ENVIRONMENT AGENCY

Welland and Nene

Local Flood Defence Commitee

Annual Inspection

26 June 1998

WELLAND & NENE LFDC ANNUAL INSPECTION

FRIDAY 26 JUNE 1998

ATTENDEES

Welland & Nene Local Flood Defence Committee

D J Riddington Esq OBE	Chairman
J K Royston Esq	Vice Chairman
P Brown Esq	
J H R Hoyles Esq	
Dr C Newbold	
A H Proctor Esq	
I Symington Esq	
A J L Worth Esq	
Cllr J R Horrell CBE TD DL	
Cllr J R Peach	
Cllr D G Mawby	
Cllr S C Roberts	
Cllr R Seery	
Cllr B J W Smith	
Cllr M E Baines	

Observers representing the Welland & Nene AEG

Mrs P Halliwell
R Hole Esq

LFDC/RFDC Chairmen

R J Epton Esq	Chairman	Lincolnshire LFDC

Internal Drainage Boards

R Wedley	Clerk & Chief Executive	North Level IDB
J Elsey	Engineer	South Holland IDB
J Honnor	General Manager	Welland & Deepings IDB

BARCODE AT BACK

County/District Councils

Cllr W D Skells		South Holland District Council
M Cornwell	Emergency Planning Liaison Officer	Fenland District Council

Lincolnshire Trust for Nature Conservation

E J Redshaw

Ministry of Agriculture, Fisheries & Food

G Sexton	Regional Engineer

RSPB

C Kitchen

Environment Agency Officers

T Youdan	Catchment Engineer (W&N)
Fola Ogunyoye	Flood Defence Engineer
J Marshall	Flood Defence Engineer
J Cook	LEAPS Officer
D Denness	Higher Technician
I Forbes	Fisheries, Ecology & Recreation Manager (N)
N Pask	Principal Engineer
S Thomas	Public Relations Manager
R Enstone	Team Leader - Environment Protection (W&N)
A Lack	Team Leader - Environment Protection (Lower)

WELLAND AND NENE LOCAL FLOOD DEFENCE COMMITTEE
ANNUAL INSPECTION
26TH JUNE 1998

ITENERARY

08:30	Meet at Kingfisher House.
09:00	Depart Kingfisher House to visit:-
	Peakirk Pumping Station
	Market Deeping Bypass
	Crowland/Cowbit Wash
	Pinchbeck Engine Drainage Museum
	Tidal Welland
	Tidal Nene
17:00	Return to Kingfisher House.

The route plan is shown on fig.1.

Regional Boundary

Catchment Boundary

Main Rivers

Sea Banks

Inspection Route

1. Kingfisher House
2. Peakirk Pumping Station
3. Maxey Cut, Nine Bridges
4. A15 Market Deeping Bypass
5. River Welland, Deeping St James
6. Wide Welland, Crowland
7. Wide Welland, Four Mile Bar
8. Pinchbeck Engine
9. Pinchbeck Village Hall
10. Tidal Welland, Fosdyke Bridge
11. Sutton Bridge, River Bank Stoning Works
12. Wisbech Flood Defences and Port Regeneration
13. Rings End Sluice, Guyhirn
14. Whittlesey Washes

ENVIRONMENT AGENCY

WELLAND AND NENE LFDC INSPECTION ROUTE

26 JUNE 1998

FIG 1

PEAKIRK PUMPING STATION

Peakirk pumping station was constructed in 1973 as part of a major Folley River/Brook Drain improvement scheme. It is the outfall structure for the Peterborough Brooks. These brooks convey the drainage from the northern part of Peterborough and surrounding villages. The pumping station discharges into the Wide Welland just downstream of the Maxey Cut outfall. Three diesel pumps were added to the existing three electric pumps in 1985 to provide a combined discharge capacity of 9 cumecs. The electric pumps are started automatically as the upstream level rises, the diesel pumps are manually operated in high flow conditions.

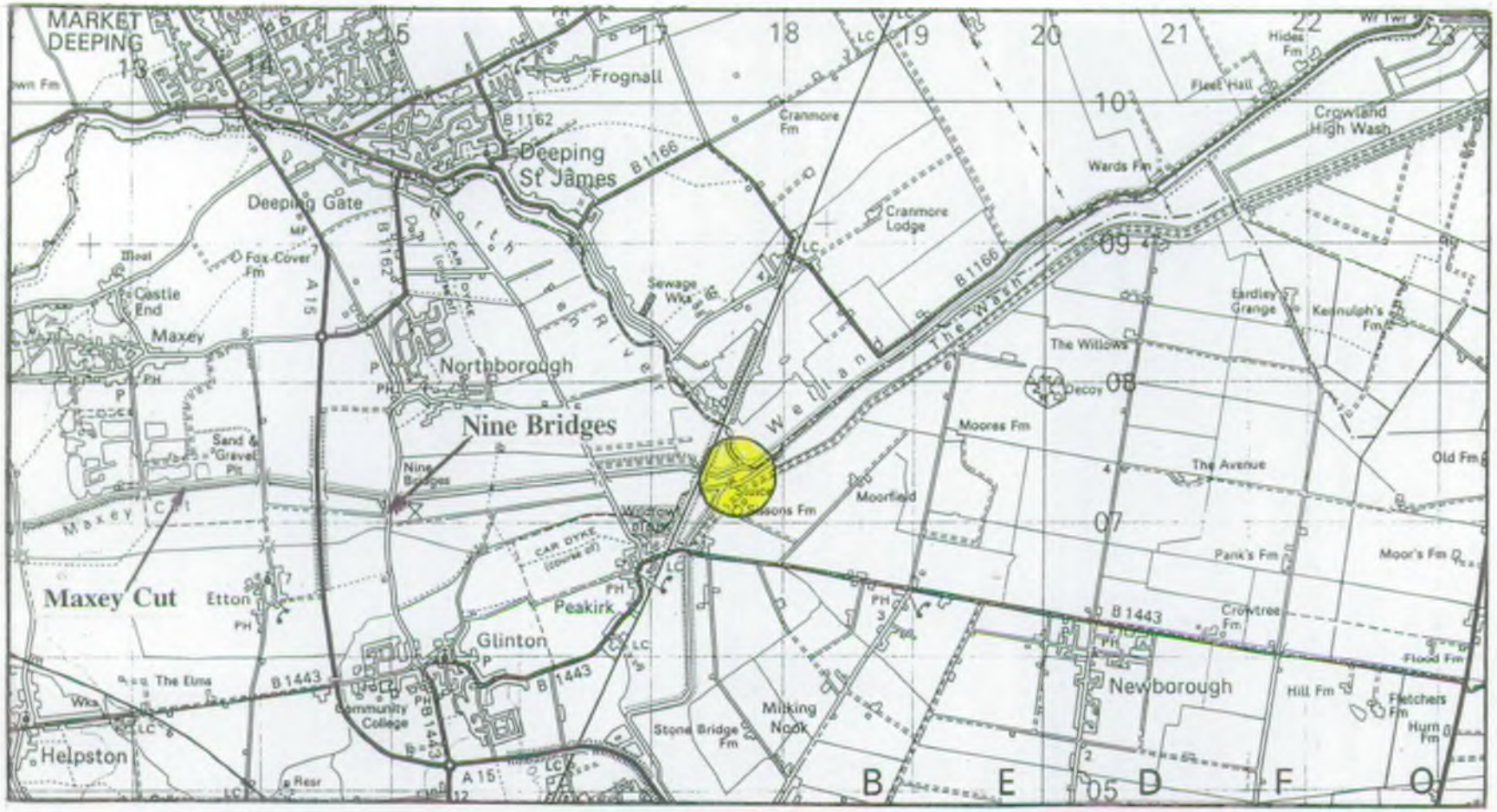
An automatic weedscreen cleaner was installed in 1992 to attain more effective removal of weed and other blockages in front of the weedscreen. The operation of the pumping station and possible improvement of the weedscreen cleaning process is currently being considered as part of the ongoing Peterborough Brooks improvement feasibility study. This study covers all main river within the catchment of Peakirk pumping station. The study includes the development of a hydraulic model to appraise the performance of the system under pre-set flow conditions and the need for improvement works. The preliminary report is due this summer.

MAXEY CUT

Maxey Cut is the River Welland flood bypass channel completed in 1954 from Tallington to Peakirk to protect the Deepings from flooding. It has the capacity to convey over 100 cumecs of flow. The channel is mainly of gravel. These banks and gravel bed suffer from erosion during high flows. A number of measures such as riffles, weirs, piling and stoning have been used since its construction to control this erosion.

In the mid 1980's a major capital scheme was carried out to stabilize the banks from Tallington to Nine Bridges with enkamat. The unprotected length between Nine Bridges and Peakirk are still affected by erosion. During May and June this year, repairs to 500 metres of erosion damage was carried out using machine placed stone at the toe of the banks between Nine Bridges and the outfall (see fig. 3).

As a result of the mobile gravel bed shoals are regularly removed at the outfall and downstream of bridges along the cut to maintain adequate discharge. The porous gravel bed has also made it difficult to retain water during the periods of low flow for abstraction and fishery.



PEAKIRK PUMPING STATION

Location Plan

Figure. 2a

Figure. 2b : Peakirk Pumping Station

Figure. 2c : High Levels At Peakirk During The Easter Flood, 1998.

Figure. 3 : Maxey Cut Stoning Works, Downstream Of Nine Bridges.

A15/16 MARKET DEEPING BYPASS

The 8 km A15/16 Market Deeping Bypass construction was commenced in 1997 following a lengthy period of design, construction and planning process. The road will divert traffic away from the conservation area of Market Deeping and the 28 grade 1 listed buildings fronting on to the roads. The bypass is expected to reduce the high accident figures through the town by about 51%.

The bypass crosses two of the River Welland millstream channels and a number of dykes within the Welland and Deepings Internal Drainage Board area. Both the Agency and the Drainage Board worked closely with the Council to ensure that the drainage from the new trunk road and the dyke crossings are adequately designed. Some river corridor improvements were also carried out as part of the development of the road.

The road construction is estimated to cost £10.8 m on completion. It is due to be open to the public before the end of July 1998. (See fig. 4 for the route map and description).

