
**WINTERING BIRD SURVEYS
WEST WIGHT**

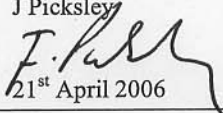
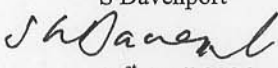
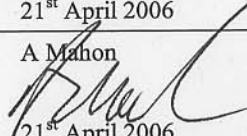
**for
YOUR ENERGY LIMITED**

April 2006

Terence O'Rourke

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Your Energy Limited

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1.0 Introduction

- 1.1 This report summaries the findings of bird survey work undertaken during the winter of 2005/2006 at Manor Farm, Wellow, on the Isle of Wight and in the wider area. Terence O'Rourke was commissioned by Your Energy Limited to undertake a number of ornithological surveys to provide baseline data to support an application to build a wind farm on farm land south of Wellow.
- 1.2 During 2003/2004 Jonathan Cox Associates undertook wintering and breeding bird surveys at the Manor Farm site. A meeting was held in November 2005 with Nikki Hiorns of English Nature and Dr, Colin Pope of the Isle of Wight Council. It was agreed that the winter bird survey should be repeated, as the status of some species of birds recorded from the site during 2003/04 was unclear. Specific mention was made of a large flock of golden plover recorded on site in November 2003.
- 1.3 The winter bird survey work commenced in November 2005 and the preliminary findings were made available to Isle of Wight Council, English Nature and the Royal Society for the Protection of Birds in January 2006. Due to the presence of golden plover on site in large numbers in both November and December, it was agreed that more intensive survey work was required.
- 1.4 A programme of weekly vantage point observations commenced in January 2006 to record flight activity of golden plover across the site. Survey work aimed at locating golden plover feeding in the wider area, particularly around Newtown, also commenced in January 2006.
- 1.5 The findings of the three ornithological surveys undertaken during the winter of 2005/2006 are set out in this report. The report is divided into four main sections, the first covering the winter bird survey and vantage point observations and the second the historic status of golden plover on the Isle of Wight and the findings of the surveys for golden plover outside the area affected by the proposed development. There then follows an evaluation of collision risk for annex 1 species using the Scottish Natural Heritage model. The final sections deal with the potential impacts of development on schedule 1 species, red list birds and any other notable species recorded.

2.0 Winter bird survey

2.1 Six visits were made to the site between November 2005 and March 2006. The dates, times and weather conditions during each survey, along with the number of species recorded during each visit, are shown in Table 1. The survey involved walking the whole site and recording all bird activity (seen or heard) on a large-scale map. The starting point for each of the six surveys was varied to ensure there was no bias relating to the time of day each part of the site was visited. All field boundaries and woodland on the site were walked.

Table 1: Dates, times and weather conditions for winter bird surveys

Survey date	Survey duration	Weather conditions	Number of species recorded
28/11/06	08:00 – 16:30	Sunny during morning, increasing cloud cover during afternoon. Light rain between 13:30-14:30. Light northerly breeze. Good visibility.	47
29/12/06	07:30 – 14:30	Mainly overcast, occasional sunny spells. Very light westerly breeze. Good visibility.	49
18/1/06	07:30 – 15:15	Overcast in morning, sunny spells between 11:00-13:00 then increased cloud after 13:00. Light westerly breeze. Good visibility.	42
15/2/06	07:30 – 13:30	Cloudy, cloud cover 7/8. Occasional sunny spells. Good Visibility. Moderate south-west breeze.	42
7/3/06	07:00 – 14:00	Cloud cover 8/8. Light to moderate rain all day. Light south-east breeze at 07:00 strengthening to moderate by 13:00. Good visibility.	41
21/3/06	07:25-15:00	Overcast all day. Light east-north-east breeze gradually strengthening throughout day. Gusty in afternoon.	48

2.2 The results of the survey are produced in Table 2 and maps showing the location of the species recorded can be found in Appendix 1. Notes on the species recorded are included where relevant.

Table 2: Species recoded during the winter of 2005/2006 from Manor Farm, Wellow

Species	Maximum count on any one visit	No. of surveys species recorded	Comments
Barn owl	1	1	A bird was flushed from a day roost in one of the small copses in late March.
Barnacle goose	6	1	Feeding with Canada geese by Tapnell Farm
Black headed gull	85	4	Variable numbers recorded feeding on fields.
Blackbird	43	6	Widespread all across site.
Blue tit	26	6	Frequently recorded in woodland and along hedges and ditches on site.
Bullfinch	1	2	A single bird was recorded near Wellow Farm in December. Another bird was recorded calling from Stony Copse in January.
Buzzard	12	6	Many registrations probably refer to multiple records of the same birds. Maximum count of birds together was 4 in January with 2 in November and December.
Canada goose	138	6	Feeding flocks of variable size recorded in fields east of Tapnell Farm in November, January and February. Only 2 birds were recorded in early March.
Carrion crow	45	6	Many registrations probably refer to multiple records of pairs. Maximum count of birds together was 20 in February
Chaffinch	107	6	The game cover strips on site held high numbers of chaffinch throughout the winter with a peak count of 107 in January. A flock of between 30-40 birds was recorded around Shalcombe Holding.
Collared dove	4	4	Recorded around dwellings bordering survey area.
Common gull	1	1	Single bird flying over site in December.
Coot	2	3	Present in November, February and March on ponds north of Churchills Farm.
Cormorant	1	2	Singles recorded flying across site in February and late March
Curlew	2	1	Recorded flying over pasture to south of survey area in November.
Dunnock	17	6	Widely distributed across site.
Feral pigeon	12	4	Recorded feeding on spilt grain near Dansbutt Cottages.
Fieldfare	83	6	Present in small, scattered groups across whole survey area. Flock of 80 birds recorded to south of Shalcombe in February.
Goldcrest	6	6	Present in small numbers in woodland and hedgerows.
Golden plover	535	3	A flock of 350 birds were present feeding on site, south-east of Dansbutt Cottages, in December. Flocks recorded regularly flying over site in November and December. Small numbers were recorded flying over the site in early March.
Goldfinch	9	4	Small numbers recorded flying over site.
Great spotted woodpecker	2	3	At least two different birds recorded during survey work in woodland on, or close to site.
Great tit	19	6	Frequently recorded from woodland, hedges and ditches on and around site.
Green woodpecker	1	1	A bird was calling on the northern edge of the site in late March.

Species	Maximum count on any one visit	No. of surveys species recorded	Comments
Greenfinch	15	6	Small numbers recorded around houses on edge of survey area or flying across site. Five displaying males recorded in Wellow in February.
Grey heron	2	2	Two birds were noted flying across the site in December. A single bird was flushed from a ditch in late March.
Grey partridge	3	3	Birds were recorded on the edge of the survey area during December. A pair was recorded on site during both March surveys.
Hen harrier	1	1	A ringtail bird was recorded in November hunting along hedges and ditches. A ringtail bird was also recorded during a preliminary site visit in November.
Herring gull	10	2	Recorded flying across site.
House sparrow	5	5	Recorded in low numbers around dwellings on edge of survey area.
Jack snipe	1	1	A single bird was flushed from a ditch in early March.
Jackdaw	127	6	c50 birds recorded leaving roost in Bouldnor Copse and heading south across site in December. Large flocks of 60 and 49 birds together around Tapnell Farm in February.
Jay	2	5	At least 2 birds present in copses on site.
Kestrel	3	6	At least 2 birds present in general area.
Lapwing	35	2	Small groups recorded flying across site.
Linnet	46	6	A flock of 31 birds recorded foraging in rape field in November. Only a single bird recorded in December. Flocks of 35 birds and 25 were recorded in January and February respectively.
Long-tailed tit	14	3	A group of 14 birds was recorded in January.
Magpie	6	6	Small numbers present across site.
Mallard	30	6	Totals include 6-8 feral/domesticated mallards on pond north of Shalcombe Holding.
Meadow pipit	72	6	Flock of 62 by quarry in December. A total of 38 birds were recorded on site in January
Merlin	1	2	A single bird recorded hunting passerines in December. A female was recorded in late March. A single bird was also recorded during a preliminary site visit in November.
Mistle thrush	2	4	Two birds recorded on site in November and a single bird in January, February and March.
Moorhen	1	1	A single bird was recorded on the ponds by Stony Copse in early March.
Peregrine	1	3	One bird recorded in December. Spent c6 minutes perched on ground in centre of wheat field. A bird was recorded hunting wood pigeons in February. A single bird drifted high over the site in late March. A single bird was also recorded during a preliminary site visit in November.

Species	Maximum count on any one visit	No. of surveys species recorded	Comments
Pheasant	20	6	
Pied wagtail	8	6	Birds present both on site and feeding around farm buildings bordering survey area.
Raven	2	3	A pair were recorded in November, December and January.
Red-legged partridge	25	6	Several sizable coveys recorded.
Redwing	12	2	Small numbers recorded in hedgerows and copses in November and December.
Reed bunting	3	5	Birds present along ditches and field boundaries in very small numbers.
Robin	31	6	Frequent along hedges and in copses on site.
Rook	368	6	c280 birds recorded leaving roost in Bouldnor Copse and heading south across site in December. Large flocks in fields around Tapnell Farm in February and around Shalcombe Holding in March.
Skylark	43	6	Small flocks (10-15) wintering on cereal fields.
Snipe	4	4	Birds flushed from ditches as well as recorded flying high over site.
Song thrush	58	6	Unusually high numbers particularly along ditches and other watercourses in early winter period.
Sparrowhawk	2	4	At least 1 bird regularly recorded hunting over area.
Starling	120	6	Numerous flocks of 20-40 birds recorded. Mainly feeding on pasture bordering survey area.
Stock dove	4	4	
Stonechat	13	5	Especially numerous during early winter period. Several birds wintering along ditches and field boundaries.
Teal	2	3	A bird was heard calling from ponds north of Churchills Farm in November. A pair was flushed from a ditch near Shalcombe Holding in early March, with a drake in the same area in late March.
Wood pigeon	1101	6	Sizable flocks present feeding on arable fields.
Wren	46	6	Abundant in copses, ditches and hedgerows.
Yellowhammer	95	6	Large flocks present particularly favouring rough grassland bordering eastern edge of site near Churchills Farm. Also recorded from game strips and feeding on spilt grain near Dansbutt Cottages.

