



NRA

STOKE FERRY

DEC 1990



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ANGLIAN REGION

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*National Rivers Authority  
Anglian Region*

## STOKE FERRY

### Introduction

The Licence held by Anglian Water Services Limited (6/33/50/19/9) for the Stoke Ferry river abstraction works has a variation to allow increased abstraction. This variation expires on 31st December 1991.

During the dry spell of 1989 and 1990 there has been increasing public concern over the impact groundwater abstraction has on the river. With this factor in mind, and the forthcoming review of the Stoke Ferry licence, this paper sets out the background of Water Resource development, and looks at possible options for future Public Water Supply licensing in the Wissey Catchment.

- a.) Locality : The Stoke Ferry Water Treatment works is located on the North Bank of the Cut Off Channel, to the north west of the River Wissey aqueduct. (NGR TL 699 988) A map of the location is attached.
- b.) Historic Need For Water : Prior to the construction of Stoke Ferry, Kings Lynn's main water supply was met from Chalk Aquifer boreholes to the East. The Gayton source provided the earliest supply, followed by Congham and Hillington. In the 1960's proposals to increase abstraction from Hillington (Greensand) and Congham (Chalk) were the subject of Public Inquiries. In both cases the Water Board lost their case on the grounds that the abstractions would unduly deplete summer flows in local streams and rivers. Thus obtaining additional supplies from groundwater sources was proving too difficult and the option of surface abstractions became more attractive.
- c.) Available Options : Local surface sources close to King's Lynn were unsuitable. The River Nar was ruled out due to quantity and the Relief Channel between Denver and Kings Lynn due to quality. As a result Stoke Ferry, on the Lower Wissey, was selected as it provided both suitable quantity and quality and had the added advantage of being adjacent to the Cut Off Channel which could provide alternative "Bank Side" storage at times of low flow in the River Wissey.
- d.) Result : The King's Lynn (River Wissey) Water Order 1967 came into operation on 21<sup>st</sup> April 1967. This set out the structure of the works, the quantities to be abstracted and the control rules of operation. Further items such as the gauging stations used in the control rules were also specified.

Abstraction trials commenced in July 1972. The works officially opened on 6<sup>th</sup> October 1972.

### Original Licence

The licence for Stoke Ferry was based on, but not the same as, the King's Lynn (River Wissey) Water Order 1967. The licence was granted on 29<sup>th</sup> February 1972. A copy of the Licence (6/33/50/19/9) and King's Lynn Water Order are attached in Appendix 1.

The Water Order encompasses the controls on abstraction for both the treatment works and river support. Its details are as follows :

Two intakes exist; Number 1 on the River Wissey (NGR TL 703 989) and Number 2 on the Cut Off Channel (NGR TL 699 987)(See attached schematic).

Two river control points exist; the first at Northwold (033006 at NGR TL 771 965) on the River Wissey and the second at Whitebridge(033029 at NGR TF 716 006) on the Stringside Drain, a tributary of the Wissey.

Proviso 4 states :

- 1.) If the combined flow at Northwold and Whitebridge is above 12 million gallons per day (mgd), up to 6mgd can be taken from the Number 1 intake.
- 2.) If the combined flow at Northwold and Whitebridge is below 12 mgd, then the aim is to still leave 6mgd in the river downstream of Stoke Ferry. This is accomplished either by :
  - a.) Taking up to 6 mgd from a combination of the Number 1 and Number 2 intakes.
  - b.) Taking up to 6 mgd from Number 1 intake and compensating the water lost from the River Wissey with Cut Off Channel water. This is done by abstracting via intake Number 2 and discharging the water to the River Wissey downstream of the Number 1 intake. (see schematic).
- 3.) If the combined flow at Northwold and Whitebridge is below 6 mgd, then a combined abstraction of up to 6mgd can be abstracted from the Number 1 and Number 2 intakes, as long as a further quantity equal to the abstraction at the Number 1 intake is discharged into the River Wissey via the Number 2 intake.

Examples (flows in mgd)

	River Flow (U/S)	Intake 1 (Works)	Intake 2 (Works) (River)		River Flow (D/S)
[Prov.]					
4	12	6	0	0	6
4a(i)	9	3	3	0	6
4a(ii)	9	6	0	3	6
4b (or)	5	5	1	5	5
4b	5	3	3	3	5

Conversion to Thousand Cubic Metres :

12 mgd = 54.55 thousand cubic metres per day (tcmd)  
9 mgd = 40.91 tcmd  
6 mgd = 27.28 tcmd  
4 mgd = 18.18 tcmd  
2 mgd = 9.09 tcmd

The abstraction conditions stated in the King's Lynn (River Wissey) Order and the Stoke Ferry Licence 6/33/50/19/9 differ. Schedule 4(b) of the Order is as 3.) above. The Proviso of Section 2.) of the Stoke Ferry licence however states "PROVIDED ALWAYS THAT the quantity of water abstracted by means of Intake No.1 when added to ..... Intake

No.2 shall NOT in the aggregate.....exceed .....6,000,000 gallons.....". This would suggest a combined maximum abstraction from the two intakes of only 6 mgd.

However the Stoke Ferry licence refers only to abstraction for the works itself (as stated in section 5.) of the licence), and so section 2.) of the licence does not include details of the river support capacity. This is alluded to in Section 3.) by reference to the provisions of the King's Lynn Water Order.

#### Operation Of Works

Initially the works were designed to operate at a peak of 4mgd and an average of 2 mgd. As a result licence charges were a third higher than could physically be abstracted. The Water Board therefore sought a variation of the licence, which was granted in July 1973, as follows :

	1972 Licence (mgd)	1973 Variation (mgd)
Hourly	0.250	0.250
Daily	6.000	4.000
Yearly	2,190.000	700.000

By 1976 it was realised that an increase to the quantities of the original licence would be required. To investigate the reliability of the works at this higher take a study on river flows at Northwold and Whitebridge was undertaken. This indicated that it may be necessary at some future date to install up to 6 river support boreholes to improve reliability of the original licence entitlement of 6 mgd. The number of boreholes to be developed would depend entirely on the need to maintain the minimum prescribed flow for 100% of time, or whether it would be acceptable to have short periods of lower flows. (Details of this assessment are attached as appendix 2). No action appears to have resulted from this. [Now with 1976,1989 and 1990 low flow records this study should be repeated].

