Great Ouse Local Flood Defence Committee

ANNUAL REPORT

1996 - 1997

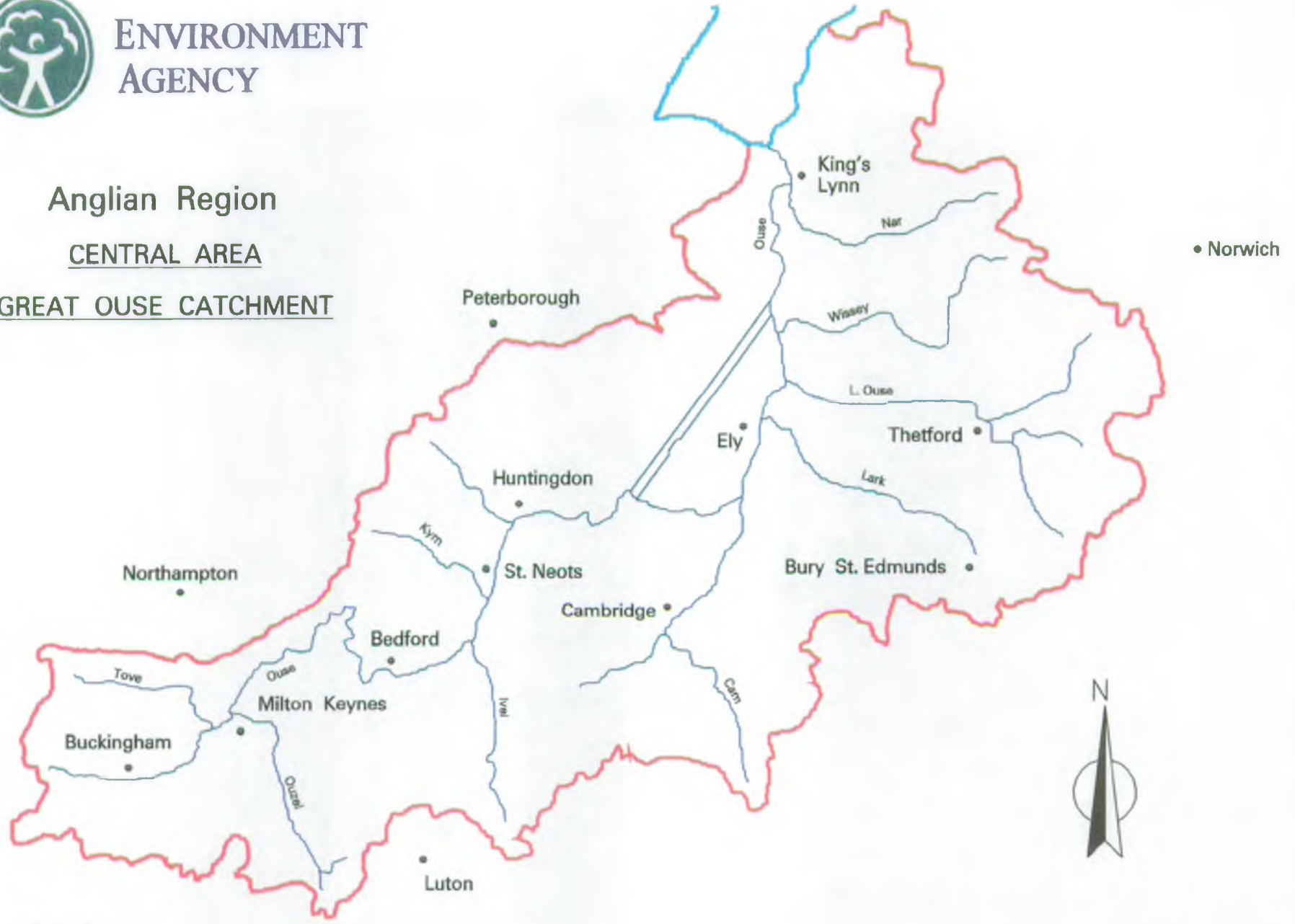
ENVIRONMENT AGENCY

ENVIRONMENT AGENCY

Anglian Region

CENTRAL AREA

GREAT OUSE CATCHMENT



EA-Anglian FD 2

CONTENTS

FRONT COVER - DREDGING WORKS ON THE 10 MILE RIVER

Photo courtesy of The Cambridge Evening News

FLOREAT
TERRA

GREAT OUSE LOCAL FLOOD DEFENCE COMMITTEE

LIST OF MEMBERS

APPOINTED BY THE REGIONAL FLOOD DEFENCE COMMITTEE:-

(CHAIRMAN)	A J MORBEY FORGE COTTAGE LOWER ROAD STUNTNEY ELY CAMBRIDGESHIRE CB7 5TL	TEL: (01353) 663275
	J M CHILDS MILLFIELD HOUSE LONDON ROAD CHATTERIS CAMBRIDGESHIRE PE16 6SF	TEL: (01354) 692819
	C D BOUGHTON FIELD END HOUSE BENWICK ROAD DODDINGTON MARCH CAMBRIDGESHIRE PE15 0SH	TEL: (01354) 740373
	A G F RICHARDSON PARADISE FARM WALSOKEN WISBECH CAMBRIDGESHIRE PE14 7BQ	TEL: (01945) 584678
	G WILLIAMS 10 WEST ROAD GAMLINGAY SANDY BEDFORDSHIRE SG19 3JT	TEL: (01767) 650834