RIVER WELLAND THROUGH DEEPING ST. JAMES

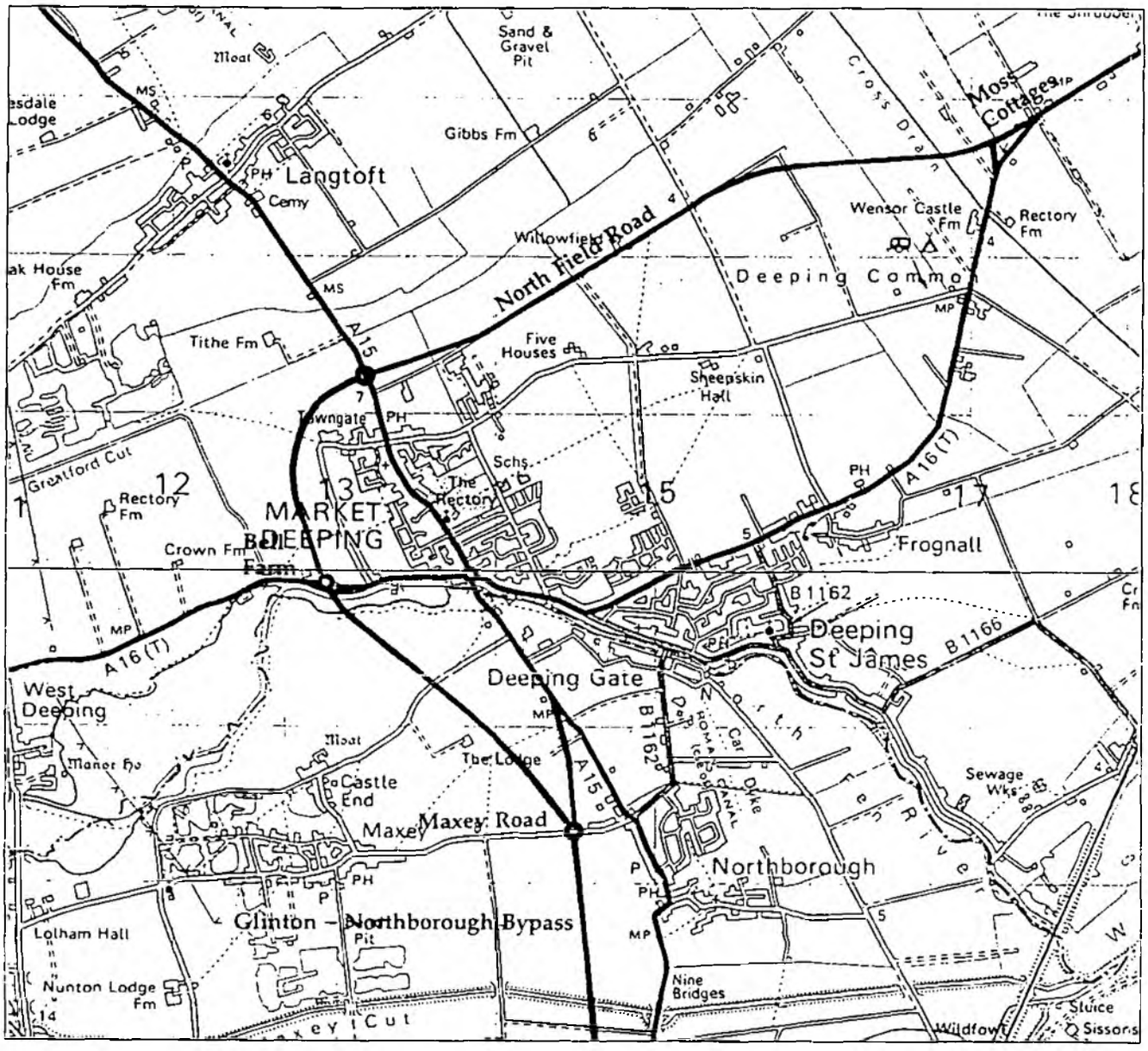
The Welland through Deeping St. James is often required to convey high flows despite the Maxey Cut as a result of a combination of flows from the Millstreams and Greatford Cut during peak flows on the West Glen. Flow is regulated and flood flows discharged via two automatic sluices at High Locks and Low Locks; both in Deeping St. James.

There are a large number of properties protected by the Hives bank between these two locks. The Agency regularly monitors the integrity of these banks and seek to control development that may affect it through its powers under the 1991 Water Resources Act.

During last Easter, very high flows were experienced along this length which tested the defences. Apart from some seepage under the defences, they withstood the flows throughout its peak period. The Agency had carried out works to protect the berms and bank. Some of our recent works are shown on fig. 5b. Figs. 5c and 5d show the extent of the last Easter flows on the Welland through Deeping St. James.

A15/A16 Market Deeping Bypass

Proposed Route

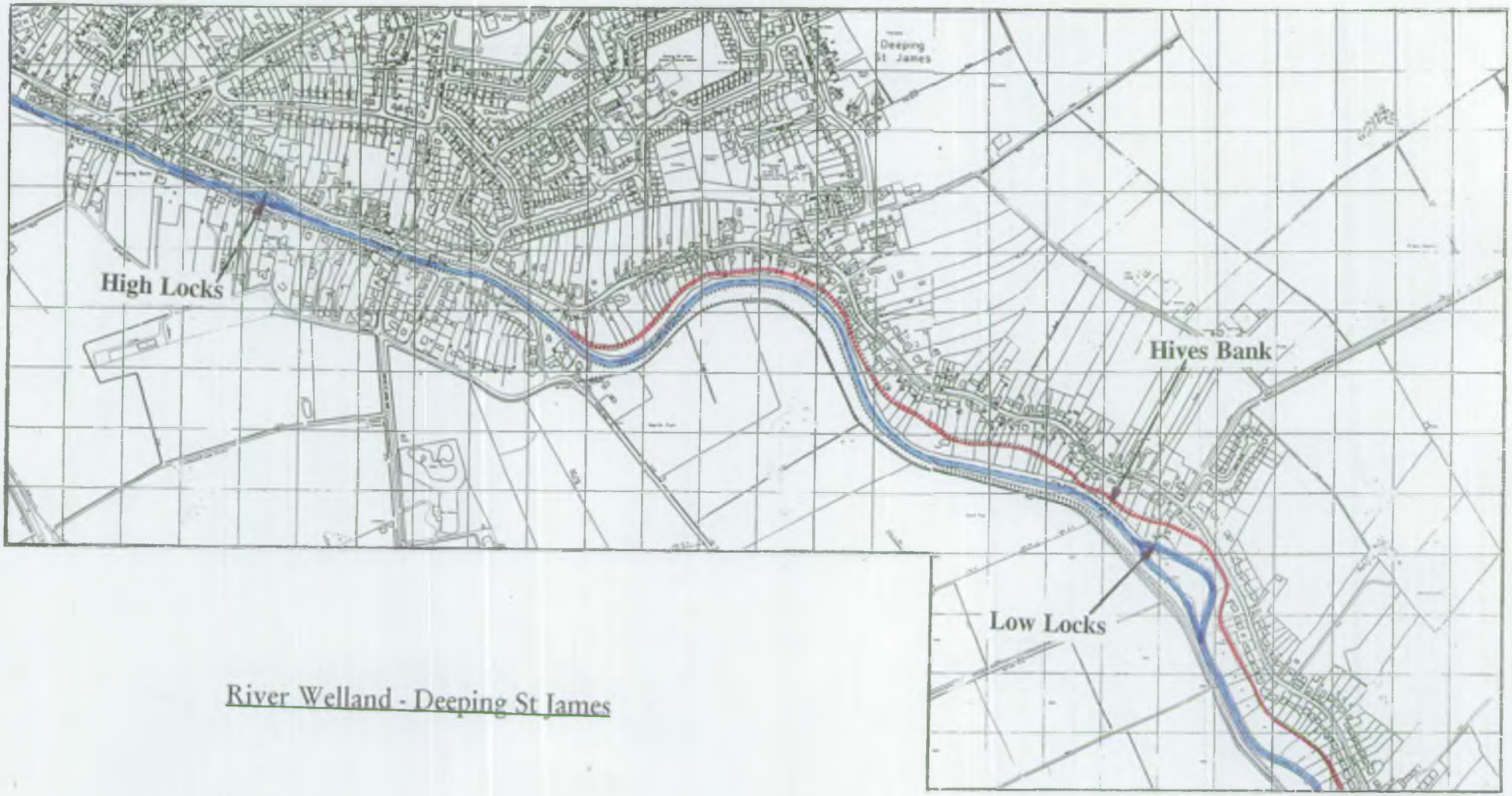


The route provides a western and northern bypass of the Deepings, commencing south of the town at the existing roundabout at Maxey Road. It runs in a north westerly directon to cross the A16 to the east of Bell Farm, where a roundabout would be constructed. The road continues northwards before curving eastwards to rejoin the A15 by means of a roundabout juncion, north of North Field Road. From this roundabout the route follows the line of North Field Road before turning eastwards to join the existing A16 west of Moss Cottages.

Rejected Options

A scheme to provide an A16 bypass to the south of the town was proposed by the Department of Transport but this was withdrawn following public consultation in 1989.

Figure. 4



River Welland - Deeping St James

Figure. 5a

Figure. 5b : Reed Roll Revetment, Undertaken May 1998

Figure. 5c : Eastgate Deeping St James, During The Easter Flooding 1998.

Figure. 5d : Low Locks, Deeping St James, During The Easter Flood, 11/4/98 AM

THE WIDE WELLAND

The Wide Welland convey flows from North Peterborough, the western part of the North Level as well as the Welland Catchment. It is the section of the Welland widened during the 1950's to provide improved channel storage and capacity following the 1947 floods. It is a length of about 19 km from Peakirk to Spalding.

The river normally flows between Deeping High Bank and Cradge Bank. In times of exceptional flow, water passes over the Cradge Bank via two syphonic weirs to flood the Crowland and Cowbit Washes where it is contained by the Welland South Barrier Bank. (See fig. 6a). The Crowland and Cowbit Washes have recently been registered as reservoirs under the Reservoirs Act 1975. They are now being inspected and maintained in accordance with the Act.

