Thanet Offshore Wind Farm

Environmental Statement
Addendum Report
Section 8 - Ornithology
June 2006

Thanet Offshore Wind Limited

June 2006
Final Report
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8 ORNITHOLOGY

8.1 Introduction

This report provides an Addendum to **Section 8, Ornithology** of the Thanet Offshore Wind Farm Environmental Statement (Royal Haskoning, 2005) (herein referred to as 'the Thanet ES') submitted to the Department of Trade and Industry (DTI) in November 2005. The Addendum Report fulfils Thanet Offshore Wind Limited's (TOW) commitment to ensure that a minimum of two years of ornithological data is used to assess the likely impacts of the Thanet Offshore Wind Farm (Thanet) project.

8.2 Assessment Methodology

8.2.1 Bird surveys

Boat based and aerial surveys were undertaken in order to collect both site specific bird data and data from the Thames Estuary Strategic Environmental Assessment (SEA) area. The surveys were carried out using standard European Seabirds at Sea (ESAS) techniques, which makes them comparable in terms of methodology to other survey data contained in the ESAS database. It is likely, however, that the monthly frequency of these surveys may be more successful in identifying concentrations of birds than the less frequent surveys for the ESAS database, which are generally funded by governments.

English Nature and the Royal Society for the Protection of Birds (RSPB) have stipulated the need for two years of survey data during *key seasons* for all Round Two projects, so that variation in numbers and distributions of species that may occur between years can be properly assessed. In the case of the Thanet project, the key season is the overwintering period i.e. November to March, when large numbers of species of conservation interest may be present within the study area.

Boat based surveys

In addition to the twelve boat based surveys that were carried out at monthly intervals between November 2004 and October 2005, an additional six surveys were undertaken over the winter period 2005-2006, taking into account the availability of suitable weather windows. These surveys ran from November 2005 and continued until April 2006, by which time the majority of overwintering species using the area had left the Thanet site. Wherever possible, the programme of boat routes has sought to randomise the sequence of transects sampled in relation to tidal state and time of day, while ensuring that tidal, day length and other constraints are observed.

The survey area included the wind farm site itself plus a buffer zone extending 1km to the north and south, together comprising the 'Survey Block', and a control area south of the Survey Block and approximately half the size, referred to as the 'Control Block'. The purpose of the Control Block is to separate the effects of the wind farm from other potential causes of bird population change during the process of ornithological monitoring. The Control Block is an area of similar bathymetry, tidal excursion, sediment profile and structure, and benthic assemblage to the Survey Block and, from the data collected, appears to be used by a similar range of seabirds. The Survey and Control Blocks were agreed with English Nature before surveying commenced.

Parallel transects, 1km apart, were steamed in an east-west or west-east direction across the Survey and Control Blocks. Points at the ends of each transect, recorded as waypoints on the boat's Global Positioning System (GPS), were used to navigate routes during the survey programme. The transects were kept as consistent as possible between visits. The Control Block was positioned just over 1.5km from the Survey Block and a total of 15 transects were steamed, eight in the Survey Block and six in the Control Block, with one in between. Due to short winter daylight hours, there was only time to steam 13 transects during the December 2005 and January 2006 surveys. However, this was considered preferable to splitting the survey across two days, during which time bird populations would have the opportunity to redistribute around the site. The Control and Survey Blocks were not subsequently changed. Figure 8.1 (Thanet ES, Nov 2005) shows the Survey and Control Blocks that were employed throughout the surveys.

An important refinement of the ESAS methodology in the current study is that transects are spaced at 1km apart, much closer together than the 10-30km spacing for surveying large expanses of sea suggested in Komdeur *et al* (1992).

Gulls, which follow or otherwise associate with the survey vessel, were not recorded on the field forms or included in the statistical analyses. There is good evidence that such 'followers' associate more strongly with survey vessels moving at speeds of around 7 knots (Garth and Huppop, 1999). The survey vessel used in this study travelled at an average speed of 7.5 to 8 knots, so the inclusion of followers would have been very likely to bias the results in favour of gulls, and could have distracted attention from recording key species.

Bird data was collected using the 'scan with band transect' and the snapshot technique method (Komdeur *et al,* 1992). This involved the recording of all birds seen in an 180° scan with the naked eye from straight ahead round to perpendicular to the vessel on each side. Binoculars were used to assist in identification. Birds were recorded as being in one of five bands perpendicular to the vessel (A 0-50m; B 50-100m; C 100-200m; D 200-300m; E >300m). One side of the vessel was chosen as the 'transect side', where recordings were analysed to produce population density estimates. All birds on the water on the chosen 'transect side' within a distance 300m perpendicular to the vessel i.e. band D, were considered 'in transect'.

In addition, a 'snapshot' was taken every two minutes of all birds flying within band D, on the 'transect side' and within the distance ahead that the vessel travelled in that two minute period. These birds were also recorded as being 'in transect' and used in the statistical analysis. In this case, the survey vessel averaged eight knots and so travelled approximately 493m in two minutes. The snapshot method has been developed by ESAS to prevent double counting of flying birds. Observations were made from a specially constructed platform that gave a 5m eye level height above sea level. Snapshots were carried out by one observer on one side of the ship only, whilst all other observations were simultaneously undertaken by the other observer from both sides of the ship, taking care not to double count.

The following data were recorded for each sighting when applicable or possible:

- Time;
- Species;
- Number;
- Age/sex/plumage;
- In flight/on sea;
- Direction of flight;
- Distance from survey vessel (Bands A, B, C, D, E);
- Height; and
- Behaviour e.g. feeding.

Aerial surveys

Four aerial surveys were carried out between November 2005 and April 2006 within the sector corresponding to the Thanet site. The relevant time periods are shown in **Table 8.1**.

Table 8.1 Aerial survey periods

Period	Season	Target Dates Flown
1	Early Winter	13th November 2005 to 17th November 2005
2	Mid-Winter 1	6th December 2005 to 11th December 2005
3	Mid-Winter 2	13th January 2006 to 10th February 2006
4	Late Winter	18th February 2006 to 7th March 2006

The programme of aerial surveys was agreed, designed and implemented across all three Round Two Strategic Environmental Assessment areas (see Section 1, Introduction, Thanet ES) through close co-ordination between wind farm developers, the Department of Trade and Industry (DTI) and statutory nature conservation agencies including English Nature and the Joint Nature Conservation Committee (JNCC). The Thames Estuary SEA area was divided into five blocks, each capable of being flown in a day (see Figure 8.2, Thanet ES). The Thanet site was located in survey area TH2.

The surveys were carried out using a methodology recently developed in Denmark by the National Environment Research Institute (NERI) (Kahlert *et al*, 2000, summarised in COWRIE, 2004). Birds were recorded from a twin-engine Partenavia P68 aircraft flying 76m above the sea surface and a distance sampling approach was employed, similar to that used for the boat based surveys, but with estimated distances for each bird or flock, rather then the five discrete distance categories, due to the inherent difficulty in applying this approach from the air. The distances of each flock were subsequently grouped into four distance bands (A 44-163m; B 164-282m; C 282-426m; and D 426-1,000m). Parallel transects were flown at a distance of 2km apart in a north-south orientation to

reduce the effect of sun glare during the survey and aid the ability to detect and identify birds. The species, number, behaviour, distance and time at which it was perpendicular to the north-south flight path of the aircraft were recorded using a dictaphone for each bird or flock of birds.

The survey work was carried out by the consultancy Wetland Advisory Services (WAS), which is the commercial arm of the Wildfowl and Wetlands Trust (WWT). Coverage of the winter periods was a requirement for all Round Two projects, but it was agreed with English Nature, JNCC and DTI that, at other times of the year, when key species would not be present in large numbers in a particular area, that the monthly boat based surveys would be sufficient and aerial surveys would not be necessary.

This agreement applied to block TH2, the aerial survey block that covers the Thanet site, which was consequently not flown during the summer months. This decision was made because it was considered that this block was not in close proximity to any tern colonies nor was it thought likely to hold any aggregations of seaducks or auks undergoing their post-breeding moults. Figure 8.3 in the Thanet ES, shows the aerial transects flown for block TH2 only.

Further details of the aerial survey methodology can be found in Appendix 8.1 of the Thanet ES.

8.3 Existing Environment

8.3.1 Introduction and overview

The following section describes each of the principal species that occurred in the study area during the overwintering period November 2005 – March 2006, their conservation status, seasonal distribution, ecological requirements and the results of the surveys discussed in **Section 8.2**.

