ENGLISH NATURE

An investigation into waterbodies of the Norfolk hinterland of the Wash

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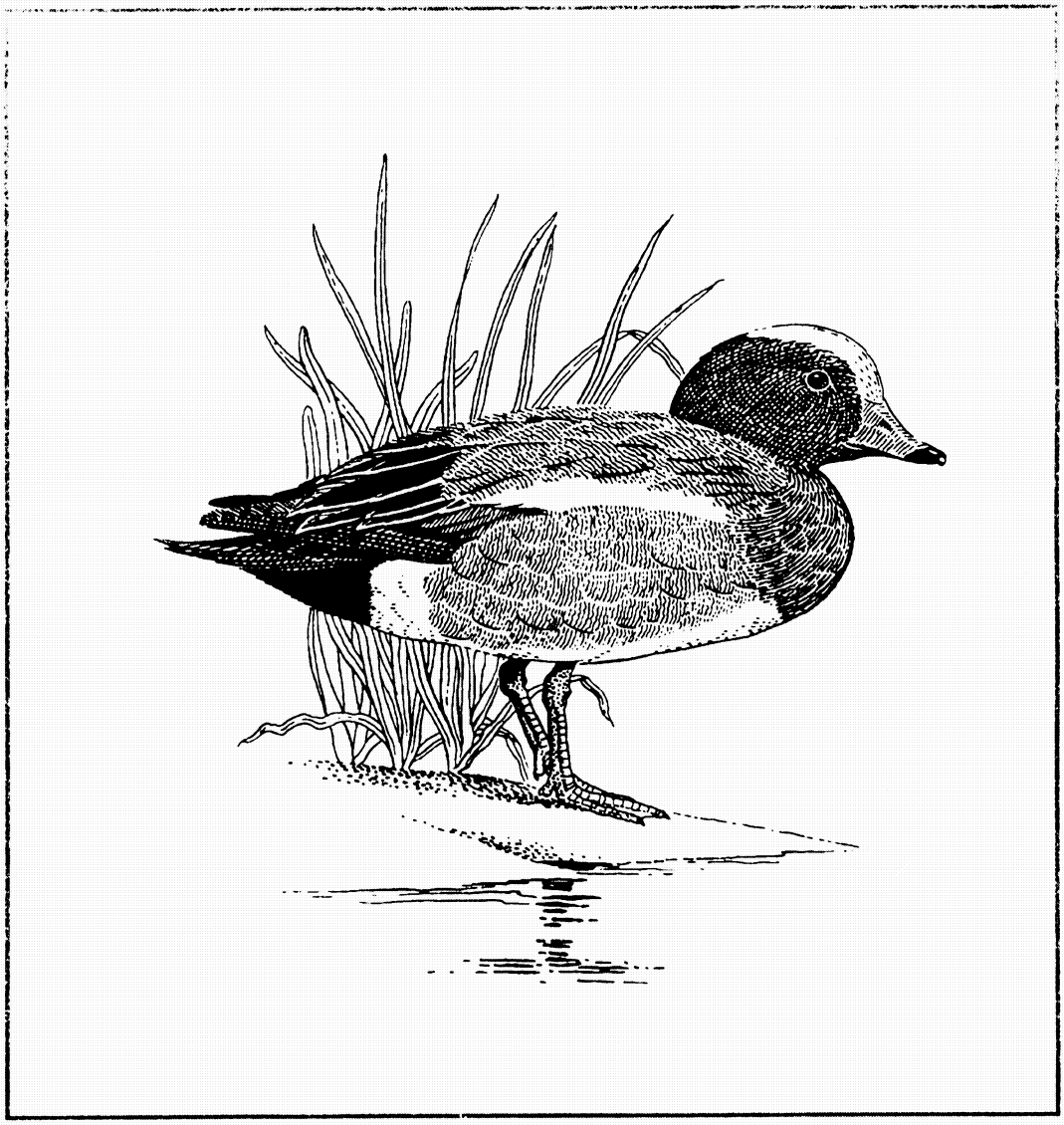

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Wash Human Interaction Studies Group

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An Investigation into Waterbodies of the Norfolk Hinterland of The Wash

by
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September 1999

For

British Association for Shooting and Conservation Ltd
Wash Estuary Strategy Group
Wash and North Norfolk Coast Special Area of Conservation
Wash Wildfowlers Working Group

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ABSTRACT

The internationally important Wash estuary is the subject of a number of conservation designations primarily for its waterfowl and marine life interest. These designations carry a variety of management obligations, one of which is to monitor waterfowl feeding and roosting and any activities which may have a detrimental impact on them.

One possible factor was the number and type of waterbodies used by waterfowl in the hinterland of the Wash. Difficulties in locating them on the ground led to the trialing of existing aerial photography to identify and categorise them as well as to determine changes over time.

Use of aerial photography from 1946, 1983 and 1993-5, supported by Ordnance Survey maps, enabled 376 waterbodies to be identified in the Norfolk hinterland of the Wash from Hunstanton to the county boundary. The main changes observed related to the loss of smaller waterbodies as agricultural practices have changed. It was not possible to identify uses made of the waterbodies.

The study demonstrated the potential of the cost-effective use of aerial photography to identify and monitor waterbodies which may be important to waterfowl.

1. INTRODUCTION

A need for improved data on bird distributions around the Wash was identified during the preparation of the Wash Estuary Management Plan. More recently the Wash was designated as a European Marine Site, consisting of both a Special Area of Conservation and a Special Protected Area. The development of a Scheme of Management required English Nature to gather information on bird feeding and roosting sites and on any activities which might have a significant detrimental impact on them.

An initial consultation document containing a list of possible studies was prepared for English Nature, Royal Society for the Protection of Birds and British Trust for Ornithology in September 1997. Discussions by these and other interested parties, including the British Association for Shooting and Conservation, the Wash Estuary Strategy Group and the Wash Wildfowlers' Working Group, resulted in agreement on an amended list of studies to go ahead in 1998 under the general title of Waterfowl and Human Interaction Studies, supported by LIFE funding via the Wash and North Norfolk Coast candidate Special Area of Conservation.

During these discussions, the opinion was expressed that the number of waterbodies in the Wash hinterland was increasing. Anecdotally, it seemed that the number of farm reservoirs, flight ponds and amenity or fishing ponds was increasing and that these might well have an effect on the populations of waterfowl on the Wash. Similar concerns had been voiced elsewhere in the Wash and North Norfolk Coast Special Area of Conservation. Difficulties in locating, accessing and describing hinterland waterbodies on the ground led to the idea within the Wash Wildfowlers Working Group of using existing aerial photography as a means of meeting the study's objectives. In particular the method would enable changes over time to be quantified. It was recognised that it would not enable the uses of the waterbodies to be identified, by either waterfowl or humans, with any certainty. It offered, however, a promising and cost-effective means of quickly quantifying the numbers, locations, types and changes in hinterland waterbodies, as a pre-requisite for any more detailed studies, based on ground work, that might be deemed necessary. The method was developed in consultation with Derek Edwards of the Archaeology Department, Norfolk Museums Service. The Wash Estuary Strategy Group recognised the broader significance of this study for the nature conservation interest of the Wash hinterland and the Wash Biodiversity Action Plan process.