By 1979 abstractions had increased to the 1973 licence variation quantities. However it was not until 1987 that a further variation was sought to increase the licence as follows :

	1972 Licence (tcm)	1973 Variation (tcm)	1987 Variation (tcm)
Hourly	1.137	1.137	1.137
Daily	27.276	18.184	27.000
Yearly	9,955.740	3,182.200	6,570.000

[N.B. the 1972 and 1973 figures are printed in mgd's above].

At this time however, the Divisional Scientist of the Cambridge Division of Anglian Water expressed concern over the impact the increased abstraction would have on dilution of the British Sugar works effluent discharge approximately 5 Km downstream of Stoke Ferry to the River Wissey at Wissington (NGR TL 660 978). A new effluent treatment plant had just been completed, designed to meet a consent standard based on the 1973 licence river flows. Increasing the abstraction at Stoke Ferry would require a tighter effluent standard at the British Sugar works. It was anticipated, however, that the new plant would meet the

tighter effluent standard but this could not be guaranteed. The proposed abstraction licence was therefore time limited to 3 years to allow effluent performance data to be obtained.

If the tighter consent could not be met it was anticipated that the Anglian Water Authority would "...have to appraise the funding of the required works to uprate the Company's effluent treatment plant (circa £100,000).".

Capital works were needed at the Stoke Ferry works to achieve the peak abstraction. Stoke Ferry Internal Drainage Board expressed concern over this variation and its impact on the ability of Spray Irrigation licence holders to abstract during droughts. This was particularly relevant as many licences now had cessation levels.

#### Wissey Resources

In this assessment it is assumed that the Wissey Chalk Groundwater Unit Number 10 has a Net Resource of approximately 149 tcmd (Cambridge Water Plan 1985).

Public Water Supply sites in the Wissey groundwater catchment, with licence quantities (both annual total and daily average) are listed below. Also included are the abstraction figures for these sites for 1972 (the year Stoke Ferry was commissioned) and the most recent figures from 1989. The details are as follows :

Source	LICENSED		ACTUAL	
	Annual (tcm)	Daily Aver. (tcmd)	1972 (tcm)	1989 (tcm)
Carbrooke	829	2.27	609	426
W. Bradenham	1091	3.00	865	913
Watton	1278	3.50	602	1266
East Watton	1347	3.69	0	0
High Ash	675	1.85	0	615
N. Pickenham	1847	5.06	114	1196
Mundford	159	0.44	82	0
Beechamwell	4977	13.64	3580	4544
Swaffham	263	0.72	439	0
Denton Lodge	2655	7.27	867	1316
Groundwater Total	15126	41.44	7158	10276
-----				
Stoke Ferry	6570	18.00	0	3918
Catchment Total	21696	59.44	7158	14194
-----				

Since the commissioning of the Stoke Ferry works exploitation of the Chalk aquifer has continued. The 1989 abstractions are almost 44% higher than in 1972 and current licensed quantities allow a further 4850 tcm to be abstracted. Overall under the current licences groundwater abstraction, as compared with 1989, can rise by 32%, from the river at Stoke Ferry by 40%, and for the catchment as a whole by 35%.

### Assessment of Available Resources.

Using the assessment of the 1985 Cambridge Water Plan, the <sup>Committed demand</sup> available resources are as follows :

	Licensed (tcmd)	1989 Abstracted (tcmd)
PWS (Gdwater)	41.44	28.15
Industry	0.37	0.37
Spray Irrigation	5.20	5.20
Agriculture	1.93	1.93
River Needs	55.15	55.15
	<hr/> 104.08 <hr/>	<hr/> 90.80 <hr/>
Percentage of Net Resource	70%	61%

(These figures exclude surface abstractions at Stoke Ferry).

In theory therefore as much 30% of the average resource of the groundwater catchment is still not committed either to the river or to licensed abstraction. It should be noted that the River Need matches the control flow at Stoke Ferry. (i.e. maximum Stoke Ferry abstraction of 27.28 tcmd (6 mgd) plus the M.R.F. also of 27.28 tcmd). This was not the 95%ile flow of the River Wissey, (in early 1976 = 65.5 tcmd), however today's figure is much nearer the 55 tcmd mark (flow durations at the Stoke Ferry site should be investigated by referring to the Great Ouse Resources Model - see N. Fawthrop).

### Future Development In The Wissey Catchment.

If the NRA plays no active role in the development of the water resource of the Wissey Catchment, then market economic forces will lead to greater emphasis on groundwater exploitation.

It is the NRA's view that the Wissey Catchment as a whole would benefit from increased abstraction from the river at Stoke Ferry rather than abstraction from groundwater sources in the catchment.

However, it is accepted that groundwater sources have many advantage over large river intake source, such as meeting local needs at low cost. Any options must therefore be viewed with the sometimes conflicting aim of AWS to minimise costs, against public concern over the river.

1.) Wissey Groundwater Development: Development can occur as follows :

a.) Piecemeal Development - this has happened more recently without the active participation of the NRA or its predecessors. In theory the water resource is sufficient to meet current and future development, but certain stretches of river will almost certainly be put at risk.

Following the drought of 1990 an Embargo has been imposed on spray irrigation on the sensitive zone 1 areas of the Wissey catchment. As a spin-off, this will increase the reliability of Stoke Ferry abstractions from the River Wissey.

b.) Controlled Development - The NRA must be pro-active in identifying and managing the remaining resource of the catchment if we are to avoid detrimental affects on our rivers. Further development will also lead to a reduction in the reliability of Stoke Ferry abstraction from the River Wissey.