8.3.2 Seabird species accounts

Red-throated diver

The red-throated diver *Gavia stellata* is listed under Annex I of EU Directive 79/409/EEC *on the conservation of wild* birds (the Birds Directive) and Schedule 1 of the Wildlife and Countryside Act, 1981. They breed on pools and lakes in high northern latitudes including Scotland and Scandinavia moving south to warmer waters during the winter, where they are associated with shallow inshore sandy bays, usually no more than 30m deep. They occur singly and in loose aggregations and major prey items include crustaceans, sand eels, sprat, herring, flatfish and codling, which are caught by diving. The availability of many of the prey items is often determined by external factors such as weather conditions and levels of pollution. Consequently, the distribution and abundance of this species fluctuates with prey availability.

The majority of wintering individuals are located along the east coast of Britain. Passage on the East coast occurs both in late summer, with the arrival of the Shetland population, and in early autumn, with the migration of birds from Scandinavia. Return passage occurs in late February to early March, with the return to Scotland of the British breeding populations, followed by a second movement in April and May involving the Scandinavian population.

All divers have two moults during the year, one before and one after breeding. For red-throated diver, the major moult occurs in October and November, and during this period the birds are flightless and, therefore, vulnerable to disturbance and/or pollution. Even outside these times, they are still easily disturbed by human activity and will sometimes be flushed by survey vessels up to 1km or more away depending on the sea state (pers. comm. Ian Harding, boat based surveyor). The most recent population is estimated at 12,500 individuals within the wider aerial survey area i.e. blocks TH1 to TH5 inclusive (RPS, 2005).

Table 8.2: Divers – boat surveys (number of birds counted)

Winter 2004-2005

	Wind Farm Site		Control Area		Both	
Nov 2004	1		0		1	
Dec 2004	3		4		7	
Feb 2005	24		0		24	
Mar 2005	23		6		29	
	Total: 51	**Mean:** 17.75	**Total:** 10	**Mean:** 2.5	**Total:** 61	**Mean:** 15.25

Winter 2005-2006

	Wind Farm Site		Control Area		Both	
Nov 2005	0		2		2	
Dec 2005	5		0		5	
Jan 2006	3		1		4	
Mar 2006	15		41		56	
	Total: 23	**Mean:** 5.75	**Total:** 44	**Mean:** 11	**Total:** 67	**Mean:** 16.75

As **Table 8.2** shows, a peak of 56 divers was recorded during the boat based surveys during March 2006. Of these, 15 were in the survey block, and 41 in the control block. Ten were assigned as being red-throated diver, 17 as black-throated diver and 29 as diver sp.. In addition, one Great-northern Diver was seen in the survey site on 20th April 2006. The majority of diver sightings, as expected, were of red-throated diver which winters in the Thames Estuary SEA area in large numbers. There was an unexpectedly high count of black-throated diver on 6th March 2006 however, although this could be attributed to birds heading north from their wintering sites in the south-west, and may

involve some level of duplication, with a few mobile individuals seen. In general, numbers were slightly down in the second winter surveys period, although there was the large count in the control site on the March 2006 survey. The results seem to indicate a generally low usage of the wind farm site by divers, with certainly no higher level of use than anywhere else in the overall survey area.

A maximum of 2,854 divers was recorded in the Thames Estuary SEA area between November 2005 and March 2006 during the aerial surveys. Three diver species were present during these surveys, namely red-throated diver, black-throated diver and great northern diver *Gavia immer*. Divers can be difficult to distinguish from the air and, as a result, the vast majority of records were assigned to diver sp.. The majority of these records are likely to be red-throated divers, since black-throated and great northern divers are, in the main, distributed more towards the southern and western coasts of the UK (Snow and Perrins, 1998). For the purposes of this assessment, all diver species are considered together, as their ecological requirements during the winter are similar, along with their likely behavioural responses to wind farm developments.

Table 8.3 shows the results from the aerial surveys, comparing the numbers of divers present over the two different winter periods. Numbers of divers in TH2, which incorporates the area of the Thanet project, were generally similar to diver levels over the whole survey area. It is important to note though that TH2 does not cover solely the wind farm site, and **Figure 8.1** shows that diver useage over the wind farm and control sites was generally less than over the survey area as a whole. It seems that TH2 showed a slightly higher rate of utilisation during the 2005-2006 surveys, although again, as **Figure 8.1** shows, the Thanet site was not heavily used compared to the overall area.

Table 8.3: Divers – aerial surveys (Number of birds counted)

Winter 2004-2005

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	19		172		153	
2	144		974		830	
3	172		927		755	
4	553		1,408		855	
	Total: 888	**Mean:** 222	**Total:** 3,481	**Mean:** 870	**Total:** 2,593	**Mean:** 648.25

Winter 2005-2006

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	8		101		93	
2	64		689		625	
3	515		1,075		560	
4	405		989		584	
	Total: 992	**Mean:** 248	**Total:** 2,854	**Mean:** 713	**Total:** 1,862	**Mean:** 465.5

Figure 8.1 shows the distribution of divers across the Thames Estuary SEA area during winter 2005-2006. Numbers do not start to build up until late November and early December, indicating that they are not undergoing their main moult in this area. Numbers then remain fairly consistent throughout the winter occurring in most parts of the Thames Estuary, but hotspots of activity tend to be more towards the inner Thames Estuary and over sandbanks, where waters are shallower, well to the northwest of the Thanet site. As birds congregate prior to their northerly spring migration in late February and early March, numbers increase in and around the Thanet site. Birds start to move out from key feeding areas in the inner Thames Estuary and concentrate themselves in the outer Thames Estuary prior to migrating north to their breeding grounds. This is when the largest numbers were recorded in the 2005-2006 winter period around the Thanet site.

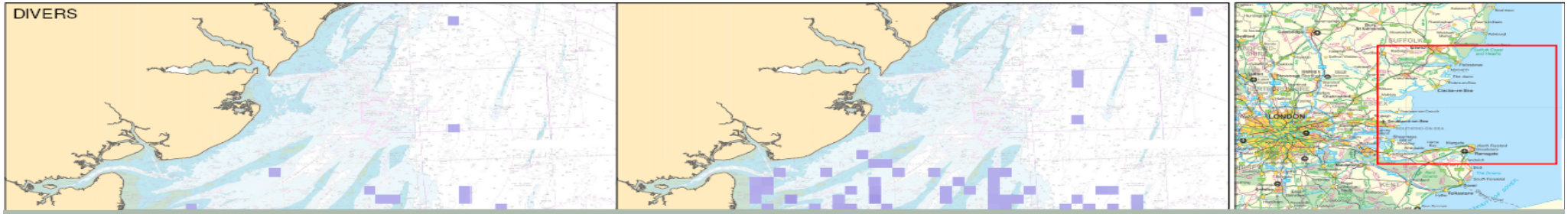

FIGURE 8.1 Distribution of Divers across the Thames Estuary SEA Area during Winter 2005-2006

Kittiwake

Kittiwake *Rissa tridactyla* are small pelagic gulls that breed on cliffs and islands from the temperate to the Arctic zones in the Atlantic, Arctic and Pacific zones. They number some 4.2 million pairs in the northeast Atlantic, which represents 53-70% of the world population (Skov *et al,* 1995).

The UK population was estimated as nearly 416,000 pairs during Seabird 2000. The majority of these breed along the East Coast from Flamborough to Shetland, but they also breed in Kent, where 1,121 nests were counted between Dover and St Margaret's during the summer of 2002 (Kent Bird Report, 2002). Outside the breeding season, they disperse widely over the North Sea, with no one area holding particularly significant numbers. They are surface feeders, feeding on small shoaling fish and taking advantage of any scavenging opportunities, including taking waste from trawlers.

Table 8.10: Kittiwake – boat surveys (number of birds counted)

Winter 2004-2005

	Wind Farm Site		**Control Area**		**Both**	
Nov 2004	16		5		21	
Dec 2004	46		22		68	
Feb 2005	27		27		54	
Mar 2005	29		27		56	
	Total: 118	**Mean:** 29.5	**Total:** 81	**Mean:** 20.25	**Total:** 199	**Mean:** 49.75

Winter 2005-2006

	Wind Farm Site		**Control Area**		**Both**	
Nov 2005	49		46		95	
Dec 2005	43		62		105	
Jan 2006	56		43		99	
Mar 2006	24		33		57	
	Total: 172	**Mean:** 43	**Total:** 184	**Mean:** 46	**Total:** 356	**Mean:** 89

Kittiwake were present throughout the boat based surveys in the 2005-2006 survey period, with highest numbers between November and January, with approximately 100 birds seen on visits in these months (95, 105 and 99 on 19th November 2005, 19th

December 2005 and 12th January 2006 respectively). When compared with the 2004-2005 survey data, there seems to be a slight increase in numbers in 2005-2006, probably in relation to feeding or bad weather movements, and does not reflect any increased affinity with the Thanet site.