A steering group comprising the British Association for Shooting and Conservation and the funding partners was established to advise on the study. The work was carried out in the autumn of 1999.

Funding was provided by the Wash Estuary Strategy Group, the Wash and North Norfolk Coast Special Area of Conservation (LIFE), and the Wash Wildfowlers' Working Group.

The study was prepared and managed by the British Association for Shooting and Conservation. Brian Cushion, an archaeological and cartographical surveyor, with considerable experience in photo-interpretation and many years work at Ordnance Survey and then the Norfolk Museums Service, Archaeology Department, was contracted to undertake this work.

2. AIM

To investigate the waterbodies of the Norfolk hinterland of the Wash.

3. OBJECTIVES

To determine the numbers of waterbodies in the Norfolk hinterland of the Wash (Hunstanton to the county boundary).

To assess the size, shape, location and associated vegetation of these waterbodies.

To quantify changes in the numbers, types and sizes of waterbodies in the Norfolk hinterland of the Wash since 1946.

4. METHODOLOGY

This consisted of inspection of three sets of air photographs, in conjunction with the Ordnance Survey 1:10000 maps.

a) 1946 air photographs. These were taken by the RAF and are black and white at a scale of approximately 1:10560. They are held by the Air Photo Library of the Landscapes Archaeology Section of the Norfolk Museums Service at Gressenhall.

b) 1988 air photographs. Taken for Norfolk County Council by BKS Surveys. These are in colour at a scale of approximately 1:10000. They are held by Norfolk County Council Planning and Transportation Department.

c) 1993-95 air photographs. These were taken for the National Remote Sensing Centre and are in colour at a scale of approximately 1:25000. They are held at both the above locations.

The Ordnance Survey maps were made available by English Nature and the Landscape Archaeology Section of the Norfolk Museums Service.

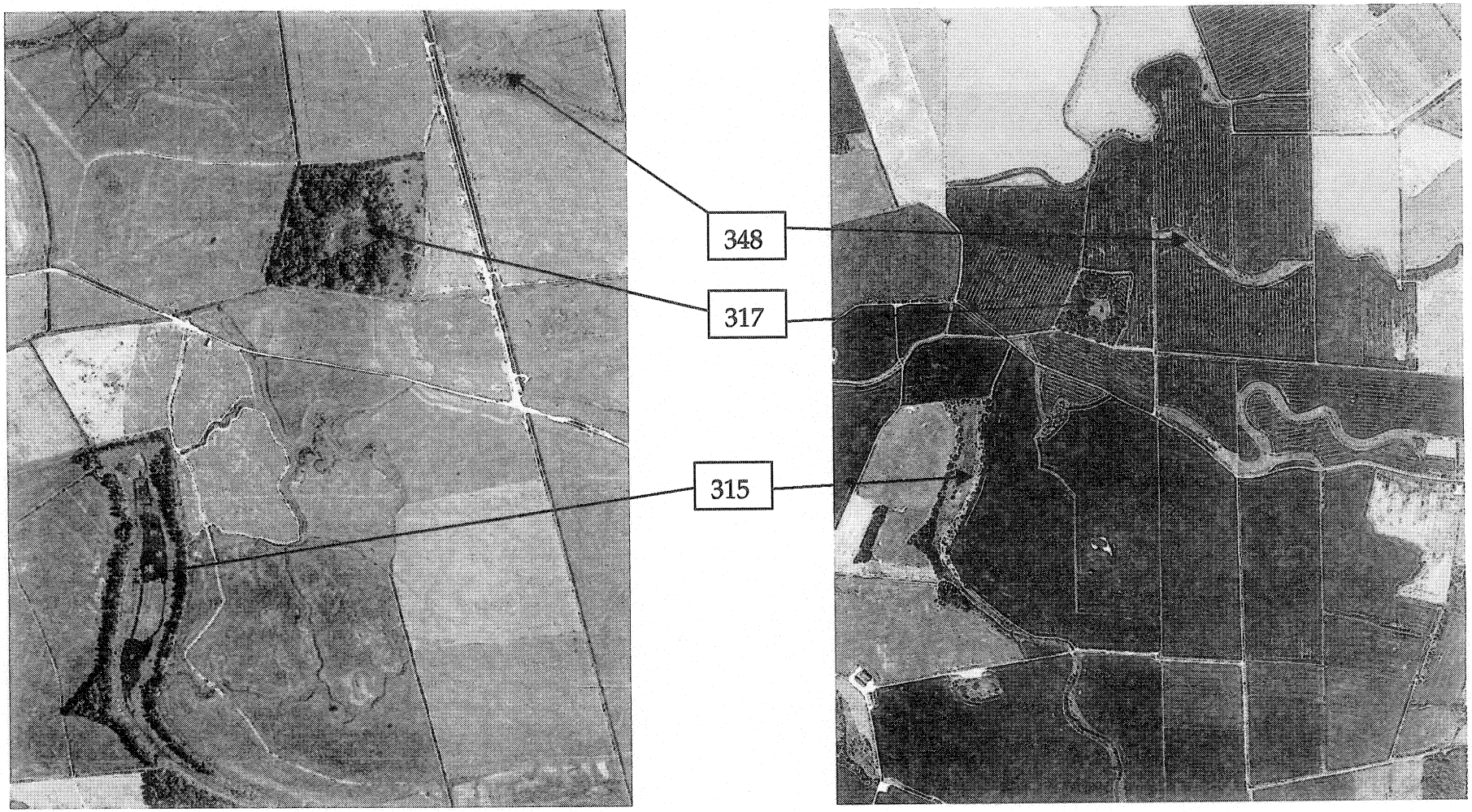
Inspection of the maps and photographs took place as appropriate at Gressenhall and English Nature, Norwich.

The original intention was to cover an area up to 5km above the high water mark, but this was extended after discussion with the British Association for Shooting and Conservation and the funding partners to the area shown in Figure 1, a total of 210.6 km^2. This extension allowed the complete area of Norfolk within the Wash Biodiversity Action Plan boundary to be studied. This, and any future extension of the study to the Lincolnshire Wash hinterland, provides information regarding the freshwater habitats and their potential contribution to the Wash Biodiversity Action Plan progression.

The national grid reference of each waterbody, along with its size, shape, location in terms of land use, surrounding vegetation density and any indication of islands were tabulated, according to criteria agreed with the funding partners. Size was categorised into three classes from small, at less than 200m^2, to large at over 1ha. Shape consisted of three classes from regular to linear. Location was defined by six descriptions, such as agricultural or natural and semi-natural vegetation. Vegetation density varied from heavily vegetated to no vegetation. Islands were denoted merely by their presence or absence. The details are given in the Appendix.