2.3 A total of 63 species were recorded during the winter bird survey. This compares to a total of 51 species recorded during the winter of 2003/04. A copy of the 2003/04 wintering bird surveys can be found in Appendix 1. Forty-eight species were recorded on the site during the winters of 2003/04 and 2005/06. Whilst the majority of birds recorded on the site during the winter period are common and widespread species, a number of rarer species were recorded in both surveys including merlin, peregrine and golden plover.

2.4 A total of fifteen species were recorded on site during the winter of 2005/06, which had not been recorded during the 2003/04 survey work. These included common species such as pied wagtail and green woodpecker as well as scarce wintering species such as hen harrier and jack snipe.

2.5 Three species recorded during 2003/04 were not recorded during the 2005/06 surveys. These were pink-footed goose, wheatear and chiffchaff. Pink-footed geese are an extremely scarce visitor to the Isle of Wight and it is not surprising that the exceptional record of three birds made during December 2003 was not repeated during this survey. It is likely that the prolonged period of bitter easterly and northerly winds during mid-to-late March significantly delayed the arrival of early spring migrants to the Isle of Wight resulting in the absence of chiffchaff and wheatear during the winter bird surveys. Both species were recorded, either on or close to the site in late March, during the course of other survey work.

2.6 A number of non-passerines were recorded on site that are of significant conservation concern, particularly raptors and owls. A brief summary of the key species recorded during the 2005/06 winter bird surveys is given below.

Barn owl

2.7 A single bird was flushed from a day roost in thick ivy during the final winter bird survey (21/03/06). Another surveyor had flushed this bird from the same copse on 20/3/06. The previous week a barn owl had been flushed from thick ivy in Hummet Copse and subsequently two birds were recorded hunting over rough grassland just west of Shalcombe Holdings for approximately one hour. Several incidental records of hunting barn owl close to the quarry on the southern edge on the site were also made in March. It is likely that there is a territorial pair breeding close to the site and using the small copses on site as roost sites. It is likely that the rough grassland bordering the ditches on the site will also be used by hunting barn owls.

Peregrine

2.8 Peregrines were recorded three times on the site during the winter bird surveys. The large concentrations of prey species recorded on the site over the winter months, such as woodpigeons and game birds, is likely to prove attractive to these birds. A bird was recorded hunting woodpigeons in February whilst the other records relate to birds that appeared to be transient across the site. The cliffs around the Isle of Wight support a number of breeding pairs of peregrine and the records from the site are likely to relate to a resident breeding pair nearby.

Merlin

2.9 Merlin were recorded twice during the winter bird survey on the site. On both these occasions the birds were actively hunting passerines. Other records of this species were also made during the vantage point observations and during a preliminary site visit. At least two different birds were recorded during the winter, with an adult male recorded and a female bird present in late March. Merlins were also recorded during the 2003/04 winter bird survey, suggesting that the presence of this species on site is a regular occurrence.

2.10 The presence of large numbers of prey species on the site, including large flocks of finches, buntings and pipits is likely to explain the attractiveness of the site to this species. Merlins require extensive open ground for hunting and are likely to range widely over the whole island during the winter period. It is probably that the attractiveness of this site to hunting merlin will vary depending on the numbers of wintering passerines present each year.

Hen harrier

- 2.11 A ring-tail bird was recorded hunting along ditches and hedgerows in November. It is likely that this is also the bird that was recorded hunting over the site during the preliminary site visit in early November. This bird was not recorded again during the winter period.
- 2.12 A male hen harrier was recorded hunting over fields to the south and east of the site, around Shalcombe Holdings and Churchills Farm during a period of heavy snow in February. The main period of observed hunting activity took place outside the proposed site boundary. This bird was not recorded again during the survey work.
- 2.13 Hen harriers are a scarce winter visitor to the Isle of Wight and like merlin will range widely over open ground in search of prey. The areas of stubble and rough grassland along the ditches and around the quarry would provide suitable hunting habitat for this species, although there is no evidence to suggest that this species is regularly using this site for foraging.

Golden plover

- 2.14 The numbers of golden plover recorded during the winter bird surveys fluctuated widely. Large numbers were recorded in November and December (with a flock of 350 birds recorded in late December). The numbers recorded in the late winter period were much smaller with no birds recorded during January, February or late March. The status of golden plover on the Isle of Wight is discussed further in section 3.

Wintering passerine records

- 2.15 The wintering bird community recorded at Manor Farm during 2005/06 was broadly similar to that recorded during the previous wintering bird survey. However, the total numbers recorded for some species were higher than the previous survey work.
- 2.16 A particular feature of the early winter period was the very high numbers of song thrushes and blackbirds present along the ditches and hedgerows of the site. It is possible that these numbers were due to migrants (either from northern Britain or Europe) temporarily using the site whilst conditions were mild. As numbers of both thrushes dropped in the late winter period it is probable that these birds moved further south and west as cooler conditions became established after Christmas. Large numbers of song thrushes and blackbirds regularly winter in Ireland, France and Iberia.
- 2.17 Good numbers of yellowhammer and chaffinch were also a notable feature of the winter bird surveys, with peak counts of 95 and 107 respectively. The chaffinches were predominantly associated with the strips of game cover sown between the copses on site. A flock of 50-60 birds was regular here until early March. The farm buildings around Shalcombe Holdings also held a sizable concentration of chaffinches with 20-30 birds regular in this area.
- 2.18 The largest concentration of yellowhammers was found along the eastern boundary of the site, adjacent to Churchills Farm. The rough grassland strip and strips of stubble alongside the public footpath held a flock of 40-50 birds throughout the winter period. Smaller flocks of yellowhammer were recorded from the areas of game cover linking the copses on site and also around the barns south-east of Manor Farm.
- 2.19 The 2003/04 winter bird survey recorded very few linnets on the site. During the 2005/06 surveys a flock of approximately 35 linnets were regularly recorded in the north-eastern corner of the site. This flock was recorded foraging either on the remaining area of stubble or the fields of oilseed rape.

- 2.20 A feature of November and December surveys were the high number of stonechat present along the ditches and areas of rough grassland in and around the survey area. The numbers of stonechat recorded dropped steadily throughout the winter period and no birds were recorded during the final winter bird survey in late March. There is a general trend for inland breeders and those breeding in eastern England (as well as those breeding in northern Europe) to move westwards to winter. It is possible that some of the birds recorded during the early winter periods were birds that moved westwards later in the winter period.

Vantage point observations

- 2.21 A total of 40 hours of vantage point observations were made on the site between the 27th of January and the 30th of March 2006. The purpose of this work was to map any golden plover flights across the site during the period of observation. The site was checked briefly before the commencement of the vantage point work and the presence of any golden plover on site was recorded.
- 2.22 Each watch lasted for two hours, with a maximum of 8 hours observation undertaken in any one day. A short break was taken between the cessation of one set of observations and the commencement of another watch. The flight activity of golden plover across the site was recorded in three flight bands: less than 20m above ground, 20-100m above ground and above 100m. The duration of flights was also recorded. The main flight band in which activity was noted was recorded every 15 seconds. The dates, weather conditions and maps showing the direction of flights is can be found in Appendix 2.
- 2.23 Golden plover were recorded on site during nine vantage point watches (out of a total of 20 watches). No obvious pattern is discernible from the initial vantage point observations. Golden plover do not appear to be using the site for feeding on a regular basis, although birds were recorded feeding on the site on several occasions during the vantage point observations.
- 2.24 Movements of golden plover across the site do not show any regular pattern, suggesting that the area surveyed is not on a route used by birds moving between feeding and roosting areas. Out of the 20 flights recorded across the site, six were in a northerly direction, six in an easterly direction, five were of birds heading south with a single record of birds flying west. Two flights were of birds circling the site. The sightings during the vantage point work would indicate that although birds move across the site and use the fields for feeding on occasions, the area is not particularly favoured by golden plovers for feeding or roosting. More detailed evaluation of the behaviour recorded during the vantage point observations support this conclusion.
- 2.25 Tables showing the details of the flights of golden plover across the site recorded during the vantage point watches can be found in Appendix 2. The pattern and direction of flights recorded during the vantage point observations are shown on accompanying maps. The record of activity is listed in chronological order.
- 2.26 Golden plover were recorded in flight for a total of 22 minutes (the vantage point survey work totalled 40 hours of observation). The vast majority of this time, 18 minutes and 30 seconds, was spent below 100m, suggesting that the birds involved were undertaking localised movements between feeding and roosting areas. Very few birds were recorded above 100m. Birds flying at greater heights could be undertaking larger-scale movements than those recorded at lower heights. For example, golden plover are known to move further south and west in the UK in response to freezing conditions.
- 2.27 Birds were recorded flying less than 20m above the ground for a total of 8 minutes and 45 seconds. The patterns of these records varied. Some refer to small flocks flying straight

through the site, others to birds coming into the site to feed or roost. These flocks or individuals tended to circle around a number of times before alighting. This is typical behaviour of golden plover, which frequently circle areas with low and fast circuits before landing; this is presumably linked to some form of predator avoidance behaviour. The circling of areas either confuses potential avian predators or the plovers are searching for ground predators prior to landing.

- 2.28 Birds were recorded flying 20-100m above the ground for a total of 9 minutes 45 seconds. This height is nominally the flight band where birds are most at risk from collision with turbine blades. Most of the birds passing through at this height were in small groups flying through the site with no regular flight lines apparent from the observations made (two flights were recorded heading east, two flights heading south and a single flight heading west). A single bird was also recorded circling arable fields within the site boundary on one occasion. This bird spent nearly five minutes within the band 20-100m above ground level, persistently calling. It was assumed that this bird was attempting to locate a feeding or roosting flock. The behaviour of bird was very different to the majority of birds recorded in the 20-100m flight band.
- 2.29 Other species of conservation interest were recorded during the vantage point observations. Key species were considered to be those on Annex 1 of the EU Wild Bird Directive and all those species mentioned in the Ramsar and SPA citations for the Solent and Southampton Water. Tables in Appendix 2 show the flight details of those species recorded during the vantage point watches.