Table 8.11 shows the results of the aerial surveys over the two winter periods surveyed. Usage of the TH2 survey area was generally lower than average for the survey area as a whole. This, when viewed with **Figure 8.7**, reflects the pelagic nature of kittiwake, generally favouring areas further offshore than the Thanet site. Usage of TH2 seemed to be fairly consistent numbers over both survey periods.

Table 8.11: Kittiwake – aerial surveys (Number of birds counted)

Winter 2004-2005

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	70		229		159	
2	127		514		387	
3	146		495		349	
4	55		72		17	
	Total: 398	**Mean:** 99.5	**Total:** 1,310	**Mean:** 327.5	**Total:** 912	**Mean:** 228

Winter 2005-2006

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	12		196		184	
2	76		547		471	
3	165		1,255		1,090	
4	34		225		191	
	Total: 287	**Mean:** 72	**Total:** 2,223	**Mean:** 556	**Total:** 1,936	**Mean:** 484

Figure 8.3 shows the distribution of kittiwake during winter 2005-2006.

FIGURE 8.3 Distribution of Kittiwakes across the Thames Estuary SEA Area during Winter 2005-2006

Herring gull

The herring gull *Larus argentatus* is the most widespread species of gull in the Northern Hemisphere and a total of 1.35 million pairs are though to breed in west and northwest Europe. Herring gull from Western Europe are mostly sedentary, whilst birds from further north migrate into the North Sea after the breeding season. Their diet comprises mainly of fish and invertebrates whilst at sea and they are the most common species within the study area associated with seabird flocks that follow fish trawlers.

Table 8.14 Herring Gull – boat surveys (number of birds counted)

Winter 2004-2005

	Wind Farm Site	Control Area	Both
Nov 2004			

Table 8.22 summarises the peak raw counts for the main seabird species and species groups found within the Survey and Control Blocks during the boat based surveys.

Table 8.22 Peak counts for seabirds using the Survey and Control Blocks during the boat based surveys, Nov 2005 – Apr 2006

Species	Peak Raw Count			Survey Visit
	Survey Block	Control Block	Total	
Red-throated Diver	0	10	**10**	6th March 2006
Black-throated Diver	8	9	**17**	6th March 2006
Great-northern Diver	1	0	**1**	20th April 2006
Diver sp	7	22	**29**	6th March 2006
Fulmar	78	56	**134**	20th April 2006
Gannet	4	17	**21**	6th March 2006
Common Scoter	0	0	**0**	-
All Terns	21	3	**24**	20th April 2006
All Gulls	438	127	**565**	12th January 2006
All Auks	41	53	**94**	6th March 2006

Turnstone

Turnstone *Arenaria interpres* is the only species qualifying the Thanet Coast and Sandwich Bay SPA. Turnstone occurs within the SPA in nationally important numbers i.e. greater than 1% of the British population. The Thanet Coast and Sandwich Bay qualifies as an SPA under Article 4.2 of the EC Birds Directive (79/409/EEC) by supporting overwintering populations of European importance of turnstone, 940 individuals representing at least 1.3% of the wintering Western Palearctic – wintering population (five year peak mean 1991-1992 to 1995-1996). No turnstone were seen during any of the boat based surveys, or from the aerial surveys, although small wader species were noted over the coastal fringes.

Other species

In addition to the species discussed above, the following were also seen sporadically within the Survey and Control Blocks from the boat based surveys:

- Arctic Skua *Stercorarius parasiticus* (1), 19th November 2005;
- Blackbird *Turdus merula* (1), 19th November 2005;
- Chaffinch *Fringilla coelebs* (11), 19th November 2005;

- duck sp. (2), 12th January 2006;
- finch sp. (1), 19th November 2005;
- Great Skua *Stercorarius skua* (2), 20th April 2006;
- House Martin *Delichon urbica* (1), 14th April 2006;
- Leach's Petrel *Oceanodroma leucorhoa* (1), 19th November 2005;
- Meadow Pipit *Anthus pratensis* (5), 14th April 2006;
- passerine sp. (2), 20th April 2006;
- Reed Bunting *Emberiza schoeniclus* (3), 14th April 2006;
- Shelduck *Tadorna tadorna (1),* 19th November 2005 and 20th April 2006;
- Starling *Sturnus vulgaris* (512), 19th November 2005;
- Swallow *Hirundo rustica* (7), 14th April 2006 and (2), 20th April 2006
- warbler sp. (1), 20th April 2006;
- Woodpigeon *Columba palumbus* (41), 14th April 2006

All these species were seen moving through the site rather than lingering or feeding. It should be noted that this is only a small percentage of the numbers of birds that may have crossed the site outside of surveys times.

Of the above species, Arctic Skua is likely to be a scarce passage migrant through the site, on both spring and autumn migration from breeding grounds in northern Scotland and Scandinavia. Leach's Petrel is a very scarce visitor to the English Channel and North Sea, and probably ended up here as a result of autumn gales, before trying to reorientate to its wintering grounds, with most in the tropics but good numbers remaining in the North Atlantic.

The remainder of the species can be split between autumn and spring passage periods, and reflect the fact that passerine species will pass through the site at these times. Although numbers above are quite low, with the exception of Starling, this shows a range of species will pass through, and only indicates a small amount of the numbers passing through, as many species are nocturnal migrants. However, the Thanet site is not in a migration bottleneck, and birds will be passing through on a broad front, so the site is no more or less likely to have large numbers of migrants passing through than any other area.

Figures 8.9 and **8.10** show how wildfowl and waders respectively were distributed across the Thames Estuary SEA area during winter 2005-2006 from aerial surveys.

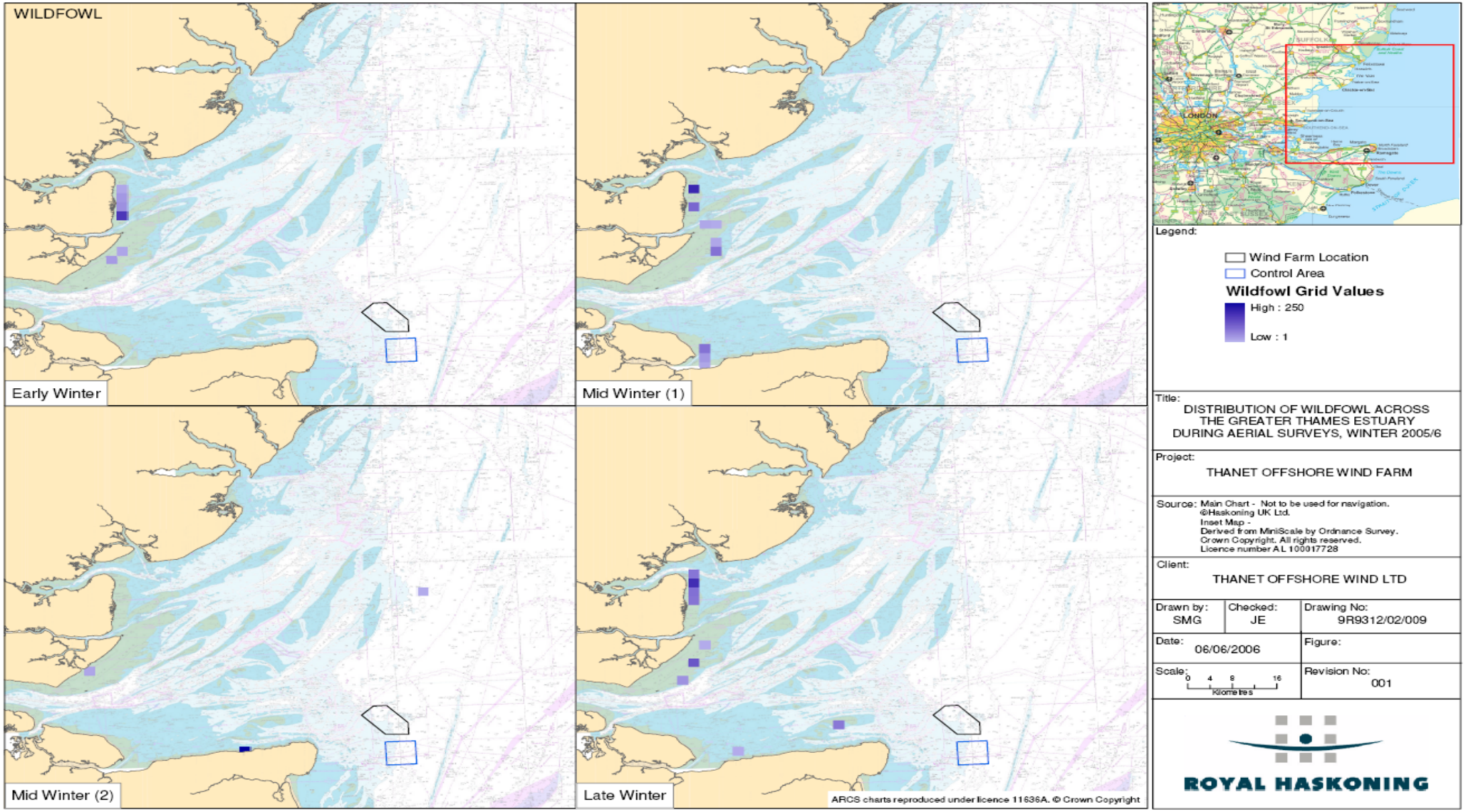

FIGURE 8.9 Distribution of Wildfowl across the Thames Estuary SEA Area during Winter 2005-2006