The Welland Channel:

The Environment Agency carried out a series of stability analyses as part of its Strategy Study in 1993. The study confirmed that the stability of the flood banks were adequate. The major threat to them was through loss of berm width by erosion.

A number of revenue and capital schemes have been carried out to protect the riverbank from erosion. Methods such as stoning, faggotting, trench sheet piling and duracem piling have been used in the past.

The Agency has also recently completed the stoning of 350 metres of the Cradge Bank just upstream of Crowland bridge to stop the erosion there. Fig. 6b shows the high erosion rate since the end of the capital scheme completed in 1994 while fig. 6c shows the newly completed works.

The Agency is currently carrying out a five year scheme between Four Mile Bar and Spalding to protect the riverbank against erosion on the Deeping High Bank side. A number of methods are being considered. The first years work has just been completed. This involved the use of Nicospan toe, thin reed planted flax matting at the top edge of the berm and thick reed planted coir matting within the normal water level range to resist the flows and waves during high flow and windy conditions. As this length is important for fishing, fishing platforms were incorporated at every fishing peg over the length of the works. This was partly funded by the Agency's Fisheries section. (See figs. 7a, 7b and 7c).

Newborough and Four Mile Bar Syphons:

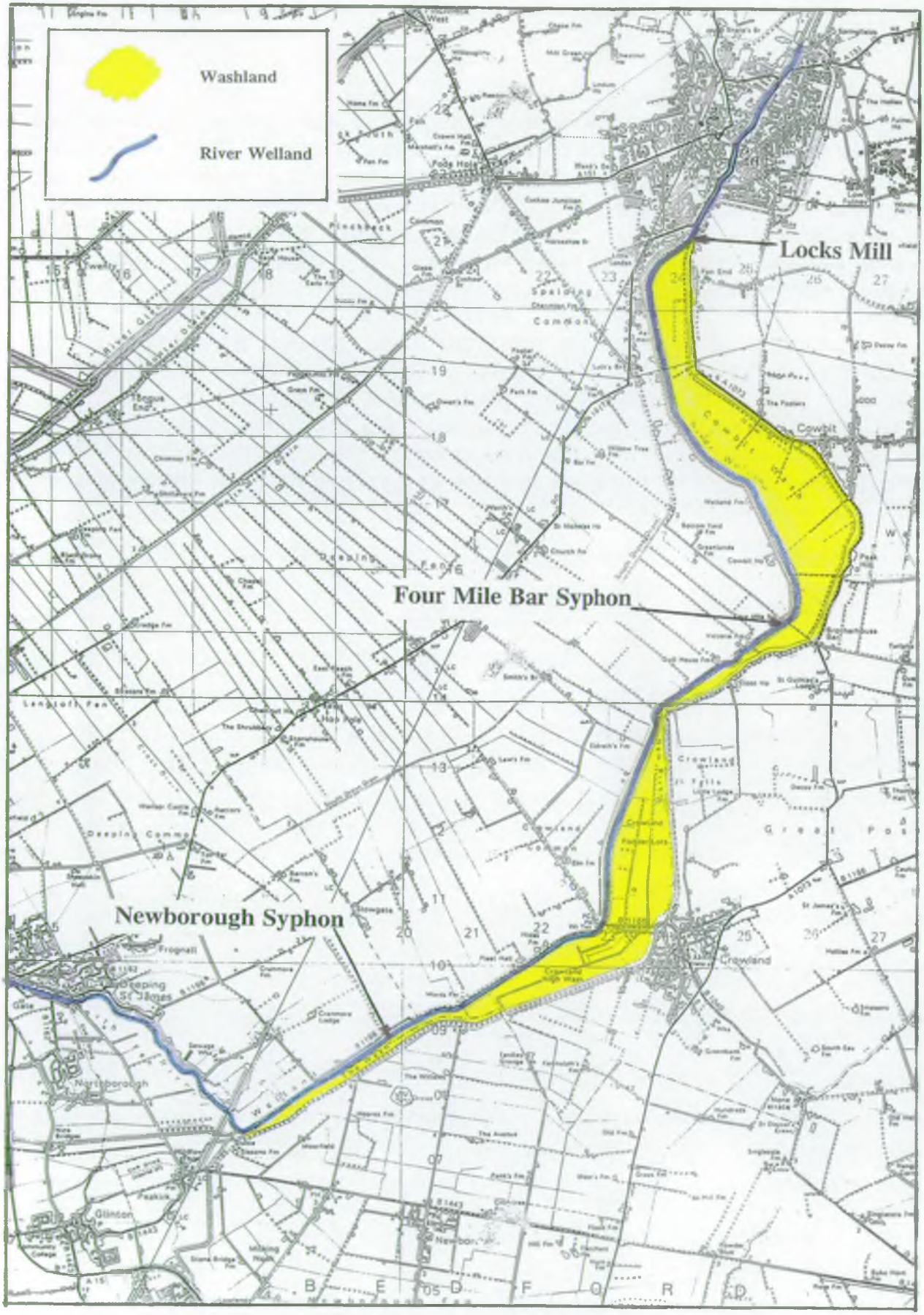
During periods of high flows flood waters are expected to flood the 2,500 acres of Washland initially via the syphons. Newborough and Four Mile Bar syphonic weirs were constructed in 1975 to replace the weirs which up until then controlled flows into the Washes. This was done to cope with the additional discharge from the new Peterborough Development via Peakirk pumping station.

THE WIDE WELLAND

Newborough and Four Mile Bar (Continued)

Newborough and Four Mile Bar Syphons are designed to start discharging water into the Washes when the Welland level reaches 5.23 and 4.77 metres ODN respectively. (See fig. 8a). The Washes are normally drained via a network of channels which are pumped into the Welland via the Welland and Deepings Internal Drainage Board's Postland pump at Four Mile Bar. If washes are used in a flood, the flood water is evacuated from the Washes through Locks Mill Sluice at Spalding once river levels have receded.

Water was stored on a small part of the Wash during the last Easter floods from overtopping of the Cradge bank at a few low spots. Records from the flood levels showed that both syphons were within about 40 mm of their trigger levels. (See figs. 8b and 8c). These are the highest known levels reached in the Welland since the 1950's after the completion of the Welland improvement scheme in the 1950's. A study is to be undertaken to verify the levels at which the syphons would discharge and the level of the cradge bank.



Crowland / Cowbit Washes & River Welland

Figure. 6a

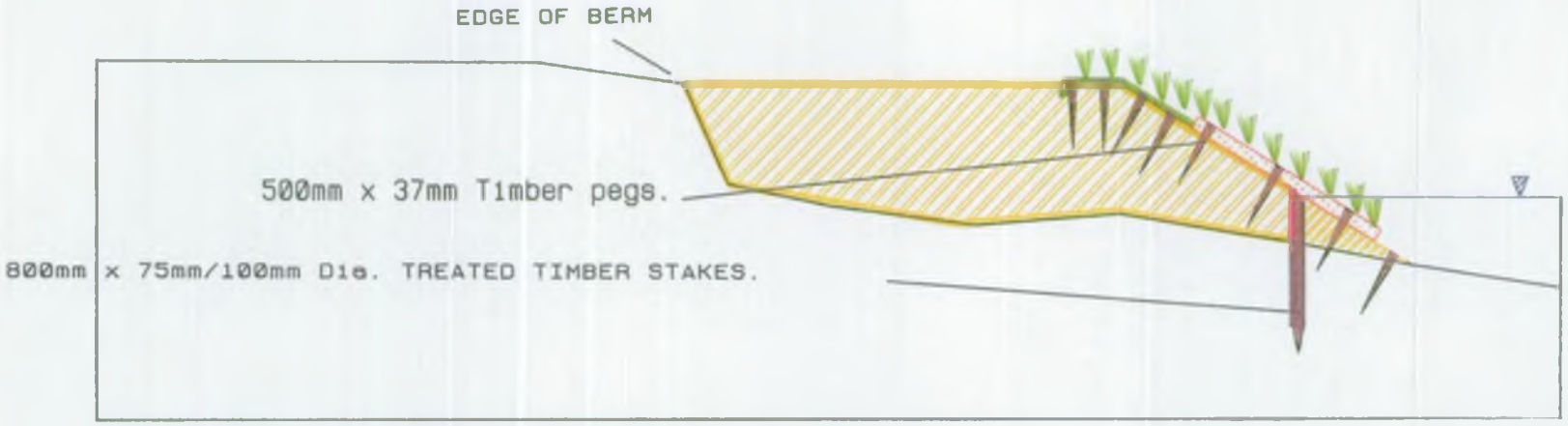
Figure. 6b : River Welland Upstream Of Crowland Bridge, Prior To Stoning Works

Figure. 6c : River Welland Upstream Of Crowland Bridge After Stoning Works

Figure. 6d : Crowland Bridge During The Easter Flood Event, 14:30 11/04/98

Figure. 6e : Water Spilling Over The Bank Upstream Of Crowland Bridge, 11/04/98

RIVER WELLAND BANK STABILISATION
AT
FOUR MILE BAR



NORMAL WATER RETENTION LEVEL ▽

NICOSPAN

FLAX MAT PLANTED WITH REEDS FOLLOWING INSTALLATION.