2.) Increasing The Reliability of the Stoke Ferry Source - present abstraction conditions

a.) Quality The Stoke Ferry Works was originally designed to use Cut Off Channel water to guarantee supply. When flows in the River Wissey dropped below 6 mgd, the ability to abstract would come increasingly from the Intake No 2.

However the current works cannot treat Cut Off Channel water. The works therefore becomes unreliable when river flows are low. Reliability could be improved by upgrading treatment facilities.

b.) Quantity Without the capacity to treat Cut Off Channel water, low flow conditions would reduce abstraction capacity. Reliability could only be increased by supporting river flows.

3.) Permanent Increase In Abstraction At Stoke Ferry

a.) This could be achieved by increased use of Cut Off Channel water. The cost would be in improving treatment capability. Increasing abstraction from the No 2 Intake in drought conditions would have a major impact on the Ely Ouse - Essex transfer. During 1990 Stoke Ferry abstracted 12 tcmd of the 46 tcmd transferred into the Cut Off Channel from the Little Ouse, thereby removing 25% of the water destined for Essex.

b.) Any increase in abstraction from the River Wissey without measures to support an increased flow, would reduce the available dilution at the British Sugar (BS) works downstream. This could be overcome by improving the BS effluent treatment to allow this lower dilution. 1990 experience identified that even under existing conditions aeration of the Wissey at the BS Works was required. This was as a result of extremely low flow in the lower Wissey.

c.) To allow an increase in take whilst providing the reliability required, would require a means of supporting low flows. This could be achieved by supporting the River Wissey with chalk borehole water. These support boreholes could be either new sources, or existing PWS sources giving some are all there capacity to this role, or more likely a mixture of both. In using existing PWS sites as river support boreholes or dual purpose sites, the quantity 'lost' to AWS would be made up at Stoke Ferry.

d.) Conjunctive use of boreholes and Stoke Ferry could occur with river water being used much of the year, and borehole water meeting supply when river levels are low and when demand is very high.

Proposed Developments And Investigations.

From the NRA's standpoint, an increase in abstraction at Stoke Ferry would be favoured. It is thought that River Support provides the best option in meeting the reliability that a PWS River Intake would require. The river support boreholes would ideally be new purpose built sites. This development would require a reduction in licensed quantity

at some of the current PWS boreholes equal to the gain at Stoke Ferry, or an aggregate quantity for these sites and Stoke Ferry, but with the emphasis to abstract from the river.

The impact of these options needs to be discussed objectively between Anglian Water Services and National Rivers Authority.