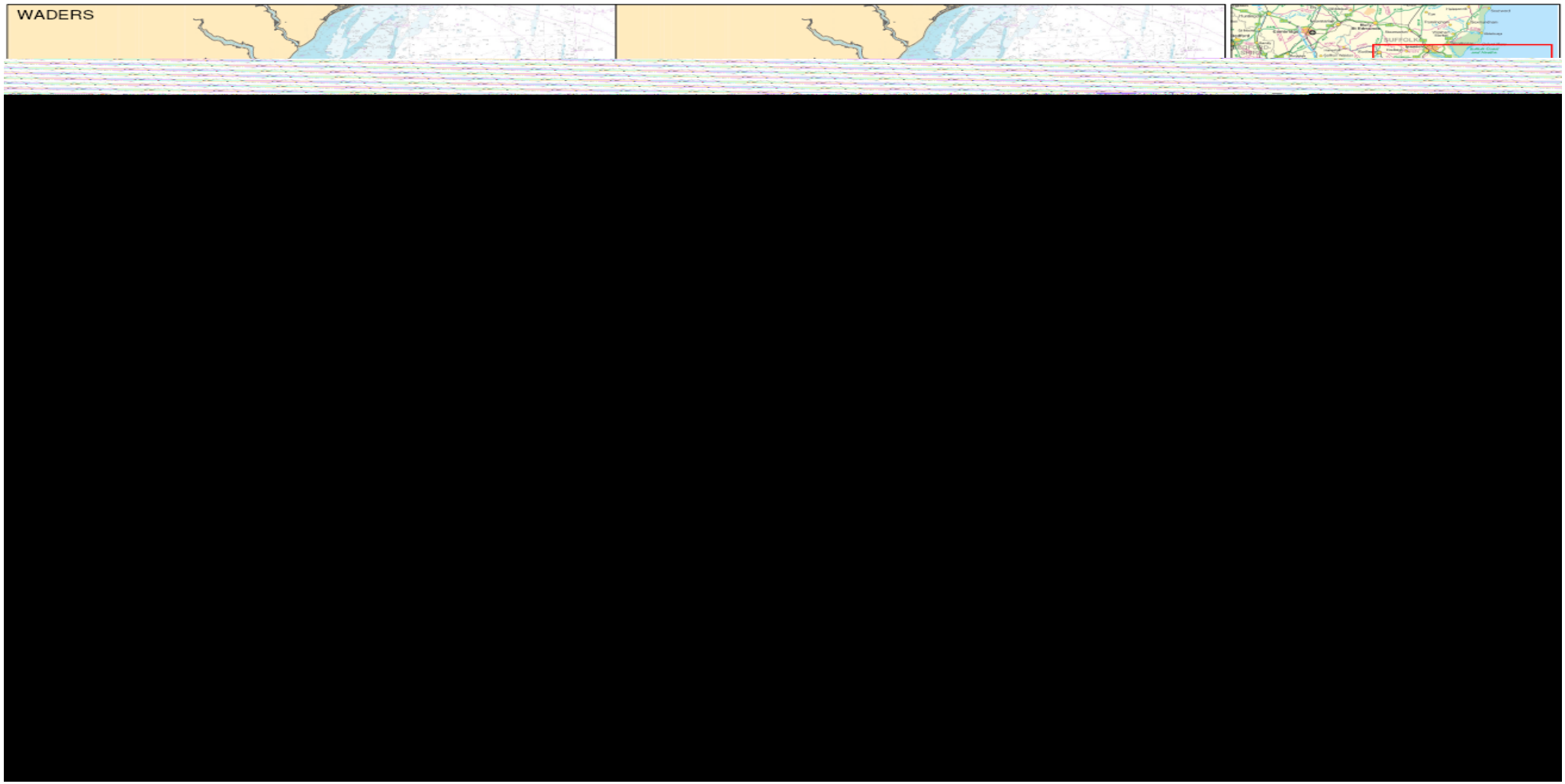

FIGURE 8.10 Distribution of Waders across the Thames Estuary SEA Area during Winter 2005-2006

These maps indicate that both waders and wildfowl concentrated themselves around coastal locations. There were very few records in the middle of the Thames Estuary and none over the Thanet site.

Tables 8.23 and **8.24** show the results of the aerial and boat surveys for wildfowl over both winter periods. Wildfowl numbers were very low on the boat based surveys in both periods. The aerial surveys recorded low wildfowl numbers in TH2, in both winter survey periods, with very small numbers present (and none in the 2004-2005 survey).

Table 8.23: Wildfowl – boat surveys (number of birds counted)

Winter 2004-2005

	Wind Farm Site		**Control Area**		**Both**	
Nov 2004	0		0		0	
Dec 2004	9		0		9	
Feb 2005	0		0		0	
Mar 2005	3		0		3	
	Total: 12	**Mean:** 3	**Total:** 0	**Mean:** 0	**Total:** 12	**Mean:** 3

Winter 2005-2006

	Wind Farm Site		**Control Area**		**Both**	
Nov 2005	1		0		1	
Dec 2005	0		0		0	
Jan 2006	2		0		2	
Mar 2006	0		0		0	
	Total: 3	**Mean:** 0.75	**Total:** 0	**Mean:** 0	**Total:** 3	**Mean:** 0.75

Table 8.24: Wildfowl – aerial surveys (Number of birds counted)

Winter 2004-2005

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	0		76		76	
2	0		807		807	
3	0		4		4	
4	0		124		124	
	Total: 0	**Mean:** 0	**Total:** 1,011	**Mean:** 253	**Total:** 1,011	**Mean:** 253

Winter 2005-2006

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	0		147		147	
2	0		254		254	
3	0		267		267	
4	35		327		292	
	Total: 35	**Mean:** 8.75	**Total:** 995	**Mean:** 248.75	**Total:** 960	**Mean:** 240

Table 8.25: Waders – boat surveys (number of birds counted)

Winter 2004-2005

	Wind Farm Site		Control Area		Both	
Nov 2004	0		0		0	
Dec 2004	6		0		6	
Feb 2005	0		0		0	
Mar 2005	0		0		0	
	Total: 6	**Mean:** 1.5	**Total:** 0	**Mean:** 0	**Total:** 6	**Mean:** 1.5

Winter 2005-2006

	Wind Farm Site		Control Area		Both	
Nov 2005	0		0		0	
Dec 2005	0		0		0	
Jan 2006	0		0		0	
Mar 2006	0		0		0	
	Total: 0	**Mean:** 0	**Total:** 0	**Mean:** 0	**Total:** 0	**Mean:** 0

Table 8.26: Waders – aerial surveys (Number of birds counted)

Winter 2004-2005

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	0		65		65	
2	0		2,264		2,264	
3	405		1,935		1,530	
4	0		4,696		4,696	
	Total: 405	**Mean:** 101	**Total:** 8,960	**Mean:** 2,240	**Total:** 8,555	**Mean:** 2,138.75

Winter 2005-2006

Period	TH2 only		All areas (inc TH2)		All areas (excl TH2)	
1	0		1,988		1,988	
2	6		2,695		2,689	
3	0		1,713		1,713	
4	15		4,250		4,235	
	Total: 21	**Mean:** 5	**Total:** 10,646	**Mean:** 2,661.5	**Total:** 10,625	**Mean:** 2,656.25

Tables 8.25 and **8.26** show the results of the aerial and boat surveys for waders over both winter periods. The boat based surveys for 2005-2006 recorded no waders at all, with only six in the 2004-2005 surveys, indicating low numbers passing through the Thanet site. For the aerial surveys, there were also generally low numbers of waders seen in the TH2 survey area, with only one relatively large count in the February 2005 period. For the 2005-2006 surveys, only 15 waders were seen.