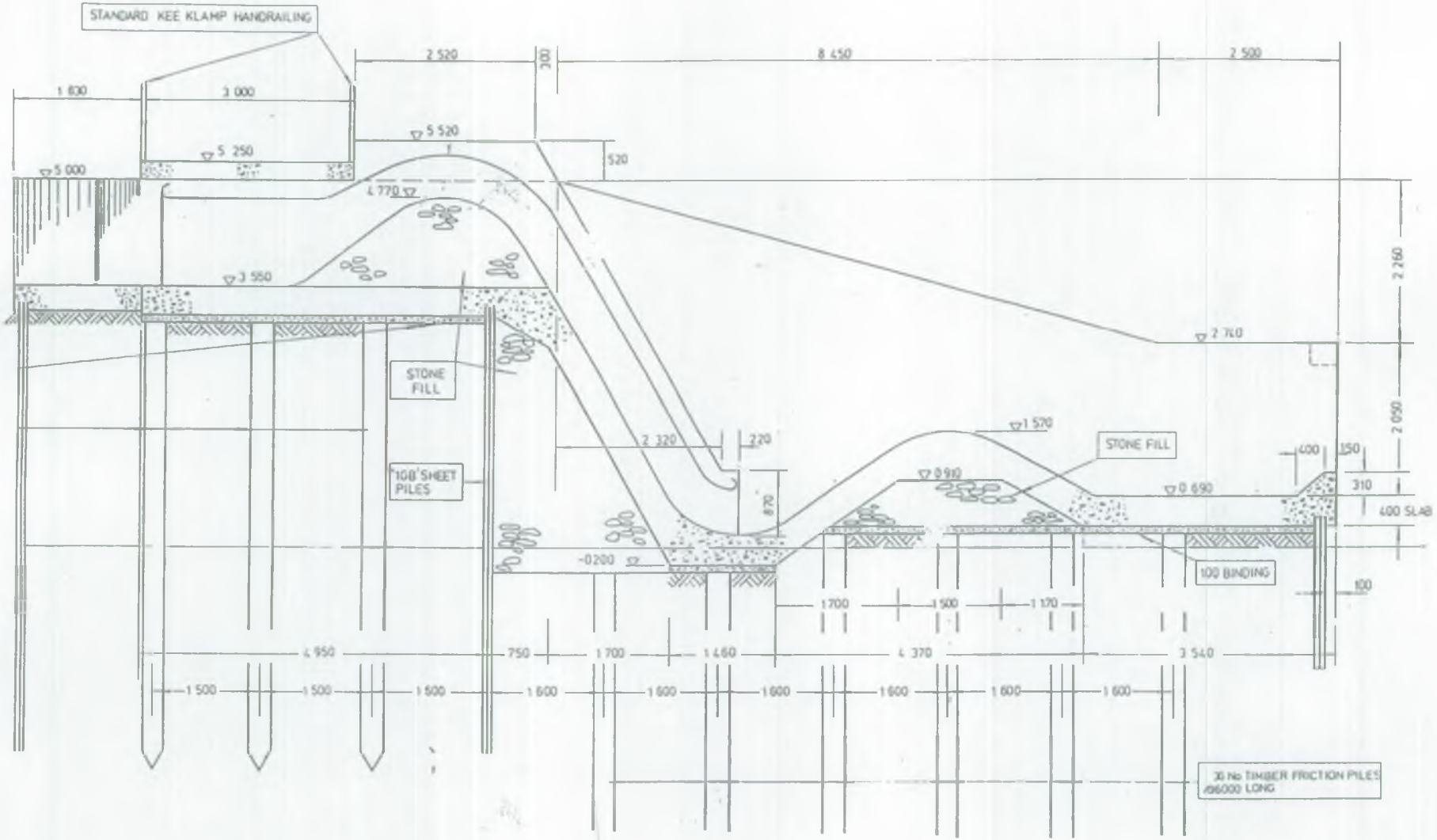
COIR MATTING PLANTED WITH REEDS FOLLOWING INSTALLATION 1.25M X 0.800M

FILL FROM THE SOIL STOCKPILE.

Figure. 7a

Figure. 7b : Four Mile Bar Erosion Protection, Incorporating Fishing Platforms Showing Nicospan Prior To Backfilling

Figure. 7c : Four Mile Bar After Backfilling And Placement Of Coir Matting



Four Mile Bar Syphon Details

Figure. 8a

Figure. 8b Four Mile Bar Syphon During The Easter Flood, 12/04/98

Figure. 8c : Newborough Syphon During The Easter Flood, 11/04/98

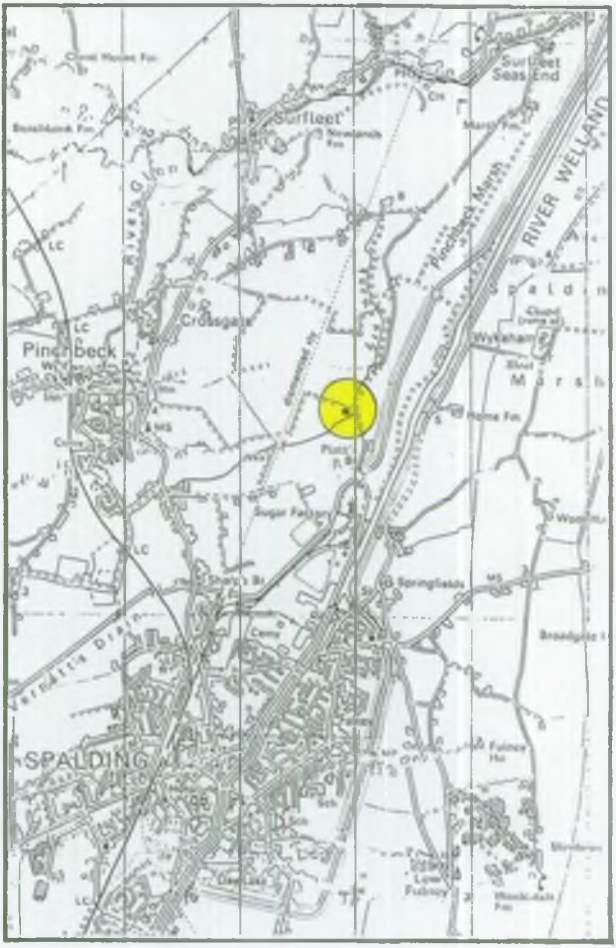
Figure. 8d : Overtopping Of The Cradge Bank At Four Mile Bar Syphon, 11/04/98

Figure. 8e: Overtopping Of The Cradge Bank At Bell Row Freshwater Feed, 11/04/98

THE PINCHBECK ENGINE

The Pinchbeck Engine was built in 1833 enabled by an Act of 1832 to improve the drainage of the lands of Spalding and Pinchbeck. The improved drainage method was needed as the windmills were unable to cope with the pumping required to drain water from the rapidly shrinking fens. It had the capacity to pump 20 cusecs/hour using 1 cwt. of coal.

The Pinchbeck engine worked until 1952 when it was replaced by a new electrically powered station in 1952. Due to its importance in the drainage of the Fens it was then preserved by the Welland and Deepings Internal Drainage Board. The last ten years has seen its restoration in partnership with South Holland District Council to create a Land Drainage Museum. (See fig. 9).



Pinchbeck Engine

Figure. 9

RIVER NENE STABILISATION PHASE B
SUTTON BRIDGE TO THE LIGHTHOUSES

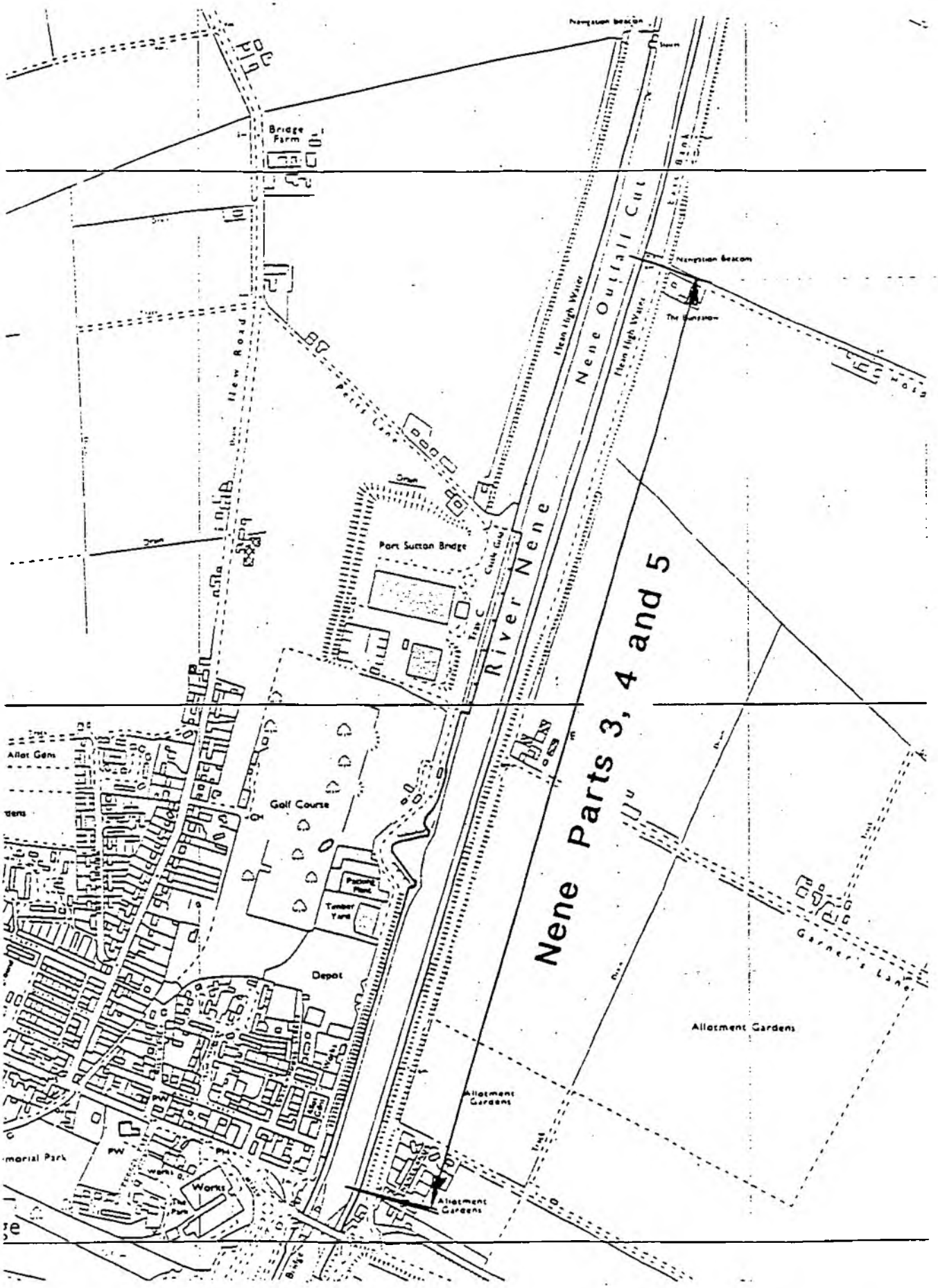
This is the second phase of a programme of works identified from the Nene Strategy Study as necessary to ensure the protection of the low lying land protected by the tidal Nene banks. The length concerned is the last 5 kilometers of the 39 km long tidal part of the Nene.