3.0 Golden plover on the Isle of Wight

Newtown Harbour (Wetland Bird Survey (WeBS) data)

- 3.1 Two WeBS data sets were obtained for Newtown Harbour from the British Trust for Ornithology. The first data set covers the period 1994-1999 and the second set covers the period 1999-2004. Data covering a ten-year period should be sufficient to detect trends in the wintering population.
- 3.2 The Newtown area has traditionally held a significant number of the wintering golden plover found on the Isle of Wight. The presence of golden plover in the Newtown area follows a well-established pattern. Passage birds generally begin to arrive in the Newtown area during August and numbers continue to build until November. Peak numbers occur between November and March and fall rapidly during April. Golden plover are generally absent from the Harbour between May and July. A summary of the high tide WeBS data is provided below. Full copies of the information provided by the BTO can be found in Appendix 3.

Table 3: Peak and average monthly counts of golden plover at Newtown Harbour (1994/1995 – 1998/1999)

Monthly counts of golden plover at Newtown Harbour (1994/1995 – 1998/1999)												
Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
5yr average count	243	284	135	7	0	0	0	3	18	48	60	118
5yr peak count	707	565	376	20	0	0	0	7	37	115	184	205

Table 4: Peak and average monthly counts of golden plover at Newtown Harbour (1999/2000 – 2003/2004)

Monthly counts of golden plover at Newtown Harbour (1999/2000 – 2003/2004)												
Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
5yr average count	527	377	317	3	1	0	0	4	5	105	409	593
5yr peak count	730	580	625	10	1	0	0	8	20	240	500	700

Table 5: Peak winter counts of golden plover in Newtown Harbour 1994/1995 – 2003/2004

Peak winter counts of golden plover at Newtown Harbour (1994/1995 – 2003/2004)										
Year	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Peak count	75	128	157	169	707	637	730	378	700	500
Month peak count made	December	March	December	March	January	January	January	January	December	November

- 3.3 WeBS counts are made at monthly intervals and cover the high tide period. For species such as golden plover, not reliant on inter-tidal areas, these counts may not present an accurate picture of use of an estuary by this species. A series of low tide counts were made during the winter of 1999/2000. The peak counts of golden plover made at low tide are shown in Table 6.

Table 6: Peak low-tide counts at Newtown Harbour during the 1999/2000 winter

Month	Nov	Dec	Jan	Feb
Peak count	801	483	1027	1449

- 3.4 The low-tide survey estimated there was a 262ha of preferred habitat for golden plover around Newtown estuary (inter-tidal and non-tidal habitat). The mean site count over the winter period was 940 giving a site density of 3.59 birds per ha. Golden plover was the second most abundant wader around Newtown estuary during the low tide period. Golden plover were concentrated on the enclosed saltmarsh and mudflats of Newtown NNR and the adjacent flats by the main Newtown River.

Isle of Wight Bird reports (1998-2003)

- 3.5 The Isle of Wight bird reports class golden plover as a locally common winter visitor. Highest counts are generally obtained from Newtown National Nature Reserve. The pattern at this site shows that the first wintering and passage birds appear in August and September. Numbers increase markedly during the early winter period (October – December) and remain high through until March. Typically only small numbers remain in the area in April and May. The table below shows the peak monthly counts obtained from Newtown NNR between 1998 and 2003.

Table 7: Peak monthly counts of golden plover at Newtown 1998 - 2003

Year	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May
1998	8	16	115	223	381	76	418	230	40	-
1999	8	16	212	465	650	800	700	600	-	-
2000	15	25	240	340	600	649	649	550	17	1
2001	1	16	194	400	450	730	550	-	1	2
2002	1	35	283	600	800	600	376	235	3	-
2003	4	25	230	513	550	500	150	20	60	-

- 3.6 Records away from the core site at Newtown NNR are rather sporadic with no regular concentrations of birds away from this area. The majority of records relate to small numbers of golden plover, typically less than 10 birds. However, high counts are occasionally made of birds at other sites including 400 birds at Thorness (Jan, 2001) and 275 birds in Thorness Bay (Dec, 2003). The only other three figure counts made between 1998 and 2003 were from Guyers Heath near Shalfleet (245 birds, Feb, 1998) and from the Western Yar (100 birds, Jan, 2003).
- 3.7 During the period 1998-2003 flocks of birds between 10 and 60 in number have been recorded at Wellow (1998), Atherfield (1998, 2001-2003), Thorness Bay (2002), Western Yar (2002), Benbridge (2002), Sandown airfield (2002), Afton Down (2003) and the River Medina (2001).

- 3.8 The pattern of records from the Isle of Wight bird reports shows that golden plover range widely over the Island during the winter months. It is notable that there are no large concentrations of golden plover regularly recorded away from Newtown Harbour. The wide scatter of records away from the Newtown area would indicate that the birds are not favouring particular areas of the Island during the winter months. This is interesting, as golden plover demonstrate a high level of site fidelity in feeding and roosting areas. The evidence available would indicate that Newtown is the key area for wintering golden plover on the island with limited movement away from this area over the winter. Flocks of golden plover away from Newtown may be either birds from the Newtown flock or from the wider population wintering along the Solent. It is likely that in some winters, the wintering population is supplemented by birds moving in response to hard weather in northern and eastern England or on the Continent. These birds are more likely to be seen away from traditional wintering areas.
- 3.9 An element of caution must be applied when attempting to use data from bird reports to establish the use of areas by birds. Records are submitted to the local recorders on a voluntary basis by enthusiasts, unless surveys such as WeBS or CBC work has been undertaken, the records submitted are essentially random observations by ornithologists. It is important to appreciate that a habitat such as farmland, with perceived low ornithological interest, is likely to be little visited by ornithologists especially during the winter months. Other aspects of observer bias also need to be considered such as the accessibility of land from footpaths, or viewing from roads. It should also be borne in mind that large flocks of birds, or birds in unexpected areas, are more likely to attract an observer's attention and be considered noteworthy. Therefore it is possible that small numbers of golden plover feeding in fields are under-recorded.

4.0 Wintering golden plover survey

- 4.1 In an attempt to clarify patterns of use of the wider area by golden plover a weekly survey was undertaken between January and March 2006. This survey was undertaken from footpaths and public roads and covered an area between Thorness, Yarmouth, Freshwater and Carisbrooke. The survey aimed to identify any golden plover flocks feeding within the survey area. Details of the dates, weather and the routes used during each of the surveys are included in Appendix 4.
- 4.2 The results of the survey were surprising with very few golden plover located despite extensive searching. The locations of the golden plover flocks located are show on maps in Appendix 4, along with full survey details. A summary of the golden plover flocks recorded is shown in the table below.

Table 8: Results of wintering golden plover survey

Date	Time	Location	Number	Associated species/comments
26/1/06	13:00	Field south of Ningwood Manor Farm	73	21 lapwing feeding with golden plover
26/1/06	14:00	Field near Thorley Copse	23	47 lapwing feeding with golden plover
26/1/06	16:20	Saltmarsh on River Yar	8	Birds roosting with 20 lapwing
2/2/06	08:00	Pasture south of Newport Road	23	Roosting
10/2/06	10:50 (37) 16:45 (101)	Field south of Ningwood Manor Farm	37 increasing to 101	74 lapwing feeding with golden plover

23/2/06	12:40 (25) 12:50 (14)	Within site boundary	25 and 14	Two separate single species groups
8/3/06	09:27	East of Afton	1	Single flying bird calling in fog
31/3/06	16:20	Rofford Marsh	4	Birds flying west

- 4.3 Given the size of the wintering population in and around Newtown, the most surprising aspect of the fieldwork was the lack of records of golden plover from this area. The Newtown area was visited in a variety of tidal conditions and the absence of records was unexpected. However, the findings of the survey show that golden plover are not frequently using the arable areas around the proposed wind farm. The surveys found no evidence that any wader species, even those regularly associated with farmland, such as lapwing, golden plover and curlew, are using arable fields and pasture around the proposed wind farm site for feeding or roosting.

5.0 Evaluation - Annex 1 species

Whooper swan

- 5.1 Whooper swans are uncommon winter visitors to southern England, generally in response to harsh weather conditions in northern Britain or continental Europe. The vast majority of the UK wintering population occur in Scotland, northern Britain and Northern Ireland. The most significant wintering population in southern England occurs on the Ouse Washes. Whooper swans winter on freshwater lakes and marshes and also feed on agricultural land. Small numbers of feral birds are also present in southern England throughout the year. The presence of Whooper swan on the Isle of Wight is unusual, and although the origins of the birds are unclear, they are treated as wild birds for the purposes of this assessment.
- 5.2 Whooper swans do not regularly winter on the Isle of Wight, or indeed along the Solent. The occurrence of this species on the island is likely to be highly erratic and influenced by weather conditions on the main wintering grounds in both the UK and the near Continent. There are no features within the proposed wind farm site that would prove particularly attractive to this species and it is concluded that the proposed wind farm poses no significant risk to this species.

Merlin

- 5.3 Wintering merlin are widespread in lowland England, although significant concentrations of birds away from traditional roost sites are rare. Birds generally winter at low densities, typically 1-3 birds per 10km², with the most recent estimates putting the wintering population in the region of 1,300 individuals. The wintering population comprises British breeders and a proportion of birds from the Icelandic breeding population. These birds hunt over coastal habitats and open farmland.
- 5.4 Hunting merlin were recorded from the proposed wind farm site on several occasions throughout the winter; at least two different individuals were identified during the surveys. Merlin is a scarce but regular winter visitor to the Solent and the presence of this species on site is not too surprising. These birds were presumably attracted by the large concentrations of wintering passerines on site and birds were recorded actively hunting passerines on two occasions. Merlin typically hunt low to the ground, relying on surprise to ambush potential prey, even on their breeding grounds this is not a species considered to have a high collision risk with turbines.