RAV 29/11/90



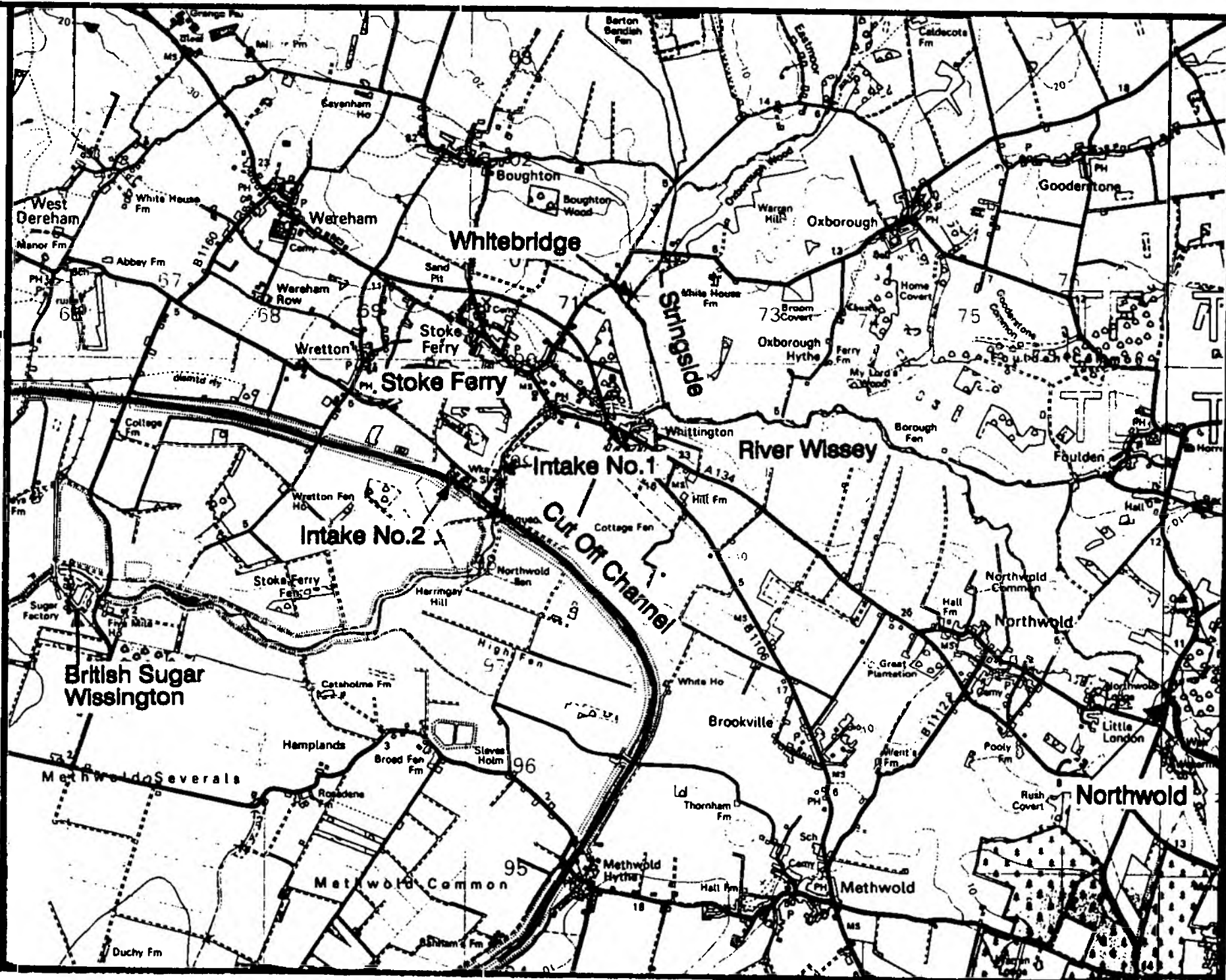


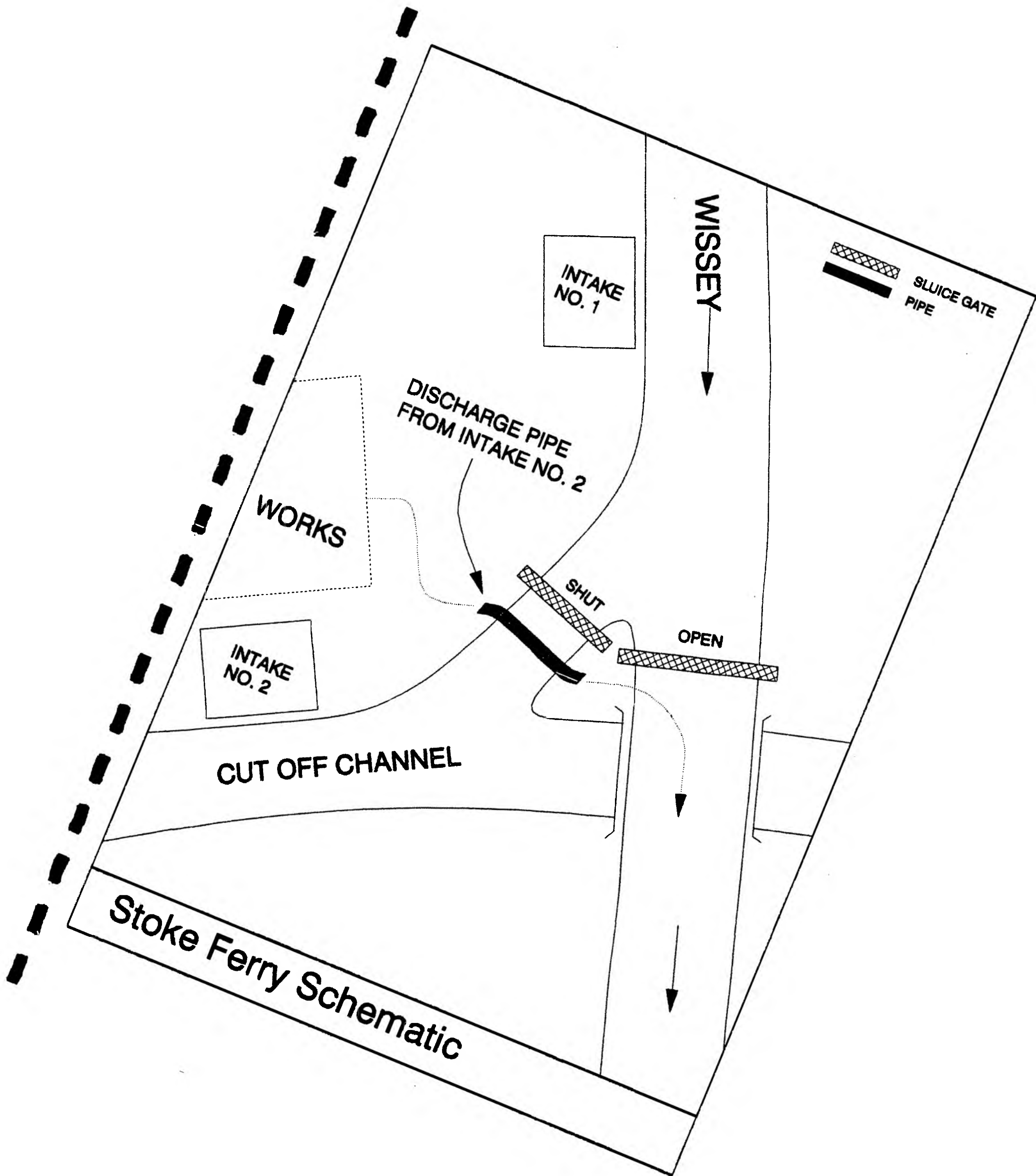
National Rivers Authority  
Anglian Region

NRA

Title

Stoke Ferry





**APPENDIX 1**

**KINGS LYNN ( RIVER WISSEY )  
WATER ORDER 1967**

**STOKE FERRY LICENCE 6/33/50/19/9**

## GREAT OUSE RIVER AUTHORITY

ANGLIAN WATER AUTHORITY  
whose principal office is  
situated at Diploma House  
Grammar School Walk  
Huntingdon in the County  
of Cambridgeshire with  
effect from 1st April 1974  
By Virtue of Section 254  
Local Govt Act 1972 and  
Section 34 Water Act 1973

## Water Resources Act 1963

## Water Resources (Licences) Regulations 1965

## Licence to Abstract Water s.56(2)

THE GREAT OUSE RIVER AUTHORITY (hereinafter referred to as "the Authority") hereby grant a licence to—

NORTH WEST NORFOLK WATER BOARD

of Maple Road Saddlebow King's Lynn in the County of Norfolk

(hereinafter referred to as "the licence holder") to abstract water from the source of supply described in the Schedule hereto, subject to the provisions specified in such Schedule.

This licence shall [remain in force until revoked] ~~for a period of~~

~~xxxxx~~

~~12~~ ].

DATED this 29th day of February 19 72

*Alan Wilson*  
Deputy Clerk of the Authority.

CLARENDON ROAD, CAMBRIDGE, CB2 2BL.

(Address to which all communications should be sent.)

## NOTES

## 1. Fees and Charges

The fee payable by the licence holder under Section 57 of the Act on the grant of this licence and annually thereafter is £ 5.00 (or such other sum as is for the time being prescribed by order of the ~~Minister~~ in accordance with Section 39 of the Water Resources Act 1963 and the Water Resources (Licences) Regulations 1965 (S.I. 1965 No. 534). In addition, charges may be payable pursuant to Part V of the Act in respect of water authorised to be abstracted under this licence.

