

NRA WATER RESOURCES 68

RELOCATION OF SUFFOLK WATER COMPANY BOREHOLE

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Key to symbols used

B	Aquifer thickness (m)
CCTV	Closed circuit Television logging
D	Distance(m)
Fe	Iron
K	Permeability (m/day)
MAC	Maximum admissable concentration (EC guidelines)
Mn	Manganese
Q	Discharge (m ³ /day)
r	Radial distance from abstraction well (m)
S	Storage co-efficient
SSSI	Site of Special Scientific Interest
T	Transmissivity (m ² /day)
t	Time (mins)
tcmd	1000 m ³ /day
W(u)	Well function
l/s	Litres per second flowrate
µg/l	micrograms (10 ⁻⁶) per litre

1. Introduction

This report is to investigate water resource implications of relocating a Suffolk Water Company borehole adjacent to Redgrave and Lopham Fens to one of four possible NRA boreholes. It is not intended to make any recommendations which will be influenced by budgetary constraints, but only to comment from a water resources viewpoint.

2. Description of problem

Abstraction from two Suffolk Water Company boreholes (TM 04650 79200) adjacent to Redgrave and Lopham Fens has caused the water level within the fens to fall to an unacceptable level. Certain species of flora and fauna have been lost and others are in danger - case in point is the raft spider. Through various discussions between the NRA and Suffolk Water Company it has been agreed that the NRA would examine the feasibility in relocating the abstraction point from the existing site to one of the following sites:-

- Dairy Farm, North Lopham
NGR TM 0251 8361
NRA No. TM08/085
- Lovers Lane, Garboldisham
NGR TM 0011 8198
NRA No. TM08/117
- Yaxley Crag borehole 3A2
NGR TM 1205 7351
- Cranley borehole 10A
NGR TM 1506 7232

The first two boreholes are part of the Great Ouse Groundwater Scheme and are used for river transfers to the Ely-Ouse scheme. The latter two are part of the Waveney Groundwater Scheme and are used for river support to Suffolk Water Company's Shipmeadow intake.

The source of the Lt Ouse and Waveney Rivers is located near many SSSI sites. Therefore, in selecting an appropriate alternative site consideration has to be given to any likely effect extra pumping from either of the four sites would have on sensitive environmental areas. The alternative site may also have an effect on local abstractors and these will have to be considered as well.

A map showing the location of the borehole in relation to the proposed sites is presented in Map 1. The location of all known SSSI's and environmentally sensitive areas is presented in Map 2.

A water level contour was constructed for April 1991 - presented in Appendix 1. There is a good coverage of water level data within the Lt Ouse area, an average coverage within the Dove area, and a fairly sparse coverage between. However, there is a strong indication that the two GOGWS boreholes will affect the resources of the R. Lt. Ouse (with flow paths running in a westerly direction), while the remaining two boreholes will effect the resources of the R. Dove (with flow paths running in an easterly direction).

3. Licence requirements of new site

The current licence which covers the abstraction from the boreholes adjacent to Redgrave Fen (7/34/16/*G/048) was issued 1st April 1969. The licence is an aggregate licence to cover the abstraction from

Boreholes adjacent to Redgrave Fen	TM 046 792
Abstraction limit = 3637 m ³ /day	
Borehole off Cranley Green Road, Eye	TM 15447295
Borehole off Roman Road, Mendlesham	TM 11756440
Boreholes at High Elm, Syleham	TM 209 783

All annual combined abstraction must not exceed a total of 2500 tcma.

Actual monthly abstraction data from 1967 to 1990 (inclusive) - see Figure 1 - was used to estimate the historical average annual use. The historical average annual abstraction is estimated to be 2.8tcmd. Suffolk Water Company have not as yet provided details of the annual abstraction rate for the new site. However, it has been assumed that the daily pumping rate will be 3.6tcmd and the drawdown effect will be based on continuous pumping for 200 days. It must be noted that if Suffolk Water Company abstracted on average 2.8tcmd then any pumping impact, as estimated for 3.6tcmd, would be much less. It is realised that pumping could last longer than 200 days, however, this limit is used to take into consideration the longest expected period of no recharge.

4. Proposed locations

It has been proposed that there are four likely sites to be used as a replacement. These sites in detail are as follows.

Dairy Farm, North Lopham
 NGR TM 0251 8361
 NRA No. TM08/085

The 610mm diameter by 160m deep borehole is drilled through 29.0m of Drift (Boulder Clay; glacial sands and gravels) into chalk - see Appendix 2. The borehole was drilled in March 1985 by Smiths (Grimsby) as part of the Great Ouse Groundwater Scheme. The borehole has been acidised at 45 and 100m below ground level. A CCTV log was conducted prior to acidisation but is not available for inspection. The borehole is located approximately 5km from R. Lt. Ouse and within a relatively large extent of Drift. A geological cross-section for the Lt. Ouse and located through this site is presented - see Figure 3 for location and Figure 4 for the cross-section. This shows that the borehole is located within boulder clay overlying chalk. However, the aquifer is categorised as having a low sensitivity to pollution by nitrates leaching from agricultural soils. The water table (when drilled) is within the Drift and, with consideration to the drilling log, the aquifer is considered to be confined.

There have been two pump tests. The first pump test was a four daily stage step/recovery test (each step lasting 480mins and recovery averaging 960mins). The maximum drawdown was 11.15m at a maximum discharge rate of 80.5 l/s. The data was analysed (see Appendix 2.) using both the Bierschenk and Wilson method as well as the Eden and Hazel method. The results are as follows:-

- o Bierschenk and Wilson Method
 (@10mins) $s = 0.001182Q + 0.0000003703Q^2$
 $T = 1032 \text{ m}^2/\text{day}$
- o Eden and Hazel Method
 $s = 0.0002512Q + 0.0006456 \log tQ$
 $+ 0.0000003864Q^2$

The second pump test was a seven day constant rate test which commenced 31 May 1985 with an average discharge of 62 l/s. The drawdown apparently reached an equilibrium after 2000mins with possible recharge/discharge discontinuities before 30mins. It was considered appropriate to analyse the data using type curves for a leaky confined aquifer (see Appendix 2.). The results were as follows:-

- o Type curve for leaky confined aquifer
 Where:-
 $W(u) = 1; 1/u = 1; s = 1.33m;$
 $t = 53.91 \text{ mins}; r/B = 0.25$
- Calculated parameters:-
 $T = 375 \text{ m}^2/\text{day}$
 $S = 0.00106$
 leakage factor = 919.6m
 Hydraulic resistance = 2255 days

The leakage could be coming from :-

- o recharge from the R. Lt. Ouse
- o recharge through the confining Drift
- o direct recharge from rainfall during the pump test (40.5mm recorded at Harling Farm, East Harling).

Data is not available to adequately separate out any possibility or combination of recharge.

The value of transmissivity derived from type curve analysis ($T=375 \text{ m}^2/\text{day}$) is consistent with other estimates within the area. The value of transmissivity derived from Bierschenk and Wilson ($T=1032 \text{ m}^2/\text{day}$) is based on Equation 1.

$$T = \frac{1.22Q}{S_v}$$

Equation 1 - Logan's transmissivity approximation

The above equation assumes equilibrium in each step, which in this test is not satisfied. Therefore, transmissivity has been assumed to be $375 \text{ m}^2/\text{day}$. To estimate the drawdown effect of pumping from this site a Theis approach (via the program wellcalc) was used. The parameters passed to the program were $T=375 \text{ m}^2/\text{day}$; $S=0.0008$; $t=200$ days; $Q=3600 \text{ m}^3/\text{day}$. The predicted drawdown is reasonably significant, being at least 3m at a distance of 2100m - see Figure 4.

Extrapolating, for a predicted drawdown of 0.5m the radius of influence would be 12690m. This is, however, for a Theis aquifer where the aquifer is isotropic, homogeneous, infinite in extent, and not affected by recharge. It seems obvious from the hydrogeology that this indeed does not exist. Therefore, this method must be considered as an extreme worst case. It is considered that this influence would be much less. If this borehole were to be used then a pump test with no recharge event should be conducted.

There have been 5 water quality analyses - included in Appendix 2 - collected at the discharge outlet. These results show that certain determinands exceed the maximum admissible concentration (EC guidelines) for total Iron (MAC=200 $\mu\text{g}/\text{lFe}$; results were 2180, 460, 10900 and 3060 $\mu\text{g}/\text{lFe}$) as well as for Manganese (MAC=50 $\mu\text{g}/\text{lMn}$; results were 60, 67, and 68 $\mu\text{g}/\text{lMn}$). There was no detection of hydrocarbons - including pesticides - or exceedences of E coli. There was no organoleptical test for hydrogen sulphide. Exceedences of Iron and Manganese should be removed by the appropriate filtration if the water is to be used for drinking purposes.

Lovers Lane, Garboldisham
 NGR TM 0011 8198
 NRA No. TM08/117

The 610mm diameter by 150m deep borehole is drilled through 18.0m of Drift (clays; sand) into chalk - see Appendix 3. The borehole was drilled in November/December 1985 by Le Grand as part of the Great Ouse Groundwater Scheme. The borehole has been acidised at 30 and 90m below ground level. Geophysical logging conducted prior to acidisation and is available for inspection. The geophysical log, however, is difficult to interpret as scaling and the logging sonde used has not been annotated to the traces. The well archive sheet shows a previous interpretation which is now assumed to be correct. The hydrogeology map indicates that a buried channel is located within 300m of the borehole. As well there are exposed superficial deposits, again within 300m, which appear to be in connection with the R. Lt. Ouse. A geological cross-section for the Lt. Ouse and located through this site is presented - see Figure 3 for location and Figure 4 for the cross-section. This shows that the borehole is located within boulder clay overlying chalk. There is evidence that a lens of sands and gravels is located nearby which appears to intercept the R. Lt. Ouse. The aquifer around the borehole is categorised as having a low sensitivity to pollution by nitrates leaching from agricultural soils, while the superficial deposits are categorised as being extremely to moderately sensitive to agricultural nitrate pollution. The water table (when drilled) is within the Drift and, with consideration to the drilling log, the aquifer is considered to be confined.

There was one pump test which was a four stage step test (Three steps lasting 120mins, the fourth step lasted 1095mins and recovery lasting 1275mins). The maximum drawdown was 16.35m at a maximum discharge rate of 97.4 l/s. The data was analysed (see Appendix 3.) using both the Bierschenk and Wilson method as well as the Eden and Hazel method. The results are as follows:-

- o Bierschenk and Wilson Method
 (@10mins) $s = 0.00008726Q + 0.0000001610Q^2$
 $T = 13981 \text{ m}^2/\text{day}$
- o Eden and Hazel Method
 $s = 0.000171Q + 0.000219\log tQ$
 $+ 0.0000000851Q^2$

It was considered that the transmissivity value as calculated using the Logan approximation (Equation 1) was relatively high and, again, the assumptions behind the approximation are not satisfied. To obtain an estimate of transmissivity, two separate methods were employed. The first was to use a single-layer radial flow model, and the second was to analyse the residual drawdown using a weighted average discharge rate. There were difficulties in applying the conditions to a single layer model, however, a transmissivity value of $792\text{m}^2/\text{day}$ ($K=6\text{m}/\text{d}$, $r=132\text{m}$) and a storage co-efficient of 0.00005 were obtained. The residual drawdown gave a value for transmissivity of $660\text{m}^2/\text{day}$ ($Q=84.8\text{m}^3/\text{day}$). To estimate the drawdown effect of pumping from this site a Theis approach (via the program wellcalc) was used. The parameters passed to the program were $T=660\text{m}^2/\text{day}$; $S=0.0001$ (smallest allowable value is 0.0001, therefore cannot use $S=0.00005$); $t=200$ days; $Q=3600\text{m}^3/\text{day}$. The predicted drawdown is reasonably significant, being at least 3m at a distance of 1700m - see Figure 5.

Extrapolating, for a predicted drawdown of 0.5m the radius would be 33900m. This is, however, for a Theis aquifer where the aquifer is isotropic, homogeneous, infinite in extent, and not affected by recharge. It seems obvious from the hydrogeology that this indeed does not exist. Therefore, this method must be considered as an extreme worst case. It is considered that this influence would be much less. If this borehole were to be used then a pump test with no recharge event should be conducted.

There have been 6 water quality analyses - included in Appendix 3 - collected at the discharge outlet. These results show that certain determinands exceed the maximum admissible concentration (EC guidelines) for total Iron (MAC=200µg/lFe; results were 500, 630, and 450 µg/lFe) as well as for Manganese (MAC=50µg/lMn; one result was 66 µg/lMn). There was no detection of hydrocarbons - including pesticides - or exceedences of E coli. There was no organoleptical test for hydrogen sulphide. Exceedences of Iron and Manganese should be removed by the appropriate filtration if the water is to be used for drinking purposes.

Yaxley Crag borehole 3A2
NGR TM 1205 7351

The 431mm diameter by 130m deep borehole is drilled through 56.0m of Drift (Crag - clays; sand) into chalk - see Appendix 4. The borehole was drilled in 1974 by Farrods Ltd as part of the Waveney Groundwater Scheme to be used for river support. There is no known geophysical logging conducted. The water table (when drilled) is within the Crag and, with consideration to the drilling log, the aquifer is considered to be leaky confined. A geological cross-section was adapted from the River Waveney Groundwater Scheme - Stage 1 Report and presented in Figure 6 shows that the site is located on Drift (Boulder Clay and Crag) overlying Chalk.

There has been one known pump test conducted. The data and results are not available, but it is known that a 43 hour step(?) test was conducted around July 1974 at a rate of 26.5 l/s giving a maximum drawdown of 3.5m - recovery to rest level taking 1 week. Although the data is not available it is of concern that the recovery took one week. This would have to be verified by a constant rate pump test.

The hydrogeology map shows the aquifer is confined by Drift and Crag deposits. There is no evidence of buried channels within the chalk aquifer. The aquifer is considered as having a low sensitivity to pollution by nitrates from agricultural soils.

To calculate the pumping influence, it was necessary to use estimates of transmissivity and storage co-efficient. The estimates obtained from Tony Hockaday (Eastern Area - Norwich office) were $T=750\text{m}^2/\text{day}$ and $S=0.01$. To estimate the drawdown effect of pumping from this site a Theis approach (via the program wellcalc) was used. The parameters passed to the program were $T=750\text{m}^2/\text{day}$; $S=0.01$; $t=200$ days; $Q=3600\text{m}^3/\text{day}$. The predicted drawdown is reasonably significant, being at least 1m at a distance of 1680m - see Figure 7.

Extrapolating, for a predicted drawdown of 0.5m the radius would be 3280m. This is, however, for a Theis aquifer where the aquifer is isotropic, homogeneous, infinite in extent, not affected by recharge as well as being confined. It seems obvious from the hydrogeology that this indeed does not exist. Within the River Waveney Groundwater Scheme - Stage 1 report drawdown due to pumping (B14) was constructed for pumping during 1976. This shows that in fact the drawdown is much less than predicted - predicting 0.5m at a radius of 2000m. However, using a Theis prediction method on the assumed pump test data ($Q=6500\text{m}^3/\text{d}$; $t=140\text{days}$; $r=1000\text{m}$) would give aquifer parameters of $T=750\text{m}^2/\text{day}$ and $S=0.04$. Therefore, it is considered that the drawdown predictions based on Theis may not be grossly in error. For further calculations, based on Theis, the following aquifer parameters were used: $T=750\text{m}^2/\text{day}$; $S=0.04$.

There has been one water quality analysis taken for this borehole. These results show exceedences to the maximum admissible concentration (EC guidelines) for total Iron ($\text{MAC}=200\mu\text{g}/\text{lFe}$; the result was $7700\mu\text{g}/\text{lFe}$). The Iron should be removed by the appropriate filtration if the water is to be used for drinking purposes.

Cranley borehole 10A
NGR TM 1506 7232

The 460mm diameter by 96.3m deep borehole is drilled through 56.0m of Drift (clays; sand; Crag) into chalk - see Appendix 5. The borehole was drilled in February/April 1974 by Le Grand as part of the Waveney Groundwater Scheme to be used for river support. There is no known geophysical logging conducted. The water table (when drilled) is within the Crag and, with consideration to the drilling log, the aquifer is considered to be leaky confined. A geological cross-section was adapted from the River Waveney Groundwater Scheme - Stage 1 Report and presented in Figure 6 shows that the site is located on Drift (Boulder Clay and Crag) overlying Chalk.

There has been one known pump test conducted. The data and results are not available, but it is known that a 270 hour constant(?) rate test was conducted around May 1974 at a rate of 83.97 l/s giving a maximum drawdown of 14.73m - recovery to 3m from rest level taking 2.5 hours.

The hydrogeology map shows the aquifer is confined by Drift and Crag deposits. There is no evidence of buried channels within the chalk aquifer. The aquifer is considered as having a low sensitivity to pollution by nitrates from agricultural soils.

To calculate the pumping influence, it was necessary to use estimates of transmissivity and storage co-efficient. The estimates obtained from Tony Hockaday (Eastern Area - Norwich office) were $T=300\text{m}^2/\text{day}$ and $S=0.002$. To estimate the drawdown effect of pumping from this site a Theis approach (via the program wellcalc) was used. The parameters passed to the program were $T=300\text{m}^2/\text{day}$; $S=0.002$; $t=200$ days; $Q=3600\text{m}^3/\text{day}$. The predicted drawdown is reasonably significant, being at least 3m at a distance of 1700m - see Figure 8.

Extrapolating, for a predicted drawdown of 0.5m the radius would be 7980m. This is, however, for a Theis aquifer where aquifer is isotropic, homogeneous, infinite in extent, not affected by recharge, as well as being confined. It seems obvious from the hydrogeology that this indeed does not exist. Within the River Waveney Groundwater Scheme - Stage 1 report drawdown due to pumping (B14) was constructed for pumping during 1976. This shows that in fact the drawdown is much less than predicted - predicting 0.5m at a radius of 1000m. However, using a Theis prediction method on the assumed pump test data ($Q=6500\text{m}^3/\text{d}$; $t=140\text{days}$; $r=1000\text{m}$) would give aquifer parameters of $T=5000\text{m}^2/\text{day}$ and $S=0.02$. Therefore, it is considered that the drawdown predictions based using the initial parameters would not be correct. Assuming Theis conditions, then the parameters adopted for further drawdown predictions are as follows: $T=5000\text{m}^2/\text{day}$; $S=0.02$.

There has been one water quality analysis taken for this borehole. These results show exceedences to the maximum admissible concentration (EC guidelines) for total Iron (MAC=200 $\mu\text{g}/\text{lFe}$; the result was 530 $\mu\text{g}/\text{lFe}$). The Iron should be removed by the appropriate filtration if the water is to be used for drinking purposes.

5. Catchment water balances

The purpose of this section is to describe the water balance for two surface water catchments which area potentially influenced by the relocation of the Suffolk Water Company borehole. The catchments are for the R. Lt. Ouse upstream of the confluence with the R. Sapiston (6/33/43), and the R. Dove (7/34/17). The catchments in detail are as follows.

R. Lt Ouse

Surface water catchment 6/33/42

The total catchment area for this section of the Lt Ouse is calculated to be 154.5km². Of this area only 31km² is exposed chalk, with the majority of the area being covered by Drift deposits. From Appendix 6 the estimated available resource is a deficit of 0.5tcmd. This calculation does not take into consideration the NRA river transfer boreholes which, due to the complexities of operation, is difficult to allocate an appropriate quantity. The 17 boreholes attached to the licence (6/33/43/074) are entitled to an average annual licence quantity of 29tcmd, however, of the 17 boreholes only four are in operation. To estimate the additional abstraction requirement it was decided to use the operational quantities from 1991. The total abstraction spread over one year gives an average licence use of 6.4tcmd (2350460m³ in one year). Therefore, the available resource would be a deficit of 6.9tcmd. However, the abstraction from these boreholes may also be supporting the flow within the river. It is assumed in this report that a river support borehole is used to support the 95 percentile flow, with any flow above this may be considered as a river transfer - hence a loss to the catchment resource balance. To calculate the overall transfer an estimate of the natural recession flow if river augmentation had not occurred was superimposed on the mean daily discharge hydrograph - a line representing the 95 percentile was also superimposed (refer to Figure 9). As actual streamflow data is used this would eliminate errors associated with borehole recirculation (often referred to as nett gains), as well as errors in estimating borehole abstraction.

The volume of river transfer was calculated to be 844.4m³, or the equivalent of an average annual discharge of 2.3tcmd. (Note: this gives a nett gain of 40%) Including the proposed abstraction of 3.6tcmd would give a total resource deficit of 6.4tcmd.

There are time limited licences within the catchment which if not renewed may assist in allocating more resource to the catchment. However, under present conditions and noting the expiry of the time limited licences - see Figure 10 - it would mean that the catchment would not have the resources available until the beginning of 2004.

The Lt Ouse is not a particularly defined catchment in regards to groundwater resources. At the confluence of the R. Sapiston and R. Thet there is evidence that the groundwater flow is not perpendicular to the surface water catchment - in particular refer to Appendix 1. Therefore treating the resources in the Lt Ouse as being in a catchment and not part of a subcatchment may lead to an underestimate to the total resources available. The R. Lt. Ouse catchment is such that abstractions within the lower section of the surface water may be allocated against the resources of either the R. Thet or R. Sapiston groundwater catchment. Therefore major licences near the confluence of

the Lt Ouse with the Sapiston and then the Thet may be considered as not part of this water balance. If it could be shown that, for example, the Cambridge Water Company licence for the Euston/Rushford boreholes could be removed from the water balance, this would then release 4.38tcmd - giving a resource deficit of only 2tcmd.

To fully appreciate the resources in the Lt Ouse it would be necessary to undertake a full and thorough modelling of the Thet/Lt Ouse/Sapiston catchment.

R. Dove

Surface water catchment 7/34/17

The total catchment area for this section of the Dove is calculated to be 208km². The total area is covered by Drift deposits. From Appendix 7 the estimated available resource is a surplus of 8.7tcmd. This calculation does not take into consideration the NRA river transfer boreholes which, due to the complexities of operation, is difficult to allocate an appropriate quantity. The 5 boreholes attached to the licence (7/34/17/068) are entitled to an average annual licence quantity of 16tcmd. However, the boreholes are used to augment river supplies for Suffolk Water Company for a surface water supply at Shipmeadow. The licence (7/34/19/108) has stage conditions to restrict the flow to licence abstractions. If it is assumed that, on average, when the flow in the R. Waveney falls below 0.5m³/s at Ellingham then R. Dove river support boreholes would be required to augment the deficit flow - see Figure 11. Historical mean daily discharge data for Ellingham was inspected for all flows falling below a threshold of 0.5m³/s and the respective deficits calculated and summed. Daily abstraction data from the intake at Shipmeadow is not available, therefore, a comparison between daily streamflow rate to abstraction rate can not be easily established.

To estimate the additional abstraction requirement it was decided to use the operational quantities for 1990. The total abstraction spread over one year gives an average annual licence use of 1.8tcmd (641915.0m³ in one year). A similar analysis to R. Lt Ouse to separate the abstraction from the stream flow but was found to be inconclusive. The stream hydrograph for the R. Dove at Oakley Park - see Figure 12 - do not show any conclusive relationship between stage height and borehole discharge. To calculate the additional abstraction requirement it was decided to use the 80% nett gain calculated in the River Waveney Groundwater Scheme - Stage 1 Report. This gives an additional requirement of 80% of 1.8, or 1.4tcmd. Therefore the nett resource available is estimated to be 7.3tcmd. The additional 3.6tcmd from the proposed licence will still leave an available resource of 3.7tcmd.

There are time limited licences within the catchment which if not renewed may assist in allocating more resource to the catchment. The variation in quantity is relatively small - see Figure 13 - and would not assist in releasing further resources.

6. Areas of Environmental interest

All potential sites could have an impact on various areas of environmental interest. The upper Waveney and upper Lt Ouse have many sites of special scientific interest which must be considered when proposing a new site. A reference map - Map 2 - and associated description of all known SSSI's is included in Appendix 8. To determine the impact a new borehole would have on a SSSI site, particularly a wetland site, would require at least a long term constant rate pump test and preferably a detail modelling study. Both of these options are beyond the scope of this report. Instead, it was decided that for each site a list of all potential SSSI would be listed with the distance to that site and a predicted Theis drawdown - see Table 1. Table 1 is only a guide to the relative impacts on the various SSSI, however, the table indicates that both boreholes in the Dove catchment will have the least impact on most of the SSSI's. The Theis predictions are based on aquifer parameters previously assumed for each respective site. It is considered that drawdown predictions for distances greater than 4km may be extremely tenuous and therefore viewed with caution.

TABLE 1 - Distances and potential drawdown for SSSI sites

Site Name	Distance from source to site (m) (Theis drawdown prediction)			
	Dairy Farm	Lovers Lane	3A	10A
Kerminghall & Barham Fen	8130 (1.0m)	5320 (2.0m)	18427 (0.0m)	21664 (0.0m)
Middle Harling Fen	3950 (2.0m)	3430 (2.4m)	17590 (0.0m)	20660 (0.0m)
Redgrave and Lopham Fen	4640 (1.8m)	5400 (2.0m)	9380 (0.0m)	12480 (0.1m)
Shelfanger Meadows	8530 (1.0m)	10920 (1.4m)	9350 (0.0m)	11240 (0.2m)
Knettishall Heath	8130 (1.0m)	5320 (2.0m)	18430 (0.0m)	21660 (0.0m)
Hopton Fen	5040 (1.7m)	2270 (2.8m)	14580 (0.0m)	17800 (0.0m)
Buggs Hole, Thelnethan	4510 (1.8m)	2820 (2.6m)	12790 (0.0m)	16010 (0.0m)
Weston Fen	6600 (1.3m)	3850 (2.3m)	14890 (0.0m)	18120 (0.0m)
Blo'norton & Thelnethan Fen	4680 (1.8m)	3380 (2.4m)	11720 (0.0m)	14940 (0.0m)
Burgate Wood	9410 (0.7m)	9780 (1.5m)	4960 (0.0m)	8190 (0.0m)
Gypsey Camp Meadows, Thrandeston	10980 (0.7m)	12310 (1.3m)	3830 (0.1m)	6120 (0.1m)
Major Farm, Braiseworth	14890 (0.4m)	15490 (1.1m)	1220 (0.7m)	2860 (0.2m)
Hoxne Brick Pit	16460 (0.3m)	18110 (1.0m)	6180 (0.0m)	4880 (0.1m)

However, Table 1 shows that several SSSI's could possibly be adversely affected by pumping. In particular:-

- o Dairy Farm, North Lopham
Middle Harling Fen r=3950m; S=2.0m
- o Lovers Lane, Garboldisham
Middle Harling Fen r=3430m, S=2.4m
Hopton Fen r=2270m, S=2.8m
Buggs Hole, Thelnetham r=2820m, S=2.6m
Weston Fen r=3850m, S=2.3m
Blo'norton & Thelnetham Fen r=3380m, S=2.4m
- o Yaxley 3A
Major Farm, Braiseworth r=1220m; S=0.7m
- o Cranley 10A
Major Farm, Braiseworth r=2860m; S=0.2m

(* These sites have a major stream between the SSSI and the pump source. Therefore, the effective drawdown may be less than predicted if the stream is in connection with aquifer. A long term pump test with appropriate monitoring would be the better way at estimating the effective drawdown)

The Dove catchment boreholes would appear to have an effect on Major Farm meadow, Braiseworth. It would, however, appear that the meadow may not be controlled by groundwater levels, but controlled by poor draining land. The River Waveney Groundwater Scheme - Stage 1 report indicates that the water level in 1989 was 34mAOD (B8), while the chalk surface is at -20mAOD (B5). Comparing the water levels with an estimated surface level of 50mAOD shows that although the aquifer is confined, the piezometric level is at least 15m below the meadows. This would indicate that poor drainage soils are controlling the water resources for the meadow. If this hypothesis is correct then the Dove catchment boreholes would have no effect on the water levels within Major Farm meadows. This of course would have to be verified from a pump test.

7. Conclusion

From this investigation it is considered that the overall resources of the R. Lt Ouse catchment have already been over committed, a deficit of 6.4 tcmd, and could not sustain additional abstraction. It is noted that the Lt Ouse catchment, especially the lower end of the catchment, can be influenced by the catchments of the R. Thet and R. Sapiston. To overcome this problem and to determine the effective resource balance of the upper Lt Ouse catchment a resource model should be constructed, or adapted from other modelling approaches. However, it is considered unlikely that the resources calculated after modelling will be enough to commit an additional abstraction to the catchment. Due to the hydrogeology of the catchment, the radius of influence from either of the two proposed borehole sites would be such to impact various SSSI's. Therefore, if it is considered advisable to use one of these sites, a long term pump test should be conducted with piezometers located near all SSSI's likely to be effected. As well, a detailed modelling programme should be started in parallel with the pump test.

There are available resources in the R. Dove catchment to commit an additional abstraction, a surplus of 3.3 tcmd. Both sites have a potential to effect Major Farm meadows and, therefore, a long term pump test should be conducted with piezometers located near Major Farm SSSI, as well as any other likely site to be effected. However, it is considered that that any potential drawdown below this site would be counteracted by the fact that the SSSI is not in continuity with the chalk aquifer.

In both catchments the water quality appears reasonable, albeit requiring appropriate filtration prior to use. In all boreholes Iron would tend to be a problem.

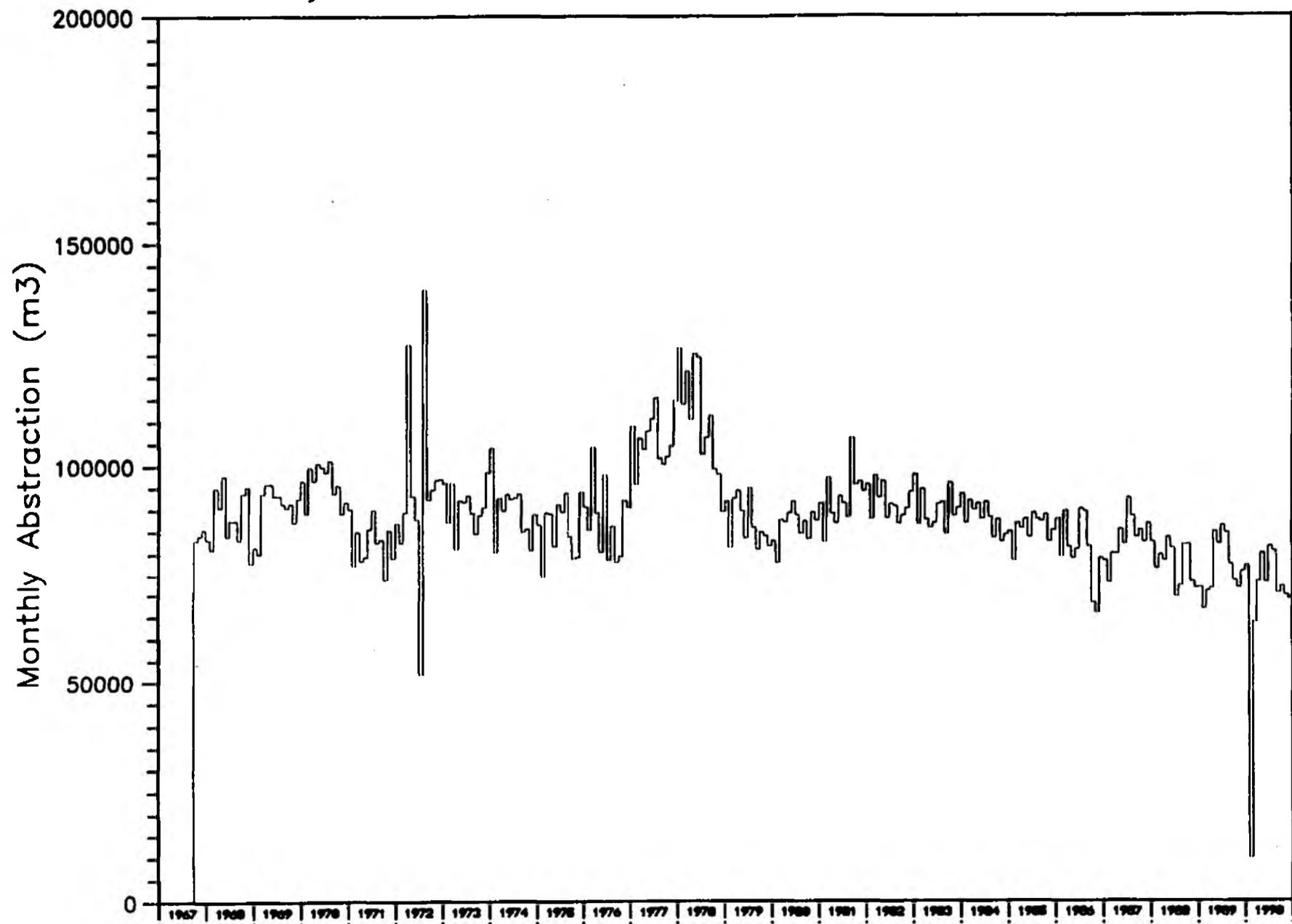
It is concluded that both sites in the Lt Ouse catchment do not have enough resources available and appear to affect many SSSI's - e.g Middle Harling Fen. It is recommended from this report that either site in the Dove catchment, in preference the site at Cranley (Waveney groundwater scheme - 10A), would be likely sites to relocate the borehole adjacent to Redgrave & Lopham Fen.

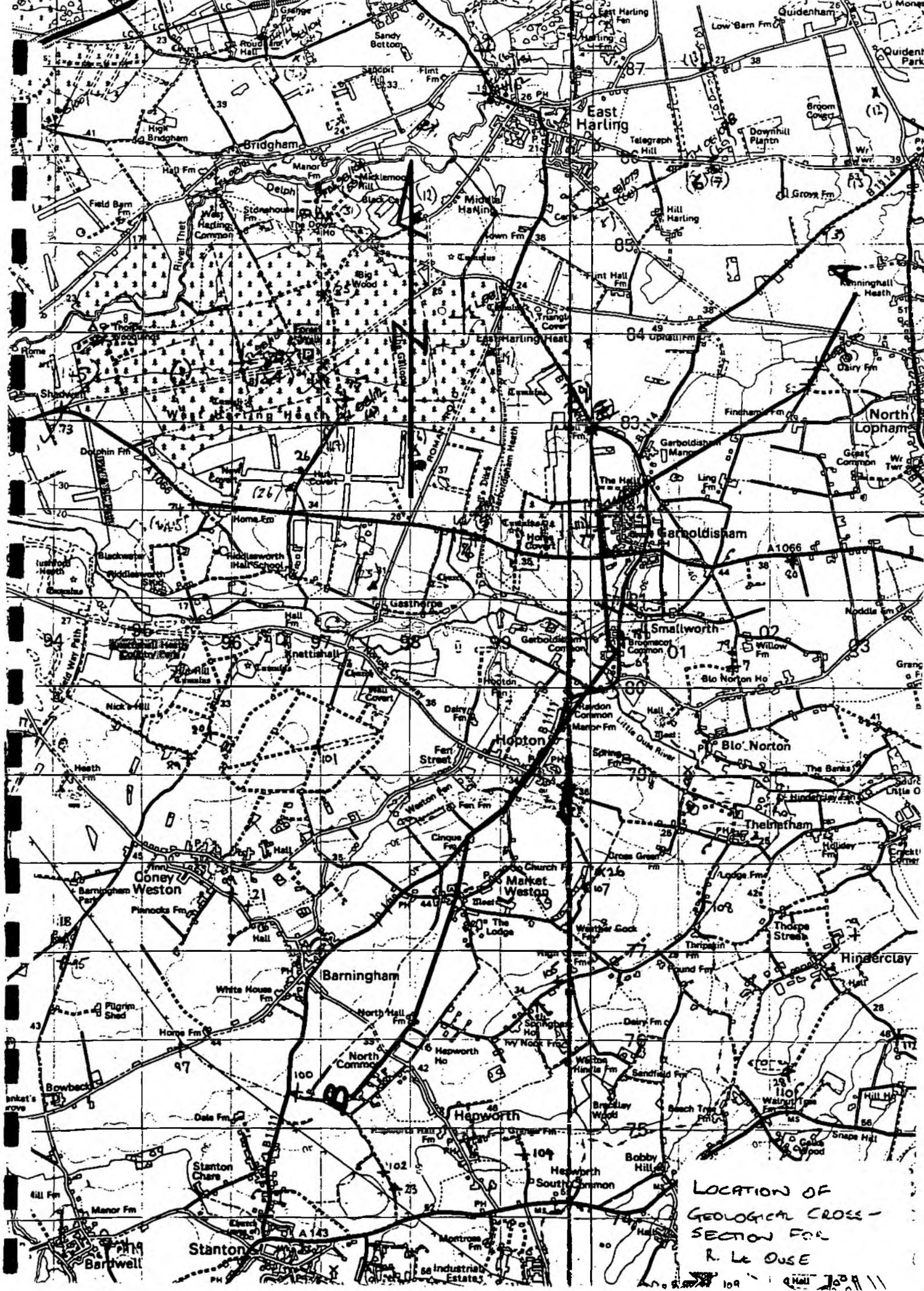
8. Recommendations

The following is recommended to further the investigation into relocating the borehole adjacent to Redgrave & Lopham Fen. The recommendations concentrate on investigating further the water resources around both sources to determine the most appropriate borehole to use. The recommendations are as follows:-

1. Investigate the water resources of Major Farm Meadows, Braiseworth.
2. Conduct detail long term pump tests on both boreholes in the Dove catchment.
3. Determine impact on SSSI's from pump tests.
4. Conduct a well survey around the two boreholes to determine pumping effects on protected sources.
5. Undertake, or adapt a current resource model of the Lt Ouse and Dove catchments.

Monthly abstractions from two boreholes adj. to Redgrave Fen

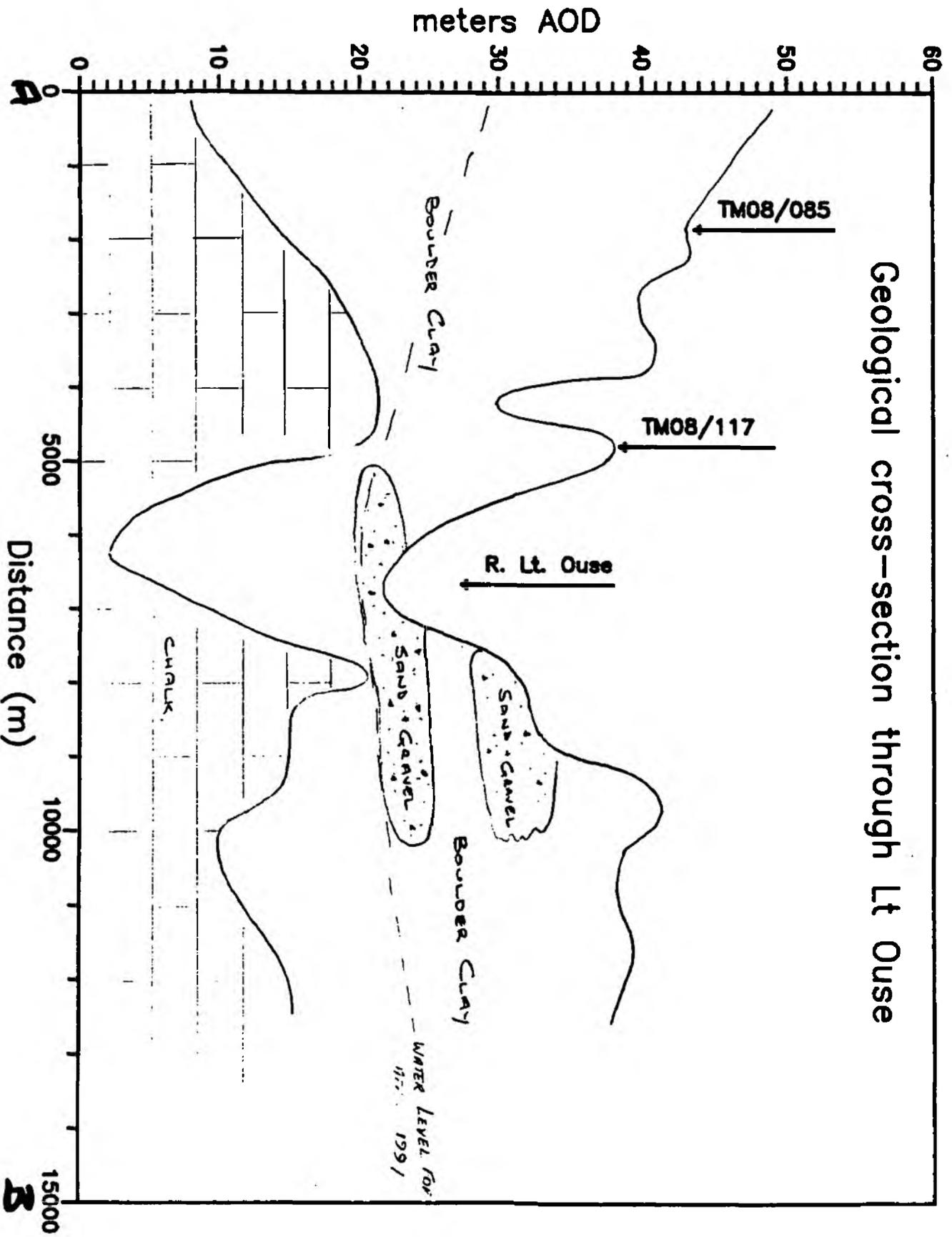




LOCATION OF
GEOLOGICAL CROSS-
SECTION FOR
R. LE OUSE

109 Hall 10/11

Geological cross-section through Lt Ouse



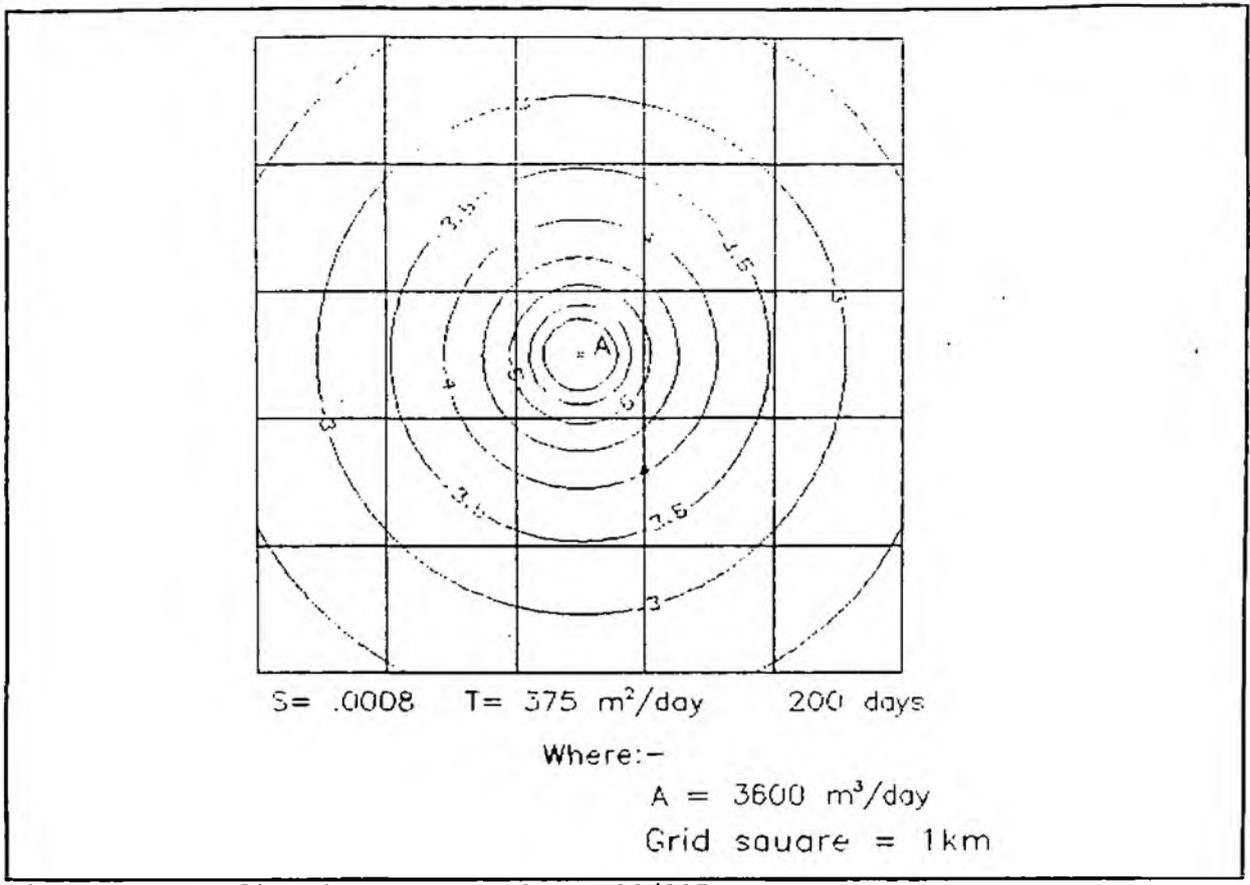
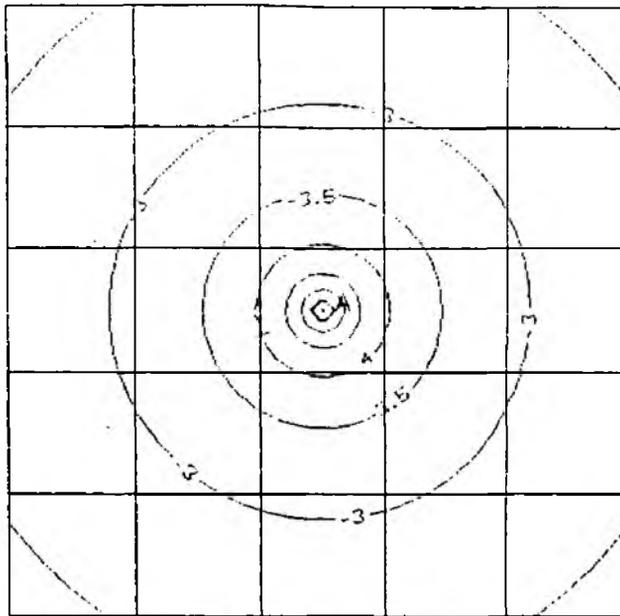


Figure 4 - Predicted Drawdowns for TM08/085



S= .0001 T= 660 m²/day 200 days

Where :-

A = 3600 m³/day

Grid square = 1km

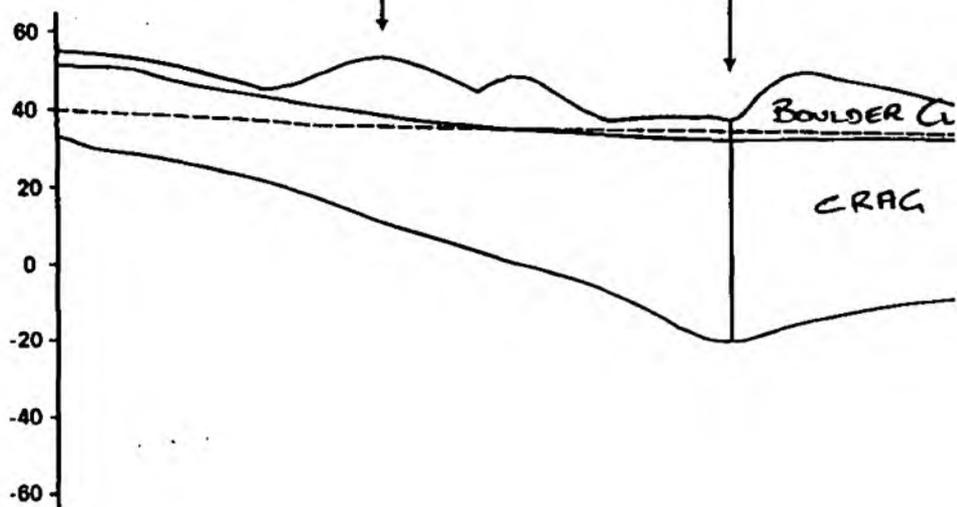
Figure 5 - Predicted drawdown for TM08/117

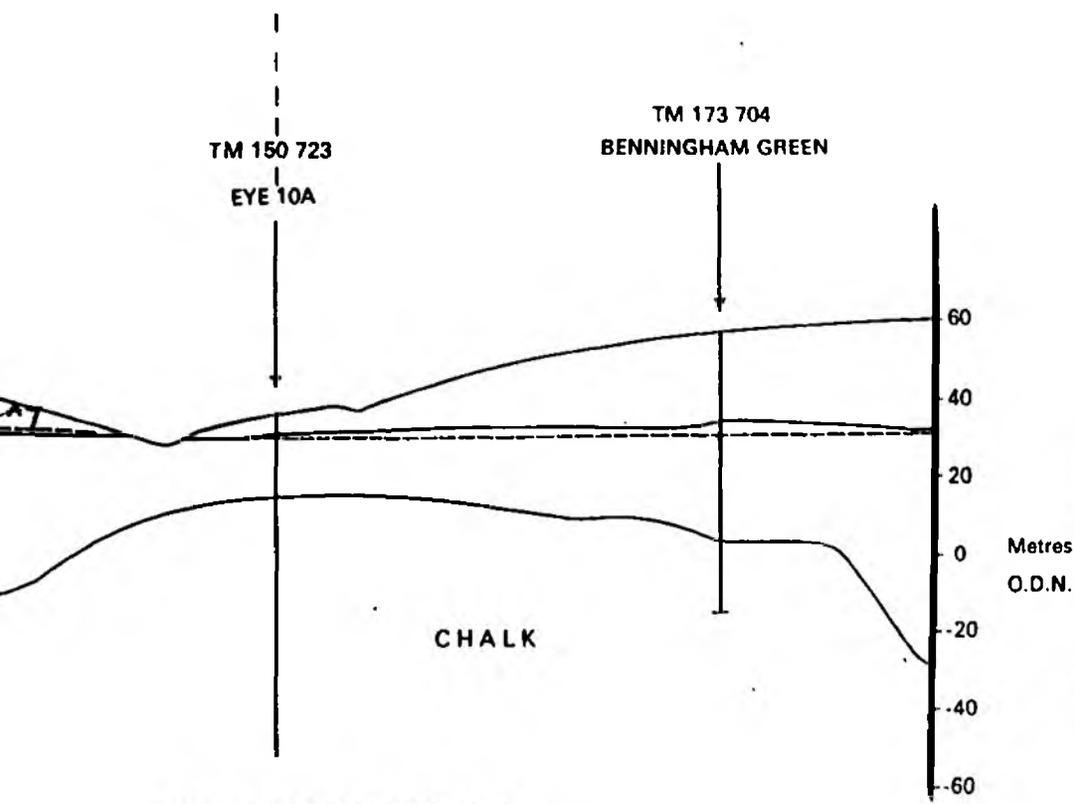
ORDNANCE
DATUM

TM 079 750

CATCHMENT
BOUNDARY

TM 120 735
YAXLEY 3A2





----- WATER TABLE - MARCH 1979

← 205 CHLORINITY (MG/L)

SCALES VERTICAL 1:2 000
 HORIZONTAL 1:50 000

ADAPTED FROM 'RIVER WAVENEY
 GROUNDWATER SCHEME - STAGE 1
 REPORT (65)