- 5.5 The installation of turbines on the site is unlikely to have a significant impact on wintering merlin using the site. This species will largely be hunting below the swept area of the turbine blades for the vast majority of the time, although occasionally pursuit flights may reach greater heights as passerines climb to avoid the pursuing merlin. The potential risk of collision could be minimised by ensuring areas likely to attract significant concentrations of passerines, such as set-aside and game cover strips, are situated well away from the turbines.

Peregrine

- 5.6 Peregrines are a resident breeder on the Isle of Wight and are increasingly widespread breeders along the coastal counties of southern England. This species is relatively sedentary with most ringing recoveries coming from within 100km of breeding sites. Juveniles do tend to move further than adults and will move to coastal locations to winter.
- 5.7 A number of sightings of peregrine were made during the survey work, birds were recorded flying over the site as well as hunting on site. The large flocks of woodpigeon present, feeding on oilseed rape, were a focus for hunting birds over the winter. There is no evidence that peregrine are regularly using the site for hunting and the sightings of birds are likely to relate to resident pairs breeding along the cliffs on the southern side of the Island. The flocks of woodpigeon would be attractive to hunting peregrine but the pigeon flocks recorded on site were not exceptional and similar large flocks were recorded from many arable areas.
- 5.8 Peregrines are fast and agile fliers and are considered to be at a relatively low risk of colliding with turbines. In the absence of any features that would prove particularly attractive to feeding peregrines on the site, there is no evidence that the use of this site by peregrines will be particularly high. Therefore the risk to peregrines from the proposed development is considered to be low.

Hen harrier

- 5.9 Hen harriers regularly winter along the Solent coast and are also present in good numbers in the New Forest and on the Dorset heaths throughout the winter. The wintering population in England during a typical winter is estimated to be in the region of 300 birds. The wintering population comprises British breeders that move from moorland breeding areas to lowland sites to winter and also some Continental birds. Saltmarsh is a particularly favoured hunting habitat for birds along with downland and lowland heath.
- 5.10 Harriers typically hunt low to the ground, covering areas by systematic quartering of habitats searching for small mammals and passerines. This relatively prosaic hunting method means these birds are generally well below the area swept by the turbine blades and have a low collision potential. The main concern relating to hen harriers is the risk of displaying birds colliding with turbines during their display flights, known as “sky-dancing”, which involved birds flying at much greater heights than typical hunting flights. Hen harriers do not breed on the Isle of Wight.
- 5.11 The birds observed on or close to the site (at least two individuals were recorded) were hunting along habitat features such as hedgerows, ditches and rough grassland. These are features that will support a higher density of prey compared to cultivated fields. Any potential risk to hen harrier can be minimised by ensuring habitats likely to support prey, such as conservation headlands, set-aside and game strips, are not located close to turbines. The risk of hunting birds colliding with turbines is likely to be minimal on this site.

Golden plover

- 5.12 Golden plover will use inter-tidal areas, although they are more frequent on arable and pasture during the winter months. This species feeds primarily on invertebrates, particularly beetles and earthworms. Most food is taken from the surface or by probing the top 2cm of earth. Surveys on the Humber Estuary have shown that wintering golden plover tend to be faithful to a few key areas for feeding and roosting around the estuary. These areas tend to be situated in either large tracts of arable land or on extensive mudflats. This pattern is similar to that shown on the Isle of Wight where the main wintering flock appears to demonstrate high site fidelity to Newtown Harbour.
- 5.13 Waders are known to feed both day and night, as the energy intake during daylight hours is not sufficient to balance energy budgets for many species. This is particularly prevalent in shorebirds feeding on inter-tidal areas, but has been little studied in species not dependent on inter-tidal feeding sites. Studies in Norfolk have shown that the diurnal habitat preferences of golden plover do not reflect nocturnal habitat choice and site selection. For example, the study found nocturnal feeding flocks of golden plover were present within the survey area during January-March 2002, yet the nearest flock during the day was 6km away.
- 5.14 To evaluate the use of the site by golden plover at night three visits were made during the survey period. Table 9 shows the details of the weather and findings of the nocturnal surveys.

Table 9: Nocturnal activity survey results

Date	Time of site	Weather conditions	Records
13/2/06	19:45 – 21:45	Overcast. Moderate south-west wind/ Temperature 9.5°C.	None
21/3/06	20:00 – 21:30	Clear. Moderate east breeze. Temperature 3°C falling to 1.5°C.	None
9/2/06	20:00 – 22:15	Clear. Light variable breeze. Temperature 0°C.	Calling snipe. Lapwing calling in flight.

- 5.15 There was no evidence from these surveys that golden plover were using the site for nocturnal feeding or roosting. Therefore the risk to this species is considered to relate primarily to the daylight hours and the assessment is based solely on daytime records.
- 5.16 A high proportion of the wintering golden plover on the Isle of Wight regularly occur around Newtown Harbour, with flocks typically numbering 500-700 birds although counts over 1000 have been made in some winters. The evidence available would suggest that the birds are relatively faithful to this area and large feeding flocks of golden plover away from Newtown are not a regular occurrence. It is likely that the high numbers of golden plover occasionally recorded away from Newtown Harbour are part of the Newtown flock. On this basis it is assumed, for the purpose of this assessment, that the flock of 350 birds recorded on the site in December originated from the Newtown Harbour flock.
- 5.17 Newtown Harbour forms part of the Solent and Southampton Water Special Protection Area (SPA) and Ramsar site. The site qualifies under a number of Articles of the Habitats Directive including 4.1 and 4.2, relating to breeding and wintering populations. The breeding populations of terns and Mediterranean gull, and wintering populations of dark-bellied brent geese, black-tailed godwit, ringed plover and teal within the Solent and Southampton Water SPA are of European importance.

- 5.18 Although not specifically mentioned in the SPA and Ramsar citations, the golden plover flock at Newtown estuary will form part of total waterfowl assemblage of the protected areas. The total wintering flock of the SPA is 53,948 individuals. Under Article 4.2, areas that regularly support assemblages of over 20,000 waterfowl are designated as wetlands of international importance.
- 5.19 Golden plover were recorded from the proposed wind farm site, in variable numbers, throughout the winter period. The vantage point work recorded a number of flights within, or across, the site below 100m suggesting that these were local movements, possibly birds originating from the Newtown Harbour area. The suitability of the site for feeding golden plover and the number of flights recorded mean it is possible that the proposed development of the wind farm could have an impact on a site of international importance for wintering birds.

6.0 Collision risk analysis

- 6.1 To evaluate the risk of significant impacts on Annex 1 birds recorded during the vantage point observations, collision risk modelling has been undertaken for three species: merlin, peregrine and golden plover. Although Whooper swan is an Annex 1 species, it is considered that due to the infrequency of wild birds on the Isle of Wight, collision risk modelling is unlikely to accurately reflect the true picture of potential risk. Collision risk modelling works on the assumption that birds will regularly be present within the wind farm area during the lifetime of the wind farm; this is clearly not the case with Whooper swans.

Merlin

- 6.2 The calculations for the collision risk for merlin are included in Appendix 5. An evaluation of the potential impacts on merlin, based on numbers present and ecology (see paragraphs 5.3 - 5.5) concluded that the risk of collision for this species was low. The collision risk model confirms these findings. The calculations are made using measurement of the largest merlins likely to be present in southern England i.e. female birds of the Icelandic race (*Falco columbarius subaesalon*). Using figures for the slightly smaller European race (*Falco columbarius aesalon*) or allowing for sexual dimorphism does not have any significant bearing on the collision risk assessment.
- 6.3 Running the collision risk model, assuming 95% avoidance, predicts a mortality rate of 0.27 birds over a 25-year period. The modelling supports the earlier conclusions that this species is at negligible risk from the proposed development. Although there remains the possibility that birds may collide with turbines, it is considered that the proposed development will have no significant impact on the wintering merlin population on the Isle of Wight.

Peregrine

- 6.4 Peregrine falcons are resident on the Isle of Wight and it is assumed that the birds recorded during the vantage point surveys were resident birds, although juveniles will typically range up to 100km from natal sites. An evaluation of the risk to peregrine from the proposed development concluded that the risk of collision for such an agile flier was relatively low. Peregrine are considered to be at most risk during the breeding season when both sexes will undertake display flights in the immediate vicinity of the nest site, including periods of high circling, undulating flights and mock sparring. The collision risk is based on observations during the winter period when the site is most likely to hold significant concentrations of prey species, such as large flocks of woodpigeons and thrushes. It is therefore possible that there will be an over-estimation of the use of the site during the summer months when prey species are less concentrated. The calculations made during the collision risk assessment are included in Appendix 5.

- 6.5 The collision risk model is run using measurements for a female of the nominate race of peregrine in the Western Palearctic (*Falco peregrinus peregrinus*), the race most likely to occur in winter on the Isle of Wight. The arctic populations (*Falco peregrinus calidus*) are slightly larger than the nominate race although these differences (along with sexual dimorphism) will not have a significant impact on the modelling. Running the collision risk model, assuming a 95% avoidance rate, predicts a mortality rate of 1 bird over a 25-year period. The modelling supports the conclusions reached, based on behavioural ecology, that this species is not at significant risk of collisions with turbines.
- 6.6 The loss of a single bird could be locally significant if the bird is from a resident breeding pair, particularly during the breeding season. However, it is considered that the densities of breeding peregrines along the south coast is sufficiently high to ensure that vacant territories will quickly become occupied, or unmated birds will attract new mates, with little long-term impact on the overall breeding population. Therefore, it is concluded that although there is a small risk to the local population from the proposed development, this is not sufficiently high to present significant danger to the local breeding and wintering population.