J J H WILSON
MANOR FARM
IXWORTH THORPE
BURY ST EDMUNDS
SUFFOLK
IP31 1QH TEL: (01359) 269326

J F WRIGHT
70 CHURCH ROAD
WOBURN SANDS
MILTON KEYNES
BUCKINGHAMSHIRE
MK17 7TA TEL: (01908) 583363

APPOINTED BY THE CONSTITUENT COUNTY COUNCILS:-

BEDFORDSHIRE COUNTY COUNCIL

CLLR R PAYNE
2 THE GRANGEWAY
WILLINGTON
BEDFORD
BEDFORDSHIRE
MK44 3QW TEL: (01234) 838454

CLLR T W J ALBONE
98 WINIFRED ROAD
BEDFORD
BEDFORDSHIRE
MK40 4EP TEL: (01234) 343784

BUCKINGHAMSHIRE COUNTY COUNCIL

MRS S C MARLER
OVERBROOK HOUSE
WESTON UNDERWOOD
OLNEY
BUCKINGHAMSHIRE TEL: (01234) 711451

CAMBRIDGESHIRE COUNTY COUNCIL

CLLR A W MORRIS
33 BOURNE ROAD
EAST CHESTERTON
CAMBRIDGE
CAMBRIDGESHIRE
CB4 1UF TEL: (01223) 317201

CLLR N E PRITCHARD
42 MANOR PARK
HISTON
CAMBRIDGESHIRE
CB4 4JT

TEL: (01223) 233098

HERTFORDSHIRE COUNTY COUNCIL

CLLR A K GRAY
DRAGON COTTAGE FARM
DANCERS LANE
BARNET
HERTFORDSHIRE
EN5 4RW

TEL: (0181)4471510

NORFOLK COUNTY COUNCIL

CLLR R C ROCKCLIFFE
KILN HOUSE
34 THIEVES BRIDGE ROAD
WATLINGTON
KING'S LYNN
NORFOLK
PE33 0HL

TEL: (01553) 810331

SUFFOLK COUNTY COUNCIL

CLLR D J LOCKWOOD
7 BIRCHDALE COURT
FORNHAM ST MARTIN
BURY ST EDMUNDS
SUFFOLK
IP28 6XF

TEL: (01284) 753123

AREA ENVIRONMENT GROUP REPRESENTATIVE

C J CLARE
1 MOUNT PLEASANT ROAD
WISBECH
CAMBRIDGESHIRE
PE13 3NF

TEL: (01945) 585281

ENVIRONMENT AGENCY

ANGLIAN REGION

KINGFISHER HOUSE, GOLDHAY WAY, ORTON GOLDHAY, PETERBOROUGH, PE2 OZR

TELEPHONE (01733) 371811

OFFICERS

(AS AT 31ST MARCH 1997)

REGIONAL HEADQUARTERS

REGIONAL GENERAL MANAGER	GRAINGER DAVIES
REGIONAL FINANCE MANAGER	IAN RIPLEY
REGIONAL WATER MANAGER	ROBERT RUNCIE
REGIONAL FLOOD DEFENCE MANAGER	STEVEN WHEATLEY
REGIONAL ENGINEERING MANAGER	GORDON HEALD

CENTRAL AREA

AREA MANAGER	KEITH STONELL
AREA FLOOD DEFENCE MANAGER	IAN HART
PLANNING MANAGER	BRIAN ELSDON
WATER RESOURCES MANAGER	PAT SONES
FISHERIES, RECREATION, NAVIGATION AND CONSERVATION MANAGER	MIKE EVANS
CATCHMENT ENGINEER (NORTH)	NIGEL WOONTON/DAVID GILLETT
CATCHMENT ENGINEER (SOUTH)	IAIN FINNIGAN
OPERATIONS ENGINEER	PETER STARLING

Great Ouse Local Flood Defence Committee

ANNUAL REPORT

1996 - 1997

HEACHAM NORTH BEACH URGENT WORKS

INTRODUCTION

Although it could be a truism to declare that the weather is a dominant influence on the Flood Defence function, 1996/97 was noteworthy because of the unusual consequences of the exceptional weather. The drama of Flood Defence is invariably associated with violent weather, but this year saw the progressive development of what has turned out to be the worst protracted drought on record in East Anglia. Whilst the generally mild weather may have been of great assistance to the conduct of maintenance and capital works operations, unprecedented low flows gave rise to difficulties of riverine access on occasion and, more seriously, extensive siltation within the Tidal River system. The obstructive consequences of this siltation were already in the process of being addressed in strategic studies, but the need for corrective works within the river system has been heightened by this year's weather.

In contrast with the generally bland weather throughout the year, the onset of sea storms with the arrival of the autumn equinox caused significant disturbance and critical damage to the defences between Hunstanton, Heacham and Snettisham. On two occasions, residents of holiday caravans at Shepherds Port, Snettisham were evacuated, although these exercises were prompted by operational pressures on our partners, the police, rather than the onset of an acute red alert situation. Extensive damage was suffered by the revetment defences in the vicinity of Kala Juga, Heacham, but these defences have been satisfactorily reinstated by an urgently prepared project which was developed to augment the existing sea defence strategy. These troubles on the Committee's coastline were both a help and a hindrance to the development of the revised sea defence strategy. The hindrance arose whilst the import of the storm damage was incorporated in the consultant's study, but the events were helpful in providing additional factual information on the interaction of the beach, its defences and the impact of the sea.

Finally, the year brought a successful conclusion to the major, five year long comprehensive programme of improvements to the embankments containing the Tidal River between Denver and King's Lynn. Overall, £8.5 million have been devoted to raising and reinforcing 30 km of conventional earth embankments and 7 km of reinforced concrete and masonry walls in order to protect the neighbouring Fenland to a 1:100 year standard. Whilst great satisfaction can be taken by all those involved in the promotion of these projects, other aspects of the performance of the Tidal River system, particularly siltation, demonstrate the unrelenting challenge faced by the Flood Defence service in general and the Great Ouse Flood Defence Committee in particular.

IAN HART
Flood Defence Manager

WELMORE LAKE SLUICE
PROPOSED NEW STRUCTURE.

CAPITAL WORKS

OUSE WASHES FLOOD CONTROL STRATEGY
Project Number 11043

Approved Estimated Cost	£326,000
Expenditure in 1996/97	£Nil
Total expenditure to 31 March 1997	£368,000

The Strategy received MAFF approval in September 1996 and this has since been updated to a revised Approval in Principle of £6,491,740. The total value of the works recommended by the Strategy is £8.1 million, of which £7.46 million represents capital works and fees and the remaining £0.65 million represents revenue expenditure already accommodated within the Agency's programme.

English Nature have since established a group constituted from the Washes' Liaison Group members and other Washes users with the objective of seeking solutions to provide the desired level of environmental enhancement. The Environment Agency is represented on this Group.

The elements of the Strategy, namely Reconstruction of Welmore Lake Sluice, Improvements to the Cradge Bank, Diversion of water to the Old West River, Raising Earith Drawmark and Maintaining the Structures of the Ouse Washes, are being progressed through individual projects within the Capital Programme and are thus reported separately.

CRADGE BANK IMPROVEMENTS
Project Number 11044

Approved Estimated Cost	£ 60,000
Expenditure in 1996/97	£ 35,000
Total expenditure to 31 March 1997	£ 35,000

As agreed with the Wetlands & Wildfowl Trust, raising of a 6.8km length of Cradge Bank between Welmore Sluice and Welney Suspension Bridge was started during 1996 and will be completed by September 1997. The work was undertaken to raise low spots in the bank and widen narrow sections with material dredged from the Hundred Foot River. This will help reduce the risk of breaching during winter floods and overtopping during high tides in summer.

DIVERSION OF WATER TO THE OLD WEST RIVER
Project Number 11045

Approved Estimated Cost	£ 880,000
Total expenditure to 31 March 1997	£Nil

The Strategy identifies a new structure at Hemitage Lock to divert up to 5m^3/sec into the Old West and so reduce the frequency of Summer Flooding in the Washes.
This project is included within the Capital Programme for years 1999/00 onwards. Investigation and design work will precede this date, however no work has been carried out at present.

RAISING EARITH DRAW MARK
Project Number 11046

Whilst this forms part of the approved Strategy, much more development work will be required before this particular stratagem can be promoted. It is currently included in the capital programme for 199/00 onwards.

WELMORE LAKE SLUICE RECONSTRUCTION
Project Number 11047

Approved Estimated Cost	£ 5,201,000
Expenditure in 1996/97	£ 193,000
Total expenditure to 31 March 1997	£ 218,000

Due to a need to advertise this project under the rules of the European Tendering Directives and earlier difficulties with the detailed design, capital expenditure has carried over from 1996/97 to commence in July 1997. An extensive post tender evaluation period has resulted in combined savings of approximately £230k on both the civil and mechanical/electrical tenders.