Figure 1. Extent of study area

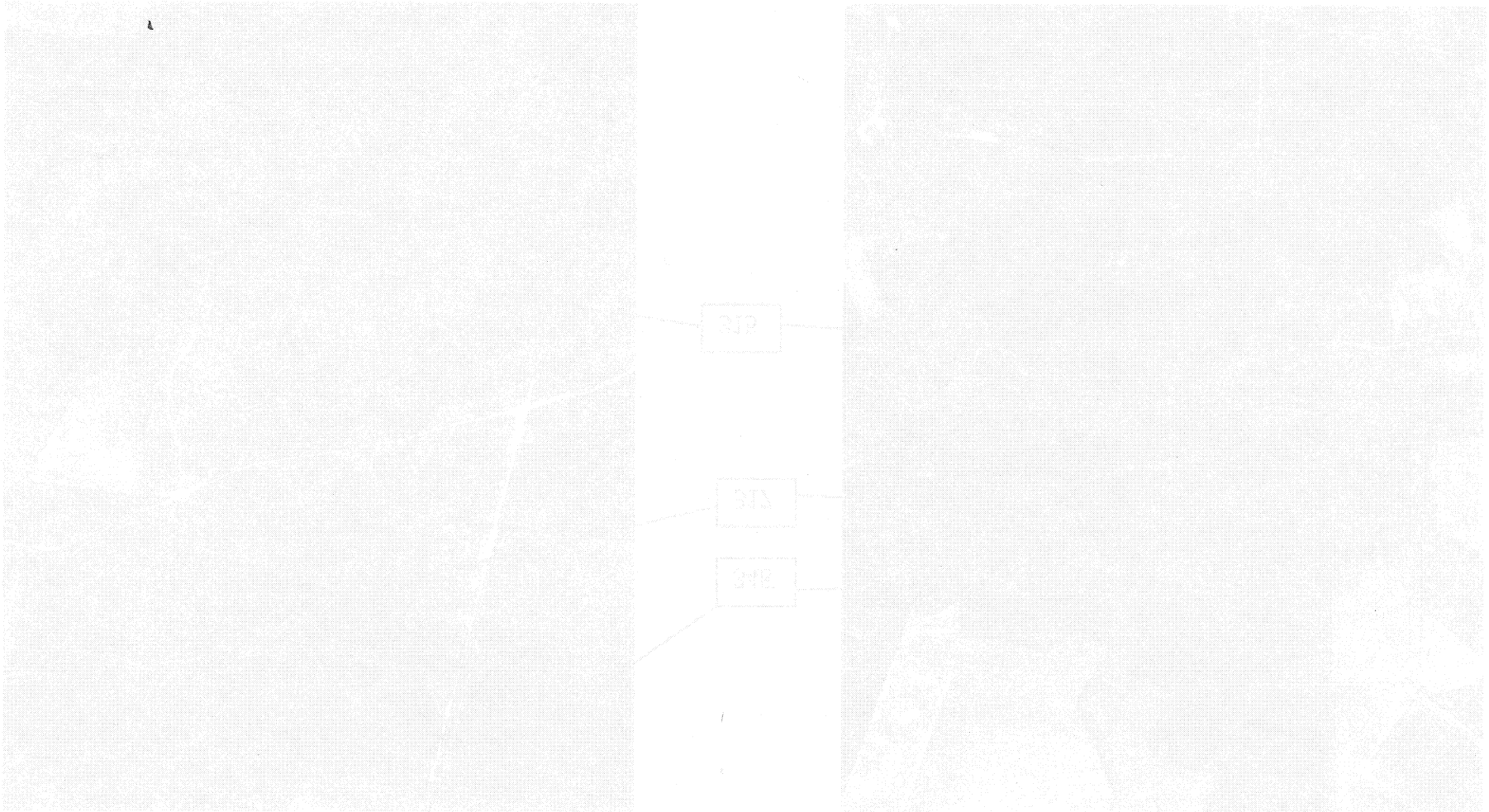
By way of illustration Figure 2 shows three waterbodies as seen on the 1946 and 1993 air photographs. Two (no. 315 and 317) are large ponds, one linear and the other irregular in shape, in woodland, with heavy vegetation and islands, while the third (348) is smaller and located in agricultural land.



106G/UK 1606. 27 Jun 46 F/36"//540 SQDN 1260 Crown Copyright

Photo no 20 95 223 by UK Perspectives.com

Figure 2. Example air photographs from 1946 and 1993 showing three waterbodies


ЗЛР
ЗЛА
ЗНЕ

5. RESULTS

The raw data, by 1:10000 Ordnance Survey sheet numbers, are presented in the Appendix.

A total of 376 waterbodies were recorded, of which 322 were noted in 1946, 270 in 1988 and 271 in 1993-5.

The overall reduction since 1946 seems largely a result of changes in the area to the west of the Great Ouse, and will be more fully discussed later.

The numbers recorded inevitably reflect some masking of changes as a result of loss and creation of waterbodies in the various categories.

Each of the categories of waterbodies has been tabulated to provide a summary of the numbers and percentages from each set of aerial photographs. A brief analysis of these statistics then follows.

SIZE	1946		1988		1993/5	
	Number	%	Number	%	Number	%
Large	19	6	22	8	22	8
Medium	173	54	171	63	174	64
Small	130	40	77	29	75	28
Totals	322		270		271	

The major change to note here is the considerable reduction in the numbers and resulting percentages of small waterbodies. This reflects considerable in-filling of field and farm ponds since 1946, due to the change to larger arable fields as well as the reduction in small pastures near to farms. It is particularly noticeable in the area to the west of the Great Ouse, where a reduction in both small and medium size waterbodies is pronounced. Overall, medium sized waterbodies have increased in most other areas. Of the 47 new waterbodies identified in 1988, four were small, 39 were medium and four were large, whilst of the nine newly identified in 1993-5, two were small and seven were medium. A very small number of waterbodies changed size category in the period of study.

these areas, along with a few new ones. The latter includes ornamental ponds within parkland at the Sports Centre in Kings Lynn.

The true urban waterbodies have changed little, whilst those in natural/semi-natural areas have increased, partly a result of a specific instance of woodland clearance.

VEGETATION DENSITY	1946		1988		1993/5	
	Number	%	Number	%	Number	%
Heavy	60	18	76	28	77	28
Some	102	32	98	36	95	35
None	160	50	96	36	99	37
Totals	322		270		271	

The increase in those waterbodies with a heavy vegetation cover may reflect a lack of management of many of the small and medium sized ponds remaining on agricultural land. The decrease in those with no cover appears to reflect the reduction in those formerly on agricultural land.

ISLANDS	1946		1988		1993/5	
	Number	%	Number	%	Number	%
Present	20	6	42	16	44	16
Absent	302	94	228	84	227	84
Totals	322		270		271	

Those waterbodies where islands were present in 1946 were usually in parkland or woodland. Some are noted at Shepherds Port (TF63SW), where large ponds, formerly partially tidal, have fluctuated in form.