8.4 Impacts during Construction

8.4.1 Disturbance to and displacement of feeding seabirds

The noise levels and presence of a variety of vessels and other machinery associated with erecting the wind turbines during the construction process, as well as the wind turbines themselves, are likely to impact on the normal use of the site by the seabird species found there. Any impacts would be short term i.e. less than 12 months in each part of the wind farm, and given the overall low densities of birds observed throughout the year and availability of similar feeding areas close by, any impacts are considered to be short term and of **minor adverse** significance.

8.4.2 Disturbance and displacement of waterfowl along the export cable route

The installation of the export cables would require ploughing across an area of shallow coastal waters that may be attractive feeding areas for a variety of seabirds. In addition to those species seen regularly in the Control and Survey Blocks, these might include species of inshore coastal waters, such as grebes, cormorant, red-breasted merganser and terns. Common and Sandwich terns in particular build up in their hundreds off Pegwell Bay during late summer, feeding in the shallow waters prior to migration (pers. comm. Ian Harding, boat based surveyor). In addition, the installation of the export cables would also involve crossing the intertidal mudflats and shingle shores of Pegwell Bay, which would cause some temporary disturbance to waders feeding or roosting in this area, including turnstone, the key interest feature of the Thanet Coast and Sandwich Bay SPA (see **Section 4, Policy Framework and Guidance**, Thanet ES, Royal Haskoning, 2005).

Providing there are no unforeseen circumstances, the export cables would take 14 to 20 days to install and of this only two to four days would be spent crossing the mudflats themselves. Landfall connection works in the area of the beach and joint transition pit are estimated to take approximately ten days (see **Section 2, Project Details**, Thanet ES, Royal Haskoning, 2005). In order to avoid disturbing important populations of migratory waterfowl, construction would not be undertaken during the winter and passage periods i.e. September to April inclusive. Any seabirds feeding along the export cable route may be disturbed temporarily during construction, but given the short duration of the works, this is also not anticipated to have a significant impact. Prey availability in areas where the cables have been installed is not expected to change post construction (see **Section 9, Marine Ecology**, Thanet ES, Royal Haskoning, 2005). Overall, **no impacts** on overwintering waterfowl are anticipated.

8.4.3 Collision risk during construction

Although there is a collision risk involved wherever a structure is being erected, the construction activity and noise associated with it, is likely to deter most birds from using the wind farm site. The probability of any birds colliding with immobile structures should be considered very low and the risk to birds that persist in the wind farm area during the construction period is considered to be of **negligible** significance.

8.5 Impacts during Operation

8.5.1 Direct loss of habitat

The footprint of the wind farm on the seabed is relatively small and would be restricted to the foundation bases of the turbines themselves. The total area of habitat lost directly to the turbine foundations or affected by scour around the foundations would be 0.564% of the total wind farm area under the worst case scenario (see **Section 9**, Thanet ES, Royal Haskoning, 2005). Given the small percentage of seabed loss and its wide and similar distribution elsewhere, it is not considered that direct habitat loss would impact on any bird species, which use the Thanet site. No habitat loss is associated with the export cable route, since it would be buried beneath the seabed.

8.5.2 Displacement of feeding seabirds

Displacement of birds using the Thanet site could occur if birds are deterred from using the area due to the presence of the turbines, as well as the routine operation and maintenance activities. There are three elements of bird behaviour that need to be considered when assessing this potential impact:

- The relative importance of the disturbed area;
- The bird's susceptibility to this disturbance; and
- How far the bird might be displaced as a result.

These factors would vary considerably between species.

The relative importance of the Thanet site to individual species can be assessed using the data collected from the aerial and boat based surveys and comparing usage of the site with usage of other areas of the Thames Estuary SEA area. Assessing each species' susceptibility to disturbance and displacement however, is more problematic. Studies at existing offshore wind farms have shown a range of responses for different species, from avoidance through to preference, but it is sometimes difficult to separate how much is attributable to the wind farm and how much is a response to natural fluctuations in prey distribution and weather patterns (Peterson, 2005).

There is little information available for offshore wind farms on how far displacement effects could stretch beyond the perimeter of the wind farm array and, therefore, the overall area that could be affected. Avoidance distances recorded for onshore wind farms show displacement effects have been observed for feeding geese as far as 600m from the wind farm (Langston and Pullan, 2002). Eiders were demonstrated to avoid turbines by up to 1,500m at night at the Tuno Knob offshore wind farm (Langston and Pullan, 2002).

The potential impacts of displacement on the principal species groups are considered below.

Divers

Divers are amongst the more susceptible species to disturbance, often being flushed from the surface of the sea up to 1km away from vessels such as those employed during the boat based surveys (pers. comm. Jon Ford, boat based surveyor). The most

comprehensive study on the disturbance effects of offshore wind farms on seabirds to date is being carried out at Horns Rev, which comprises 80 turbines located approximately 14km west-south-west of Blavands Huk in the Danish part of the North Sea. The operation began in the last quarter of 2002 and a total of 25 waterbird surveys were carried out in the Horns Rev area between August 1999 and December 2003. Six of these were undertaken with the wind farm operational. The results so far indicate that divers, gannets, common scoter, and auks all showed an increased avoidance of the wind farm area (Peterson, 2005). Of these species, divers showed some of the highest avoidance levels.

The red-throated diver is the commonest diver species recorded regularly at the Thanet site and it is clear from surveys undertaken by wind farm developers in other areas, that the Thames Estuary SEA area is one of the most important wintering sites for red-throated divers in the UK (RPS, 2005). It is, therefore, considered the key species of conservation importance in this assessment and thus the one for which any potential impacts could be the most significant.

Divers were consistently a minor part of the overall seabird assemblage during the winter boat based surveys. For example, on 19th November 2005, no divers were seen out of a total of 813 birds. The peak count of eight birds on 14th April 2006 can be compared with the proposed London Array offshore wind farm, where numbers peaked during boat based surveys at 7,489 (RPS, 2005), and the Kentish Flats offshore wind farm, where populations were estimated at 62 during the initial survey period (EMU, 2002). These figures are not directly comparable, due to differences in site extent, and surveys being undertaken during different years, but survey methodologies were broadly similar and overall they do indicate that the numbers of divers recorded at the Thanet site are very low when compared with the overall population overwintering in the Thames Estuary SEA area.

According to the current threshold set by the JNCC, which is based upon published population estimates, 1% of the UK population of red-throated divers is 50 birds or 85 for all diver species. On this basis, less than 0.2% of the UK population uses the Thanet site over the winter. In practice, the real percentage is likely to be far less than this as the 50 bird threshold is based on a UK population estimate of 4,850.

In terms of other diver species using the site, a single great-northern diver was seen on 20th April 2006, although this is likely to have been passing through, and great-northern diver will be a very scarce bird in the area. There were small numbers of black-throated diver recorded on the boat surveys, around the mid-winter period, although the March counts could be attributed to birds moving north and may involve the same mobile individuals. Both great-northern diver and black-throated diver will be rare at the Thanet site, and the impact of the project on these two species is thought to be **negligible**.

The comparatively low numbers of divers in and around the Thanet site is not surprising considering the ecology of this species group (see **Section 8.3.2**). The waters at the Thanet site are deeper in comparison with other parts of the Thames Estuary SEA area, and in some areas approach the limit that these birds can dive to, which is considered to be about 30m (Snow and Perrins, 1998). Studies undertaken as part of the London Array project indicate that divers showed a strong preference for water depths less than 15m (RPS, 2005). Deeper dives require more energy expenditure, which appears to make the Thanet site less attractive to this species. Overall, therefore, the ability of the

Thanet site to support nationally important populations of divers will always be limited, especially when compared with areas of the inner Thames Estuary, where the water is shallower, over sandy substrate with more abundant and easily exploitable prey.

In a worst case scenario, where all divers recorded during the boat based surveys were displaced from these feeding areas for the operational life of the wind farm, the impact on the Thames Estuary SEA area population would still be insignificant, given the numbers quoted above. In practice however, complete avoidance is unlikely. Offshore wind farm studies, such as those in Denmark, have only shown decreased usage of the site by species most susceptible to disturbance, including divers, but not complete avoidance (Peterson, 2005). Those individuals that are displaced from the site could be expected to find plenty of similar habitats close to the site, which could be exploited equally successfully.

Given the lack of preferred habitat at the site, the small numbers of birds involved, and the probability that not all birds would be displaced from the site as result of the operational wind farm, a **minor adverse** impact is predicted as a result of indirect habitat loss.