The project has been approved by MAFF in the sum of £5,147,740 (excluding fees,salaries and the cost of an independent design review).

The requirements for the new sluice include an increase of 50% in open waterway area, sluices to be operable from Denver via the telemetry system, tidal mitre gates to exclude saline water from the Ouse Washes, guillotine gates to provide water level control for the Ouse Washes. The location of the new sluice will be nearer the Hundred Foot River to reduce the siltation problems associated with the current sluice. A pumping station is to be incorporated to facilitate drainage of the Ouse Washes (River Delph) to the normal retention level which may be below low tide level in the Hundred Foot River.

Once the new sluice has been constructed and commissioned, the existing 60 year old sluice will be demolished. Final commissioning is expected by July 1999.

ELY OUSE FLOOD DEFENCE STRATEGY
Project Number 11005

A strategy study was completed in 1994/95 for the Ely Ouse Flood Defences. This considered the stability of the flood banks of the Ely Ouse rivers and made recommendations for improvements to reduce the erosion at the toe of the embankments.

Following completion of the strategy the project was divided into 11 Flood Defence Units for the purposes of detailed appraisal, which was carried out in two groups of approximately equal work content. The first group of work, including the River Wissey, Little Ouse (Right Bank) and the Ten Mile River has been designed by Posford Duvivier, and the second group including the Ely Ouse (Left Bank), Little Ouse, River Lark, River Cam, Old West River by Mott MacDonald. Progress on these units is reported separately in the following two paragraphs.

The Strategy was approved by MAFF in June 1996 in the sum of £1,462,800 (excluding fees and salaries).

ELY OUSE FLOOD DEFENCES UNITS 1 AND 2
Project Numbers 11060 and 11061

Approved Estimated cost	£ 826,000
Expenditure in 1996/97	£ 297,000
Total expenditure to 31 March 19997	£ 554,000

The work consists primarily of sheet piled revetments to the Ten Mile River and River Wissey and to some of these works reed planting in fibre rolls are being added to improve the environmental value of the riverside margins. Some new cattle drinking points are being constructed as part of the works.

The intention of the strategy is to allow natural river processes to continue where possible, but where erosion of the riverbank threatens the stability of flood defence works, to carry out revetment works to stabilise the situation.

The works are under construction by Central Area Direct Services and due to be completed by September 1997 at a projected total final cost of £758k(including fees and salaries)

ELY OUSE FLOOD DEFENCES UNITS 3 TO 11
Project Numbers 11062 to 11070

Approved Estimated cost	£ 934,000
Expenditure in 1996/97	£ 446,000
Total expenditure to 31 March 1997	£ 673,000

Works commenced in February 1996,by Central Area Direct Services, and will be completed in September 1997. Much of the work includes sheet piling to the margins of the river to ensure flood bank stability. A significant level of consultation has taken place with the Great Ouse Boating Association to alleviate concerns over the use of low level piling and has resulted in the implementation of several mitigation measures. The projected total final cost for this phase of the work is £902k(including fees and salaries)

MIDDLE LEVEL BARRIER BANK EROSION PROTECTION
Project Number 11334

Approved Estimated Cost	£ 150,000
Expenditure in 1996/97	£ 60,000
Total expenditure to 31 March 1997	£ 150,000

Works repairing the erosion at the toe of the Middle Level Barrier Bank continued this year using compacted clay topped with imported turf. This technique had been proved in the previous year to be most effective in providing an erosion resistant toe to the Barrier Bank and also a surface acceptable for environmental and agricultural interests.

The erosion repair works in 1996 were carried out by Wrekin Construction,based in Raunds.

COUNTERDRAIN FLOOD DEFENCES
Project Number 11341

Approved estimated cost	£ 1,181,000
Expenditure in 1996/97	£ 10,000
Total expenditure to 31 March 1997	£ 115,000

The original Detailed Appraisal, completed in 1996 by Binnie,Black & Veatch, recommended the replacement of the existing diesel engines and pumps with four diesel/electric 3.15 cumec pumps and the installation of automatic monitoring and control.

In May 1996 concern was expressed by the Middle Level Commissioners that insufficient investigation had been given to the option of a Black Sluice Pumping Station. Although this was further reviewed, it was concluded that the cost of even a single pump unit facility could not be justified, particularly as there would still be a need to maintain some form of pumping at Welches Dam.

In September 1996 further questions were raised concerning the feasibility and practicality of pumping IDB discharges direct into the Ouse Washes and thereby eliminate the pumping requirements at Welches Dam. This was discounted on the basis of an overall greater cost to the IDB's over a fifty year period and the considerable environmental problems that would result from increased water levels in the Washes.

In February 1997 constraints on funding due to the increased cost of the reconstruction of Welmore Lake Sluice required the Agency to reconsider its strategy for Welches Dam. It was agreed with the IDB's that a Do Minimum option of replacing a single diesel engine over what would be a twenty year lifespan may be the best course of action at this time. This would allow the pumping station to continue to operate effectively, and allow further consideration of an alternative pumping facility for the Counter Drain at a new location.

It is intended that a new engine will be procured during 1997/98 and installation will commence in May 1998.

HUNSTANTON AND HEACHAM STRATEGY
Project Number 12058

Approved Estimated Cost	£ 85,000
Expenditure in 1996/97	£ 34,000
Total expenditure to 31 March 1997	£ 70,000

The original appointment of Posford Duvivier called for a review of the beach performance together with a detailed appraisal of particular problems. In the course of carrying out the study it became apparent that significant lengths of defences were well below the indicative standard of 1 in 100 years. As a result of this and storm events in the Autumn of 1996 the study was redefined and , with guidance from MAFF, included a review of the previous beach recharge scheme (1990), strategic options for further works and a strategic environmental assessment.

The final report has received internal Agency approval and identifies a preferred strategic option of both selective hard defence improvements and beach recharge.The annual recycling

of beach material from Snettisham Scalp should continue, but, on its own, is not a sustainable long term solution.

A suite of individual projects is now being formulated, including beach recycling , surveys and monitoring, for approval by the Committee. The overall five year cost of the strategy is £10.68 million with works due to commence in 1998/99.

HEACHAM NORTH BEACH URGENT WORKS
Project Number 12057

Approved Estimated Cost	£ 260,000
Expenditure during 1996/97	£ 134,000
Total expenditure to 31 March 1997	£ 134,000

Following storm damage to a 300m length of flexible open revetment between Kala Juga and the Jubilee Ramp, MAFF approved the funding of urgent works to extend the toe of the revetment further down into the beach. The work was undertaken by J. Breheny of Needham Market during February to April 1997 at a final cost of £115,000. Tender Prices submitted for this type of work were extremely competitive and gave excellent value.