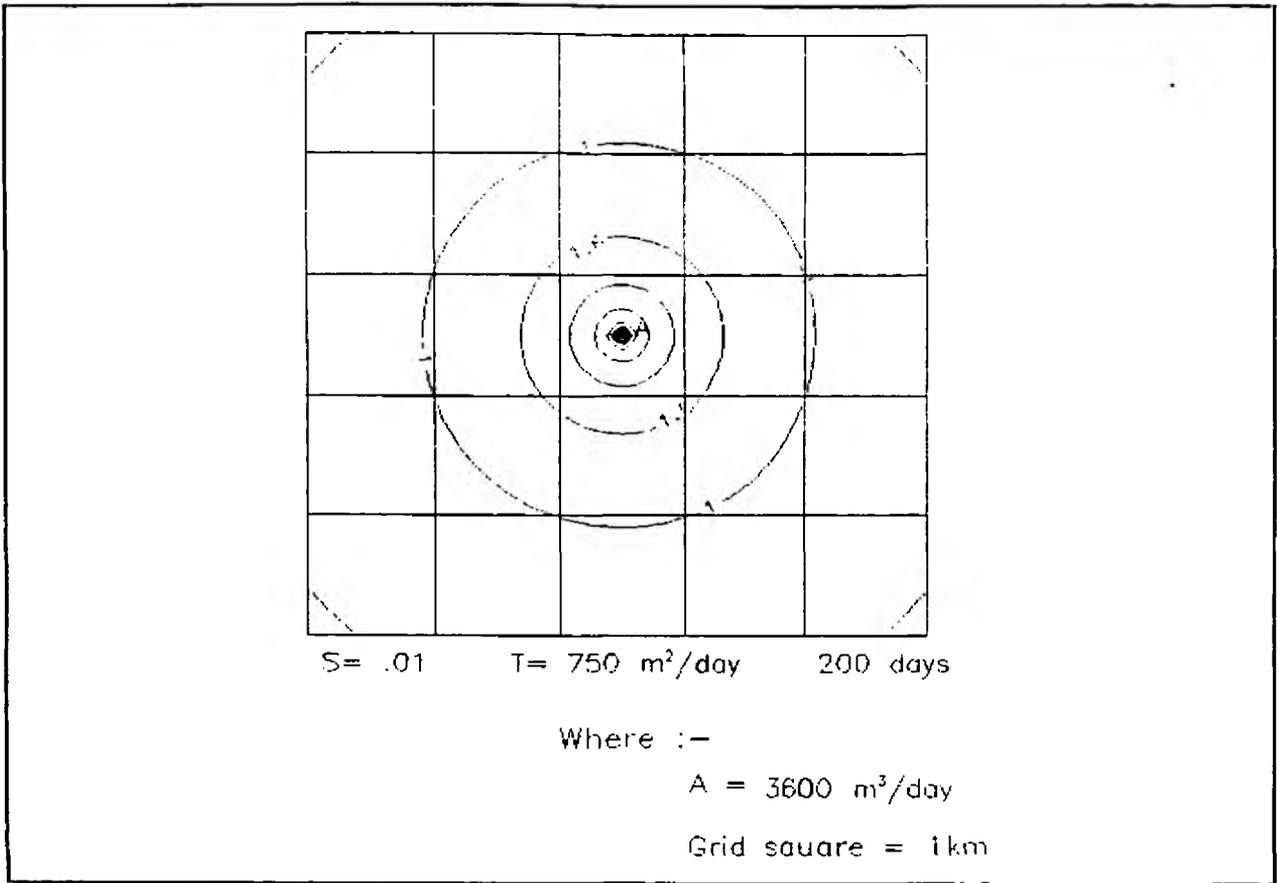


Figure 7 - Predicted drawdown for Yaxley Crag 3A

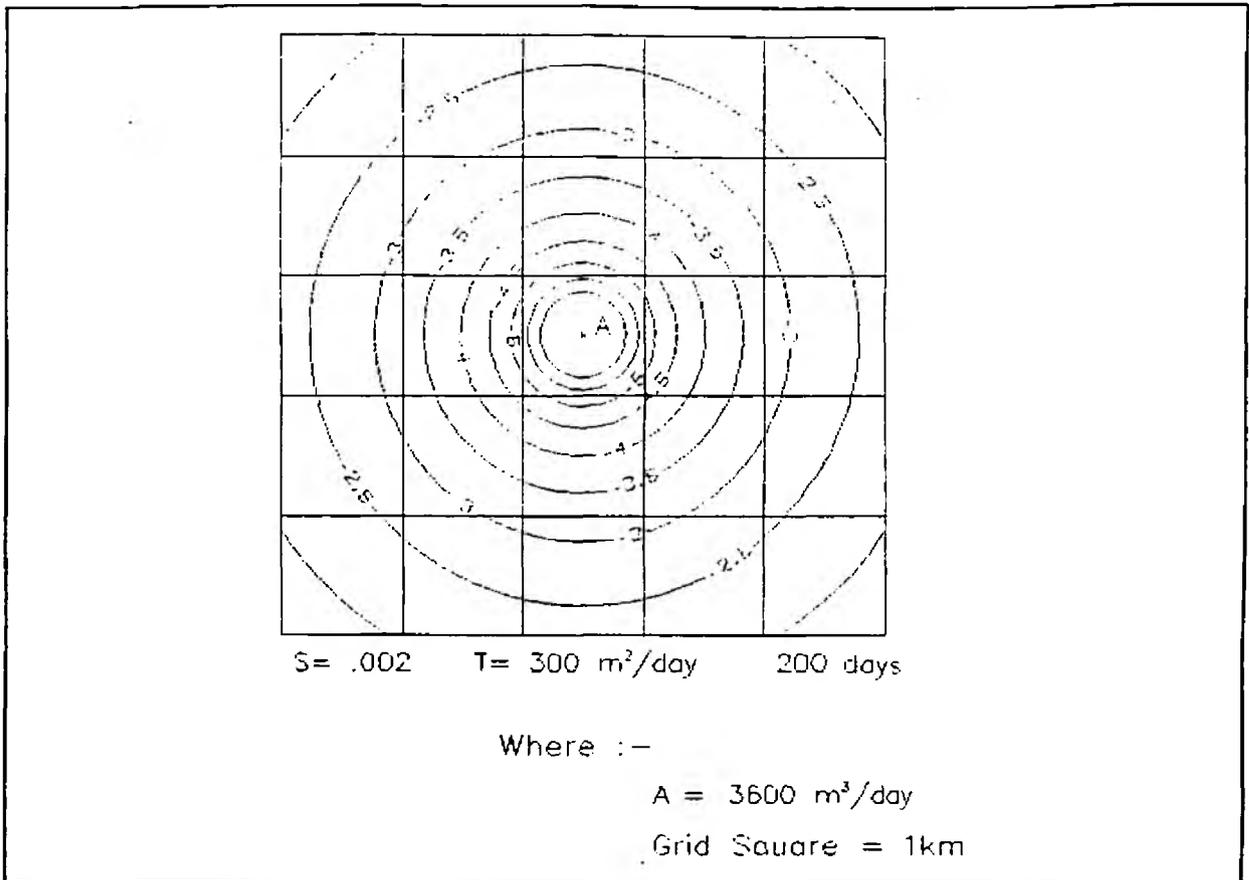
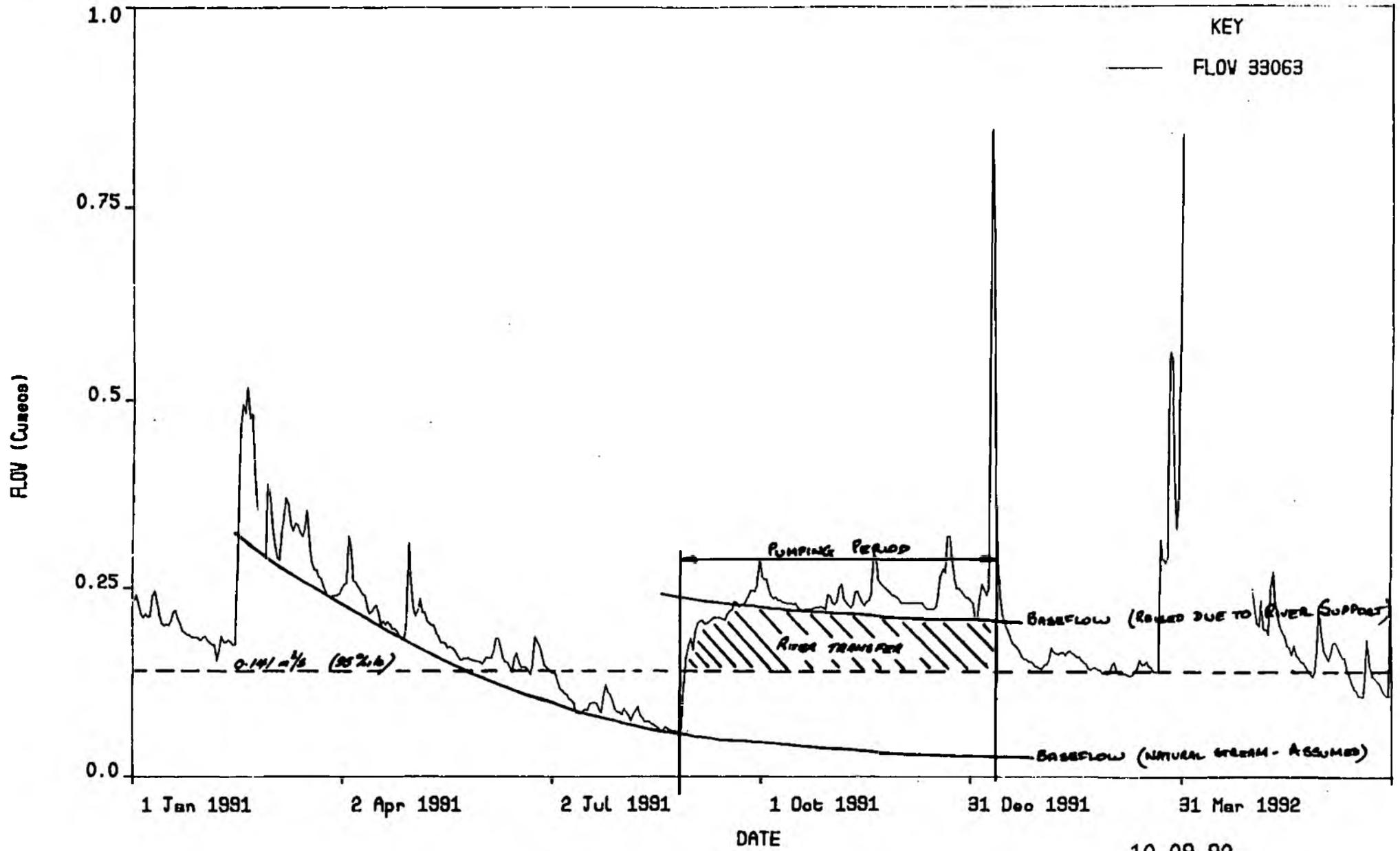
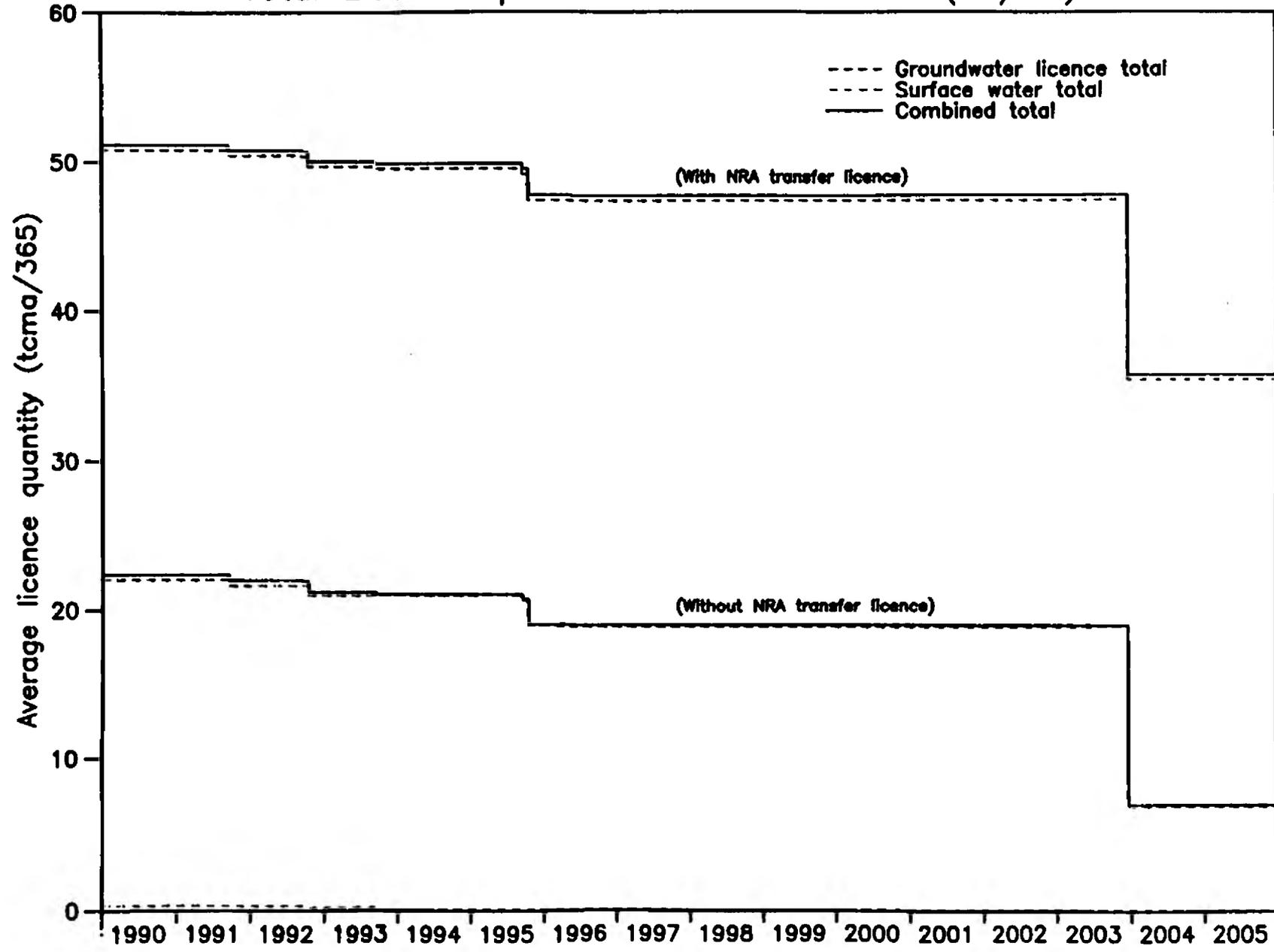


Figure 8 - Predicted drawdown for Cranley 10A

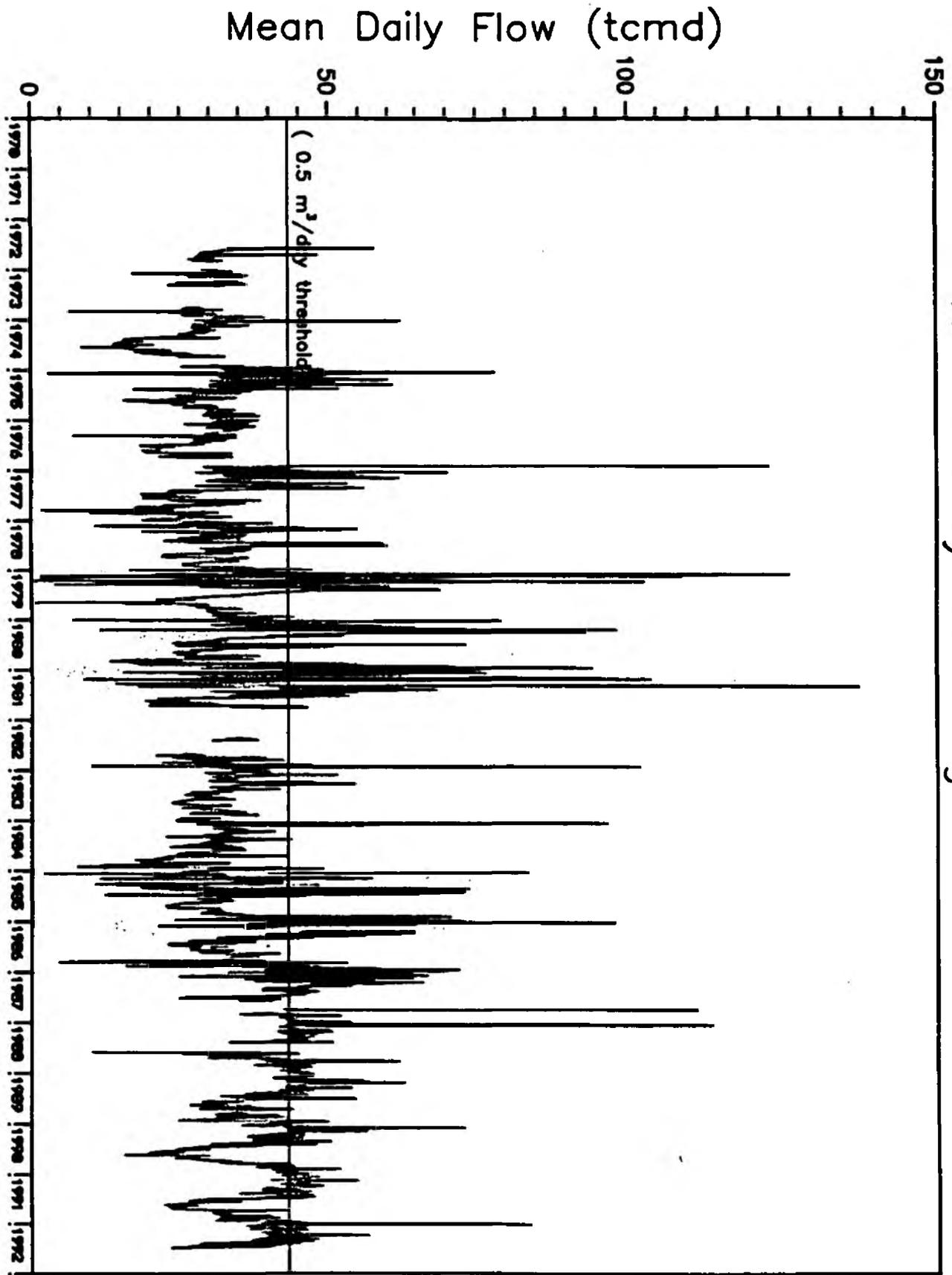
LITTLE OUSE, Knattishall.



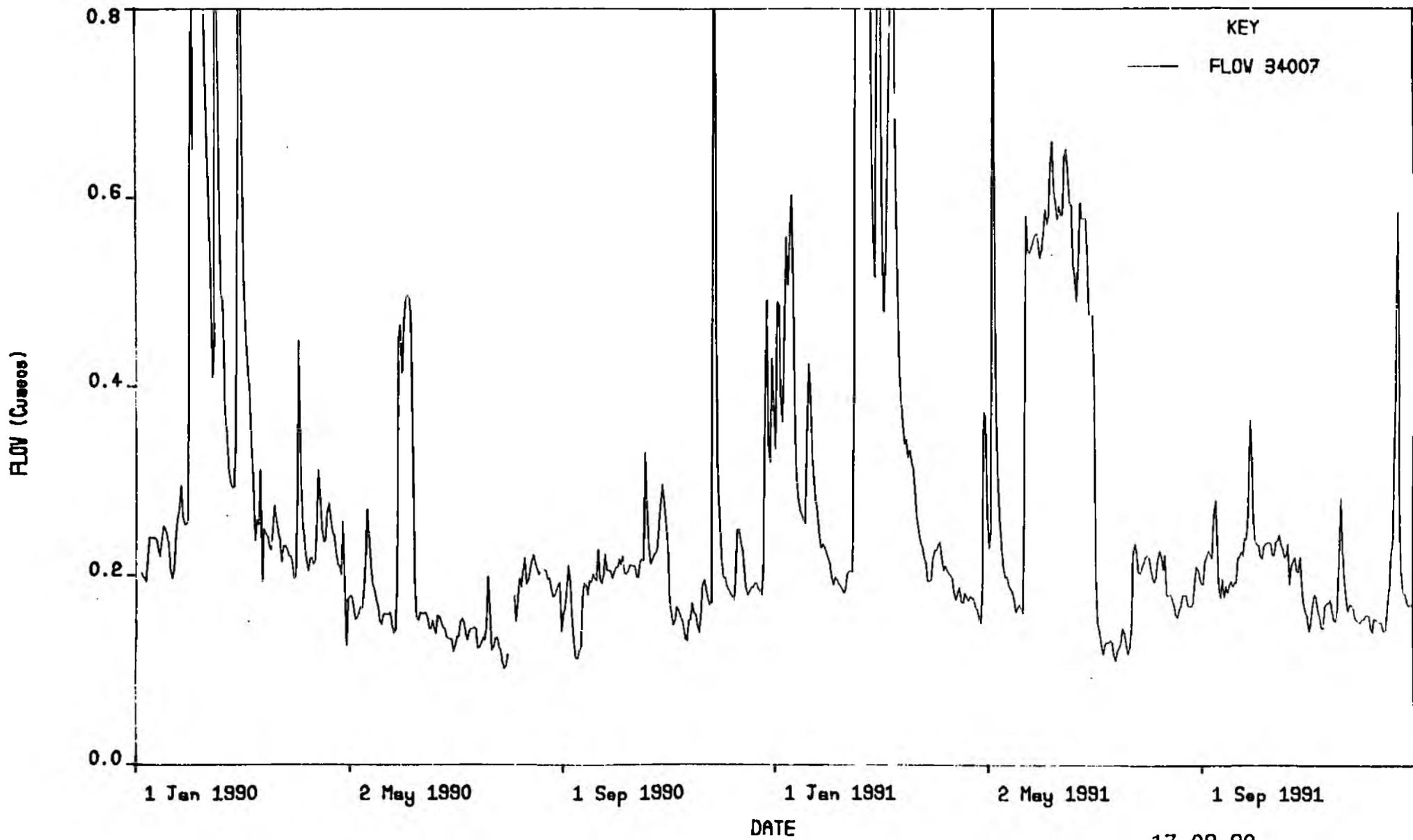
Total Licence quantities for R. Lt Ouse (33/42)



R. Waveney at Ellingham

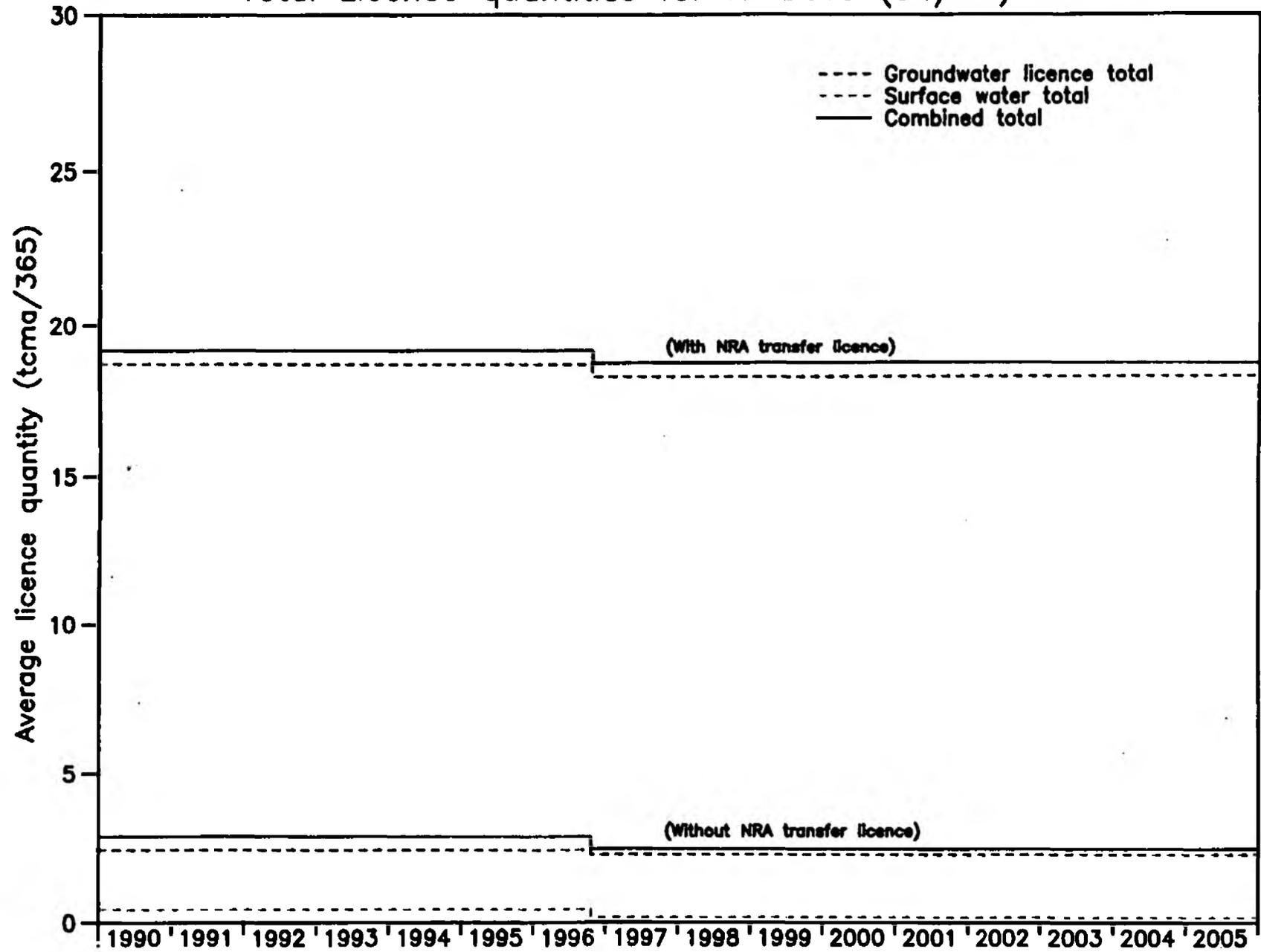


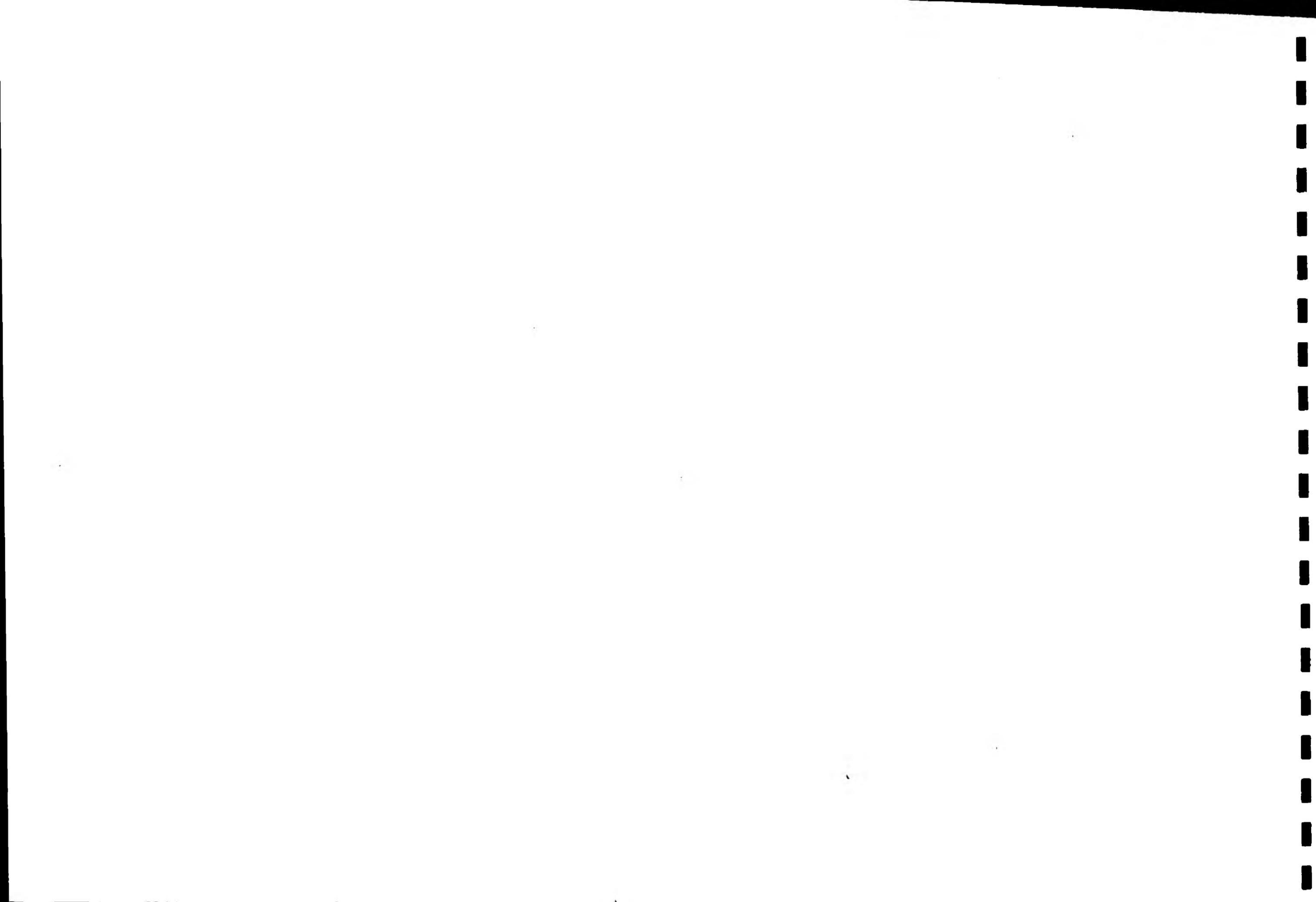
R. Dove, Oakley Park

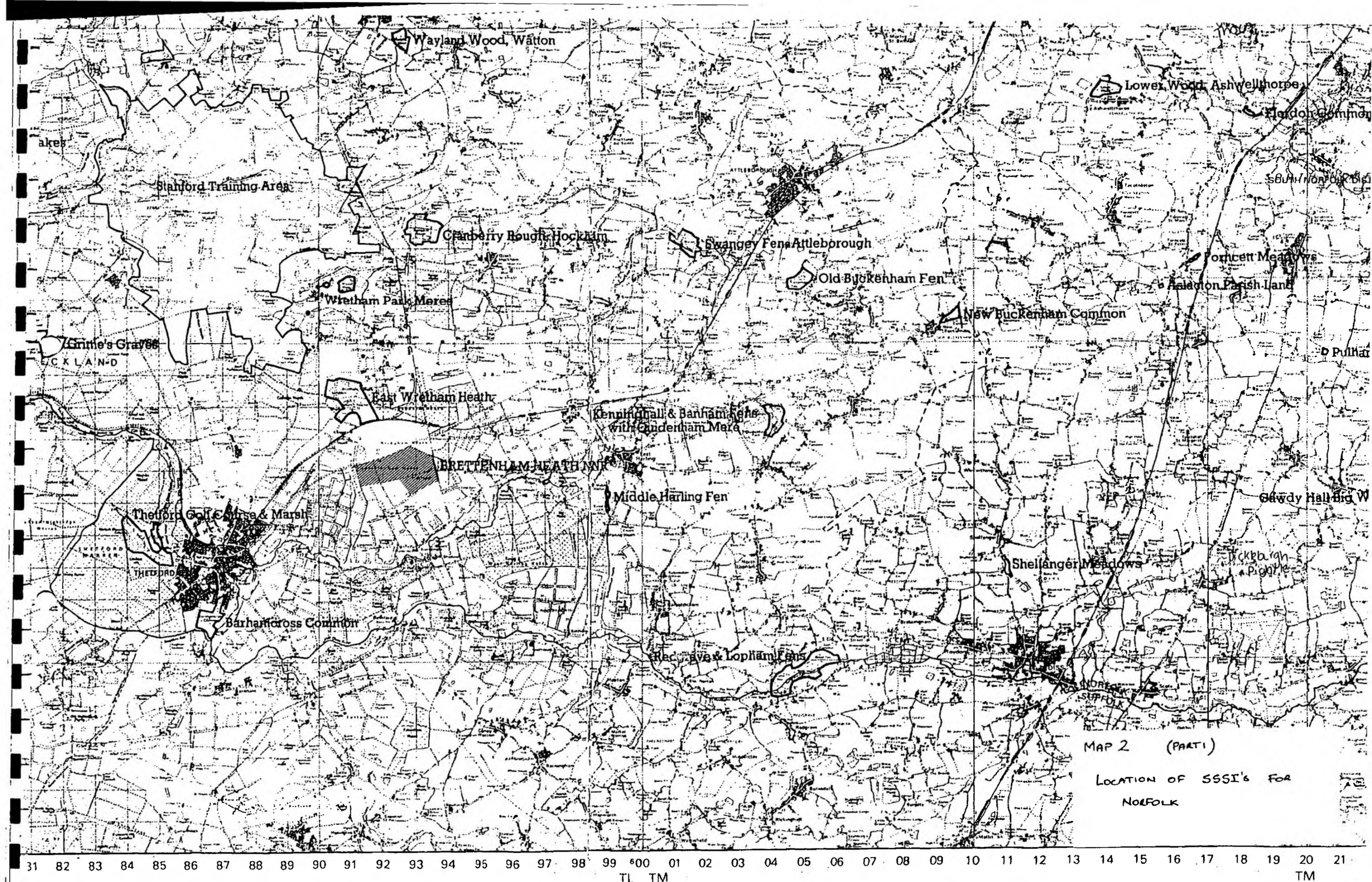


17.09.92

Total Licence quantities for R. Dove (34/17)

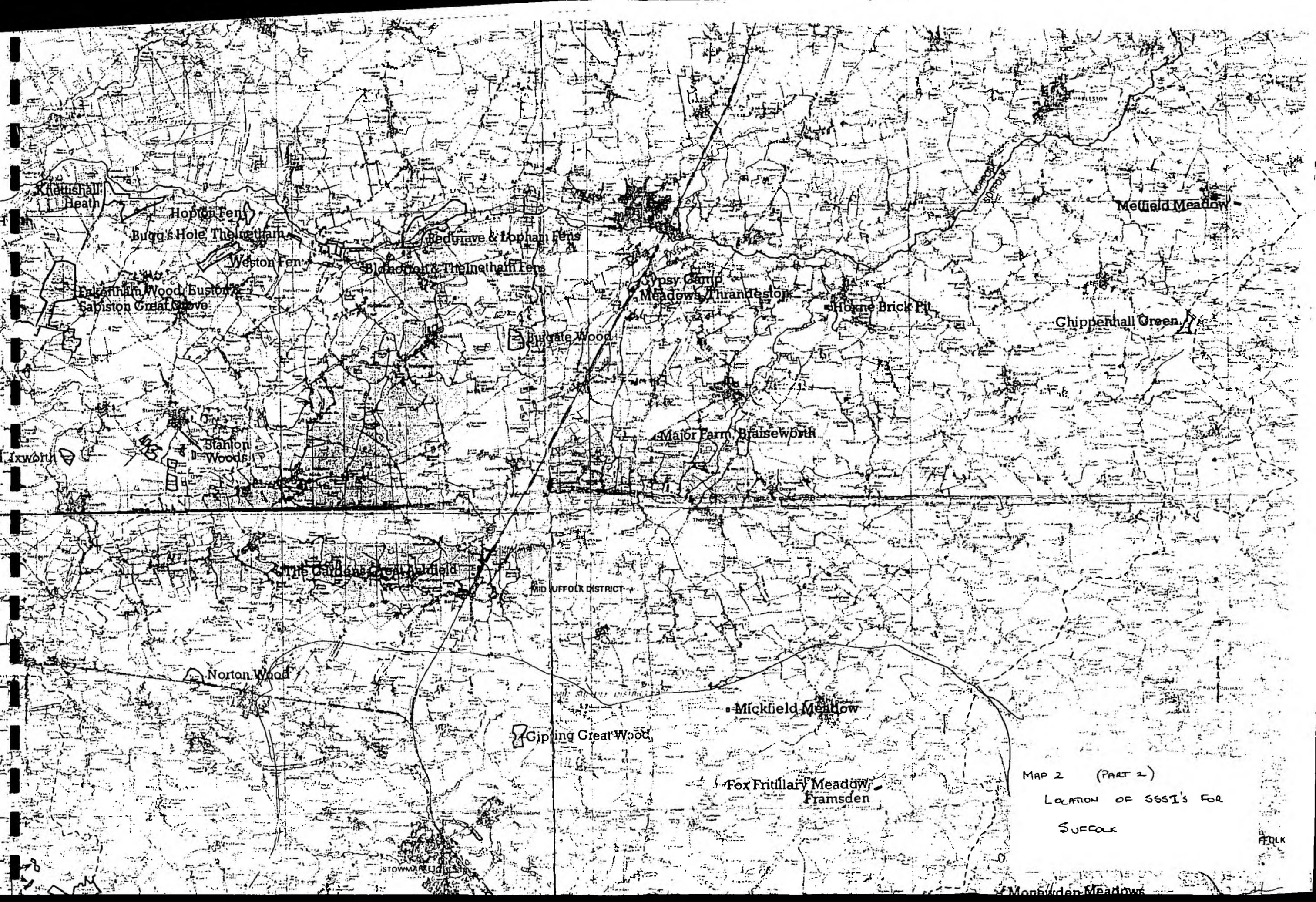






MAP 2 (PART I)
 LOCATION OF SSSI'S FOR
 NORFOLK

31 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21
 TL TM TM



MAP 2 (PART 2)
LOCATION OF SSSIS FOR
SUFFOLK

FOLK

Monbyden Meadows

APPENDIX 1

National Rivers Authority - Relocation of Suffolk Water Company borehole

APPENDIX 2.

National Rivers Authority - Relocation of Suffolk Water Company borehole

WELL SURVEY SHEET

Name/Address of:-

Well GROUNDWATER DEV
BARBORDISHAM

Dairy Farm, North Lopham
Owner AXA
NRA

Tenant Mr. Callow (Adjacent)

Details of Well:-

Ground Level _____

Datum 43.36m AOD to axle flange

Depth ~~175m~~ 160m

Diameter 610 mm

Construction Plain casing 0 - 38m
Sloped 38 - 43m

Used or Disused USED

Probe Obtained _____

A typical W.L. 16.98m May 85

Well drilled by Smiths of Grimby

Date March 1985

Visited by _____

Date _____

General Notes:-

Borehole Acidised on the 26/4/85.
Step Tested 20 May - 23rd May
Seven day test 31st May - 7 June
Logged 17/4/85. Temp measuring
Caliper.

Station No. TM08/85

Nat. Grid Ref. TM 02518361

Aquifer CHALK

Licence No. 42/74

Licence File No. 1007

Abstraction Rate 3000 TCM/A

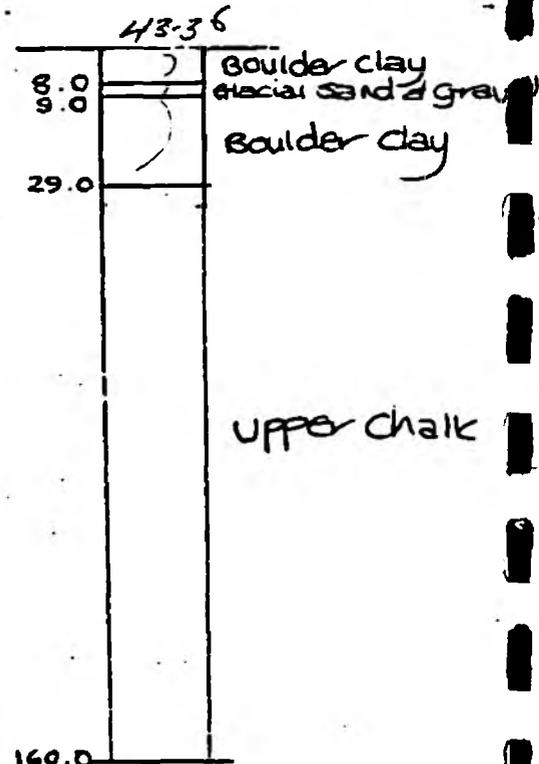
I.G.S. Ref. _____

Other Ref. CWDS 469

Reading Freq. _____

By _____ PROBE/RECORDER

Strata Log and Details



Source of Information:-

Driller (F. Smith & Sons Ltd.)

depth	depth	depth	depth
43.36	0.00	8.00	
34.36	9.00	29.00	
35.36	8.00	1.00	
14.36	29.90		

at 100 m and 45 m below G.L.
18 ton total - 90% at 100m.
at 62 l/pc
TV logged prior to acidising
22/4/85.

RECORD OF WELL

TM08/68

175

At
Town or Village **GARBOLDISHAM**
County **NORFOLK**

EXACT SITE
OF WELL

Six-inch National Grid sheet and reference **TM 0251 8361**
For **ANGLIAN WATER AUTHORITY**
State whether owner, tenant, builder, contractor, consultant, etc.:
Address (if different from above)

*DELETE
AS
NECESSARY

Level of ground surface above sea level (O.D.) ft (..... m)
If well top is not at ground level state how far ^{above*} below: ft (..... m)
SHAFT ft (..... m); diameter ft (..... m);
HEADINGS (please attach details—dimensions and directions)
BORE ft (... **160** m); diameter: at top in (... **6.10** mm);
at bottom in (..... mm)

Full details of permanent lining tubes (position, length, inner and outer diameters, plain slotted etc.):
48.50m x 61.0mm of tube to BSS 879, table
4' from 0.50m A.G.L. lower 10m - slotted - 12 no.
slots 305mm long + 13mm wide

TEST
CONDITIONS

Water struck at depths of ft (..... m) below well top
Rest level of water ft (**16.00** m) ^{above*} below well top. Suction at ft (..... m)
Yield on **7** ^{hours*} _{days} test pumping at galls per (**62** l/s) with
depression to ft (... **70** m) below well top. Recovery to rest level in mins*
Capacity of pump g.p.h. (..... l/s)
Date of measurements **17th April 1985**

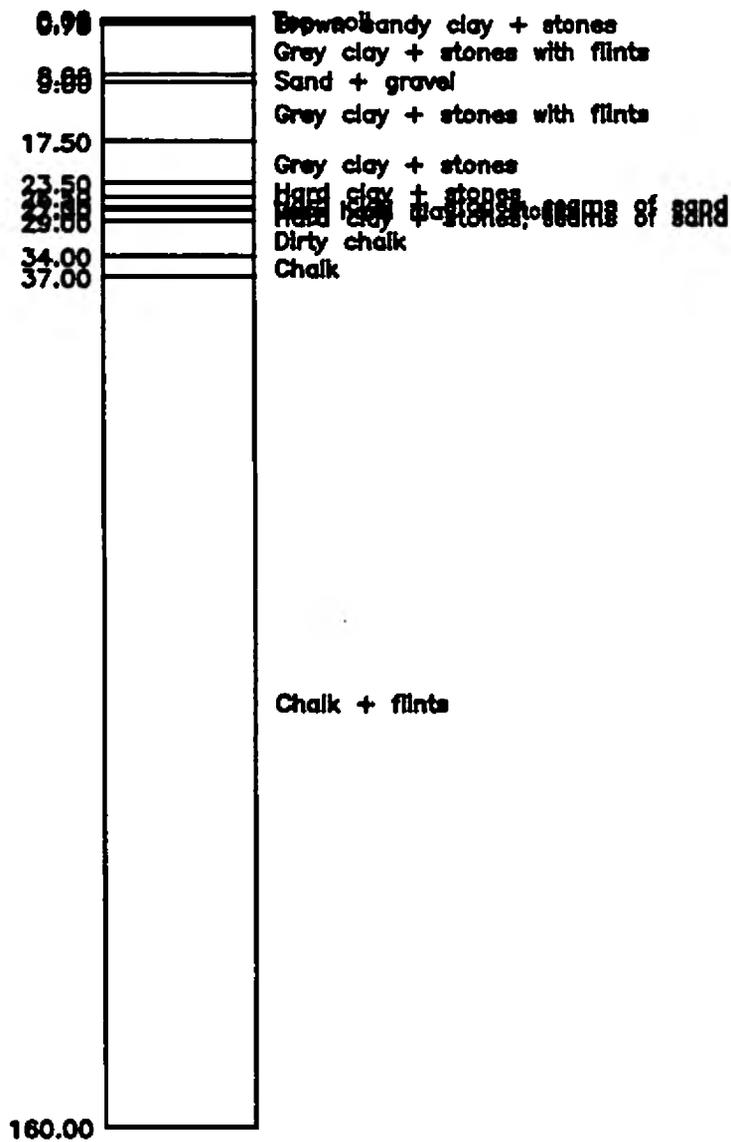
NORMAL
CONDITIONS

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:
Make and/or type Motive power
Capacity galls (..... m³) per hour. Suction at ft (..... m)
below well top. Amount pumped galls (..... m³) per day. Estimated
consumption galls (..... m³) per week
Well made by **F. SMITH & SON (GRIMSBY) LTD** Date of sinking **June 1985**

LOG OF
STRATA
OVERLEAF

ADDITIONAL NOTES ANALYSIS (please attach copy if available)
TREATED WITH 17.84 t. of hydrochloric acid
prior to test pumping

Received from **F. SMITH & SON (GRIMSBY) LTD**
Date **10.7.85**
Observation well
Recorder
ER log
Site marked on
1" map
6" map—Grid Sheet
(use symbol)
Copy to
Date



NRA

GWDS - Garboldisham
 Dairy Farm, North Lopham
 TM08/085

STEP TEST DATA

TM 08/085

Time-Drawdown/Recovery Data

Test Site Name : GWDS- GARBOLDISHAM
 Start Time & Date : 20/05/85- 11:00

Step No.	Pump Rate (l/s)	Pumping Period (mins)	Recovery Period (mins)	Initial Level (m.b.Datum)
1	60.00	240.0	990.0	16.660
2	80.50	240.0	1250.0	17.210
3	37.80	240.0	1200.0	17.380
4	52.80	240.0	240.0	17.180

Elapsed Time (mins)	Step 1 Drawdown (m)	Step 2 Drawdown (m)	Step 3 Drawdown (m)	Step 4 Drawdown (m)	Step 5 Drawdown (m)
0.0	0.000	0.000	0.000	0.000	
0.5	2.200	6.590	2.310	2.830	
1.0	3.910	13.280	3.730	4.960	
1.5	7.040	17.750	4.000	7.180	
2.0	9.090	21.090	4.990	8.370	
2.5	9.770	23.320	5.730	9.430	
3.0	11.000	24.350	6.340	10.080	
3.5	12.750	25.820	6.610	10.520	
4.0	13.470	27.100	6.860	10.850	
4.5	13.920	28.040	6.990	11.150	
5.0	14.280	29.120	7.160	11.350	
6.0	14.860	30.620	7.370	11.690	
7.0	15.230	31.850	7.510	11.930	
8.0	15.490	32.850	7.640	12.140	
9.0	15.727	33.740	7.740	12.300	
10.0	15.900	34.450	7.850	12.440	
12.0	16.200	35.570	8.020	12.640	
15.0	16.510	36.710	8.200	12.910	
20.0	16.760	38.350	8.460	13.220	
25.0	17.040	38.550	8.670	13.450	
30.0	17.280	38.940	8.840	13.700	
35.0	17.510	39.310	8.950	13.840	
40.0	17.720	39.650	9.080	14.010	
45.0	17.930	39.900	9.180	14.180	
50.0	18.090	40.150	9.290	14.280	
55.0	18.250	40.270	9.390	14.410	
60.0	18.370	40.500	9.470	14.540	
70.0	18.670	40.720	9.630	14.750	
80.0	18.860	41.030	9.770	14.980	
90.0	19.140	41.290	9.910	15.200	
100.0	19.340	41.590	10.020	15.340	

DATE OF ANALYSIS /
 by D SECORBE

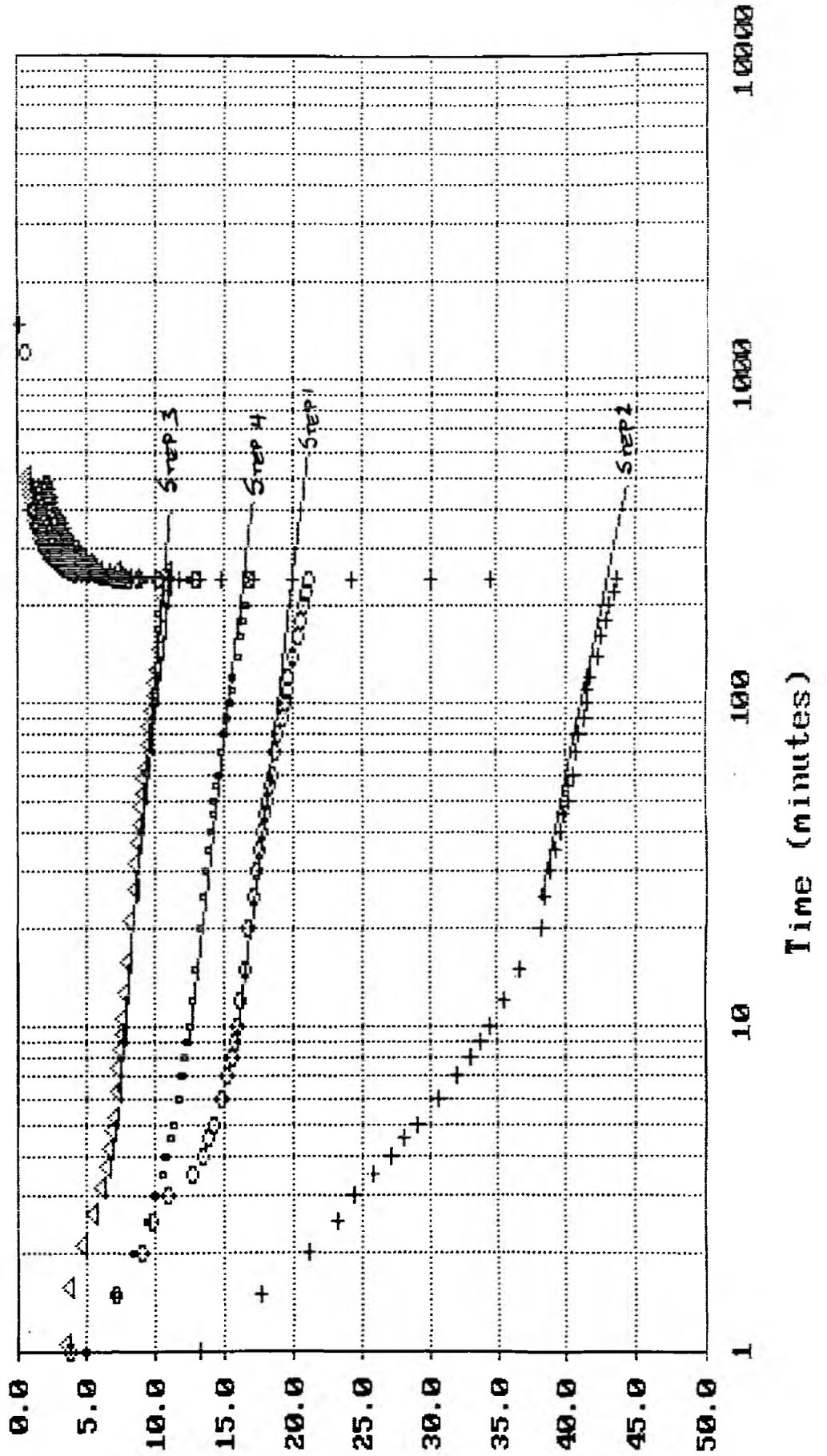
Elapsed Time (mins)	Step 1 Drawdown (m)	Step 2 Drawdown (m)	Step 3 Drawdown (m)	Step 4 Drawdown (m)	Step 5 Drawdown (m)
110.0	19.520	41.590	10.130	15.500	
120.0	19.700	41.790	10.230	15.660	
140.0	20.010	42.280	10.420	15.880	
160.0	20.290	42.570	10.620	16.120	
180.0	20.540	42.830	10.760	16.310	
200.0	20.740	43.160	10.910	16.500	
220.0	20.970	43.410	11.030		
240.0	21.150	43.590	11.150	16.630	
240.5	16.740	34.690	7.430	12.430	
241.0	12.940	29.950	6.040	9.140	
241.5	10.190	24.240	5.190	7.870	
242.0	8.920	19.980	4.860	7.220	
242.5	8.100	17.050	4.450	6.440	
243.0	7.690	14.880	4.240	6.140	
243.5	7.410	13.260	4.150	5.990	
244.0	7.130	11.750	4.040	5.730	
244.5	6.920	10.900	3.900	5.560	
245.0	6.760	9.980	3.830	5.470	
246.0	6.510	8.880	3.690	5.250	
247.0	6.330	8.240	3.580	5.110	
248.0	6.160	7.900	3.490	4.960	
249.0	6.010	7.630	3.410	4.830	
250.0	5.880	7.420	3.330	4.760	
252.0	5.680	7.080	3.200	4.560	
255.0	5.430	6.700	3.040	4.330	
260.0	5.090	6.230	2.840	4.050	
265.0	4.830	5.850	2.670	3.840	
270.0	4.650	5.550	2.530	3.640	
275.0	4.470	5.300	2.420	3.470	
280.0	4.300	5.060	2.310	3.320	
285.0	4.140	4.860	2.220	3.190	
290.0	4.010	4.690	2.140	3.070	
295.0	3.880	4.510	2.060	2.980	
300.0	3.770	4.380	1.990	2.880	
310.0	3.560	4.120	1.870	2.700	
320.0	3.380	3.900	1.760	2.570	
330.0	3.250	3.700	1.660	2.440	
340.0	3.110	3.530	1.580	2.330	
350.0	2.990	3.370	1.500	2.230	
360.0	2.880	3.230	1.430	2.130	
380.0	2.680	2.990	1.300	1.960	
400.0	2.530	2.770	1.200	1.830	
420.0	2.370	2.590	1.100	1.700	
440.0	2.240	2.410	1.020	1.590	
460.0	2.130	2.270	0.950	1.490	
480.0	2.040	2.150	0.890	1.400	
1230.0	0.550				
1440.0			-0.200		
1490.0		0.170			