Auks

In contrast to divers, auks are more adept swimmers and can dive much deeper, up to 60m, so they are better able to exploit the prey resources available at the Thanet site. They are pelagic species and tend to linger just offshore throughout the winter, rather than being attracted into the shallower inshore waters of the Thames Estuary SEA area (Mitchell *et al,* 2004). Small numbers of auks occurred throughout the Thanet site with a peak of 41 noted on 6th March 2006, considerably lower than the 239 observed in February 2005. Auks are fairly abundant in the Northern Hemisphere, especially guillemots, which comprised the majority of records at the site and are generally a far more common wintering species in Kentish waters than Razorbill (Kent Bird Report, 2002). UK colonies are home to over 1.5 million pairs of guillemots and in the context of this population, the numbers present in and around the Thanet site are not significant. Furthermore, aerial surveys show that densities are comparable to those elsewhere in the outer Thames Estuary (see **Figure 8.2**), indicating that the auks are present on a broad front and that there is nothing particular about the Thanet site that is attractive to these species.

Studies at Horns Rev showed that whilst auk numbers decreased at the site post-construction these declines were not statistically significant (Peterson, 2005). This indicates that auks are less susceptible to disturbance than more sensitive species such as divers.

Given that the relatively small numbers of birds using the site and that numbers are comparable with and certainly not exceptional in the context of the rest of the outer Thames Estuary, and taking into consideration the studies at Horns Rev, a **minor adverse** impact is predicted for this species.

Gulls

All of the gull species found at the site were capable to a lesser or greater extent of exploiting anthropogenic food sources such as offal and fish discards from trawlers. In fact, their propensity to follow vessels, including bird survey boats, in the hope of picking

up scraps, makes it difficult to accurately gauge populations, even allowing for this behaviour by discounting 'followers'. It is likely that during wind farm operation, gulls would also see the wind farm as a potential feeding opportunity, following maintenance boats in the same way as they do survey boats and using parts of the wind farm structures to perch and rest on. Studies suggest that gulls are attracted to existing operational offshore wind farms. For example, herring gull at Horns Rev showed a decreased avoidance around the wind farm, whilst great black-backed gull and little gull demonstrated a shift from avoiding the area pre-construction to actually preferring it post-construction (Peterson, 2005). It is unlikely, therefore, that gulls would be deterred from the Thanet site and may in fact be attracted to it. **No impact** due to disturbance on these species is envisaged.

Terns

Studies at Horns Rev showed that like gulls, Common Tern and Arctic Tern *Sterna paradisaea* also demonstrated a shift from avoiding the area pre-construction to a preference to it post-construction (Peterson, 2005). Terns feed by shallow plunge dives and cannot alight on the surface of the water for any length of time, so the presence of structures to rest on and spot prey from, would make offshore wind farms potentially more attractive and easily exploitable areas compared with similar parts of the sea nearby.

The nearest breeding colonies to the site are at Burntwick Island in the Medway Estuary, approximately 50km northwest of Margate. Whilst they are tied to their breeding colonies, terns tend to forage offshore fairly close to them, for example, Cramp *et al* (1974) observed that in the case of Common Tern most feeding takes place within 3-10km of the coast. However, at Kentish Flats, some terns were found to be flying over 30km from the colonies to feed on sandbanks beyond the wind farm site (pers. comm. Paul Gill, Environmentally Sustainable Systems). Terns were seen only during the April boat surveys, whilst they were arriving back in the UK from their wintering grounds. Small numbers of Common and Sandwich Tern were seen, but were likely to be passing through the site on route to breeding sites further north. With the 2004-2005 surveys, it was thought that breeding terns from the Kent colonies would in fact use further inshore waters to feed, closer to their breeding sites, and the late summer build up of terns noted could be attributed to failed breeders followed by adults with fledged young. However, numbers were still low in terms of overall UK populations, and in practice, therefore, given that the site is only being used by small numbers of non-breeding individuals, any habitat loss or even potential gain bought about by the wind farm is unlikely to have any impact on tern populations.

Overall **no impact** on terns is anticipated from the operational wind farm.

Other Species

Other species that regularly used the Thanet site during 2004-2005 included fulmar and gannet.

With the exception of a small colony in the Channel Islands, gannets do not breed further south than Grassholm Island off the coast of Pembrokeshire. The nearest colony on the East Coast is at Bempton Cliffs in Yorkshire (Mitchell *et al,* 2004). The peak count of gannets at the site during the 2005-2006 winter period was 21 on 6th March 2006. It is likely that these birds were heading north to breeding colonies, and numbers

were low over the whole winter period, with a slight rise in the Spring. The 2004-2005 surveys showed limited use in the summer months, although these were mostly non-breeding immature individuals. At Horns Rev, studies indicated that gannets showed an increased avoidance of the site once the wind farm was operational (Peterson, 2005).

Although the breeding population of fulmars is also heavily skewed towards the north of England and Scotland, this is a species that has extended its range south significantly and they now breed in very small numbers around the Kent coast. Numbers recorded at the site over the winter were low, and were only between 10 and 20 between November and March 2006. However, the April counts were higher peaking at 78 on 20th April 2006, reflecting a passage of birds to breeding areas. With the exception of an unusually high count of 150 in August 2005, the April figures are the highest over the year. These figures are not significant in the context of the UK population and continuing success and range expansion of this species, although they are important in the regional context, as this is a rare breeding species in Kent.

The aerial surveys indicate fulmars do not exploit the site to a greater degree than anywhere else in the Thames Estuary SEA area. Furthermore, fulmars, like gulls, will also scavenge off fish trawlers, which is one of the reasons they have been so successful over the last 100-150 years, so they may be attracted to the Thanet site in the same way.

There does not appear to be any evidence to date of avoidance behaviour or otherwise by fulmar at any currently operational wind farm sites. Even if they were to be deterred from using the site to forage there are likely to be plenty of other feeding opportunities elsewhere in the Thames Estuary SEA area and beyond, especially given that in temperate and sub-arctic latitudes, fulmars can range as far as 320km from their breeding colonies to find food (Palmer, 1962 as cited in Cramp *et al,* 1977).

Overall it is considered that the operational wind farm would have **no impact** on gannets or fulmars as a result of disturbance and displacement effects.

Common scoter were not seen on the Thanet site during either the aerial or boat based surveys during the 2005-2006 winter period. They were only seen on three occasions at the Thanet site during the 2004-2005 surveys, with a mid-summer bias suggesting a small moulting flock. This is a species that has been shown to avoid wind farms (Peterson, 2005), but given the very low numbers present and only on sporadic occasions, **no impact** on this species is envisaged.

Table 8.27 summarises the likely responses to disturbance and displacement of all the seabird species and species groups observed at the Thanet site and the associated potential impact level.

Table 8.27 Likely disturbance and displacement impacts on seabirds using the Thanet site – 2004-2005 and 2005-2006 surveys

Species	Sensitivity to Disturbance	Likely Effect	Peak Population Estimate	Peak Raw Count	Impact Level
Divers	High	Strong Avoidance	**16**	**25**	Minor Adverse
Common Scoter	High	Strong Avoidance	**Sample size too small**	**15**	Negligible
Auks	Medium	Avoidance	**193**	**239**	Minor Adverse
Terns	Low	Preference	**48**	**23**	No Impact
Gulls	Low	Preference	**863**	**735**	No Impact
Gannet	Medium	Avoidance	**37**	**27**	Negligible
Fulmar	Low	Potential Preference	**33**	**78**	No Impact

8.5.3 Collision risk

The collision risk modelling undertaken for the Thanet site predicts the number of collisions per annum for each species by calculating the number of birds that could fly through the rotor swept volume over the course of a year, based on the boat based survey results and then assuming a range of avoidance rates from 0% to 99%. A 99% avoidance rate has been used for the purposes of this assessment because this is in line with the majority of published rates of collision avoidance, based on direct observations and calculated rates from existing wind farms (see **Tables 8.28** and **8.29**).

Table 8.28 Direction observations of avoidance

Direct observation of avoidance	
Avoidance rate	**References**
100% - Barnacle, Greylag, White-fronted geese (Sweden)	(Percival, 1998)
99.9% - Gulls (Belgium)	(Everaert *et al*, 2002, in Langston and Pullan, 2003)
99.8% - Common terns (Belgium)	(Everaert *et al,* 2002, in Langston and Pullan, 2003)
99.5% - Common terns avoidance rate for powerlines	(Henderson *et al*, 1996)
99% - migrating birds - diurnal and nocturnal data (Holland)	(Winkelman, 1992a)
97.5% - waterfowl and waders (Holland)	(Winkelman, 1992b, 1994)
87% - waterfowl and waders at night (Holland)	(Winkelman, 1990)

Table 8.29 Calculated avoidance rates

Calculated Avoidance Rate	
Avoidance rate	**References**
99% - avoidance reported for waterfowl, waders and cormorants i.e. recorded fatalities compared with measured utilisation rates	(Percival, 2001)
99% - waterfowl, waders and Cormorants (UK)	(Percival, 2001)
99% - Common eider, Herring gull, Great black-backed gull and Black-headed gull	(Still *et al,* 1999)

Table 8.30 summarises the results of the collision risk model for the worst case scenario, which is in this instance 60 wind turbines, as they have the greatest combined rotor swept volume. It also includes data from the Control and Survey Blocks together as a precautionary measure, when in reality birds seen in the former area would not be at risk from collision.