KINGS LYNN TO DENVER TIDAL RIVER DEFENCES
Project nos: 11418 and 11424

Project 11418	
Approved Estimated Cost	£ 433,000
Expenditure during 1996/97	£ 306,000
Total expenditure to 31 March 1997	£ 340,000

A contract was awarded in May 1996 to Dean & Dyball for the raising and bank strengthening of approximately 1.3km of tidal defences comprising the West (Left) Bank Works, Wiggenhall St Peters. The work was completed in September 1997 at a projected final cost of £264k.

Project 11424	
Approved Estimated Cost	£ 535,000
Expenditure during 1996/97	£ 240,00
Total expenditure to 31 March 1997	£ 270,000

The tenders received for this phase of work proved to be considerably less than the estimated cost, and it was awarded to the Central Area Direct Services in the sum of £253k. The work included both hard and soft defences over a 1.8km length of tidal defences between Downham West and Salters Lode. It was completed in September 1997 at a projected final cost of £223k.

The successful completion of these two projects sees the overall completion of 37km of River Gt.Ouse Tidal Defences between Denver Sluice and Kings Lynn. The final cost of the Strategy is £8.5 million, raising 30km of conventional earth embankments and 7km of reinforced concrete and brick walls.

RIVER NAR IMPROVEMENTS
Project No: 112216

During 1996/97 a feasibility study was completed by Binnie, Black and Veatch. It examined 18km of embankments from Kings Lynn to Narborough, which following serious breaches in 1993 had raised concern over settlement, reduced freeboard and increased probability of overtopping. A hydraulic model was developed during the study to check the adequacy of the river channel capacity and the effectiveness of any possible improvement options. The preferred option , at an estimated cost of £3 million , recommends a new flood relief channel between the Nar and the Gt. Ouse Flood Relief Channel together with significant bank strengthening works.

Funding constraints with the capital programme have prevented this scheme being further developed, although some discussion has taken place with English Nature concerning the proposed option. At present the scheme is planned to start during 1999/00.

WASH RIVER OUTFALL STRATEGIC STUDY
Project No: 16010

The final report of the River Gt.Ouse Strategy has been approved by the Agency. The strategy recommends several elements that would go some way towards alleviating the siltation problems. It would:-

1. Maintain the West and East Training Walls
2. Raise the West Training Wall
3. Dredge at sluices,outfalls and remove shoals in the river
4. Consider the automation of Denver Sluice and enhance fluvial flushing flows

Work has now commenced on appraisal and design of the West Training Wall and an Operational Review of Denver Sluice. The final cost chargeable to the Gt. Ouse LFDC for the study is 25% of the whole Wash Study and is estimated at £21,130. This will attract MAFF grant aid.

WASH SHORELINE MANAGEMENT PLAN
Project No: 16009

The final version of the plan was adopted by the committee at the October 1996 meeting. It has since been used in the justification of possible works to West Bank Training Wall. The apportionment of costs to the Gt. Ouse for the plan is 25%, resulting in a final cost of £18k. This will attract MAFF grant aid.

NORTH NORFOLK SHORELINE MANAGEMENT PLAN
Project No: 12350

This plan examines the length of shoreline between Snettisham and Sheringham. It was adopted by the committee at the October 1996 meeting and has been used in the justification of the Hunstanton/Heacham strategy. The apportionment of costs to the committee is £8k and will receive MAFF grant aid.

ANGLIAN REGION TELEMETRY SCHEME PHASE 4
Project No: 19034

Mott MacDonald was appointed in July 1996 to undertake the design and construction management of a series of river and flood warning station improvements across the region. Works in Gt. Ouse consist of flat vee weirs at three locations; the River Sapiston (Black Bourne) near Bury St. Edmonds, and the River Ouzel and its tributary, Clipstone Brook in Leighton Buzzard. The anticipated cost of these works during 1997/98 is £58k..

HUNSTANTON AND HEACHAM BEACH MANAGEMENT 1996/97
Project Number 12063

Approved Estimated Cost	£164,000
Expenditure during 1996/97	£136,000
Total expenditure to 31 March 1997	£136,000

In accordance with the 1989 Strategy for the Hunstanton and Heacham Sea Defences, beach material was again transported from the south of the beaches at Snettisham and deposited in areas where the beach level had become depleted due to southerly drift. The operation was managed on behalf of the Agency by the Direct Services Unit.

This year it was necessary to transport material on two separate occasions; the first time being after the storm tides which struck the beach in August 1997. One of the compensatory consequences of last Autumn's storms was that material was available earlier that normal and therefore the damage could be repaired immediately. The earlier campaign also meant less recycling work than normal was required for the second, planned exercise which was carried out in February. This was because the beach was in a reasonable condition because of the earlier work and the absence of any subsequent major storms. The total quantity of material recycled this year was approximately 30,000 m^3.

TIDAL RIVER MATTRESSING PART S
Project Number 12155

Approved Estimated Cost	£321,000
Expenditure during 1996/97	£243,000
Total expenditure to 31 March 1997	£243,000

Work on this scheme was successfully completed by the Agency's Direct Services Organisation.

TIDAL RIVER MATTRESSING PART T
Project Number 12160

Approved Estimated Cost	£480,000
Expenditure during 1996/97	£189,000
Total expenditure to 31 March 1997	£189,000

Contract documents for the supply of materials were prepared and tenders sought. Materials were subsequently purchased and Contract documents for work items also prepared. Work is due to commence on site during May 1997. An application for grant aid was prepared and

submitted to MAFF for approval.

KIMBOLTON FLOOD RELIEF SCHEME
STAGE 1: STONELY
Project Number 12212

Approved Estimated Cost	£124,000.00
Expenditure during 1996/97	£100,323.00
Total expenditure to 31 March 1997	£110,609.67

MAFF approval to the scheme was given in February 1997 and work commenced on site in March 1997. Good progress is being made with completion anticipated late April 1997. The scheme has been designed to provide flood protection to residential properties of Stonely near Kimbolton.


5 3'97

MAINTENANCE AND OPERATIONAL WORKS

During the year an average of 68 operatives from the Emergency Workforce were employed directly on flood defence maintenance operations. These were supported by Central Workshops and by plant hire and other sub-contractors.

The expenditure on maintenance was as follows:-

£k	1995/96	1996/97 £k
Dredging 57km on inland/tidal rivers	371	370
Banks and embankments - grasscutting, repairs and vermin control 1009km	668	722
Structures - routine periodic maintenance to all structures, major services and scheduled repairs as required	405	329
Weed control 736km completed	417	449
Obstructions and Pioneer Clearance - Removal of fallen trees, clearance and accumulated debris	168	130
Pumping Stations - Maintaining and Operating	52	20
Sea Defences/Tidal Waters	300	420
Other Works (including surveys)	366	363
Emergency Works	32	14
Contributions to Internal Drainage Boards relating to Highland Water	604	520
TOTAL	**3,383**	**3,337**

CONSERVATION

MANAGEMENT OF WILLOWS ON RIVER GREAT OUSE

The previous practice of pollarding willows has been abandoned by landowners in recent years. This has resulted in large, mature and unmanaged trees that are vulnerable to wind and ice damage. This project aims to manage trees in support of the Ouse Valley Willows Strategy (supported by Huntingdonshire District Council, the local Wildlife Trust and as part of the Ouse Valley Countryside Partnership). The pollarded willows will greatly benefit wildlife as well as obviating tree collapse risks to the Flood Defence and Navigation functions. To limit any adverse effect of this work on wildlife living in or on the trees, a maximum of one third of the trees requiring attention on each site were pollarded.