TM 08/085

BIERSCHENK & WILSON

3W1

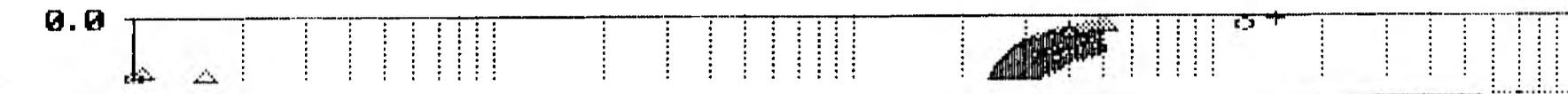
(STEP 1 10/07/92)



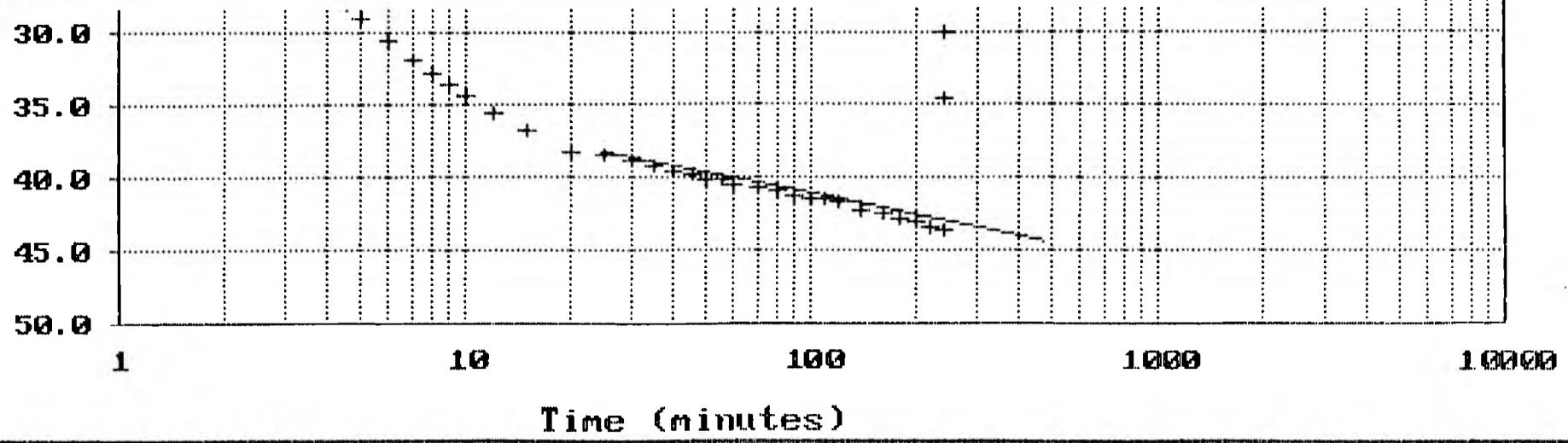
Drawdown

Time (minutes)

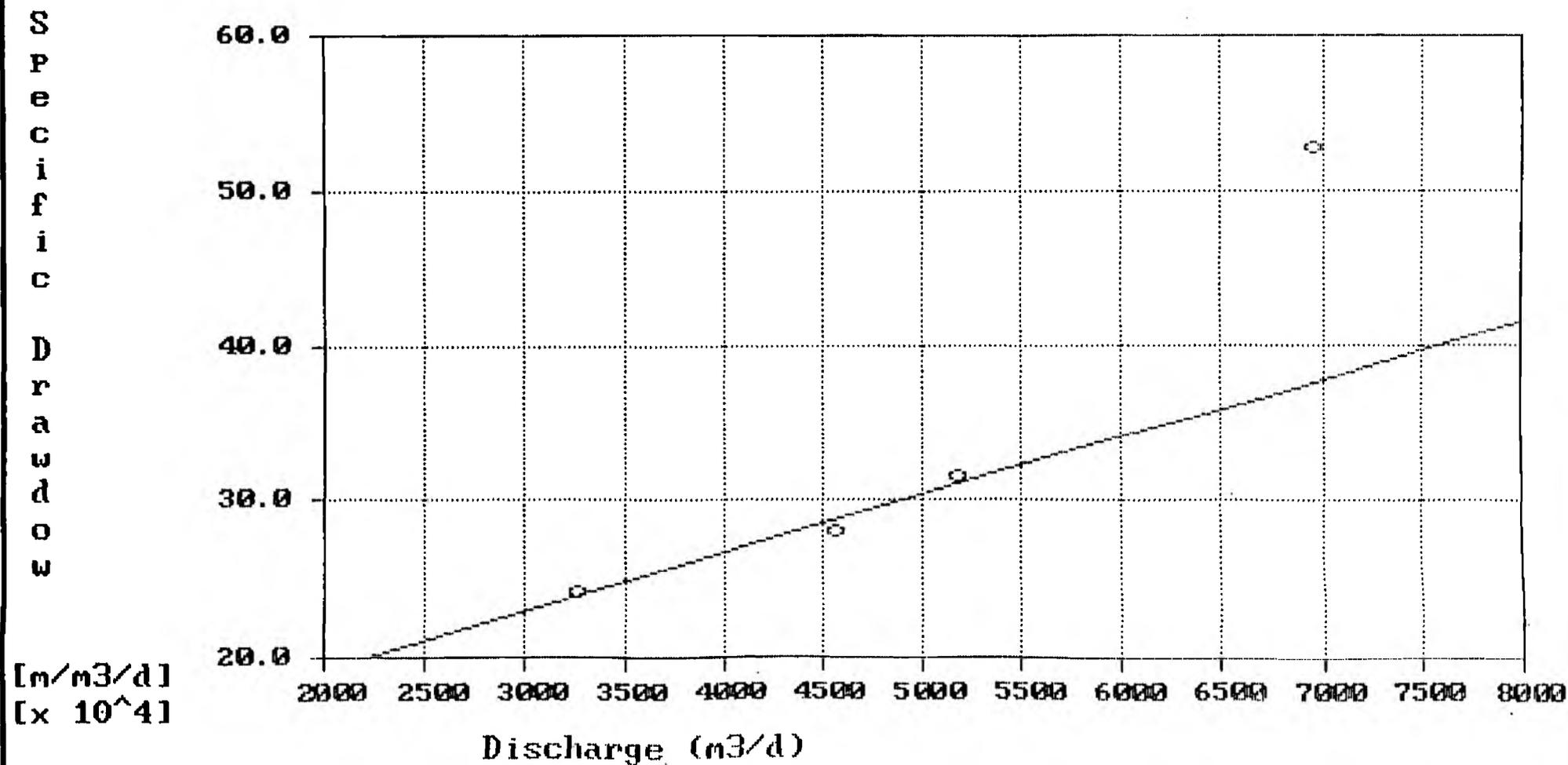
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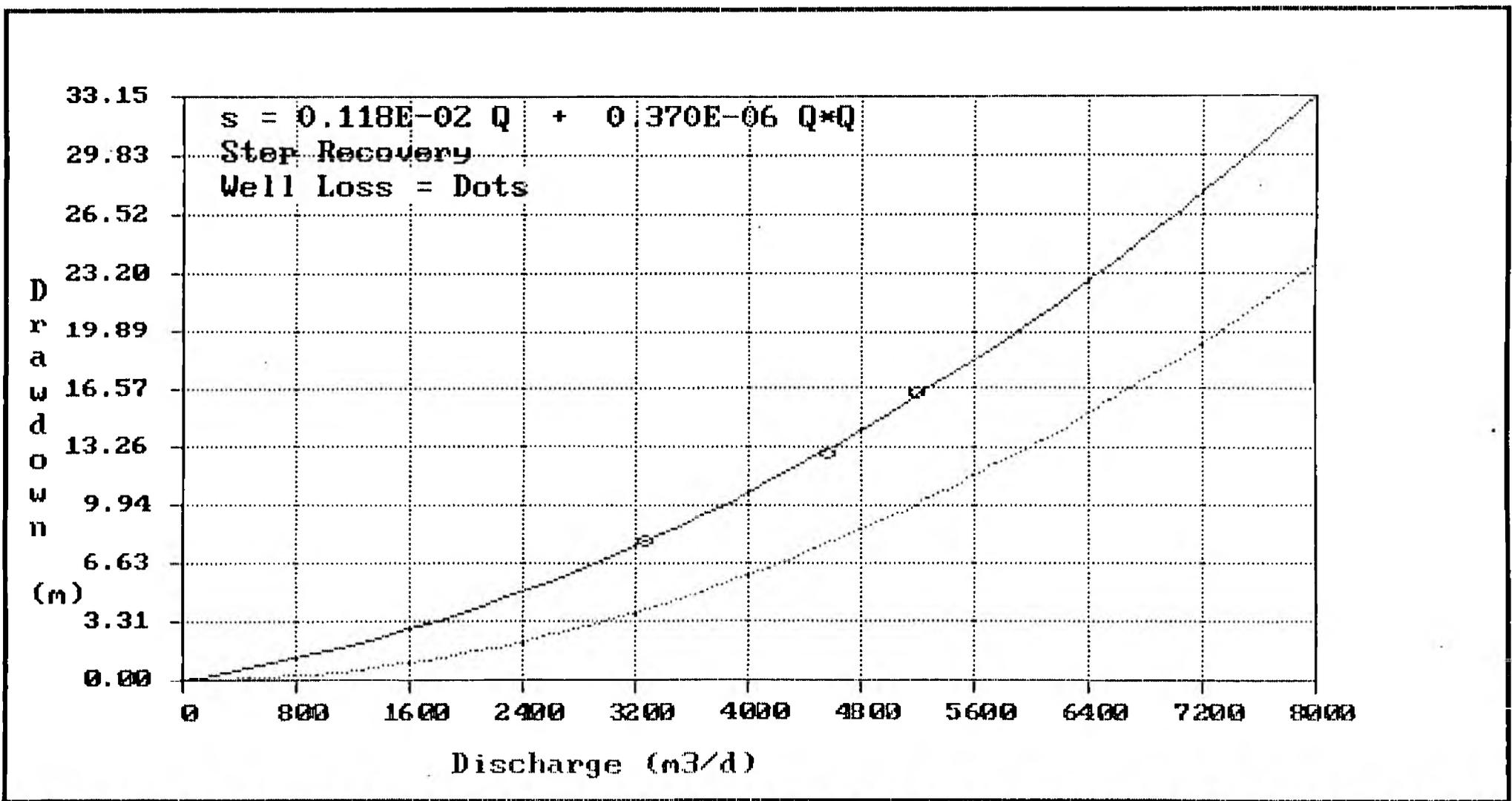


Step No.	Pumping (l/s)	Drawdown at 10 mins		s/Q (m/m ³ /d)	
		S.Recovery	S.Increment	S.Recovery	S.Increment
1	60.00	16.311 m	16.311 m	0.3146E-02	0.3146E-02
2	80.50	36.705 m	35.791 m	0.5277E-02	0.5146E-02
3	37.80	7.880 m	5.422 m	0.2413E-02	0.1660E-02
4	52.80	12.796 m	9.649 m	0.2805E-02	0.2115E-02

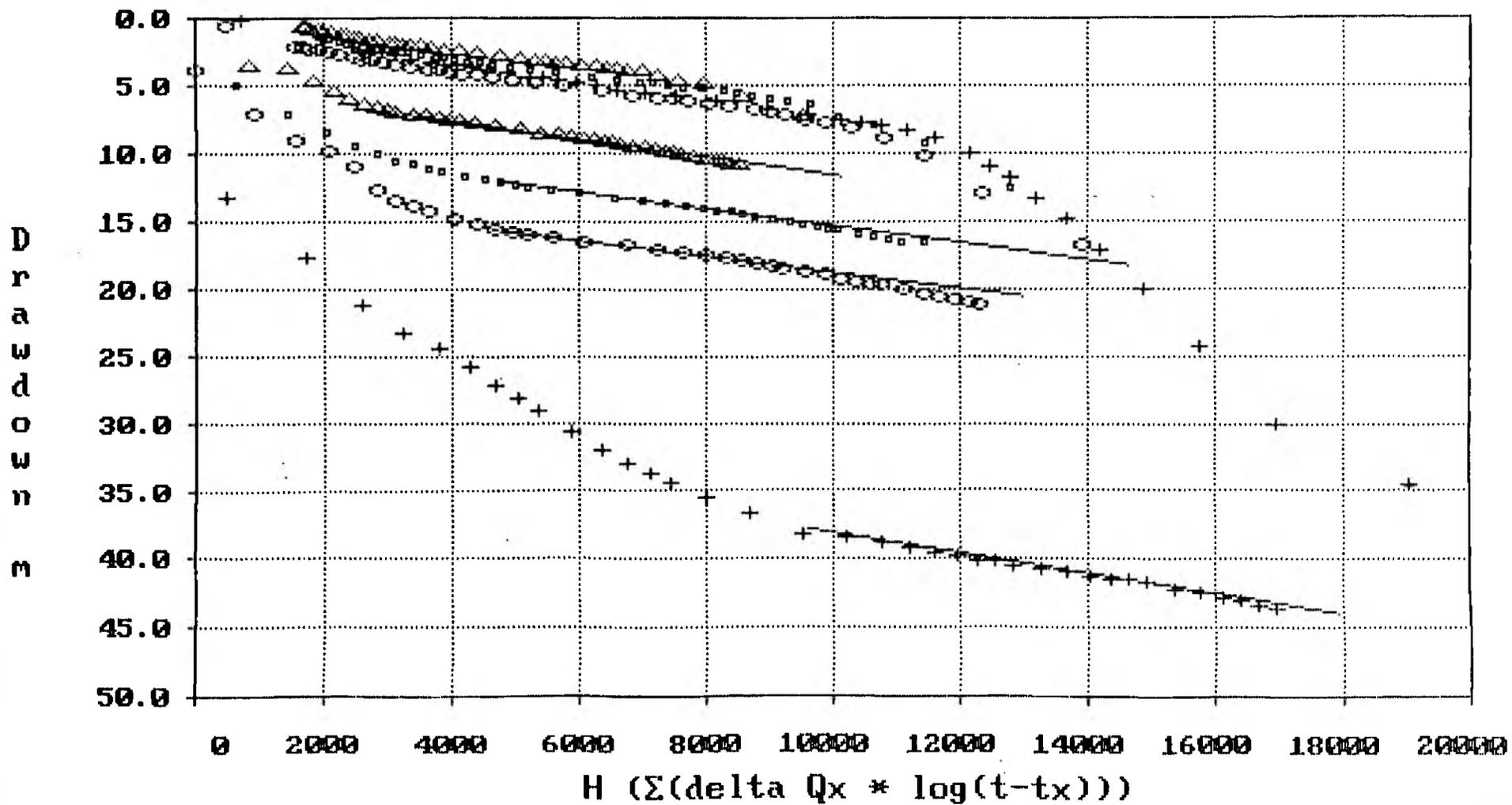


GWDS- GARBOLDISHAM 20/05/85- 11:00 - Step Recov.





4 mg

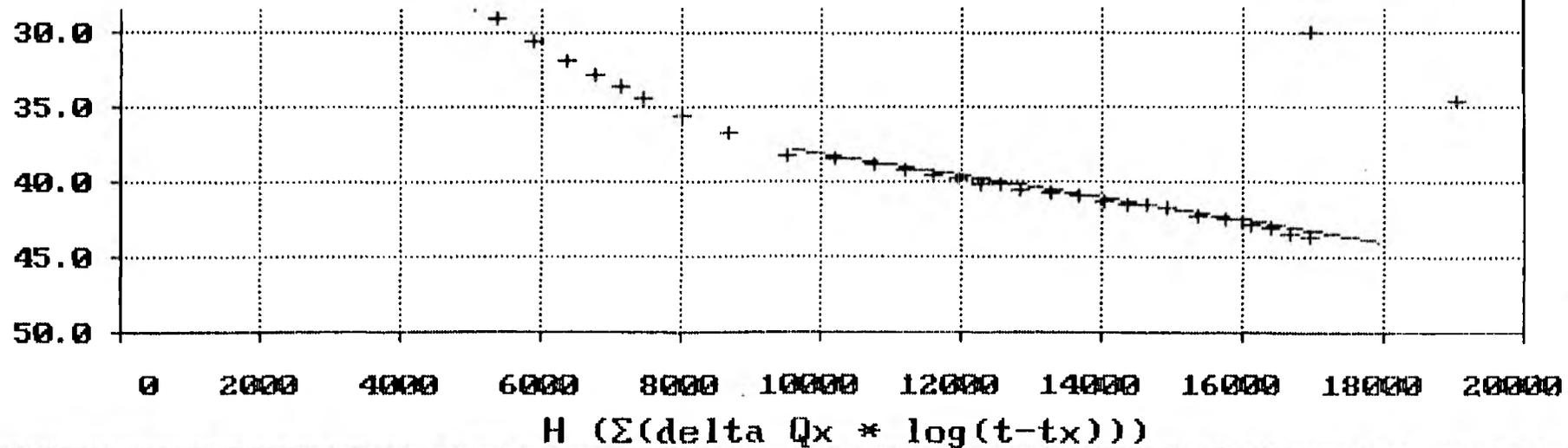


TM 08/085
 EDEN 2 Hazel
 (STES 7 10/07/92)



Step No.	Pumping (l/s)	Trans (m2/d)	Intercept (m)	h/Q (m/m3/d)	Gradient
1	60.000	306.0	12.802	0.2469E-02	0.5981E-03
2	80.500	247.5	30.784	0.4426E-02	0.7396E-03
3	37.800	272.8	4.942	0.1513E-02	0.6708E-03
4	52.800	295.0	9.187	0.2014E-02	0.6203E-03

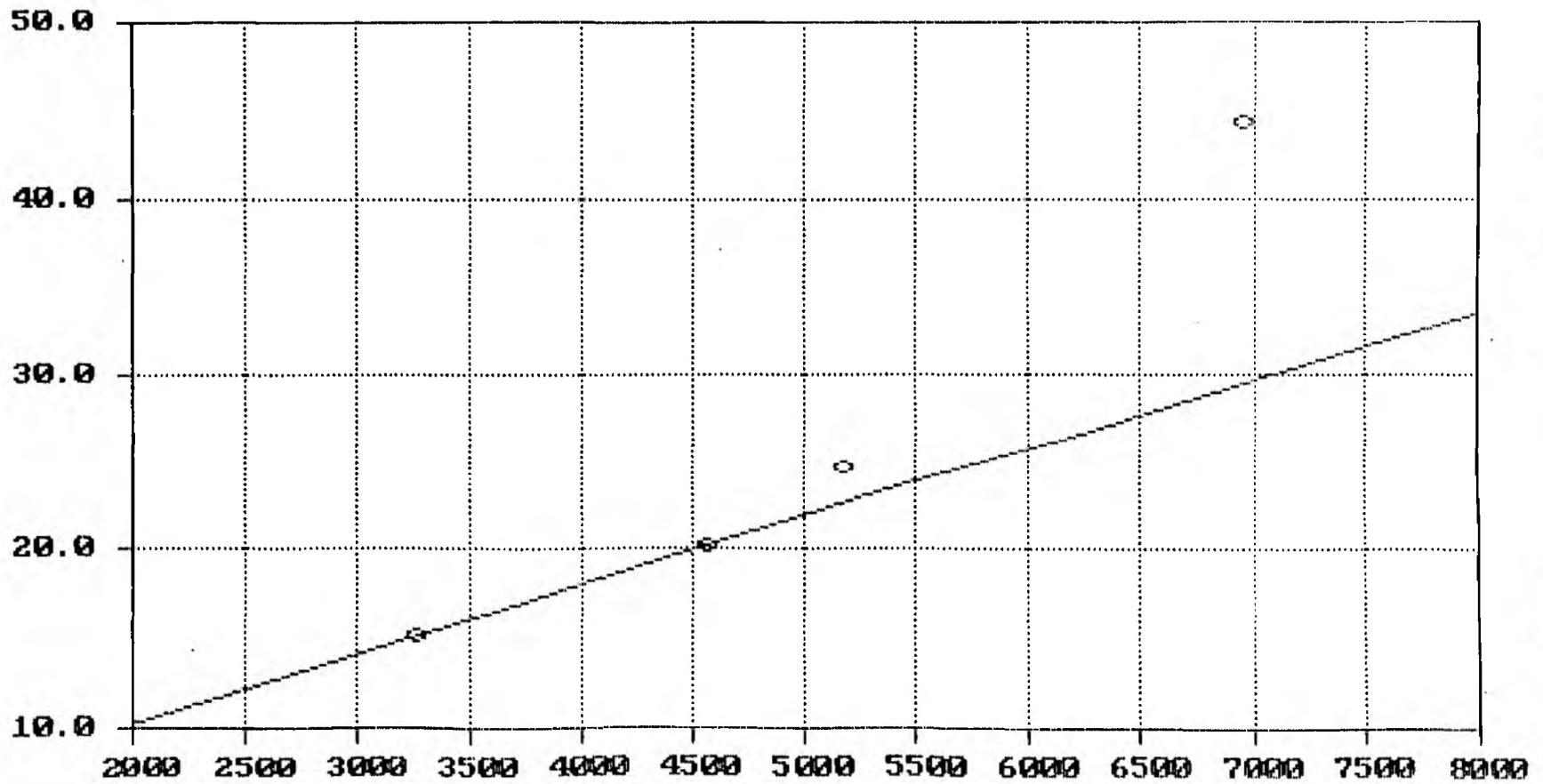
D
r
a
w
n
g



GWDS- GARBOLDISHAM 20/05/85- 11:00 -

S
P
E
C
I
F
I
C

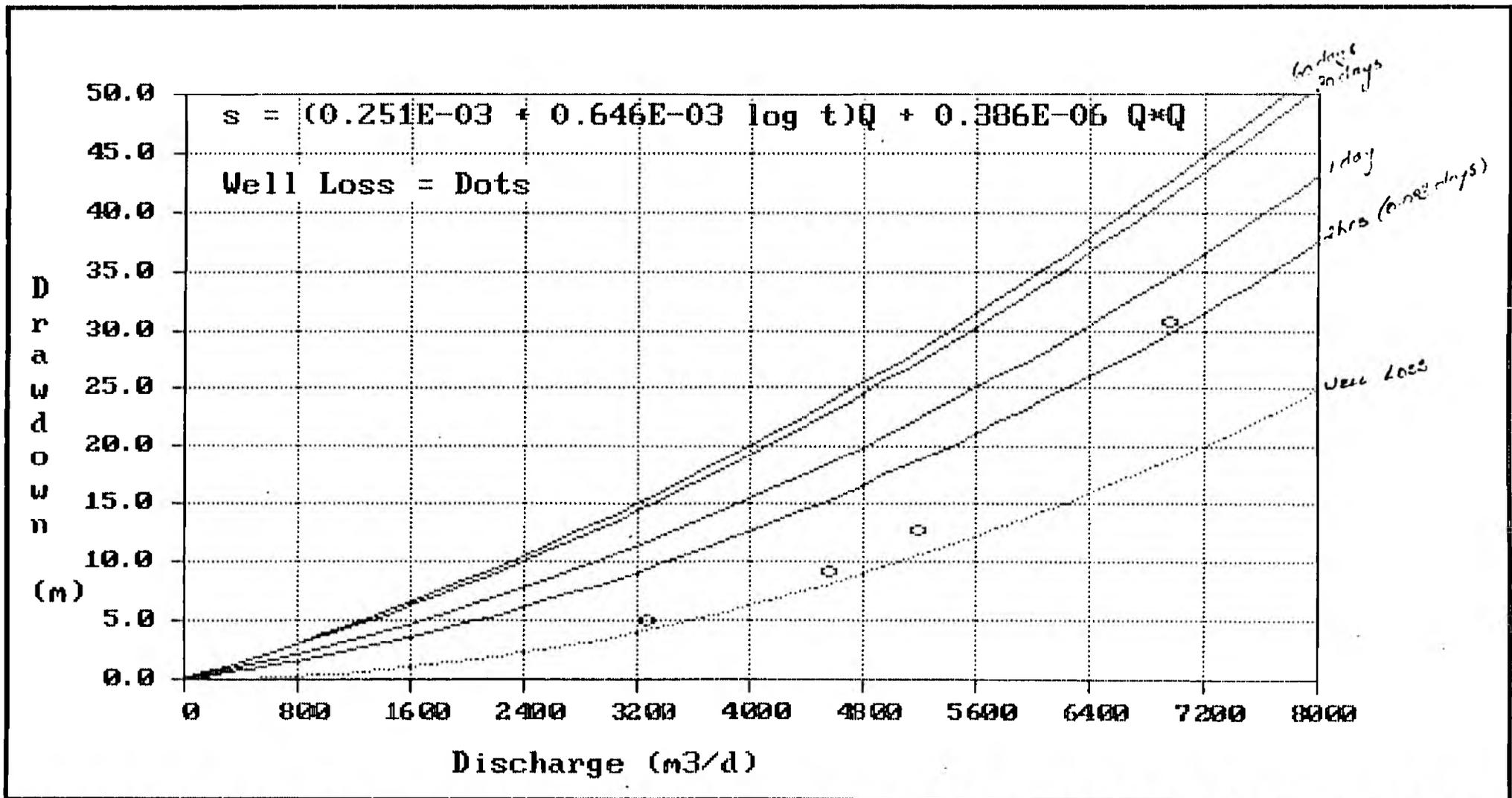
D
r
a
w
d
o
w



[m/m3/d]
[x 10^4]

Discharge (m3/d)

44



TM08/085

AQUIFER TEST DATA

Time-Drawdown Data

Test-Reference : GWDS- GARBOLDISHAM
 Start Time & Date : 31/05/85 14:05
 Test Discharge : 72.7 l/s

Piez. No. Ref. Rad. Dist.
 1 TM08/082 229.9 m

Elapsed Time (mins)	Production Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
0.0	16.790	0.000	0.000			
1.0	26.500	9.710				
2.0	31.770	14.980				
3.0	36.320	19.530				
4.0	38.720	21.930				
5.0	40.150	23.360				
6.0	40.890	24.100				
7.0	41.780	24.990				
8.0	42.430	25.640				
9.0	42.990	26.200				
10.0	43.450	26.660	0.220			
12.0	44.300	27.510				
15.0	45.250	28.460				
20.0	46.410	29.620				
25.0	47.280	30.490	0.510			
30.0	48.130	31.340				
35.0	48.890	32.100				
40.0	49.600	32.810	0.690			
45.0	50.200	33.410				
50.0	50.850	34.060				
55.0	51.360	34.570	0.820			
60.0	51.880	35.090				
70.0	52.770	35.980	0.930			
80.0	53.550	36.760				
85.0			1.020			
90.0	54.330	37.540				
100.0	54.940	38.150	1.100			
110.0	55.560	38.770				
115.0			1.170			
120.0	56.070	39.280				
130.0			1.230			
140.0	56.970	40.180				
145.0			1.300			
160.0	57.740	40.950	1.380			
175.0			1.450			
180.0	58.420	41.630				
190.0			1.510			
200.0	59.080	42.290				

Elapsed Time (mins)	Production Well Data Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
205.0			1.560			
220.0	59.770	42.980	1.610			
235.0			1.670			
240.0	60.350	43.560				
250.0			1.720			
265.0			1.770			
280.0			1.810			
295.0			1.860			
300.0	61.840	45.050				
310.0			1.900			
325.0			1.940			
340.0			1.980			
355.0			2.020			
360.0	63.130	46.340				
370.0			2.060			
385.0			2.100			
400.0			2.140			
415.0			2.170			
420.0	64.150	47.360				
430.0			2.200			
445.0			2.230			
460.0			2.260			
475.0			2.290			
480.0	65.040	48.250				
490.0			2.320			
505.0			2.350			
520.0			2.390			
535.0			2.420			
540.0	65.730	48.940				
550.0			2.450			
565.0			2.470			
580.0			2.490			
595.0			2.520			
599.0	66.280	49.490				
610.0			2.540			
625.0			2.570			
640.0			2.600			
655.0			2.620			
660.0	66.840	50.050				
670.0			2.640			
685.0			2.660			
700.0			2.680			
715.0			2.710			
720.0	67.420	50.630				
730.0			2.730			
745.0			2.750			
760.0			2.760			
775.0			2.780			
780.0	67.710	50.920				
790.0			2.800			
805.0			2.820			
820.0			2.830			

Elapsed Time (mins)	Production Well Data Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
835.0			2.850			
840.0	68.050	51.260				
850.0			2.870			
865.0			2.890			
880.0			2.910			
895.0			2.920			
900.0	68.400	51.610				
910.0			2.940			
925.0			2.960			
940.0			2.970			
955.0			2.980			
960.0	68.620	51.830				
970.0			3.000			
985.0			3.010			
1000.0			3.030			
1015.0			3.040			
1020.0	68.810	52.020				
1030.0			3.060			
1045.0			3.080			
1060.0			3.090			
1075.0			3.110			
1080.0	69.060	52.270				
1090.0			3.120			
1105.0			3.140			
1120.0			3.150			
1135.0			3.160			
1140.0	69.190	52.400				
1150.0			3.170			
1165.0			3.190			
1180.0			3.200			
1195.0			3.200			
1200.0	69.300	52.510				
1210.0			3.210			
1225.0			3.230			
1240.0			3.240			
1255.0			3.250			
1260.0	69.420	52.630				
1270.0			3.260			
1285.0			3.270			
1300.0			3.280			
1315.0			3.290			
1320.0	69.460	52.670				
1330.0			3.300			
1345.0			3.310			
1360.0			3.320			
1375.0			3.330			
1380.0	69.590	52.800				
1390.0			3.340			
1405.0			3.350			
1420.0			3.350			
1435.0			3.360			
1440.0	69.590	52.800				

Elapsed Time (mins)	Production Well Data Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
1450.0			3.370			
1465.0			3.380			
1480.0			3.390			
1495.0			3.390			
1500.0	69.080	52.290				
1510.0			3.400			
1525.0			3.400			
1540.0			3.410			
1555.0			3.420			
1560.0	69.050	52.260				
1570.0			3.430			
1585.0			3.440			
1600.0			3.440			
1615.0			3.450			
1620.0	69.130	52.340				
1630.0			3.460			
1645.0			3.470			
1660.0			3.480			
1675.0			3.490			
1680.0	69.200	52.410				
1690.0			3.490			
1705.0			3.500			
1720.0			3.510			
1735.0			3.510			
1740.0	69.350	52.560				
1750.0			3.520			
1765.0			3.530			
1780.0			3.530			
1795.0			3.530			
1800.0	69.510	52.720				
1810.0			3.540			
1825.0			3.550			
1840.0			3.560			
1855.0			3.570			
1860.0	69.720	52.930				
1870.0			3.570			
1885.0			3.580			
1900.0			3.580			
1915.0			3.590			
1920.0	69.890	53.100				
1930.0			3.600			
1945.0			3.610			
1960.0			3.620			
1975.0			3.620			
1980.0	70.000	53.210				
1990.0			3.630			
2005.0			3.630			
2020.0			3.640			
2035.0			3.640			
2040.0	70.110	53.320				
2050.0			3.640			
2065.0			3.650			

Elapsed Time (mins)	Production Well Data		Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
	Water Level (m.b.ref)	Drawdown (m)				
2080.0			3.660			
2095.0			3.670			
2100.0	70.220	53.430				
2110.0			3.670			
2125.0			3.670			
2140.0			3.680			
2155.0			3.680			
2160.0	70.350	53.560				
2170.0			3.690			
2185.0			3.700			
2200.0			3.700			
2215.0			3.700			
2220.0	70.280	53.490				
2230.0			3.710			
2245.0			3.710			
2260.0			3.710			
2275.0			3.720			
2280.0	70.390	53.600				
2290.0			3.720			
2305.0			3.730			
2320.0			3.730			
2335.0			3.730			
2340.0	70.410	53.620				
2350.0			3.740			
2365.0			3.740			
2380.0			3.750			
2395.0			3.750			
2400.0	70.390	53.600				
2410.0			3.750			
2425.0			3.760			
2440.0			3.760			
2455.0			3.770			
2460.0	70.340	53.550				
2470.0			3.780			
2485.0			3.780			
2500.0			3.780			
2515.0			3.780			
2520.0	70.220	53.430				
2530.0			3.790			
2545.0			3.790			
2560.0			3.800			
2575.0			3.800			
2580.0	70.200	53.410				
2590.0			3.810			
2605.0			3.810			
2620.0			3.810			
2635.0			3.820			
2640.0	70.090	53.300				
2650.0			3.820			
2665.0			3.820			
2680.0			3.830			
2695.0			3.830			

Elapsed Time (mins)	Production Well Data		Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
	Water Level (m.b.ref)	Drawdown (m)				
2700.0	70.070	53.280				
2710.0				3.830		
2725.0				3.840		
2740.0				3.840		
2755.0				3.840		
2760.0	70.060	53.270				
2770.0				3.840		
2785.0				3.830		
2800.0				3.840		
2815.0				3.840		
2820.0	70.080	53.290				
2830.0				3.840		
2845.0				3.840		
2860.0				3.840		
2875.0				3.850		
2880.0	70.110	53.320				
2890.0				3.850		
2905.0				3.850		
2920.0				3.860		
2935.0				3.860		
2940.0	70.080	53.290				
2950.0				3.860		
2965.0				3.870		
2980.0				3.870		
2995.0				3.870		
3000.0	70.100	53.310				
3010.0				3.870		
3025.0				3.870		
3040.0				3.870		
3055.0				3.870		
3060.0	70.120	53.330				
3070.0				3.870		
3085.0				3.880		
3100.0				3.880		
3115.0				3.880		
3120.0	70.160	53.370				
3130.0				3.880		
3145.0				3.880		
3160.0				3.890		
3175.0				3.890		
3180.0	70.180	53.390				
3190.0				3.890		
3205.0				3.900		
3220.0				3.900		
3235.0				3.900		
3240.0	70.190	53.400				
3250.0				3.900		
3265.0				3.910		
3280.0				3.910		
3295.0				3.910		
3300.0	70.330	53.540				
3310.0				3.910		

Elapsed Time (mins)	Production Well Data Water Level (m.b.ref)	Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
3325.0			3.920			
3340.0			3.920			
3355.0			3.910			
3360.0	70.410	53.620				
3370.0			3.920			
3385.0			3.920			
3400.0			3.920			
3415.0			3.920			
3420.0	70.570	53.780				
3430.0			3.920			
3445.0			3.930			
3460.0			3.930			
3475.0			3.930			
3480.0	70.650	53.860				
3490.0			3.930			
3505.0			3.930			
3520.0			3.930			
3535.0			3.930			
3540.0	70.720	53.930				
3550.0			3.940			
3565.0			3.940			
3580.0			3.940			
3595.0			3.950			
3600.0	70.770	53.980				
3610.0			3.950			
3625.0			3.950			
3640.0			3.950			
3655.0			3.950			
3660.0	70.710	53.920				
3670.0			3.950			
3685.0			3.950			
3700.0			3.950			
3715.0			3.950			
3720.0	70.690	53.900				
3730.0			3.950			
3745.0			3.960			
3760.0			3.960			
3775.0			3.960			
3780.0	70.800	54.010				
3790.0			3.960			
3805.0			3.960			
3820.0			3.960			
3835.0			3.960			
3840.0	70.750	53.960				
3850.0			3.970			
3865.0			3.970			
3880.0			3.970			
3895.0			3.980			
3900.0	70.700	53.910				
3910.0			3.980			
3925.0			3.980			
3940.0			3.980			

Elapsed Time (mins)	Production Well Data Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
3955.0			3.980			
3960.0	70.520	53.730				
3970.0			3.980			
3985.0			3.980			
4000.0			3.980			
4015.0			3.990			
4020.0	70.400	53.610				
4030.0			3.990			
4045.0			3.990			
4060.0			3.990			
4075.0			3.990			
4080.0	70.290	53.500				
4090.0			3.990			
4105.0			3.990			
4120.0			4.000			
4135.0			4.000			
4140.0	70.180	53.390				
4150.0			4.000			
4165.0			3.990			
4180.0			4.000			
4195.0			4.000			
4210.0			4.010			
4225.0			4.010			
4240.0			4.000			
4255.0			4.000			
4260.0	70.140	53.350				
4270.0			4.000			
4285.0			4.000			
4300.0			4.000			
4315.0			4.000			
4320.0	70.060	53.270				
4330.0			4.010			
4345.0			4.010			
4360.0			4.000			
4375.0			4.000			
4380.0	70.050	53.260				
4390.0			4.020			
4405.0			4.050			
4420.0			4.070			
4435.0			4.080			
4450.0			4.080			
4465.0			4.080			
4480.0			4.070			
4495.0			4.080			
4500.0	70.130	53.340				
4510.0			4.080			
4525.0			4.070			
4540.0			4.070			
4555.0			4.080			
4560.0	70.170	53.380				
4570.0			4.080			
4585.0			4.080			

Elapsed Time (mins)	Production Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
4600.0			4.080			
4615.0			4.070			
4620.0	70.280	53.490				
4630.0			4.070			
4645.0			4.070			
4660.0			4.070			
4675.0			4.080			
4680.0	70.370	53.580				
4690.0			4.080			
4705.0			4.080			
4720.0			4.080			
4735.0			4.070			
4740.0	70.530	53.740				
4750.0			4.070			
4765.0			4.070			
4780.0			4.070			
4795.0			4.080			
4800.0	70.690	53.900				
4810.0			4.080			
4825.0			4.080			
4840.0			4.080			
4855.0			4.080			
4860.0	70.740	53.950				
4870.0			4.070			
4885.0			4.080			
4900.0			4.080			
4915.0			4.080			
4920.0	70.720	53.930				
4930.0			4.080			
4945.0			4.080			
4960.0			4.080			
4975.0			4.080			
4980.0	70.700	53.910				
4990.0			4.080			
5005.0			4.080			
5020.0			4.080			
5035.0			4.080			
5040.0	70.640	53.850				
5050.0			4.080			
5065.0			4.080			
5080.0			4.080			
5095.0			4.090			
5100.0	70.630	53.840				
5110.0			4.090			
5125.0			4.090			
5140.0			4.090			
5155.0			4.090			
5160.0	70.600	53.810				
5170.0			4.090			
5185.0			4.090			
5200.0			4.090			
5215.0			4.090			

Elapsed Time (mins)	Production Well Data		Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
	Water Level (m.b.ref)	Drawdown (m)				
5220.0	70.560	53.770				
5230.0			4.090			
5245.0			4.080			
5260.0			4.060			
5275.0			4.060			
5280.0	70.580	53.790				
5290.0			4.060			
5305.0			4.060			
5320.0			4.060			
5335.0			4.060			
5340.0	70.580	53.790				
5350.0			4.060			
5365.0			4.060			
5380.0			4.060			
5395.0			4.060			
5400.0	70.560	53.770				
5410.0			4.060			
5425.0			4.060			
5440.0			4.060			
5455.0			4.060			
5460.0	70.400	53.610				
5470.0			4.060			
5485.0			4.070			
5500.0			4.070			
5515.0			4.070			
5520.0	70.370	53.580				
5530.0			4.070			
5545.0			4.070			
5560.0			4.080			
5575.0			4.080			
5580.0	70.380	53.590				
5590.0			4.070			
5605.0			4.070			
5620.0			4.070			
5635.0			4.070			
5640.0	70.280	53.490				
5650.0			4.070			
5665.0			4.070			
5680.0			4.070			
5695.0			4.070			
5700.0	70.160	53.370				
5710.0			4.070			
5725.0			4.070			
5740.0			4.070			
5755.0			4.070			
5760.0	70.050	53.260				
5770.0			4.080			
5785.0			4.080			
5800.0			4.070			
5815.0			4.070			
5820.0	69.890	53.100				
5830.0			4.080			

Elapsed Time (mins)	Production Well Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
5845.0			4.080			
5860.0			4.080			
5875.0			4.080			
5880.0	69.860	53.070				
5890.0			4.080			
5905.0			4.080			
5920.0			4.080			
5935.0			4.080			
5940.0	69.920	53.130				
5950.0			4.080			
5965.0			4.080			
5980.0			4.080			
5995.0			4.080			
6000.0	69.890	53.100				
6010.0			4.080			
6025.0			4.080			
6040.0			4.080			
6055.0			4.080			
6060.0	69.870	53.080				
6070.0			4.080			
6085.0			4.080			
6100.0			4.090			
6115.0			4.090			
6120.0	69.870	53.080				
6130.0			4.090			
6145.0			4.090			
6160.0			4.090			
6175.0			4.090			
6180.0	69.970	53.180				
6190.0			4.080			
6205.0			4.080			
6220.0			4.080			
6235.0			4.080			
6240.0	70.120	53.330				
6250.0			4.080			
6265.0			4.080			
6280.0			4.080			
6295.0			4.080			
6300.0	70.230	53.440				
6310.0			4.080			
6325.0			4.090			
6340.0			4.090			
6355.0			4.080			
6360.0	70.200	53.410				
6370.0			4.080			
6385.0			4.090			
6400.0			4.080			
6415.0			4.080			
6420.0	70.250	53.460				
6430.0			4.080			
6445.0			4.080			
6460.0			4.080			

Elapsed Time (mins)	Production Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
6475.0			4.080			
6480.0	70.260	53.470	4.090			
6490.0			4.090			
6505.0			4.090			
6520.0			4.090			
6535.0			4.090			
6540.0	70.180	53.390	4.090			
6550.0			4.090			
6565.0			4.090			
6580.0			4.090			
6595.0			4.090			
6600.0	70.170	53.380	4.090			
6610.0			4.090			
6625.0			4.100			
6640.0			4.090			
6655.0			4.090			
6660.0	70.190	53.400	4.090			
6670.0			4.090			
6685.0			4.090			
6700.0			4.100			
6715.0			4.100			
6720.0	70.250	53.460	4.100			
6730.0			4.100			
6745.0			4.100			
6760.0			4.090			
6775.0			4.090			
6780.0	70.340	53.550	4.090			
6790.0			4.100			
6805.0			4.100			
6820.0			4.110			
6835.0	70.410	53.620	4.110			
6850.0			4.110			
6865.0			4.110			
6880.0			4.110			
6895.0			4.110			
6900.0	70.360	53.570	4.110			
6910.0			4.110			
6925.0			4.120			
6940.0			4.120			
6955.0			4.120			
6960.0	70.300	53.510	4.120			
6970.0			4.120			
6985.0			4.120			
7000.0			4.120			
7015.0			4.120			
7020.0	70.250	53.460	4.120			
7030.0			4.120			
7045.0			4.130			
7060.0			4.140			
7075.0			4.140			
7080.0	70.230	53.440	4.140			
7090.0			4.140			

Elapsed Time (mins)	Production Well Data		Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
	Water Level (m.b.ref)	Drawdown (m)				
7105.0			4.130			
7120.0			4.130			
7135.0			4.130			
7140.0	70.210	53.420				
7150.0			4.140			
7165.0			4.140			
7180.0			4.150			
7195.0			4.150			
7200.0	70.210	53.420				
7210.0			4.150			
7225.0			4.150			
7240.0			4.140			
7255.0			4.140			
7264.0	70.210	53.420				
7270.0			4.140			
7285.0			4.140			
7300.0			4.140			
7315.0			4.130			
7320.0	70.200	53.410				
7330.0			4.130			
7345.0			4.140			
7360.0			4.140			
7375.0			4.140			
7380.0	70.270	53.480				
7390.0			4.150			
7405.0			4.150			
7420.0			4.150			
7435.0			4.150			
7440.0	70.270	53.480				
7450.0			4.160			
7465.0			4.160			
7480.0			4.150			
7495.0			4.150			
7500.0	70.200	53.410				
7510.0			4.150			
7525.0			4.150			
7540.0			4.150			
7555.0			4.150			
7560.0	70.170	53.380				
7570.0			4.150			
7585.0			4.150			
7600.0			4.160			
7615.0			4.160			
7620.0	70.170	53.380				
7630.0			4.160			
7645.0			4.160			
7660.0			4.160			
7675.0			4.160			
7680.0	70.260	53.470				
7690.0			4.170			
7705.0			4.170			
7720.0			4.170			

Elapsed Time (mins)	Production Water Level (m.b.ref)	Well Data Drawdown (m)	Piez 1 Drawdown (m)	Piez 2 Drawdown (m)	Piez 3 Drawdown (m)	Piez 4 Drawdown (m)
7735.0			4.170			
7740.0	70.200	53.410	4.170			
7750.0			4.170			
7765.0			4.170			
7780.0			4.170			
7795.0	70.120	53.330	4.170			
7800.0			4.160			
7810.0			4.170			
7825.0			4.170			
7840.0			4.170			
7855.0			4.170			
7860.0	70.120	53.330	4.170			
7870.0			4.170			
7885.0			4.170			
7900.0			4.170			
7915.0			4.180			
7920.0	70.110	53.320	4.180			
7930.0			4.180			
7945.0			4.180			
7960.0			4.180			
7975.0			4.180			
7980.0	70.150	53.360	4.170			
7990.0			4.170			
8005.0			4.170			
8020.0			4.170			
8035.0			4.170			
8040.0	70.200	53.410	4.170			
8050.0			4.170			
8065.0			4.170			
8080.0			4.170			
8095.0			4.170			
8100.0	70.300	53.510	4.170			
8110.0			4.170			
8125.0			4.170			
8140.0			4.180			

TEST-PUMPING DATA

Test Reference No.: 6WDS- GARBOLDISHAM

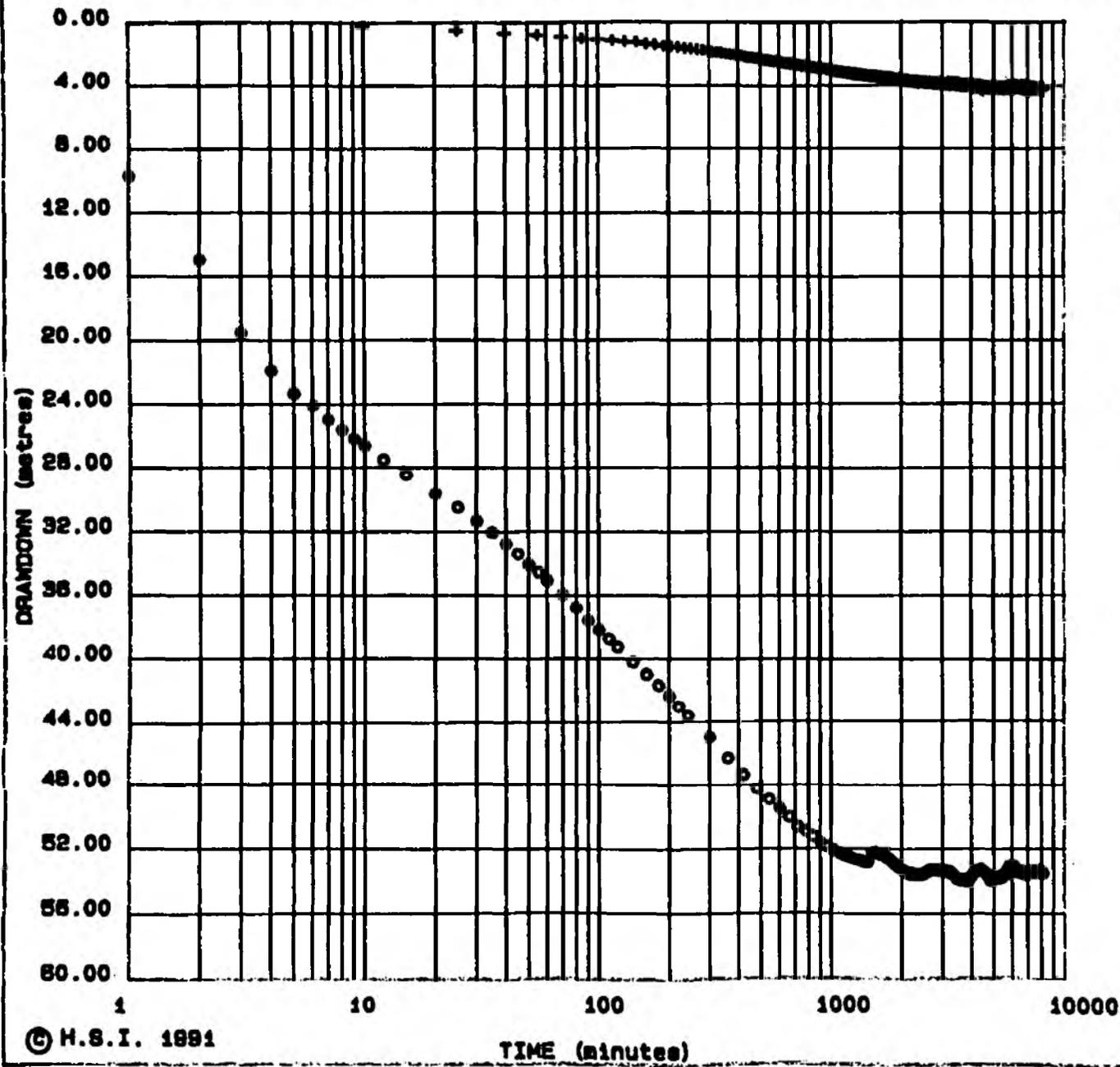
Date: 31/08/85 14:05

Discharge of pumping-well: 72.7 l/s

(Well is represented by circle symbol)

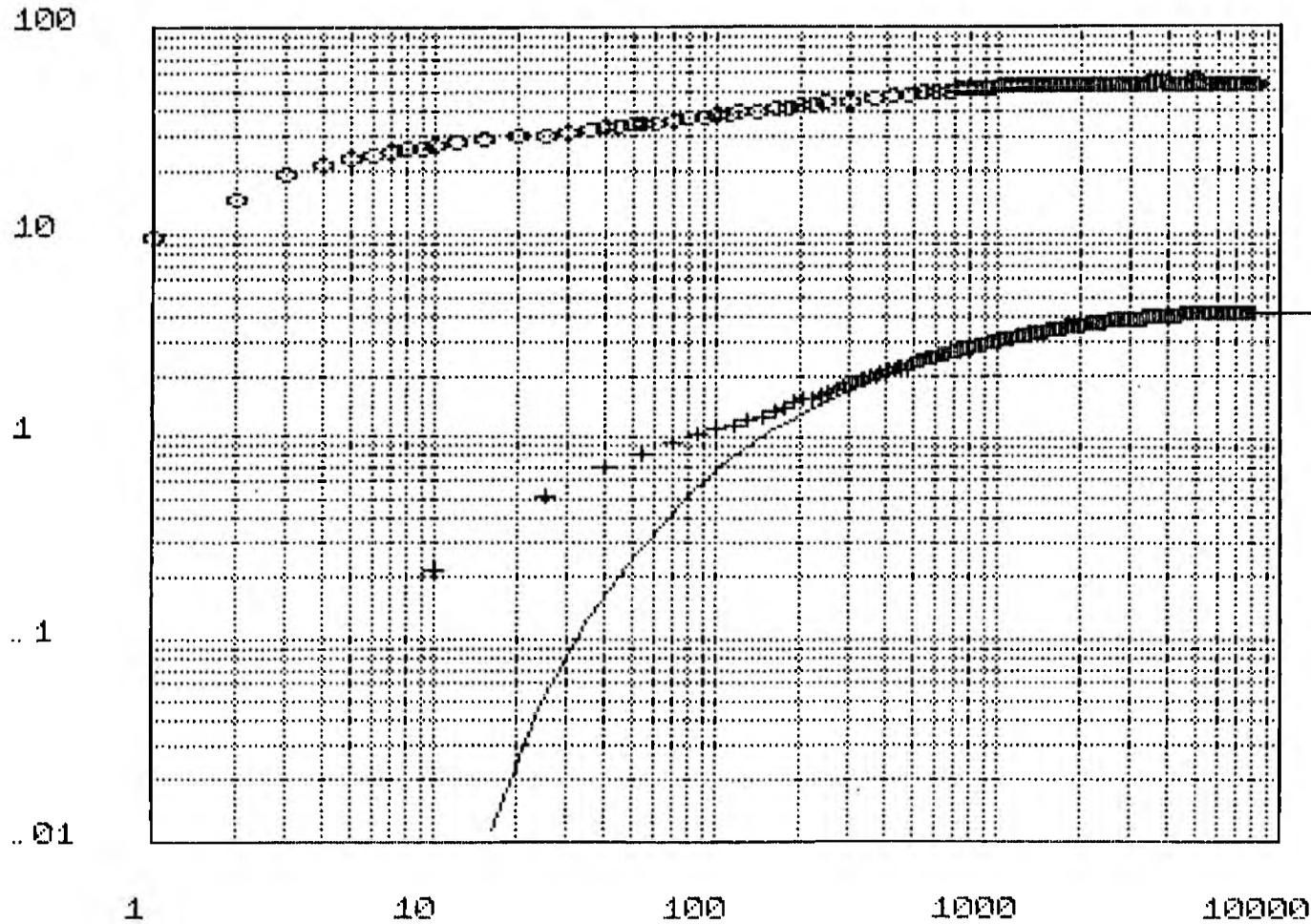
Radial distances of observation wells

TM08/082 229.9m (cross)



T = 375.0m²/d

S = 0.106E-02



TYPE CURVE ANALYSIS

1/2

Type-curve match-points:

Well-Function :	1	Drawdown :	1.333 metres.
1/U value :	1	Time :	53.910 mins.
r/B value :	0.25		

Derived Aquifer parameters:

Transmissivity :	375.0	m ³ /m/d
Storativity :	0.00106251	
Leakage factor :	919.6	metres.