Table 8.30 Possible rates of collision for species using the Thanet site (2004-2005 surveys)

Species	No. of collisions per annum
Red-throated Diver	1
Fulmar	0
Gannet	1
Common Tern	0
Sandwich Tern	1
Kittiwake	1
Common Gull	17
Herring Gull	49
Lesser Black-backed Gull	32
Great Black-backed Gull	1
Gull sp..	23
Auks	0

The Collision Risk Model was not run again after the 2005-2006 surveys, as all species, with the exception of fulmar were recorded in lower numbers in the 2005-2006 winter period, than in the corresponding 2004-2005 period. It follows, therefore that the results of any model runs would generate the same predicted collision risk, or in some cases a lower risk. In the case of fulmar, the increase in numbers was a very small one, and fulmar tend to fly very low over the water, below the rotor swept area. Due to the relatively small numbers of birds involved, and the species' flight pattern, it was not considered necessary to re-run the model for this one species. Indeed, the 2004-2005 model indicated there would be no impact on this particular species for the same reasons as indicated here.

The results of the Collision Risk Model indicate that the wind farm would pose the biggest risk for gull species, with herring gull and lesser black-backed gull predicted to suffer the highest levels of mortality. It should be reiterated that the figures in **Table 8.30** are based on using the Control and Survey Blocks and furthermore that the boat based surveys are likely to have overestimated the number of gulls using the site. Furthermore, not every collision would result in a fatality. Even for gull species, the additional mortality as a result of collision was only 0.2% of the published background level of mortality. The mortality rates for all other species were less than 0.2% (BTO, 2005).

The Scottish Natural Heritage (2000) model is necessarily theoretical and makes a number of assumptions that may not be valid for all species including:

- It assumes a constant rate of movement throughout a 24hr period;
- It assumes that species present all year round use the site in the same way across all seasons;
- It cannot differentiate between different birds and the same bird visiting the site several times; and
- It makes no allowance for birds that would avoid the area completely or partially as a result of the wind farm being constructed.

The model is best used as a tool to indicate which species are likely to be the most vulnerable to collision and given these results a **moderate adverse** impact is anticipated for herring and lesser black-backed gull and **minor adverse** impact for all other species except for auks and fulmar for which there would be **no impact**.

8.5.4 Effects on migrants

Large scale migrations occur during spring and autumn as birds move across the North Sea between their wintering areas in the UK and breeding grounds in Scandinavia. These include numerous wildfowl and waders, as well as millions of passerines such as pipits, wagtails, warblers and thrushes. A proportion of these birds are likely to come into contact with the Thanet site and could be affected either directly as a result of collision risk or indirectly due to the “barrier effect” whereby individual birds avoid the wind farm by flying around it and in the process are deflected from their most direct route leading to an increase in energy expenditure. These effects are discussed further below.

Collision risk to waterfowl

Boat based surveys at the site in 2004-2005 identified few migrants, despite being present during peak migration periods. In the case of waterfowl, the sum total of birds amounted to ten geese and seven waders of four species. In the 2005-2006 surveys, only two duck sp. were seen on 12th January 2006, and a single Shelduck on 19th November 2005 and 20th April 2006. This is only a snapshot of the total migration occurring across the general area. Flocks of waterfowl were seen during the 2005-2006 aerial surveys but these were seen only around the coast. The 2004-2005 surveys showed a similar pattern of coastal use, but none around the Thanet site. The observations that were made in both survey periods included peak periods and the observers, who have a good knowledge of migration patterns around Thanet and north Kent, had expected more activity (pers. comm. Ian Harding, boat based surveyor). This suggests that only a very small proportion of the total spring and autumn passage is occurring directly through the Thanet site.

Studies to date at offshore wind farms in Denmark and Sweden have shown that mortality due to collision risk does not appear to be significant for migrant waterfowl that are passing through the site. For example, studies at a Swedish wind farm comprising seven wind turbines in the southern Kalmar Sound, situated at a point where the sound is 34km across, involved recording movements of over half a million migrating waterfowl during a four year period. The majority of birds were eider, but there were also other

ducks, geese and cormorants. Most flocks flew at least 1km from the wind turbines during this time. Furthermore, only one collision event was recorded over the whole four year study. This comprised four eiders from a flock of 300, of which three survived (Petterson, 2005).

More recently, studies of migratory birds at Nysted in Denmark found that geese and eiders, some of the species considered to be potentially most vulnerable to collision due to their comparative lack of manoeuvrability, were capable of negotiating large arrays of wind turbines. Birds were tracked with radar and it was observed that those entering the wind farm flew almost exclusively down the corridors between the wind turbine rows, with less than 1% flying close enough to the wind turbines to risk collision. The birds gave the wind turbines an even wider berth at night, with a preference for flying down the middle of the corridors. Many avoided the wind farm altogether, preferring to fly over or around them (Kahlert *et al,* 2004). It is, therefore, considered that given the relatively small numbers of birds crossing the Thanet site, combined with evidence indicating their ability to avoid the structures, a **minor adverse** impact would be anticipated on migrating waterfowl due to collision risk.

Collision risk to passerines

The situation is more difficult to judge in the case of migrating passerines and other land birds. At a distance of 12km offshore, all migration regardless of species can be expected to occur on a broad front, as there are no topographical features to concentrate birds into a particular area (Alerstrom, 1990). Given suitable weather conditions, land birds will fly at high altitudes and often at night, which takes them well beyond the range of the turbines but also makes them difficult to systematically observe. However, in certain weather conditions they may be forced to fly lower and can even be grounded in particularly poor weather, for example when fog banks occur over the North Sea. In these conditions, which are conducive to “falls” of migrants, it is not visually possible to undertake site surveys and make observations.

It has been suggested that the Thanet project could pose a collision risk to these birds at such times. In addition, bright lights do disorientate birds and there have been significant bird kills at lighthouses on headlands and offshore oil rigs, where birds are attracted by the light and are killed by colliding with the structure. Collision risk for small birds that have low adult survival and high productivity is not generally considered to be a significant issue, as populations have a far greater capacity to replace themselves than some of the long-lived, less productive species discussed in earlier sections. For significant numbers of collisions to occur, very large numbers of birds would need to pass through the wind farm. Generally, such concentrations are found in close proximity to shore since, as noted above, birds typically migrate offshore over broad fronts, but are then concentrated by features such as headlands, when attempting landfall (Alerstrom, 1990). Furthermore, structures out to sea can actually benefit exhausted and disorientated migrants during periods of poor visibility allowing them to perch and rest before moving on again when conditions have improved.

Overall, given that passerine migration is believed to generally occur on a broad front offshore, there are no topographical features that would funnel birds through the site, and that the species are adapted to withstand high levels of mortality, there is expected to be a **minor adverse** impact on migratory passerines and other land birds and even then only in conditions of bad weather and poor visibility during peak migration periods.

Barrier effect

Offshore wind farm studies have demonstrated that birds will more often chose to avoid wind farms rather than fly through them. Radar studies at Nysted offshore wind farm, found that where flocks of migrating geese and eider were involved, 40% of flocks in the survey area crossed the wind farm site before construction started and only 9% per cent ventured among the wind turbines once they were operating (Kahlert *et al,* 2004). This implies a physiological cost, as by detouring from what would otherwise be a more direct path, birds would have to travel further and expend more energy. Where individuals are already operating at their limits, this could theoretically tip the balance and be the difference between mortality and survival.

In practice, the size of the Thanet project is sufficiently small that the maximum distance a bird could be deflected from its natural path, allowing for a 1km buffer zone of avoidance around the wind farm, would be an additional 8-10km. In the context of the entire migration journey they are capable of undertaking, for example, across the North Sea, this detour would be unlikely to make the difference between survival and mortality, unless the condition of the individual is extremely poor, in which case survival would be unlikely even under natural conditions.

Overall a **negligible** impact on birds due to any barrier effect is anticipated.

8.6 Impacts during Decommissioning

Impacts during decommissioning are anticipated to be similar to the construction impacts associated with the Thanet project. The export cables would be left in-situ and, therefore, there would be **no impact** on the SPA.

8.7 Cumulative Impacts

8.7.1 Disturbance, displacement and collision risk

Five offshore wind farm projects including the Thanet project are either consented or currently proposed within the Thames Estuary area. Two Round One projects, namely Kentish Flats and Gunfleet Sands are consented and construction of the former has recently been completed. Of the Round Two projects, a consent application was submitted for London Array in June 2005 and for Greater Gabbard in October 2005 and a small extension to Gunfleet Sands.