THE BRECKS RIVER RESTORATION PROJECT -PHASE II

Past management practices have straightened and over-deepened watercourses which have resulted in ecologically degraded rivers within Breckland. The process resulted in the loss of in-river habitat diversity such as river margins and spawning areas for fish and has caused floodplain wetlands to dry out. The need to restore the ecological value of the rivers in this area was identified in the Ely Ouse Catchment Management Plan.

The second, final phase of the project involves the restoration of meanders cut off in the 1960's to the channel on the upper reaches of the Little Ouse at Garboldisham. Work this year included the feasibility, design and initial meander construction.

MAINTENANCE DREDGING

Fifty nine lengths (39 km) of main river were included in the maintenance dredging

programme in Central Area.

A typical example of the attention given to the assessment of the environmental impact of our operations is given below with the dredging of the Ely Ouse River in Cambridgeshire. Item 3, railway bridge - Ely depot.

The Fenland area associated with this catchment has a 1 in 100 year standard of protection because of the large area of low lying land and hence the very serious consequences of flooding. The dredging of this length of the Ely Ouse marks the penultimate length of a rolling programme which commenced at Bottisham Lock in 1989. The initial project was identified to improve the discharge capacity through the Rivers Cam and Ely Ouse.

The entire length (14.7km) of the Ely Ouse main river is embanked. The river and its washlands enclosed by its flood banks not only form a green corridor through an intensively farmed landscape but make an important contribution to the extent and variety of washland in eastern England.

Great care was taken to minimise the impact of the dredging works and to ensure that the diversity of interests in this area was not compromised. A successful outcome was achieved through a wide consultation process and continued dialogue between Flood Defence and Conservation, with the landowners, the District Council, the Wildlife Trust and English Nature both before and during the operation.

RIVER CORRIDOR SURVEYS

Tree Management Surveys

Oak, ash and willow trees along 121 km of main river in the Cam and Ivel catchments were surveyed and all trees above 1.5 m in height were recorded onto base maps. This information will be used to ensure both the survival of the trees and to pre-empt any collapse of the trees into the watercourse, thus preventing potential obstruction to flows.

Ornithological Assessment of REDS Bird Data

This assessment relates bird species to habitats within the river corridor as well as discussing the susceptibility of some species to disturbance by particular river maintenance practices. Recommendations resulting from this study will be made for river maintenance operations.

Assessment of River Corridors

Phase I and II National Vegetation Classification surveys were undertaken on 149 km of main river (Ely Ouse, Old West River and Great Ouse catchments). The surveys were used to determine the conservation value of each river corridor section and to assess the potential impact of any river maintenance works.

Otter Surveys

Surveys for otters were undertaken throughout Central Area in collaboration with the Wildlife Trusts. River maintenance practices can adversely affect otter habitat if not undertaken in the appropriate manner.

PRISCILLA BARRETT

WATER VOLEWATCH

■ ***may be carried out*** *between March and October; the ideal period is April to June. The project is aimed at all sorts of freshwater habitats—from ditches to wide rivers, lakes to canals.*

■ ***asks you to record*** *presence or absence of water vole, otter, mink, brown rat and other wildlife, together with the habitats and vegetation in your chosen stretch.*

■ ***is detailed in*** *a leaflet available from your local Trust office, or direct from The Wildlife Trusts' national office (see page 47).*

HYDRO

Northumberland, have trained teams of volunteers to recognise these signs and are in the process of surveying entire rivers—for example the North Tyne. Others, such as the Dorset and Staffordshire Trusts, have also trained volunteers but have opted to survey sample lengths of local watercourses. Avon, Somerset, the combined Welsh Trusts and others have launched publicity campaigns. "We are asking specific groups, such as anglers and boatowners, conservationists as well as members of the public, to send in details of water vole sightings," explains Louise Liles of the Welsh Wildlife Trusts, who is also representing all the Trusts on the UK Water Vole Technical Group.

Most of these projects have not been running long enough for results to be fully analysed, but early indications confirm that the rapid decline in water vole numbers has continued, even accelerated, in the six years since the VWT survey. In Northumberland, for instance, there were hardly any positive sightings last year.

But some findings have surprised even the organisers—the Nottinghamshire Trust discovered healthy populations on the river Leen, near the centre of Nottingham; in Northamptonshire, on the Swanspool Brook in Wellingborough, it was a similar story. London Wildlife Trust has water voles breeding on an island nature reserve in Richmond, and there have even been sightings in garden ponds!

However, despite all these surveys, the position of the water vole is so precarious that Wildlife Watch wants to mobilise many more people to discover where the animals do and do not occur. Water Volewatch, launched in March with funding from Norsk Hydro (UK) Ltd, aims to encourage not only children working within Watch groups but also their parents and members of the general public to look for voles and to complete a simple survey form.

Model for the future

The results of Water Volewatch will be analysed at the University of Newcastle upon Tyne, where scientists are developing a model of water vole distribution in relation to habitat and predators. From this, they hope to determine how the animals can best be protected. The model will also be used by The Wildlife Trusts and other nature conservation bodies to draw up management plans aimed at safeguarding remaining populations and improving habitats in other areas which the voles may be able to recolonise, even in the presence of such enemies as mink.

Our cavalier treatment of waterside habitats over the last half century has left this well-loved species in a position described by Adrian Colston, conservation director at the Northamptonshire Trust, as "absolutely dire". However, the situation is not entirely without hope. "For instance," he says, "we are finding that where otters are coming back into rivers, mink numbers are reduced through competition, and here the water vole may stand a chance of recolonising."

But for projects like this to succeed, Wildlife Watch and all the other organisations involved in water vole conservation need *your* help in 1997. Get those wellies on!

Bob Tobin is an ecological consultant and freelance writer.

MICHAEL LEACH/NPA

FURTHER READING
Water Voles *by Rob Strachan (Whittet Books, £9.99, published in late July. See advertisement on page 38).*

HYDROLOGICAL REPORT 1 APRIL 1996 TO 31 MARCH 1997

1. Precipitation

Rainfall for the last twelve months was 393mm (64% of the LTA) reflecting the continuation of the drought sequence which started in April 1995. See Table 1.1. Nine of the twelve months had below average rainfall, with January 1997 precipitation below the historical (1961-1990) minimum for the time of year. November 1996 saw the heaviest rainfall with 83mm (146% of LTA for the time of year).

Table 1.1 Catchment Rainfall Compared To Average Rainfall

MONTH	YEAR	RAINFALL (mm)	LONG TERM AVERAGE RAINFALL (mm)
APRIL	1996	17	46
MAY	1996	20	52
JUNE	1996	16	54
JULY	1996	33	51
AUGUST	1996	63	56
SEPTEMBER	1996	13	50
OCTOBER	1996	43	53
NOVEMBER	1996	83	57
DECEMBER	1996	33	56
JANUARY	1997	15	51
FEBRUARY	1997	45	37
MARCH	1997	12	47
	TOTALS	393	610

A small Soil Moisture Deficit (SMD) was evident going into Spring 1996 and rose to a maximum of 123 mm in July 1996. The SMD did not decline to below 100mm until November 1996 in response to the below average rainfall. By the end of March 1997 the SMD had already exceeded 50mm.