Golden plover

- 6.7 An evaluation based on the known distribution and feeding ecology of golden plover has indicated that the proposed development could have an adverse impact on wintering golden plover on the Isle of Wight. The feeding ecology of this species, foraging on farmland, forming cohesive feeding flocks and its tendency to undertake long circuits around feeding areas prior to landing (or if flushed) were considered to put this species at high risk of collision with turbines. The potential for significant mortality through collision is particularly significant for this species as it forms part of the total waterfowl flock for the Solent and Southampton Water SPA and Ramsar site.
- 6.8 The calculations made during the collision risk assessment are included in Appendix 5. The calculations are made using measurements for the largest golden plovers (*Pluvialis apricaria altifrons*), rather than *Pluvialis apricaria apricaria*, which breeds in the UK. It is assumed that a significant proportion of the wintering birds in the Solent area will be *Pluvialis apricaria altifrons*. Two different collision risk models have been run for golden plover for this site. This is due to a record on 24/2/06 when a single golden plover circled the site for nearly 5 minutes calling repeatedly. Much of this time, although away from the area identified for turbines, was a rotor height (20-100m). Small groups of golden plover had been recorded moving east at low level earlier in the morning and it is thought that this individual was attempting to locate a feeding or roosting flock. Similar behaviour was not recorded again during the vantage point observations and the inclusion of this bird in the collision risk model may artificially increase the predicted collision risk.
- 6.9 Due to the slightly anomalous behaviour of this bird two models were run for golden plover. The first model included all the golden plover flights recorded; the second removes the anomalous flight from the calculations. The collision risk model for all golden plover flights predicted annual mortality of 16 birds. Over a 25-year period the total predicted mortality is 368-450 birds. Based on counts from Newtown Harbour the local wintering golden plover population is typically in the region of 600 birds. Therefore, the predicted annual mortality of 16 birds represents 2.67% of the local population.
- 6.10 With the anomalous flight removed, but using the same assumptions for the total flights the model predicts an annual mortality rate of 7 birds. With this mortality rate, the predicted mortality over a 25-year period is 150-184 birds. Assuming an annual wintering population of 600 birds in the Newtown area, the predicted annual mortality represents 1.17% of the local wintering population.

- 6.11 The golden plover population around Newtown Harbour forms part of the total SPA and Ramsar waterfowl flock. The predicted annual mortality of the total SPA flock due to the proposed development would be 0.01-0.03% of the total SPA flock. There would be no displacement of feeding or roosting birds within the SPA/Ramsar site as a result of this development. The risk relates to birds, assumed to be from the SPA, utilising or flying over land outside these protected sites. Although no direct link between the Newtown flock and the birds recorded on the site has been established, for the purposes of the assessment it is taken that the birds recorded on site are associated with this flock.
- 6.12 The predicted annual mortality of golden plover represents a tiny percentage of the total SPA flock. The predicted mortality is more significant at a local level and is not considered that the losses predicted would have an adverse impact on the interest features of the European site.
- 6.13 The collision risk model demonstrates that a significant impact on the local golden plover population is likely as a result of the proposed development. The collision risk model can only give an indication of likely impacts and caution should be used when attempting to interpret results generated. Many variables will influence the potential collision risk during the lifetime of an operational wind farm. Cropping patterns will change on an annual basis and the attractiveness of fields to feeding and roosting golden plover will vary from year to year. Weather conditions both in the UK and the Continent will have an influence on the numbers and distribution of golden plover on the Island during the winter period. Fluctuations in the wintering population over the life time of the wind farm (cf. changes in mean wintering numbers from the WeBS data) will also have an influence on the potential risk.
- 6.14 The true level of avoidance and displacement of particular species by wind farms is unknown, and local weather conditions and the circumstances of flights through wind farms (e.g. birds flushed by predators or displaying) are also likely to have an influence on risk levels. The collision risk model presents a standard method of providing comparable results across different wind farms, allowing the evaluation of risk to avian populations.
- 6.15 Based on the fieldwork undertaken during January to March 2006, no significant impact is predicted on either the wintering merlin or breeding peregrine populations on the Isle of Wight. The collision risk model has highlighted the vulnerability of golden plover to collisions with turbines. The losses predicted represent a small, but significant percentage of the local golden plover population. The impact on the overall numbers of waterfowl in the SPA/Ramsar flock is not considered to be significant.

7.0 **Schedule 1 species**

Barn owl

- 7.1 Barn owls are widespread breeders on the Isle of Wight; the island supports some of the highest densities of breeding barn owls in England (10-30 pairs per 100km²). The increase in activity recorded in March would suggest that there is a breeding pair close to the proposed wind farm site. Most foraging activity in the breeding season is within 1km of the nest site, with barn owls recorded foraging up to 4.5km away from breeding sites during winter. Barn owls feed almost exclusively on rodents, particularly voles, and employ a similar hunting technique to harriers, systematically quartering suitable habitat listening for prey.
- 7.2 As barn owls typically hunt low to the ground the risk of collision with turbines will be low, only in exceptional circumstances will barn owls be flying at a height that would mean they were in danger of entering the area swept by the turbine blades. Birds are most likely to be using the areas of rough grassland and set-aside for hunting. Once the wind farm is

operational, ensuring that these areas are situated away from the turbines could reduce the risk of potential collision with turbines.

8.0 Red list species

- 8.1 The majority of wintering birds on the site, featured on the red list of Species of Conservation Concern are passerines: song thrush, skylark, starling, linnet, house sparrow, bullfinch and reed bunting. Grey partridge were also recorded from the site.
- 8.2 None of these species are considered to be at significant risk of collision with wind turbines. With the exception of skylark and grey partridge, the wintering populations of these birds were found away from the arable fields. Appendix 1 includes maps showing the winter distribution of all these species.
- 8.3 Starlings were recorded in good numbers during the survey work. However, the most significant flocks recorded were using the pasture around Shalcombe Holdings and Tapnell Farm for feeding. Birds were also recorded from around the houses in Wellow and Thorley Street. Many pairs are likely to nest in these houses. Apart from flights across the site, at the present time, there is no evidence to suggest that the proposed wind farm is used to a significant degree by starlings. Similarly, house sparrows were recorded around the periphery of the survey area, associated with human dwellings, and are not considered to be at risk from this proposed development.
- 8.4 Only two records of bullfinch were made during the survey work, both came from areas with mature trees and dense hedgerows. This species forages within woodland and scrub and is not known to breed on the site. Due to the habitat requirements of this species, and the fact the turbines will be located in arable fields, the risk of collision with turbines is extremely low.
- 8.5 Song thrushes were widespread across the site in the early winter period, but numbers were significantly lower in the late winter. This species was strongly associated with the streams, ditches and areas of game cover on site. High numbers were recorded from the streams in particular, where presumably the running water and thick vegetation supported high populations of invertebrates. Due to the preference for habitats associated with the margins of the cultivated area, there is minimal risk to song thrushes of collision with turbines. The small numbers of reed buntings recorded during the survey work also favoured the rough grass strips alongside the streams. As with song thrushes, the preference of this species for habitats associated with the margins of arable fields would suggest that the risk of collisions with turbines is low.
- 8.6 Skylark was recorded widely across the site and occurred mainly on arable fields and set-aside. The sightings show that this species was recorded from the majority of arable fields and it is considered that skylark will use all the fields within the survey area over the winter period for foraging. During the winter skylarks forage on the ground for seeds and plant material and most flights between feeding areas will be below the area swept by the turbine rotors. This species is far more likely to be at risk of collision with turbines during the spring when males undertaking territorial song-flights will ascend to 50-100m.
- 8.7 Linnet and grey partridge were the other two species strongly associated with the open arable land. The linnet flock was regularly recorded from the area of set-aside in the north-west of the site. Small numbers were also recorded from the areas of game cover. A pair of grey partridge was noted regularly on arable just south of Wellow (mainly during the vantage point work).

- 8.8 Grey partridge will feed on arable land and is likely to nest in strips of rough grassland or hedgerows. As with many of the partridge family, flight is low and rapid with birds rarely attaining heights over 10m. Therefore the risk of collision with turbine blades is considered to be negligible.
- 8.9 Linnets will occur widely across the site taking advantage of seed sources as they become seasonally available. This species is particularly dependent on weed seeds such as those of Polygonaceae, Cruciferae, Caryophyllaceae and Compositae. Linnets will undertake localised movements across the site in search of food sources but these are unlikely to be at a significant height. Most flights would be below the area swept by the turbine rotors and therefore the risk of collision is minimal.
- 9.0 **Other records**
- 9.1 Few other species of note were made during the survey work. Species potentially vulnerable to collision with turbines included Canada and barnacle geese, common buzzard, common snipe and jack snipe. The majority of birds recorded during winter bird surveys were passerines that are considered to have a low risk of collision with turbines.
- 9.2 The pasture at Tapnell Farm regularly held a flock of feeding Canada geese, these birds were also recorded on the Yar and localised movements between the two sites appeared to occur. Only on one occasion was a small group of Canada geese recorded crossing the proposed wind farm site. Geese have good eyesight and are generally capable of avoiding turbines in good weather, however, there is a risk of collision with turbines in poor weather conditions such as rain or fog. There is the possibility therefore that some of these birds may be at risk of collision with turbines when crossing the site. However, there is no evidence of regular movement across the site by these birds, most of the regular movement appeared to be between the Yar and Tapnell Farm. Therefore, although there is potential for collisions to occur the risk is likely to be low, due to the low incidence of birds crossing the site.
- 9.3 The record of six barnacle geese occurred in February and coincided with the record of Whooper swan. This species is a rare winter visitor the southern England. However the patterns of arrivals of wild birds is confused as several feral populations are well established in southern England and this species has regularly been recorded breeding in Hampshire. It is likely that these birds were feral, although the fact they were not recorded subsequently, and that they arrived at the same time as Whooper swans raises the possibility these were wild birds.
- 9.4 Although monotypic, the three breeding populations of barnacle geese winter in distinct areas. The Svalbard population, estimated to be in the region of 24,000 birds, winters on the Solway Firth. The Greenland population winters on islands along the coast of western Scotland and western Ireland (estimated to be 38,500) and the northern Russian population (176,000 birds) winters predominantly in the Netherlands. It is possible that the record of birds from Tapnell Farm relates to birds moving from the Netherlands in response to freezing conditions. If these birds were wild it is an exceptional record for the Isle of Wight. Due to the scarcity of wild birds on the Isle of Wight, it is considered that the risk of collision with turbines over the lifetime of the wind farm is extremely low.
- 9.5 The ditches and streams on site were found to support small numbers of snipe, with a single record of jack snipe (probably a passage bird). Both species are considered to be at low risk of collision with turbines, except during the breeding season when drumming males climb up to 50m high during display flights. The wintering population will undertake localised movements between feeding areas, but these are likely to be below rotor height and the risk of collision, especially for birds capable of rapid twists and dives, is considered to be very low.