As discussed previously, the most sensitive species to the Thanet project is considered to be the red-throated diver, because of its conservation status and susceptibility to anthropogenic disturbance. The Environmental Impact Assessments for Kentish Flats, Gunfleet Sands and London Array also take this view and the situation is likely to be the same for any other site in the Thames Estuary SEA area. **Table 8.31** provides information on these sites relating to the peak numbers of divers found there.

Table 8.31 Peak counts of divers for the Thames Estuary SEA area wind farms

Site Name	Number of Turbines	Stage	Status	Peak Diver Count / Population Estimate
London Array	271	Round 2	Application Submitted	7,849
Kentish Flats	30	Round 1	Constructed	62
Gunfleet Sands	30	Round 1	Consented	unknown
Greater Gabbard	Up to 140	Round 2	Application Submitted	98
Thanet	Up to 100	Round 2	Application Submitted	25

Given the extremely low numbers of divers found at the Thanet site throughout the winter, especially when compared with the other wind farm sites in the Thames Estuary SEA area, the capacity of the Thanet site to contribute to any cumulative wind farm impacts for this species is considered limited.

8.7.2 Barrier effect

It has already been discussed in **Section 8.5.4** that barrier effects are unlikely to have a significant impact when restricted to a single wind farm the size of Thanet, but if an individual bird was compelled to take similar deviations around other proposed wind farms in the Thames Estuary SEA area, the cumulative impact of this in terms of additional distance flown and energy expended may become significant.

The routes that migrants take across and around the Thames Estuary SEA area vary considerably between species groups and are heavily affected by the weather. Although much is known from ringing studies about eventual destinations at either end of migration routes, the movement of birds across offshore waters is less understood. It seems unlikely however, that birds would pass through all of the wind farm sites, as this would require several detours, which would be considered unlikely in the context of migrants, which prefer to take a direct route wherever possible. Nevertheless, it is possible that more than one wind farm could lie on a single migratory pathway. In this case, similar arguments can be applied for a single site, that is, the distance of the detour would still be small in comparison with the entire journey taken and unlikely to make the difference between survival and mortality. In addition, studies at Nysted wind farm show that migrants will on occasions chose not to detour and fly down the rows of the wind turbine array thus negating any barrier effects for these individuals (see **Section 8.5.4**).

8.8 Summary

In order to understand the ornithological interest at the Thanet site, monthly boat based surveys were undertaken between November 2004 and October 2005, with an additional round of surveys between November 2005 and April 2006 over the critical winter period, as agreed with English Nature and the RSPB. Aerial surveys of the whole Thames Estuary SEA area, including the Thanet site, were undertaken between October 2004 and June 2005, with an additional round of surveys between November 2005 and April 2006.

Seabirds observed in the site at varying densities during the winter 2005-2006 surveys, included *inter alia*, all three common British diver species, fulmar, gannet, guillemot and razorbill, kittiwake, several gull species and common and sandwich tern.

The surveys show that there are very few red-throated divers using the Survey or Control Blocks. Numbers were markedly low in comparison to populations discovered at other proposed and constructed wind farms in the Thames Estuary SEA area. Divers show a marked preference for the shallow waters often associated with sandbanks towards the inner Thames Estuary, which explains their reduced presence in the deeper waters around the Thanet site. Red-throated diver numbers appeared to be slightly lower than the 2004-2005 surveys, although with such small numbers involved, this difference is difficult to measure.

Small numbers of auks including razorbill and guillemot used the site throughout the winter but showed no preference for the area compared with other parts of the outer Thames Estuary SEA area.

Terns were absent until April 2006 when small numbers were seen on passage through the site. During the summer period of 2005, numbers were low in early summer, but peaked in late summer, suggesting the site is used by failed breeders and then adults and fledged young. Numbers, in terms of the overall UK population however, were low.

Gulls were the most common feature of the site, with herring and lesser black-backed gull forming the bulk of the numbers. Peak numbers counted may be artificially high due to the habits of these opportunistic species that actively seek out and follow survey vessels as a potential food source. Other seabirds recorded regularly at the site included fulmar, kittiwake and gannet. Common scoter were not seen at all during the 2005-2006 surveys.

The amount of visible migration that occurred through the site was low considering the site's proximity to the Thanet coastline, which is the most easterly point in Kent and a first point of landfall for a variety of species migrating across the North Sea. Only single figure numbers of blackbird, chaffinch, finch sp., house martin, meadow pipit, reed bunting, swallow and warbler sp. were seen passing through the site, apart from large numbers of starling during the November survey. Although this is only a snapshot of the number of migrants that could pass through the Thanet site, more birds would have been expected, especially during the November and April passage periods.

Noise levels and the presence of a number of construction vessels would be expected to disturb and displace seabirds using the area during construction of the Thanet project. Any impacts would be short term however, and given the low density of birds observed

using the site, and the availability of similar feeding areas close by, a **minor adverse** impact is predicted. Similar impacts would be expected during the decommissioning phase.

Some populations of feeding and roosting waders at Pegwell Bay could be disturbed during installation of the export cables. The impact of the cables would be limited to the construction period and would involve crossing the intertidal area for only a few days. However, construction will be timed outside the overwintering and passage periods to ensure that any disturbance impacts to waterfowl populations is minimised. **No impact** on overwintering species is anticipated during construction. The export cables would be left in situ during decommissioning, so **no impact** is expected.

It is considered that the potential for more significant impacts to birds occurs during the operation of the wind farm. Birds using the Thanet site could be affected in one or more of the following ways:

- Disturbance and displacement from feeding areas;
- Mortality through collision; and
- Barriers to movement.

Disturbance and displacement

Red-throated divers are the most susceptible species to disturbance and generally avoid areas of human activity. Some level of avoidance of the Thanet site by this species is expected, but even assuming complete vacation of the site, the impacts on the Thames Estuary SEA area population as a whole is expected to be minimal, given that so few birds would be involved. Studies of other operational wind farms have indicated some displacement but not complete avoidance. Other species seen at the Thanet site may also exhibit some avoidance of the site, although this is likely to be less marked than for red-throated divers. In most instances, numbers of birds using the site were either lower or unexceptional in comparison with other areas in the Thames Estuary SEA area and there are plenty of similar habitats close by to accommodate any birds that are displaced. There is some evidence to suggest that gulls and terns may actually be attracted to the site due to the opportunities to perch and rest on the structures.

Collision mortality

A full collision risk assessment was carried out using the boat based survey data and a range of risk scenarios for the 2004-2005 data set. For all of the species analysed, the peak numbers using the Thanet site were lower in the 2005-2006 surveys, with the exception of fulmar, whose numbers were slightly up. The model results from 2004-2005 indicated that divers were at low risk from collision due to their low flight heights. Auks flew so close to the water that not a single bird would be at risk form the wind turbine blades. Gulls were at the greatest risk of collision, but even for these species, the additional mortality rate as a result of collision was only 0.2% of the background mortality rate. The mortality rates for all other species were less than 0.2%. It can therefore be concluded that the collision risk would be the same or less than that calculated for the 2004-2005 data for which a **minor adverse impact** was predicted

Barrier effect

The wind farm could act as a barrier to birds crossing the site, particularly during migration. Recent studies undertaken at operational wind farms have shown that birds such as geese would not necessarily detour around the wind farm and a proportion would fly between the rows of the wind turbine array. Some birds would completely avoid the site and increase their journey as a result. However, it is considered that the increase in distance would be minor in comparison to the whole journey travelled and unlikely to mean the difference between survival and mortality, unless the individual's condition is so poor that survival would be unlikely under natural conditions.

The Thanet project is one of several proposed, consented and operational wind farms in the Thames Estuary SEA area that could act cumulatively to increase the level of impact on seabird and migrant populations. Red-throated diver, the most susceptible species, is present at the Thanet site in such low numbers that when compared with much larger populations at the other sites in the Thames Estuary SEA area, the potential to contribute significantly to any cumulative impacts is very limited. Migrants that might avoid the Thanet site due to barrier effects could also have to detour other wind farms, but again, the overall additional distance that could be travelled is still not thought to be significant in the context of the overall journey. As there is no increase in numbers from the 2004-2005 data, with a decrease noted in most cases, the collision risk will be no greater than that previously modelled for the 2004-2005 data.

Overall a **negligible** to **minor adverse** impact is anticipated on the ornithological interest of the Thanet site. The data set covering the overwintering period from November 2005 to March 2006 re-enforce the conclusions of the Thanet ES (Royal Haskoning, Nov 2005). No additional impacts from those reported are anticipated.

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