2. River Flows

River flows were below average for the whole twelve month period (see attached graphs). Flows suffered from the reduced rainfall in terms of reduced baseflows from below average groundwater levels and low runoff volumes. Groundwater fed rivers such as the Ely Ouse and Little Ouse went below historical minima during late spring and early summer 1996 (see attached graphs). During late winter and early spring 1997 new record minima were being recorded at Denver. The Bedford Ouse - a clay fed catchment although experiencing below average flows did not go below historic levels, reflecting the high amount of contributing effluent from Milton Keynes and Bedford.

3. Groundwater Levels

Recharge of groundwaters was poor in winter/spring 1996 due to the continued below average rainfall. Recharge of the Lower Greensand around Furzenhall Sand was particularly poor with the recession starting in April 1996. With little recharge in winter/spring 1996/97 levels dropped below historical minima around Furzenhall Sand. (See figure). The Great Ouse Chalk and Norfolk Chalk levels although low were above historical minima levels for the period.

4. Flooding

a) Fluvial

No fluvial flooding was recorded during this period.

b) Tidal

Stormy weather conditions and high tides during the period of 28/29 August 1996 resulted in the issue of Amber flood warnings for the King's Lynn area, although no flooding of property occurred.

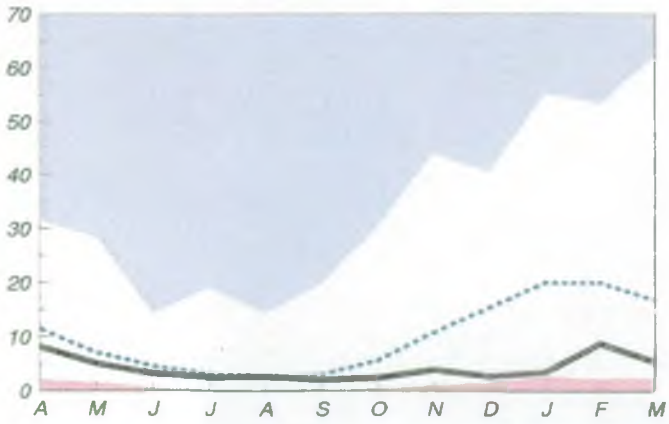
This was followed by two tidal surges in October and November. During the first event on 29 October 1996 levels reached 5.0 metres at King's Lynn. Levels reached only 4.5 metres on 12 November. Neither event resulted in any road or property flooding.

The last event of the period was on 9 February at Kings Lynn when levels reached 4.97 metres. This was caused by very strong south-westerly winds (Force 6) pushing the surge around from Scotland. This was an unusual event from which useful forecasting lessons were learnt. No property flooding occurred.

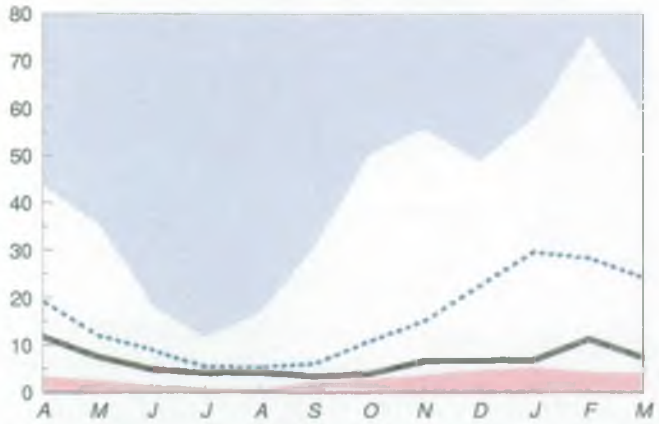
Central Area Key Hydrometric Data
APRIL 1996 TO MARCH 1997