- 9.6 Common buzzard were regularly recorded around the site and it is likely that areas such as Brightstone Forest and Bouldner Copse support breeding pairs. Although regularly recorded across the site, no large counts were made and activity over the site appeared to be similar to that of the surrounding area. It is likely that hunting birds will be active across the site throughout the year, with birds using the woodland as well as hunting for rabbits, birds and invertebrates across the arable areas. This species is relatively agile and is not generally considered to be at high risk of collision with turbines. The highest risk of collision is likely to occur in autumn in the period immediately following post-fledging dispersal. The absence of a resident breeding pair on the site reduces this potential risk significantly.

10.0 Conclusions

- 10.1 The wintering bird survey found the overall bird community within the survey area to be broadly similar to previous surveys. The majority of species recorded were not considered to be at risk of collision with operational turbines and the impacts of the proposed development are considered to be negligible.
- 10.2 A number of scarce raptors were recorded on site during the winter. Hen harrier and merlin were considered to have low risk of collision with turbines due to their characteristic low level hunting techniques. Some habitat manipulation within the site during the operation of the wind farm is recommended to further reduce risk, by ensuring habitats that hold concentrations of prey are located away from the turbines.
- 10.3 Peregrine falcons were also recorded on site during the winter. Although it was concluded that there was a low risk of this species colliding with turbines, any mortality of peregrine could be locally significant as it is likely to relate to local breeding birds. This impact was considered to be significant at a local level in the short-term. However, it was concluded that the mortality rates predicted using the collision risk model were highly unlikely to have any significant long-term impact on breeding peregrines locally.
- 10.4 Golden plover were recorded throughout the winter period within the study area. The numbers recorded flying through the site mean that there is the potential for relatively high annual mortality rates caused by collisions with turbines. Although the potential mortality rates are not considered significant when assessed against the total waterfowl numbers using the Solent and Southampton Water SPA and Ramsar, they are locally significant. Golden plover is the only species considered to be particularly vulnerable to collision with turbines based on the fieldwork collected at this site.

Appendix 1

Results of Winter Bird Survey

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Appendix 2

Results of Vantage Point Surveys

Table 1: Dates, weather conditions and sightings summaries for vantage point watches

Date	Watch number	Weather conditions	Golden plover recorded	Other species of interest recorded
27/1/06	1	Overcast. Cloud cover 8/8. Moderate north-east wind (BF4)	4 flights	None
27/1/06	2	Overcast. Cloud cover 8/8. Moderate north-east wind (BF4-5)	3 flights	None
9/2/06	3	Sunny at start of watch with increasing cloud. Cloud cover 1/8 increasing to 7/8. Very light north-westerly (BF1)	None	None
9/2/06	4	Increasingly sunny with decreasing cloud. Cloud cover 6/8 at start of watch increasing to 0/8 after 10:40. Very light north-westerly (BF1)	None	Merlin – 1 flight
9/2/06	5	Sunny, occasional high cloud. Very light north-westerly (BF1)	None	Whooper swan – 1 flight Merlin – 1 flight
9/2/06	6	Sunny, occasional high cloud. Very light north-westerly (BF1)	None	Peregrine – 1 flight Whooper swan – 1 flight
13/2/06	7	Misty with cloud cover 6/8 – 8/8. Mild with moderate south-west wind (BF4-5)	None	None
13/2/06	8	Misty with light rain for 10 minutes from 15:45. Cloud cover 8/8. Mild with moderate south-west wind (BF4-5)	None	None
24/2/06	9	Overcast, cloud cover 8/8 with snow flurries 07:25-09:25. Moderate NE breeze (BF5)	4 flights	None
24/2/06	10	Overcast with occasional sunny spells. Cloud cover 6/8. Heavy snow shower 10:40-10:55. Moderate east-northeast breeze (BF4-5)	1 flight	None
2/3/06	11	Bright and sunny. Cloud cover 2/8. Moderate south-west breeze (BF3-4)	3 flights	None

Date	Watch number	Weather conditions	Golden plover recorded	Other species of interest recorded
2/3/06	12	Mainly sunny. Cloud cover 3/8. Light south-west breeze (BF3 dropping to BF1)	1 flight	Barn owl – 1 flight
6/3/06	13	Sunny spells. Cloud cover 5/8. Moderate south-west breeze (BF3-4)	None	None
7/3/06	14	Light to moderate rain until 16:00. Misty after 16:00 with visibility below 150m at times. Gusty south-east wind (up to BF5/6).	2 flights	None
15/3/06	15	Cloudy and still. Cloud cover 7/8.	None	None
15/3/06	16	Cloudy with occasional sunny spells. Cloud cover 7/8 Very light north-east breeze developed (BF2)	None	Lapwing – 1 flight
23/3/06	17	Sunny with cloud gradually developing 4/8 by 10:00. Light south-east breeze (BF2-3)	1 flight	None
23/3/06	18	Initially sunny spells with increasing cloud 7/8 by 11:00. Strengthening south-east wind (BF3-5)	None	None
30/3/06	19	Low cloud and slightly misty. Cloud cover 8/8. Moderate south south-west breeze (BF5)	1 flight	None
30/3/06	20	Overcast and increasingly misty (viability down to 500m at times). Frequent rain showers after 16:15. Blustery south – south west breeze.	None	None

Table 2: Golden plover activity recorded during vantage point watch number 1 (see map 19)

Date: 27/1/06

Time:09:00 -11:00

Weather conditions: Overcast. Cloud cover 8/8. Moderate north-east wind (BF4)

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	4	96	210	75	-	285	Flock of 32 birds (maybe same flock seen twice)

Table 3: Golden plover activity recorded during vantage point watch number 2 (see map 20)

Date: 27/1/06

Time: 11:20 -13:20

Weather conditions: Overcast. Cloud cover 8/8. Moderate north-east wind (BF4-5)

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	3	c99	135	-	-	135	Lost sight of final flock (c40 birds) whilst still flying

Table 4: Golden plover activity recorded during vantage point watch number 9 (see map 21)

Date: 24/2/06

Time:07:25 -09:25

Weather conditions: Overcast, cloud cover 8/8 with snow flurries 07:25-09:25. Moderate NE breeze (BF5)

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	4	32	45	420	210	675	

Table 5: Golden plover activity recorded during vantage point watch number 10 (see map 22)

Date: 24/2/06

Time: 09:35 – 11:35

Weather conditions: Overcast with occasional sunny spells. Cloud cover 6/8. Heavy snow shower 10:40-10:55. Moderate east-northeast breeze (BF4-5)

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	1	1	15	45		60	

Table 6: Golden plover activity recorded during vantage point watch number 11 (see map 23)

Date: 2/3/06

Time: 13:35 – 15:35

Weather conditions: Bright and sunny. Cloud cover 2/8. Moderate south-west breeze (BF3-4)

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	3	81	45	45		90	Flock of 14 birds recorded twice (possibly same birds)

Table 7: Golden plover activity recorded during vantage point watch number 12 (see map 24)

Date: 2/3/06

Time: 16:00 – 18:00

Weather conditions: Mainly sunny. Cloud cover 3/8. Light south-west breeze (BF3 dropping to BF1)

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	1	7	15			15	

Table 8: Golden plover activity recorded during vantage point watch number 14 (see map 25)

Date: 7/3/06

Time: 14:45 – 16:45

Weather conditions: Light to moderate rain until 16:00. Misty after 16:00 with visibility below 150m at times. Gusty south-east wind (up to BF5/6).

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	2	c48	45			45	

Table 9: Golden plover activity recorded during vantage point watch number 17 (see map 26)

Date: 15/3/06

Time: 06:50 – 08:50

Weather conditions: Cloudy and still. Cloud cover 7/8.

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	1	3	15			15	

Table 10: Golden plover activity recorded during vantage point watch number 19 (see map 27)

Date: 30/3/06

Time: 13:50 – 15:50

Weather conditions: Low cloud and slightly misty. Cloud cover 8/8. Moderate south south-west breeze (BF5)

Target Species	Number of records	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Golden plover	1	c50	30			30	

Table 11: Annex 1 bird activity recorded during vantage point watch number 4 (see map 18)

Date: 9/2/06

Time:

Weather conditions: Increasingly sunny with decreasing cloud. Cloud cover 6/8 at start of watch increasing to 0/8 after 10:40. Very light north-westerly (BF1)

Target Species	Number records of	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Merlin	1	1	15	60	45	120	Probably same bird. Chasing skylark on one occasion

Table 12: Annex 1 bird activity recorded during vantage point watch number 5 (see map 18)

Date: 9/2/06

Time:

Weather conditions: Sunny, occasional high cloud. Very light north-westerly (BF1)

Target Species	Number records of	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Merlin	1	1	15	60	45	120	Probably same bird. Chasing skylark on one occasion
Whooper swan	1	3	30	105	60	195	Same group of birds seen on two occasions

Table 13: Annex 1 bird activity recorded during vantage point watch number 6 (see map 18)

Date: 9/2/06

Time:

Weather conditions: Sunny, occasional high cloud. Very light north-westerly (BF1)

Target Species	Number records of	Number of birds	Below 20m	20 - 100m	100m	Total flight time	Comments
Whooper swan	1	3	30	105	60	195	Same group of birds seen on two occasions
Peregrine	1	1	15	105	75	195	

Appendix 3

WeBS data and low-tide counts for Newtown Harbour

Five year summary for Newtown Estuary

Table 1: Total Counts - All Species Combined.

Peak monthly total = maximum of the sum of the counts of all species within each month.

Seasonal peaks = sum of the maximum counts of all species within each season.