## 2. Reasons for Conditions

Reasons for the imposition of conditions and for any material departure from the proposals in the application are set forth in the Appendix attached hereto.

## 3. Right of Appeal

If the applicant is dissatisfied with the decision of the River Authority on his application, he may, by notice served within one month from the date of receipt of this notice, appeal to the ~~Minister~~ in accordance with Section 39 of the Water Resources Act 1963 and the Water Resources (Licences) Regulations 1965 (S.I. 1965 No. 534). The Minister has power to allow a longer period for the giving of a notice of appeal.

## 4. Offences

Attention is drawn to the following offences under the Act. It is an offence—

- (1) to fail to comply with a condition or requirement of a licence—penalty, a fine (not exceeding £100 in the case of summary conviction) (Section 49);
- (2) to construct or extend any well, borehole or other work whereby water may be abstracted from underground strata, or install or modify any machinery or apparatus whereby additional quantities of water may be abstracted from underground strata, unless the abstraction of the water, or additional quantities of water, is authorised by licence under the Act and the well, borehole or other work as constructed or extended, or the machinery or apparatus as installed or modified, complies with the requirements of the licence—penalty as in (1) above (Sections 23(2) and 49);
- (3) wilfully to alter or to interfere with a measuring device required by a licence to be used, so as to prevent it from measuring correctly—penalty, imprisonment, or a fine, or both (Section 115).

## 5. IMPORTANT NOTICE

## TO A SUCCESSOR TO THIS LICENCE

If you have become the holder of this licence, in accordance with Section 32(1), or regulations made under Section 32(3), of the Water Resources Act 1963, by succeeding to the previous licence holder's occupation of land specified in the licence as land on which water abstracted in pursuance of the licence is to be used, you should note that, by virtue of Section 32(2) of the above Act (or corresponding provisions in the regulations under Section 32(3)), you will cease to be the holder of the licence at the end of a period of one month from the date on which you became the occupier of the land in question unless before the end of that period you have given the River Authority notice of the change in the occupation of the land.

## SCHEDULE

### PROVISIONS OF LICENCE

1. The source of supply to which this licence relates is the River Wissey and the Out-Off Channel and the authorised points of abstraction are two at the positions marked "INTAKE NO. 1" and "INTAKE NO.2" respectively on the plan signed on behalf of the Authority and annexed hereto
2. This licence authorises the abstraction of water from the said source of supply within the following limits :-

(1) As to INTAKE NO. 1

- (a) Not more than 250,000 gallons shall be taken in any one hour
- (b) Not more than ~~6,000,000~~ gallons shall be taken in any one day of twenty-four hours reckoned from midnight to midnight and
- (c) Not more than ~~2,490,000,000~~ gallons shall be taken in any one period of twelve months

See  
Endorsement  
No. 1

(11) As to INTAKE NO. 2

- (a) Not more than 250,000 gallons shall be taken in any one hour
- (b) Not more than ~~6,000,000~~ gallons shall be taken in any one day of twenty-four hours reckoned from midnight to midnight and
- (c) Not more than ~~2,490,000,000~~ gallons shall be taken in any one period of twelve months and

See  
Endorsement  
No. 1

See  
Endorsement  
No. 1

PROVIDED ALWAYS THAT the quantity of water abstracted by means of Intake No. 1 when added to water abstracted by means of Intake No. 2 shall NOT in the aggregate in any one hour day or year exceed 250,000 gallons ~~6,000,000~~ gallons and ~~2,490,000,000~~ gallons respectively

3. The abstraction authorised by this licence shall be subject in all respects to the provisions of the King's Lynn (River Wissey) Water Order 1967 (S.I. 1967 No. 612)
4. The water shall be abstracted only by the following means namely the existing intake works machinery or apparatus or such other works machinery or apparatus having a total capacity not exceeding 500,000 gallons per hour as may from time to time be agreed upon in writing between the Authority and the licence holder
5. The water shall be used only for the purposes of the licence holders water undertaking

### APPENDIX

#### Reasons for conditions :-

- (a) The need to conserve water and the requirements of the Act regarding matters to be specified in licences and
- (b) The requirements of the Act that the provisions of a licence shall be such as appear to the Authority to correspond as nearly as may be to those of any subsisting statutory provision.