The importance of the outfall channels and defences to the flood defence of the whole of the Nene Catchment is vital.

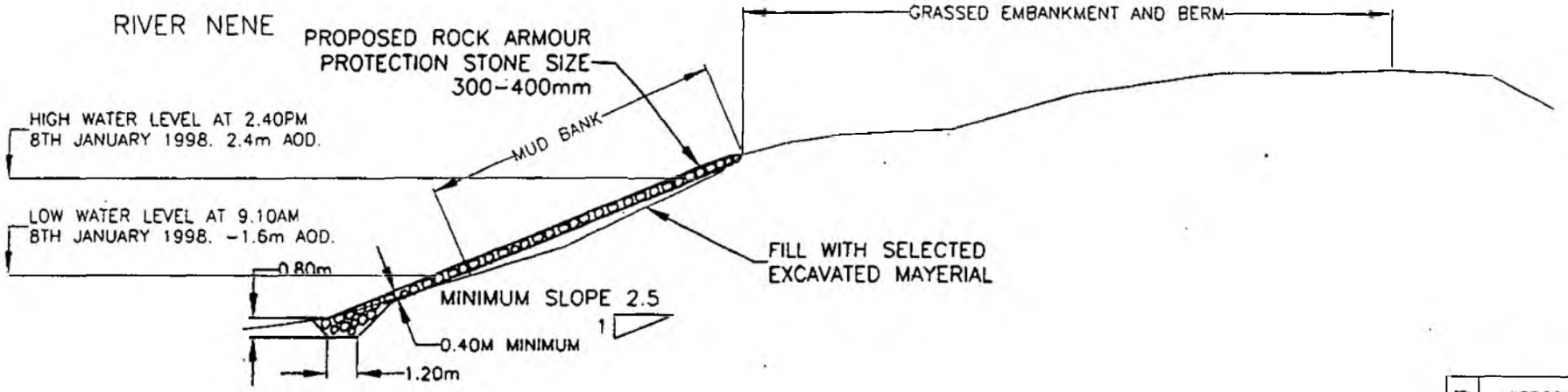
This phase of works has been packaged together to produce savings to the Agency.

Parts 1 and 2 were carried out in 1997, Part 3 (righthand bank), 4 and 5 are ongoing, while Part 3 (lefthand bank) is being planned for next year.

The stabilisation involves machine placing of 300 - 400 mm diameter rock armour on the riverbank to keep its trained profile and protect the bank from erosion. This method has been used successfully along the tidal lengths of the Nene and Welland in similar conditions. The completed works will ensure a standard of protection against a 1 in 200 year return period tidal surge. The total length of the bank revetment in this phase is 4.2 km at an estimated cost of £1.6 million. Figs. 10a and 10b show the location and cross section of the ongoing works for this year.



ENVIRONMENT AGENCY	RIVER NENE STABILISATION PHASE B, PARTS 3 (RHB), 4 & 5 LOCATION PLAN	DATE January 1998	SCALE NTS
		DRAWN JGA	CHKD
		Figure. 10a	



TYPICAL CROSS SECTION CH4800–4400m & CH3900m–CH3100m

REV	AMENDMENT	DR	CHD	APP	DATE

CLIENT
ENVIRONMENT AGENCY
ANGLIAN REGION

PROJECT
TIDAL RIVER NENE STABILISATION
PHASE B, PARTS 3 (RHB), 4 & 5

TITLE
R.NENE: SUTTON BRIDGE RIGHT BANK
TYPICAL CROSS SECTION 1
PROPOSED WORKS

Bullen
consultants
11/12 Eldon Place, Bradford, BD1 3AZ.
Tel. 01274 870410 Fax. 01274 734447
Email gen@bullenbr.demon.co.uk

DRAWN BY	CHECKED BY	APPT. BY	DATE
MC	RN	VH	JAN 98
SCALE	PROJECT NO.	DRAWING NO.	REV
1:200	97B303		

Figure. 10b

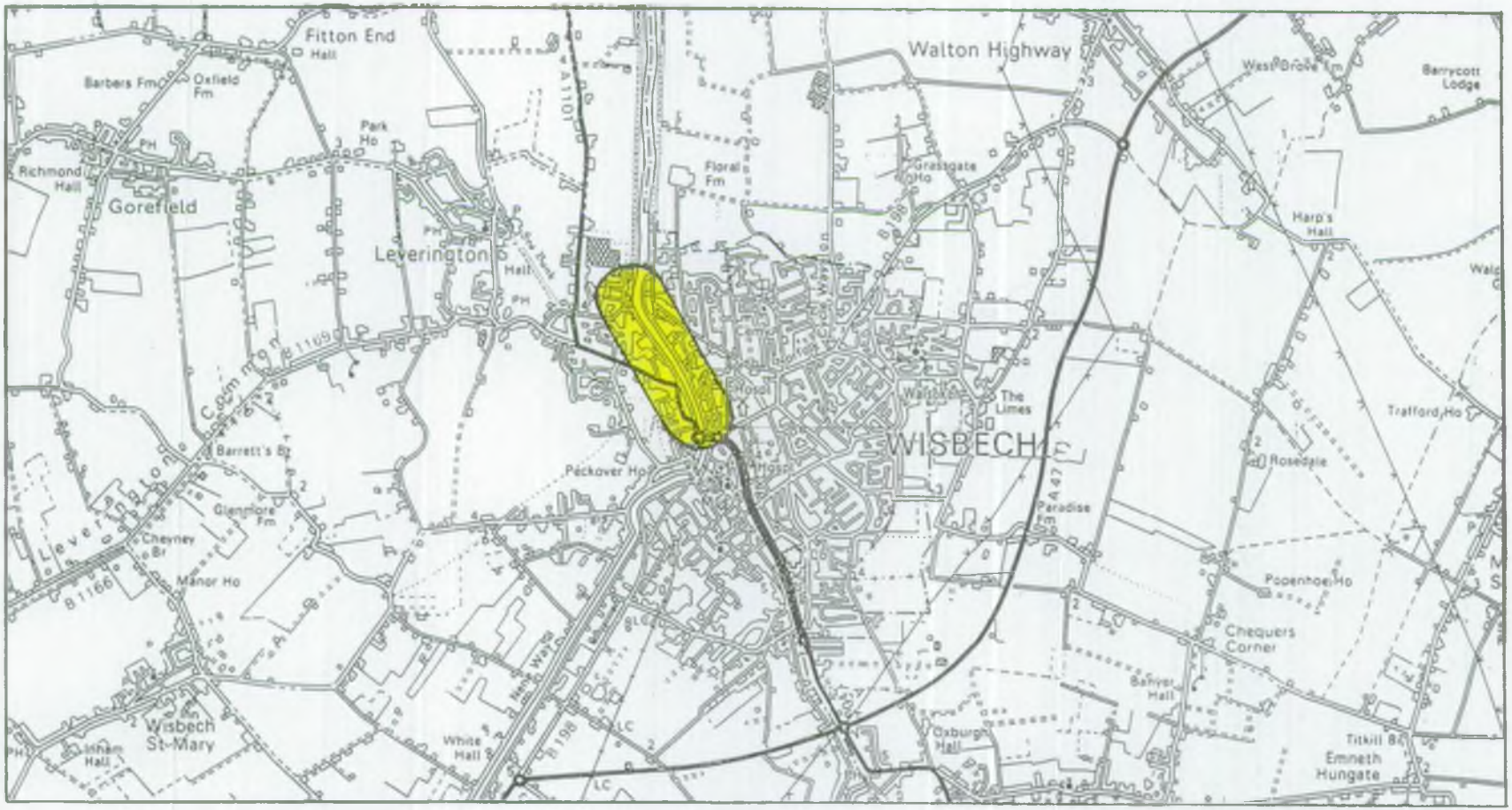
Figure. 10c : Tidal River Nene Stabilisation Works

WISBECH DEFENCES

The River Nene tidal defences protecting the town of Wisbech were raised following the 1978 tidal surge to provide defence against 1 in 100 year return tidal surges. They consist of earth banks, concrete and sheet piles, steel, concrete and brick walls.

The defences vary in age with piles through Wisbech dating back to the 1930's. It was identified that various lengths of the defences were at or reaching the end of their design life. Two condition surveys were commissioned to look into the current condition of the piles and the walls. A draft report on the piles produced by Bullen Consultants indicated that they were in good condition and stable through the town. The second survey on the walls being carried out by Posford Duvivier is ongoing with findings due in the Autumn. In the meantime regular maintenance of the infrastructure is ongoing to maintain its integrity.