Year	Peak Monthly Total	Spring Peak	Autumn Peak	Winter Peak
94/95	10001 (JAN)	1714	3749	10481
95/96	7103 (DEC)	1148	3304	9439
96/97	7517 (DEC)	1010	3094	9068
97/98	5934 (JAN)	1746	3181	8767
98/99	8013 (JAN)	2562	3505	11446
MEAN		1636	3367	9840

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Five year summary for Newtown Estuary

Table2: Five-year average monthly counts of each species.

Figure in parentheses give number of complete and incomplete counts upon which the average is based. Incomplete counts are excluded from calculation where, if included, they would depress the mean.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Great Northern Diver	0(4,.)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Little Grebe	0(3,1)	0(2,2)	0(2,3)	1(3,2)	3(4,1)	4(1,4)	3(4,1)	7(5,.)	9(4,1)	9(3,2)	8(2,3)	6(5,.)
Great Crested Grebe	1(3,1)	1(2,2)	0(2,3)	0(3,2)	0(5,.)	0(1,4)	0(4,1)	2(5,.)	1(4,1)	2(3,2)	1(2,3)	0(5,.)
Red-necked Grebe	0(3,1)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Slavonian Grebe	0(3,1)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(3,2)	1(2,3)	0(5,.)
Black-necked Grebe	0(4,.)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(3,2)	0(5,.)	0(5,.)
Cormorant	3(3,1)	3(2,2)	2(2,3)	4(3,2)	4(4,1)	6(1,4)	3(4,1)	5(5,.)	4(4,1)	3(3,2)	3(2,3)	2(5,.)
Little Egret	3(3,1)	2(2,2)	2(2,3)	6(3,2)	23(4,1)	29(1,4)	17(4,1)	10(5,.)	11(4,1)	5(3,2)	5(2,3)	4(5,.)
Grey Heron	0(3,1)	2(2,2)	2(2,3)	3(3,2)	4(4,1)	5(1,4)	4(4,1)	3(5,.)	2(4,1)	2(3,2)	0(2,3)	0(5,.)
Mute Swan	7(3,1)	6(2,2)	3(2,3)	2(3,2)	2(4,1)	2(1,4)	4(4,1)	2(5,.)	4(4,1)	3(3,2)	2(2,3)	5(5,.)
European White-fronted Goose	0(4,.)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Greylag Goose (re-established)	0(3,1)	2(2,2)	0(2,3)	1(3,2)	0(4,1)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Bar-headed Goose	0(4,.)	0(2,2)	0(2,3)	0(3,2)	0(4,1)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)
Canada Goose	13(3,1)	18(2,2)	95(2,3)	89(3,2)	26(4,1)	194(1,4)	88(4,1)	31(5,.)	80(4,1)	85(3,2)	45(2,3)	17(5,.)
Barnacle Goose (naturalised population)	0(4,.)	0(4,.)	0(2,3)	1(3,2)	0(4,1)	0(1,4)	0(4,1)	0(5,.)	0(4,1)	1(3,2)	0(2,3)	0(5,.)
Dark-bellied Brent Goose	11(3,1)	3(2,2)	1(2,3)	0(3,2)	0(4,1)	0(1,4)	158(4,1)	876(5,.)	1360(4,1)	1348(3,2)	1299(2,3)	676(5,.)
Shelduck	98(3,1)	29(2,2)	44(2,3)	5(3,2)	5(4,1)	16(1,4)	43(4,1)	194(5,.)	377(4,1)	543(3,2)	377(2,3)	182(5,.)
Wigeon	0(3,1)	0(2,2)	0(2,3)	0(3,2)	0(4,1)	41(1,4)	346(4,1)	709(5,.)	1071(4,1)	1215(3,2)	900(2,3)	408(5,.)
Teal	7(3,1)	0(2,2)	0(2,3)	0(3,2)	32(4,1)	280(1,4)	701(4,1)	737(5,.)	1064(4,1)	1142(3,2)	684(2,3)	297(5,.)
Mallard	7(3,1)	8(2,2)	11(2,3)	3(3,2)	15(4,1)	6(1,4)	31(4,1)	24(5,.)	34(4,1)	31(3,2)	11(2,3)	13(5,.)
Pintail	0(3,1)	0(2,2)	0(5,.)	0(5,.)	0(4,1)	7(1,4)	29(4,1)	52(5,.)	76(4,1)	74(3,2)	60(2,3)	17(5,.)
Shoveler	0(3,1)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(1,4)	1(4,1)	3(5,.)	3(4,1)	13(3,2)	2(2,3)	1(5,.)
Eider	0(3,1)	0(2,2)	0(5,.)	0(5,.)	0(4,1)	0(1,4)	0(4,1)	1(5,.)	1(4,1)	0(3,2)	0(2,3)	0(5,.)
Common Scoter	0(4,.)	0(4,.)	0(5,.)	0(3,2)	0(4,1)	0(1,4)	0(4,1)	0(5,.)	0(4,1)	0(3,2)	0(5,.)	0(5,.)
Goldeneye	0(3,1)	0(2,2)	0(5,.)	0(5,.)	0(5,.)	0(1,4)	0(4,1)	5(5,.)	13(4,1)	15(3,2)	13(2,3)	6(5,.)
Red-breasted Merganser	4(3,1)	0(2,2)	0(5,.)	0(5,.)	0(4,1)	0(1,4)	2(4,1)	29(5,.)	31(4,1)	22(3,2)	20(2,3)	11(5,.)
Goosander	0(4,.)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Water Rail	0(4,.)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(1,4)	0(4,1)	0(5,.)	0(4,1)	0(3,2)	0(5,.)	0(5,.)
Moorhen	2(3,1)	5(2,2)	6(2,3)	6(3,2)	11(4,1)	3(1,4)	6(4,1)	6(5,.)	4(4,1)	4(3,2)	4(2,3)	8(5,.)
Oystercatcher	39(3,1)	29(2,2)	34(2,3)	36(3,2)	61(4,1)	73(1,4)	67(4,1)	71(5,.)	59(4,1)	57(3,2)	73(2,3)	49(5,.)
Ringed Plover	1(3,1)	2(2,2)	2(2,3)	2(3,2)	36(4,1)	49(1,4)	26(4,1)	18(5,.)	12(4,1)	11(3,2)	8(2,3)	7(5,.)
Golden Plover	7(3,1)	0(2,2)	0(2,3)	0(3,2)	3(4,1)	18(1,4)	48(4,1)	60(5,.)	118(4,1)	243(3,2)	284(2,3)	135(5,.)
Grey Plover	8(3,1)	9(2,2)	4(2,3)	11(3,2)	86(4,1)	76(1,4)	77(4,1)	89(5,.)	123(4,1)	148(3,2)	188(2,3)	128(5,.)
Lapwing	2(3,1)	3(2,2)	8(2,3)	44(3,2)	65(4,1)	76(1,4)	134(4,1)	527(5,.)	935(4,1)	874(3,2)	536(2,3)	37(5,.)
Knot	23(3,1)	0(2,2)	3(2,3)	0(3,2)	1(4,1)	5(1,4)	5(4,1)	12(5,.)	6(4,1)	108(3,2)	44(2,3)	92(5,.)

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Five year summary for Newtown Estuary

Table2: Five-year average monthly counts of each species.

Figure in parentheses give number of complete and incomplete counts upon which the average is based.
Incomplete counts are excluded from calculation where, if included, they would depress the mean.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Sanderling	0(3,1)	0(2,2)	0(5,.)	0(5,.)	0(4,1)	0(1,4)	0(4,1)	0(5,.)	0(5,.)	0(3,2)	1(2,3)	0(5,.)
Little Stint	0(4,.)	0(4,.)	0(5,.)	0(3,2)	0(4,1)	3(1,4)	1(4,1)	1(5,.)	0(4,1)	0(5,.)	0(5,.)	0(5,.)
Curlew Sandpiper	0(3,1)	0(4,.)	0(2,3)	0(3,2)	0(4,1)	1(1,4)	0(4,1)	0(5,.)	0(4,1)	0(5,.)	0(2,3)	0(5,.)
Dunlin	14(3,1)	37(2,2)	2(2,3)	10(3,2)	76(4,1)	94(1,4)	68(4,1)	1103(5,.)	847(4,1)	1089(3,2)	1066(2,3)	446(5,.)
Ruff	0(3,1)	0(2,2)	0(5,.)	0(3,2)	0(4,1)	0(1,4)	0(4,1)	0(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Jack Snipe	0(3,1)	0(2,2)	0(5,.)	0(5,.)	0(5,.)	0(1,4)	0(4,1)	1(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Snipe	1(3,1)	0(2,2)	1(2,3)	0(3,2)	1(4,1)	1(1,4)	3(4,1)	17(5,.)	13(4,1)	14(3,2)	12(2,3)	23(5,.)
Woodcock	0(4,.)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,1)	0(3,2)	0(5,.)	0(5,.)
Black-tailed Godwit	112(3,1)	0(2,2)	0(2,3)	4(3,2)	36(4,1)	71(1,4)	98(4,1)	107(5,.)	111(4,1)	103(3,2)	231(2,3)	170(5,.)
Bar-tailed Godwit	1(3,1)	0(2,2)	1(2,3)	0(3,2)	0(4,1)	0(1,4)	1(4,1)	1(5,.)	0(4,1)	0(3,2)	1(2,3)	1(5,.)
Whimbrel	23(3,1)	6(2,2)	1(2,3)	4(3,2)	6(4,1)	3(1,4)	0(4,1)	0(5,.)	0(4,1)	0(3,2)	0(2,3)	0(5,.)
Curlew	62(3,1)	8(2,2)	49(2,3)	198(3,2)	254(4,1)	344(1,4)	282(4,1)	177(5,.)	283(4,1)	275(3,2)	327(2,3)	202(5,.)
Spotted Redshank	1(3,1)	0(2,2)	0(2,3)	0(3,2)	0(4,1)	1(1,4)	2(4,1)	1(5,.)	2(4,1)	4(3,2)	2(2,3)	1(5,.)
Redshank	24(3,1)	19(2,2)	14(2,3)	29(3,2)	97(4,1)	122(1,4)	84(4,1)	78(5,.)	86(4,1)	128(3,2)	82(2,3)	50(5,.)
Greenshank	1(3,1)	1(2,2)	1(2,3)	1(3,2)	5(4,1)	18(1,4)	2(4,1)	2(5,.)	1(4,1)	1(3,2)	1(2,3)	1(5,.)
Common Sandpiper	0(3,1)	0(2,2)	0(2,3)	2(3,2)	4(4,1)	8(1,4)	0(4,1)	0(5,.)	0(4,1)	0(3,2)	1(2,3)	0(5,.)
Turnstone	0(3,1)	1(2,2)	0(2,3)	2(3,2)	7(4,1)	9(1,4)	9(4,1)	10(5,.)	4(4,1)	8(3,2)	12(2,3)	12(5,.)
Mediterranean Gull	5(3,1)	1(2,2)	0(2,3)	0(3,2)	0(4,1)	0(1,4)	0(5,.)	0(5,.)	0(4,1)	0(3,2)	6(2,3)	5(5,.)
Black-headed Gull	1055(3,1)	1087(2,2)	942(2,3)	485(3,2)	596(4,1)	463(1,4)	478(4,1)	104(5,.)	132(4,1)	656(3,2)	923(2,3)	816(5,.)
Common Gull	0(4,.)	0(4,.)	0(5,.)	0(5,.)	0(4,1)	0(1,4)	0(4,1)	0(5,.)	1(4,1)	2(3,2)	3(2,3)	0(5,.)
Lesser Black-backed Gull	0(3,1)	1(2,2)	11(2,3)	0(3,2)	1(4,1)	1(1,4)	2(4,1)	1(5,.)	0(4,1)	2(3,2)	1(2,3)	0(5,.)
Herring Gull	5(3,1)	11(2,2)	48(2,3)	8(3,2)	25(4,1)	52(1,4)	72(4,1)	14(5,.)	29(4,1)	37(3,2)	12(2,3)	11(5,.)
Great Black-backed Gull	3(3,1)	4(2,2)	3(2,3)	2(3,2)	1(4,1)	5(1,4)	10(4,1)	4(5,.)	6(4,1)	2(3,2)	2(2,3)	4(5,.)
Sandwich Tern	3(2,1)	2(2,2)	1(2,3)	0(3,2)	0(4,1)	0(1,4)	1(4,1)	0(5,.)	0(5,.)	0(4,.)	0(2,2)	0(3,.)
Common Tern	3(2,1)	14(2,2)	12(2,3)	19(3,2)	18(4,1)	13(1,4)	2(4,1)	0(5,.)	0(5,.)	0(4,.)	0(4,.)	0(3,.)
Little Tern	0(2,1)	2(2,2)	1(2,3)	1(3,2)	0(4,1)	0(1,4)	0(5,.)	0(5,.)	0(5,.)	0(4,.)	0(4,.)	0(3,.)
Kingfisher	0(3,1)	1(2,2)	0(2,3)	0(3,2)	0(4,1)	0(1,4)	1(4,1)	0(5,.)	1(4,1)	1(3,2)	1(2,3)	0(5,.)