Press any key to continue.

$$L = \sqrt{KDc}$$

\uparrow hydraulic resistance.
 \uparrow saturated thickness
 \uparrow hydraulic conductivity

$$KD = 375$$

$$c = \frac{(919.6)^2}{375}$$

$$= 2255 \text{ days.}$$

SIMULATION PARAMETERS

Prod. Well Diam(m): .61 Limits of modelled area(kms): 10

Observation well details

No.	Rad. dist	No.	Rad. dist
1	229.9	3	0
2	0	4	0

Aquifer Type(1,2 or 3): 1
 Beta: 919.9 Alpha: 0
 (1)Leaky;(2)W. Table;(3)Artesian

Aquifer Hydraulics

Permeability (m/d)	Distance(m)
1.8	200
3.4	10000
0	0
0	0

Well loss constant: 0
 Well loss exponent: 2

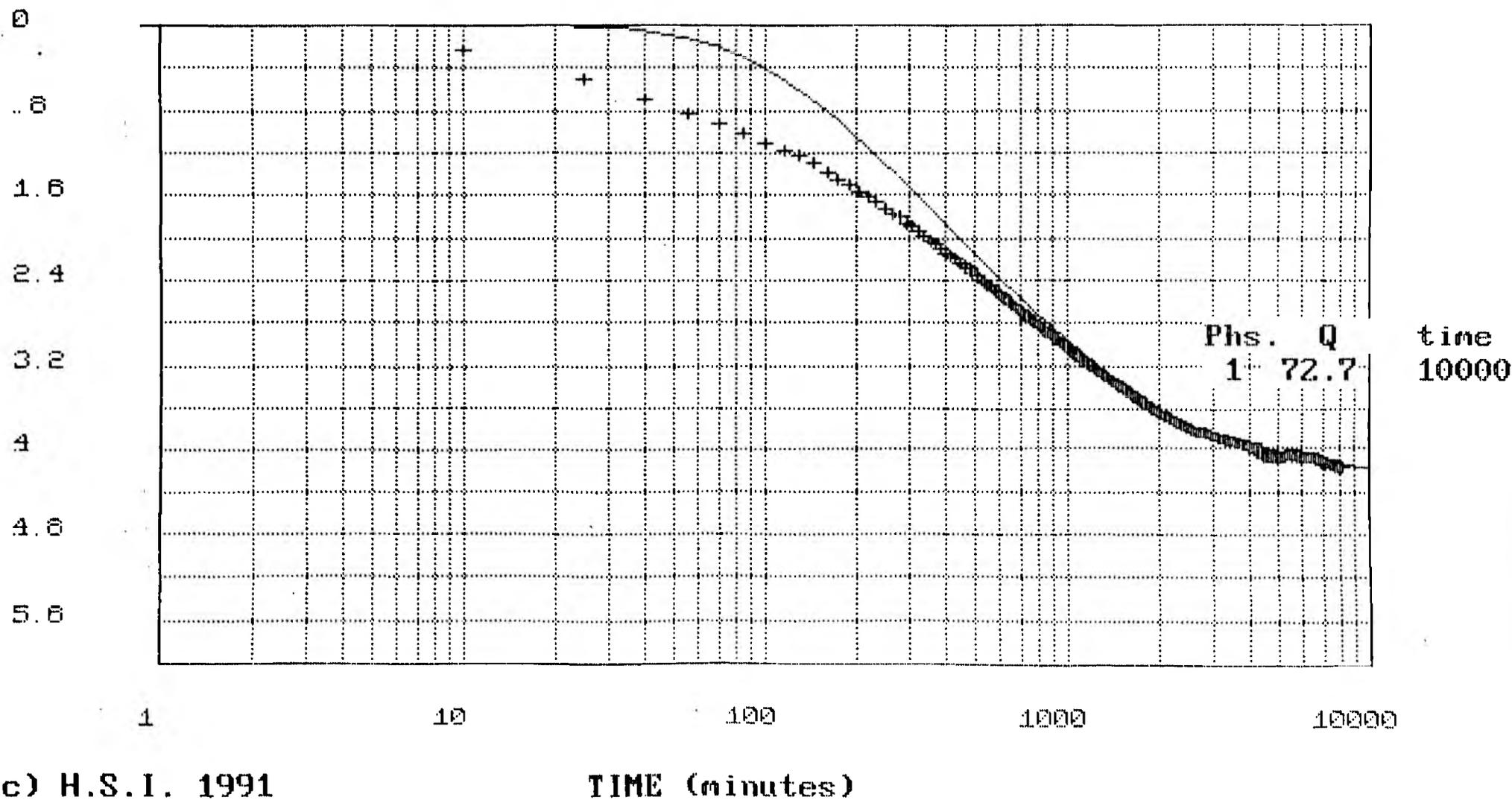
Stor. Coeff. .0008 Specific Yield .000005

Top of Aquifer(m)	Base of Aquifer(m)	Water Level(m)
0	125	25

Phase	Q(l/s)	Time(mins)
1.	72.7	10000
2.	0	0
3.	0	0
4.	0	0
5.	0	0

Phase	Q(l/s)	Time(mins)
6.	0	0
7.	0	0
8.	0	0
9.	0	0
10.	0	0

<E>dit Input field.
 <C>ommence Execution.
 <Q>uit to program menu.



SINGLE layer approx 2000

SAMPLE RESULTS 1 (AW710)

DATA SELECTION CRITERIA:-

EXTRACT FILE	
SAMPLE POINT	R02BDTM08085*
SAMPLE TYPE	**
AREA	**
SUB1	**
SUB2	**
DISTRICT COUNCIL	**
PARISH COUNCIL	***
ZONE	****
SAMPLING DEPT	**
SAMPLER	***
METHOD	*
INDICATOR	**
LAB. REFERENCE	**
REASON CODES	: : : :
DATE RANGE	01/01/88 to 31/12/99
SAMPLE RANGE	88000001 to 99999999
INDEX KEY	NONE

OUTPUT MODE:-

PRINT FOLLOWS

RESULT FILTERS:-

INCLUSION FILTER: VALIDATED RESULTS ONLY

RESULT IMAGING: ENABLED

RESULT ROUNDING: ENABLED

SAMPLE RESULTS REPORT for location G.W.D.S. B/H 9 DAIRY FM NORTH LOPHAM
R02BDTM08085C

SAMPLE NUMBER	ANALYST	ANALYST	ANALYST	ANALYST	ANALYST	ANALYST
DATE	DATE	DATE	DATE	DATE	DATE	DATE
TIME	TIME	TIME	TIME	TIME	TIME	TIME
INSTRUMENT	METHOD	METHOD	METHOD	METHOD	METHOD	METHOD
REMARKS	REMARKS	REMARKS	REMARKS	REMARKS	REMARKS	REMARKS

CODE	NAME	UNITS	1	2	3	4	5	6
00010	PH	PH UNITS	7.26	7.25	7.25	7.08	7.08	-----
00701	TEMP C	CEL	-----	-----	18.5	18.5	18.5	-----
00771	COND 25 C	USIB/CM	399	399	1851	1810	1810	-----
00812	D.O. (XSAT)	% SATS	-----	-----	21.7	21.4	21.0	-----
00812	D.O.	MG/L O	-----	-----	2.00	2.00	2.00	-----
00951	BOB-ATU T	MG/L O	-----	-----	40	41	-----	-----
00994	TEC	MG/L O	1.97	1.94	1.73	-----	1.43	-----
01110	AMMONIA N	MG/L N	1.88	1.89	1.33	1.29	1.33	-----
01160	F.O.N AS N	MG/L N	1.20	1.20	1.20	1.20	1.20	-----
01241	DS 100 C	MG/L	-----	-----	85	79	-----	-----
01551	HARD TOTAL	MG/L CALCG	-----	-----	176	180	-----	-----
01621	ALK CALCG	MG/L CALCG	327	329	321	-----	-----	-----
01622	ALK CALCG	MG/L CALCG	-----	-----	-----	115	125	-----
01724	CHLORIDE	MG/L CL	55.1	55.7	59.4	67.5	62.8	-----
01771	FLUORIDE	MG/L F	-----	-----	1.81	1.74	1.55	-----
01800	P GEHC P	MG/L P	-----	-----	1.021	1.021	1.021	-----
11820	SILICA	MG/L SIO2	-----	-----	28.9	24.9	-----	-----
01630	SULFATE	MG/L	120	129	124	127	123	-----
02020	LITHIUM	MG/L LI	-----	-----	1.0147	1.0341	-----	-----
02070	SODIUM	MG/L NA	28.3	28.9	28.7	28.3	28.3	-----
02110	POTASSIUM	MG/L K	4.04	4.42	3.91	4.76	4.70	-----
02270	MAGNESIUM	MG/L MG	14.1	15.0	14.6	14.6	15.1	-----
02414	CALCIUM	MG/L CA	150	155	130	133	162	-----
01300	BRON	MG/L B	-----	-----	1.0540	1.0919	-----	-----
04035	MN TOTAL	MG/L MN	-----	-----	1.0650	1.0651	1.0650	-----
04037	IRON TOTAL	MG/L FE	-----	2.15	1.45	16.9	1.08	-----
05022	CELESTINP	UG/L	-----	-----	1.015	-----	-----	-----
05070	EICHELORPOS	UG/L	-----	-----	1.015	-----	-----	-----
05072	NALATHIOM	UG/L	-----	-----	1.015	-----	-----	-----
05430	PARATHIOM	UG/L	-----	-----	1.015	-----	-----	-----
05615	2,4,5-T	UG/L	-----	-----	1.050	-----	-----	-----
07200	DIACINON	UG/L	-----	-----	1.010	-----	-----	-----
20460	S PABO P	NG/100ML	-----	-----	74	0.00	0	-----
20470	E. COLI P	NG/100ML	-----	-----	74	0.00	0	-----
70341	WATERIDGER	10000	-----	-----	-----	-----	-----	-----
70422	CFM US/L	UG/L	-----	-----	1.020	-----	-----	-----
70711	ISOBETIK	NG/L	-----	-----	1.0	-----	-----	-----
70722	CHEORPDEL	UG/L	-----	-----	1.0	-----	-----	-----
70730	ISOFBOPURON	UG/L	-----	-----	1.0	-----	-----	-----
70741	NETIMPRES	UG/L	-----	-----	1.010	-----	-----	-----
70771	TRIEDAZINE	UG/L	-----	-----	1.025	-----	-----	-----
70792	PROPYLAMIDE	UG/L	-----	-----	1.0	-----	-----	-----
73261	V TOTAL	UG/L	-----	-----	1.00	1.60	-----	-----
73501	COND P/TEC	USIB/CM	-----	-----	-----	102	92.5	-----
73602	PREPAZINE	UG/L	-----	-----	1.015	-----	-----	-----

70001	CARBENDAZIM	UG/L	-----	-----	0.01	-----	-----
70002	MANIPROX	UG/L	-----	-----	0.01	-----	-----
70003	METHAFENOX	UG/L	-----	-----	0.01	-----	-----
70004	DIFENOX	UG/L	-----	-----	0.01	-----	-----
70005	TEBUCONAZOLE	NG/L	-----	-----	0.01	-----	-----
70006	TRIFLUTHIAL	NG/L	-----	-----	0.01	-----	-----
70007	CHLORFENAL	NG/L	-----	-----	0.01	-----	-----
70008	FLUOROSULFUR	NG/L	-----	-----	0.01	-----	-----
70701	ETB - C01	NG/L	-----	-----	0.01	-----	-----
70702	ETB - C02	NG/L	-----	-----	0.01	-----	-----
70703	ETB - C03	NG/L	-----	-----	0.01	-----	-----
70704	ETB - C015	NG/L	-----	-----	0.01	-----	-----
70705	ETB - C016	NG/L	-----	-----	0.01	-----	-----
70706	ETB - C017	NG/L	-----	-----	0.01	-----	-----
70707	ETB - C018	NG/L	-----	-----	0.01	-----	-----
70708	ETB - C019	NG/L	-----	-----	0.01	-----	-----
74001	EXOSULF-A	UG/L	-----	-----	0.01	-----	-----
74002	EXOSULF-B	UG/L	-----	-----	0.01	-----	-----
74101	ECBE	UG/L	-----	-----	0.01	-----	-----
74102	133062HCL3	UG/L	-----	-----	0.01	-----	-----
74401	AZINPH-ETH	UG/L	-----	-----	0.01	-----	-----
74402	FENKCHION	UG/L	-----	-----	0.01	-----	-----
74403	PARATH-METH	UG/L	-----	-----	0.01	-----	-----
74901	133062HCL3	UG/L	-----	-----	0.01	-----	-----
74902	124062HCL3	UG/L	-----	-----	0.01	-----	-----
75001	DESMETRYX	UG/L	-----	-----	0.005	-----	-----
75002	EGMETRYX	UG/L	-----	-----	0.005	-----	-----
90001	CHLOROPORM	UG/L	0.1	-----	0.01	-----	-----
90002	CHLOROPORM	UG/L	-----	-----	0.005	-----	-----
90003	CHLOROL	UG/L	0.1	-----	0.01	-----	-----
90004	CHLOROL	UG/L	0.1	-----	0.01	-----	-----
90702	BROMOPORM	UG/L	0.1	-----	0.01	-----	-----
90904	2,3,6-TRA	UG/L	-----	-----	0.050	-----	-----
91101	CARBON TET	UG/L	0.1	-----	0.01	-----	-----
91102	CARBON TET	UG/L	-----	-----	0.001	-----	-----
91103	COCL3	UG/L	0.1	-----	0.01	-----	-----
91104	COCL3	UG/L	-----	-----	0.004	-----	-----
91201	COCL4	UG/L	0.1	-----	0.01	-----	-----
91202	COCL4	UG/L	-----	-----	0.004	-----	-----
91900	TOP.C011 P	NG/100ML	-----	-----	12.0	0.00	12
92001	HCE ALPHA	UG/L	-----	-----	0.1	-----	-----
92002	HCE GAMMA	UG/L	-----	-----	0.1	-----	-----
92003	DIELDRIN	UG/L	-----	-----	0.7	-----	-----
92004	DDT (PP')	UG/L	-----	-----	0.1	-----	-----
92005	DDE (EP')	UG/L	-----	-----	0.1	-----	-----
92006	ENDRIN	UG/L	-----	-----	0.5	-----	-----
92007	ALDRIN	UG/L	-----	-----	0.5	-----	-----
92101	HEPTACHLOR	UG/L	-----	-----	0.1	-----	-----
92102	PE FIELD	PH UNITS	-----	-----	7.50	7.50	7.50
92201	HEPT EPOX	UG/L	-----	-----	0.1	-----	-----
92202	DDT (OP')	UG/L	-----	-----	0.1	-----	-----
92203	DDE (PP')	UG/L	-----	-----	0.1	-----	-----
92405	2,4,-D	UG/L	-----	-----	0.050	-----	-----
92406	MECOPROF	UG/L	-----	-----	0.050	-----	-----
92407	NCPB	UG/L	-----	-----	0.050	-----	-----
92505	NCPA	UG/L	-----	-----	0.050	-----	-----
92611	AS TOTAL	UG/L AS	-----	-----	9.43	39.3	-----
92655	CD TOTAL	UG/L CD	-----	-----	0.10	0.10	-----
92692	EG TOTAL	UG/L EG	-----	-----	0.242	0.050	-----
97001	TERRAETHYX	UG/L	-----	-----	0.021	-----	-----
97102	LINURON	UG/L	-----	-----	0.10	-----	-----

97283	SELENIUM	UG/L SE	-----	-----	1.0	1.0	-----	-----
97309	DE TOXACIN	UG/L	-----	-----	1.00	-----	-----	-----
97346	DICHOFOLOS	UG/L	-----	-----	1.0	-----	-----	-----
97348	DICHOFOLOS	UG/L	-----	-----	1.00	-----	-----	-----
97411	CECIP	UG/L	-----	-----	1.0	-----	-----	-----
97443	DICHOFOLOS	UG/L	-----	-----	1.00	-----	-----	-----
97455	DICAMPA	UG/L	-----	-----	1.000	-----	-----	-----
97482	DELPYRSEDS	UG/L	-----	-----	1.000	-----	-----	-----
97482	EMETROBATE	UG/L	-----	-----	1.00	-----	-----	-----
97482	HYKPROS-ME	UG/L	-----	-----	1.00	-----	-----	-----
97493	CARBENICHI	UG/L	-----	-----	1.00	-----	-----	-----
97500	PERITROTHI	UG/L	-----	-----	1.00	-----	-----	-----
97511	ACRIFENS-R	UG/L	-----	-----	1.00	-----	-----	-----
98101	HCE EDR	UG/L	-----	-----	1.0	-----	-----	-----
98201	DE (OP)	UG/L	-----	-----	1.0	-----	-----	-----
98641	AFRACINE	UG/L	-----	-----	1.000	-----	-----	-----
98661	SIMACINE	UG/L	-----	-----	1.000	-----	-----	-----
98874	CB TOTAL	UG/L CB	-----	-----	1.0	00.0	-----	-----
98894	CC TOTAL	UG/L CC	-----	-----	0.00	0.00	-----	-----
98914	FB TOTAL	UG/L FB	-----	-----	1.0	1	-----	-----
98934	NI TOTAL	UG/L NI	-----	-----	10.0	01.0	-----	-----
98934	ZK TOTAL	UG/L ZK	-----	-----	7.00	0.00	-----	-----
99451	HCE DELTA	UG/L	-----	-----	1.0	-----	-----	-----
99451	DDE (OP)	UG/L	-----	-----	1.0	-----	-----	-----

END OF EXTRACT FOR SAMPLE POINT

APPENDIX 3.

TM 08/117

WELL SURVEY SHEET

Name/Address of:- WORKING GWDS

Well LOVERS LANE

GARBOLDISHAM

Owner ANNA

NRA

Tenant _____

Nat. Grid Ref. TM0011 8197

Aquifer CHALK

Licence No. 6/33/42/74

Licence File No. _____

Abstraction Rate _____

I.G.S. Ref. 175/592

Other Ref. GWDS WORKING 6

Reading Freq. _____

By _____ PROBE/RECORDER

Details of Well:-

Ground Level 38.11 m.O.D.

Datum 38.68 m O.D.

Depth 150m

Diameter 610mm

Construction 610mm plain casing to 30 m

Used or Disused _____

Probe Obtained _____

A typical W.L. c 15m below flange

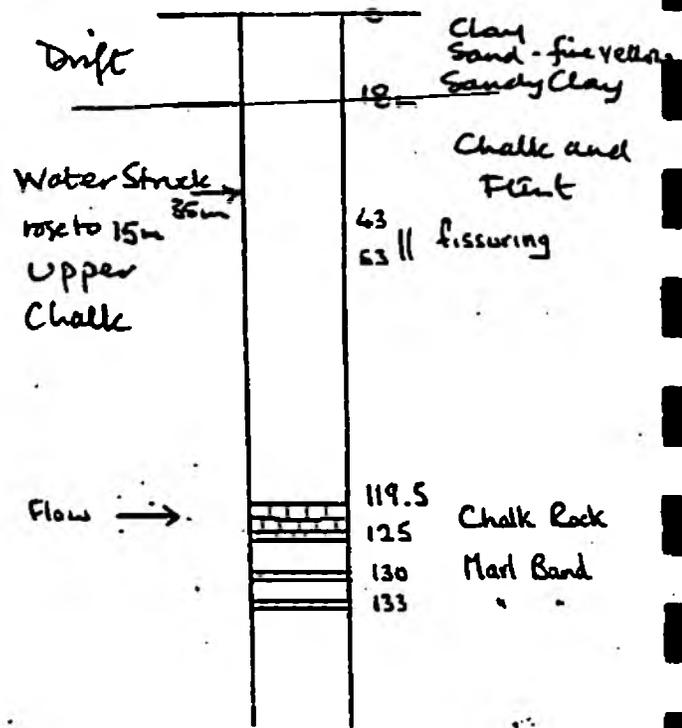
Well drilled by La Grand

Date Nov/Dec 1983

Visited by _____

Date _____

Strata Log and Details



Source of Information:-

Geophysical Log 7.12.83

Drillers Log

General Notes:-

20 tonnes acid at 30+90m below G.L. 9/12/83

24 hour test 19th/20th December 83 95 l/sec for 17m diameter.

	INTOD	D	T
superficial	-	-	-
boulder clay	?	?	?
sub-surf	?	?	?
chalk	?	?	?

RECORD OF WELL

At TM 0011 8198 TM 08SW
 GARBOLDSHAM
 Town or Village THETFORD
 County NORFOLK

TM08/67
175/592

EXACT SITE OF WELL

Six-inch National Grid sheet and reference
 For ANGLIAN WATER, CAMBRIDGE DIVISION

State whether owner, tenant, builder, contractor, consultant, etc.: TENANT

Address (if different from above) ... GREAT OUSE HOUSE, CLARENDON ROAD
CAMBRIDGE CB2 2

Level of ground surface above sea level (O.D.) ft (..... m)

*DELETE

If well top is not at ground level state how far ^{above*} ft (..... m)
_{below:}

AS

SHAFT ft (..... m); diameter ft (..... m);

NECESSARY

HEADINGS (please attach details—dimensions and directions)

BORE ft (150 m); diameter: at top 24 in (610 mm);
 at bottom in (..... mm)

Full details of permanent lining tubes (position, length, inner and outer diameters, plain slotted etc.):
30m of 610mm Ø PLAIN STEEL CASING FROM 29.5 BELOW G.L. TO 0.5m ABOVE G.L.

Water struck at depths of ft (35 m) below well top

Rest level of water ft (16.4 m) ^{above*} well top. Suction at ft (..... m)
_{below}

Yield on 24 hours* test pumping at galls per (..... l/s) with
~~24~~ depression to ft (..... m) below well top. Recovery to rest level in 24 hours

Capacity of pump g.p.h. (..... l/s)

Date of measurements 19/12/1983

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:

Make and/or type Motive power

Capacity galls (..... m³) per hour. Suction at ft (..... m)
 below well top. Amount pumped galls (..... m³) per day. Estimated
 consumption galls (..... m³) per week

Well made by J.E. GRAND (WELL-DRILLING & ENG.) CO. LTD Date of sinking SEPT/OCT 1983

ADDITIONAL NOTES ANALYSIS (please attach copy if available)

TEST CONDITIONS

NORMAL CONDITIONS

LOG OF STRATA OVERLEAF

Received from

Date

Observation well

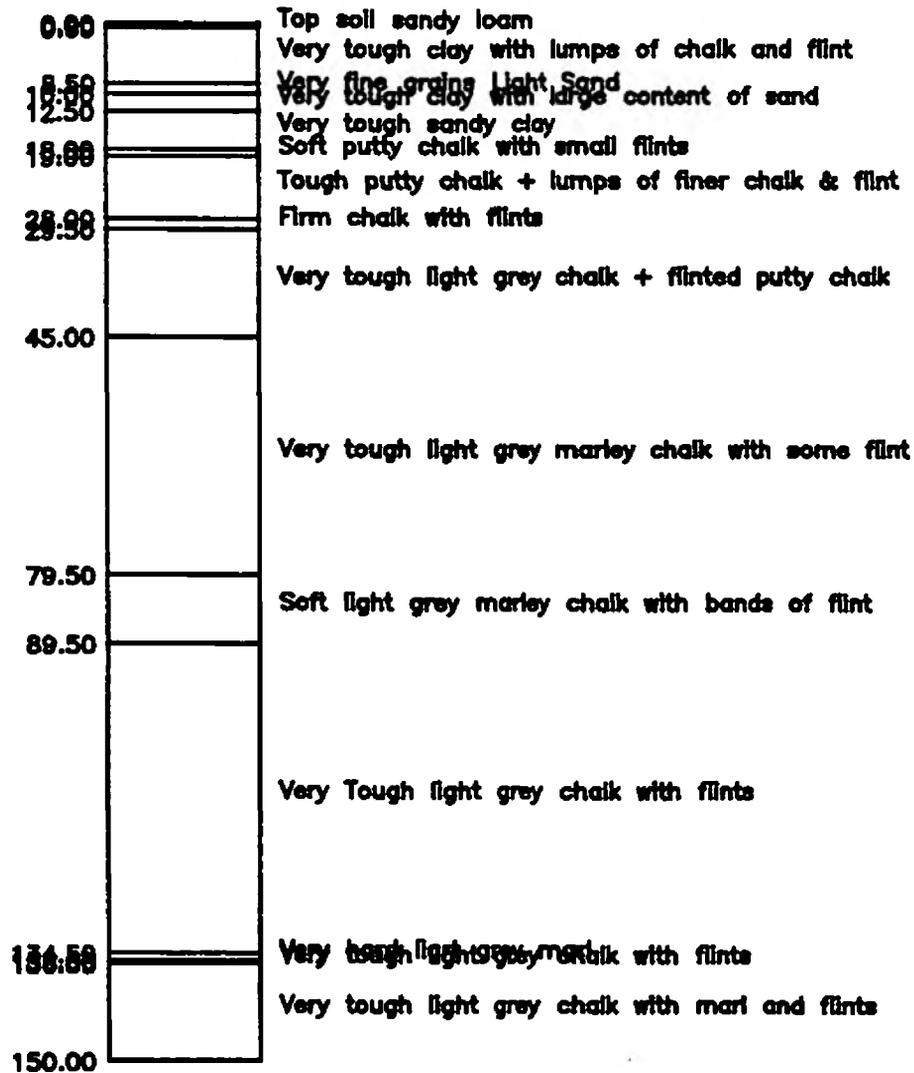
Recorder

ER log

Site marked on
 1" map
 6" map—Grid Sheet
 (use symbol)

Copy to

Date



NRA

GWDS - Garboldisham (No.6)
 Lovers Lane, Garboldisham
 TM08/117

7M 05/11/84

STEP TEST DATA

Time-Drawdown/Recovery Data

Test Site Name : GWDS - GARBOLISHAM
Start Time & Date : 19/12/84 -10:30

Step No.	Pump Rate (l/s)	Pumping Period (mins)	Recovery Period (mins)	Initial Level (m.b.Datum)
1	20.00	120.0	0.0	17.050
2	49.70	120.0	0.0	17.050
3	69.20	120.0	0.0	17.050
4	97.40	1095.0	1275.0	17.050

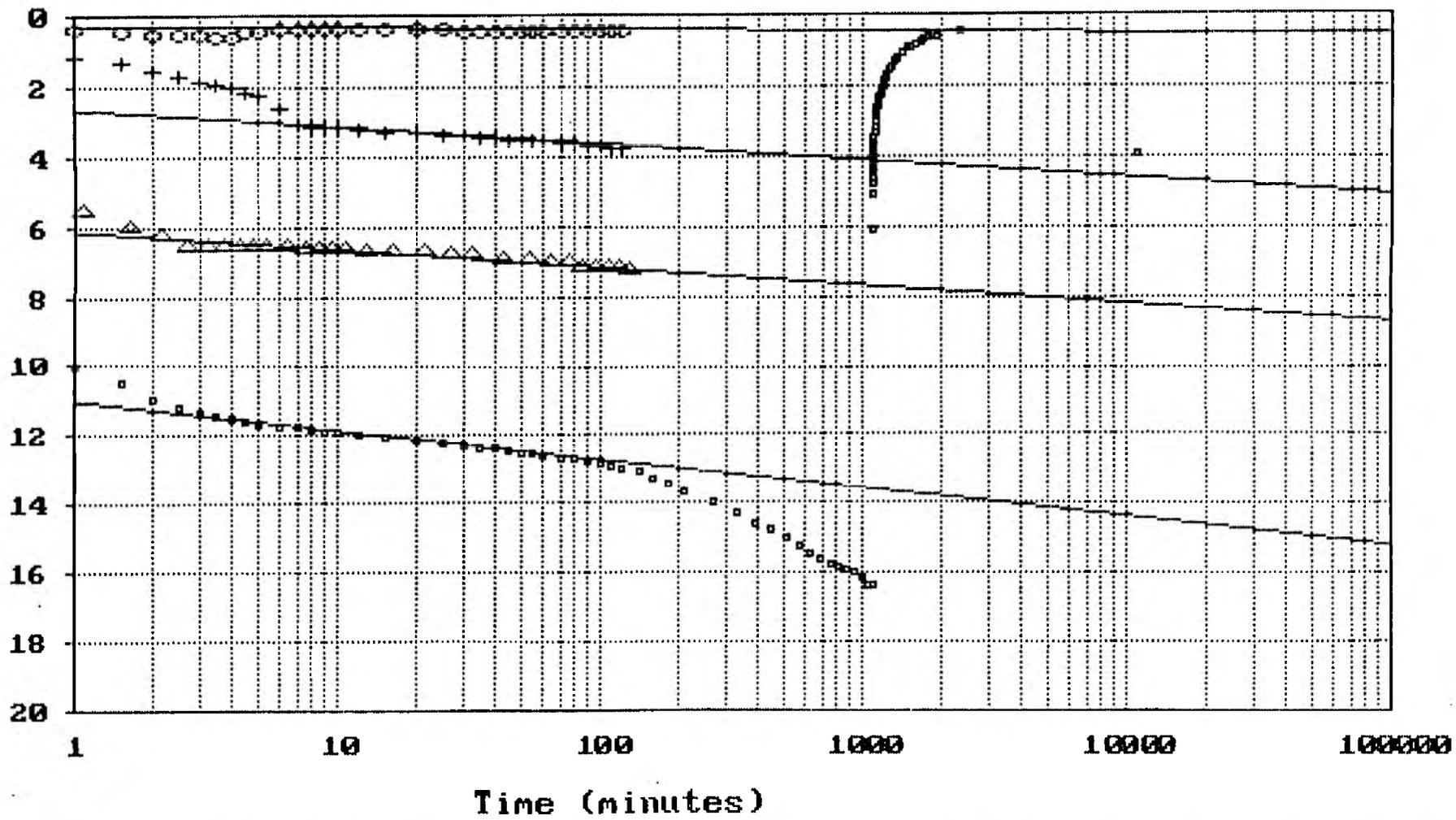
Elapsed Time (mins)	Step 1 Drawdown (m)	Step 2 Drawdown (m)	Step 3 Drawdown (m)	Step 4 Drawdown (m)	Step 5 Drawdown (m)
0.0	0.000	0.000	0.000	0.000	
0.5	0.300	0.800	3.950	9.330	
1.0	0.350	1.120	5.570	10.040	
1.5	0.500	1.320	6.030	10.560	
2.0	0.550	1.500	6.260	11.030	
2.5	0.570	1.730	6.560	11.240	
3.0	0.570	1.830	6.550	11.400	
3.5	0.590	1.940	6.550	11.490	
4.0	0.600	2.030	6.550	11.550	
4.5	0.440	2.140	6.550	11.630	
5.0	0.440	2.250	6.580	11.670	
6.0	0.400	2.600	6.600	11.740	
7.0	0.400	3.050	6.630	11.800	
8.0	0.400	3.120	6.650	11.840	
9.0	0.400	3.150	6.670	11.900	
10.0	0.400	3.190	6.680	11.930	
12.0	0.400	3.240	6.700	11.980	
15.0	0.410	3.290	6.750	12.100	
20.0	0.420	3.340	6.750	12.150	
25.0	0.420	3.380	6.820	12.230	
30.0	0.430	3.420	6.840	12.300	
35.0	0.430	3.450		12.370	
40.0	0.440	3.490	6.940	12.420	
45.0	0.440	3.500		12.460	
50.0	0.450	3.520	6.990	12.510	
55.0	0.450	3.540		12.540	
60.0	0.450	3.570	7.040	12.610	
70.0	0.450	3.610	7.070	12.660	
80.0	0.470	3.650	7.170	12.730	
90.0	0.480	3.680	7.210	12.800	
100.0	0.490	3.710	7.210	12.860	

DATE OF ANALYSIS 10/7/9.
By D. SELLOMBE

Elapsed Time (mins)	Step 1 Drawdown (m)	Step 2 Drawdown (m)	Step 3 Drawdown (m)	Step 4 Drawdown (m)	Step 5 Drawdown (m)
110.0	0.490	3.740	7.220	12.950	
120.0	0.500	3.770	7.310	12.990	
140.0				13.060	
160.0				13.330	
180.0				13.500	
210.0				13.710	
270.0				14.020	
330.0				14.330	
390.0				14.600	
450.0				14.800	
510.0				15.020	
570.0				15.210	
630.0				15.450	
690.0				15.600	
750.0				15.740	
810.0				15.850	
870.0				15.960	
930.0				15.980	
990.0				16.150	
1050.0				16.360	
1095.0				16.350	
1095.5				16.350	
1096.0				6.080	
1096.5				5.040	
1097.0				4.800	
1097.5				4.600	
1098.0				4.460	
1098.5				4.350	
1099.0				4.260	
1099.5				4.170	
1100.0				4.080	
11011.0				3.950	
1102.0				3.860	
1103.0				3.760	
1104.0				3.690	
1105.0				3.620	
1107.0				3.490	
1110.0				3.325	
1115.0				3.120	
1120.0				2.990	
1125.0				2.850	
1130.0				2.750	
1135.0				2.650	
1140.0				2.570	
1145.0				2.500	
1150.0				2.430	
1160.0				2.300	
1165.0				2.250	
1170.0				2.200	
1180.0				2.100	

Elapsed Time (mins)	Step 1 Drawdown (m)	Step 2 Drawdown (m)	Step 3 Drawdown (m)	Step 4 Drawdown (m)	Step 5 Drawdown (m)
1190.0				2.010	
1200.0				1.920	
1210.0				1.850	
1220.0				1.760	
1240.0				1.680	
1260.0				1.570	
1290.0				1.450	
1320.0				1.340	
1350.0				1.250	
1410.0				1.100	
1470.0				0.950	
1530.0				0.890	
1590.0				0.810	
1650.0				0.750	
1710.0				0.680	
1770.0				0.650	
1830.0				0.610	
1890.0				0.580	
2370.0				0.450	

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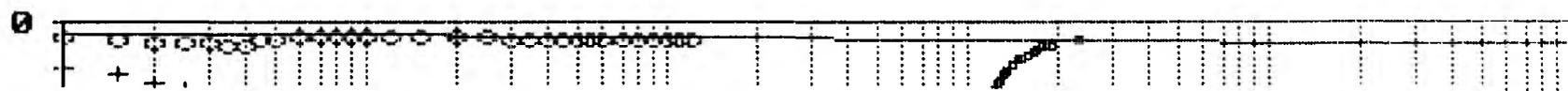


7408/117

BOSCHENK & JILSON

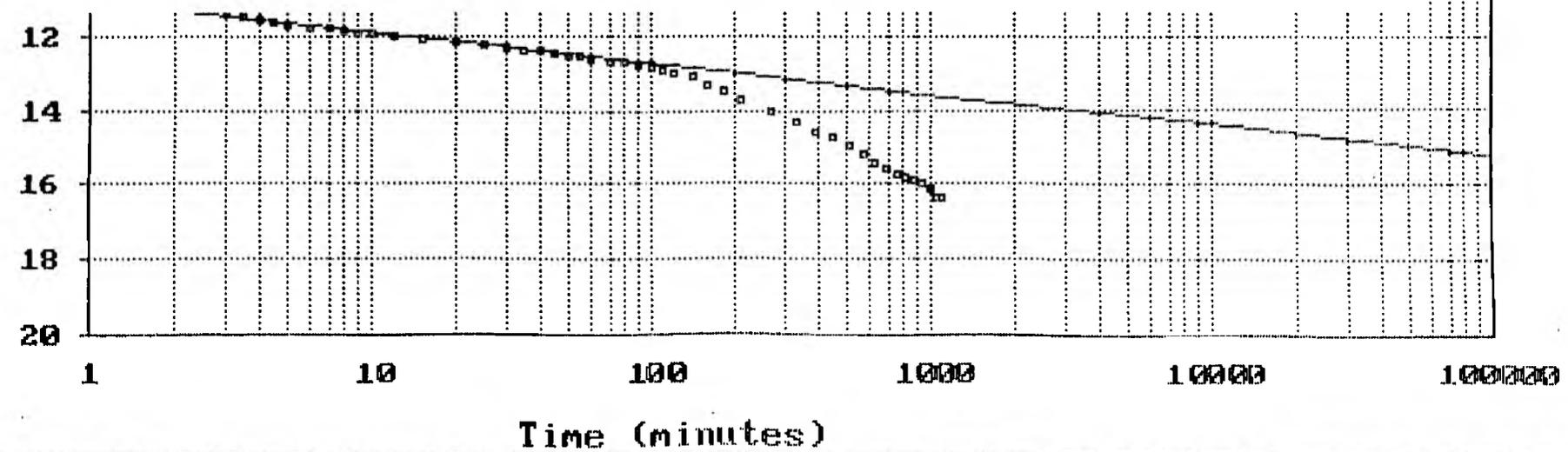
(6755) 10/07/02

Fig 1

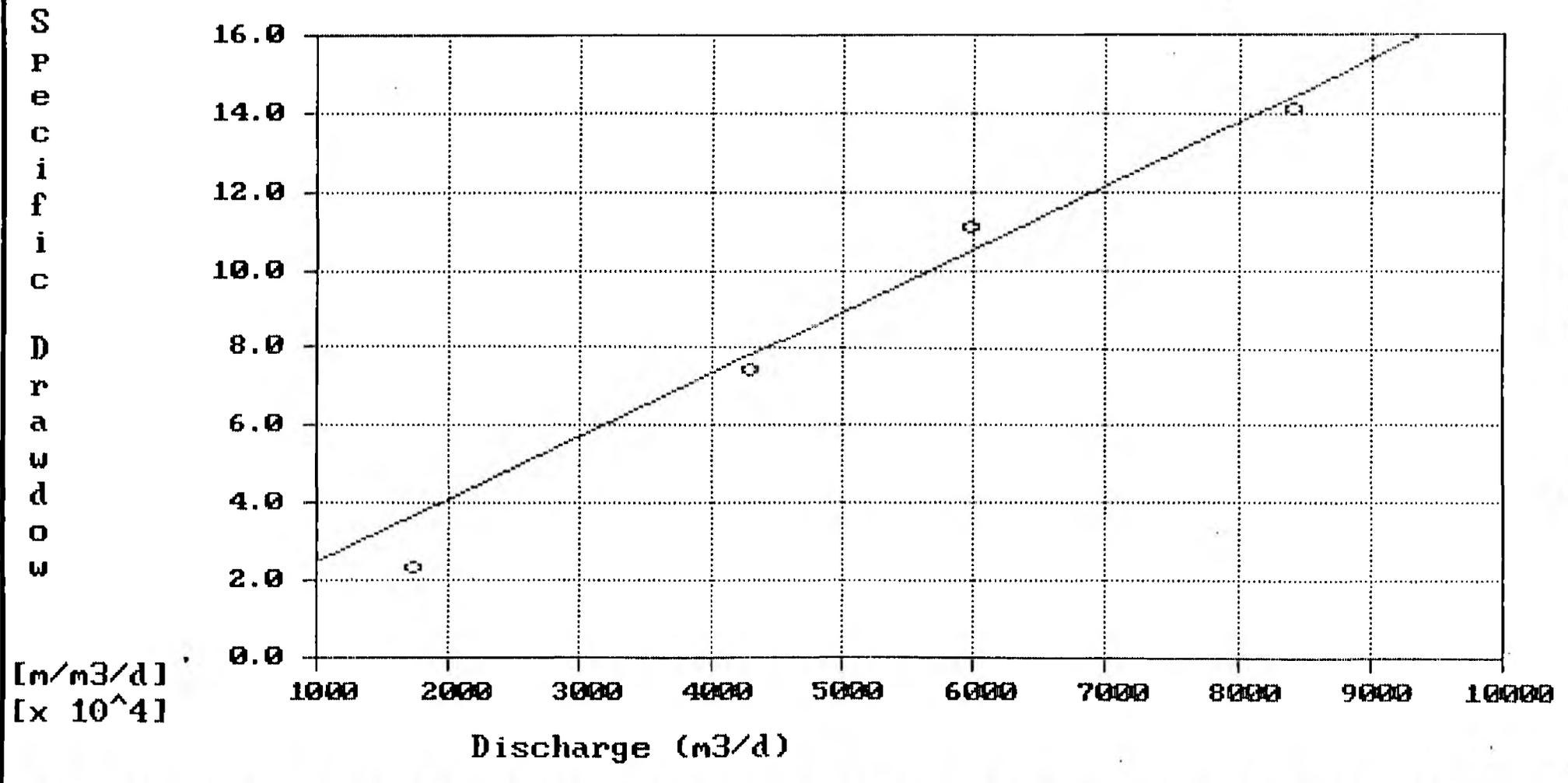


Step No.	Pumping (1/s)	Drawdown at 10 mins		s/Q (m/m ³ /d)	
		S.Recovery	S.Increment	S.Recovery	S.Increment
1	20.00	0.399 m	0.399 m	0.2310E-03	0.2310E-03
2	49.70	3.183 m	3.160 m	0.7412E-03	0.7360E-03
3	69.20	6.654 m	6.478 m	0.1113E-02	0.1083E-02
4	97.40	11.918 m	11.584 m	0.1416E-02	0.1377E-02

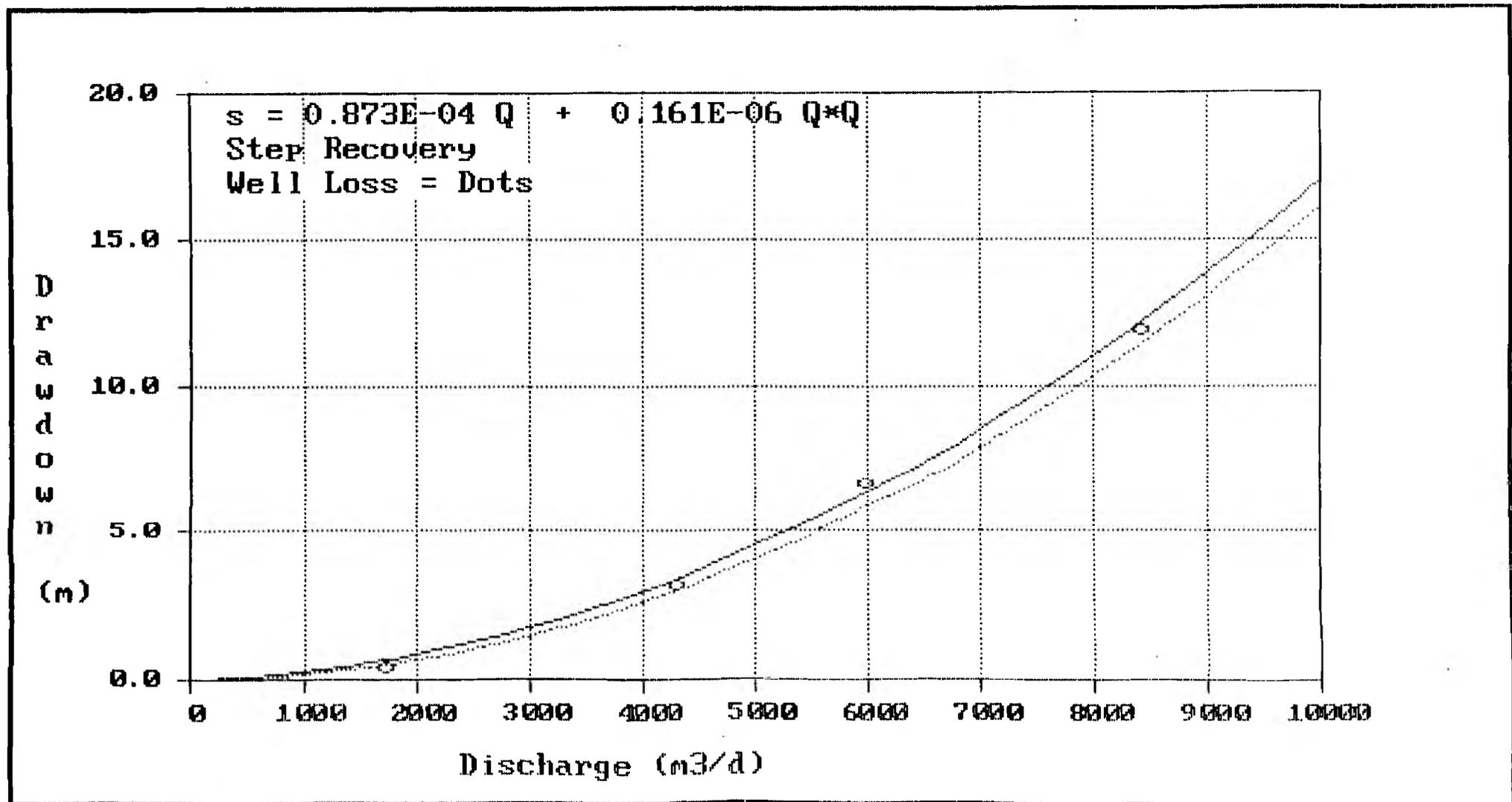
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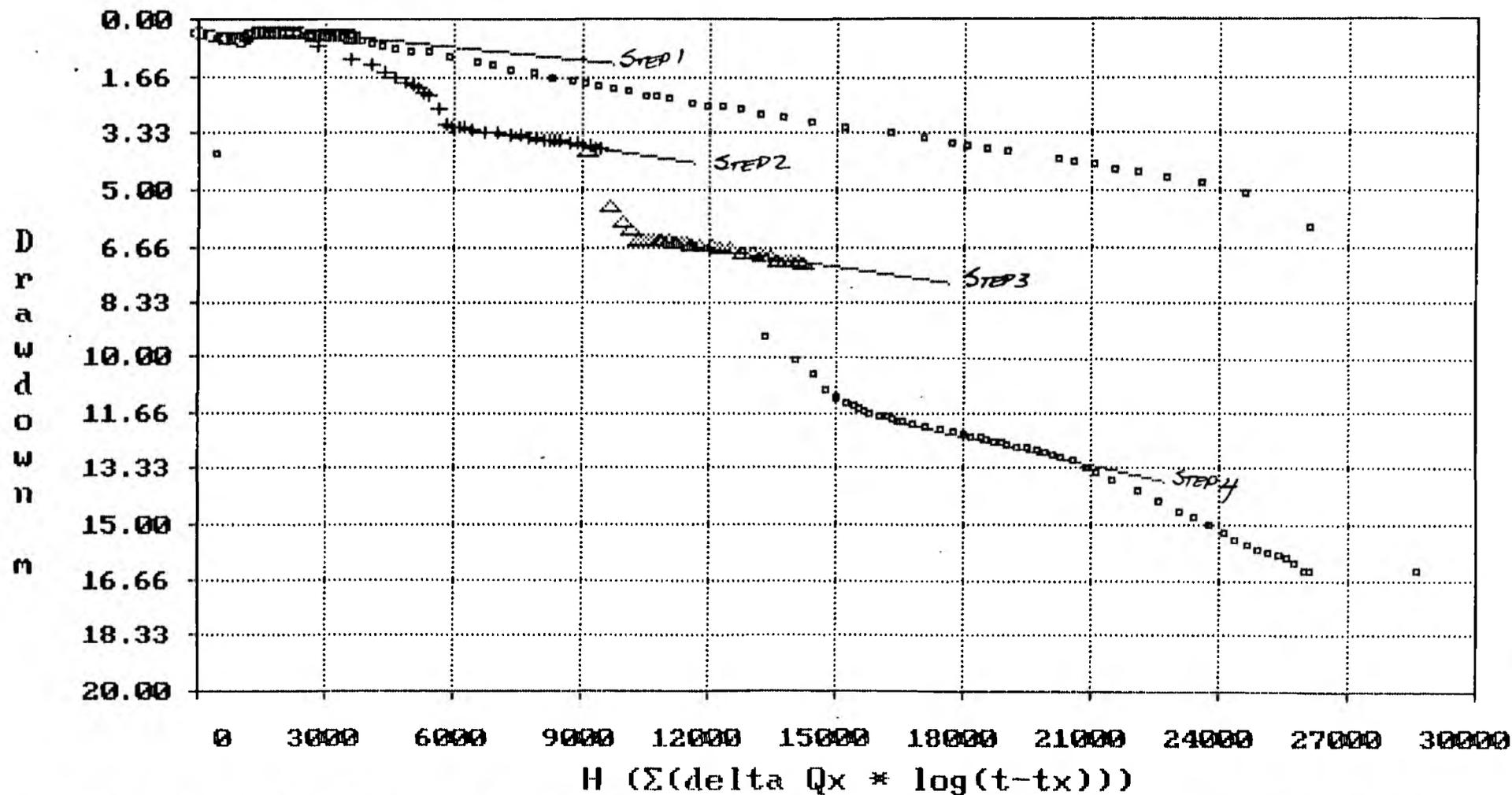
GWDS - GARBOLISHAM 19/12/84 -10:30 - Step Recov.