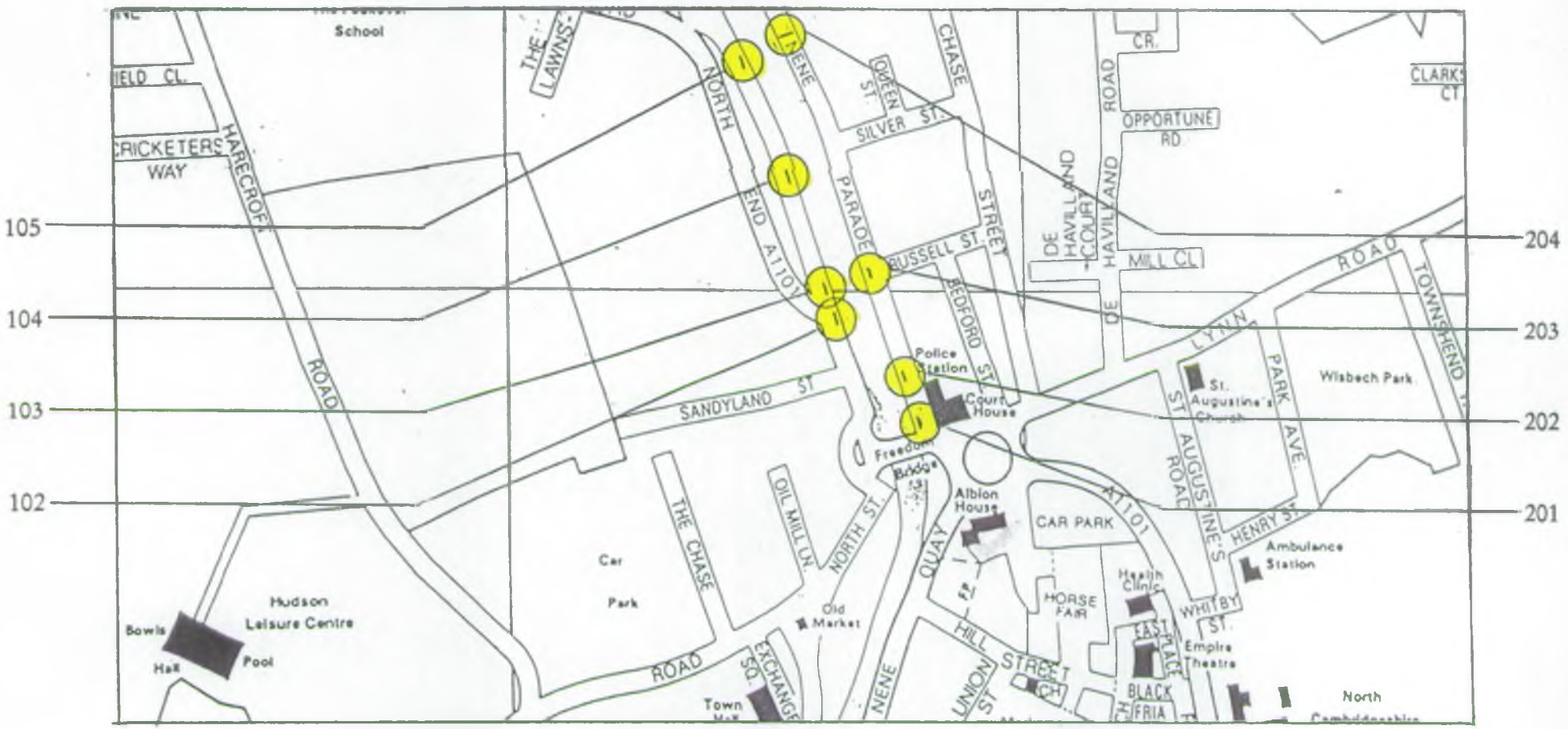
26 flood gates are operational within the Wisbech Quay. This arrangement allows the important port operation to continue under normal conditions with the quay section shut off by the Environment Agency when tides above 5.2 metres ODN are predicted. Figs 11a to d show the location of the flood gates.



WISBECH FLOOD GATES

Location Plan

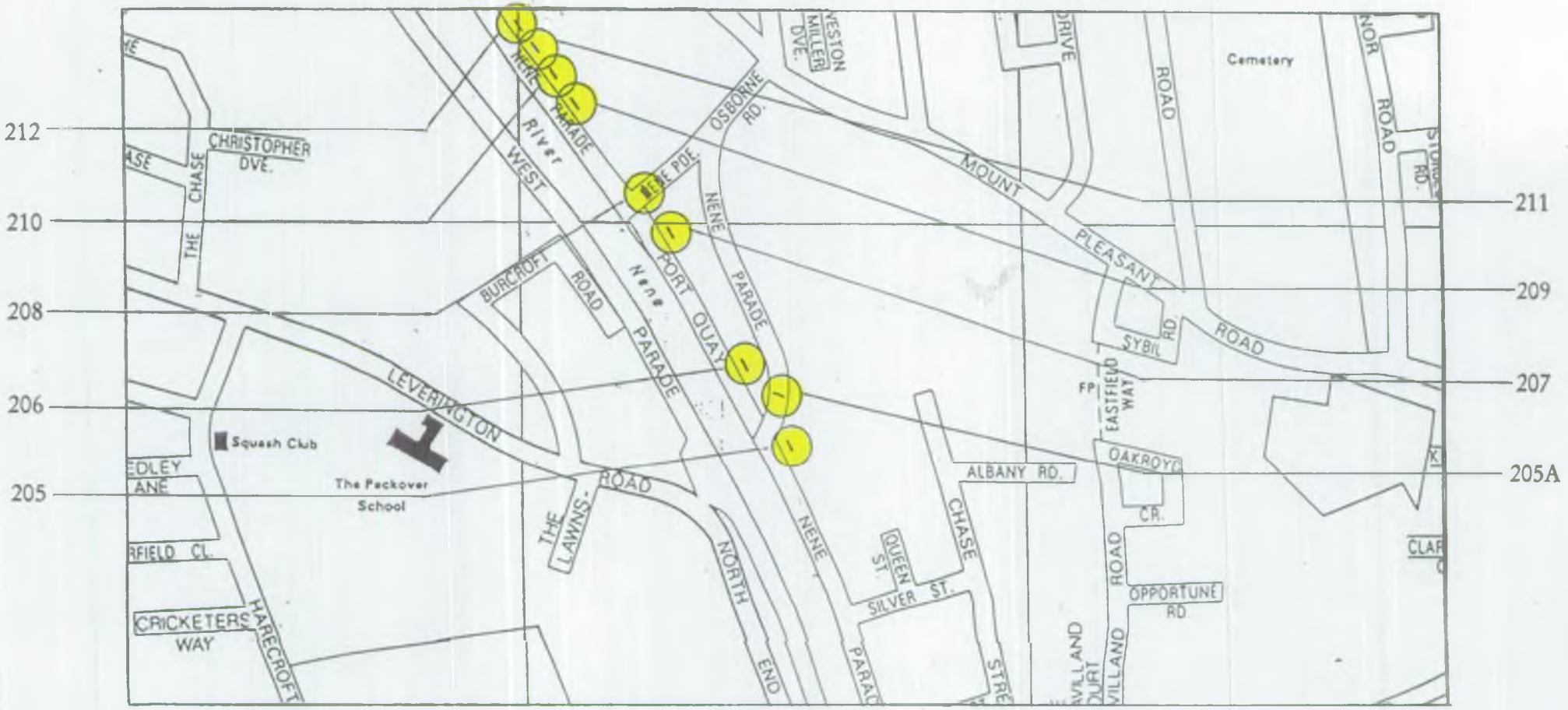
Figure 1



WISBECH FLOODGATES

Site Plan 1

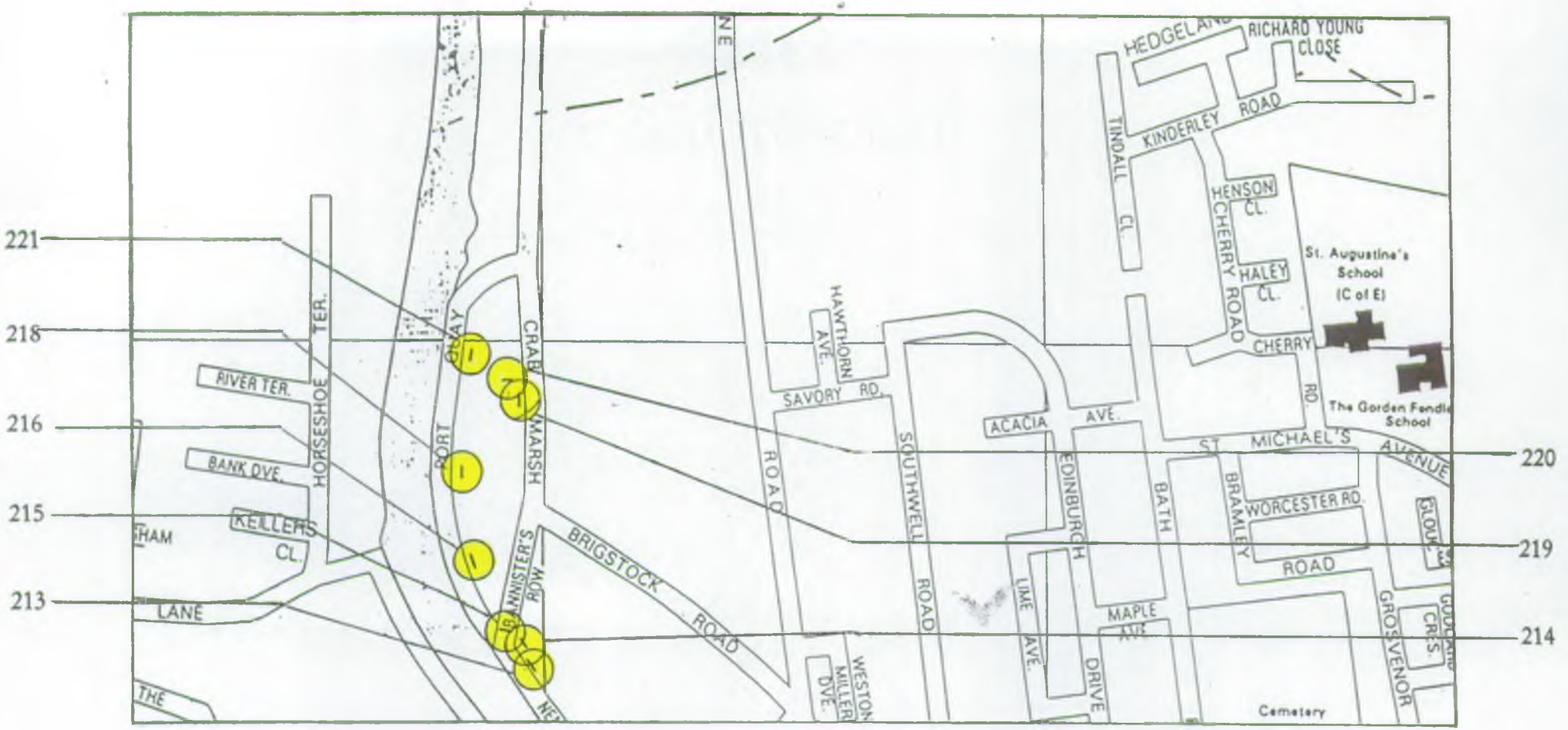
Figure. 11b



WISBECH FLOODGATES

Site Plan 2

Figure. 11c



WISBECH FLOODGATES

Site Plan 3

Figure. 11d

WISBECH PORT REGENERATION

The Wisbech Port regeneration project is being developed by the Fenland District Council with support from the Environment Agency and the Wisbech Town Council among others. The aim of the project is to create a leisure/tourist facility along the river which can offer real development potential to the port and create an opportunity for further regeneration to the adjoining land. It is expected to provide a resting berth for leisure craft moving between the inland and tidal stretches of the Nene.