Some of the newer waterbodies with islands appear to have been constructed for various amenity functions.

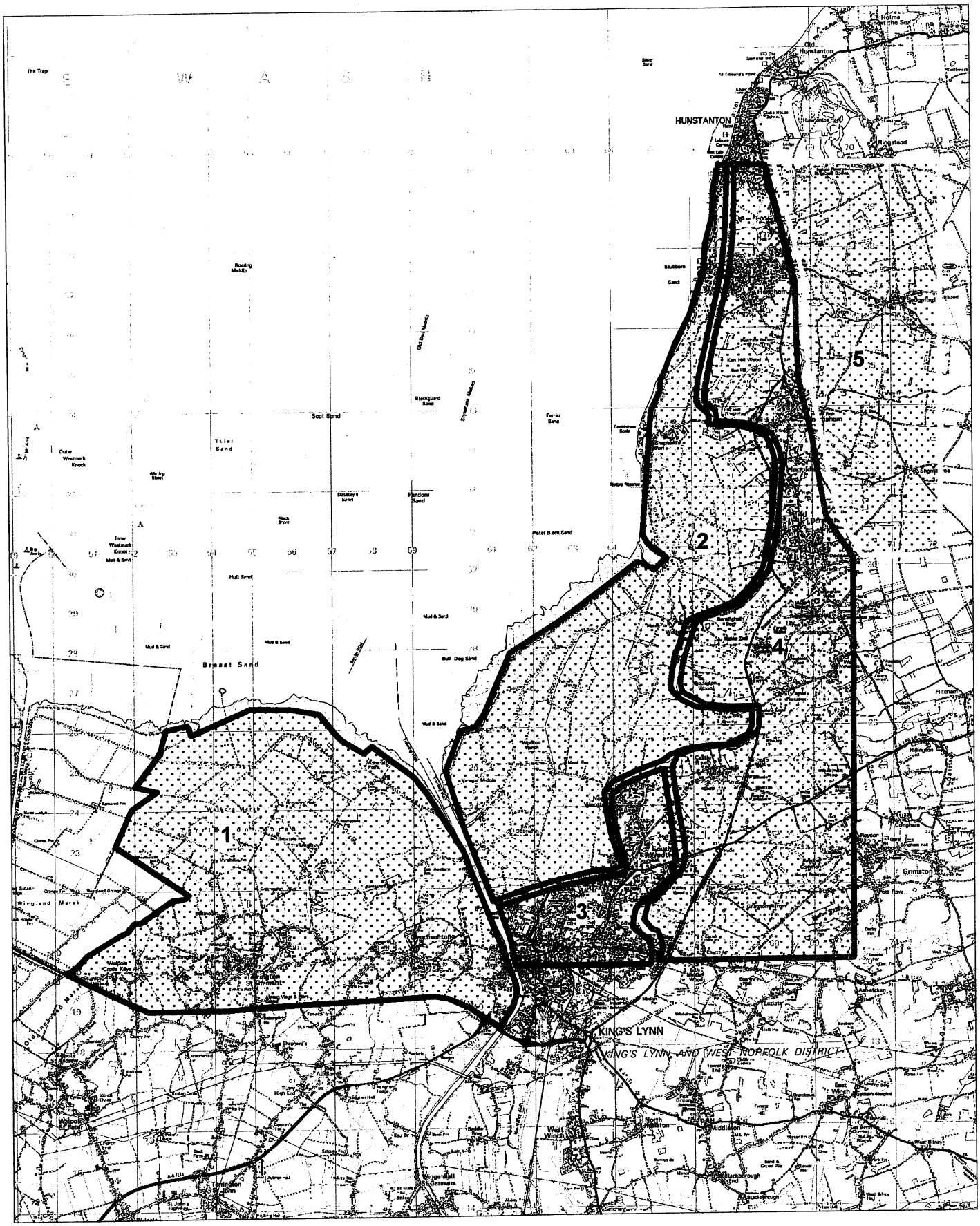


Figure 3. Geographical/landscape zoning of study area

waterbodies, as well as affecting the changes that have happened since 1946.

already been noted, providing a considerable range of types of waterbody in this area.

Zone 3
The urban areas of Kings Lynn and North Wootton (parts of Ordnance Survey sheets TF62SW and SE).

No major surprises were encountered in this area, with some incorporation of agricultural land into it. The new ponds at the Sports Centre (waterbodies 191-194) are perhaps the most noteworthy additional features.

Zone 4
The Greensand Belt extending with variable width to the east of the drained marshland (most of the Ordnance Survey sheets TF62NE and SE, and parts of TF63NE and SE).

This contains several sizeable villages and the greatest expanse of woodland, heathland and parkland in the study area. Several valleys cut through the escarpment from the east. The area contains almost all the locations within woodland on all air photographs, and several of those on semi-natural land. Several field and farm ponds remain, less in-filling having occurred here than to the west. This may reflect the land management and/or the original function of the ponds, as many of them may be deeper pits dug for sand or clay, and thus less likely to be readily in-filled. At least two new farm reservoirs are noted in this area as well as several new probable amenity waterbodies. The continuing presence of many waterbodies in the non-urban categories may well be due to the number of more traditional landed estates in this area.

Zone 5
The chalk escarpment (parts of Ordnance Survey sheets TF63NE and SE, and TF73NW and SW).

Because of the porosity of the chalk, inevitably this area has limited scope for surface water except in the river valleys which cut through it. Only one pond was noted adjacent to farm buildings on the chalk upland in 1946, apparently in-filled by 1988. Several new ponds are noted in the valleys including one probable reservoir and at least two probably for amenity purposes.

The vegetation density is mostly straightforward, but one point perhaps requires clarification. Several features were classified as heavily vegetated but located within agricultural land. This was deemed justified if there was a complete surround of overhanging vegetation.

In an ideal world, air photographs of the same scale and format would be inspected. A more equal time gap between the photographs would also be preferable as would a more recent set of photographs. However, it is suspected that the present study had as good a representation as one is likely to find, especially given the availability of two sets in one location, and the excellent arrangements for access to them by the two sources. It would certainly be less efficient to have the photographs scattered in several locations and would inevitably add to cost and possibly lose some continuity of approach.

The 1988 photographs were undeniably the easiest to use, given their larger scale and colour.

The experience of any contractor in the interpretation of varying types of photographs has to be a major factor in any future study of this type.

The sub-division of the recorded waterbodies into the various categories was the prerogative of the various funding bodies, and probably produced as fair a reflection of their type as could be expected.

7. RECOMMENDATIONS

The methodology employed in this study is considered a sound format upon which to base other comparative studies over a significant time scale.

The air photography, however, may not be as easily available as for this study and considerable additional costs may well have to be considered if the photography is more geographically spread.

Any study using this type of small scale photography would be best undertaken by someone with specialist knowledge and experience of both photography and the comparable Ordnance Survey mapping. The black and white photography particularly justifies the greater need for an experienced interpreter.