SR Drawdown(m) = 0.8726E-04 Q + 0.1610E-06 Q² (T = 13981 m2/d) ± 10 mins



OPTIONS :- S)cales E)quations T)oggle Type D)ump P)lotter Q)uit



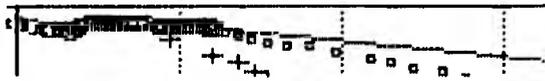
7/10/81

EDEN & HAZEL

(BEST 10/07/92)

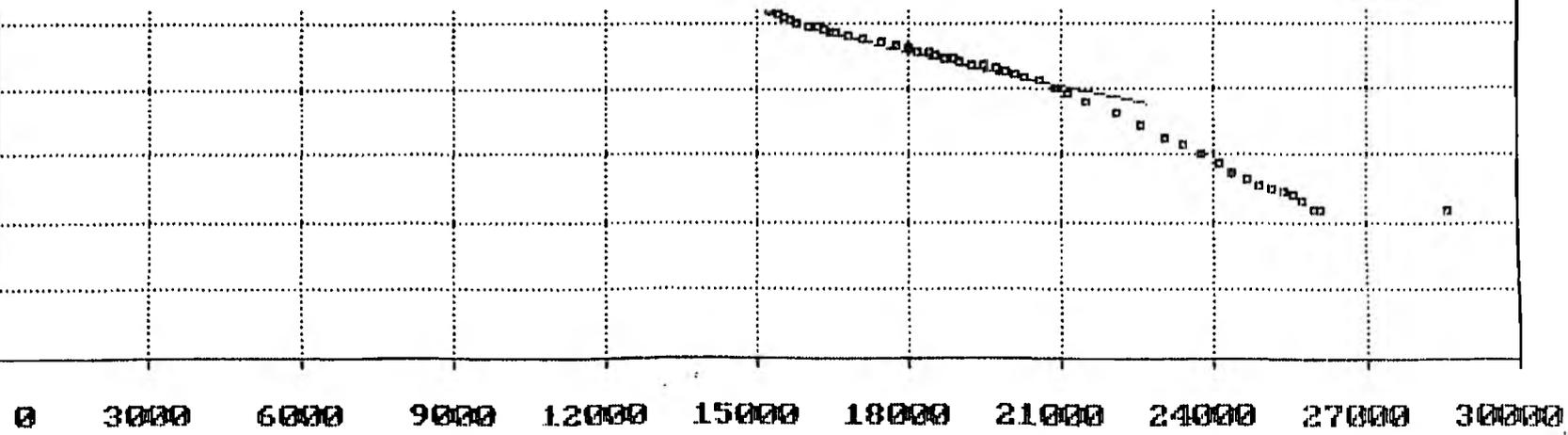
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Step No.	Pumping (l/s)	Trans (m ² /d)	Intercept (m)	h/Q (m/m ³ /d)	Gradient
1	20.000	1427.6	0.062	0.3561E-04	0.1282E-03
2	49.700	999.3	2.099	0.4888E-03	0.1832E-03
3	69.200	999.3	4.538	0.7591E-03	0.1832E-03
4	97.400	630.5	7.186	0.8539E-03	0.2903E-03

11.66
13.33
15.00
16.66
18.33
20.00

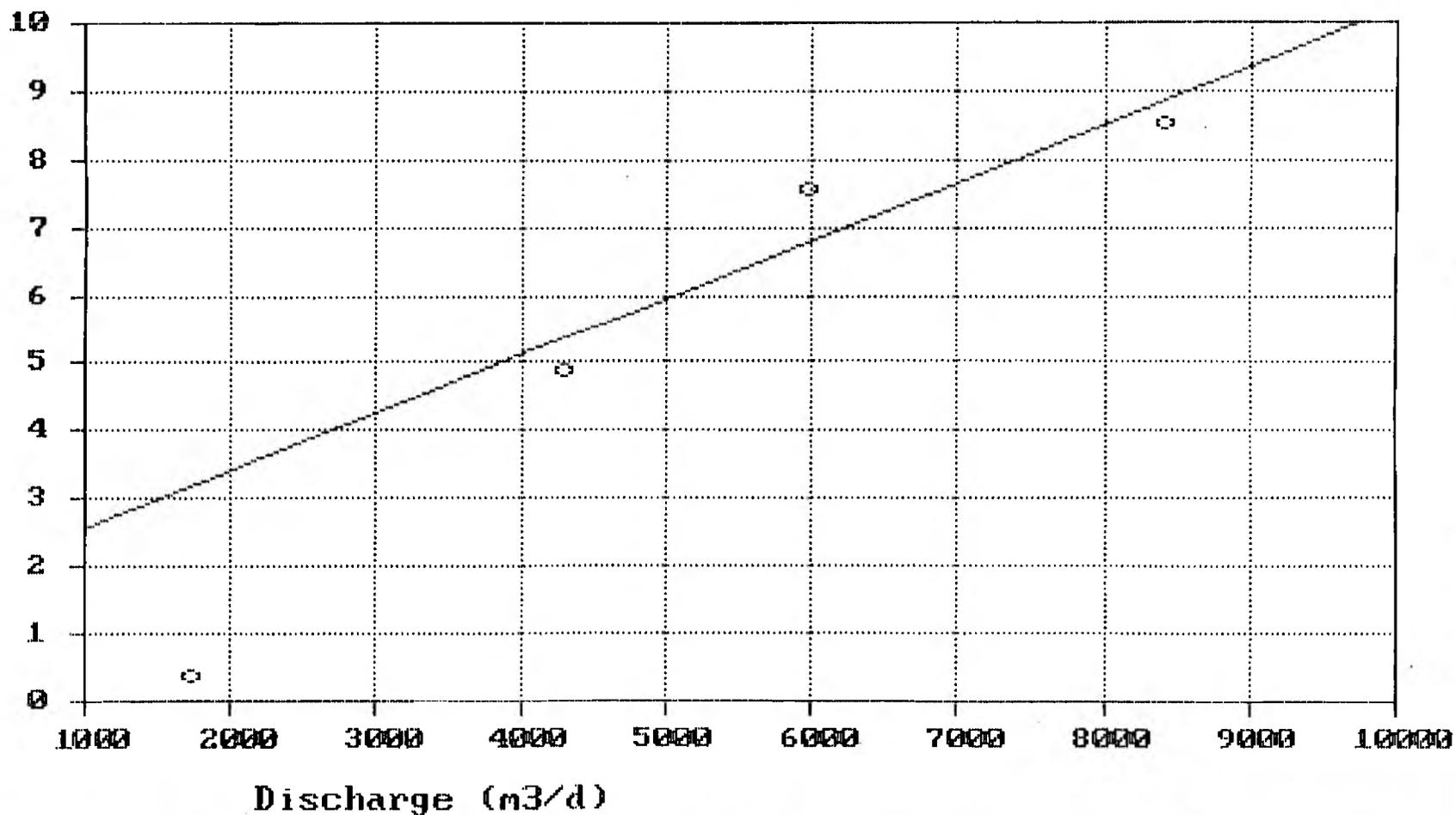


H (Σ(delta Qx * log(t-tx)))

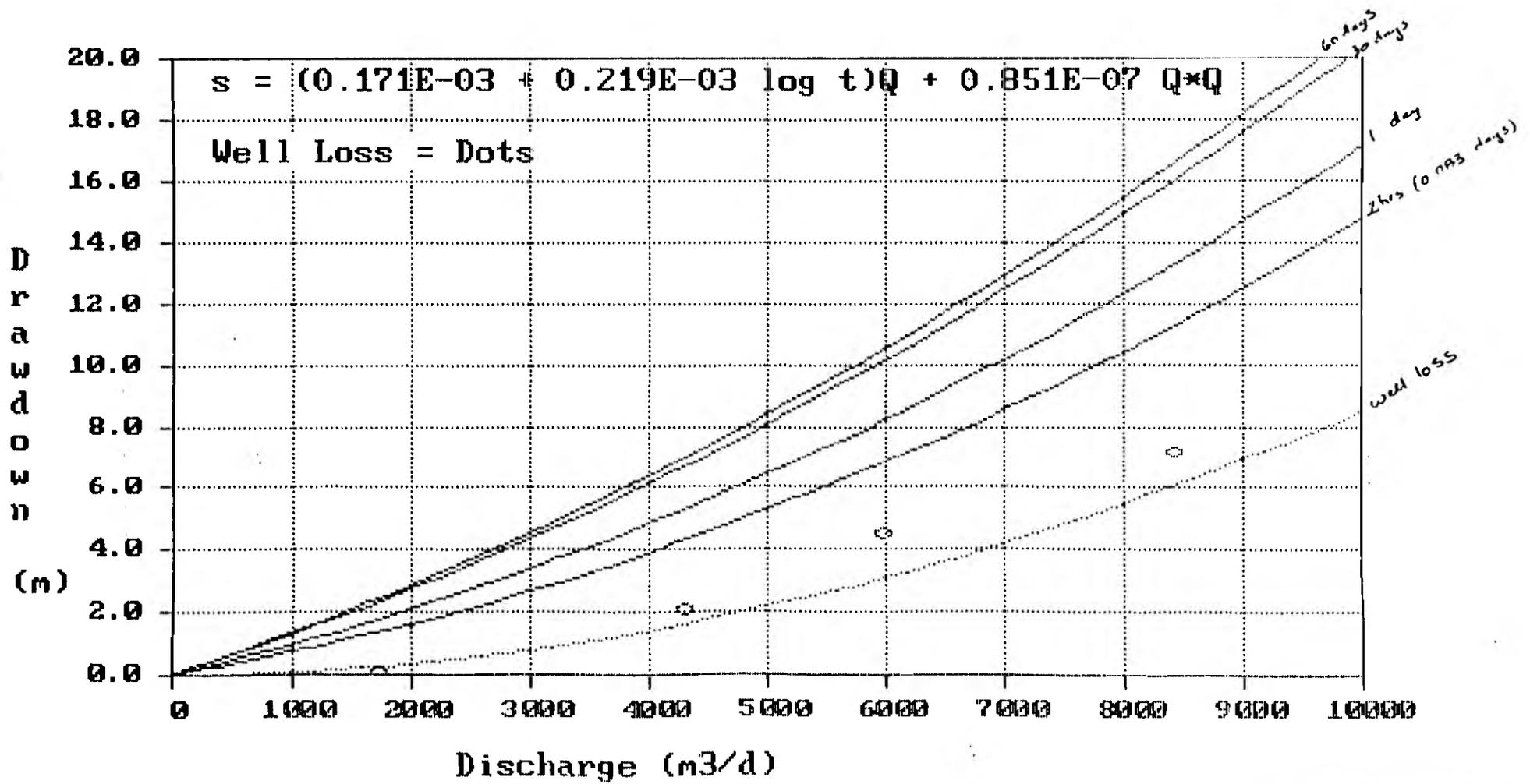
GWDS - GARBOLISHAM 19/12/84 -10:30 -

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m/m3/d
x 10^4



AQUIFER TEST DATA

Recovery Data

Test-Reference : GWDS- GARBOLDISHAM
 Start Time & Date : 19/12/84 10:30
 Test Discharge : 72.7 l/s

Piez. No. Ref. Rad. Dist.

Elapsed Time since pumpstrt (mins)	Time since pumpstop (mins)	t/t'	Prod. Well		Piez 1 Drawn (m)	Piez 2 Drawn (m)	Piez 3 Drawn (m)	Piez 4 Drawn (m)
			Water Level mb.ref	Resid. Drawdown (m)				
1455.5	0.5	2911.0	33.400	16.350				
1456.0	1.0	1456.0	23.130	6.080				
1456.5	1.5	971.0	22.090	5.040				
1457.0	2.0	728.5	21.850	4.800				
1457.5	2.5	583.0	21.650	4.600				
1458.0	3.0	486.0	21.510	4.460				
1458.5	3.5	416.7	21.400	4.350				
1459.0	4.0	364.8	21.310	4.260				
1459.5	4.5	324.3	21.220	4.170				
1460.0	5.0	292.0	21.130	4.080				
1461.0	6.0	243.5	21.000	3.950				
1462.0	7.0	208.9	20.910	3.860				
1463.0	8.0	182.9	20.810	3.760				
1464.0	9.0	162.7	20.740	3.690				
1465.0	10.0	146.5	20.670	3.620				
1467.0	12.0	122.3	20.540	3.490				
1470.0	15.0	98.0	20.380	3.330				
1475.0	20.0	73.8	20.170	3.120				
1480.0	25.0	59.2	20.040	2.990				
1485.0	30.0	49.5	19.900	2.850				
1490.0	35.0	42.6	19.800	2.750				
1495.0	40.0	37.4	19.700	2.650				
1500.0	45.0	33.3	19.620	2.570				
1505.0	50.0	30.1	19.550	2.500				
1510.0	55.0	27.5	19.480	2.430				
1520.0	65.0	23.4	19.350	2.300				
1525.0	70.0	21.8	19.300	2.250				
1530.0	75.0	20.4	19.250	2.200				
1540.0	85.0	18.1	19.150	2.100				
1550.0	95.0	16.3	19.060	2.010				
1560.0	105.0	14.9	18.970	1.920				

Elapsed Time since pumpstrt (mins)	Time since pumpstop (mins)	t/t'	Prodn. Well		Piez 1 Drawn (m)	Piez 2 Drawn (m)	Piez 3 Drawn (m)	Piez 4 Drawn (m)
			Water Level mb.ref	Resid. Drawdown (m)				
1570.0	115.0	13.7	18.900	1.850				
1580.0	125.0	12.6	18.810	1.760				
1600.0	145.0	11.0	18.730	1.680				
1620.0	165.0	9.8	18.620	1.570				
1650.0	195.0	8.5	18.500	1.450				
1680.0	225.0	7.5	18.390	1.340				
1710.0	255.0	6.7	18.300	1.250				
1770.0	315.0	5.6	18.150	1.100				
1830.0	375.0	4.9	18.000	0.950				
1890.0	435.0	4.3	17.940	0.890				
1950.0	495.0	3.9	17.860	0.810				
2010.0	555.0	3.6	17.800	0.750				
2070.0	615.0	3.4	17.730	0.680				
2130.0	675.0	3.2	17.700	0.650				
2190.0	735.0	3.0	17.660	0.610				
2250.0	795.0	2.8	17.630	0.580				
2730.0	1275.0	2.1	17.500	0.450				

COOPER-JACOB STRAIGHT-LINE METHOD

Production Well Discharge : 72.7 l/s
Observation Well Ref :
Radial Distance : m

CALCULATED HYDRAULIC PARAMETERS:

Determined between 1.97697 and 963.83 mins or t/t'

Delta S 1.742931 metres

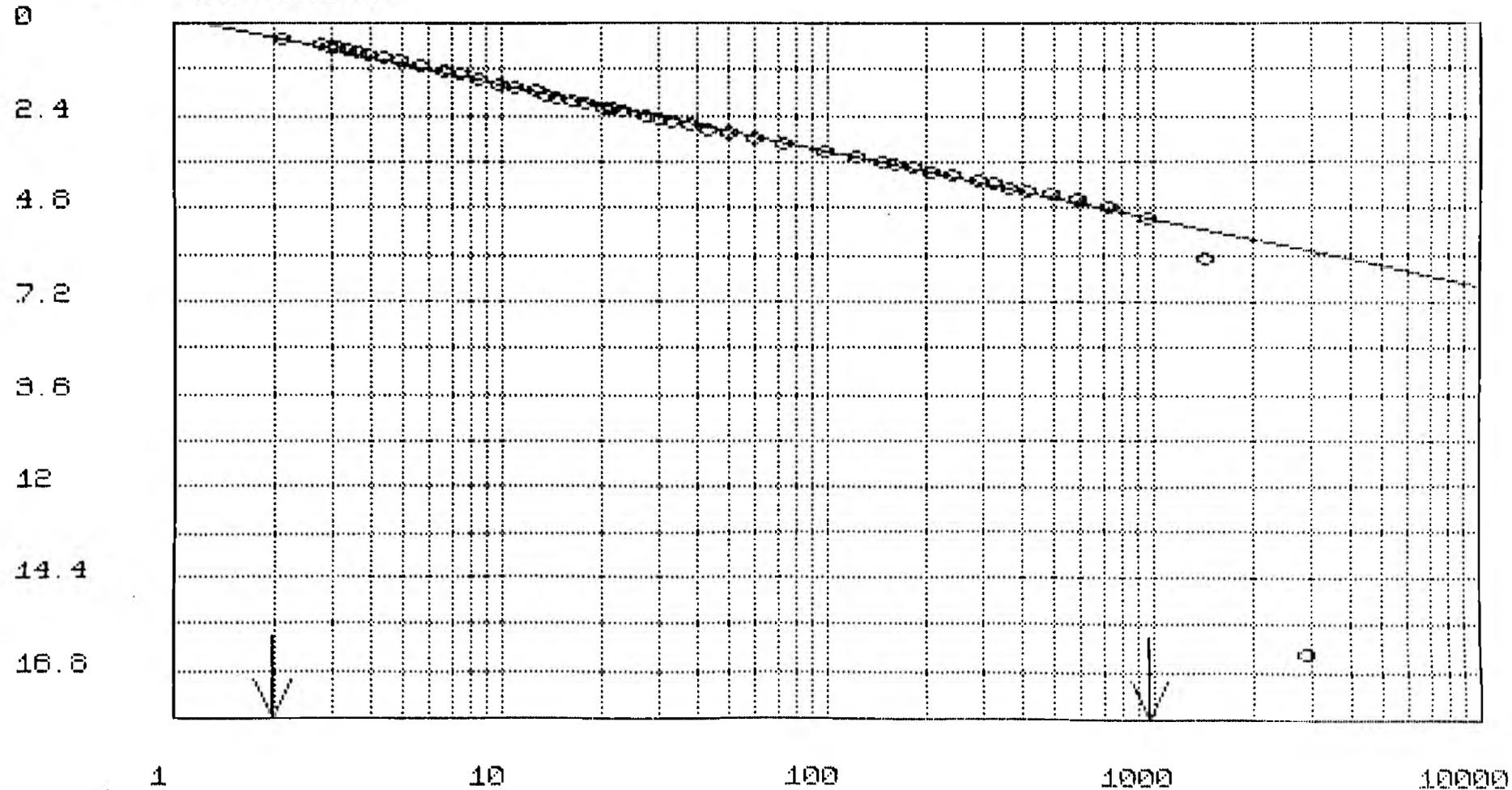
To mins

TRANSMISSIVITY - 659.6079 M3/M/D

STORAGE. COEFF. -

Press any key to continue.

Trans = 659.6m²/d



(c) H.S.I. 1991

time/time'

SIMULATION PARAMETERS

Prod. Well Diam(m): .61 Limits of modelled area(kms): 10

Observation well details

No.	Rad. dist	No.	Rad. dist
1	0	3	0
2	0	4	0

Aquifer Type(1,2 or 3): 2
 Beta: 0 Alpha: .5
 (1)Leaky;(2)W. Table;(3)Artesian

Aquifer Hydraulics

Permeability (m/d)	Distance(m)
18	100
6	10000
0	0
0	0

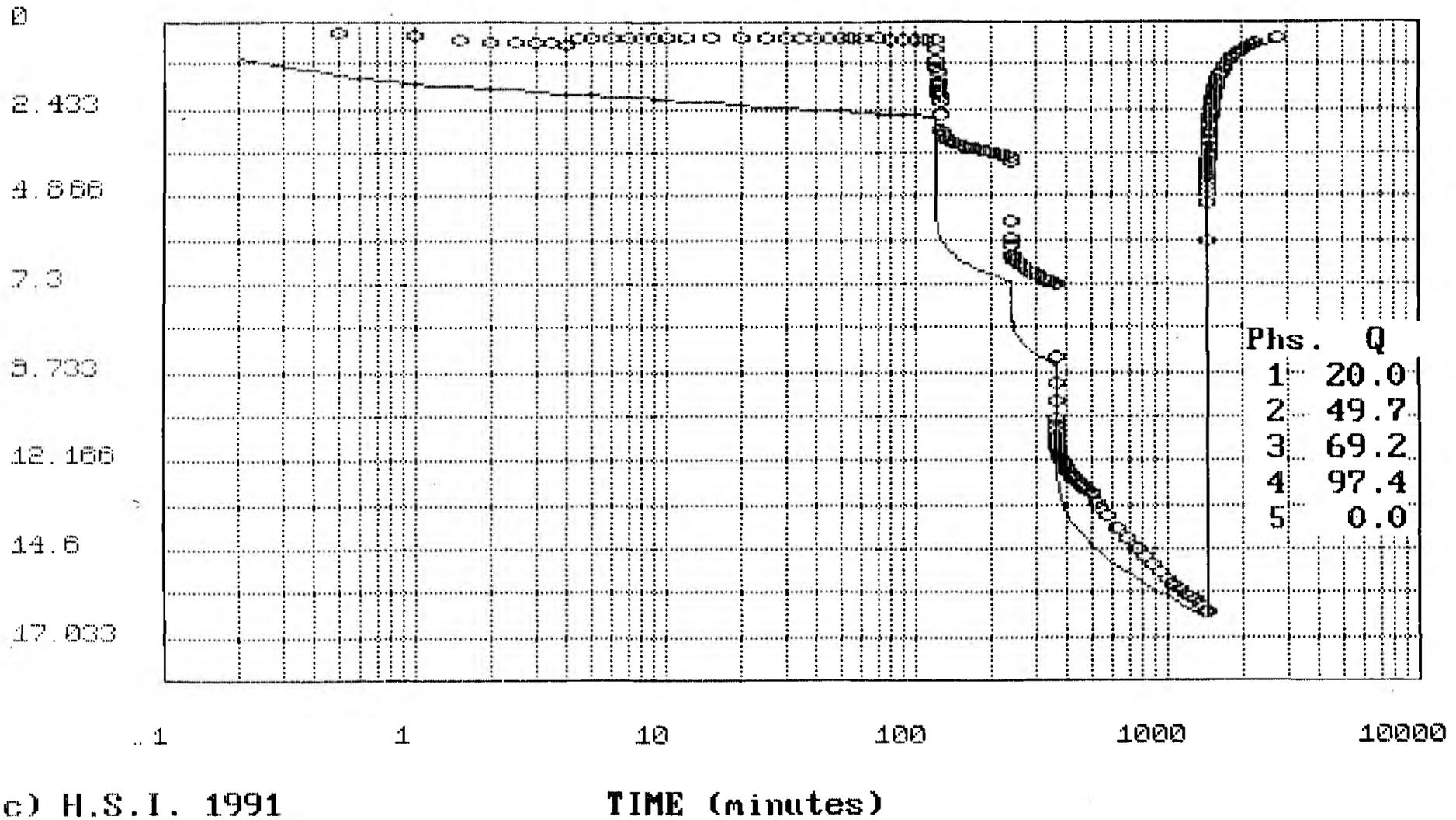
Well loss constant: 22
 Well loss exponent: 10

Stor. Coeff. .00005 Specific Yield .0001

Top of Aquifer(m)	Base of Aquifer(m)	Water Level(m)
18	150	17.05

Phase	Q(l/s)	Time(mins)	Phase	Q(l/s)	Time(mins)
1.	20	120	6.	0	0
2.	49.7	240	7.	0	0
3.	69.2	360	8.	0	0
4.	97.4	1455	9.	0	0
5.	0	2730	10.	0	0

<E>dit Input field.
 <C>ommence Execution.
 <Q>uit to program menu.



(c) H.S.I. 1991

TIME (minutes)

SAMPLE RESULTS 1 (AW710)

DATA SELECTION CRITERIA:-

EXTRACT FILE
SAMPLE POINT 802BDM0011F*
SAMPLE TYPE **
AREA **
SUB1 **
SUB2 **
DISTRICT COUNCIL **
PARISH COUNCIL ***
ZONE ****

SAMPLING DEPT **
SAMPLER ***
METHOD *
INDICATOR **
LAB. REFERENCE **
REASON CODES : : : :
DATE RANGE 31/01/86 to 31/12/99

SAMPLE RANGE 88000001 to 99999999

INDEX KEY NONE

OUTPUT MODE:-

PRINT FOLLOWS

RESULT FILTERS:-

INCLUSION FILTER: *** ALL RESULTS ***
RESULT IMAGING: ENABLED
RESULT BOUNDING: ENABLED

SAMPLE RESULTS 1 (ARTIST) For Location G.W.D.S. B/H 6 LOVERS LANE GARBOLDISHAM
R02BDIM08117C

SAMPLE NUMBER	21003699	21003700	21003701	21003702	21003703	21003704
DATE	02/04/92	02/04/92	02/04/92	02/04/92	02/04/92	02/04/92
TIME	15:50	16:10	09:30	09:40	10:00	09:50
INDICATOR						
METHOD	S	S	S	S	S	S
REASON	CM: 1 1 1					

CODE	NAME	UNITS	21003699	21003700	21003701	21003702	21003703	21003704
00610	PH	PP UNITS	7.02	7.00	7.00	7.10	7.10	7.10
00761	TEMP C	CEL	-----	-----	10.0	10.0	10.0	10.0
00770	CORR 25 C	USIE/CM	905	870	890	907	907	910
00812	L.C. (XSAF)	% SATN	-----	-----	50.0	24.0	30.0	16.0
00822	D.O	MG/L O	-----	-----	0.00	0.00	0.00	0.00
00851	BOD-APU 5	MG/L O	-----	-----	02	01	-----	-----
00994	TDC	MG/L C	0.000	0.02	0.41	-----	0.04	-----
01110	AMMONIA N	MG/L N	0.0260	0.020	0.020	0.0300	0.0300	0.020
01165	T.O.N AS N	MG/L N	6.40	5.77	5.57	7.69	8.96	6.09
01341	TDS 105 C	MG/L	-----	-----	510	620	-----	-----
01581	HARD TOTAL	MG/L CACOS	-----	-----	424	500	-----	-----
01621	ALK CACOS	MG/L CACOS	318	317	315	-----	-----	-----
01622	ALK CACOS	MG/L CACOS	-----	-----	-----	305	320	315
01724	CHLORIDE	MG/L CL	45.0	45.0	47.5	54.0	50.0	47.0
01771	FLUORIDE	MG/L F	-----	-----	0.00	0.200	0.200	0.00
01905	P ORTED P	MG/L P	-----	-----	0.021	0.021	0.021	0.021
01920	SILICA	MG/L SIO2	-----	-----	21.9	20.1	-----	-----
01933	SULFATE	MG/L SO4	-----	-----	-----	-----	-----	101
01835	SULFATE	MG/L	65.0	66.8	60.6	73.0	70.0	-----
02020	LITHIUM	MG/L LI	-----	-----	00.02	0.02	-----	-----
02073	SODIUM	MG/L NA	20.6	19.0	20.0	23.0	20.0	20.0
02110	POTASSIUM	MG/L K	7.95	6.60	6.00	9.40	8.00	4.90
02274	MAGNESIUM	MG/L MG	6.94	6.91	6.14	7.50	7.00	20.0
02414	CALCIUM	MG/L CA	149	140	140	154	151	150
02350	BORON	MG/L B	-----	-----	0.04	0.04	-----	-----
04335	MK TOTAL	MG/L MK	-----	-----	0.0400	0.0460	0.0000	0.0000
04217	IRON TOTAL	MG/L FE	-----	0.0500	0.01	0.0500	0.0450	-----
05032	CHLOROPHYLL	UG/L	-----	-----	0.010	-----	-----	-----
05072	DICHLOROPHS	UG/L	-----	-----	0.010	-----	-----	-----
05050	MALATHIOS	UG/L	-----	-----	0.010	-----	-----	-----
05400	PARATHIOL	UG/L	-----	-----	0.010	-----	-----	-----
05610	2,4,5-T	UG/L	-----	-----	0.050	-----	-----	-----
07232	DIATIOL	UG/L	-----	-----	0.010	-----	-----	-----
25460	S FAEC P	NO/100ML	-----	-----	0	0.00	00	-----
25490	E.COLI P	NO/100ML	-----	-----	0	0.00	00	-----
70341	NATRIUREP	1820	-----	-----	-----	-----	-----	-----
70422	CFM UG/L	UG/L	-----	-----	0.020	-----	-----	-----
70711	ISODRIN	MG/L	-----	-----	0.0	-----	-----	-----
70722	CHLOROTOL.	UG/L	-----	-----	0.10	-----	-----	-----
70732	ISOPROCTIOL	UG/L	-----	-----	0.10	-----	-----	-----
70741	NEFIBPHOS	UG/L	-----	-----	0.010	-----	-----	-----
70771	TRIFAZIOL	UG/L	-----	-----	0.020	-----	-----	-----
70792	PROPYLANIOL	UG/L	-----	-----	0.10	-----	-----	-----
73261	V TOTAL	UG/L	-----	-----	3.20	1.60	-----	-----
73521	CORR PATBT	USIE/CM	-----	-----	-----	90.0	21.0	370

73630	PROPACINE	UG/L	-----	-----	0.050	-----	-----	-----
73631	CARBETAMI.	UG/L	-----	-----	0.10	-----	-----	-----
73632	MORFON	UG/L	-----	-----	0.10	-----	-----	-----
73633	METHADON	UG/L	-----	-----	0.10	-----	-----	-----
73647	DIURON	UG/L	-----	-----	0.10	-----	-----	-----
73661	TECHALINE	UG/L	-----	-----	0.10	-----	-----	-----
73671	TRIFLURAL.	UG/L	-----	-----	0.10	-----	-----	-----
73681	CHLORFAL.	UG/L	-----	-----	0.10	-----	-----	-----
73691	FLUOROPYR	UG/L	-----	-----	0.10	-----	-----	-----
73701	ECB - 008	UG/L	-----	-----	0.10	-----	-----	-----
73711	PCB - 009	UG/L	-----	-----	0.10	-----	-----	-----
73721	ECB - 0101	UG/L	-----	-----	0.10	-----	-----	-----
73731	PCB - 0119	UG/L	-----	-----	0.10	-----	-----	-----
73741	ECB - 0135	UG/L	-----	-----	0.10	-----	-----	-----
73751	PCB - 0155	UG/L	-----	-----	0.10	-----	-----	-----
73761	PCB - 0180	UG/L	-----	-----	0.10	-----	-----	-----
74061	ENDOSULF-A	UG/L	-----	-----	0.1	-----	-----	-----
74071	ENDOSULF-B	UG/L	-----	-----	0.5	-----	-----	-----
74101	ECED	UG/L	-----	-----	1.0	-----	-----	-----
74181	13506H3CL3	UG/L	-----	-----	0.10	-----	-----	-----
74401	ALINER-EYE	UG/L	-----	-----	0.010	-----	-----	-----
74411	FEETHION	UG/L	-----	-----	0.010	-----	-----	-----
74421	PARATH-METH	UG/L	-----	-----	0.010	-----	-----	-----
74561	12306H3CL3	UG/L	-----	-----	0.10	-----	-----	-----
74871	12406H3CL3	UG/L	-----	-----	0.10	-----	-----	-----
75051	DESMETRYN	UG/L	-----	-----	0.025	-----	-----	-----
75061	PROMETRYN	UG/L	-----	-----	0.025	-----	-----	-----
90672	CHLOROFORM	UG/L	0.1	-----	0.880	-----	-----	-----
90675	CHLOROFORM	UG/L	-----	-----	0.020	-----	-----	-----
90682	CHLORO2	UG/L	0.1	-----	0.1	-----	-----	-----
90692	CHLORO2CL	UG/L	0.1	-----	0.1	-----	-----	-----
90702	BROMOFORM	UG/L	0.1	-----	0.1	-----	-----	-----
90954	2,3,6-TBA	UG/L	-----	-----	0.050	-----	-----	-----
91152	CARBON TET	UG/L	0.1	-----	0.480	-----	-----	-----
91155	CARBON TET	UG/L	-----	-----	0.006	-----	-----	-----
91192	C2HCL3	UG/L	0.1	-----	0.1	-----	-----	-----
91195	C2HCL3	UG/L	-----	-----	0.004	-----	-----	-----
91212	C2CL4	UG/L	0.1	-----	0.1	-----	-----	-----
91215	C2CL4	UG/L	-----	-----	0.004	-----	-----	-----
91930	TOT.COLI P	NO/100ML	-----	-----	40.0	0.00	0.2	-----
92031	HCE ALPHA	UG/L	-----	-----	0.10	-----	-----	-----
92041	HCE GAMMA	UG/L	-----	-----	0.53	-----	-----	-----
92051	DIELDRI	UG/L	-----	-----	0.88	-----	-----	-----
92061	DDT (PP')	UG/L	-----	-----	0.10	-----	-----	-----
92071	DDE (PP')	UG/L	-----	-----	0.10	-----	-----	-----
92091	ENDRI	UG/L	-----	-----	0.5	-----	-----	-----
92091	ALDRI	UG/L	-----	-----	0.5	-----	-----	-----
92101	HEPTACHLOR	UG/L	-----	-----	0.10	-----	-----	-----
92181	PE FIELD	PE UNITS	-----	-----	8.00	7.60	7.40	7.40
92231	HEPT EPOX	UG/L	-----	-----	0.10	-----	-----	-----
92241	ENDOSULFAN	UG/L	-----	-----	-----	-----	-----	-----
92251	DDT (OP')	UG/L	-----	-----	0.10	-----	-----	-----
92261	DDE (PP')	UG/L	-----	-----	0.10	-----	-----	-----
92465	2,4,-D	UG/L	-----	-----	0.050	-----	-----	-----
92485	NECOPROP	UG/L	-----	-----	0.050	-----	-----	-----
92495	KCPB	UG/L	-----	-----	0.050	-----	-----	-----
92505	KCPA	UG/L	-----	-----	0.050	-----	-----	-----
92611	AS TOTAL	UG/L AS	-----	-----	1.70	0.5	-----	-----
92655	CB TOTAL	UG/L CB	-----	-----	0.10	0.10	-----	-----
92592	HG TOTAL	UG/L HG	-----	-----	0.05	0.050	-----	-----

97001	TERBUTRYN	UG/L	-----	-----	1.000	-----	-----
97101	LINURON	UG/L	-----	-----	1.00	-----	-----
97201	SELENIUM	UG/L SE	-----	-----	1.00	1.50	-----
97301	12 CEE4CL2	UG/L	-----	-----	1.000	-----	-----
97341	11IC2E3CL2	UG/L	-----	-----	1.770	-----	-----
97345	11IC2E3CL2	UG/L	-----	-----	1.000	-----	-----
97411	CSCL2	UG/L	-----	-----	1.00	-----	-----
97441	DICHOLOPEOF	UG/L	-----	-----	1.000	-----	-----
97451	DICANBA	UG/L	-----	-----	1.000	-----	-----
97462	CHLIFRPHOS	UG/L	-----	-----	1.000	-----	-----
97471	DIMETHOATE	UG/L	-----	-----	1.000	-----	-----
97482	FRPHOS-WE	UG/L	-----	-----	1.000	-----	-----
97492	CARBENTH	UG/L	-----	-----	1.000	-----	-----
97502	FENITEOTH	UG/L	-----	-----	1.000	-----	-----
97512	ADINERGS-M	UG/L	-----	-----	1.000	-----	-----
98191	HCH BETA	UG/L	-----	-----	1.00	-----	-----
98201	DDE (OP')	UG/L	-----	-----	1.00	-----	-----
98641	ATRAZINE	UG/L	-----	-----	1.000	-----	-----
98651	SIMAZINE	UG/L	-----	-----	1.000	-----	-----
98874	CE TOTAL	UG/L CE	-----	-----	1.00	31.0	-----
98894	CU TOTAL	UG/L CU	-----	-----	1.10	1.70	-----
98914	PB TOTAL	UG/L PB	-----	-----	1.00	1	-----
98934	NI TOTAL	UG/L NI	-----	-----	1.20	4.30	-----
98954	ZN TOTAL	UG/L ZN	-----	-----	18.0	14.0	-----
99451	HCH DELTA	UG/L	-----	-----	1.00	-----	-----
99461	DDE (OP')	UG/L	-----	-----	1.00	-----	-----

END OF EXTRACT FOR SAMPLE POINT

APPENDIX 4.

National Rivers Authority - Relocation of Suffolk Water Company borehole

RECORD OF WELL

At HALL LANE

190 / TM 17 / 29 601 C

Town or Village YAXLEY

County SUFFOLK

EXACT SITE
OF WELL

Six-inch County Sheet Suffolk 36NW/E

Six-inch National Grid sheet and reference TM 17 SW (1205 7351)

For ENGLISH WATER AUTHORITY formerly East Suffolk & Norfolk R.A.

State whether owner, tenant, builder, contractor, consultant, etc.:-

Address (if different from above) 146 Bedons adhemarle Rd. Norwich

*DELETE
AS
NECESSARY

Level of ground surface above sea level (O.D.) 123 ft. 7 in (37.67 m)

If well top is not at ground level, state how far above* 1 ft. 8 in (0.5 m)
below:

SHAFT.....ft (.....m); diameter.....ft (.....m);

HEADINGS (please attach details—dimensions and directions)

BORE 427 ft (..... 130.00 m); diameter: at top 17 in (..... 431 mm); at bottom 17 in (..... 431 mm)

Full details of permanent lining tubes (position, length, diameter, plain, slotted, etc.)

(247 ft x 17 ins). 75.2 m x 431 mm plain steel casing, welded, sunk to a depth of (245 ft) 74.7 m below G.L.

The base of the bore was grouted from (427 ft to 336.5 ft) 130m to 102.5 m below G.L. to minimise the ingress of salt water from this state.

Water struck at depths offt (.....m) below well top

Rest level of water 18 ft (..... 5.4 m) above* well top. Suction at.....ft (.....m) below

TEST
CONDITIONS

Yield on 43 hours* test pumping at 21,000 galls (..... 26.51 l/s) per hour with depression to 78 ft 7 ins (21.5 m) below well top. Recovery to rest level in 1 week mins* / hours

Capacity of pump 80,000 g.p.h. (.....m³/h)

Date of measurements 2nd - 22nd July 1974

NORMAL
CONDITIONS

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:

Make and/or type..... Motive power.....

Capacity.....galls (.....m³) per hour. Suction at.....ft (.....m)

below well top. Amount pumped.....galls (.....m³) per day. Estimated

consumption.....galls (.....m³) per week

Well made by Farrads Ltd. Ripon Date of sinking 1974

ADDITIONAL NOTES ANALYSIS (please attach copy if available)

LOG OF
STRATA
OVERLEAF

Data Bank

Received from Farrads Ltd.

Date 20-5-1975

Observation well

Recorder.....

E.R. log

Site marked on

1" map

6" map

(use symbol)

Copy to A.W.A. (S.S.N)

C.W.P.U. & W.A.C.

Date

(For Institute use only)
GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA

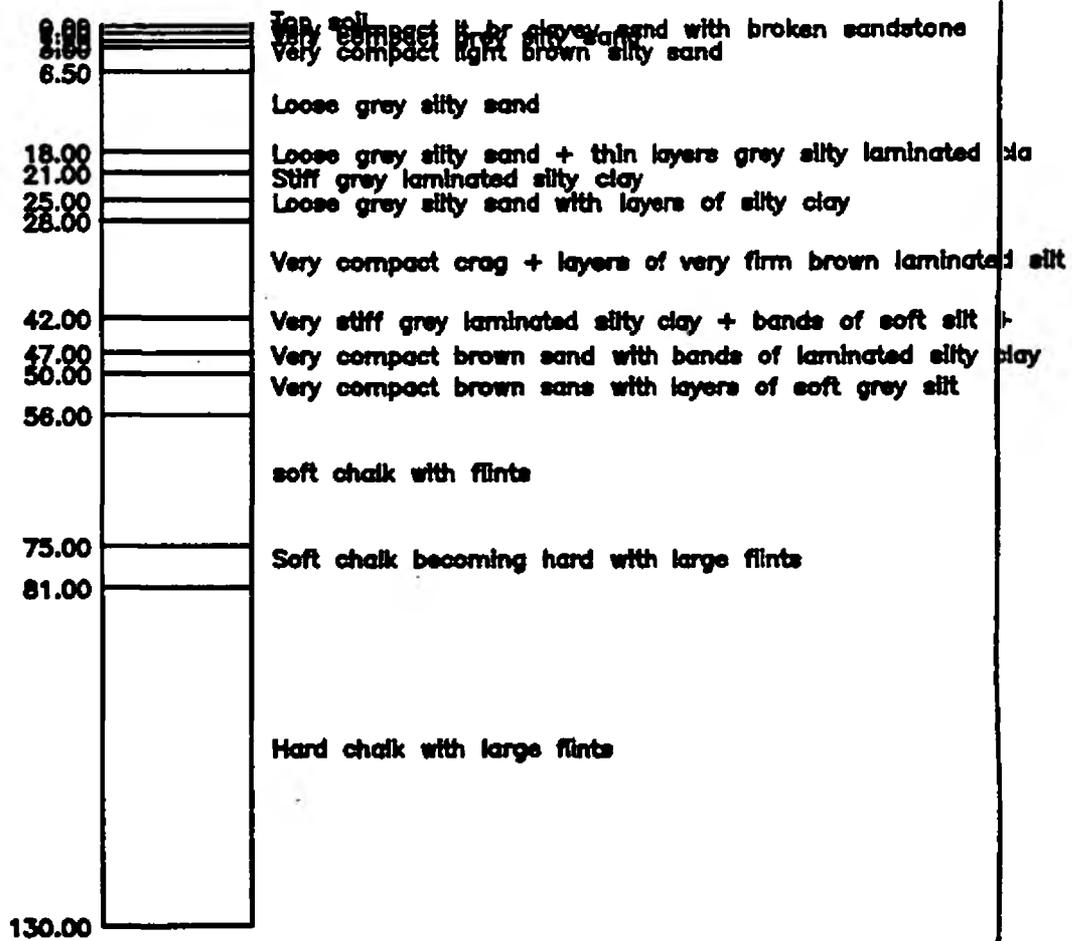
If measurements start below
ground surface, state how far.

THICKNESS

DEPTH

Feet Inches Metres Feet Inches Metre

(For Institute use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA If measurements start below ground surface, state how far.	THICKNESS			DEPTH		
		Feet	Inches	Metres	Feet	Inches	Metre
	Top soil			1.00			1.00
	Very compact light brown clayey sand with traces of broken sandstone			1.20			2.20
	Very compact grey silty sand			0.80			3.00
	Very compact light brown silty sand			3.50			6.50
	Loose grey silty sand			11.50			18.00
Nominal bray	Loose grey silty sand with thin layers of grey silty laminated clay			3.00			21.00
	Stiff grey laminated silty clay			4.00			25.00
	Loose grey silty sand with layers of silty clay			3.00			28.00
	Very compact cong. with layers of very firm brown laminated silty clay			14.00			42.00
	Very soft grey laminated silty clay with bands of soft silt & sand mixed			3.00			47.00
	Very compact brown sand with bands of laminated silty clay mixed			3.00			50.00
	Very compact brown sand with layers of soft grey silt			6.00			56.00
upper chalk	Soft chalk with flints			19.00			75.00
	Soft chalk becoming hard with large flints			6.00			81.00
	Hard chalk with large flints			49.00	427		130.00
pet C.R.B. 4/3/78	Data Bank						



NRA

Waveny Groundwater Scheme - 3A
 Yaxley Crag Borehole 3A2

Yield in tcmd

10

9

8

7

6

5

4

3

2

1

0

0

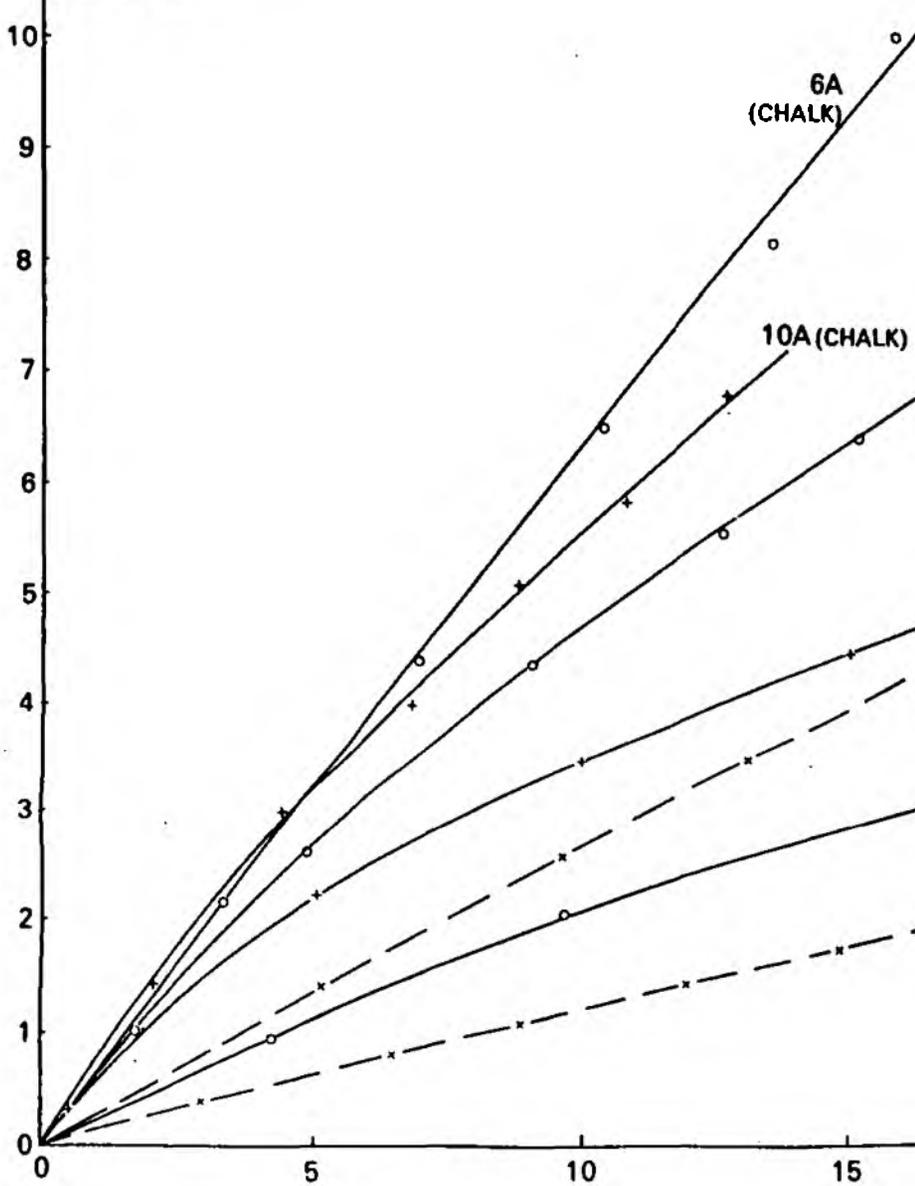
5

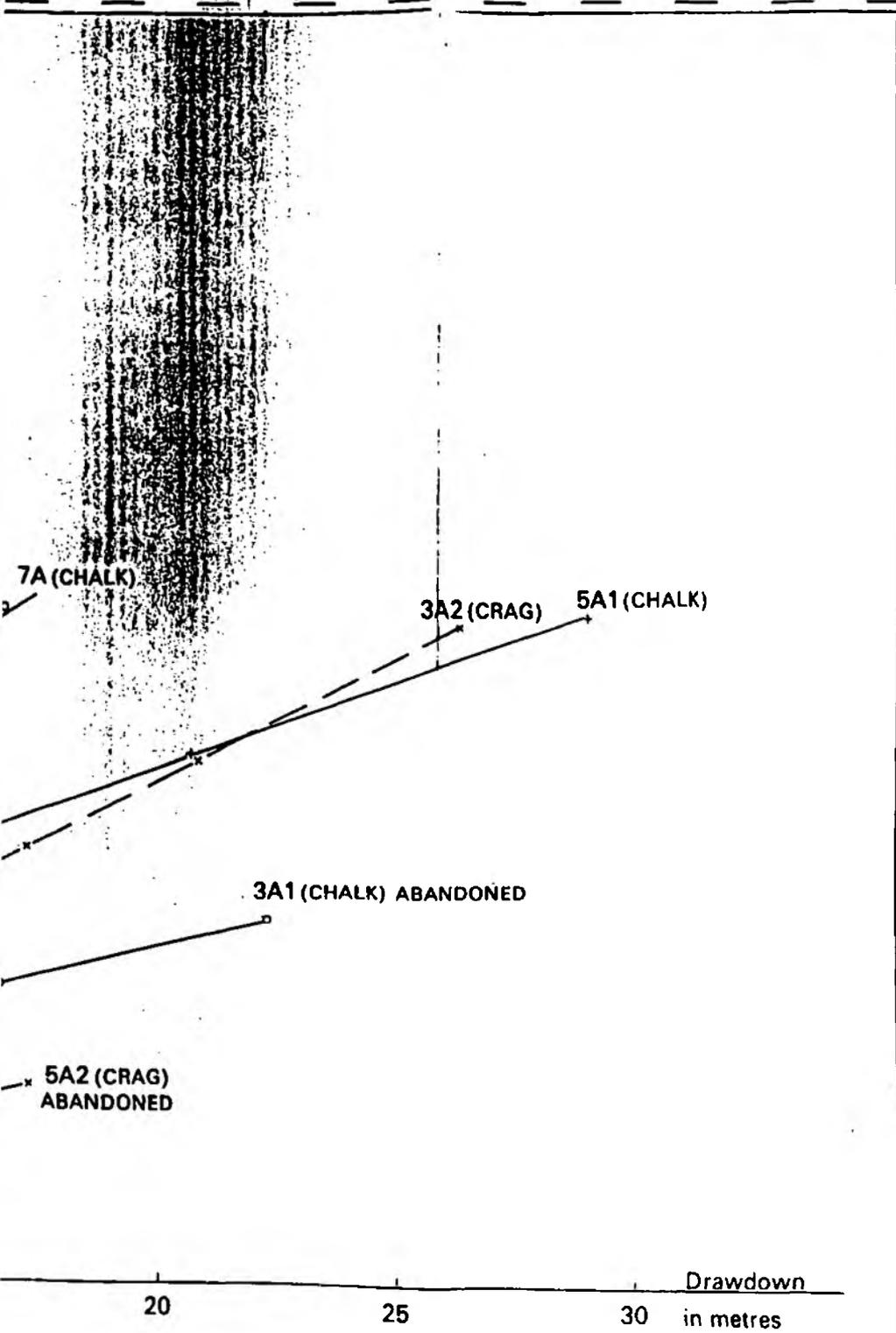
10

15

6A
(CHALK)

10A (CHALK)





ANGLI.
NORFOLK
WAVENEY
YIELD DEP
FOR ABSTR.

APPENDIX 5.

National Rivers Authority - Relocation of Suffolk Water Company borehole

RECORD OF WELL

N. 14073

190 / TM 17 / 12.8
600 B

At base Eye 1 1/2 KM. S.S.E of Jown
Production Borehole No 10A.

Town or Village

County SUFFOLK

Six-inch County Sheet SUFFOLK 36 NE/W

Six-inch National Grid sheet and reference TM 17 SE (1506 7232)

For Anglian Water Authority Norfolk and Suffolk Rivers Division

State whether owner, tenant, builder, contractor, consultant, etc.:-

Address (if different from above) The Sadlers, Alameda Road Norwich
Rivers Waverley Groundwater Project - Contract No 3.

Level of ground surface above sea level (O.D.) 115 ft (35 metres) m

If well top is not at ground level, state how far above: * below: * ft (m)

SHAFT ft (m); diameter ft (m);

HEADINGS (please attach details—dimensions and directions)

BORE 31 1/2 ft (9.6 m); diameter: at top 18 in (460 mm); at bottom 17 1/2 in (444 mm)

Full details of permanent lining tubes (position, length, diameter, plain, slotted, etc.)

(118 ft) 36 metres of 460 mm diameter plain steel lining tubes

(8 m) 2 metres above surface

Annulus space outside of tubes cement grouted from base to surface

Water struck at depths of 102 ft, 118 ft (31 and 36 m) below well top

Rest level of water 21 1/4 ft (6.47 m) above well top. Suction at 165 ft (50 m)

Yield on 270.25 hours test pumping at 66.500 galls (83.9745 m³) per hour with depression to 69 ft 7 in (21.29 m) below well top. Recovery to rest level in 2 1/2 hours

Capacity of pump g.p.h. (m³/h)

Date of measurements 6/5/1974

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:

Make and/or type Motive power

Capacity galls (m³) per hour. Suction at ft (m)

below well top: Amount pumped galls (m³) per day. Estimated

consumption galls (m³) per week

Well made by Le Grand Well Drilling and Engineering Co. Ltd Date of sinking 16/4/1974

ADDITIONAL NOTES ANALYSIS (please attach copy if available)

Borehole treated with acid before the test

Data Bank

Received from Le Grand

Date 19.5.75

Observation well

Recorder

E.R. log

Site marked on

1" map

6" map

(use symbol)

Copy to B.W.A. (S.R.S.)

S.W.P. 2 W.P.C.

Date

EXACT SITE OF WELL

*DELETE AS NECESSARY

TEST CONDITIONS

NORMAL CONDITIONS

LOG OF STRATA OVERLEAF

(For Institute use only)
GEOLOGICAL
CLASSIFICATION

NATURE OF STRATA

If measurements start below
ground surface, state how far.

THICKNESS

DEPTH

Feet	Inches	Metres	Feet	Inches	Metre
------	--------	--------	------	--------	-------

Alluvial
deposits
+ glacial
sand and
gravel

* Top Soil

0.23

0.23

Brown sandy clay with small stones

6.27

7.00

Sandy clay with blowing sand

2.50

11.50

blowing sand with small stones

3.00

14.50

Norwich Brag

brag

4.70

19.20

Soft chalk and flints

7.80

27.00

upper chalk

Very soft chalk and flints

7.50

34.50

Soft chalk and flints

21.50

56.00

Firm chalk and flints

10.50

66.50

Chalk and flints

19.80

316

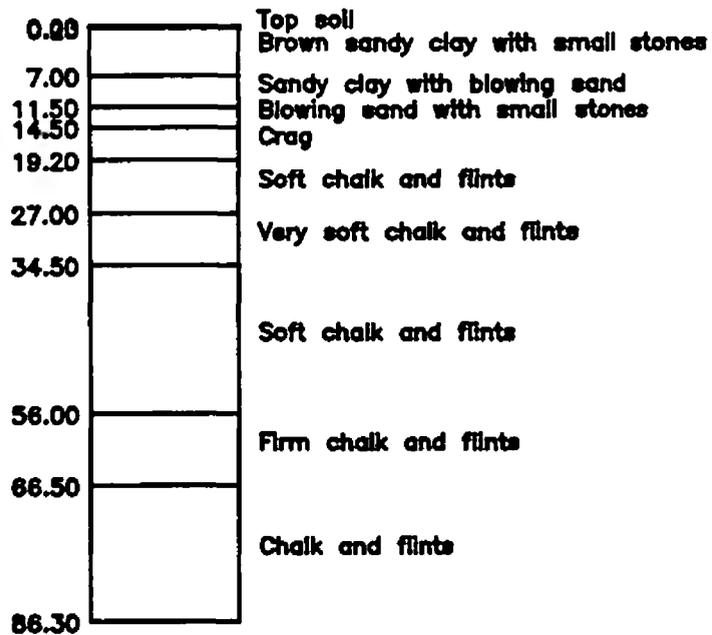
96.30

ps.