B A R I N G B E N D

License Serial No. 6/31/50/15/9

Dated this 29th day of February 1970

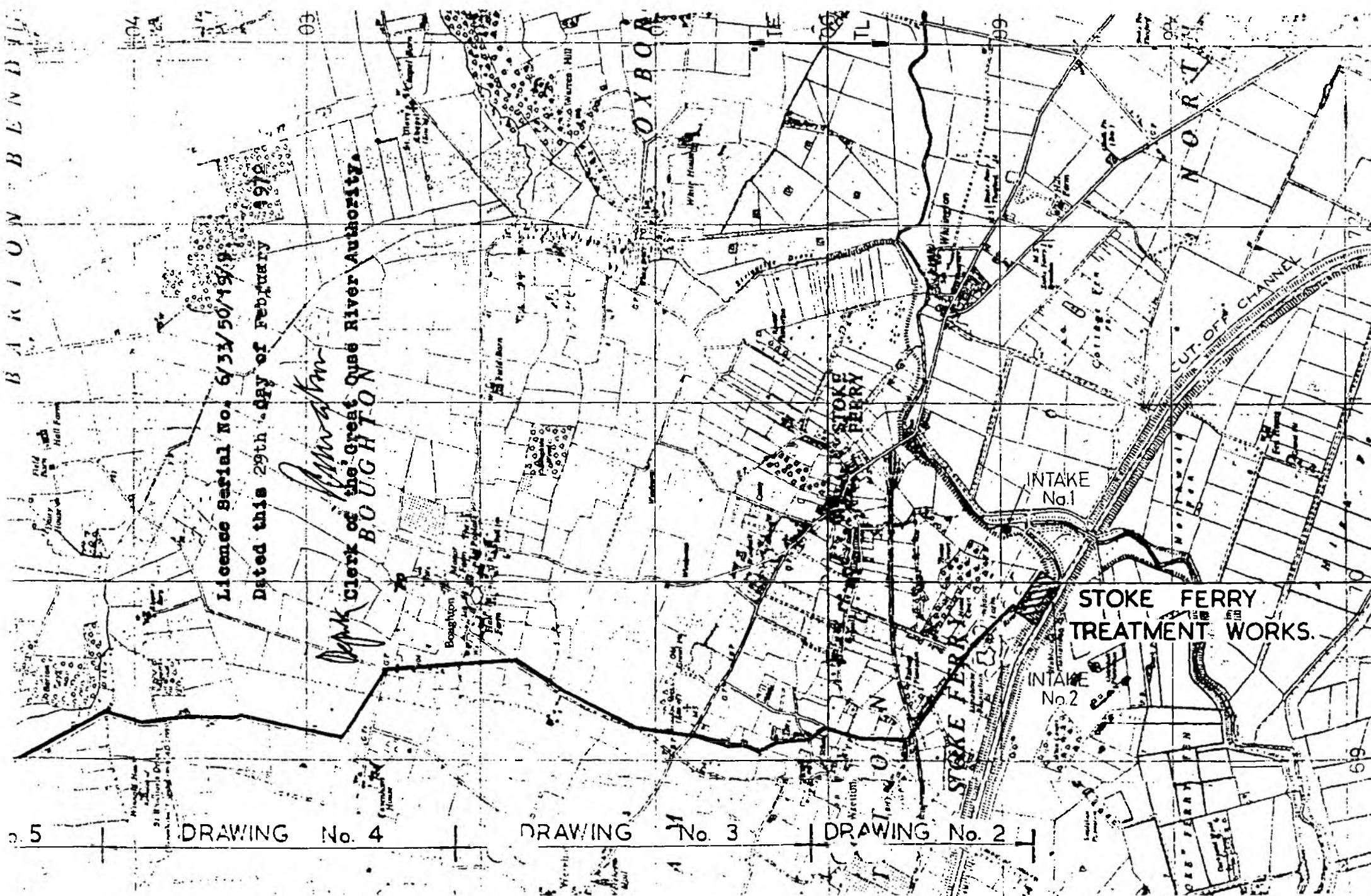
*Johnston*  
Clerk of the Great Ouse River Authority  
BOUGHTON

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DRAWING No. 4

DRAWING No. 3

DRAWING No. 2

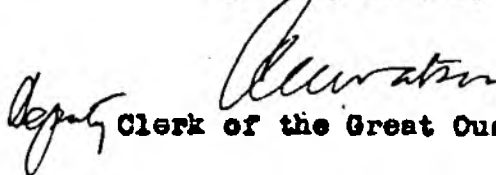


Endorsement No. 1

In pursuance of Section 42(2) of the Act this licence is hereby varied as follows with effect from and including the 12th day of October 1972 :-

- (1) In provision 2(i)(b) by the deletion of "6,000,000 gallons" and the substitution therefor of "4,000,000 gallons"
- (2) In provision 2(i)(c) by the deletion of "2,190,000,000 gallons" and the substitution therefor of "700,000,000 gallons"
- (3) In provision 2(ii)(b) by the deletion of "6,000,000 gallons" and the substitution therefor of "4,000,000 gallons"
- (4) In provision 2(ii)(c) by the deletion of "2,190,000,000 gallons" and the substitution therefor of "700,000,000 gallons"
- (5) In the proviso by the deletion of "6,000,000 gallons" and "2,190,000,000 gallons" and the substitution therefor of "4,000,000 gallons" and "700,000,000 gallons" respectively.

Dated this 3rd day of July 1973

  
Clerk of the Great Ouse River Authority.

Licence No.

6/33/50/19/9

(Stoke Ferry/Wissey)

## Anglian Water Authority, N.R.A. Unit

Water Resources Act 1963

Water Resources (Licences) Regulations 1965

Water Act 1973

## Notice of Variation of Licence

In pursuance of Section 42 of the Water Resources Act 1963, and in accordance with regulation 13(10) and (11) of the Water Resources (Licences) Regulations 1965, the terms of licence number 6/33/50/19/9 are deemed to be varied by the Secretary of State for the Environment as set out on the attached sheets

Dated this 31<sup>st</sup> day of March 1989

Signed .....  
Authority Secretary

Signed .....  
Director of Technical Services

Anglian Water Authority  
Ambury Road,  
Huntingdon,  
Cambridgeshire. PE18 6NZ

THIS NOTICE OF VARIATION SHOULD BE CAREFULLY PRESERVED, AND SHOULD BE KEPT WITH THE ORIGINAL LICENCE. ITS EXISTENCE SHOULD BE DISCLOSED ON ANY SALE OR CHANGE OF OCCUPATION OF ANY LAND ON WHICH WATER ABSTRACTED UNDER THE LICENCE IS



ENDORSEMENT NO. 2In Provision 2

(a) By the insertion after "limits" of a new sub-paragraph:-

"(A) Up to and including the 31st day of December 1991

(i) As to INTAKE No. 1

(a) Not more than 1136.5 cubic metres (250,000 gallons) shall be taken in any one hour

(b) Not more than 27 thousand cubic metres (5,940,000 gallons) shall be taken in any one day of twenty four hours reckoned from midnight to midnight

(c) Not more than 6,570 thousand cubic metres (1,445,400,000 gallons) shall be taken in any one period of twelve months

(ii) As to INTAKE No. 2

(a) Not more than 1136.5 cubic metres (250,000 gallons) shall be taken in any one hour

(b) Not more than 27 thousand cubic metres (5,940,000 gallons) shall be taken in any one day of twenty four hours reckoned from midnight to midnight

(c) Not more than 6,570 thousand cubic metres (1,445,400,000 gallons) shall be taken in any one period of twelve months

PROVIDED ALWAYS THAT the quantity of water abstracted by means of Intake No 1 when added to water abstracted by means of Intake No 2 shall not in the aggregate in any one hour, day or year exceed 1136.5 cubic metres (250,000 gallons) 27 thousand cubic metres (5,940,000 gallons) and 6,570 thousand cubic metres (1,445,400,000 gallons) respectively."