ACKNOWLEDGEMENTS

The excellent co-operation of Derek Edwards of Norfolk Landscape Archaeology and Barry Wilkinson of the Planning and Transportation Department of Norfolk County Council, in facilitating access to the air photographs, is much appreciated.

Thanks are also due to staff at English Nature in Norwich, for providing office accommodation and hospitality during the inspection of the 1988 photographs, for providing the expertise to produce the maps within the report, and for help in the final stages of report production.

Dr John Harradine and Patrick Green of the British Association for Shooting and Conservation for managing the study and their advice at various stages during it.

The various funding partners:

The Wash Estuary Strategy Group
The Wash and North Norfolk Coast Special Area of Conservation (LIFE)
The Wash Wildfowlers Working Group

APPENDIX

This sets out in 1:10000 Ordnance Survey sheet areas the raw data gained from the inspection of the air photographs.

Key

The numbers in the first column are consecutive throughout. National grid reference is to the nearest 100 metres, by tradition that inter-section to the SW of the feature. Dashes denote no evidence for waterbody at that date.

Column marked 1 denotes SIZE:

S = Small	less than $200m^2$
M = Medium	between $200m^2$ and $10,000m^2$ (1 ha)
L = Large	over 1 ha

Column marked 2 denotes SHAPE:

R = Regular or smooth sides
I = Irregular sides
L = Linear features, e.g. channels or watercourses

Column marked 3 denotes LOCATION:

W = Woodland
A = Agricultural
S = Semi-urban
U = Urban
F = Farmstead, close to buildings
N = Natural and semi-natural vegetation, including heath, common and rough ground

Column marked 4 denotes VEGETATION DENSITY:

H = Heavily vegetated
S = Some vegetation
N = No vegetation

Column marked 5 denotes ISLANDS:

P = Island(s) present
A = Island(s) absent

1:10000 Sheet number.... TF52SW

No	NG Ref		1946					Remarks
	E	N	1	2	3	4	5	
8	5360	2190	M	L	A	N	A	
9	5280	2250	S	R	F	N	A	
10	5280	2270	S	R	F	N	A	
11	5290	2290	M	L	A	N	A	
12	5300	2420	M	L	A	N	A	
13	5320	2420	M	L	A	N	A	
14	5340	2430	M	R	F	N	A	
15	5310	2420	S	R	A	N	A	
16	5230	2400	S	R	A	N	A	
17	5250	2370	S	R	A	N	A	
18	5320	2330	S	R	F	N	A	
19	5370	2320	M	I	A	N	A	
20	5380	2440	S	R	A	N	A	
21	5440	2290	S	R	A	N	A	
22	5460	2300	M	R	A	N	A	
23	5280	2300	S	I	F	S	A	
24	5370	2020	S	I	A	N	A	
25	5270	2130	S	R	A	N	A	
26	5290	2350	S	R	A	N	A	
27	5270	2130	-	-	-	-	-	
28	5490	2250	-	-	-	-	-	
29	5120	2020	S	I	A	N	A	
30	5130	2010	M	I	A	N	A	
31	5200	2000	S	I	A	S	A	
32	5330	2000	M	I	A	S	A	
33	5360	2020	M	R	A	N	A	
34	5360	2020	S	R	A	N	A	
35	5380	2020	S	I	F	S	A	
36	5450	2050	S	I	S	S	A	

No	NG Ref		1988					Remarks
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8	5360	2190	M	L	A	N	A	
9	5280	2250	-	-	-	-	-	
10	5280	2270	-	-	-	-	-	
11	5290	2290	-	-	-	-	-	
12	5300	2420	-	-	-	-	-	
13	5320	2420	-	-	-	-	-	
14	5340	2430	-	-	-	-	-	
15	5310	2420	-	-	-	-	-	
16	5230	2400	-	-	-	-	-	
17	5250	2370	-	-	-	-	-	
18	5320	2330	-	-	-	-	-	
19	5370	2320	-	-	-	-	-	
20	5380	2440	-	-	-	-	-	
21	5440	2290	-	-	-	-	-	
22	5460	2300	S	I	A	S	A	
23	5280	2300	S	I	F	S	A	
24	5370	2020						

1:10000 Sheet number.... TF52SE

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39	5560	2400	S	R	F	N	A	
40	5620	2220	M	R	F	N	A	
41	5640	2290	M	R	A	N	A	
42	5670	2240	M	R	F	N	A	
43	5670	2160	M	R	A	N	A	
44	5670	2140	M	R	A	N	A	
45	5610	2400	M	I	A	N	A	
46	5580	2420	S	R	A	N	A	
47	5680	2460	S	I	A	N	A	
48	5720	2480	S	I	A	N	A	
49	5750	2450	M	I	F	N	A	
50	5760	2190	M	R	F	N	A	
51	5650	2320	M	R	A	N	A	
52	5730	2330	M	I	F	S	A	
53	5800	2210	M	R	A	N	A	
54	5840	2420	M	R	A	N	A	
55	5790	2430	M	I	A	N	A	
56	5800	2430	M	I	A	N	A	
57	5800	2460	S	R	F	N	A	
58	5800	2450	S	I	F	N	A	
59	5820	2420	S	I	A	S	A	
60	5820	2470	M	I	A	N	A	
61	5830	2050	M	I	F	N	A	
62	5850	2060	S	R	F	N	A	
63	5850	2040	M	R	S	H	A	
64	5810	2190	M	I	A	N	A	
65	5830	2210	M	R	F	H	A	
66	5840	2080	M	I	A	N	A	
67	5920	2080	M	R	A	N	A	
68	5920	2240	M	I	A	N	A	
69	5880	2360	M	R	A	N	A	
70	5910	2380	M	R	F	N	A	
71	5880	2020	S	R	S	S	A	
72	5860	2220	M	R	A	N	A	
73	5930	2050	M	R	A	S	A	
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75	5960	2100	S	R	A	N	A	
76	5990	2050	S	I	F	N	A	
77	5940	2250	M	I	F	N	A	
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79	5950	2380	M	L	A	S	A	
80	5540	2100	M	I	F	S	A	
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84	5560	2020	S	I	A	S	A	
85	5760	2000	M	I	A	S	A	
86	5690	2260	M	L	A	S	A	
87	5590	2010	S	I	A	N	A	
88	5880	2000	M	I	A	S	A	

No	NG Ref		1993/95					Remarks
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39	5560	2400	-	-	-	-	-	
40	5620	2220	-	-	-	-	-	
41	5640	2290	-	-	-	-	-	
42	5670	2240	-	-	-	-	-	
43	5670	2160	M	R	A	H	A	
44	5670	2140	-	-	-	-	-	
45	5610	2400	M	I	A	N	A	
46	5580	2420	-	-	-	-	-	
47	5680	2460	-	-	-	-	-	
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68	5920	2240	-	-	-	-	-	
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70	5910	2380	-	-	-	-	-	
71	5880	2020	-	-	-	-	-	
72	5860	2220	-	-	-	-	-	
73	5930	2050	-	-	-	-	-	
74	5960	2090	-	-	-	-	-	
75	5960	2100	-	-	-	-	-	
76	5990	2050	S	I	S	H	A	
77	5940	2250	-	-	-	-	-	
78	5860	2430	-	-	-	-	-	
79	5950	2380	-	-	-	-	-	
80	5540	2100	S	I	S	H	A	
81	5980	2010	M	R	A	H	A	
82	5940	2010	-	-	-	-	-	
83	5520	2040	M	I	A	H	A	
84	5560	2020	S	I	A	S	A	
85	5760	2000	M	I	A	S	A	
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1:10000 Sheet number.... TF62NW (Cont.)