Data Bank

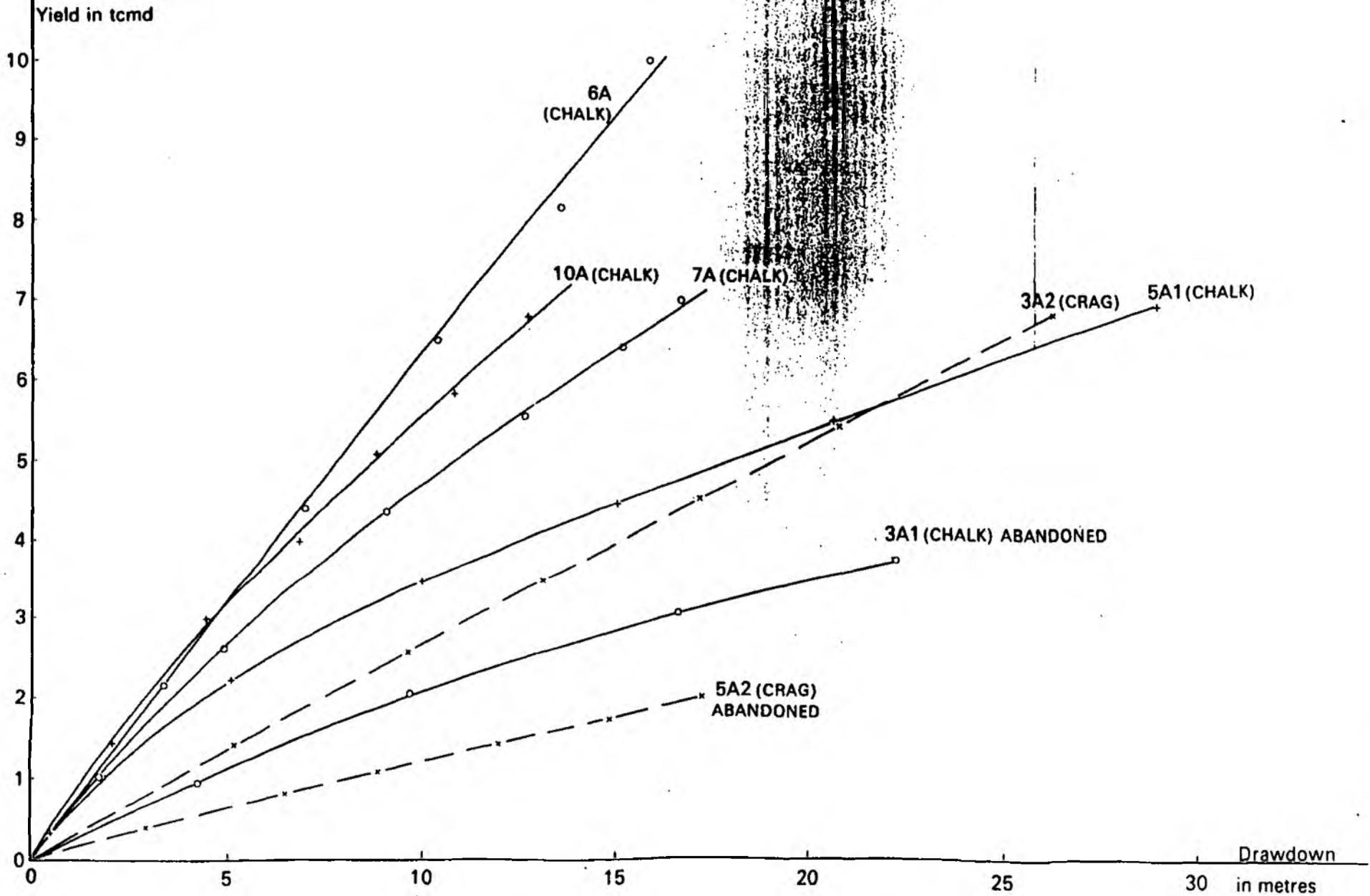
C.R.B.

4/3/76



NRA

Waveney Groundwater Scheme—10A



ANGLI
 NORFOLK
 WAVENEY
 YIELD DEI
 FOR ABSTR

APPENDIX 6.

Groundwater resource balance calculation for R. Lt Ouse catchment (6/33/42)

To calculate the nett resource estimates of available recharge (via Wrights method), in river needs, and licensed abstractions are required. The calculation of the nett resource estimates area as follows.

Average annual recharge

Resource	Area (km ²)	Annual Rainfall (mm)	Annual Recharge		
			(mm)	(tcma)	(tcmd)
Chalk outcrop	31.0	627	201	6231	17
Chalk overlain by Boulder Clay	123.5	620	49	6052	17
Total					34

The total resource available = 80% of total average recharge
 = 80% x 34tcmd
 = 27tcmd

In river needs, calculated as the nett amount of the 95 percentile for gauged flows less the contribution from surface flow/effluents, is assumed to be that amount which must come from the groundwater resource to sustain the environmental needs of the river.

95 percentile = 0.1m³/s
 = 9tcmd

Contribution from surface flow = 0.5tcmd

Nett river flow allocation = 8.5tcmd

Total licence abstractions were estimated from groundwater abstractions using the licence database. Surface water component was not included as it is assumed that this resource estimation is for the worst case (a drought condition) where surface water licence restrictions would be imposed. The licence database records two main quantities of abstraction. To estimate the daily quantity it was decided not to use the peak daily quantities, but to use the annual quantity proportioned to a daily quantity (typically tcma/365).

Average licence daily quantity = 19tcmd

Therefore the overall balance is equated as follows.

Nett resource = Average annual recharge
 - In river needs
 - Licensed daily quantity
 = 27 - 8.5 - 19
 = -0.5tcmd

APPENDIX 7.

Groundwater resource balance calculation for R. Dove catchment (7/34/17)

To calculate the nett resource estimates of available recharge (via Wrights method), in river needs, and licensed abstractions are required. The calculation of the nett resource estimates area as follows.

Average annual recharge

Resource	Area (km ²)	Annual Rainfall (mm)	Annual Recharge		
			(mm)	(tcma)	(tcmd)
Chalk outcrop	0.0				
Chalk overlain by Boulder Clay	208.0	571	45	9448	25
Total					25

The total resource available = 80% of total average recharge
 = 80% x 35tcmd
 = 20tcmd

In river needs, calculated as the nett amount of the 95 percentile for gauged flows less the contribution from surface flow/effluents, is assumed to be that amount which must come from the groundwater resource to sustain the environmental needs of the river.

95 percentile = 0.145m³/s
 = 12.6tcmd

Contribution from surface flow = 3.6tcmd

Nett river flow allocation = 9.0tcmd

Total licence abstractions were estimated from groundwater abstractions using the licence database. Surface water component was not included as it is assumed that this resource estimation is for the worst case (a drought condition) where surface water licence restrictions would be imposed. The licence database records two main quantities of abstraction. To estimate the daily quantity it was decided not to use the peak daily quantities, but to use the annual quantity proportioned to a daily quantity (typically tcma/365).

Average licence daily quantity = 2.3tcmd

Therefore the overall balance is equated as follows.

Nett resource = Average annual recharge
 - In river needs
 - Licensed daily quantity
 = 20 - 9 - 2.3
 = +8.7tcmd

APPENDIX 8.

Details for the following SSSI's are available for information only.

- o Blo'norton & Thelnetham Fen
- o Buggs Hole Fen, Thelnetham
- o Burgate Wood
- o Gypsy Camp Meadows, Thrandeston
- o Hopton Fen
- o Hoxne Brick Pit
- o Kenninghall & Banham Fens with Quidenham Mere
- o Knettishall Heath
- o Major Farm, Braiseworth
- o Middle Harling Fen
- o Redgrave and Lopham Fen
- o Shelfanger Meadows
- o Weston Fen

Also included is a list of

- o Local Nature Reserves
- o National Nature Reserves
- o Scheduled Ancient Monuments



K LYNN
EZY R.W AG

Nature Conservancy Council

60 Bracondale Norwich NR1 2BE

Telephone Norwich 20558

Notification
BRAW.

The Divisional Manager
Anglian Water Authority
Great Ouse River Division
Great Ouse House
Clarendon Road
Cambridge CB2 2BL

Your reference

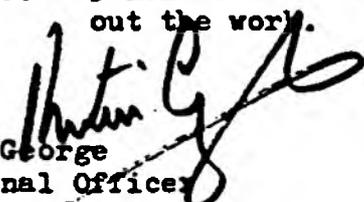
Our reference EA/S/12/14 WDP

Date 25th July 1983

Notification under Section 28 of the Wildlife and Countryside Act 1981

BLO'NCRTON AND THELNETHAN FENS

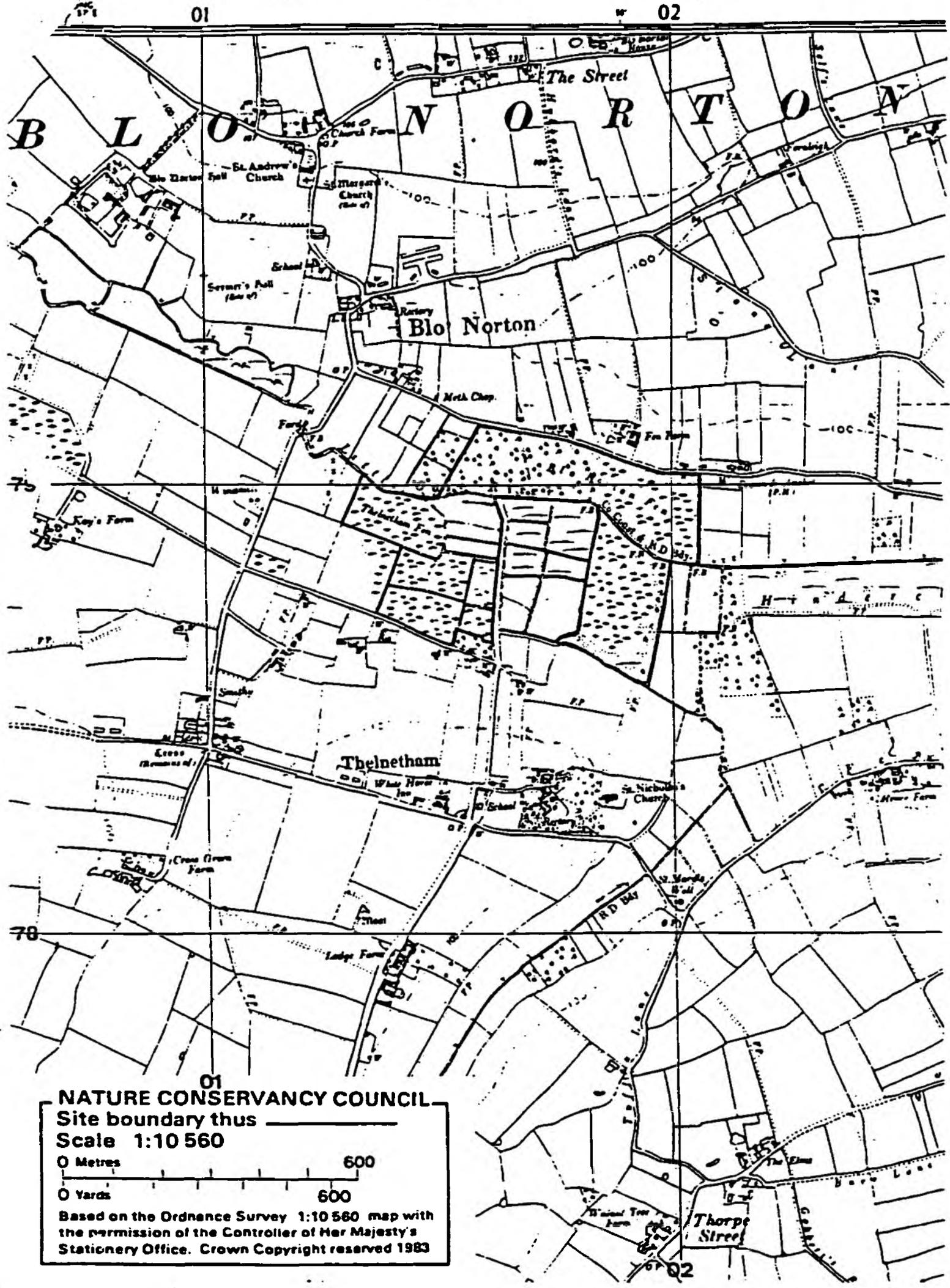
1. The area of land shown on the attached map is of special interest by reason of the features described on the reverse of the map.
2. This notice constitutes the formal notification of the land by the Nature Conservancy Council as a Site of Special Scientific Interest in accordance with Section 28(1) of the Wildlife and Countryside Act 1981, and under Section 22(3) of the Water Act 1973 as amended by Section 48 of the Wildlife and Countryside Act.
3. The Council considers that the operations listed overleaf are likely to cause damage to the special interest of the site. This list identifies all readily foreseeable operations which could damage features of special interest occurring anywhere within the site. Not all features will necessarily be represented on every individual property. The purpose of the list is to ensure that the NCC has the opportunity to consider the possible effects of any listed operation, but this does not mean that it will object in every case; many such operations will be acceptable if carried out at agreed levels, on certain parts of the site or at particular times of the year. In order to minimise interference with current management practice each owner and occupier will be informed as soon as possible of what can be carried out on his property without prior consultation.
4. You are required to give written notice to NCC (directed to the Assistant Regional Officer) of your intention to carry out any listed operation and you may not proceed with the work unless:
 - a. the operation is carried out with the written consent of the NCC;
 - b. it is carried out in accordance with a management agreement under Section 16 of the National Parks and Access to the Countryside Act 1949 or Section 15 of the Countryside Act 1968;
 - c. 3 months have expired since NCC received notice of your proposal to carry out the work.


Dr H George
Regional Officer
East Anglia

POTENTIALLY DAMAGING OPERATIONS

BLO'NORTON AND THELNETHAM FENS

1. Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2. Grazing, the introduction of grazing
and
Changes in the grazing regime (including type of stock or intensity or seasonal pattern of grazing and cessation of grazing).
3. Stock feeding, the introduction of stock feeding
and
Changes in stock feeding practice.
4. The introduction of mowing etc. (where applicable)
and
Changes in the mowing or cutting regime (including hay making to silage and cessation).
5. Application of manure, fertilisers and lime.
6. Application of pesticides, including herbicides (weedkillers).
7. Dumping, spreading or discharge of any materials.
8. Burning (and changes in the pattern or frequency of burning (where applicable)).
12. Tree and woodland management⁺
and
Changes in tree and/or woodland management⁺
⁺ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species composition, cessation of management.
- 13a. Drainage (including the use of mole, tile, tunnel or other artificial drains).
- 13b. Modification of the structure of watercourses (eg. rivers, streams, ditches, including their banks and beds, as by re-alignment, re-grading and dredging).
- 13c. Management of aquatic and bank vegetation for drainage purposes.
14. The changing of water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes).
15. Infilling of ditches, dykes or marshes.
20. Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, lime and spoil.
21. Construction, removal or destruction of roads, tracks, walls, fences, hard-stands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22. Storage of materials.
23. Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26. Use of vehicles or craft likely to damage or disturb features of interest.
27. Recreational or other activities likely to damage fenland areas.
28. Introduction of game or waterfowl management (where applicable)
and
Changes in game and waterfowl management and hunting practice.



01

NATURE CONSERVANCY COUNCIL
 Site boundary thus ———

Scale 1:10 560

0 Metres 600

0 Yards 600

Based on the Ordnance Survey 1:10 560 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1983

COUNTY: Suffolk/Norfolk

SITE NAME: Blo' Norton and Thelnetam

DISTRICT:

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Breckland District Council, St Edmundsbury District Council

National Grid Reference: TM.017790 Area: 21.03 (ha.) 51.97 (ac.)

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM.07EW

Date Notified (Under 1949 Act): 1959 Date of Last Revision: 1972

Date Notified (Under 1981 Act): 1983 Date of Last Revision: -

Other Information:

The boundary has been modified by the deletion of Hinderclay Fen and of some arable land. Part of the site is managed as a nature reserve by the Suffolk Trust for Nature Conservation. Arthur Rivett 0379-87618.

Reasons for Notification:

This site is of interest mainly because of the plant communities associated with the remaining areas of open fen. Additional interest is provided by the areas of carr woodland and by some of the meadows adjacent to the fen.

The areas of fen least affected by drainage still support calcareous valley fen vegetation with plants such as Black Bog Rush (Schoenus nigricans), Saw Sedge (Cladium mariscus), which is dominant in some parts, and Purple Moor Grass (Molinia caerulea). A very large number of plant species are associated with these areas, notably 'Fen Orchid' (Dactylorhiza praetermissa), Devil's Bit Scabious (Succisa pratensis), Long-stalked Yellow Sedge (Carex lepidocarpa) Quaking Grass (Briza media), a small colony of Grass of Parnassus (Parnassia palustris) and a number of rare mosses. In other parts of the fen, where there is some drying-out in summer, this type of vegetation is replaced by taller vegetation dominated by Reed (Phragmites australis) and Meadowsweet (Filipendula ulmaria). This vegetation has a different range of associated species including plants such as Hemp Agrimony (Bupatorium cannabinum), Purple Loosestrife (Lythrum salicaria) and Great Hairy Willowherb (Epilobium hirsutum).

Woodland and scrub have invaded quite large areas of all three fens. The scrub consists mostly of dense Sallow, whilst the woodland is mostly Alder carr, with Ash and Oak on the drier parts of Blo' Norton Fen. Beneath the woodland canopy, the ground vegetation is made up of a restricted range of fen plants and weedy species such as Nettle and Cleavers.

In order to provide some control over the water table in the fen areas the site boundary also encompasses several small fields and ditches. These are of some interest in their own right with plants such as Ragged Robin (Lychnis flos-cuculi) Marsh Marigold (Caltha palustris) and Marsh Thistle (Cirsium palustre) and Purple Loosestrife all occurring in considerable numbers.



Nature Conservancy Council

60 Bracondale Norwich NR1 2BE .

Telephone Norwich 20558

Your reference

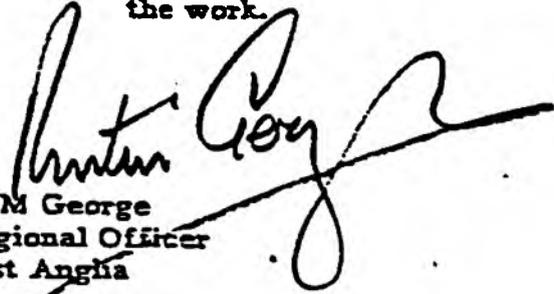
Our reference EA/S/231/14 WDK

Date 27th July 1984

Notification under Section 28 of the Wildlife and Countryside Act 1981

BUGG'S HOLE FEN

1. The area of land shown on the attached map is of special interest by reason of the features described on the reverse of the map.
 2. This notice constitutes the formal notification of the land by the Nature Conservancy Council as a Site of Special Scientific Interest in accordance with Section 28(1) of the Wildlife and Countryside Act 1981.
 3. The Council considers that the operations listed overleaf are likely to cause damage to the special interest of the site. This list identifies all readily foreseeable operations which could damage features of special interest occurring anywhere within the site. Not all features will necessarily be represented on every individual property. The purpose of the list is to ensure that the NCC has the opportunity to consider the possible effects of any listed operation, but this does not mean that it will object in every case; many such operations will be acceptable if carried out at agreed levels, on certain parts of the site or at particular times of the year. In order to minimise interference with current management practice each owner and occupier will be informed as soon as possible of what can be carried out on his property without prior consultation.
 4. You are required to give written notice to NCC (directed to the Assistant Regional Officer) of your intention to carry out any listed operation and you may not proceed with the work unless:
 - a. the operation is carried out with the written consent of the NCC;
- OR
- b. it is carried out in accordance with a management agreement under Section 16 of the National Parks and Access to the Countryside Act 1949 or Section 15 of the Countryside Act 1968;
- OR
- c. 3 months have expired since NCC received notice of your proposal to carry out the work.

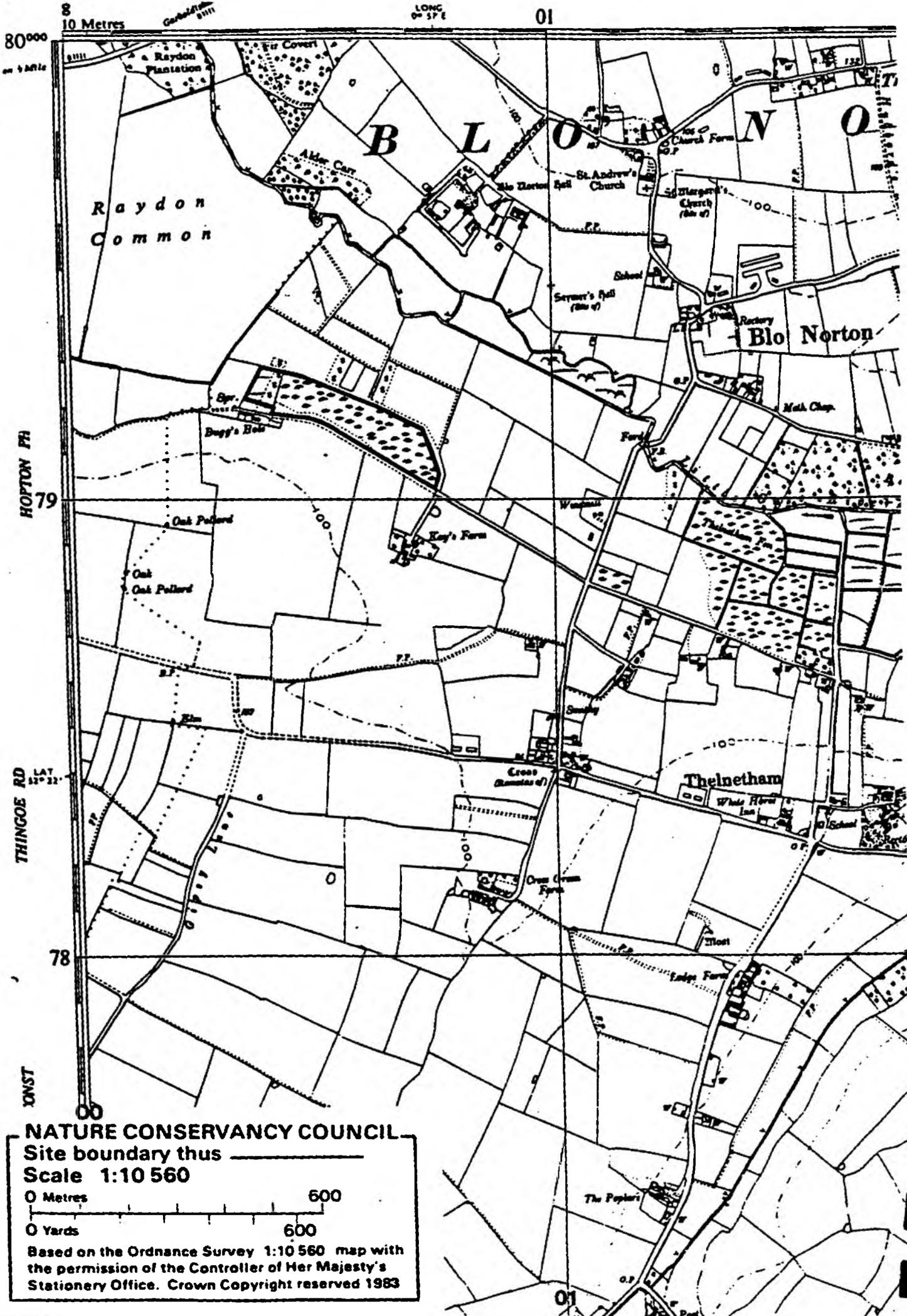

Dr M George
Regional Officer
East Anglia

Potentially Damaging Operations requiring prior consultation with NCC

Site name: BUGG'S HOLE FEN, THELNETHAM

1. Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2. Changes in the grazing regime (including type of stock or intensity or seasonal pattern of grazing and cessation of grazing).
3. Stock feeding and changes in stock feeding practice including changes in the number of animals stocked.
4. Mowing or other methods of cutting and changes in the mowing or cutting regime (including hay making to silage and cessation).
5. Application of manure, fertilisers and lime.
6. Application of pesticides, including herbicides (weedkillers).
7. Dumping, spreading or discharge of any materials.
8. Burning.
9. The release into the site of any wild, feral or domestic animal*, plant or seed
* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.
11. The destruction, displacement, or removal of any herb or turf.
12. The introduction of tree and/or woodland management+ and changes in tree and/or woodland management+
+ including afforestation and planting.
- 13a. Drainage (including the use of mole, tile, tunnel or other artificial drains).
- 13b. Modification of the structure of watercourses (eg. springs, ditches, dykes, drains), including their banks and beds, as by re-alignment, re-grading and dredging.
- 13c. Management of aquatic and bank vegetation for drainage purposes (see also 11).
14. The changing of water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes).
15. Infilling of ditches, drains, or marshes.
20. Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, lime and spoil.
21. Construction, removal or destruction of roads, tracks, walls, fences, hard-stands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22. Storage of materials.
23. Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26. Use of vehicles or craft likely to damage or disturb wetland vegetation.
27. Recreational or other activities likely to damage wetland vegetation.
28. Changes in game and waterfowl management and hunting practice.

**IG'S HOLE, THELNETHAM
FOLK**



NATURE CONSERVANCY COUNCIL
 Site boundary thus 
 Scale 1:10 560
 0 Metres 600
 0 Yards 600
 Based on the Ordnance Survey 1:10 560 map with
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COUNTY: Suffolk

SITE NAME: BUGG'S HOLE FEN, THELNETHAM

DISTRICT: St Edmundsbury

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: St Edmundsbury District Council

National Grid Reference: TM 006792 Area: 4.0 (ha.) 9.9 (ac.)

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM 07 NW

Date Notified (Under 1949 Act): N/A Date of Last Revision: N/A

Date Notified (Under 1981 Act): 1984 Date of Last Revision: -

Other Information:

A new site.

Reasons for Notification:

Bugg's Hole is a small, spring-fed calcareous fen situated in the valley of the Little Ouse River. A wide range of habitats occur from mown grassland on the driest soils to tall fen vegetation on shallow fen peats. The diversity of vegetation types is reflected in the richness of the flora which includes a number of uncommon species.

Bugg's Hole is situated on a shallow north-facing slope with an area of semi-improved mown grassland on the highest ground along the southern margin. There is a clear zonation of vegetation types on the slope. Below the mown area is a band of species-rich, fen grassland dominated by Red Fescue (Festuca rubra) with frequent Common Quaking Grass (Briza media). Several uncommon species are found in this zone and include Common Butterwort (Pinguicula vulgaris), Grass of Parnassus (Parnassia palustris), Bog Pimpernel (Anagallis tenella), Fragrant Orchid (Gymnadenia conopsea), Marsh Helleborine (Epipactis palustris) and Adder's Tongue Fern (Ophioglossum vulgatum).

A band of marshy grassland occurs below the fen grassland. It is dominated by tussocks of Purple Moor-Grass (Molinia caerulea) with abundant Blunt-flowered Rush (Juncus subnodulosus). The conditions are wetter in this zone and typical species include Marsh Pennywort (Hydrocotyle vulgaris), Southern Marsh Orchid (Dactylorhiza praetermissa), Tormentil (Potentilla erecta) and Meadowsweet (Filipendula ulmaria).

Tall fen vegetation occupies the low-lying northern part of the site. The area is wet with a number of springs arising in the zone. Common Reed (Phragmites communis) and Saw Sedge (Cladium mariscus) are dominant with abundant Blunt-flowered Rush and Carnation Sedge (Carex panicea). Several species are confined to the wet conditions including Marsh Marigold (Caltha palustris), Tubular Water Dropwort (Oenanthe fistulosa) and Lesser Water Parsnip (Berula erecta).



Nature Conservancy Council

60 Bracondale Norwich NR1 2BE

Telephone Norwich 20558

Your reference .

Our reference

Date

Notification under Section 28 of the Wildlife and Countryside Act 1981

BURGATE WOOD

1. The area of land shown on the attached map is of special interest by reason of the features described on the reverse of the map.
2. This notice constitutes the formal notification of the land by the Nature Conservancy Council as a Site of Special Scientific Interest in accordance with Section 28(1) of the Wildlife and Countryside Act 1981.
3. The Council considers that the operations listed overleaf are likely to cause damage to the special interest of the site. This list identifies all readily foreseeable operations which could damage features of special interest occurring anywhere within the site. Not all features will necessarily be represented on every individual property. The purpose of the list is to ensure that the NCC has the opportunity to consider the possible effects of any listed operation, but this does not mean that it will object in every case; many such operations will be acceptable if carried out at agreed levels, on certain parts of the site or at particular times of the year. In order to minimise interference with current management practice each owner and occupier will be informed as soon as possible of what can be carried out on his property without prior consultation.
4. You are required to give written notice to NCC (directed to the Assistant Regional Officer) of your intention to carry out any listed operation and you may not proceed with the work unless:
 - a. the operation is carried out with the written consent of the NCC;OR
 - b. it is carried out in accordance with a management agreement under Section 16 of the National Parks and Access to the Countryside Act 1949 or Section 15 of the Countryside Act 1968;OR
 - c. 3 months have expired since NCC received notice of your proposal to carry out the work.

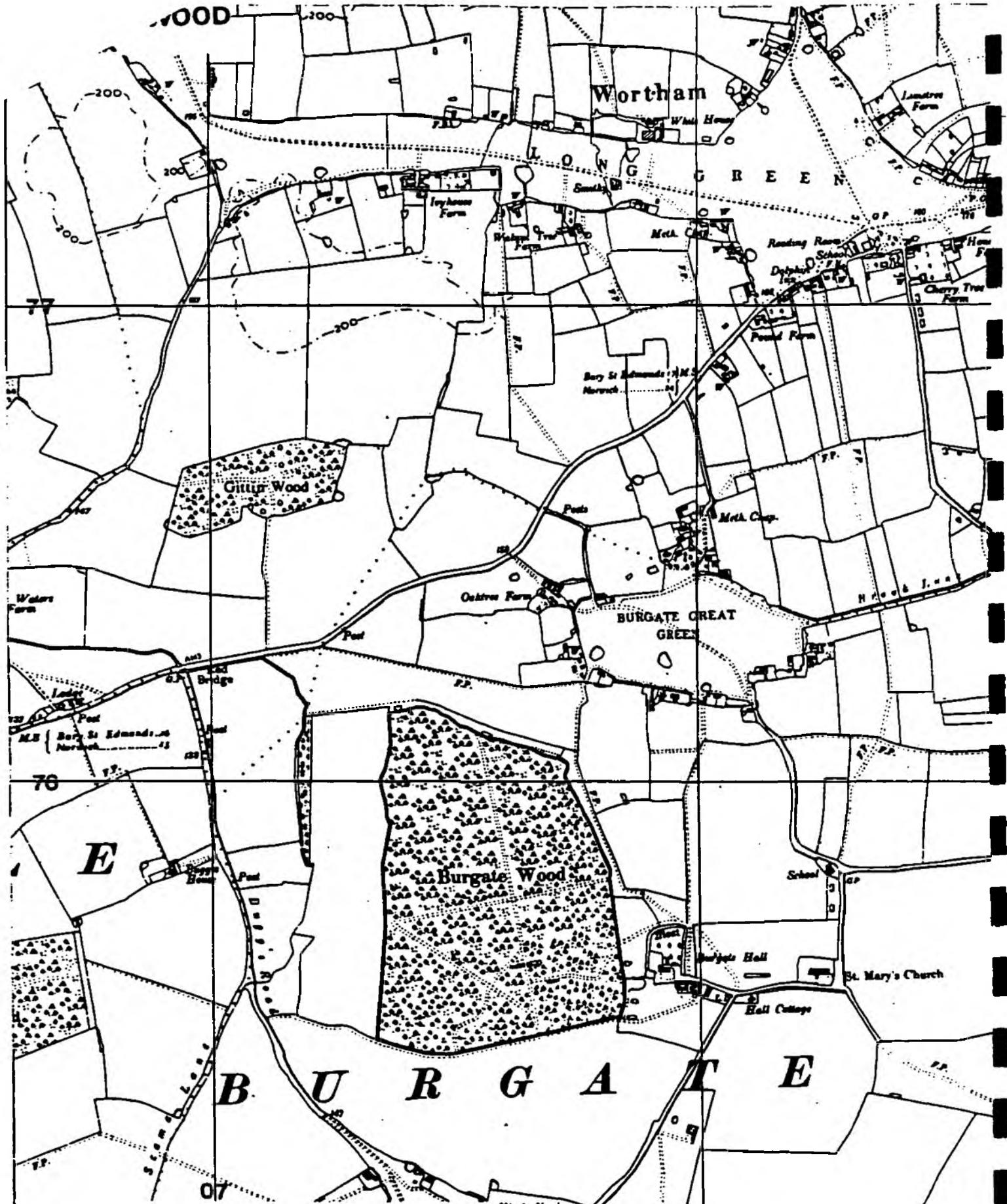
Dr M George
Regional Officer
East Anglia

Name: BURGATE WOOD, SUFFOLK

<u>Ref No.</u>	<u>Type of Operation</u>
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	The introduction of grazing and changes in the grazing regime [including type of stock or intensity or seasonal pattern of grazing and cessation of grazing].
3.	The introduction of stock feeding and changes in stock feeding practice [including changes in the number of animals stocked].
4.	The introduction of mowing or other methods of cutting vegetation, and changes in the mowing or cutting regime.
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides [weedkillers].
7.	Dumping, spreading or discharge of any materials.
8.	Burning.
9.	The release into the site of any wild, feral or domestic animal*, plant or seed, excluding game birds.
10.	The killing or removal of any wild animal*, excluding pest control and recognised game species.
11.	The destruction, displacement, removal or cutting of any herb, dead or decaying wood, moss, lichen, fungus, leaf-mould, or turf.
12.	Changes in tree and/or woodland management+.
13a.	Drainage [including the use of mole, tile, tunnel or other artificial drains].
14.	The changing of water levels and tables and water utilisation [including irrigation, storage and abstraction from existing water bodies and through boreholes].
15.	Infilling of ditches, drains, ponds, pools, or pits.
20.	Extraction of minerals, including sand and gravel, topsoil, subsoil, chalk, and spoil.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials.
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26.	Use of vehicles or craft likely to damage or disturb features of interest.
27.	Recreational or other activities likely to damage woodland vegetation.
28.	Changes in game and waterfowl management and hunting practice.

* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.

+ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species composition, cessation of management.



NATURE CONSERVANCY COUNCIL
 Site boundary thus 
 Scale 1:10 560

0 Metres  600
 0 Yards  600

Based on the Ordnance Survey 1:10 560 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1984

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2000

GRID
 ECT TO 100 METRES

REVISION DIAGRAM

COUNTY: Suffolk

SITE NAME: BURGATE WOOD

DISTRICT: Mid Suffolk

Status: Site of Special Scientific Interest [SSSI] notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Mid Suffolk District Council

National Grid Reference: TM 076757 Area: 30.5 [ha] 75.36 [ac]

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM 07 NE

Date Notified [Under 1949 Act]: N/A Date of Last Revision: N/A

Date Notified [Under 1981 Act]: 1984 Date of Last Revision: N/A

Other Information:

A new site.

Reasons for Notification:

Burgate Wood is a particularly good example of the type of oak-hornbeam woodland characteristic of this part of north Suffolk. It is ancient, with a coppice-with-standards structure and continues to support entirely semi-natural stands. Many giant coppiced stools are present which indicate its great antiquity. The ground flora is diverse and includes several species that are indicators of ancient woodland, including one rarity.

Pedunculate oak-hornbeam woodland occupies the central plateau in the wood. Hornbeam [Carpinus betulus] is present as coppice with Ash [Fraxinus excelsior] and Hazel [Corylus avellana]. Some Field Maple [Acer campestre] occurs on the edge of the plateau and standard trees are of Oak [Quercus robur] and Ash. Mixed oak-hazel-ash woodland is present on a number of shallow valley sides that radiate from the central area with wet ash-maple woodland on the more calcareous boulder clays in the valley bottoms. Dogwood [Cornus sanguinea], Guelder Rose [Viburnum opulus] and Spindle-tree [Euonymus europaeus] are characteristic of the calcareous soils.

The ground flora contains much Dog's Mercury [Mercurialis perennis] with frequent Primrose [Primula vulgaris], Enchanter's Nightshade [Circaea lutetiana], Sanicle [Sanicula europaea] and Water Avens [Geum rivale]. A number of uncommon species are present including Herb Paris [Paris quadrifolia], Yellow Archangel [Lamium galeobdolon], Hairy Woodrush [Luzula pilosa] and the rare Lungwort [Pulmonaria officinalis]. The acidic sands on the central plateau are dominated by Bracken with Honeysuckle [Lonicera periclymenum] and Wood Sorrel [Oxalis acetosella]. Wide rides are present and they have a distinctive flora including Tufted Hair-grass [Deschampsia caespitosa], Meadowsweet [Filipendula ulmaria], Yellow Pimpernel [Lysimachia nemorum] and Creeping Buttercup [Ranunculus repens].

A moated site is present and a massive woodbank and ditch surrounds much of the wood.

NATURE
CONSERVANCY
COUNCIL

53

East Anglia Region

60 Bracondale, Norwich NR1 2BE. Telephone Norwich (0603) 620558

Recreation and Conservation Officer
Anglian Water
Norwich Division
Yare House
62 Thorpe Road
Norwich
Norfolk NR1 1SA

Your reference

Our reference EA/S/271/14 WIA JR

Date 7 August 1987

A.W. CONSERVATION DIVISION	
10 AUG 1987	
ISSUED TO	
DATE	
CONCERNING	
FILE REF.	PASSED FOR
	FILING

Dear Sir

**WILDLIFE AND COUNTRYSIDE ACT 1981:
SITES OF SPECIAL SCIENTIFIC INTEREST (SSSI)**

GYPSY CAMP MEADOWS, THRANDESTON SSSI, SUFFOLK

S28(1) of the Wildlife and Countryside Act 1981 requires the Nature Conservancy Council (NCC) to notify owners and occupiers of areas of land which in the Council's opinion is of Special Scientific Interest (SSSI). The local planning authority in whose area the land is situated and the Secretary of State for the Environment have also to be notified.

S22(3) of the Water Act 1973, as amended by S48 of the Wildlife and Countryside Act, also requires the NCC to notify regional Water Authorities, including Internal Drainage Boards of any SSSIs lying with the Authority's or Board's areas of interest.

Accordingly, I now enclose formal notification documents comprising a site map, description, and list of operations likely to damage the special interest for the above site.

We ask that you consult NCC over proposals to undertake any kind of work which might affect the special interest of SSSIs notified to you under the 1981 Act. We would also appreciate continued consultation over SSSIs notified under the National Parks and Access to the Countryside Act 1949, pending their re-notification under the new legislation.

Should it be necessary to undertake emergency work without prior consultation, please inform NCC as soon as is practicable after the event.

I would be grateful if you would acknowledge receipt by completing and returning the appropriate acknowledgement slip to NCC at the Suffolk sub-office, Norman Tower House, 1/2 Crown Street, Bury St Edmunds, Suffolk IP33 1QX.

Yours faithfully

J R MOORE (MRS)
Regional Administrative Officer
East Anglia

Enc

- | NO. | TYPE OF OPERATION |
|------|---|
| 15. | Infilling of ditches, dykes, drains, ponds, pools, marshes or pits. |
| 16a. | The introduction of freshwater fishery production and/or management* and changes in freshwater fishery production and/or management*
• including sporting fishing and angling |
| 20. | Extraction of minerals, including peat, sand and gravel, topsoil, sub-soil, chalk, lime and spoil. |
| 21. | Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground. |
| 22. | Storage of materials. |
| 23. | Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling. |
| 26. | Use of vehicles or craft likely to damage or disturb features of interest. |
| 27. | Recreational or other activities likely to damage features of interest. |
| 28. | Introduction of game or waterfowl management and changes in game and waterfowl management and hunting practice. |

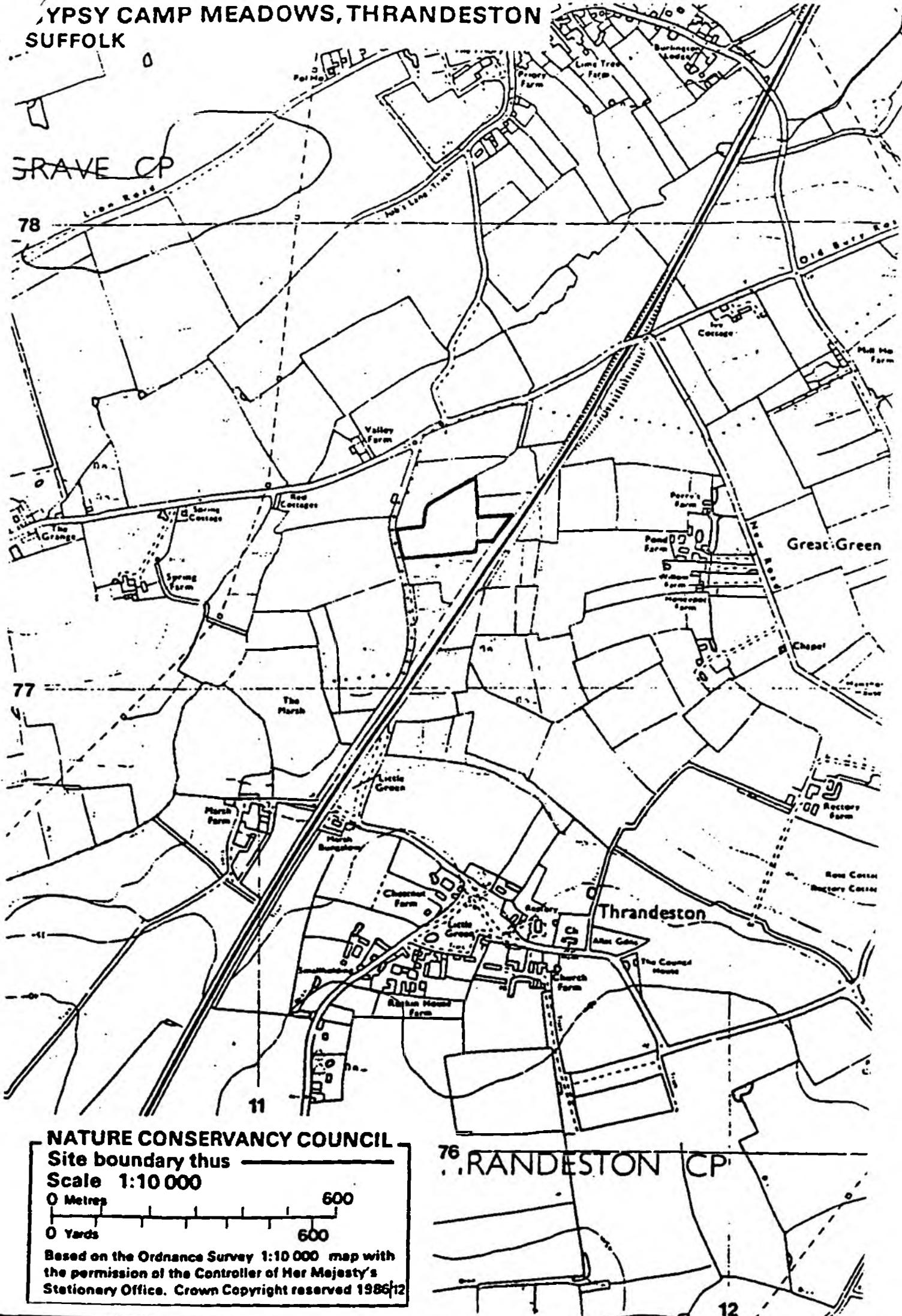
GYPSY CAMP MEADOWS, THRANDESTON

OPERATIONS LIKELY TO DAMAGE THE SPECIAL INTEREST

<u>REF NO.</u>	<u>TYPE OF OPERATION</u>
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	Grazing and changes in the grazing regime (including type of stock or intensity or seasonal pattern of grazing and cessation of grazing).
3.	The introduction of stock feeding and changes in stock feeding practice.
4.	The introduction of mowing etc and changes in the mowing or cutting regime (including hay making to silage and cessation).
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides (weedkillers).
7.	Dumping, spreading or discharge of any materials.
8.	Burning.
9.	The release into the site of any wild, feral or domestic animal,* plant or seed.
10.	The killing or removal of any wild animal*, including pest control.
11.	The destruction, displacement, removal or cutting of any plant or plant remains, including tree, shrub, herb, hedge, dead or decaying wood, moss, lichen, fungus, leaf-mould, turf etc.
12.	The introduction of tree and/or woodland management and changes in tree and/or woodland management+ * (including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand or underwood, changes in species composition, cessation of management).
13a.	Drainage (including the use of mole, tile, tunnel or other artificial drains).
13b.	Modification of the structure of water courses (eg streams, springs, ditches, dykes, drains), including their banks and beds, as by re-alignment, regrading and dredging.
13c.	Management of aquatic and bank vegetation for drainage purposes (see also 11).
14.	The changing of water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes. * "animal" includes any mammal, reptile, amphibian, bird, fish or invertebrate.

Continued/....
15, 16a, 20, 21, 22,
23, 26, 27, 28

YPSY CAMP MEADOWS, THRANDESTON
SUFFOLK



NATURE CONSERVANCY COUNCIL

Site boundary thus 

Scale 1:10 000

0 Metres

600

0 Yards

600

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76 GRANDESTON CP

12

COUNTY: Suffolk

SITE NAME: Gypsy Camp Meadows, Thrandeston

DISTRICT: Mid Suffolk

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Mid Suffolk

National Grid Reference: TM 115773 Area: 2.46 [ha] 6.08 [ac]

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM 17 NW

Date Notified [Under 1949 Act]: Date of Last Revision:

Date Notified [Under 1981 Act]: 1987 Date of Last Revision:

Other Information:

A new site

Description and Reasons for Notification:

Gypsy Camp Meadows, representing one of the few remaining wet meadow sites in Suffolk, consists of a large and a smaller species rich wet meadow, situated on poorly drained Suffolk boulder-clay. The site supports several community types, ranging from base-rich marsh with Sharp-flowered Rush (Juncus acutiflorus), Marsh Marigold (Caltha palustris) and Carnation Sedge (Carex panicea), with Lesser Pond Sedge (C acutiformis) and Marsh Arrow-grass (Triglochin palustris) to a wetter alluvial meadow type with Floating Sweet-grass (Glyceria fluitans), Reed Canary-grass (Phalaris arundinacea) and Hairy Sedge (C hirta). A system of drainage ditches runs through the site and adds further diversity to the plant communities present.

The main part of the site is the more typical water meadow, grass-dominated with a low cover of forbs, and with Tall Fescue (Festuca arundinacea), Meadow Fescue (Festuca pratensis), Cuckoo Flower (Cardamine pratensis), Brown Sedge (Carex disticha) and Perennial Rye-grass (Lolium perenne). Along the water courses Reed Canary-grass occurs with Yellow Flag Iris (Iris pseudacorus) and Purple Loosestrife (Lythrum salicaria). These ditches also support Water Forget-me-not (Myosotis palustris), Brooklime (Veronica beccabunga), Pink Water Speedwell (Veronica catenata), Gypsy-wort (Lycopus europaeus), Water Mint (Mentha aquatica) and Water Cress (Nasturtium officinale).

Throughout the site there are areas of drier grassland dominated by Meadow Foxtail (Alopecurus pratensis), Crested Dog's-tail (Cynosurus cristatus) and Yorkshire Fog (Holcus lanatus). Management of the site is by summer grazing of cattle, with occasional cutting for hay. This tradition of management has allowed the development of a very diverse flora, including species such as Common Spotted Orchid, Marsh Orchid and Early Purple Orchid (Dactylorhiza fuchsii, D incarnata and Orchis mascula), Ragged Robin (Lychnis flos-cuculi), Zig-zag Clover (Trifolium medium) and Water Avens (Geum rivale). Additional habitats for plants and invertebrates are provided by hedgerows within the site.



Nature Conservancy Council

60 Bracondale Norwich NR1 2BE

Telephone Norwich 20558

Your reference

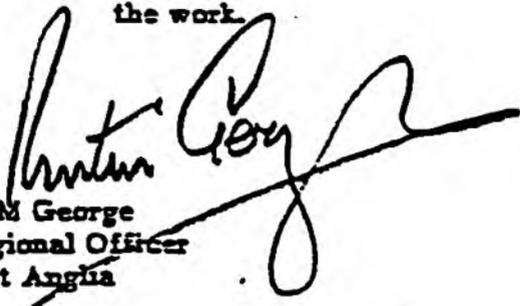
Our reference EA/S/54/14 WLR

Date 13th February 1984

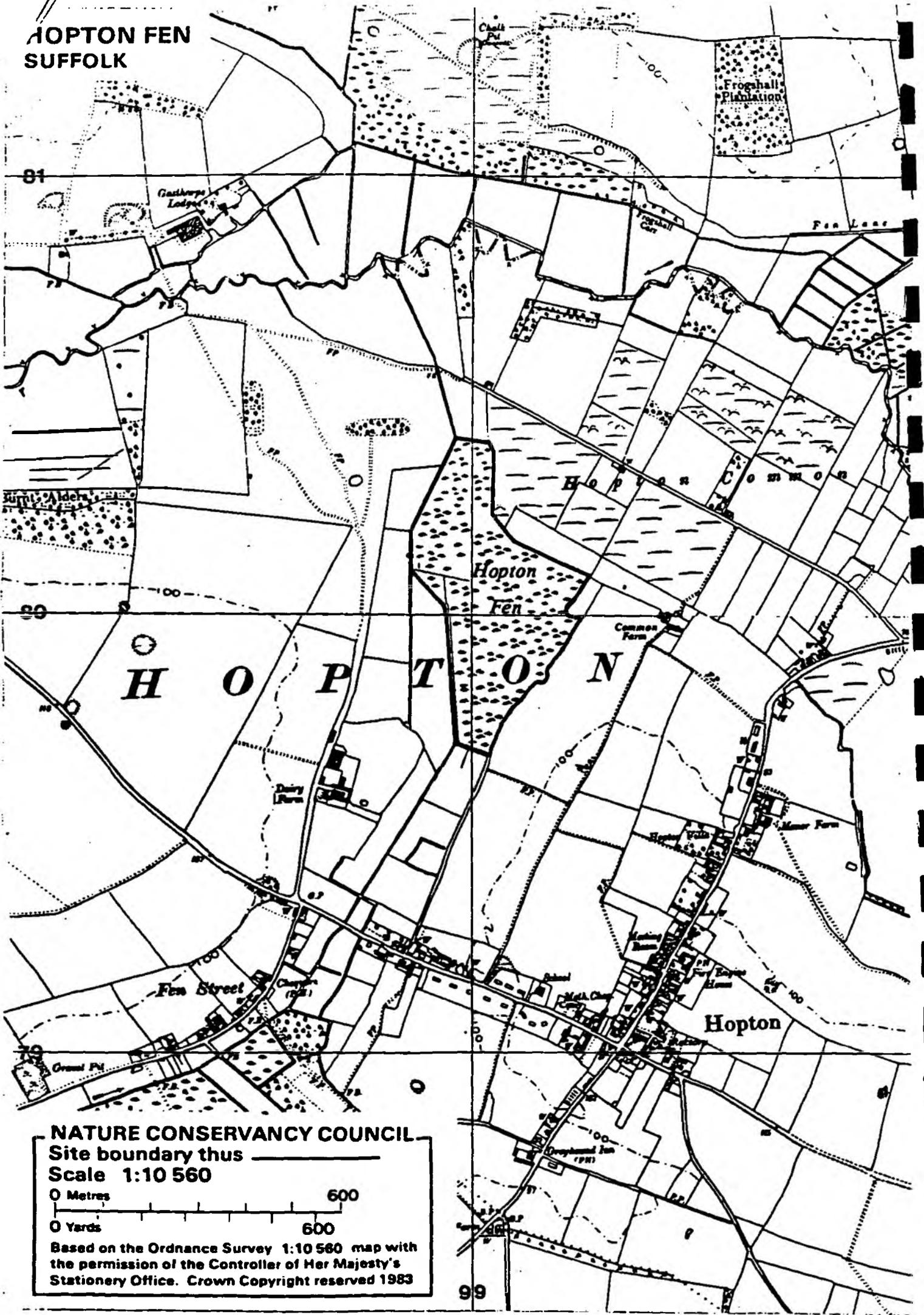
Notification under Section 28 of the Wildlife and Countryside Act 1981

HOPTON FEN

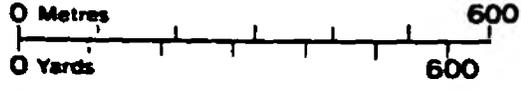
1. The area of land shown on the attached map is of special interest by reason of the features described on the reverse of the map.
2. This notice constitutes the formal notification of the land by the Nature Conservancy Council as a Site of Special Scientific Interest in accordance with Section 28(1) of the Wildlife and Countryside Act 1981.
3. The Council considers that the operations listed overleaf are likely to cause damage to the special interest of the site. This list identifies all readily foreseeable operations which could damage features of special interest occurring anywhere within the site. Not all features will necessarily be represented on every individual property. The purpose of the list is to ensure that the NCC has the opportunity to consider the possible effects of any listed operation, but this does not mean that it will object in every case; many such operations will be acceptable if carried out at agreed levels, on certain parts of the site or at particular times of the year. In order to minimise interference with current management practice each owner and occupier will be informed as soon as possible of what can be carried out on his property without prior consultation.
4. You are required to give written notice to NCC (directed to the Assistant Regional Officer) of your intention to carry out any listed operation and you may not proceed with the work unless:
 - a. the operation is carried out with the written consent of the NCC;OR
 - b. it is carried out in accordance with a management agreement under Section 16 of the National Parks and Access to the Countryside Act 1949 or Section 15 of the Countryside Act 1968;OR
 - c. 3 months have expired since NCC received notice of your proposal to carry out the work.