Monthly Mean River Flows
All flows in cumecs

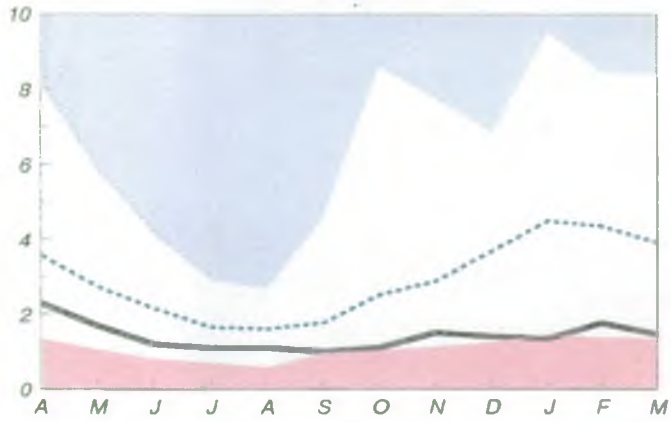
Bedford Ouse Flow at Bedford



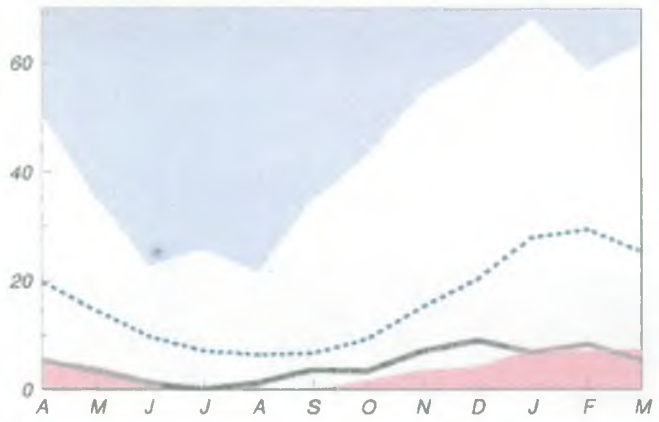
Bedford Ouse Flow (Gross) at Offord



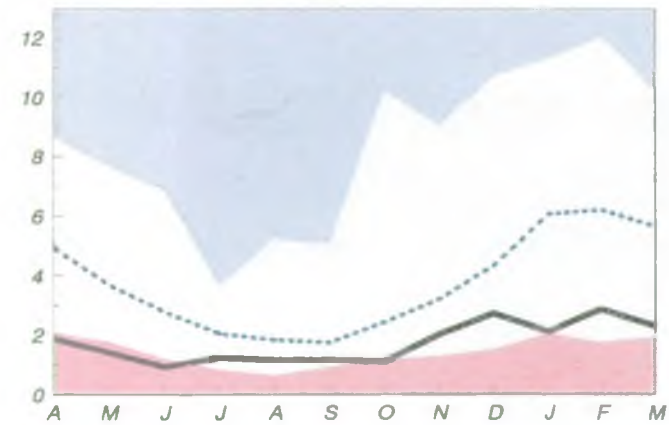
Ivel Flow at Blunham

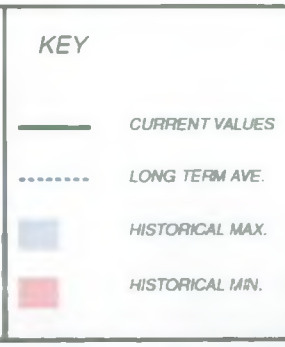


Ely Ouse and Cut Off Channel Flows at Denver



Little Ouse at Abbey Heath

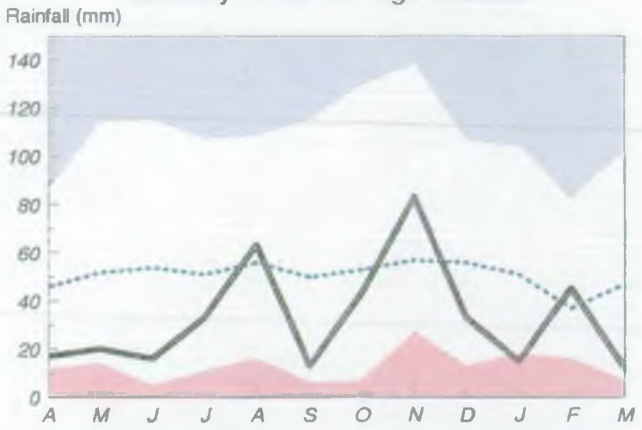




Central Area Key Hydrometric Data
APRIL 1996 TO MARCH 1997

Rainfall surplus, SMD and GW levels are for end of given month.

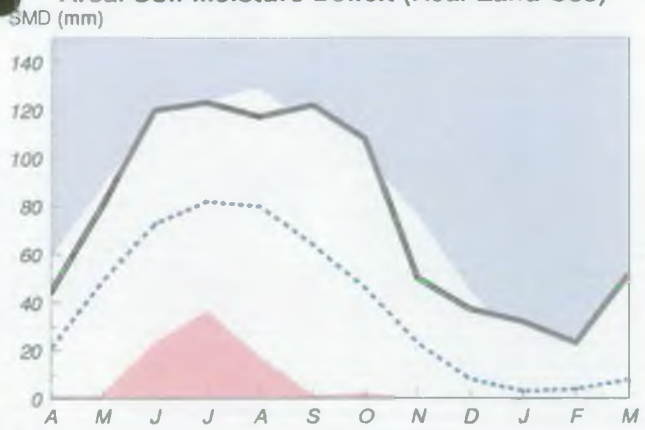
Monthly Areal Average Rainfall



Monthly Rainfall Surplus/Deficit

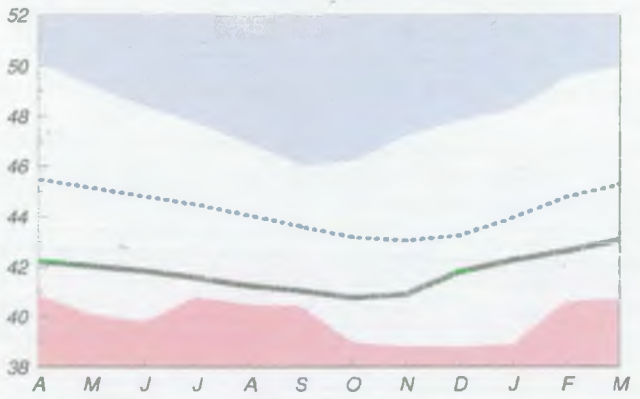
Upper line is annual average. Lower line is total for last 12 months.

Areal Soil Moisture Deficit (Real Land Use)



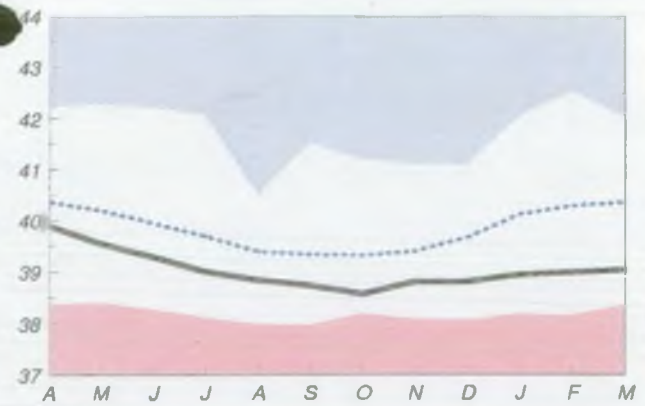
Chalk Groundwater levels at TF81/10 Washpit Farm

TF 813 195. Levels in mAOD (GL 80.38)



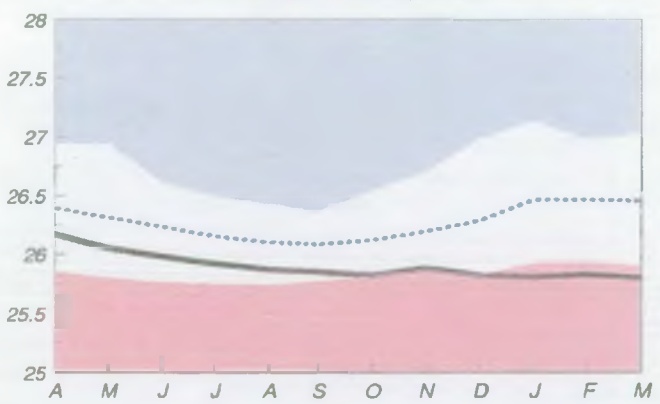
Chalk Groundwater Levels at TL54/19 Chesterford Park

TL 435 423. Levels in mAOD (GL 107.85)



Lower Greensand Levels at TL14/1 Furzenhall Farm

TL 193 468. Levels in mAOD (GL 27.06)



KEY

- CURRENT VALUES
- LONG TERM AVE.
- HISTORICAL MAX.
- HISTORICAL MIN.

GREAT OUSE LOCAL FLOOD DEFENCE COMMITTEE

FINAL ACCOUNTS 1996/1997

(£000's)