The Port of Wisbech has been in existence since the Roman times when huge quantities of corn were imported to feed the occupying areas. In fact it was the second largest corn shipping port until the 18th century. The port was established by the Wisbech Town Act of 1810. As the corn trade declined, the shipping traffic decreased rapidly. It is hoped that this port can be regenerated to its past glory.

The project seeks to diversify activities within the port with the first stage being the introduction of mooring facilities followed by riverside enhancements and provision of amenities such as drainage, parking, lighting, pedestrian areas, street furniture and land-scaping. These works are proposed to be carried out in phases. (See fig. 12 for the draft proposals).

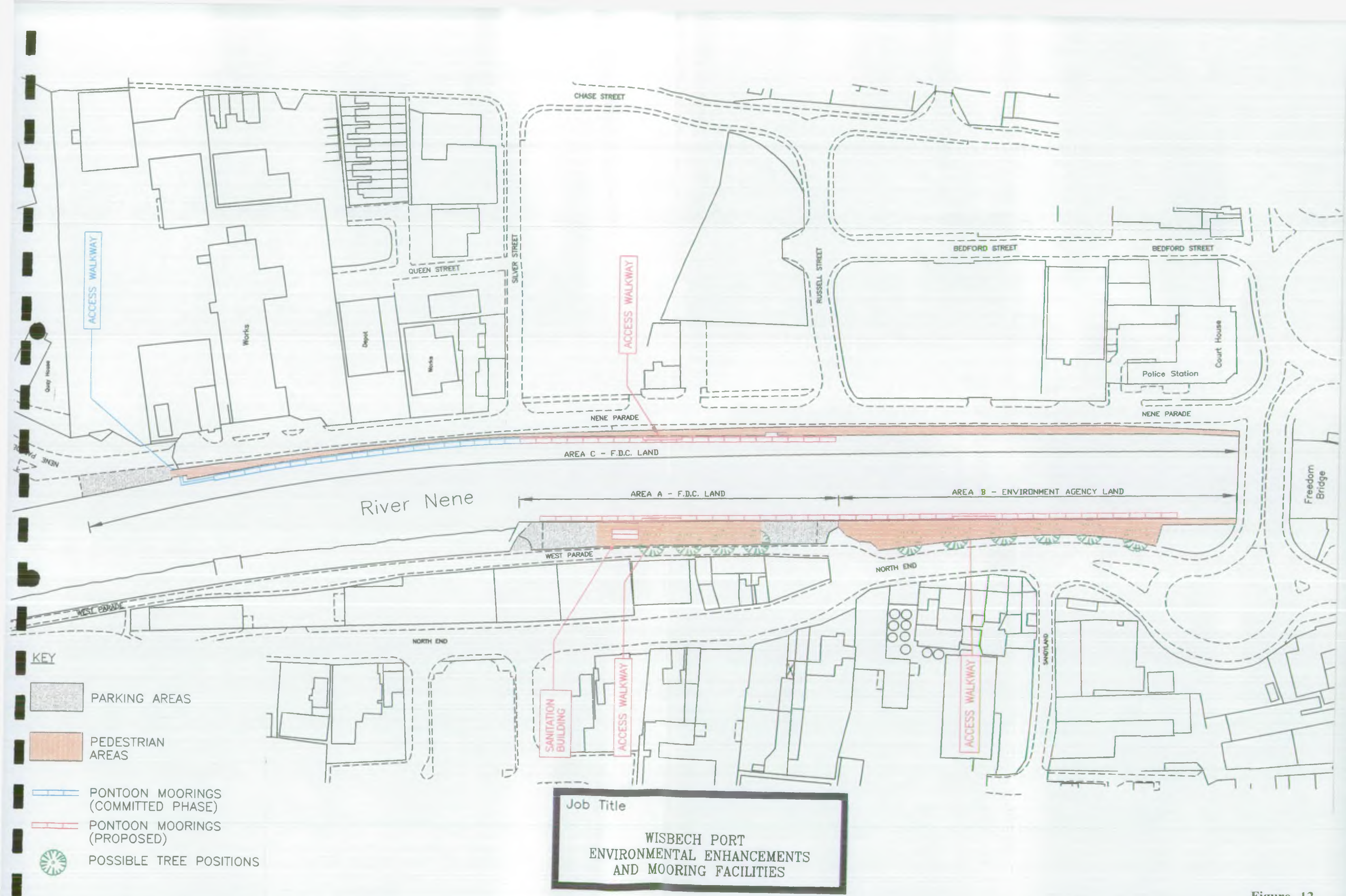

CHASE STREET
QUEEN STREET
SILVER STREET
RUSSELL STREET
BEDFORD STREET
BEDFORD STREET
ACCESS WALKWAY
ACCESS WALKWAY
Works
Depot
Works
Quay House
Police Station
Court House
NENE PARADE
NENE PARADE
AREA C - F.D.C. LAND
River Nene
AREA A - F.D.C. LAND
AREA B - ENVIRONMENT AGENCY LAND
Freedom Bridge
WEST PARADE
WEST PARADE
NORTH END
NORTH END
SANDYLAND
SANITATION BUILDING
ACCESS WALKWAY
ACCESS WALKWAY
KEY
PARKING AREAS
PEDESTRIAN AREAS
PONTOON MOORINGS (COMMITTED PHASE)
PONTOON MOORINGS (PROPOSED)
POSSIBLE TREE POSITIONS
Job Title
WISBECH PORT
ENVIRONMENTAL ENHANCEMENTS
AND MOORING FACILITIES

Figure. 12

TIDAL NENE - DOG-IN-A-DOUBLET SLUICE TO GUYHIRN

Nene Siltation:

This section of the Nene suffers heavily from siltation with the worst section being the length between the Dog-in-a-Doublet Bridge and Popeleys Gull. The siltation reduces significantly downstream of Cross Guns pumping station. The Environment Agency carries out a regular monitoring of the bed levels along the tidal Nene and Welland. While the dredging, silt movement and high flows have significantly reduced the siltation on the Welland it has had less effect on the Nene.

Earlier this year, the Environment Agency carried out the dredging of a kilometre length of the tidal Nene around Cross Guns pumping station as this was the downstream limit of significant siltation. The channel behaviour along this length is being monitored. Figs. 13b and c show the bed levels at the middle of the tidal channels over the last year. Figs. 13d and e show the tidal dredging at Cross Guns and at Mortons Leam outfall onto the Nene at Guyhirn.

Nene Washes:

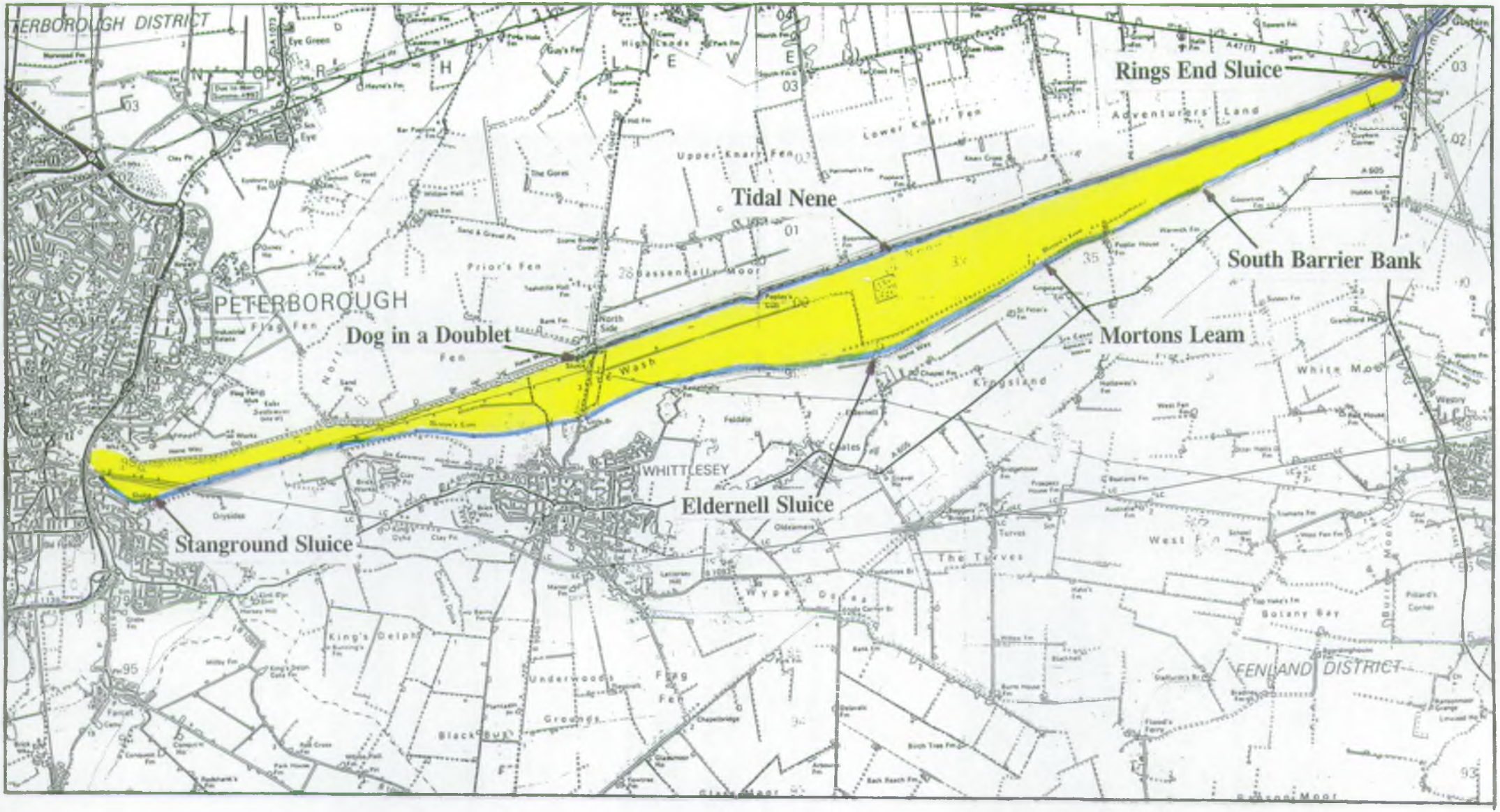
The Washes form a storage reservoir for the City of Peterborough when River Nene is tide locked at the Dog-in-a-Doublet Sluice. It consists of some 1450 hectares of land.