Dr M George
Regional Officer
East Anglia

**HOPTON FEN
SUFFOLK**



NATURE CONSERVANCY COUNCIL
 Site boundary thus ———
 Scale 1:10 560



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 the permission of the Controller of Her Majesty's
 Stationery Office. Crown Copyright reserved 1983

Potentially Damaging Operations requiring prior consultation with NCC

Site name: HOPTON FEN, SUFFOLK

<u>Ref No.</u>	<u>Type of Operation</u>
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	The introduction of grazing and changes in the grazing regime [including type of stock or intensity or seasonal pattern of grazing and cessation of grazing].
3.	The introduction of stock feeding and changes in stock feeding practice, including changes in the number of animals stocked.
4.	The introduction of mowing or other methods of cutting vegetation and changes in the mowing or cutting regime.
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides [weedkillers].
7.	Dumping, spreading or discharge of any materials.
8.	Burning.
9.	The release into the site of any wild, feral or domestic animal ^o , plant or seed.
11.	The destruction, displacement, removal or cutting of any herb, moss, or turf.
12.	The introduction of tree and/or woodland management ⁺ [where applicable] and changes in tree and/or woodland management ⁺ .
13a.	Drainage [including the use of mole, tile, tunnel or other artificial drains].
13b.	Modification of the structure of watercourses [eg. streams, springs, ditches, dykes, drains], including their banks and beds, as by re-alignment, re-grading and dredging.
13c.	Management of aquatic and bank vegetation for drainage purposes [see also 11].
14.	The changing of water levels and tables and water utilisation [including irrigation, storage and abstraction from existing water bodies and through boreholes].
15.	Infilling of ditches, dykes, drains, ponds, pools, or marshes.
20.	Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, and spoil.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials, except for reed or sedge harvested from the site and awaiting collection.
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26.	Use of vehicles or craft likely to damage or disturb features of interest.
27.	Recreational or other activities likely to damage fen vegetation.
28.	Changes in game and waterfowl management and hunting practice.

^o 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.

⁺ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species composition, cessation of management.



File 848/55/92

NATURE CONSERVANCY COUNCIL

East Anglia Region Sub-Office.

Norman Tower House, 1/2 Crown Street, Bury St. Edmunds, Suffolk IP33 1QX
Telephone Bury St. Edmunds (0284) 762218.

FAO Dr C J Spray
Fisheries & Conservation Officer
Mr A Tetlow
Regional Manager (Environment & Fisheries)
National Rivers Authority
Anglia Region
Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 8AG

Your reference
Our reference 14 WLS
Date 15 March 1990

Dear Sir

**WILDLIFE AND COUNTRYSIDE ACT 1981:
HOXNE BRICK PIT SITE OF SPECIAL SCIENTIFIC INTEREST**

S28 of the Wildlife and Countryside Act 1981 requires the Nature Conservancy Council (NCC) to notify owners and occupiers of areas of land which in the Council's opinion is of Special Scientific Interest (SSSI). The local planning authority in whose area the land is situated and the Secretary of State for the Environment have also to be notified.

S22(3) of the Water Act 1973, as amended by S48 of the Wildlife and Countryside Act, also requires the NCC to notify regional Water Authorities, including Internal Drainage Boards, of any SSSIs lying within the Authority's or Board's areas of interest.

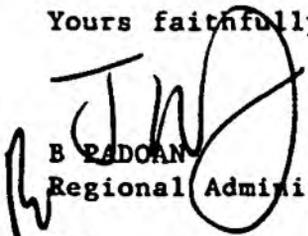
Accordingly, I now enclose formal notification documents comprising a site map, description, and list of operations likely to damage the special interest for the above site.

We ask that you consult NCC over proposals to undertake any kind of work which might affect the special interest of SSSIs notified to you under the 1981 Act. We would also appreciate continued consultation over SSSIs notified under the National Parks and Access to the Countryside Act 1949, pending their re-notification under the new legislation.

Should it be necessary to undertake emergency work without prior consultation, please inform NCC as soon as is practicable after the event.

I would be grateful if you would acknowledge receipt by completing and returning the appropriate acknowledgement slip to this office.

Yours faithfully


B PADOAN
Regional Administration Officer
Enc

RECEIVED
15 MAR 1990
00497
41000
AT

COUNTY: Suffolk

SITE NAME: HOPTON FEN

DISTRICT: St Edmundsbury

Status: Site of Special Scientific Interest [SSSI] notified under
Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: St Edmundsbury District Council

National Grid Reference: TL 990800 Area: 14.37 [ha] 35.51 [ac]

Ordnance Survey Sheet 1:50,000: 144 1:10,560: TL 98 SE TL 97 NE

Date Notified [Under 1949 Act]: 1958 Date of Last Revision: -

Date Notified [Under 1981 Act]: 1984 Date of Last Revision: -

Other Information:

Reasons for Notification:

Hopton Fen is one of a series of valley fens spanning the watershed between the headwaters of the Waveney and Little Ouse. It supports a variety of tall fen communities and is floristically rich.

The site contains areas of Reed-dominated fen, most of which is cut for thatching purposes, and other areas dominated by Saw Sedge. Associated fen species include Blunt-flowered Rush, Large Birdsfoot Trefoil, Marsh Bedstraw, Yellow Loosestrife and Valerian. The sedge-dominated areas are generally less botanically diverse than the reed areas, reflecting the effect of the build-up of litter.

Near the margins of higher ground are small seepage areas dominated by Black Bog Rush, Blunt-flowered Rush and Purple Moor-grass. Higher up the slope bracken dominates and forms the boundary between the fen and adjacent arable land. On the opposite side of the fen, close to the adjacent drain, there is a good population of Greater Tussock Sedge [Carex paniculata].

Around the margins of the fen, scrub, mostly Willow and Alder Buckthorn, has invaded. In some places this has developed into woodland dominated by Alder. Twayblade occurs in the ground flora of this woodland, along with a variety of fen carr species.

County: Suffolk

Site Name: Hoxne Brick Pit

District: Mid Suffolk

Status: Site of Special Scientific Interest (SSSI) notified under
Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Mid Suffolk District Council

National Grid Reference: TM174766 Area: 1.27 (ha) 3.13 (ac)

Ordnance Survey Sheet 1:50,000: 156 1:10,000:

Date Notified (Under 1949 Act): 1954 Date of Last Revision: 1966

Date Notified (Under 1981 Act): 15 March 1990 Date of Last Revision:

Other Information:

Description and Reasons for Notification:

Hoxne Brick Pit is a world-famous geological site. Research dates back to the 18th Century, when John Frere recognised that flint implements from here had been fashioned by early man.

Detailed description of the sediments has demonstrated that interglacial lacustrine deposits here occupy a basin in the chalky till and are in turn overlain by fluviatile deposits penetrated by ice-wedge casts. The lacustrine deposits, the type deposits of the Hoxnian Interglacial, have been shown by pollen analysis to cover the 'Anglian' late glacial - early Hoxnian (Holl) interval. The upper series of largely fluvial deposits contain abundant vertebrate material attributable to late Hoxnian and Wolstonian Stages. Finds include fishes, voles, Norway lemming, extinct beaver, horse, several deer and a macaque. Sparse finds have also been made in the organic lake deposits of Hoxnian, Zone Holl, age. Hoxne is undoubtedly one of the most important Pleistocene sites in Britain.

769

768

767

766

765

764

7687
1.689ha
4.17

5478
0.49ha
1.12

6377
883ha
2.18

7076
380ha
0.94

4870
1.138ha
2.81

Depot

6570
1.264ha
3.12

3863
1.66ha
4.1

5865
1.636ha
4.04

Fairstead Farm

B.M. 36.12m

5158
1.175ha
2.90

5554
571ha
1.41

7543
916ha
2.25

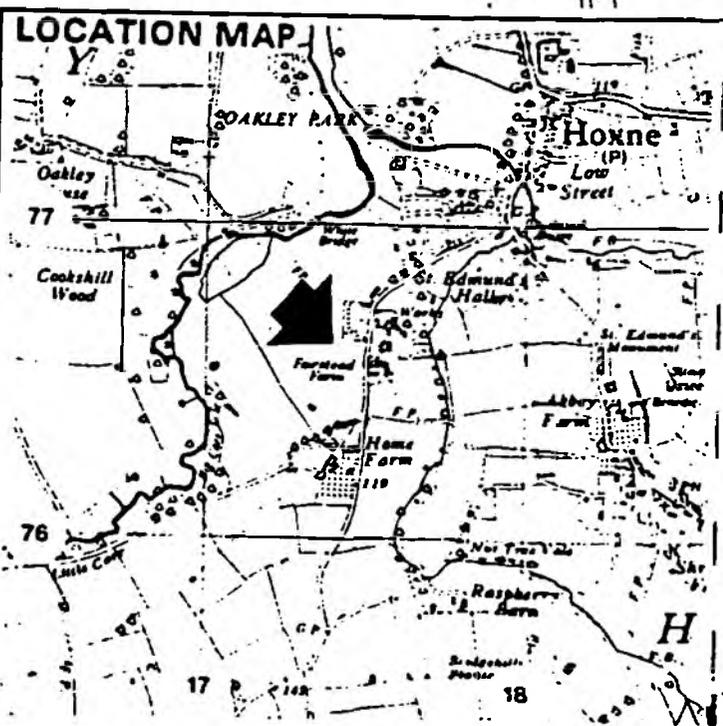
176

177

170

174

175



763

NATURE CONSERVANCY COUNCIL
 Site boundary thus 
 Scale 1:2500

0 Metres 50 100
 0 Yards 50 100

 Grid North

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30

COUNTY: Suffolk

SITE NAME: HOXNE BRICK PIT

DISTRICT: Mid Suffolk

Status: Site of Special Scientific Interest [SSSI] notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Mid Suffolk District Council

National Grid Reference: TM 174766 Area: 1.46 [ha] 3.60 [ac]

Ordnance Survey Sheet 1:50,000: 156 1:10,000: TM 17 NE

Date Notified [Under 1949 Act]: 1954 Date of Last Revision: 1966

Date Notified [Under 1981 Act]: 1986 Date of Last Revision: -

Other Information:

Reasons for Notification:

Hoxne Brick Pit is a world-famous geological site. Research dates back to the 18th Century, when John Frere recognised that flint implements from here had been fashioned by early man.

Detailed description of the sediments has demonstrated that interglacial lacustrine deposits here occupy a basin in the chalky till and are in turn overlain by fluvial deposits penetrated by ice-wedge casts. The lacustrine deposits, the type deposits of the Hoxnian Interglacial, have been shown by pollen analysis to cover the 'Anglian' late glacial - early Hoxnian [Holl] interval. The upper series of largely fluvial deposits contain abundant vertebrate material attributable to late Hoxnian and Wolstonian Stages. Finds include fishes, voles, Norway lemming, extinct beaver, horse, several deer and a macaque. Sparse finds have also been made in the organic lake deposits of Hoxnian, Zone Holl, age. Hoxne is undoubtedly one of the most important Pleistocene sites in Britain.

OPERATIONS LIKELY TO DAMAGE THE SPECIAL INTEREST

Site name: HOXNE BRICK PIT, SUFFOLK

<u>Ref No</u>	<u>Type of Operation</u>
7.	Dumping, spreading or discharge of any materials.
12.	The introduction of woodland management including tree planting.
15.	Infilling of pit.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials against faces of the pit.
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
24.	Battering or grading faces of pit.
25.	Removal of geological specimens including fossils.

Potentially Damaging Operations requiring prior consultation with NCC

Site name: KENNINGHALL AND BANHAM FENS WITH QUIDENHAM MERE, NORFOLK

1. Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2. The introduction of grazing (where applicable) and changes in the grazing regime (including type of stock or intensity or seasonal pattern of grazing and cessation of grazing).
3. The introduction of stock feeding and changes in stock feeding practice, including changes in the number of animals stocked.
4. The introduction of mowing etc. and changes in the mowing or cutting regime (including hay making to silage and cessation).
5. Application of manure, fertilisers and lime.
6. Application of pesticides, including herbicides (weedkillers).
7. Dumping, spreading or discharge of any materials.
8. Burning.
9. The release into the site of any wild, feral or domestic animal*, plant or seed
* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.
11. The destruction, displacement, removal or cutting of any herb, hedge, moss or turf.
12. The introduction of tree and/or woodland management* (where applicable) and changes in tree and/or woodland management*
+ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species composition, cessation of management.
- 13a. Drainage (including the use of mole, tile, tunnel or other artificial drains).
- 13b. Modification of the structure of watercourses (eg. rivers, streams, springs, ditches, dykes, drains), including their banks and beds, as by re-alignment, re-grading and dredging.
- 13c. Management of aquatic and bank vegetation for drainage purposes (see also 11).
14. The changing of water levels and tables and water utilization (including irrigation, storage and abstraction from existing water bodies and through boreholes).
15. Infilling of ditches, dykes, drains, ponds, pools, or marshes.
- 16a. Changes in freshwater fishery production and/or management*
*including sporting fishing and angling.
20. Extraction of minerals, including peat, sand and gravel, topsoil, subsoil and chalk.
21. Construction, removal or destruction of roads, tracks, walls, fences, hard-stands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22. Storage of materials.
23. Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26. Use of vehicles or craft likely to damage or disturb features of interest.



Nature Conservancy Council

60 Bracondale Norwich NR1 2BE

Telephone Norwich 620558

Your reference

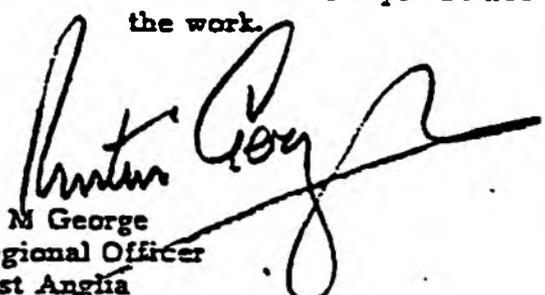
Our reference EA/N/234/14 WQW

Date 4th March 1985

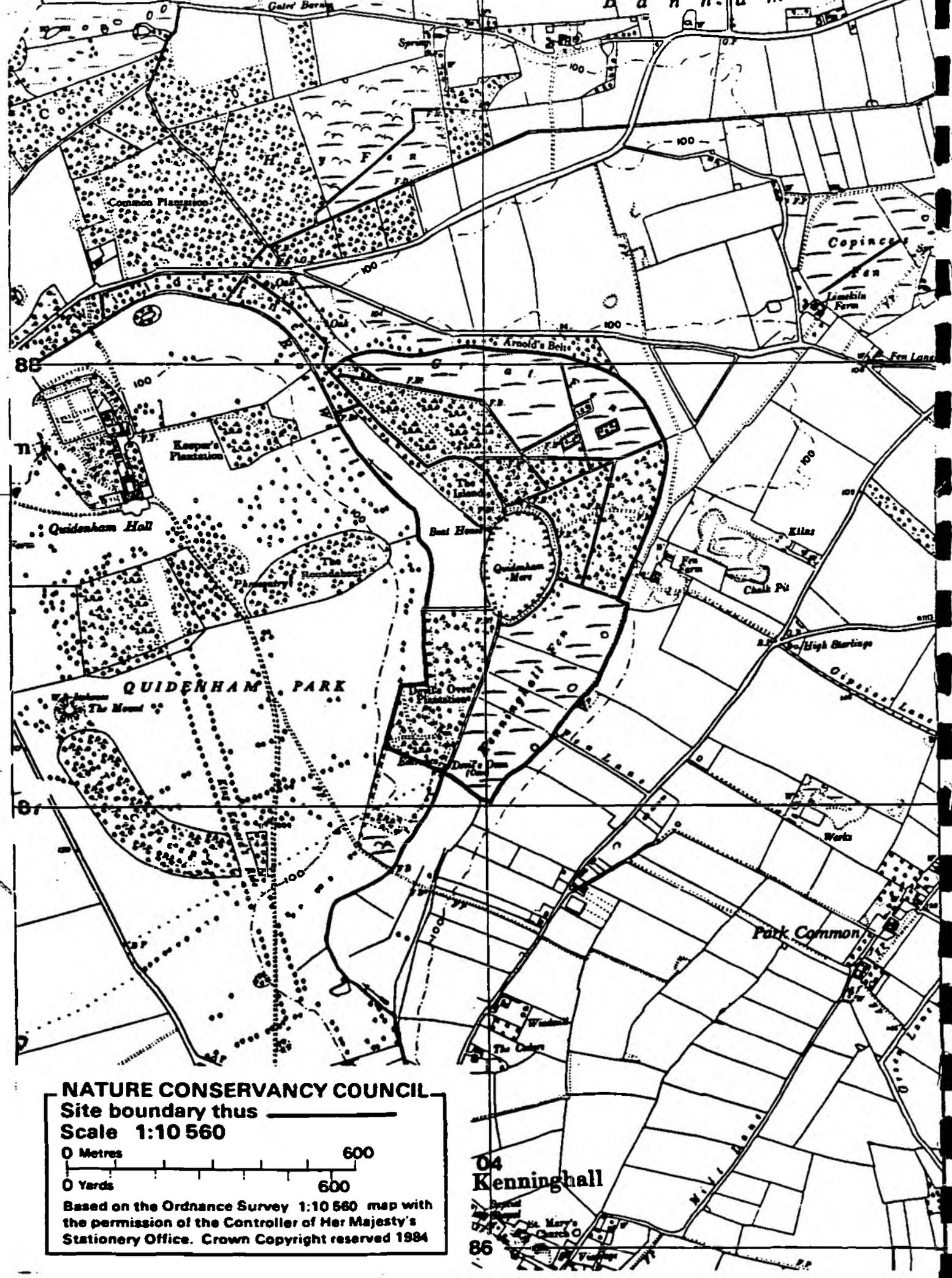
Notification under Section 28 of the Wildlife and Countryside Act 1981

KENNINGHALL AND BANHAM FENS WITH QUIDENHAM MERE

1. The area of land shown on the attached map is of special interest by reason of the features described on the reverse of the map.
2. This notice constitutes the formal notification of the land by the Nature Conservancy Council as a Site of Special Scientific Interest in accordance with Section 28(1) of the Wildlife and Countryside Act 1981.
3. The Council considers that the operations listed overleaf are likely to cause damage to the special interest of the site. This list identifies all readily foreseeable operations which could damage features of special interest occurring anywhere within the site. Not all features will necessarily be represented on every individual property. The purpose of the list is to ensure that the NCC has the opportunity to consider the possible effects of any listed operation, but this does not mean that it will object in every case; many such operations will be acceptable if carried out at agreed levels, on certain parts of the site or at particular times of the year. In order to minimise interference with current management practice each owner and occupier will be informed as soon as possible of what can be carried out on his property without prior consultation.
4. You are required to give written notice to NCC (directed to the Assistant Regional Officer) of your intention to carry out any listed operation and you may not proceed with the work unless:
 - a. the operation is carried out with the written consent of the NCC;OR
 - b. it is carried out in accordance with a management agreement under Section 16 of the National Parks and Access to the Countryside Act 1949 or Section 15 of the Countryside Act 1968;OR
 - c. 3 months have expired since NCC received notice of your proposal to carry out the work.


Dr M George
Regional Officer
East Anglia

KENNINGHALL & BANHAM FENS with QUIDENHAM MERE
SUFFOLK



NATURE CONSERVANCY COUNCIL
 Site boundary thus 
 Scale 1:10 560
 0 Metres  600
 0 Yards  600
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04
Kenninghall

86

27. Recreational or other activities likely to damage terrestrial vegetation, freshwater plants and animals.
28. Changes in game and waterfowl management and hunting practice.

(Euonymus europaeus), Guelder Rose (Viburnum opulus), Yellow Iris (Iris pseudacorus), Angelica (Angelica sylvestris), Primrose (Primula vulgaris) and Purple Small Reed (Calamagrostis canescens).

An area of dry, unmanaged tall fen with abundant Reed Sweetgrass (Glyceria maxima) and Great Willowherb (Epilobium hirsutum) occurs on the western side of Quidenham Mere.

COUNTY: Norfolk

SITE NAME: KENNINGHALL AND BANHAM FENS
WITH QUIDENHAM MERE

DISTRICT: Breckland

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Breckland District Council

National Grid Reference: TM 041875 Area: 48.9 (ha.) 120.8(ac.)

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM 08 NW

Date Notified (Under 1949 Act): N/A Date of Last Revision: N/A

Date Notified (Under 1981 Act): 1985 Date of Last Revision: -

Other Information:

A new site.

Reasons for Notification:

This complex site occupies a section of the valley of the River Whittle. It consists of areas of tall fen, species-rich fen and calcareous grassland (Kenninghall Fen and Banham Great Fen) and a deep natural mere (Quidenham Mere). Additional interest is provided by areas of wet woodland and by an area of drier unmanaged fen.

Kenninghall Fen is bounded on the eastern side by an area of chalk grassland with several typical calcicoles including Common Quaking Grass (Briza media), Hoary Plantain (Plantago media), Bird's-foot Trefoil (Lotus corniculatus) and Common Milkwort (Polygala vulgaris). Springs emerge from the base of the chalk uplands and give rise to a zone of fen grassland and rich-fen vegetation dominated by Blunt-flowered Rush (Juncus subnodulosus), Purple Moor Grass (Molinia caerulea) and Black Bog Rush (Schoenus nigricans). A number of unusual species are present including Common Butterwort (Pinguicula vulgaris), Bog Pimpernel (Anagallis tenella), Marsh Helleborine (Epipactis palustris), Grass of Parnassus (Parnassia palustris) and Marsh Lousewort (Pedicularis palustris). On the lowest lying ground, the rush-dominated fen is replaced by tall fen with Common Reed (Phragmites australis) and Saw Sedge (Cladium mariscus). Southern Marsh Orchid (Dactylorhiza praetermissa), Bogbean (Menyanthes trifoliata) and Marsh Arrow Grass (Triglochin palustris) are frequent. The fen and chalk grassland are grazed by cattle and horses during the summer months.

Banham Great Fen complements Kenninghall Fen with its extensive beds of managed saw sedge and reed. A species-rich fen vegetation occurs along a mown ride that has a similar plant assemblage to Kenninghall Fen.

Quidenham Mere is a natural, deep, non-fluctuating Breckland mere with a fringing vegetation dominated by Lesser Bulrush (Typha angustifolia), Common Club Rush (Scirpus lacustris) and reed. Water plants include a zone of White and Yellow Water Lilies (Nymphaea alba and Nuphar lutea). The surrounding carr woodland is dominated by Ash (Fraxinus excelsior) with frequent Pedunculate Oak (Quercus robur) and Alder (Alnus glutinosa). There has been considerable planting but the shrubs and ground flora are of interest with Dogwood (Cornus sanguinea), Spindle Tree

Continued.....

Site name: KNETTISHALL HEATH, SUFFOLK

1. Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2. The introduction of grazing and changes in the grazing regime (including type of stock or intensity or seasonal pattern of grazing and cessation of grazing).
3. The introduction of stock feeding and changes in stock feeding practice, including changes in the number of animals stocked.
4. Changes in the mowing or cutting regime (including hay making to silage and cessation).
5. Application of manure, fertilisers and lime.
6. Application of pesticides, including herbicides (weedkillers).
7. Dumping, spreading or discharge of any materials.
8. Burning.
9. The release into the site of any wild, feral or domestic animal^{*}, plant or seed, excluding game birds.
10. The killing or removal of any wild animal^{*}, excluding pest control and game species
^{*} 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.
11. The destruction, displacement, removal or cutting of any herb, lichen or turf.
12. The introduction of tree and/or woodland management⁺ (where applicable) and changes in tree and/or woodland management⁺
⁺ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species composition, cessation of management.
- 13a. Drainage (including the use of mole, tile, tunnel or other artificial drains).
- 13b. Modification of the structure of watercourses (eg. ditches, dykes, drains), including their banks and beds, as by re-alignment, re-grading and dredging (specify where possible).
- 13c. Management of aquatic and bank vegetation for drainage purposes (see also 11).
14. The changing of water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes).
15. Infilling of ditches, dykes, drains, ponds, pools, marshes or pits.
20. Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, lime and spoil.
21. Construction, removal or destruction of roads, tracks, walls, fences, hard-stands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22. Storage of materials.
23. Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26. Use of vehicles or craft likely to damage or disturb features of interest.
27. Recreational or other activities likely to damage heathland vegetation or birdlife.
28. Changes in game management and hunting practice.



Nature Conservancy Council

60 Bracondale Norwich NR1 2BE

Telephone Norwich 20558

Your reference

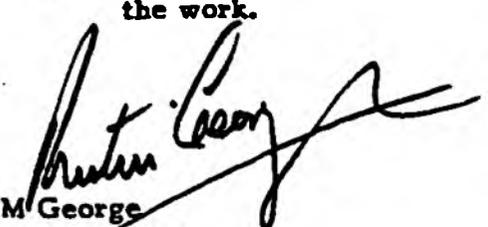
Our reference EA/S/207/14 WSS

Date 17th August 1984

Notification under Section 28 of the Wildlife and Countryside Act 1981

KNETTISHALL HEATH

1. The area of land shown on the attached map is of special interest by reason of the features described on the reverse of the map.
 2. This notice constitutes the formal notification of the land by the Nature Conservancy Council as a Site of Special Scientific Interest in accordance with Section 28(1) of the Wildlife and Countryside Act 1981.
 3. The Council considers that the operations listed overleaf are likely to cause damage to the special interest of the site. This list identifies all readily foreseeable operations which could damage features of special interest occurring anywhere within the site. Not all features will necessarily be represented on every individual property. The purpose of the list is to ensure that the NCC has the opportunity to consider the possible effects of any listed operation, but this does not mean that it will object in every case; many such operations will be acceptable if carried out at agreed levels, on certain parts of the site or at particular times of the year. In order to minimise interference with current management practice each owner and occupier will be informed as soon as possible of what can be carried out on his property without prior consultation.
 4. You are required to give written notice to NCC (directed to the Assistant Regional Officer) of your intention to carry out any listed operation and you may not proceed with the work unless:
 - a. the operation is carried out with the written consent of the NCC;
- OR
- b. it is carried out in accordance with a management agreement under Section 16 of the National Parks and Access to the Countryside Act 1949 or Section 15 of the Countryside Act 1968;
- OR
- c. 3 months have expired since NCC received notice of your proposal to carry out the work.


Dr M George
Regional Officer
East Anglia

COUNTY: Suffolk

SITE NAME: KNETTISHALL HEATH

DISTRICT: St Edmundsbury

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: St Edmundsbury District Council

National Grid Reference: TL 950805

Area:

91.2 (ha.)

225.3 (ac.)

Ordnance Survey Sheet 1:50,000: 144

1:10,560

TL 98 SW

TL 98 SE

TL 97 NW

TL 97 NE

Date Notified (Under 1949 Act): N/A

Date of Last Revision: N/A

Date Notified (Under 1981 Act): 1984

Date of Last Revision: -

Other Information:

A new site. Much of the site is a country park managed by Suffolk County Council.

Reasons for Notification:

Knettishall Heath lies on the eastern edge of Breckland and consists of a large area of unimproved dwarf ericaceous heath and grassland on mainly acidic soils. A chalk grassland flora has developed where fragments of chalk occur in the underlying soils. Secondary woodland is represented and there are also wet hollows with a characteristic flora.

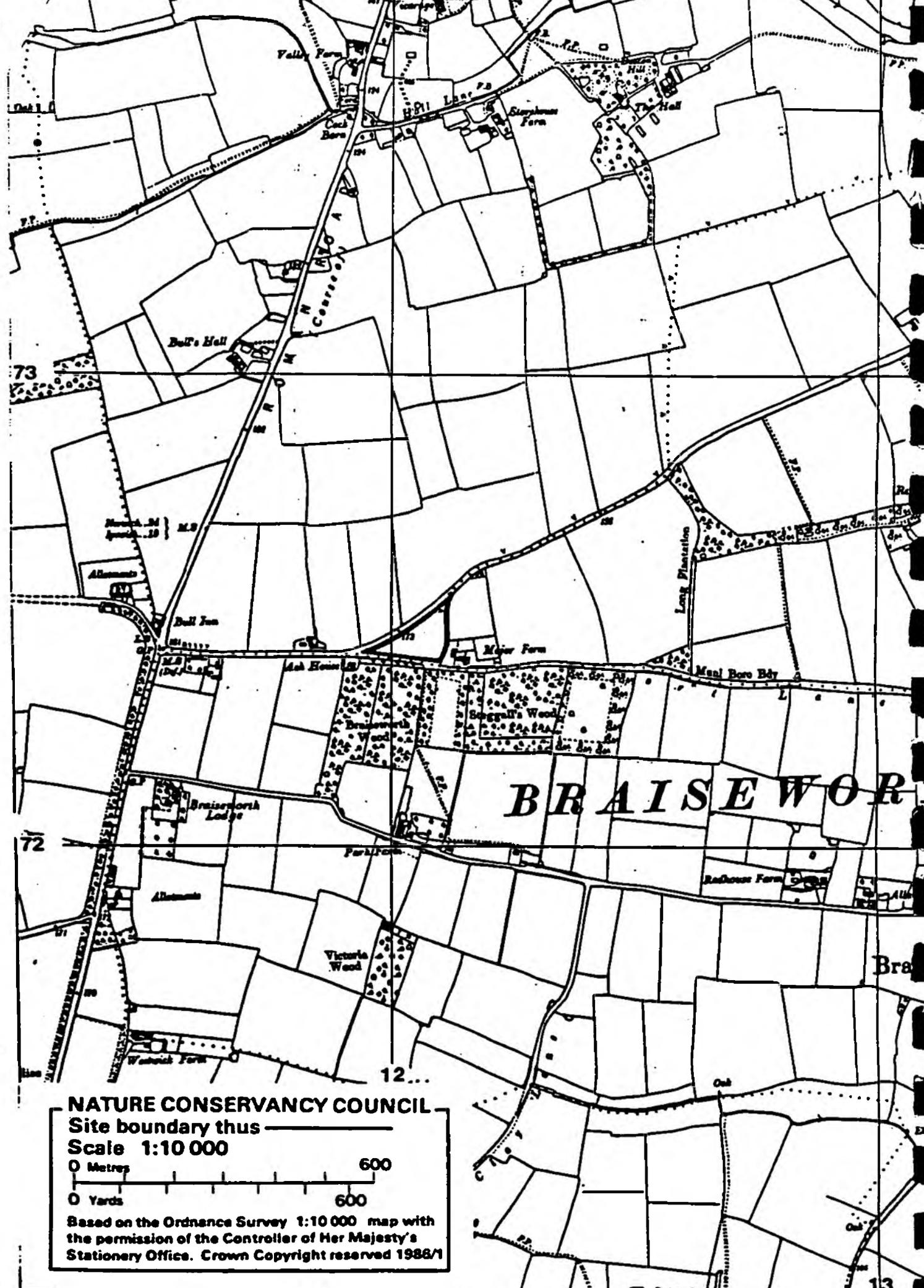
Heather (Calluna vulgaris) covers large areas in places in association with Tufted Hair-Grass (Deschampsia flexuosa)-dominated acid grassland. Bracken (Pteridium aquilinum) is locally abundant and other typical heathland plants include Heath Bedstraw (Galium saxatile), Sheep's Sorrel (Rumex acetosella), Tormentil (Potentilla erecta) and Harebell (Campanula rotundifolia). Stone striping, a periglacial feature often observed in Breckland, is well developed on part of the heath. Scrub is generally well scattered and consists of young trees and Gorse (Ulex europaeus) which forms a few dense patches.

Areas of calcareous grassland are dominated by Oat Grass (Arrhenatherum elatius) and Red Fescue (Festuca rubra) with rabbit grazing producing a diverse short-sward community locally. Associated species include Common Quaking Grass (Briza media), Dropwort (Filipendula vulgaris), Hoary Plantain (Plantago media), Salad Burnet (Sanguisorba minor), Common Rock-rose (Helianthemum nummularium) and Carline Thistle (Carlina vulgaris).

Wet areas, on low-lying ground and in hollows support a type of tall fen vegetation with Common Reed (Phragmites australis) and Meadowswest (Filipendula ulmaria) with Angelica (Angelica sylvestris), Water Mint (Mentha aquatica) and Yellow Iris (Iris pseudacorus). Marsh Stitchwort (Stellaria palustris), a local plant of marshes and base-rich fens occurs in one of these hollows.

The woodland areas consist of plantings and self re-generated stands of Pedunculate Oak (Quercus robur), Scots Pine (Pinus sylvestris) and Birch (both Betula pendula and B. pubescens).

Regular nesting birds include Nightjar, Nightingale and Lesser Whitethroat.



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 Site boundary thus ———
 Scale 1:10 000
 0 Metres 600
 0 Yards 600
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10

COUNTY: Suffolk

DISTRICT: Mid Suffolk

Status: Site of Special Scientific Interest [SSSI] notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Mid Suffolk District Council

National Grid Reference: TM 122723 Area: 1.2 [ha] 2.9 [ac]

Ordnance Survey Sheet 1:50,000: 155 1:10,000: TM 17 SW

Date Notified [Under 1949 Act]: - Date of Last Revision: -

Date Notified [Under 1981 Act]: 1986 Date of Last Revision: -

Other Information:

A new site.

Description and Reasons for Notification:

Major Farm Meadow is damp and species-rich, one of the few remaining unimproved hay meadows in Suffolk. The meadow is shallow-sloping, on boulder clay of low soil fertility, and characterised by an abundance of mole-hills.

The sward supports a wide variety of grasses and herbs of which Sweet Vernal-grass [Anthoxanthum odoratum], Common Sorrel [Rumex acetosa], Meadow Buttercup [Ranunculus acris] and Ribwort [Plantago lanceolata] are dominant. Other species include Crested Dogtail [Cynosurus cristatus], Red Fescue [Festuca rubra], Rough-stalked Meadow Grass [Poa trivialis], Perennial Rye Grass [Lolium perenne], Cock'sfoot [Dactylis glomerata] and Yorkshire Fog [Holcus lanatus]. Herbaceous species include Cuckoo Flower [Cardamine pratensis], Pepper Saxifrage [Silaum silaus], Oxeye Daisy [Leucanthemum vulgare], Adder's Tongue [Ophioglossum vulgatum] and the white flowered form of the Bugle [Ajuga reptans], with colonies of Cowslip [Primula veris], Twayblade [Listera ovata], Green-winged Orchid [Orchis morio] and Common Spotted Orchid [Dactylorhiza fuchsii].

The meadow is bounded by a mature hedgerow containing oak and ash standards and rich in woody species. Within the meadow there is a fine specimen of the rare native Black Poplar [Populus nigra].

<u>Ref No</u>	<u>Type of Operation</u>
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
6.	Use of vehicles or craft likely to damage or disturb features of interest.
7.	Recreational or other activities likely to damage features of interest.
28.	Introduction of game or waterfowl management and changes in game and waterfowl management and hunting practice.

ACTIONS LIKELY TO DAMAGE THE SPECIAL INTEREST

Site name: MAJOR FARM, BRAISEWORTH, SUFFOLK

<u>Ref No</u>	<u>Type of Operation</u>
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	The introduction of grazing and changes in the grazing regime [including type of stock or intensity or seasonal pattern of grazing and cessation of grazing].
3.	The introduction of stock feeding and changes in stock feeding practice.
4.	Mowing or other methods of cutting vegetation and changes in the mowing or cutting regime [including hay making to silage and cessation].
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides [weedkillers].
7.	Dumping, spreading or discharge of any materials.
8.	Burning.
9.	The release into the site of any wild, feral or domestic animal*, plant or seed.
10.	The killing or removal of any wild animal*, excluding pest control.
11.	The destruction, displacement, removal or cutting of any plant or plant remains, including tree, herb or turf.
12.	The introduction of tree and/or woodland management+ and changes in tree and/or woodland management+.
13a.	Drainage [including the use of mole, tile, tunnel or artificial drains].
13b.	Modification of the structure of watercourses [eg. ditches and drains], including their banks and beds, as by re-alignment, re-grading and dredging.
14.	The changing of water levels and tables and water utilisation [including irrigation, storage and abstraction from existing water bodies and through boreholes].
15.	Infilling of ditches or ponds.
20.	Extraction of minerals, including sand and gravel, topsoil, subsoil, and spoil.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials.

* 'animal' includes any mammal, reptile, amphibian, bird, fish, or invertebrate.

+ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand or underwood, changes in species composition, cessation of management.

Continued...

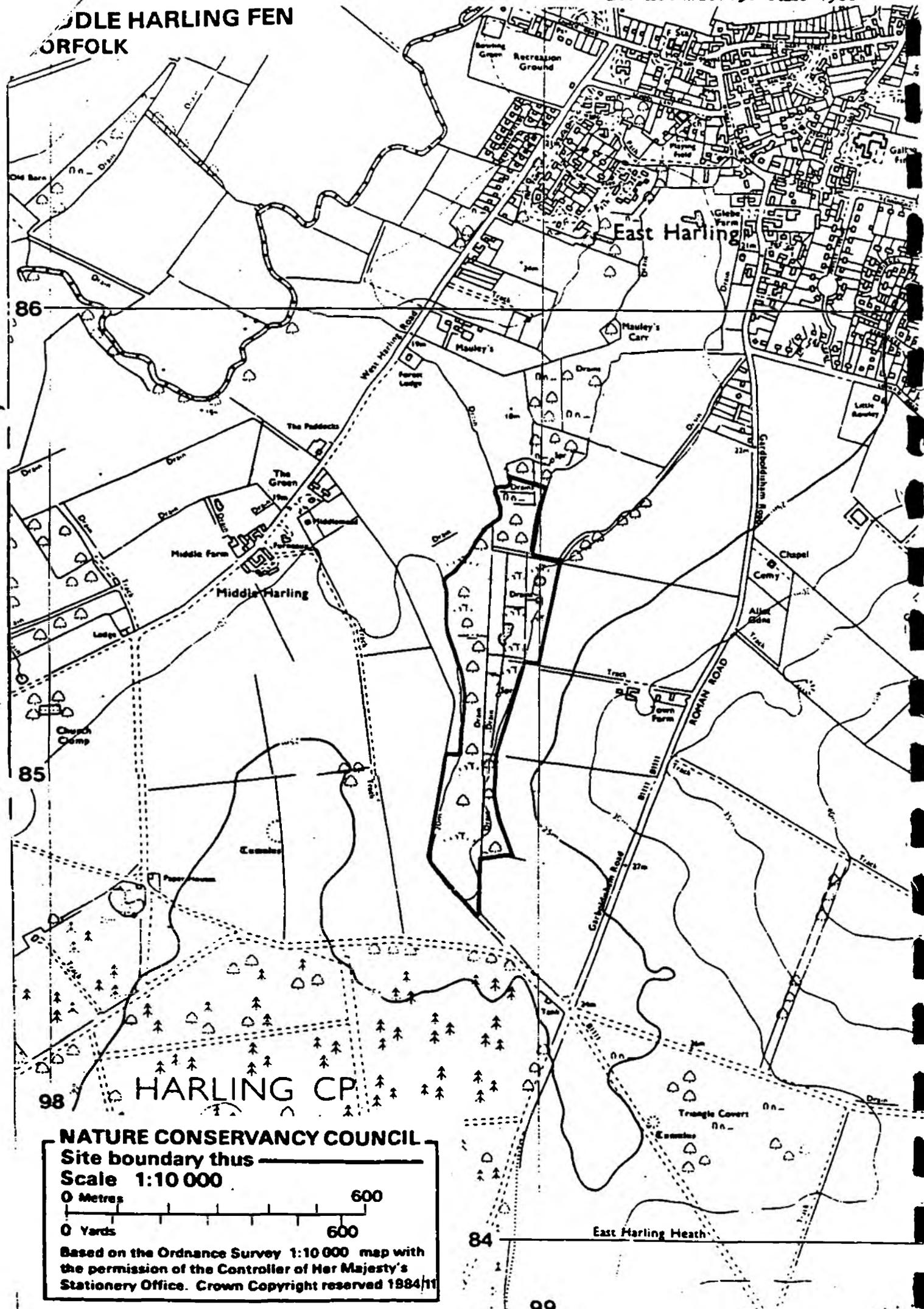
23, 26, 27 & 28

Site name: MIDDLE HARLING FEN, NORFOLK

<u>Ref No</u>	<u>Type of Operation</u>
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	Changes in the grazing regime [including type of stock or intensity or seasonal pattern of grazing and cessation of grazing].
3.	The introduction of stock feeding and changes in stock feeding practice, including changes in the number of animals stocked.
4.	The introduction of mowing or other methods of cutting vegetation and changes in the mowing or cutting regime [including hay making to silage and cessation].
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides [weedkillers].
7.	Dumping, spreading or discharge of any materials.
8.	Burning.
	The release into the site of any wild, feral or domestic animal*, plant or seed.
10.	The killing or removal of any wild animal*, excluding pest control.
11.	The destruction, displacement, removal or cutting of any plant or plant remains, including herb, moss, and turf.
12.	The introduction of tree and/or woodland management+ and changes in tree and/or woodland management+.
13a.	Drainage [including the use of mole, tile, tunnel or other artificial drains].
13b.	Modification of the structure of watercourses [eg. streams, springs, ditches, dykes, drains], including their banks and beds, as by re-alignment, re-grading and dredging.
13c.	Management of aquatic and bank vegetation for drainage purposes [see also 11].
14.	The changing of water levels and tables and water utilisation [including irrigation, storage and abstraction from existing water bodies and through boreholes].
15.	Infilling of ditches, dykes, drains, ponds, pools, or marshes.
20.	Extraction of minerals, including peat, shingle, sand and gravel, topsoil, subsoil, chalk, and spoil.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials.
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26.	Use of vehicles or craft likely to damage or disturb features of interest.
27.	Recreational or other activities likely to damage wetland plant communities.
28.	Changes in game and waterfowl management and hunting practice.

* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate. including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand or underwood, changes in species composition, cessation of management.

MIDDLE HARLING FEN NORFOLK



NATURE CONSERVANCY COUNCIL
 Site boundary thus
 Scale 1:10 000
 0 Metres 600
 0 Yards 600
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COUNTY: Norfolk

SITE NAME: MIDDLE HARLING FEN

DISTRICT: Breckland

Status: Site of Special Scientific Interest [SSSI] notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Breckland District Council

National Grid Reference: TL 989852 Area: 12.7 [ha] 31.3 [ac]

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TL 98 NE, TL 98 SE

Date Notified [Under 1949 Act]: - Date of Last Revision: N/A

Date Notified [Under 1981 Act]: 1986 Date of Last Revision: -

Other Information:

A new site.

Reasons for Notification:

Middle Harling Fen is a small calcareous valley fen situated at the head of a tributary of the River Thet. The site lies in a shallow valley and a number of springs, bearing water from the underlying chalk, emerge on the sloping ground. A wide range of grassland types is present including both wet and dry communities. The species-rich fen vegetation includes several plants that are now uncommon in East Anglia due to the drainage of many similar areas. An unusual feature is the unimproved calcareous grassland that occurs on dry ground surrounding the fen.

Tall calcareous grassland dominated by Cock'sfoot [Dactylis glomerata] and Oat-grass [Arrhenatherum elatius] occurs on the driest soils. The herb-rich sward includes several species that are indicators of calcareous soils, notably Small Scabious [Scabiosa columbaria], Hairy Rockcress [Arabis hirsuta], Hoary Plantain [Plantago media], Meadow Saxifrage [Saxifraga granulata] and Spotted Orchid [Dactylorhiza fuchsii].

Unimproved neutral grassland is present further down the valley slope on damp soils and is dominated by Fiorin [Agrostis stolonifera] and Red Fescue [Festuca rubra]. Several uncommon species occur in this diverse community including Cowslip [Primula veris], Yellow Rattle [Rhinanthus minor], Twayblade [Listera ovata], Green-winged Orchid [Orchis morio] and Adder's Tongue [Ophioglossum vulgatum].

The majority of the calcareous fen in the valley bottom is dominated by Blunt-flowered Rush [Juncus subnodulosus] with frequent Purple Moor-grass [Molinia caerulea], Quaking Grass [Briza media] and Carnation Sedge [Carex panicea]. This community is again very rich with many notable species including Bog Pimpernel [Anagallis tenella], Ragged Robin [Lychnis flos-cuculi], Marsh Lousewort [Pedicularis palustris], Marsh Arrow-grass [Triglochin palustris] and Southern Marsh Orchid [Dactylorhiza praetermissa]. The wettest part of the fen is dominated by large tussocks of Tufted Sedge [Carex elata] which grades into tall fen vegetation on the lowest-lying ground. Here Reed [Phragmites australis] and Reed-grass [Phalaris arundinacea] are dominant and there are scattered bushes of Common Sallow [Salix cinerea].

An area of carr woodland and improved grassland is included within the site boundary because any changes in water level in this area would also affect the fen.

There is a good range of breeding bird species on the site, including Snipe, Cuckoo, Reed Warbler and Sedge Warbler.

"Ramsar" Convention on Wetlands of International Importance especially as Waterfowl Habitat

REDGRAVE AND SOUTH LOPHAM FENS (NORFOLK & SUFFOLK)

This site is internationally important under Cagliari criteria 2A, 2B and 3.

Redgrave and South Lopham fen is an extensive example of lowland base-rich valley mire. It is the source of the River Waveney.

It is a particularly well developed example of East Anglian valley mire and is remarkable for its lack of fragmentation. Nearby, Theltenham and Blo' Norton fens show similarities but they are small fragments of a previously large system which would have paralleled Redgrave and South Lopham.

The diversity of the site is due to the lateral and longitudinal zonation of vegetation types characteristic of valley mires. Dry birch woodland of the valley sides is replaced by floristically rich fen grassland. This grades into a mixed fen vegetation and areas dominated by reed and sedge, notably the saw sedge Cladium mariscus, in the valley bottom. Where springs emerge at the valley head black bog rush Schoenus nigricans dominates.

The diversity of the site is further increased by the occurrence of wet heath on acid upper slopes.

Redgrave and South Lopham is the only known British locality of the Fen Raft Spider Dolomedes plantarius. In Europe it occurs as scattered isolated declining populations. Population estimates (made in 1984) of the spider at this site are 7-10,000.

J955/9

Eastern/Gaird



NATURE CONSERVANCY COUNCIL

East Anglia Region Sub-Office.

Norman Tower House, 1/2 Crown Street, Bury St. Edmunds, Suffolk IP33 1QX
Telephone Bury St. Edmunds (0284) 62218.

ANGLIAN WATER
NRA UNIT
05 APR 1989
No 00949
REF 41000
ORIG RT
COPY -----

Mr ~~ARMOUR~~
Regional Manager (Environmental Regulation & Fisheries)

Your reference

Our reference

Date

AJM/EM

3 April 1989

Anglian Water
NRA Unit
Aqua House
London Road
Peterborough PE2 8AG

For the attention of C J Spray, Fisheries & Conservation Officer

Dear Sir

REDGRAVE AND SOUTH LOPHAM FENS PROPOSED WETLAND OF INTERNATIONAL IMPORTANCE

In the opinion of the Nature Conservancy Council the land shown edged in black on the attached map meets the criteria for inclusion in the list of Wetlands of International Importance under the Ramsar Convention. Accordingly the NCC proposes to advise the Secretary of State for the Environment that the land should be formally designated.

This designation will not impose any additional obligations on owners, occupiers and local planning authorities to those brought about by the notification of the land as a Site of Special Scientific Interest under the Wildlife and Countryside Act 1981.

I enclose a leaflet for your information along with a copy of the citation which sets out why this site has been selected as a Wetland of International Importance.

If you have any comments to make on the above proposal or any queries that you would like answered please (contact me at the above address by 3rd May 1989.)

contact Chris Spray at Peterborough first.

Yours faithfully

A. J. Moore

A J MOORE
Asst Regional Officer
West Suffolk

Enc

Internationally important wetlands and special protection areas for birds

This leaflet describes two international designations that may be given by the United Kingdom Government to land of high wildlife interest by virtue of the quality of its habitat or the numbers of birds it supports.

Ramsar sites — wetlands of international importance

The Convention on Wetlands of International Importance especially as Waterfowl Habitat was adopted at a meeting of countries concerned with wetland and waterfowl conservation which was held at Ramsar, Iran in 1971. The objectives are to stem the progressive encroachment on, and loss of, wetlands now and in the future. A wetland is defined as being an area of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt. This includes areas of marine water the depth of which at low tide does not exceed 6 metres. The UK Government signed the Convention† in 1973 and ratified it in 1976. In doing so it accepted a commitment to promote both the conservation of particular sites and the wise use of wetlands within its territory. Each country which becomes a Contracting Party to the Convention is required to designate wetlands in accordance with criteria agreed by Parties for inclusion in a list of 'Wetlands of International Importance'.

By the end of 1987 there were 45 Contracting Parties and a total of 381 sites had been designated throughout the world. With the continuing decline of wetlands as the result of drainage, together with the increasing pressure for more areas to be developed for recreation, including water-sports, it is vital that wetlands already identified as being of international importance are conserved.

The Contracting Parties have agreed criteria to establish whether wetlands are internationally important. The criteria, as revised at the Conference of Contracting Parties in Regina in 1987, are given below.

A wetland qualifies for one or more of the following reasons.

1 Criteria for assessing the value of representative or unique wetlands.

A wetland should be considered internationally important if it is a particularly good example of a specific type of wetland characteristic of its region.

2 General criteria for using plants or animals to identify wetlands of importance.

A wetland should be considered internationally important if —

- A it supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or animal or an appreciable number of individuals of any one or more of these species; or
- B it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna; or
- C it is of special value as the habitat of plants or animals at a critical stage of their biological cycles; or
- D it is of special value for its endemic plant or animal species or communities.

3 Specific criteria for using waterfowl to identify wetlands of importance.

A wetland should be considered internationally important if —

- A it regularly supports 20,000 waterfowl; or
- B it regularly supports substantial numbers of individuals from particular groups of waterfowl indicative of wetland values, productivity or diversity; or
- C where data on populations are available, it regularly supports 1% of the individuals of a population of one species or subspecies of waterfowl.