(b) By the insertion before part (1) of the existing provision of the following sub-heading:-

"(B) From the 1st day of January 1992"

STATUTORY INSTRUMENTS

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1967 No. 612

WATER SUPPLY, ENGLAND AND WALES

The King's Lynn (River Wissey) Water Order 1967

Printed in England by McCorquodale & Co. Ltd., London  
and published by

HER MAJESTY'S STATIONERY OFFICE: 1967

EIGHTPENCE NET

STATUTORY INSTRUMENTS

1967 No. 612

WATER SUPPLY, ENGLAND AND WALES

The King's Lynn (River Wissey) Water Order 1967

Made - - - - - 14th April 1967

Coming into Operation 21st April 1967

The Minister of Housing and Local Government, in exercise of his powers under section 26 of the Water Act 1945(a) and of all other powers enabling him in that behalf, hereby orders as follows:—

1. This order may be cited as the King's Lynn (River Wissey) Water Order 1967 and shall come into operation on 21st April 1967.

Citation and  
commence-  
ment.  
Interpreta-  
tion.

2.—(1) In this order, unless the context otherwise requires—

“the Corporation” means the mayor, aldermen and burgesses of the borough of King's Lynn;

“the Minister” means the Minister of Housing and Local Govern-  
ment;

“the River Authority” means the Great Ouse River Authority;

“the river” means the River Wissey;

“the cut-off channel” means the channel constructed by the River Authority between Denver and Mildenhall and in which the River Authority have agreed with the Corporation to use their best endeavours to maintain a flow or level of water sufficient for the purposes of this order;

“the Corporation's No. 1 intake” means such intake in the river as the Corporation may lawfully construct on the bank of the river between the sluices constructed by the River Authority in the river at Stoke Ferry and the confluence of the river and the Stringside River;

“the Corporation's No. 2 intake” means such intake in the cut-off channel as the Corporation may lawfully construct on the bank of the cut-off channel between the syphon constructed by the River Authority under the river and a point 900 yards downstream from such syphon measured along the centre line of the cut-off channel;

“day” means a period of twenty-four hours reckoned from 9 o'clock in the morning;

“the No. 1 gauge” means such gauge as may be established by or available to the Corporation for the purpose of continuously recording the flow of the river at the gauging station of the River Authority constructed in the river at Northwold;

“the No. 2 gauge” means such gauge as may be established by or available to the Corporation for the purpose of continuously recording the flow of the Stringside River at the gauging station of the River Authority in that river, at Stoke Ferry;

(a) 8 & 9 Geo. 6. c. 42.

HL 1 C 205021

"the Third Schedule" means the Third Schedule to the Water Act 1945.

3. Unless the context otherwise requires, any reference in this order to any enactment shall be construed as a reference to that enactment as amended by any subsequent enactment, including this order.

Power to  
take water.

4.—(1) Subject to the provisions of this order the Corporation may for the purposes of their undertaking abstract from the river by means of the No. 1 intake in any day a quantity of water not exceeding 6,000,000 gallons:

Provided that if the aggregate of the daily flows of water recorded by the No. 1 and No. 2 gauges on the previous day (hereinafter referred to as the "recorded flows") be less than 12,000,000 gallons water shall be taken only in accordance with the following provisions, that is to say:—

(a) if the recorded flows are not less than 6,000,000 gallons the Corporation may either—

(i) abstract from the river by means of the No. 1 intake a quantity of water which does not exceed the amount by which the recorded flows exceeded 6,000,000 gallons and make up the quantity required for the purposes of their undertaking to not more than 6,000,000 gallons with water abstracted from the cut-off channel by means of the No. 2 intake; or

(ii) abstract from the river by means of the No. 1 intake a quantity of water not exceeding 6,000,000 gallons and discharge into the river a quantity of water to be abstracted from the cut-off channel by means of the No. 2 intake equal to the amount (if any) by which the difference between the recorded flows and the quantity abstracted as aforesaid by means of the No. 1 intake is less than 6,000,000 gallons.

(b) if the recorded flows are less than 6,000,000 gallons the Corporation may abstract by means of the No. 1 intake and the No. 2 intake from the river and the cut-off channel respectively such quantity of water not exceeding, in the aggregate, 6,000,000 gallons as they may require for the purposes of their undertaking and discharge into the river a further quantity of water to be abstracted by means of the No. 2 intake equal to the quantity abstracted as aforesaid by means of the No. 1 intake.

(2) Water to be discharged into the river in accordance with this order shall be so discharged at any point between the point where the River Wissey crosses the cut-off channel and the sluice 430 yds. upstream thereof.

Application  
of section 10  
of Third  
Schedule.

5.—(1) The provisions of subsection (3), (4), (5) and (7) of section 10 of the Third Schedule are hereby incorporated with this order subject to the following modifications:—

(a) for subsection (3) there shall be substituted the following subsection—

"(3) The Corporation shall before taking any water in pursuance of the powers of the special Act construct or have available on approved sites approved gauges to gauge the flows of the river and of the Stringside River respectively, the quantities of water

taken, respectively, from the river and from the cut-off channel and the quantity of water discharged into the river and they shall not take any water contrary to the provisions of the special Act."