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92	6440	2530	M	I	A	H	A	
93	6420	2570	M	L	A	N	A	
94	6430	2720	-	-	-	-	-	
95	6480	2510	M	I	A	H	A	
96	6480	2520	S	I	A	S	A	
97	6480	2520	S	I	A	S	A	
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99	6490	2530	S	I	A	H	A	
100	6490	2530	S	I	A	H	A	
101	6390	2840	M	L	W	S	A	
102	6460	2630	M	L	A	N	A	
103	6440	2630	M	I	A	S	P	
104	6400	2760	M	I	A	N	P	
105	6440	2670	M	I	A	N	P	
106	6480	2900	S	I	A	N	A	
107	6440	2920	M	I	A	N	P	+
108	6440	2890	M	I	A	N	P	+
109	6220	2810	M	L	A	N	A	+
110	6370	2510	M	L	A	S	A	

Remarks: + indicates land reclaimed since 1946
* indicates Babingley River

1:10000 Sheet number.... TF62NE (Cont.)

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
111	6540	2560	M	L	A	N	A	
112	6580	2540	S	I	A	H	A	
113	6640	2590	L	L	A	N	A	*
114	6580	2650	S	I	A	S	A	
115	6570	2660	M	I	A	S	A	
116	6550	2690	M	I	A	S	A	
117	6540	2700	S	I	A	S	A	
118	6560	2790	M	I	F	H	A	
119	6510	2800	S	I	A	S	A	
120	6530	2850	M	I	F	S	A	
121	6550	2820	M	I	A	S	A	
122	6550	2830	M	I	A	S	A	
123	6560	2850	-	-	-	-	-	
124	6580	2850	S	I	A	N	A	
125	6600	2660	M	I	W	H	A	
126	6540	2930	M	I	N	S	A	
127	6540	2940	S	I	N	S	A	
128	6550	2980	S	I	N	S	A	
129	6680	2510	S	R	A	S	A	
130	6670	2530	M	I	W	H	A	
131	6710	2610	M	L	A	S	A	
132	6700	2620	M	L	F	S	A	
133	6710	2630	M	L	F	H	A	
134	6710	2620	M	I	A	N	A	
135	6710	2640	M	I	A	S	A	
136	6690	2630	-	-	-	-	-	
137	6650	2640	M	I	A	S	A	
138	6680	2660	M	I	A	S	A	
139	6660	2670	M	I	W	H	A	
140	6670	2710	M	I	W	H	P	
141	6720	2860	M	I	N	S	P	
142	6710	2900	M	I	N	S	P	
143	6830	2780	M	I	W	H	P	
144	6760	2810	S	I	W	H	A	
145	6920	2510	M	I	A	H	A	
146	6880	2530	L	L	A	S	A	*
147	6880	2610	S	I	A	S	A	
148	6920	2570	-	-	-	-	-	
149	6850	2670	M	I	W	H	P	
150	6900	2790	M	I	A	H	P	
151	6930	2800	M	I	A	S	P	
152	6950	2830	M	I	A	H	P	
153	6940	2860	M	I	A	H	P	
154	6980	2600	M	I	A	S	A	
155	6950	2790	-	-	-	-	-	
156	6860	2800	M	L	W	H	A	
157	6720	2620	M	I	A	N	A	
158	6880	2520	L	I	A	S	P	
159	6730	2620	M	I	A	N	A	
160	6690	2610	S	I	A	N	A	
161	6850	2780	S	R	W	H	A	
162	6930	2980	S	I	S	N	A	

Remarks: *indicates Babingley River

1:10000 Sheet number.... TF62SW

No	NG Ref		1946					Remarks
	E	N	1	2	3	4	5	
163	6010	2070	M	I	A	N	A	
164	6000	2170	S	R	A	N	A	
165	6030	2220	S	R	F	N	A	
166	6160	2060	L	R	U	N	A	Dock
167	6170	2090	L	R	U	N	A	Dock
168	6100	2170	S	I	A	N	A	
169	6120	2280	M	L	A	N	A	
170	6140	2470	M	L	A	N	A	
171	6230	2180	M	I	A	N	A	
172	6170	2300	M	L	A	N	A	
173	6170	2390	M	L	A	N	A	
174	6240	2470	M	L	A	N	A	
175	6280	2150	S	R	A	N	A	
176	6430	2250	M	I	A	N	A	
177	6420	2310	M	I	A	H	A	
178	6380	2330	M	I	A	H	A	
179	6390	2320	M	I	A	S	A	
180	6420	2360	M	I	A	S	A	
181	6420	2240	S	I	A	N	A	
182	6420	2450	S	I	A	N	A	
183	6400	2460	M	I	A	N	A	
184	6310	2470	M	L	A	N	A	
185	6460	2190	M	R	F	N	A	
186	6470	2200	S	I	A	H	A	
187	6480	2240	M	I	N	S	P	
188	6390	2410	M	R	S	S	A	*
189	6370	2110	L	L	U	S	A	
190	6250	2110	-	-	-	-	-	
191	6300	2080	-	-	-	-	-	
192	6300	2090	-	-	-	-	-	
193	6320	2110	-	-	-	-	-	
194	6320	2110	-	-	-	-	-	
195	6300	2070	-	-	-	-	-	
196	6380	2010	M	R	S	H	A	
197	6490	2160	-	-	-	-	-	
198	6090	2390	-	-	-	-	-	+
199	6150	2440	-	-	-	-	-	+
200	6470	2210	M	I	A	H	A	

Remarks: *indicates Gaywood River
+indicates land reclaimed since 1946

1:10000 Sheet number.... TF62SW (Cont.)