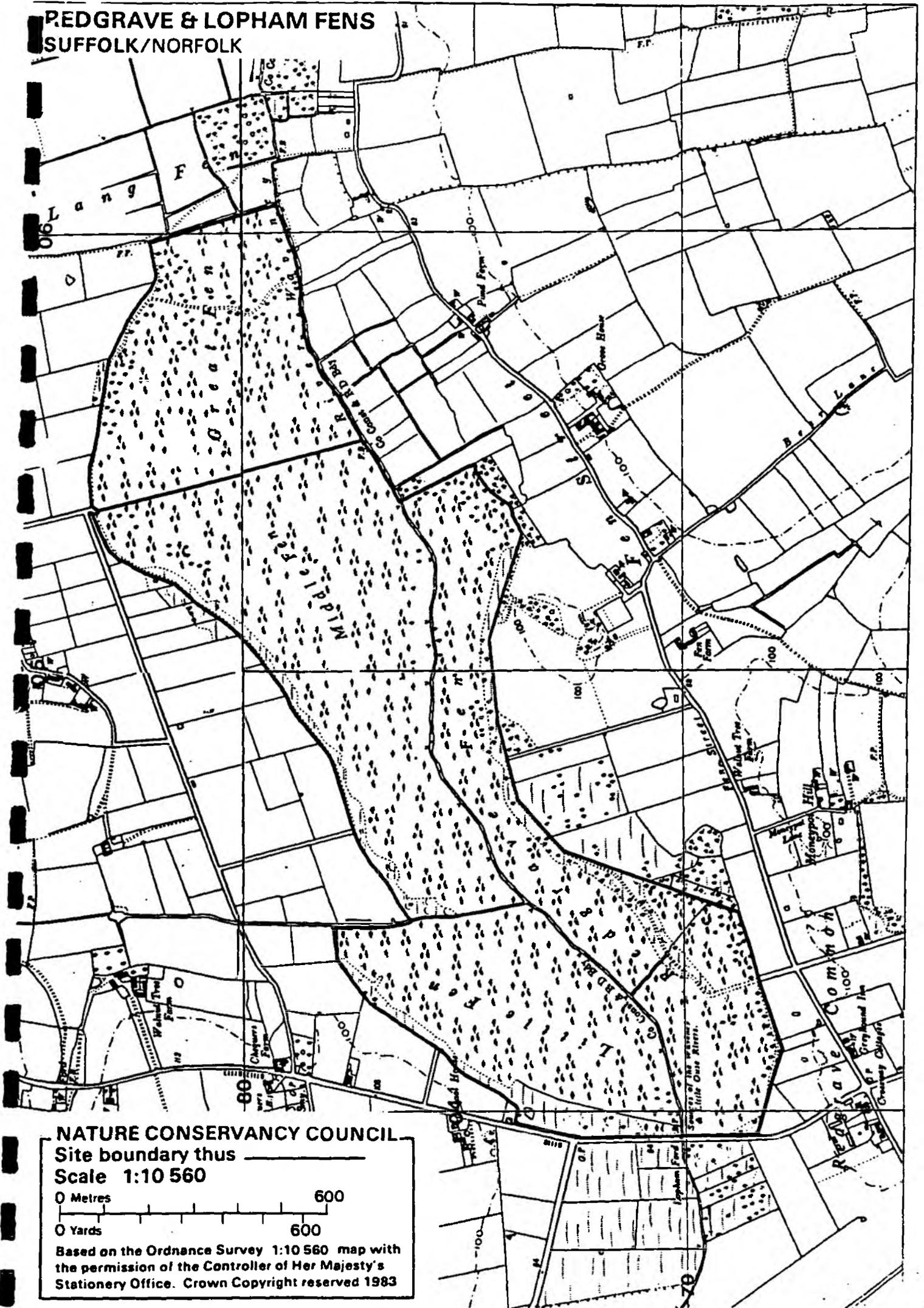
Special Protection Areas (EC Directive)

As the UK is a member of the European Community, the Government is bound by the European Communities Council Directive of April 1979 on the Conservation of Wild Birds.* Member states are required to take special measures to conserve the habitat of two categories of birds. These categories are (under Article 4.1 of the Directive) certain listed rare or vulnerable species listed below, and (under Article 4.2) regularly occurring migratory species. Particular attention must be paid to the protection of wetlands, especially wetlands of international importance.

† The full text is given in Command Paper 6465. Treaty series number 34(1976) published by HMSO.

* The full text is given in the Official Journal of the European Communities No L 103/1 25 April 1979.

**PEDGRAVE & LOPHAM FENS
SUFFOLK/NORFOLK**



NATURE CONSERVANCY COUNCIL

Site boundary thus ———

Scale 1:10 560

0 Metres 600

0 Yards 600

Based on the Ordnance Survey 1:10 560 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1983

COUNTY: Norfolk/Suffolk

SITE NAME: REDGRAVE AND LOPHAM FENS

DISTRICT: Mid-Suffolk and Breckland, Norfolk

Status: Site of Special Scientific Interest [SSSI] notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Mid-Suffolk District Council
Breckland District Council

National Grid Reference: TM 050797 Area: 124.94 [ha] 308.68 [ac]

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM 07 NW, NE

Date Notified [Under 1949 Act]: 1954 Date of Last Revision: N/A

Date Notified [Under 1981 Act]: 1985 Date of Last Revision: -

Other Information:

This site is of international importance and has been recommended for inclusion in the list of wetlands of international importance under the Ramsar Convention. This site is a Suffolk Trust for Nature Conservation reserve and is listed in the Nature Conservation Review.

Reasons for Notification:

This site consists of an extensive area of spring-fed valley fen at the headwaters of the River Waveney. It supports several distinct fen vegetation types, ranging from Molinia-based grasslands, mixed Sedge fen to Reed-dominated fen. There are small areas of wet heath, Sallow carr and Birch woodland. The invertebrate fauna is extensive and well studied and the site is the only British locality for the Fen Raft Spider [Dolomedes plantarius].

Part of the site exhibits a classic zonation of vegetation types. Dry marginal birch woodland gives way to a band of fen grassland dominated by Purple Moor grass [Molinia caerulea]. This can be species-rich with Meadow Thistle [Cirsium dissectum], Grass of Parnassus [Parnassia palustris], Butterwort [Pinguicula vulgaris], Black Bog-rush [Schoenus nigricans] and Marsh Helleborine [Epipactis palustris]. This grades into a mixed fen community dominated by the Fen Rush [Juncus subnodulosus] with Southern Marsh Orchid [Dactylorhiza praetermissa], Saw Sedge [Cladium mariscus] and Marsh Valerian [Valeriana dioica] as frequent associates. Sandy ridges protrude into these two zones and they support a damp heathy vegetation with Cross-leaved Heath [Erica tetralix] and Ling [Calluna vulgaris] which adds considerably to the diversity of the site.

Towards the centre of the valley the Fen Rush and Saw Sedge communities give way to more eutrophic tall fen. This is dominated by Reed with herbs such as Yellow and Purple Loosestrifes [Lythrum salicaria and Lythrum salicaria], Meadowsweet and Hemp Agrimony [Eupatorium cannabinum]. Most of the fen communities are prone to invasion by Sallow [Salix cinerea] and locally this has developed into dense scrub and carr.

The River Waveney and its feeder drains are sluggish eutrophic waters supporting a rather narrow range of aquatic plants. Starwort [Callitriche sp.], Floating Pondweed [Potamogeton natans], Curled Pondweed [P. crispus] and Fennel-like Pondweed [P. pectinatus] are the dominant species. In addition there are a number of small pools in the fen areas, some of which are the flooded relics of former peat cuts. They form the habitat for the nationally rare Fen Raft Spider [Dolomedes plantarius] which is listed in Schedule 5 of the Wildlife and Countryside Act 1981. Aquatic plants include Bladderwort [Utricularia vulgaris], Fen Pondweed [P. coloratus] and Charophytes, all indicators of unpolluted, low fertility spring water.

Species that are referred to in Article 4.1 of the EC Bird Directive and which occur regularly in Britain

Red-throated diver	Avocet
Black-throated diver	Stone curlew
Great northern diver	Dotterel
Slavonian grebe	Golden plover
Storm petrel	Ruff
Leach's petrel	Wood sandpiper
Bittern	Red-necked phalarope
Bewick's swan	Mediterranean gull
Whooper swan	Sandwich tern
White-fronted goose	Roseate tern
(Greenland race)	Common tern
Barnacle goose	Arctic tern
Honey buzzard	Little tern
Red kite	Black tern
White-tailed eagle	Snowy owl
Marsh harrier	Short-eared owl
Hen harrier	Nightjar
Montagu's harrier	Kingfisher
Golden eagle	Woodlark
Osprey	Wren
Merlin	(Fair Isle race only)
Peregrine	Dartford warbler
Capercaillie	Red-backed shrike
Spotted crane	Chough
Corncrake	Scottish crossbill

Member countries are required to classify the most suitable areas for these species and for regularly occurring migratory species as Special Protection Areas.

General information

Ramsar sites and Special Protection Areas in Great Britain

The Nature Conservancy Council (NCC) is responsible for identifying sites worthy of designation as Ramsar sites and Special Protection Areas. The Secretary of State for the Environment is responsible for the designation of sites in England and Wales. The Secretary of State for Scotland is responsible for their designation in Scotland. The NCC has identified 152 candidate Ramsar sites and 207 candidate Special Protection Areas. Of these the UK had designated 34 Ramsar sites and 25 Special Protection Areas by 30 March 1988.

These designations are quite separate from the notification of Sites of Special Scientific Interest (SSSIs) but there are no further requirements upon owners and occupiers beyond those applying to SSSIs under the

Wildlife and Countryside Act 1981. In most cases, the international importance will be retained if the existing management regime (especially where it relates to water-levels) is maintained, so that the site continues to attract and hold its present communities of birds or aquatic life. Most sites are particularly important for certain species of birds which are dependent on specialised habitats to provide their breeding, feeding, wintering or passage sites. Some sites qualify under both these international designations.

The procedure for designating sites is as follows —

- The NCC identifies the site as qualifying under the Convention or Directive.
- The NCC will have declared the area as a National Nature Reserve or notified it as a Site of Special Scientific Interest.
- The NCC writes to the owners and occupiers of the site and the local planning authority to inform them that the NCC intends to apply to the Secretary of State for the designation of the site under the Convention and/or Directive. All parties are given a minimum of one month in which to let the NCC have their comments.
- The NCC passes on any unresolved comments to the Department of the Environment (DoE) or the Scottish Development Department (SDD) when it applies for the designation of the site.
- DoE or SDD consults with other government departments.
- DoE or SDD considers comments from owners and occupiers of the site, the local planning authority and government departments before deciding whether to designate the site or not.
- DoE or SDD writes to any parties that may have objected to the designation to let them know whether they uphold or reject the objection.
- Should DoE or SDD decide not to designate the site, it informs the NCC and the NCC informs the parties originally consulted (see above).
- Should DoE or SDD decide to designate the site, a date is agreed with the NCC. The NCC then writes to the owners and occupiers of the site and the local planning authority to let them know the proposed date of designation.
- On the date of designation, DoE or SDD writes to the European Commission (in the case of Special Protection Areas) and/or the International Union for the Conservation of Nature and Natural Resources (in the case of Ramsar sites) informing them of the designation.

The Nature Conservancy Council is the body responsible for advising the Government on nature conservation in Great Britain. Its work includes the selection, establishment and management of National Nature Reserves; the selection and management of Marine Nature Reserves; the identification and notification of Sites of Special Scientific Interest; the provision of advice and dissemination of knowledge about nature conservation; and the support and conduct of research relevant to these functions.

This is one of a range of publications produced by the NCC. A catalogue listing current titles is available from Dept SIR, Publicity Services Branch, Nature Conservancy Council, Northminster House, Peterborough PE1 1UA.

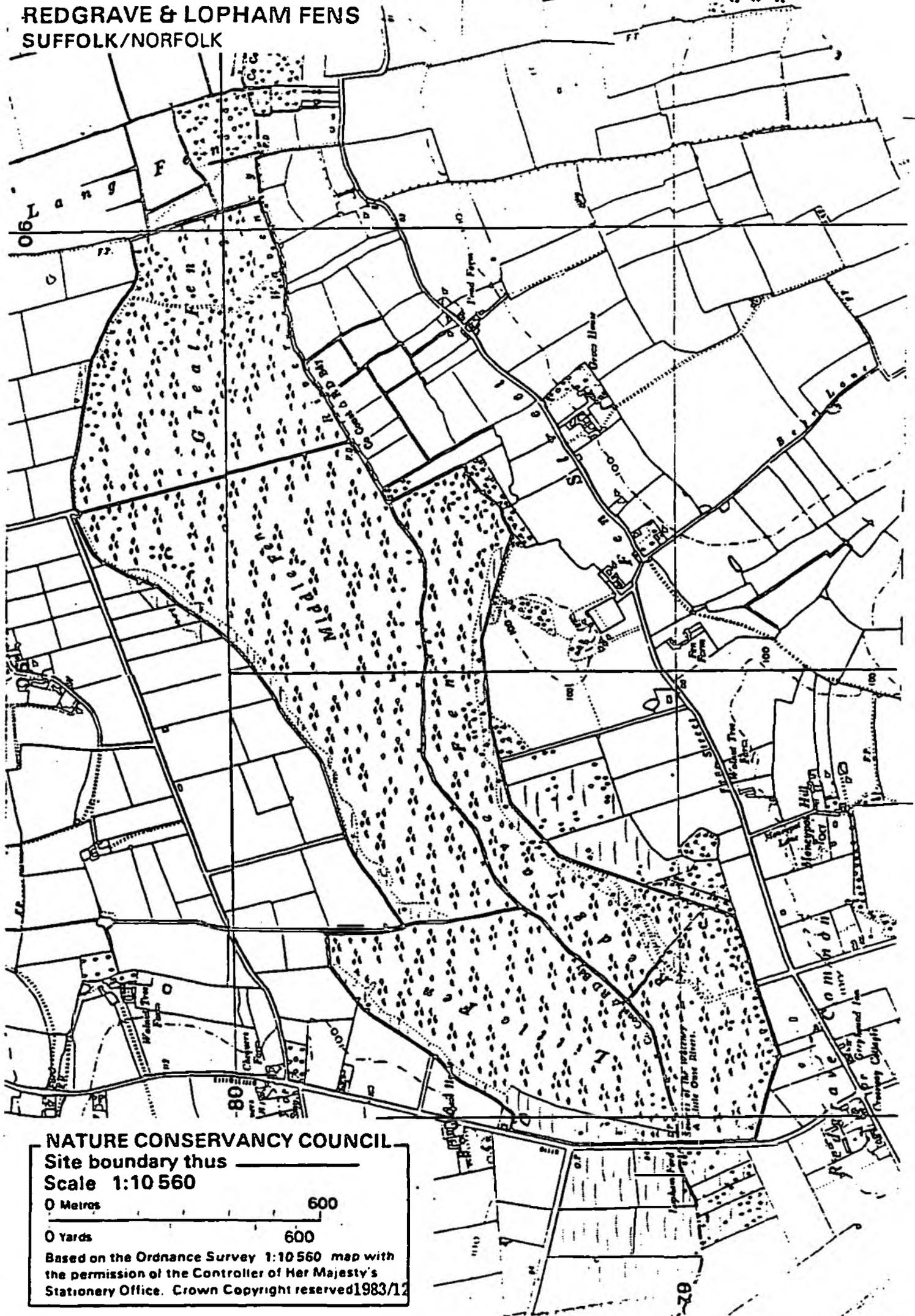


Site name: REDGRAVE AND LOPHAM FENS: NORFOLK AND SUFFOLK

1. Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2. Changes in the grazing regime (including type of stock or intensity or seasonal pattern of grazing and cessation of grazing).
3. The introduction of stock feeding and changes in stock feeding practice including changes in the number of animals stocked.
4. Changes in the mowing or cutting regime (including hay making to silage and cessation).
5. Application of manure, fertilisers and lime.
6. Application of pesticides, including herbicides (weedkillers).
7. Dumping, spreading or discharge of any materials.
8. Burning (and changes in the pattern or frequency of burning).
9. The release into the site of any wild, feral or domestic animal*, plant or seed
* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.
10. The killing or removal of any wild animal*, including pest control
* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.
11. The destruction, displacement, removal or cutting of any plant remains, including tree, shrub, herb, hedge, dead or decaying wood, moss, lichen, fungus, leaf-mould and turf.
12. The introduction of tree and/or woodland management+ and changes in tree and/or woodland management+
+ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species composition, cessation of management.
- 13a. Drainage (including the use of mole, tile, tunnel or other artificial drains).
- 13b. Modification of the structure of watercourses (eg. rivers, springs, ditches, dykes, drains), including their banks and beds, as by re-alignment, re-grading and dredging.
- 13c. Management of aquatic and bank vegetation for drainage purposes (see also 11).
14. The changing of water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes).
15. Infilling of ditches, dykes, drains, ponds, pools, marshes or pits.
- 16a. The introduction of freshwater fishery production and/or management* and changes in freshwater fishery production and/or management*
*including sporting fishing and angling.
20. Extraction of minerals, including peat, shingle, sand and gravel, topsoil, subsoil, and spoil.
21. Construction, removal or destruction of roads, tracks, walls, fences, hard-stands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22. Storage of materials.

Continued
23, 26, 27, 28

**REDGRAVE & LOPHAM FENS
SUFFOLK/NORFOLK**



NATURE CONSERVANCY COUNCIL
 Site boundary thus 
 Scale 1:10 560
 0 Metres  600
 0 Yards  600
 Based on the Ordnance Survey 1:10 560 map with
 the permission of the Controller of Her Majesty's
 Stationary Office. Crown Copyright reserved 1983/12



Nature Conservancy Council

60 Bracondale Norwich NR1 2BE

Telephone Norwich 20558

Norfolk

5

Recreation and Conservation Officer
Anglian Water
Norwich Division
Yare House
62 Thorpe Road
Norwich Norfolk NR1 1SA

Your reference

Our reference 274W JRM/ET

Date 9 June 1988

Dear Sir

WILDLIFE AND COUNTRYSIDE ACT 1981:
SITES OF SPECIAL SCIENTIFIC INTEREST [SSSI]

SHELFANGER MEADOWS SSSI

S28[1] of the Wildlife and Countryside Act 1981 requires the Nature Conservancy Council [NCC] to notify owners and occupiers of areas of land which in the Council's opinion is of Special Scientific Interest [SSSI]. The local planning authority in whose area the land is situated and the Secretary of State for the Environment have also to be notified.

S22[3] of the Water Act 1973, as amended by S48 of the Wildlife and Countryside Act, also requires the NCC to notify regional Water Authorities, including Internal Drainage Boards of any SSSIs lying within the Authority's or Board's areas of interest.

Accordingly, I now enclose formal notification documents comprising a site map, description, and list of operations likely to damage the special interest for the above site.

We ask that you consult NCC over proposals to undertake any kind of work which might affect the special interest of SSSIs notified to you under the 1981 Act. We would also appreciate continued consultation over SSSIs notified under the National Parks and Access to the Countryside Act 1949, pending their re-notification under the new legislation.

Should it be necessary to undertake emergency work without prior consultation, please inform NCC as soon as is practicable after the event.

I would be grateful if you would acknowledge receipt by completing and returning the appropriate acknowledgement slip to this office.

Yours faithfully

J R Moore [Mrs]
Regional Administrative Officer
East Anglia

13 JUN 1988

Enc

Continued...

23. Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26. Use of vehicles or craft likely to damage or disturb features of interest.
27. Recreational or other activities likely to damage or disturb the vegetation and wild plants and animals.
28. Introduction of game or waterfowl management and changes in game and waterfowl management and hunting practice.

COUNTY: Norfolk

SITE NAME: SHELFANGER MEADOWS

DISTRICT: South Norfolk

Status: Site of Special Scientific Interest [SSSI] notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: South Norfolk District Council

National Grid Reference: TM 110828 Area: 10.7 [ha] 26.4 [ac]

Ordnance Survey Sheet 1:50,000: 144 1:10,000: TM 18 SW

Date Notified [Under 1949 Act]: N/A Date of Last Revision: -

Date Notified [Under 1981 Act]: 1988 Date of Last Revision: -

Other Information:

A new site.

Reasons for Notification:

This site which lies in a tributary valley of the River Waveney is one of the most important areas of unimproved grassland in Norfolk, forming an outstanding example of traditionally managed, herb-rich, hay meadows. For several hundred years the grassland has received an annual hay-cut followed by grazing and this traditional management has ensured the survival of a rich and unusual flora. In addition, diverse marshy grassland has developed in seepage zones where springs emerge on the valley-side.

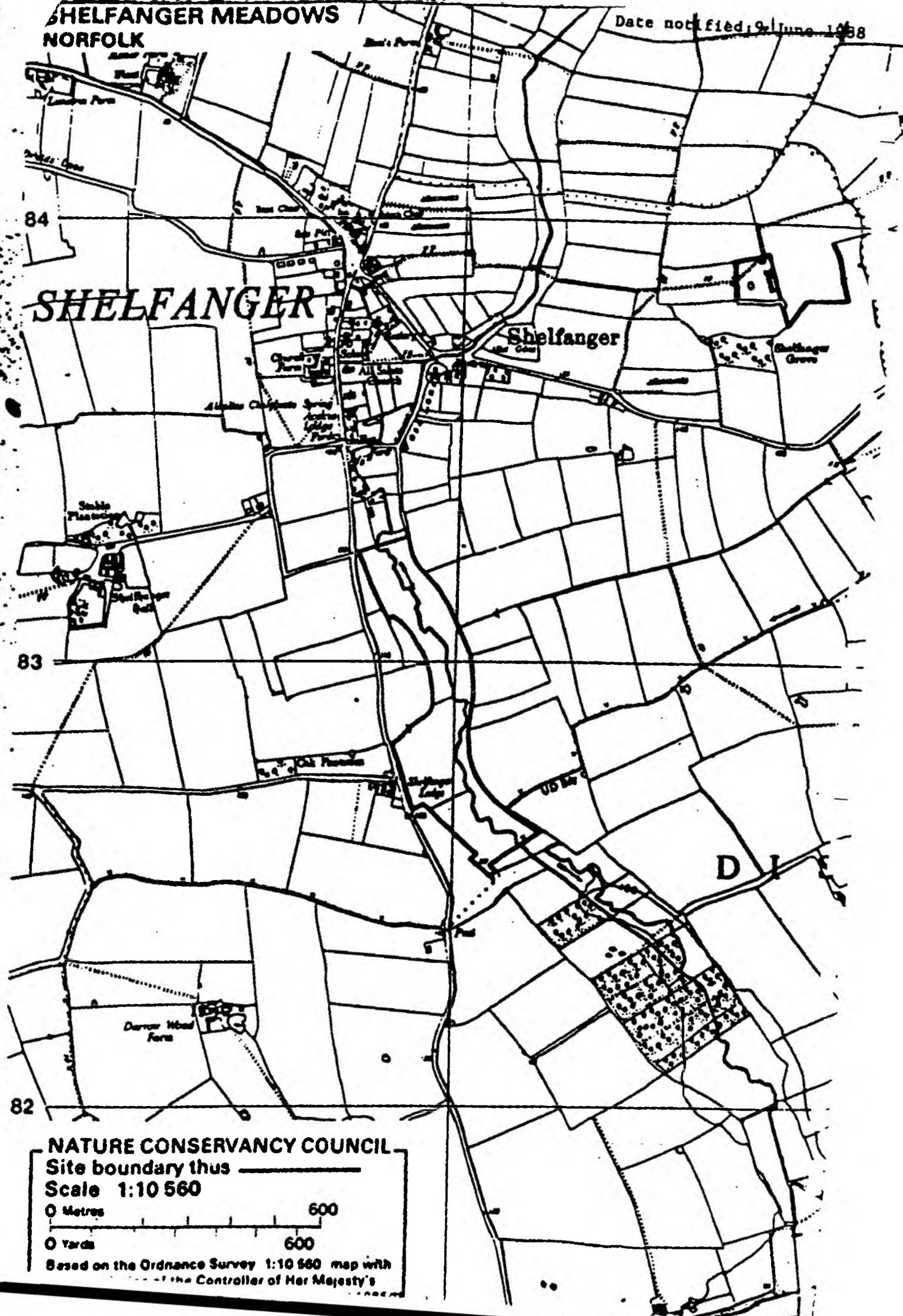
The damp, neutral grassland is rich in grasses and the more abundant species are Crested Dog's-tail [Cynosurus cristatus], Sweet Vernal-grass [Anthoxanthum odoratum], Yorkshire Fog [Holcus lanatus] and Smooth Meadow-grass [Poa pratensis]. Many herbs are associated with this sward notably Meadow Saxifrage [Saxifraga granulata], Cuckoo Flower [Cardamine pratensis], Cowslip [Primula veris], Ragged Robin [Lychnis flos-cuculi] and an exceptionally large population of Green-winged Orchids [Orchis morio]. Meadowsweet [Filipendula ulmaria] is locally abundant in the damper areas on the valley-floor.

Marshy grassland occurs in flushed areas and is generally dominated by Brown Sedge [Carex disticha], Carnation Sedge [C. panicea] and Jointed Rush [Juncus articulatus]. Other notable species include Marsh Valerian [Valeriana dioica], Devil's-bit Scabious [Succisa pratensis], Early Marsh Orchid [Dactylorhiza incarnata], Southern Marsh Orchid [D. praetermissa] and Marsh Helleborine [Epipactis palustris].

Small areas of tall, ruderal vegetation and semi-improved grassland are present on some of the field margins and a stream flows through the site.

**SHELFANGER MEADOWS
NORFOLK**

Date not filed, 9 June 1968



NATURE CONSERVANCY COUNCIL

Site boundary thus 

Scale 1:10 560

0 Metres  600

0 Yards  600

Based on the Ordnance Survey 1:10 560 map with
of the Controller of Her Majesty's



Nature Conservancy Council

60 Bracondale Norwich NR1 2BE

Telephone Norwich(20558

FILE SSSI: Suffolk
220/2.

Recreation and Conservation Officer
Anglian Water
Cambridge Division
Great Ouse House
Clarendon Road
Cambridge CB2 2BL

CAMBRIDGE DIVISION

17 JUL 1986

Your reference

Our reference

EA/S/107/14 WNW

JRM/MFW

Date 9th July 1986

Dear Sir

WILDLIFE AND COUNTRYSIDE ACT 1981:
SITES OF SPECIAL SCIENTIFIC INTEREST [SSSI]

WESTON FEN SSSI

S28[1] of the Wildlife and Countryside Act 1981 requires the Nature Conservancy Council [NCC] to notify owners and occupiers of areas of land which in the Council's opinion is of Special Scientific Interest [SSSI]. The local planning authority in whose area the land is situated and the Secretary of State for the Environment have also to be notified.

S22[3] of the Water Act 1973, as amended by S48 of the Wildlife and Countryside Act, also requires the NCC to notify regional Water Authorities, including Internal Drainage Boards of any SSSIs lying within the Authority's or Board's areas of interest.

Accordingly, I now enclose formal notification documents comprising a site map, description, and list of operations likely to damage the special interest for the above site.

We ask that you consult NCC over proposals to undertake any kind of work which might affect the special interest of SSSIs notified to you under the 1981 Act. We would also appreciate continued consultation over SSSIs notified under the National Parks and Access to the Countryside Act 1949, pending their re-notification under the new legislation.

Should it be necessary to undertake emergency work without prior consultation, please inform NCC as soon as is practicable after the event.

I would be grateful if you would acknowledge receipt by completing and returning the appropriate acknowledgement slip to this office.

Yours faithfully

J R Moore[Mrs]
Regional Administrative Officer
East Anglia

Enc

Site name: SHELFANGER MEADOWS, NORFOLK

<u>Ref No</u>	<u>Type of Operation</u>
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	Changes in the grazing regime [including type of stock or intensity or seasonal pattern of grazing and cessation of grazing].
3.	The introduction of or changes in stock feeding practice [including changes in the number of animals stocked].
4.	Changes in the mowing or cutting regime [including hay making to silage and cessation].
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides [weedkillers].
7.	Dumping, spreading or discharge of any materials. Burning.
9.	The release into the site of any wild, feral or domestic animal*, plant or seed.
10.	The killing or removal of any wild animal*, excluding pest control.
11.	The destruction, displacement, removal or cutting of any plant or plant remains, including herb, hedge, moss, or turf.
12.	The introduction of or changes in tree and/or woodland management+.
13a.	Drainage [including the use of mole, tile, tunnel or other artificial drains].
13b.	Modification of the structure of watercourses [eg. streams, springs, ditches, drains], including their banks and beds, as by re-alignment, re-grading and dredging.
14.	The changing of water levels and tables and water utilisation [including irrigation, storage and abstraction from existing water bodies and through boreholes].
15.	Infilling of ditches, drains, pools, or marshes.
16.	Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, and spoil.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials.
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.

* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate.

+ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand of underwood, changes in species composition, cessation of management.

Continued....
26, 27 & 28

OPERATIONS LIKELY TO DAMAGE THE SPECIAL INTEREST

Site name: WESTON FEN, SUFFOLK

<u>Ref No</u>	<u>Type of Operation</u>
1.	Cultivation, including ploughing, rotovating, harrowing, and re-seeding.
2.	Changes in the grazing regime [including type of stock or intensity or seasonal pattern of grazing and cessation of grazing].
3.	The introduction of stock feeding and changes in stock feeding practice, including changes in the number of animals stocked.
4.	Mowing or other methods of cutting vegetation and changes in the mowing or cutting regime [including hay making to silage and cessation].
5.	Application of manure, fertilisers and lime.
6.	Application of pesticides, including herbicides [weedkillers].
7.	Dumping, spreading or discharge of any materials.
8.	Burning and changes in the pattern or frequency of burning.
9.	The release into the site of any wild, feral or domestic animal*, plant or seed.
10.	The killing or removal of any wild animal*, excluding pest control.
11.	The destruction, displacement, removal or cutting of any plant or plant remains including tree, shrub, herb, hedge, moss, or turf.
12.	The introduction of tree and woodland management+ and changes in tree and woodland management+.
13a.	Drainage and the use of mole, tile, tunnel or other artificial drains .
13b.	Modification of the structure of watercourses [eg. streams, springs, ditches, dykes, drains], including their banks and beds, as by re-alignment, re-grading and dredging.
13c.	Management of aquatic and bank vegetation for drainage purposes.
14.	The changing of water levels and tables and water utilisation [including irrigation, storage and abstraction from existing water bodies and through boreholes].
15.	Infilling of ditches, dykes, drains, ponds, pools, or fenswamp.
16a.	The introduction of freshwater fishery production or management** and changes in freshwater fishery production or management**.
20.	Extraction of minerals, including peat, sand and gravel, topsoil, subsoil, chalk, and spoil.
21.	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22.	Storage of materials.
23.	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
26.	Use of vehicles or craft likely to damage or disturb vegetation or fauna.

Continued.....
[27 & 28]

Common Spotted Orchid [Dactylorhiza fuchsii] and Southern Marsh Orchid [Dactylorhiza praetermissa].

Relict heath communities to the north-west and south-east of the site have been heavily invaded by bracken along with gorse and hawthorn scrub. Some areas of bracken are now being cleared and acidic grassland is re-developing. Older established areas of acidic grassland contain Heather [Calluna vulgaris], Petty Whin [Genista anglica] and Mouse-ear Hawkweed [Hieracium pilosella]. Where chalk comes close to the surface the grassland is covered by anthills and contains frequent Wild Thyme [Thymus drucei] and Cowslip [Primula veris].

A small stream with good marginal and aquatic vegetation passes through the site. This stream is the main outlet for water from the site and the water level in it is close to that of the surrounding land surface.

Additional diversity is provided by a series of small wet hollows along the southern margin of the site, many of which contain standing water. These support a rich flora including Gipsywort [Lycopus europaeus], Water Forget-me-not [Myosotis scorpioides], Greater Tussock Sedge and two locally uncommon species, Bogbean [Menyanthes trifoliata] and Marsh Cinquefoil [Potentilla palustris].

Secondary woodland and scrub have developed on several marginal areas. On drier parts this consists mainly of Oak, Sycamore and Birch and is species-poor. Wetter parts support Willow and Alder Carr. These areas are floristically much more diverse. The understorey contains a mixture of Wild Privet [Ligustrum vulgare], Alder Buckthorn [Frangula alnus], Buckthorn [Rhamnus catharticus] and Guelder Rose [Viburnum opulus]. The ground flora includes many characteristic wet woodland fen species.

The whole of the notified area is a hydrological unit. The marginal habitats ensure that the water-table in the centre of the site remains fairly constant and that the water which supplies it is relatively unpolluted. The diversity of habitats on the site also means that it has a rich bird and invertebrate fauna. The fen is particularly noted as a breeding place for Water Rail and Reed Warblers, and supports large numbers of Dragon and Damselflies.

COUNTY: West Suffolk

SITE NAME: WESTON FEN

DISTRICT: St Edmundsbury

Status: Site of Special Scientific Interest [SSSI] notified under
Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: St Edmundsbury Borough Council

National Grid Reference: TL 981787

Area: 48.6 [ha] 120.1 [ac]

Ordnance Survey Sheet 1:50,000: 144

1:10,000 : TL 97 NE

Date Notified [Under 1949 Act]: 1958

Date of Last Revision: 1972

Date Notified [Under 1981 Act]: 1986

Date of Last Revision: -

Other Information:

Most of the site is a nature reserve owned by The Suffolk Trust for Nature Conservation.

Reasons for Notification:

This site contains a very valuable example of a species-rich, spring-fed valley fen, with areas of fen grassland and relict heath. These are fringed by a wide variety of grassland scrub and woodland communities. Of all the fens in the Waveney/Ouse valley it has been least affected by drainage or water abstraction. The water-table remains high and stable throughout the year and this is reflected in the rich and varied flora of the site.

The species-rich fen community which occupies the central area is dominated by Saw Sedge [Cladium mariscus] and Reed [Phragmites australis] with abundant Blunt-flowered Rush [Juncus subnodulosus]. Other species include Black Bog Rush [Schoenus nigricans], Marsh Marigold [Caltha palustris], Grass of Parnassus [Parnassia palustris], Marsh Valerian [Valeriana dioica], Southern Marsh Orchid [Dactylorhiza praetermissa], Fragrant Orchid [Gymnadenia conopsea] and the locally rare Narrow-leaved Marsh orchid [D. traunsteineri]. The Greater Tussock Sedge [Carex paniculata] is prominent in parts of this area and there are also scattered patches of Sphagnum moss with Common Sundew [Drosera rotundifolia] associated with them. The locally rare Cowbane [Cicuta virosa] also occurs in these areas. The chalk springs feed into the fen on its western side and these seepage areas are very wet.

A smaller area of less species-rich, eutrophic fen occurs in the north eastern part of the site and the wetter parts of this are characterised by Great Reedmace [Typha latifolia], Yellow Iris [Iris pseudacorus] and Marsh Horsetail [Equisetum palustre].

Tall fen grasslands dominated by a variety of grasses, rushes and sedges cover low-lying ground in several of the surrounding meadows. Much of this is currently ungrazed and is often tall and rank. Soft Rush [Juncus effusus], Yorkshire Fog [Holcus lanatus], Hairy Sedge [Carex hirta] and Meadowsweet [Filipendula ulmaria] are the most abundant and widespread species. Reed Sweet Grass [Glyceria maxima] and Hard Rush [Juncus inflexus] are locally dominant. Other frequent species include Meadow Vetchling [Lathyrus uliginosus], Valerian [Valeriana officinalis] and Water Mint [Mentha aquatica].

Towards the edges of the site this type of vegetation merges into damp neutral grasslands. The drier parts, especially those that are under-grazed, are dominated by False Oat Grass [Arrhenatherum elatius]. The wetter areas in the south eastern parts of the site are dominated by Sweet Vernal Grass [Anthoxanthum odoratum], Yorkshire Fog and Red Fescue [Festuca rubra]. This area is grazed and is very species-rich. Species recorded include Large Bird'sfoot Trefoil [Lotus uliginosus], Yellow Rattle [Rhinanthus minor],

Oxfordshire			
Magdalen Quarry	Oxford City Council	0.4	1989
Rock Edge	Oxford City Council	2	1986
Tuckmill Meadows	Vale of Whitehorse DC	6.1	1991
Vicarage Pit, Stanton Harcourt	Oxfordshire County Council	9	1976
Shropshire			
Granville Country Park	Wrekin DC	13	1989
Town Park	Wrekin DC	90	1992
Somerset			
Chard Reservoir	South Somerset DC	41	1992
Eastfield Sedgemoor Hill, High Ham	South Somerset DC	7.46	1992
Screech Owl	Somerset CC	12.1	1973
Street Heath	Somerset CC	8.5	1973
South Yorkshire			
Carlton Marsh	Barnsley BC	14	1980
Sandall Beat, Doncaster	Doncaster BC	69	1966
Staffordshire			
Brocton	Staffordshire CC	49	1971
Hazel Slade	Cannock Chase DC	12.7	1985
Hodge Lane	Tamworth BC	2.58	1990
Suffolk			
Broom Hill, Hadleigh	Babergh DC	3.9	1988
Fen Alder Carr	Suffolk CC	2	1982
Landguard Common	Suffolk CC	24	1979, Ext. 1991
	Suffolk Coastal DC		
Railway Walk, Hadleigh	Babergh DC	12.9	1988
Riverside Walk, Hadleigh	Babergh DC	4.5	1988
Spring Wood, Belstead	Suffolk CC	5.6	1986
Sudbury Common Lands	Babergh DC	49	1990
Tiger Hill	Suffolk CC	22.12	1990

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May 1992



**Local Nature Reserves
in England
at March 1992**

Total number of LNRs: 277

National Nature Reserves:

Reserve Name	Region	Area (ha)	Status
Prescombe Down, Wiltshire	South	47	NRA
FA Ribble Marshes, Lancashire and Merseyside	North-West	4,026	O
Rodney Stoke, Somerset	South-West	35	O
Rostherne Mere, Cheshire	West Midlands	152	O/NRA
Roudsea Woods and Mosses, Cumbria (formerly Roudsea Wood)	North-West	388	L/NRA
Rusland Moss, Cumbria	North-West	24	O/L/NRA
Saltfleetby - Theddlethorpe Dunes, Lincolnshire	East	440	O/L IN
* Scott Head Island, Norfolk	East	737	L
Scoska Wood, North Yorkshire	North-East	10	O
Shapwick Heath, Somerset	South-West	304	O/L/NRA
Somerset Levels, Somerset	South-West	299	O
Stiperstones, Shropshire	West Midlands	447	O
Stoborough Heath, Dorset	South-West	109	O
Stodmarsh, Kent	South-East	163	O
Studland Heath, Dorset	South-West	631	L
Swanscombe Skull Site, Kent	South-East	2	O
Swanton Hovers Woods, Norfolk	East	79	NRA
Tarn Moss, Cumbria	North-West	16	L
The Flits, Hereford & Worcester	West Midlands	21	L
The Swale, Kent	South-East	220	O/L
✓ The Wash, Lincolnshire	East	97	L IN
Thetford Heath, Suffolk	East	94	NRA
Thornhill Moss and Meadows, Cumbria	North-West	12	O
Thursley, Surrey	South-East	325	O
Upper Teesdale, Durham	North-East	3,493	L/NRA
Upwood Meadows, Cambridgeshire	East	6	NRA IN
Walberswick, Suffolk	East	582	O/L/NRA IN
Westing Heath, Norfolk	East	137	NRA IN
* Westleton Heath, Suffolk	East	47	O NOT IN
Winterton Dunes, Norfolk	East	109	L/NRA IN
IN Woodwalton Fen, Cambridgeshire	East	208	L NOT
Wren's Nest, West Midlands	West Midlands	35	NRA
Wybunbury Moss, Cheshire	West Midlands	15	O
Wychwood, Oxfordshire	South	262	NRA
Wye, Kent	South-East	133	O
Wylve Down, Wiltshire	South	34	O
Wyre Forest, Hereford & Worcester	West Midlands	419	O/L/NRA
Yarner Wood, Devon	South-West	150	O

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 ✓ WARBOROUGH

handwritten notes:
 ✓ IN
 * NOT IN

Barnham Cross Common <i>ln</i>	Norfolk		
Bowthorpe Marsh <i>Not ln</i>	Norfolk CC	67	1986
Breydon Water <i>ln</i>	Norwich City Council	6	1989
Danby Wood <i>Not ln</i>	Norfolk CC	453	1968
Earlham Park Woods <i>Not ln</i>	Great Yarmouth BC		
Felmingham Cutting <i>Not ln</i>	Norwich City Council	3.5	1989
Knapton Cutting <i>X "</i>	Norwich City Council	8	1989
Lion Wood <i>X "</i>	Norfolk CC	1	1989
Litcham Common <i>+ "</i>	Norfolk CC	0.9	1990
Marston Marshes <i>X "</i>	Norwich City Council	9	1989
Southrepps Common <i>ln</i>	Norfolk CC	28	1984
South Walsham Fen <i>Not ln</i>	Norwich City Council	26	1989
	Norfolk CC	12.42	1990
	Broadland DC	1.5	1988
	North Yorkshire (see also West Yorkshire)		
Fairburn Ings	North Yorkshire CC (West Yorkshire CC)	250	1957
Farndale	North York Moors NP	1012	1955
	Northamptonshire		
Great Oakley Meadow <i>ln</i>	Corby DC	2.5	1990
Kingsthorpe <i>Not ln</i>	Northampton BC	15	1990, Ext. 1992
Kingswood <i>ln</i>	Corby DC	26.3	1984
Lings Wood <i>ln</i>	Northampton BC	22.7	1990
River Nene, Barnes Meadow <i>Not ln</i>	Northampton BC	0.4 km	1990
Titchmarsh (Meadow) <i>ln</i>	Northants CC	110	1989
	Northumberland		
Barrow Burn Wood	Northumberland CC	2.7	1983
Borough Woods	Castle Morpeth BC	11	1985
Davies Wood	Castle Morpeth BC	5.44	1989
Grasslees Burn Wood	Northumberland CC	5.6	1983
Scotch Gill Wood	Castle Morpeth BC	8	1985
	Nottinghamshire		
Daneshill <i>Not ln</i>	Nottinghamshire CC	50	1984
Martins Pond	Nottingham City Council	4	1976
Pleasley Vale	Mansfield DC	9.5	1984
Portland Park	Ashfield DC	10.2	1992
Sellers Wood	Nottingham City Council	14	1983
Sherwood Heath	Neward & Sherwood DC	55	1987
Teveral/Pleasley Railway Network	Nottinghamshire CC	10.5km	1988
Wilwell Cutting	Rushcliffe BC	8	1981

Reserve	Region	Hectares	Tenure	
Bridgwater Bay, Somerset	South-West	2,559	O/L/NRA	
Buckingham Thick Copse, Northamptonshire	East	45	L	X Not in
Bure Marshes, Norfolk	East	451	L/NRA	✓ In an SSSI
Cabin Hill, Merseyside	North-West	28	L	as Bure Marshes & Marshes
Castle Eden Dene, Durham	North-East	221	O	
Castle Hill, Lewes, East Sussex	South-East	47	L	
Castor Hanglands, Cambridgeshire	East	90	L	✓ IN
Cavenham Heath, Suffolk	East	204	O/L	✓ IN as Cavenham Heath
Chaddesley Woods, Hereford & Worcester	West Midlands	102	O	✓ IN as Chaddesley Woods
Chartley Moss, Staffordshire	West Midlands	42	L	
Chippenham Fen, Cambridgeshire	East	117	L	✓ IN
Clawthorpe Fell, Cumbria	North-West	14	NRA/O	
Collyweston Great Wood and Eastern Hornstocks Northamptonshire/Cambridgeshire	East	155	L	Collyweston Gt. Wood IN
Colne Estuary, Essex	East	576	L/NRA	✓ IN
Coom Rigg Moss, Northumberland	North-East	36	L	
Cothill, Oxfordshire	South	2	L	
Cotswold Commons and Beechwoods, Gloucester (formerly Workmans Wood)	West Midlands	341	O/NRA	
Dendles Wood, Devon	South-West	30	O	
Dengie, Essex	East	2,293	L	✓ IN
Derbyshire Dales, Derbyshire West	Midlands	324	O/L/NRA	
Derwent Gorge and Muggleswick Northumberland	North East	71	L	
Downton Gorge, Hereford & Worcester	West Midlands	48	L	
Ebber Gorge, Somerset	South-West	41	L	
Forge Valley Woods, North Yorkshire	North-East	63	NRA	
Fyfield Down, Wiltshire	South	248	L	
Gait Barrows, Lancashire	North-West	69	O	
Gibraltar Point, Lincolnshire	East	414	S35	(Lincolnshire and South Humberside Trust for NC)
Glasson Moss, Cumbria	North-West	58	O	
Golitha Falls, Cornwall	South-West	18	O	
Gordano Valley, Avon	South-West	66	L	
Goss Moor, Cornwall	South-West	482	O/L	
Gowk Bank, Cumbria	North-West	15	O	
Grain Heads Moss, Northumberland	North-East	18	L	
Hales Wood, Essex	East	8	L	Hales + ✓
Halsana Moss, Cumbria	North-West	22	O	

National Nature Reserves:

Reserve	Region	Hectares	Tenure
✓ Hamford Water, Essex	East	688	L IN ✓
Ham Street Woods, Kent	South-East	97	O
Hartland Moor, Dorset	South-West	243	O/L
✓ Hickling Broad, Norfolk	East	487	NRA ✓ <i>HICKLING BOD - HORSE PK RE</i>
Highbury Wood, Gloucestershire	West Midlands	47	O
High Halstow, Kent	South-East	52	NRA
High Leys, Cumbria	North-West	9	O
✓ Hog Cliff, Dorset	South-West	88	O
✓ Holkham, Norfolk	East	3,925	LNRA <i>Holkham Lake</i>
✓ Holme Fen, Cambridgeshire	East	259	O ✓ IN
Holt Heath, Dorset	South-West	488	L
Holton Heath, Dorset	South-West	117	L
Ingleborough, North Yorkshire	North-East	698	L/O
Kingley Vale, West Sussex	South-East	146	O/L
Knocking Hoe, Bedfordshire	East	9	NRA
Lady Park Wood, Gloucestershire	West Midlands	45	NRA
✓ Leigh, Essex	East	257	L <i>NOT IN</i>
✓ Lewes Downs, East Sussex	South-East	49	NRA <i>NOT IN</i>
Lindisfarne, Northumberland	North-East	3,278	L <i>NOT QUERIES</i>
Ling Gill, North Yorkshire	North-East	5	O
The Lizard, Cornwall	South-West	1,375	O/NRA
✓ Lower Derwent Valley, North Yorkshire/Humberside	North-East	419	O/NRA <i>not in (anyhow)</i>
✓ Ludham Marshes, Norfolk	East	73	O IN ✓
✓ Lullington Heath, East Sussex	South-East	63	L <i>NOT IN NOT QUERIES</i>
Martin Down, Hampshire	South	299	O/S.35/L (Hampshire County Council)
✓ Meccas Park, Hereford & Worcester	West Midlands	139	NRA
✓ Monks Wood, Cambridgeshire	East	157	O IN ✓
Moor House, Cumbria	North-West	3,894	O
Morden Bog, Dorset	South-West	149	L
Motley Meadows, Staffordshire	West Midlands	37	O/L
Muston Meadows, Leicestershire	East	9	NRA
Newham Bog, Northumberland	North-East	13	L
North Fen, Cumbria	North-West	2	L
North Meadow, Cricklade, Wiltshire	South	45	O
North Solent, Hampshire	South	763	NRA
North Walney, Cumbria	North-West	144	L
Old Winchester Hill, Hampshire	South	63	O
✓ Orfordness - Havergate, Suffolk	East	228	O/NRA IN ✓
✓ Park Wood, Cumbria	North-West	15	O
✓ Parsonage Down, Wiltshire	South	276	O
✓ Pevensey Levels, East Sussex	South-East	52	O

DISTRICT: SOUTH NORFOLK

Parish	County No.	Monument title	Grid Ref.
Bawburgh	183	Two garden houses near the Hall	TG 157 088 TG 157 087
Bawburgh	348	Bawburgh Bridge	TG 156 087
Bixley	213	'Woodhenge', Arminghall	TG 239 060
Bixley (Trowse-with- Newton)	243	Arminghall, sites discovered by air photographs	TG 243 054 TG 240 059 TG 241 061 TG 239 061
Broome (Ditchingham)	152	Long barrow and round barrows on Broome Heath	TM 344 913 TM 343 910
Caistor St Edmund	148	Roman town (site of) Venta Icenorum	TG 231 035
Caistor St Edmund	234	Anglo Saxon cemetery	TG 235 032
Caistor St Edmund	235	Anglo Saxon cemetery SW of Markshall Farm	TG 229 039
Caistor St Edmund	244	Roman sites outside Town Walls	TG 240 040 TG 235 036 TG 234 037
Caistor St Edmund	245	Sites discovered by air photography at Markshall	TG 234 044 TG 234 045 TG 224 042 TG 225 043 TG 232 053
Carleton St Peter Chedgrave (Langley with Hardley) (Thurton)	151	Langley Cross	TG 347 006
Claxton	149	Claxton Castle	TG 335 037
Cringleford	205	Cringleford Bridge See also: Norwich City: Norwich	TG 200 059

ENGLISH
NATURE

**National Nature Reserves:
distribution, area and tenure**

This is a list of the 135 nature reserves declared in England up to 31 March 1992 by English Nature or its predecessors under Section 1 of the National Parks and Access to the Countryside Act 1949 or Section 35 of the Wildlife and Countryside Act 1981.

Further information about NNRs and access to them can be obtained from the appropriate Regional Office.

O = owned L = leased NRA = Nature Reserve Agreement

S.35 = Land held and managed by an approved body and declared under Section 35 (1)(c) of the Wildlife and Countryside Act 1981.

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Reserve	Region	Hectares	Tenure
Ainsdale Sand Dunes, Merseyside	North-West	492	O
Aqualate Mere, Staffordshire	West Midlands	192	L
Arne, Dorset	South-West	9	O
Asby Scar, Cumbria	North-West	166	O
Ashford Hill, Hampshire	South	20	O
Aston Rowant, Oxfordshire	South	111	O/L/NRA
Avon Gorge, Avon	South-West	63	NRA
Armouth - Lyme Regis Undercliffs, Devon	South-West	321	O/L/NRA
Barnack Hills and Holes, Cambridgeshire	East	23	L
Barrington Hill, Somerset	South-West	18	O
Barton Hills, Bedfordshire	East	44	L
Beacon Hill, Hampshire	South	30	O
Benacre, Suffolk	East	232	NRA
Blackwater Estuary, Essex	East	1,031	L/NRA
Blean Woods, Kent	South-East	90	O
Blitham Bog, Cumbria	North-West	2	L
Bovey Valley Woodlands, Devon	South-West	73	O/L
Brantton Burrows, Devon	South-West	604	L
Bredon Hill, Hereford & Worcester	West Midlands	36	O
Brettenham Heath, Norfolk	East	236	L

** NOT IN*

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DISTRICT: SOUTH NORFOLK

Parish	County No.	Monument title	Grid Ref.
Tasburgh	211	Camp in village	TM 202 960 TM 200 960 TM 201 958
Thurton (Carleton St Peter) (Chedgrave) (Langley with Hardley)	151	Langley Cross	TG 347 006
Trowse-with- Newton (Bixley)	243	Arminghall, sites discovered by air photographs	TG 243 054 TG 240 059 TG 241 061 TG 239 061
Wicklewood	327	Romano-Celtic temple 700yds (640m) SE of St James's Church, Crownthorpe	TG 088 029
Wymondham	130	Market cross	TG 112 014
Wymondham	131	Wymondham Abbey	TG 107 014
Wymondham	133	Moot Hill	TG 126 018

DISTRICT: SOUTH NORFOLK

Parish	County No.	Monument title	Grid Ref.
Denton	135	Castle Hill, Hangman's Hill and adjoining earthworks, Darrow Green	TM 264 894 TM 265 894 TM 265 895
Ditchingham (Broome)	152	Long barrow and round barrows on Broome Heath	TM 344 913 TM 343 910
Ditchingham	282	Earthwork on Broome Heath	TM 342 912 TM 343 912
Hethersett	189	Two tumuli in Big Wood	TG 181 049 TG 183 049
Ketteringham	264	Two round barrows near Norwich Lodge, Ketteringham Hall	TG 173 034 TG 173 034
Kimberley	191	Forehoe Hills, tumuli in Forehoe Wood near Carleton Forehoe	TG 081 055 TG 080 054
Kimberley	253	Moated site of Old Hall	TG 076 041
Kimberley	254	Moated site in Gelham's Wood	TG 091 053
Langley with Hardley	32	Hardley Cross	TG 401 012
Langley with Hardley	150	Langley Abbey	TG 362 028
Langley with Hardley (Carleton St Peter) (Chedgrave) (Thurton)	151	Langley Cross	TG 347 006
Loddon	301	Moated site, Hales Hall	TM 368 961
Newton Flotman Saxlingham Nethergate	210	Newton Flotman Bridge	TM 212 979
Starston	338	Wind pump	TM 233 844

DISTRICT: MID SUFFOLK

Parish	County No.	Monument title	Grid Ref.
Bacton	150	Russell's Hill moated site	TM 058 647
Badley	135	Chantry (site of)	TM 062 558
Brome	221	Moated site SE of St Mary's Church	TM 146 764
Coddenham	89	Baylham Roman site	TM 113 531 TM 115 527
Eye	6	Eye Castle	TM 148 738
Eye	199	Eye Priory guest house	TM 152 740
Eye	204	Barn at Rook Hall	TM 133 727
Finningham Gislingham	149	Earthwork in Cromwell's Plantation	TM 045 714
Framsden	166	Moated site 1/2 mile (800m) SW of Moat Farm	TM 216 586
Framsden	223	Moated site S of Basting's Hall	TM 205 577
Great Ashfield	175	Castle Hill motte	TL 991 675
Great Ashfield	225	Cross in grounds of Ashfield House	TL 999 681
Great Bricett	56	Great Bricett moated site	TM 037 506
Haughley	29	Haughley Castle	TM 025 624
Mendham	68	Mendham Priory	TM 261 818
Occold	196	Moated site NE of Occold Hall	TM 150 708
Offton	57	Offton Castle	TM 065 491
Redlingfield	216	Redlingfield nunnery	TM 186 706
Ringshall	58	Chapel Farm moated site	TM 047 516
Stowlangtoft	176	Moated site in Round Grove	TL 964 678
Woolpit	201	Lady's Well (Holy well and moat)	TL 976 626