(b) in subsection (4) the words "subsection (1) or" and the words from "or fail" to the end of paragraph (b) shall be omitted;

(c) for subsection (7) there shall be substituted the following subsection—

"(7) Subject to the provisions of section 114 of the Magistrates' Courts Act 1952(a) any fine recovered under this section on the complaint of a River Authority or of an officer of or person authorised by a River Authority, in the exercise of any function formerly exercised by a fishery board and transferred to the river authority by virtue of the Water Resources Act 1963(b) shall, as to the whole or such part thereof as the court may determine, be paid to the River Authority in respect of the costs of the prosecution."

6. The construction of the Corporation's No. 1 and No. 2 intakes and of any gauges required to be constructed pursuant to section 10 of the Third Schedule as applied by this order and of any works necessary for discharging water into the river in pursuance of this order shall be carried out by the Corporation in such manner, so far as reasonably possible—

For the protection of the River Authority.

(a) to prevent from falling into the river or into the cut-off channel any debris or other solid matter; and

(b) to avoid cutting damaging or interfering with the bed and banks of the river or the cut-off channel otherwise than in accordance with plans, section and particulars to be previously submitted by the Corporation to and approved by the River Authority, and the Corporation shall at their own expense and to the reasonable satisfaction of the River Authority make good the banks of the river and the cut-off channel adjoining and injuriously affected by any of the said works or either of the said gauges.

7. For the purposes of this order section 92 (Liability of undertakers to pay compensation) and section 94 (Copies of special Act to be kept by undertakers in their office, and deposited with certain officers) of the Third Schedule shall apply to the water undertaking of the Corporation and are hereby incorporated with this order.

Application of sections 92 and 94 of Third Schedule.

Given under the official seal of the Minister of Housing and Local Government on 14th April 1967.

(L.S.)

*J. H. Street,*  
Under Secretary,  
Ministry of Housing and Local Government.

## **APPENDIX 2**

### **FUTURE DEVELOPMENT OF RIVER WISSEY BASIN**

DAVID HESLAM 1976.

## THE WISSEY AT STOKE FERRY

### FUTURE DEVELOPMENT OF RIVER WISSEY BASIN

#### 1.) Abstraction Requirement

- a.) British Sugar Corporation : It is likely that the processing season will be extended into the summer and the gross abstraction could increase. Discussions with BSC have indicated that the net abstraction would be no greater and might even be less because of the moisture contained in the raw materials.
- b.) Lower Ouse Water Division : The licence was originally for a maximum daily average abstraction of 6 million gallons per day (mgd), in accordance with the Kings Lynn (River Wissey) Water Order 1967. In 1973 this was reduced to a maximum daily abstraction of 4 mgd and an average annual of 1.92 mgd. When L.O.W.D. speak of "uprating" Stoke Ferry, it is not clear whether they mean :-
- (i) restoring the legal entitlement to 6 mgd, or
  - (ii) enhancing the security of the 6 mgd, or
  - (iii) increasing the entitlement beyond 6 mgd.

For the present it will be assumed that the right to abstract 6 mgd will be restored when necessary and the ability to do so could be increased by regulating the river by pumping from groundwater.

#### 2.) Residual Flow Requirement

There are two ways in which the M.A.F. can be specified :

- a.) A fixed amount, depending on dilution requirements, at present 6 mgd = 316 l/s.
- b.) An amount depending on the flow record, arbitrarily fixed at the flow exceeded for 95% of time by the total measured at Northwold plus Whitebridge gauging stations = 14.4 mgd = 760 l/s.

This is a very stringent requirement and seems excessively high unless the water has some other use downstream in addition to dilution, for example export to Essex.

#### 3.) Deficit Without Groundwater Development

In the existing 10 years of record, there has been no occasion when the present abstraction entitlement could not have been met. However it is not impossible for this condition to occur and in Table 1, droughts of 3 different return periods are considered. The Table gives the length of time for which various flows would occur, with no artificial regulation. It is seen that during the 2% drought, the flow falls below 630 l/s for only 2 months, and if 10 days is taken as the minimum realistic period, the flow never falls below 465 l/s (8.84 mgd).

For less severe droughts, the shortfall is correspondingly less.

#### 4.) Number of Wells Required, and Frequency of Pumping.

If 10 - day means are used as the smallest practicable unit, the number of wells required to meet the lower flow requirement is calculated as 5.5 to 6 wells (average output 0.57 mgd). For 80 years out of 100,

no pumping would be required, i.e. pumping would be required on average once in 5 years. Only once in 100 years would the pumping period extend to 3 months. (see Table 2.)

For the much more onerous higher maintained flow, 20 wells would be required. Pumping would be required almost every year; only 8 times in a century would natural flows be high enough. In over half the years more than 2 months pumping would be required.

TABLE 1.

Flows in R. Wissey at Stoke Ferry For Droughts of Various Return Periods - (No Regulation).

RETURN PERIOD OF DROUGHT	AVERAGE NATURAL RIVER FLOW IN LITRES/SECOND.			
	Worst 10 Days	Worst Month	2 <sup>nd</sup> Worst Month	3 <sup>rd</sup> Worst Month
1 in 50 Years = 2%	465	490	570	680
1 in 20 Years = 5%	515	550	640	750
1 in 10 Years = 10%	560	615		

TABLE 2.

With River Regulation. Frequency and Amount of Regulation Required

M.A.F.	ABSTR.		MAINTAINED FLOW		No. OF WELLS	FREQUENCY	LENGTH OF TIME
l/s	mgd	l/s	mgd	l/s		Yrs/Cent.	
316	6	316	12	632	6	20	Nil
316	6	316	12	632	6	14	< 1 Month
316	6	316	12	632	6	4	< 2 Months
316	6	316	12	632	6	1	< 3 Months
760	6	316	20.43	1076	20	92	Nil
760	6	316	20.43	1076	20	76	< 1 Month
760	6	316	20.43	1076	20	58	< 2 Months
760	6	316	20.43	1076	20	42	< 3 Months

MAINTAINED FLOW	= MAF + Abstraction
No. OF WELLS	= required to provide M.F. over worst 10 days
FREQUENCY	= with which pumping would be required
LENGTH OF TIME	= for which flow would need artificial support

David Heslam  
February 1976.