LINE NO.		ACTUAL 1995/96	APPROVED BUDGET 1996/97	REVISED BUDGET 1996/97	ACTUAL 1996/97	VARIANCE
1	County Council Levies	5748	5748	5748	5748	0
2	Int. Drainage Board Precepts	1647	1622	1622	1622	0
3	General Drainage Charges	622	625	620	603	(17)
4	Other	380	375	350	271	(79)
5	Interest - on Cash flow	237	230	195	193	(2)
6	- Section 47 balances	60	60	50	50	0
7	TOTAL INCOME	8694	8660	8585	8487	(98)
8	Maintenance - Fluvial Main River	2114	2136	2136	2126	10
9	- Tidal/Sea Defences	300	311	311	316	(5)
10	Other Operational Costs	969	941	941	895	46
11	Operational Support: - Regional	1850	1860	1860	1865	(5)
12	- National	234	238	238	243	(5)
13	- NIS	267	277	277	281	(4)
14	Revenue Contribution to Capital	3540	3220	2408	2276	132
15	Working Capital	(116)	0	0	23	(23)
16	TOTAL EXPENDITURE	9158	8983	8171	8025	146
17	**SURPLUS/DEFICIT**	(464)	-323	414	462	48
	RESERVE					
18	Section 47 Balances b/fwd	1368	860	904	904	0
19	Surplus/Deficit	(464)	-323	414	462	48
20	Section 47 Balances c/fwd	904	537	1318	1366	48
21	Grant Aided Works - Fluvial Main River	1845	1550	1146	996	150
22	- Tidal/Sea Defences	3826	2650	2181	2202	(21)
23	Non Grant Aided Works	104	150	150	148	2
24	Design/Supervision	913	600	675	680	(5)
25	TOTAL EXPENDITURE	6688	4950	4152	4026	126
26	MAFF Grant	3050	1730	1744	1750	6
27	Contributions	98	0	0	0	0
28	**REVENUE CONTRIBUTION TO CAPITAL**	3540	3220	2408	2276	132
29	Grant Earning Ceiling	5400	3000	2600	2600	

GREAT OUSE LOCAL FLOOD DEFENCE COMMITTEE

FINAL ACCOUNTS 1996/1997

(£000's)

LINE NO.		ACTUAL 1995/96	APPROVED BUDGET 1996/97	REVISED BUDGET 1996/97	ACTUAL 1996/97	VARIANCE
1	County Council Levies	5748	5748	5748	5748	0
2	Int. Drainage Board Precepts	1647	1622	1622	1622	0
3	General Drainage Charges	622	625	620	603	(17)
4	Other	380	375	350	271	(79)
5	Interest - on Cash flow	237	230	195	193	(2)
6	- Section 47 balances	60	60	50	50	0
7	TOTAL INCOME	8694	8660	8585	8487	(98)
8	Maintenance - Fluvial Main River	2114	2136	2136	2126	10
9	- Tidal/Sea Defences	300	311	311	316	(5)
10	Other Operational Costs	969	941	941	895	46
11	Operational Support: - Regional	1850	1860	1860	1865	(5)
12	- National	234	238	238	243	(5)
13	- NIS	267	277	277	281	(4)
14	Revenue Contribution to Capital	3540	3220	2408	2276	132
15	Working Capital	(116)	0	0	23	(23)
16	TOTAL EXPENDITURE	9158	8983	8171	8025	146
17	**SURPLUS/DEFICIT**	(464)	-323	414	462	48
	RESERVE					
18	Section 47 Balances b/fwd	1368	860	904	904	0
19	Surplus/Deficit	(464)	-323	414	462	48
20	Section 47 Balances c/fwd	904	537	1318	1366	48
21	Grant Aided Works - Fluvial Main River	1845	1550	1146	996	150
22	- Tidal/Sea Defences	3826	2650	2181	2202	(21)
23	Non Grant Aided Works	104	150	150	148	2
24	Design/Supervision	913	600	675	680	(5)
25	TOTAL EXPENDITURE	6688	4950	4152	4026	126
26	MAFF Grant	3050	1730	1744	1750	6
27	Contributions	98	0	0	0	0
28	**REVENUE CONTRIBUTION TO CAPITAL**	3540	3220	2408	2276	132
29	Grant Earning Ceiling	5400	3000	2600	2600	

GREAT OUSE LOCAL FLOOD DEFENCE COMMITTEE

FINAL ACCOUNTS 1996/1997

FINANCE REPORT

The net effect of variances from the revised budget has been to increase Section 47 balances by some £462k, £48k above budget.

This situation was anticipated during the last quarter of the year and reported to the Committee.

The increase in balances is due to a reduced spend on the "Memorandum of Understanding" (MoU) database, and the shortfall will be carried forward via Section 47 balances into 1997/98, when additional spend will bring the programme of works back on schedule.

Individual variances are listed below:-

Line No.		Comments
3.	General Drainage Charges	With no annual increase in levies on County Councils, the increased Council Tax Base continues to erode the rate per hectare chargeable on land subject to General Drainage Charges.
4.	Other Income	The depressed property market within the Area has delayed the sale of Magdalen Depot. It is now anticipated that proceeds from the sale will accrue in year 1997/98.
10.	Other Operational Costs	There has been a much reduced spend on the MoU database - see note above.
14.	Revenue Contribution to Capital	The main changes to the original Capital Programme which occurred during the year were:- a) Expenditure on Welmore Lake Sluice was delayed due to the need to re-advertise tenders in the European Journal.

b) Accelerated expenditure on Ely Ouse Flood Defence units to take up capital spend/GEC.

c) Expenditure budgeted for re-positioning Soke Dyke deferred on the Counterdrain Scheme, pending further discussions with landowner.

d) Hunstanton Beach - urgent works brought into the programme.

e) Tidal river mattressing works extended to take up capital spend/GEC.

f) Brownshill Staunch - scheme deferred.

g) Houghton Structures - scheme deferred.

h) Kimbolton FPS - scheme brought forward

i) Fisher Fleet - evaluation of outstanding contractors claim necessitated additional expenditure provision.

17. Section 47 Balances

Balances carried forward are some £48k in excess of the revised budget - see note above.

29. Grant Earning Ceiling

Reductions to the capital programme and the inability to claim grant on the Fisher Fleet contractors claim resulted in a revision to the MAFF GEC from £3.0m to £2.6m.

FINANCE REPORT

CAPITAL EXPENDITURE ANALYSIS 1996/97

SCHEME REFERENCE	SCHEME DESCRIPTION	EXPENDITURE (£'000)
11045	Ouse Washes - Cradge bank raising	33
11047	Welmore Lake Sluice	33
11060	Ely Ouse FD Units 1 - 9	736
11333	MLBB Erosion Protection	150
11413	Kings Lynn/Denver - Eau Brinks	66
11414	Kings Lynn/Denver - St Germans	36
11418	Kings Lynn/Denver - St Peters	305
11420	Kings Lynn/Denver - A1122/Stowbridge	34
11421	Kings Lynn/Denver - A1122/Stowbridge	44
11424	Kings Lynn/Denver - Downham W	223
11995	Regional Flood Warning	50
12057	Hunstanton/Heacham - Urgent Works	102
12063	Hunstanton beach management	118
12150	Tidal River Mattressing R/1	271
12155	Tidal River Mattressing S	240
12160	Tidal River Mattressing T	187
12212	Kimbolton FPS	78
12350	Norfolk Coastal Strategy	8
18890	Shoreline Management	14
19013	ARTS	5
12045	Fisher Fleet	500
11302	Sale of 'The Fish'	(49)
		3184
	Various schemes < £10k	14
	TOTAL GRANT ELIGIBLE	**3198**
11034	Thetford Sluice	42
11040	Safety Works	24
13078	Langford Mill	9
13082	Cardington Sluice	10
13083	Silt Fen PS	6
11013	Tail Sluice Automation	48
--	Various Schemes < £10k	9
		148
	Design/Supervision - In-house	279
	- Consultants	401
	TOTAL CAPITAL EXPENDITURE	**4026**

ENVIRONMENT AGENCY