Moretons Leam, a main river maintained by the Agency, runs the whole length of the Wash from the inlet sluice at Stanground to the outlet sluice into the tidal Nene at Rings End. The Leam is approximately 20 km in length. The Wash is bounded on the south by the South Barrier Bank which runs into high ground at Whittlesey and on the north by the North Barrier Bank which also doubles as the north bank of the River Nene.

The Whittlesey Washland Commissioners act as the Land Drainage Authority within the Washes. They set the retention level for the sections of the Mortons Leam annually for the benefit of the occupiers of the Washland.

The Environment Agency have recently carried out a number of works to improve the management of Mortons Leam. This includes the modification of the stop logs and installation of a level monitoring station at Little Bridge, raising of the discharge sluice gate at Rings End and replacement of the tidal level recorder at Rings End. Further works are imminent to replace the upstream level sensors and gate control system at Rings End Sluice and replace the gate winding mechanism to ensure better efficiency in water management and discharge.

The Washes were filled via Stanground Sluice during the last Easter floods to a level of about 4.0 metres ODN. While the defences were under heavy attack from waves, they held up without any breaches. Figs. 14a and 14b show the Washes in flood.

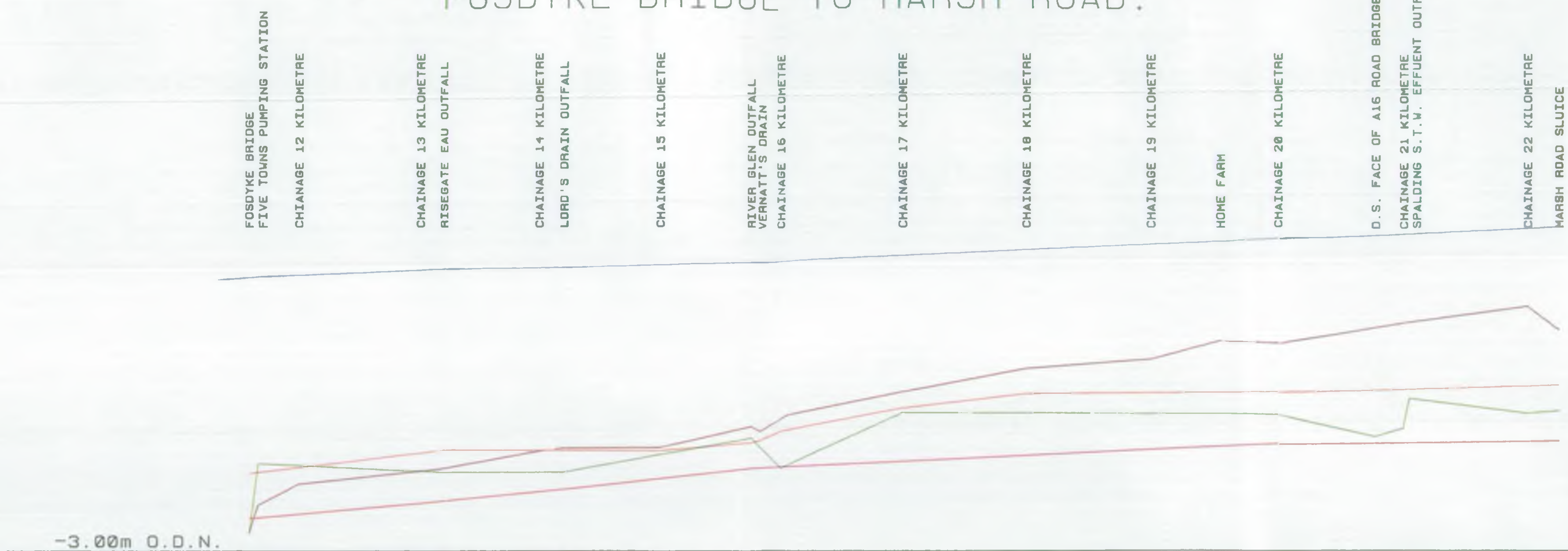


Whittlesey Washes

Figure. 13a

TIDAL RIVER WELLAND

FOSDYKE BRIDGE TO MARSH ROAD.



CHAINAGE	WATER LEVEL	DESIGN LEVEL	MAY 1998	MARCH 1998	JUNE 1997
11.59		-2.28	-2.80		-2.650
11.67	2.921		-1.10		-2.00
12.00					-1.54
13.000					
13.21	3.09	-1.900	-1.20	-0.80	-1.20
14.000			-1.20		-0.83
14.20	3.12	-1.65	-1.20	-0.805	-0.760
15.00			-0.90	-0.815	-0.750
15.74	3.23	-1.2	-0.55	-0.65	-0.30
15.82				-0.60	-0.40
16.000			-1.20	-0.40	
16.06					-0.05
17.000			0.00	0.10	0.45
18.000			0.00	0.41	0.95
19.000			-0.02		1.15
19.55			-0.02		1.55
20.00	3.75	-0.67	-0.04	0.45	1.50
20.775			-0.50		
21.000			-0.32		1.95
21.05			0.32		
22.000			0.00		2.30
22.25	4.00	-0.60	0.05	0.60	1.80

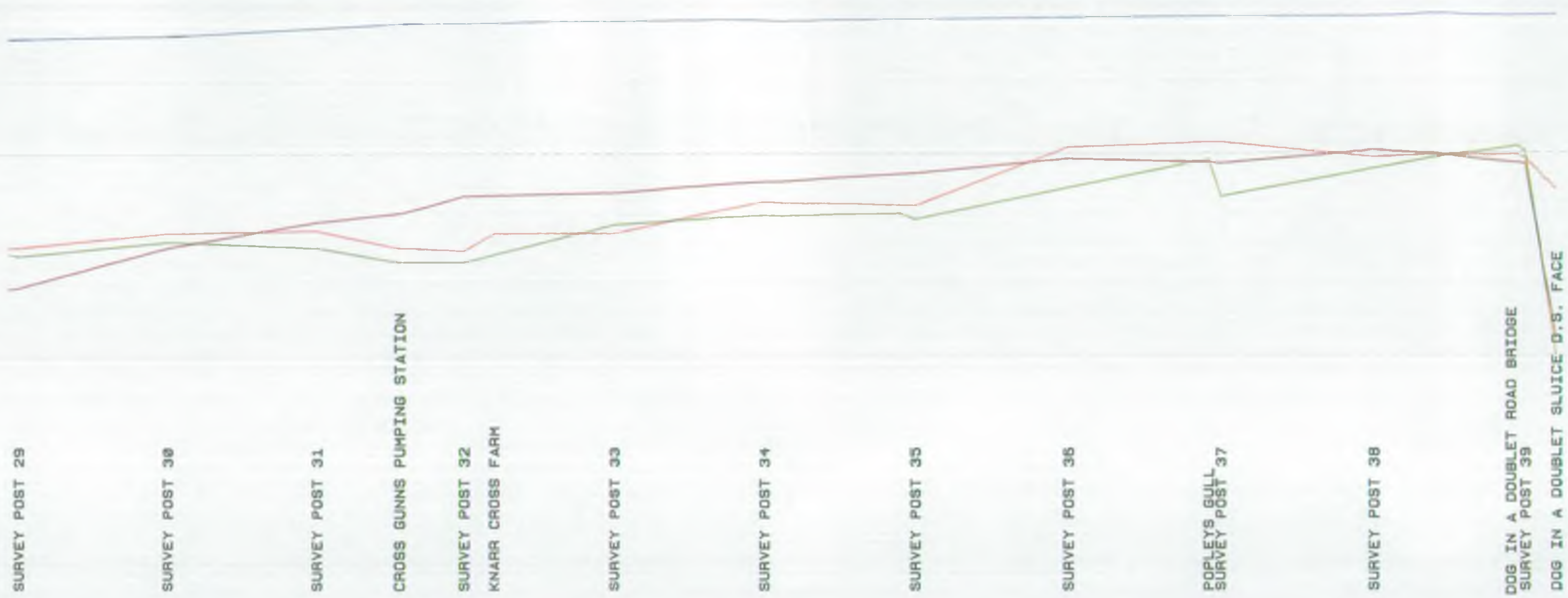
01T00088

COMPARISON SURVEYS JUNE 1997, MARCH 1998 AND MAY 1998.

15th JUNE 1998.

Figure. 13b

TIDAL RIVER NENE LONGITUDINAL SECTION



-8.00m O.D.N.

JUNE 1997	-1.75	-1.05	-0.6	-0.45	-0.15		-0.10	0.10		0.25	0.50	0.45	0.43		0.67		0.45	-2.6
MARCH 1998	-1.05	-0.80	-0.75	-1.05	-1.10	-0.80	-0.80	-0.25	-0.30	-0.32	0.70	0.80	0.80		0.55	0.60	0.55	0.00
MAY 1998	-1.20	-0.95	-1.05	-1.30	-1.30		-0.65	-0.49	-0.45	-0.55		0.50	-0.15		0.35	0.75	0.65	-2.90
DESIGN LEVEL																		
WATER LEVEL		2.64		2.85														3.05
CHAINAGE	29.000	30.000	31.000	31.550	32.000	32.200	33.000	34.000	34.90	35.000	36.000	36.920	37.000	37.650	38.000	38.950	39.000	39.200

07T00306

31st MAY 1998

COMPARISON SURVEYS JUNE 1997, MARCH 1998 AND MAY 1998.
FROM CHAINAGE 29000 TO THE DOG IN A DOUBLET SLUICE.

Figure. 13c

Figure. 13d : Dredging Of Mortons Leam Outfall To The Tidal Nene

Figure. 13e : Dredging Of The Tidal Nene At Cross Guns

Figure. 14a : Tidal Nene Immediately Downstream Of The Tidal Limit At Dog In A Doublet Sluice

Figure. 14b : Water On Whittlesey Wash Due To Easter 1998 Flood Event