY STRUCTURE PLANS

Statutory documents produced by County Councils outlining their strategy for development over a 10-15 year timescale.

CYPRINIDS

Fish of the carp family. (See also COARSE FISH, FRESHWATER FISH, SALMONIDS)

DISTRICT LOCAL PLANS

Statutory documents produced by District or Borough Councils to implement the development strategy set out in County Structure Plans. Specific land use allocations are identified.

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DROUGHT ORDER

Order issued by the Secretary of State for the Environment allowing the terms of abstraction licences to be varied and/or the levels of service to water company customers to be reduced at times when the resource is under stress.

EFFECTIVE RAINFALL

Total rainfall minus direct evaporation and the water used by plants for transpiration. This is equivalent to the total resource of a catchment.

EIFAC

The European Inland Fisheries Advisory Commission. An agency of the United Nations Food & Agriculture Organisation (FAO).

EMERGENT VEGETATION

Plants with roots in the river bed but which emerge from the water. Examples include reeds, iris and bullrush.

EPHEMERAL FLOW

River flow which dries at some times of the year (eg winterbournes).

FLOW MEASUREMENT UNITS

m ³ /s	Cubic metres per second
l/s	Litres per second
Ml/d	Megalitres per day. A megalitre is equivalent to a ten metre cube (approximates to a 4-bedroom detached house).
mgd	Millions of gallons per day

FLOW CONVERSION TABLE

<u>m³/s</u>	<u>Ml/d</u>	<u>mgd</u>
0.012	1	0.224
0.06	5	1.12
0.12	10	2.24
0.24	20	4.48
0.6	50	11.2
1.2	100	22.4

FRESHWATER FISH

For the purposes of the Salmon and Freshwater Fisheries Act 1975, fish other than Salmon, Brown Trout, Sea-Trout, Rainbow Trout and Char (see also COARSE FISH, FRESHWATER FISH, SALMONIDS).

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HECTARE

Unit of area 100m x 100m, equal to 2.471 acres.

HIGH SEAS RIGHTS

Common law rights of navigation and fisheries on tidal waters where no specific authority exists.

IDB

Internal Drainage Board. A local land drainage authority with powers to raise finance and do works.

IMPOUNDMENT RESERVOIR

Surface water storage area formed by construction of a dam and supplied only by natural inflow from the upstream catchment.

ISOHYETALS

Contours of equal mean annual rainfall.

LOCAL NATURE RESERVE

A nature reserve designated by a Local Authority, frequently owned or managed by a voluntary conservation organisation.

mAOD

A measure of altitude. Metres above ordnance datum.

MARSH FEEDING

Supply of water from the river to marsh areas during the summer for wet fencing and abstraction (usually for spray irrigation).

MEAN LICENSED ABSTRACTION

In this Plan the mean licensed abstraction is the total annual abstraction permitted within the terms of a licence, expressed as an average daily volume in terms of megalitres per day (Ml/d).

MHWS

Mean High Water Spring Tides. A datum level used in mapping.

MINIMUM RESIDUAL FLOW (MRF)

The flow set at a river gauging station to protect downstream uses and below which controlled abstractions are required to cease. (see also PRESCRIBED FLOW)

NATIONAL NATURE RESERVE

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A nature reserve of national importance, designated and managed by English Nature.

NATURAL FLOW REGIME

The river flow pattern experienced prior to the influence of man, with no abstraction from or discharges to the catchment.

PERENNIAL FLOW

River flow present through the entire year. (See also EPHEMERAL FLOW)

POTABLE WATER SUPPLY

Water supplied for domestic use, including human consumption.

PRESCRIBED FLOW (PF)

A river flow incorporated as a condition in an abstraction licence, such that abstraction must cease once the flow falls below this value. Prescribed flows are set at or above the MRF (qv) which applies to the river where the abstraction takes place.

In many instances the PF applying to new licences is increased incrementally in step with the total licensed abstraction to protect the interest of existing abstractors: ie. newer abstractions have to cease at higher river flows. (see also MINIMUM RESIDUAL FLOW)

PRIMARY GAUGING STATION

A permanent river flow gauging installation included in the National Surface Water Archive.

PUMPED STORAGE RESERVOIR

Surface water storage area where the natural inflow is supplemented by water pumped from a separate source, typically a nearby river.

POOL:RIFFLE

A stretch of river with alternate sections of shallow fast-flowing water and deeper slow-moving pools.

Q95

River flow that is exceeded for 95 percent of the flow record (a low flow, the Q5 flow would be a high flow).

RAMSAR SITE

A wetland site of international significance for conservation, notified under international treaty.

Kentish Stour Catchment Management Plan

SALMONIDS

Fish classified by the Salmon and Freshwater Fisheries Act 1975 as belonging to the salmon family - Salmon, Brown Trout, Sea-Trout, Rainbow Trout and Char. (Summer-spawning salmonid species such as Grayling are classified by the Act as Freshwater Fish) (see also COARSE FISH, FRESHWATER FISH, CYPRINIDS).

SPATE FLOWS

Episodic fresh water flood flows.

SSSI

Site of Special Scientific Interest. A site designated by English Nature as being in need of protection to conserve its outstanding ecological or geological features. Land use and management operations within SSSIs are subject to control.

SNCI

Site of Nature Conservation Interest. A site of local importance for wildlife or geology, identified by the County Wildlife Trust or the County Council.

STW

Sewage Treatment Works.

TOTAL RAINFALL

Rainfall as measured by a rain gauge.

TOTAL RESOURCE

See EFFECTIVE RAINFALL

WET FENCING

Water-filled ditches used as field boundaries or to control the movement of livestock.

APPENDIX 3 : FURTHER READING

EC Directives

Quality of Surface Water for Abstraction as Drinking Water:	(75/440/EEC)
Pollution Caused by the Discharge of Dangerous Substances:	(76/464/EEC)
Quality of Fresh Waters for the Support of Fish Life:	(78/659/EEC)
Protection of Groundwater Against Pollution:	(80/68/EEC)
Urban Waste Water Treatment:	(91/271/EEC)
Protection Against Pollution by Nitrates from Agriculture:	(91/676/EEC)

Acts of Parliament

Salmon and Freshwater Fisheries Act 1975
Wildlife and Countryside Act 1981
Water Act 1989
Environment Protection Act 1990
Land Drainage Act 1991
Water Resources Act 1991

NRA Publications

NRA Corporate Plan (Annually)
Water Resources Development Strategy: A Discussion Document. 1992
Sustaining our Resources. Southern Region Water Resources Development
Strategy: NRA Southern Region 1992

Other Publications

Conservation and Land Drainage Guidelines: Water Space Amenity Commission 1980
Nature Conservation and River Engineering: Nature Conservancy Council 1983
Rivers and Wildlife Handbook: RSPB 1984
Changing River Landscapes: Countryside Commission CCP238 1987
Code of Practice on Conservation, Access and Recreation: MAFF, DoE & Welsh Office. HMSO 1989
Nature Conservation and the Management of Drainage Channels: Nature Conservancy Council & Association of
Drainage Authorities 1989
Conservation Guidelines for Drainage Authorities: MAFF, DoE & Welsh Office. 1991
Solving the Nitrate Problem: MAFF 1993