No	NG Ref		1993/95					Remarks
	E	N	1	2	3	4	5	
163	6010	2070	-	-	-	-	-	
164	6000	2170	-	-	-	-	-	
165	6030	2220	-	-	-	-	-	
166	6160	2060	L	R	U	N	A	Dock
167	6170	2090	L	R	U	N	A	Dock
168	6100	2170	-	-	-	-	-	
169	6120	2280	-	-	-	-	-	
170	6140	2470	M	L	A	N	A	
171	6230	2180	-	-	-	-	-	
172	6170	2300	M	L	A	N	A	
173	6170	2390	-	-	-	-	-	
174	6240	2470	M	L	A	N	A	
175	6280	2150	-	-	-	-	-	
176	6430	2250	M	I	A	S	A	
177	6420	2310	M	I	A	H	A	
178	6380	2330	M	I	A	H	A	
179	6390	2320	M	I	A	H	A	
180	6420	2360	M	I	A	H	A	
181	6420	2240	S	I	W	H	A	
182	6420	2450	-	-	-	-	-	
183	6400	2460	M	I	A	S	A	
184	6310	2470	M	L	A	N	A	
185	6460	2190	M	R	S	N	A	
186	6470	2200	S	I	S	H	P	
187	6480	2240	-	-	-	-	-	
188	6390	2410	M	R	S	S	A	*
189	6370	2110	L	L	U	S	A	
190	6250	2110	M	I	U	S	A	
191	6300	2080	M	I	S	S	A	
192	6300	2090	M	R	S	S	A	
193	6320	2110	M	I	S	S	A	
194	6320	2110	M	R	S	S	A	
195	6300	2070	M	I	S	S	A	
196	6380	2010	M	R	S	H	A	
197	6490	2160	M	L	S	N	A	
198	6090	2390	M	L	A	S	A	+
199	6150	2440	M	L	A	N	A	+
200	6470	2210	-	-	-	-	-	

Remarks: *indicates Gaywood River
+indicates land reclaimed since 1946

1:10000 Sheet number.... TF62SE (Cont.)

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
201	6510	2300	-	-	-	-	-	
202	6540	2370	M	I	N	S	A	
203	6500	2450	M	I	N	S	A	
204	6500	2450	S	I	N	S	A	
205	6590	2410	S	I	A	H	A	
206	6580	2410	S	I	A	H	A	
207	6610	2450	S	I	A	S	A	
208	6640	2450	M	I	W	H	A	
209	6660	2110	S	I	A	S	A	
210	6740	2120	M	I	W	H	A	
211	6750	2130	S	I	W	H	A	
212	6740	2210	M	I	N	S	A	
213	6740	2220	-	-	-	-	-	
214	6740	2000	S	I	A	H	A	
215	6740	2010	S	I	A	H	A	
216	6810	2010	M	I	A	H	A	
217	6810	2010	M	I	A	H	A	
218	6810	2140	M	I	W	H	A	
219	6800	2200	M	I	N	S	A	
220	6810	2470	M	I	W	H	P	
221	6830	2010	M	I	F	N	A	
222	6880	2000	M	I	A	S	A	
223	6850	2180	M	L	W	H	A	
224	6860	2170	M	L	W	H	A	
225	6870	2180	S	I	W	H	A	
226	6960	2180	S	I	W	S	A	
227	6940	2180	S	I	A	S	A	
228	6960	2180	S	I	A	H	A	
229	6980	2160	S	I	W	H	A	
230	6960	2300	M	I	N	N	A	
231	6880	2360	S	I	A	H	A	
232	6830	2330	S	I	A	H	A	
233	6940	2390	S	I	A	H	A	
234	6930	2400	S	I	A	H	A	
235	6860	2410	S	I	F	N	A	
236	6990	2020	S	I	N	S	A	
237	6660	2140	M	I	A	N	P	
238	6730	2210	M	I	N	S	A	
239	6710	2280	-	-	-	-	-	
240	6720	2020	M	I	A	S	P	
241	6660	2150	L	I	A	N	A	
242	6990	2350	M	I	A	N	P	
243	6750	2340	M	R	F	N	A	
244	6730	2340	M	I	F	N	A	
245	6630	2450	M	I	S	S	A	
246	6620	2020	M	I	A	H	A	
247	6560	2030	M	L	W	H	P	
248	6590	2200	S	I	W	H	A	
249	6610	2140	-	-	-	-	-	
250	6610	2200	M	I	A	H	A	
251	6580	2240	-	-	-	-	-	
252	6590	2240	-	-	-	-	-	
253	6610	2240	S	I	A	S	A	
254	6620	2250	M	I	A	S	A	
255	6610	2260	M	I	A	S	A	
256	6610	2070	M	I	A	H	A	
257	6830	2330	S	I	A	H	A	

1:10000 Sheet number.... TF61NW

No	NG Ref		1946					Remarks
	E	N	1	2	3	4	5	
258	6030	1900	M	L	A	N	A	
259	6050	1930	M	L	A	N	A	
260	6100	1940	S	I	A	N	A	
261	6100	1940	S	I	A	S	A	
262	6110	1930	S	I	A	S	A	
263	6100	1910	S	I	A	S	A	

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
258	6030	1900	-	-	-	-	-	
259	6050	1930	M	I	A	N	A	
260	6100	1940	S	I	A	N	A	
261	6100	1940	-	-	-	-	-	
262	6110	1930	-	-	-	-	-	
263	6100	1910	-	-	-	-	-	

No	NG Ref		1993/95					Remarks
	E	N	1	2	3	4	5	
258	6030	1900	-	-	-	-	-	
259	6050	1930	M	I	A	N	A	
260	6100	1940	S	I	A	N	A	
261	6100	1940	-	-	-	-	-	
262	6110	1930	-	-	-	-	-	
263	6100	1910	-	-	-	-	-	

1:10000 Sheet number.... TF63NE (Cont.)

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
264	6790	3830	M	I	A	S	P	
265	6890	3750	M	R	A	N	A	
266	6590	3580	L	L	N	N	A	
267	6590	3570	L	L	N	N	A	
268	6550	3500	M	I	N	N	A	
269	6590	3520	M	I	A	N	A	
270	6740	3570	S	I	A	H	A	
271	6750	3570	M	I	A	H	A	
272	6730	3560	M	I	A	H	A	
273	6700	3500	M	I	W	H	P	
274	6700	3550	S	I	A	H	A	
275	6630	3710	M	L	S	N	A	
276	6670	3860	M	I	A	N	A	
277	6660	3900	L	L	N	N	A	
278	6660	3820	M	L	A	N	A	*
279	6800	3560	S	I	A	N	A	
280	6720	3640	-	-	-	-	-	
281	6780	3630	M	I	S	S	A	
282	6780	3630	M	I	S	S	A	
283	6790	3640	M	I	W	H	A	
284	6820	3680	M	R	A	S	A	
285	6730	3730	M	I	S	S	A	
286	6700	3740	S	I	S	S	A	
287	6770	3800	L	I	W	H	P	
288	6770	3830	S	I	W	H	A	
289	6780	3850	M	I	W	H	A	
290	6780	3870	M	I	F	S	A	
291	6890	3750	M	L	A	S	A	*
292	6870	3990	-	-	-	-	-	
293	6890	3990	S	I	F	S	A	
294	6600	3540	M	I	N	N	A	
295	6850	3760	M	I	A	N	P	
296	6710	3710	-	-	-	-	-	

Remarks: *indicates Heacham River

1:10000 Sheet number.... TF63SW

No	NG Ref		1946					Remarks
	E	N	1	2	3	4	5	
297	6480	3090	L	I	N	N	P	
298	6490	3120	L	I	N	N	P	
299	6480	3200	L	L	N	N	P	
300	6480	3300	L	I	N	N	P	
301	6480	3340	-	-	-	-	-	
302	6490	3060	M	L	N	N	A	
303	6490	3370	M	L	N	N	A	

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
297	6480	3090	L	I	N	N	P	
298	6490	3120	L	I	N	N	P	
299	6480	3200	L	L	N	N	P	
300	6480	3300	L	I	N	N	P	
301	6480	3340	M	I	S	N	A	
302	6490	3060	M	L	N	N	A	
303	6490	3370	M	L	N	N	A	

No	NG Ref		1993/95					Remarks
	E	N	1	2	3	4	5	
297	6480	3090	L	I	N	N	P	
298	6490	3120	L	I	N	N	P	
299	6480	3200	L	L	N	N	P	
300	6480	3300	L	I	N	N	P	
301	6480	3340	M	I	S	N	A	
302	6490	3060	M	L	N	N	A	
303	6490	3370	M	L	N	N	A	

1:10000 Sheet number... TF63SE (Cont.)

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
304	6550	3450	M	L	A	N	A	
305	6540	3420	M	L	A	N	A	
306	6790	3600	S	I	A	S	A	
307	6530	3430	L	L	A	N	A	
308	6530	3100	L	L	A	N	A	
309	6500	3130	L	L	A	N	A	*
310	6500	3340	M	L	N	N	A	
311	6500	3360	M	I	N	N	A	
312	6500	3370	M	I	N	N	A	
313	6530	3450	M	I	N	N	P	
314	6550	3010	S	L	A	S	A	
315	6590	3060	-	-	-	-	-	
316	6640	3190	M	L	A	S	A	
317	6630	3130	L	I	W	H	P	
318	6500	3300	M	R	A	N	P	
319	6530	3490	M	L	N	N	A	
320	6620	3360	M	I	A	S	A	
321	6620	3310	-	-	-	-	-	
322	6500	3390	M	I	N	N	P	
323	6540	3360	M	I	N	N	P	
324	6510	3410	S	I	N	N	A	
325	6520	3420	M	I	N	N	A	
326	6860	3250	S	I	W	H	A	
327	6510	3410	S	I	N	N	A	
328	6510	3420	S	I	N	N	A	
329	6790	3110	M	I	N	S	P	
330	6710	3290	M	R	W	H	P	
331	6810	3340	M	L	S	S	A	
332	6820	3430	S	I	A	N	A	
333	6920	3030	M	I	S	S	A	
334	6940	3030	M	I	F	N	A	
335	6830	3260	M	I	A	N	A	
336	6880	3390	S	I	F	S	A	
337	6890	3410	M	R	F	N	A	
338	6720	3470	M	I	W	H	A	
339	6810	3470	S	I	W	H	A	
340	6900	3300	M	L	A	S	A	
341	6930	3310	M	I	A	N	A	
342	6950	3290	L	L	A	N	A	
343	6500	3270	L	L	A	N	A	
344	6940	3290	M	I	A	S	A	
345	6970	3290	M	R	A	N	A	
346	6970	3280	-	-	-	-	-	
347	6630	3340	M	I	W	S	P	
348	6670	3160	M	L	A	S	P	
349	6890	3290	S	I	F	S	A	
350	6550	3350	M	I	S	N	P	

Remarks: *indicates The Ingol river

1:10000 Sheet number... TF51NW

No	NG Ref		1946					Remarks
	E	N	1	2	3	4	5	
351	5090	1970	M	I	A	N	A	
352	5100	1980	S	I	F	N	A	
353	5150	1990	S	I	A	N	A	
354	5170	1960	M	I	A	N	A	
355	5190	1920	M	I	F	N	A	
356	5330	1950	M	R	F	N	A	
357	5390	1970	M	I	F	N	A	
358	5480	1950	M	I	A	N	A	
359	5490	1910	M	I	F	N	A	
360	5490	1960	S	I	A	S	A	
361	5490	1970	M	I	A	S	A	
362	5100	1970	-	-	-	-	-	

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
351	5090	1970	-	-	-	-	-	
352	5100	1980	-	-	-	-	-	
353	5150	1990	-	-	-	-	-	
354	5170	1960	-	-	-	-	-	
355	5190	1920	M	I	F	N	A	
356	5330	1950	M	R	F	N	A	
357	5390	1970	-	-	-	-	-	
358	5480	1950	M	I	A	N	A	
359	5490	1910	-	-	-	-	-	
360	5490	1960	S	I	A	S	A	
361	5490	1970	-	-	-	-	-	
362	5100	1970	-	-	-	-	-	

No	NG Ref		1993/95					Remarks
	E	N	1	2	3	4	5	
351	5090	1970	-	-	-	-	-	
352	5100	1980	-	-	-	-	-	
353	5150	1990	-	-	-	-	-	
354	5170	1960	-	-	-	-	-	
355	5190	1920	-	-	-	-	-	
356	5330	1950	M	R	F	N	A	
357	5390	1970	-	-	-	-	-	
358	5480	1950	M	I	A	N	A	
359	5490	1910	-	-	-	-	-	
360	5490	1960	S	I	A	S	A	
361	5490	1970	-	-	-	-	-	
362	5100	1970	M	I	F	N	A	

1:10000 Sheet number... TF73NW

No	NG Ref		1946					Remarks
	E	N	1	2	3	4	5	
369	7080	3640	M	L	F	S	A	
370	7140	3620	-	-	-	-	-	
371	7080	3630	-	-	-	-	-	
372	7050	3640	M	I	A	S	A	
373	7150	3800	-	-	-	-	-	

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
369	7080	3640	M	L	F	S	A	
370	7140	3620	M	L	W	H	A	
371	7080	3630	M	I	F	N	A	
372	7050	3640	M	I	A	S	A	
373	7150	3800	S	I	F	N	A	

No	NG Ref		1993/95					Remarks
	E	N	1	2	3	4	5	
369	7080	3640	M	L	F	S	A	
370	7140	3620	M	L	W	H	A	
371	7080	3630	M	I	F	N	A	
372	7050	3640	M	I	A	S	A	
373	7150	3800	S	I	F	N	A	

1:10000 Sheet number... TF73SW

No	NG Ref		1946					Remarks
	E	N	1	2	3	4	5	
374	7070	3220	M	L	F	S	A	
375	7080	3420	M	I	F	S	A	
376	7180	3490	M	I	F	N	A	

No	NG Ref		1988					Remarks
	E	N	1	2	3	4	5	
374	7070	3220	M	L	F	S	A	
375	7080	3420	M	I	F	S	A	
376	7180	3490	-	-	-	-	-	

No	NG Ref		1993/95					Remarks
	E	N	1	2	3	4	5	
374	7070	3220	M	L	F	S	A	
375	7080	3420	M	I	F	S	A	
376	7180	3490	-	-	-	-	-	