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Five year summary for Newtown Estuary
Table3: Five-year peak monthly counts of each species.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Great Northern Diver	0	0	0	0	0	0	0	1	1	1	0	0
Little Grebe	0	0	0	2	5	4	7	13	13	16	12	8
Great Crested Grebe	2	1	0	0	0	0	0	3	1	3	3	2
Red-necked Grebe	0	0	0	0	0	0	0	0	0	1	1	1
Slavonian Grebe	0	0	0	0	0	0	0	0	1	0	2	1
Black-necked Grebe	0	0	0	0	0	0	0	0	1	0	0	0
Cormorant	4	4	3	9	4	10	4	8	5	3	4	4
Little Egret	5	2	3	9	34	34	24	16	16	7	6	8
Grey Heron	1	2	3	5	7	5	5	3	2	3	0	1
Mute Swan	8	6	4	3	4	2	6	3	4	4	4	8
European White-fronted Goose	0	0	0	0	0	0	0	0	1	0	0	0
Greylag Goose (re-established)	0	6	0	3	0	0	0	0	0	1	1	0
Bar-headed Goose	0	0	1	1	0	0	0	0	0	0	0	0
Canada Goose	17	18	125	122	91	194	350	104	122	166	71	26
Barnacle Goose (naturalised population)	0	0	0	3	0	0	0	0	0	2	0	0
Dark-bellied Brent Goose	22	4	3	1	0	1	374	1090	1676	1559	1483	931
Shelduck	144	37	53	12	9	18	63	244	510	672	643	284
Wigeon	0	0	0	1	0	102	499	1018	1281	1369	1068	862
Teal	13	0	0	0	52	280	917	1287	1226	1609	1000	655
Mallard	9	8	12	6	19	12	43	64	54	48	18	29
Pintail	0	0	0	0	0	14	52	68	102	113	91	50
Shoveler	0	0	0	0	0	0	2	12	6	30	3	2
Eider	1	0	0	0	0	0	0	6	4	1	1	0
Common Scoter	0	0	0	0	0	0	0	1	0	0	0	0
Goldeneye	1	0	0	0	0	0	0	7	18	18	22	13
Red-breasted Merganser	9	0	0	0	0	0	5	43	38	34	29	14
Goosander	0	0	0	0	0	0	0	1	0	1	0	0
Water Rail	0	0	0	0	0	0	0	0	1	0	0	0
Moorhen	4	6	7	12	23	3	8	10	7	5	5	11
Oystercatcher	52	31	42	41	77	79	81	84	95	71	82	59
Ringed Plover	3	3	2	3	57	59	54	26	49	32	14	15
Golden Plover	20	0	0	0	7	37	115	184	205	707	565	376
Grey Plover	14	18	7	42	102	96	113	126	154	180	194	187
Lapwing	4	4	24	64	99	90	249	1164	1175	1349	711	150
Knot	70	0	5	0	1	5	9	26	18	206	115	278
Sanderling	0	0	0	0	0	0	0	0	0	0	1	0
Little Stint	0	0	0	0	0	3	1	3	0	0	0	0

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Five year summary for Newtown Estuary
 Table3: Five-year peak monthly counts of each species.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Curlew Sandpiper	0	0	0	0	0	4	0	0	0	0	0	0
Dunlin	28	42	3	18	96	119	120	1650	982	1750	1125	724
Ruff	0	0	0	0	0	1	0	1	0	0	0	0
Jack Snipe	0	0	0	0	0	0	0	3	1	1	0	1
Snipe	2	0	1	0	3	3	12	37	19	29	22	77
Woodcock	0	0	0	0	0	0	0	0	1	0	0	0
Black-tailed Godwit	212	0	0	10	61	87	128	148	198	313	365	318
Bar-tailed Godwit	1	1	1	0	0	1	1	2	0	0	2	4
Whimbrel	64	16	1	6	11	12	0	0	0	0	0	0
Curlew	133	11	96	252	303	344	406	235	391	420	366	309
Spotted Redshank	3	0	0	0	1	2	5	2	8	6	3	2
Redshank	29	25	16	40	121	122	96	142	115	141	107	69
Greenshank	1	1	1	2	10	18	4	3	5	2	2	1
Common Sandpiper	1	1	0	4	5	8	1	0	1	0	1	1
Turnstone	1	3	1	7	18	11	17	15	9	18	16	22
Mediterranean Gull	14	4	0	0	0	0	0	0	0	1	6	17
Black-headed Gull	2128	1691	1500	545	1134	530	1500	217	250	1400	1283	2634
Common Gull	0	0	0	0	0	0	1	0	3	6	7	0
Lesser Black-backed Gull	0	2	21	1	2	1	5	3	1	4	1	2
Herring Gull	11	14	57	11	37	52	200	27	53	48	17	26
Great Black-backed Gull	4	4	6	2	2	8	25	14	14	4	3	13
Sandwich Tern	3	2	1	0	1	0	3	0	0	0	0	0
Common Tern	6	30	22	32	36	17	8	0	0	0	0	0
Little Tern	0	2	2	2	0	0	0	0	0	0	0	0
Kingfisher	0	2	0	0	1	1	2	1	1	2	1	1

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Five year summary for Newtown Estuary

Table 4a: Five-year spring peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	Mean Peak
Great Crested Grebe	2 (APR)	1 (MAY)	0	(0)	0	1
Cormorant	2 (APR)	(4) (APR)	3 (APR)	(4) (MAY)	3 (APR)	3
Little Egret	2 (APR)	(5) (APR)	4 (APR)	(0)	0	3
Grey Heron	2 (MAY)	2 (MAY)	1 (JUN)	(3) (JUN)	1 (APR)	2
Mute Swan	6 (APR)	(5) (APR)	7 (APR)	(5) (MAY)	8 (APR)	7
Greylag Goose (re-established)	0	(0)	0	(6) (MAY)	0	2
Bar-headed Goose	0	0	0	(1) (JUN)	0	0
Canada Goose	41 (JUN)	(125) (JUN)	108 (JUN)	(99) (JUN)	(102) (JUN)	95
Dark-bellied Brent Goose	22 (APR)	(6) (APR)	4 (APR)	(4) (MAY)	6 (APR)	11
Shelduck	144 (APR)	(82) (APR)	81 (APR)	(53) (JUN)	68 (APR)	98
Teal	4 (APR)	(9) (APR)	13 (APR)	(0)	0	7
Mallard	9 (JUN)	7 (MAY)	12 (JUN)	(4) (MAY)	7 (APR)	9
Eider	0	(0)	1 (APR)	(0)	0	0
Goldeneye	0	(0)	1 (APR)	(0)	0	0
Red-breasted Merganser	9 (APR)	(3) (APR)	1 (APR)	(0)	2 (APR)	4
Moorhen	7 (JUN)	6 (MAY)	4 (APR)	(2) (JUN)	(1) (JUN)	6
Oystercatcher	30 (JUN)	(52) (APR)	40 (APR)	(39) (JUN)	43 (APR)	41
Ringed Plover	2 (JUN)	3 (MAY)	3 (APR)	(2) (MAY)	0	2
Golden Plover	20 (APR)	(0)	0	(0)	0	7
Grey Plover	18 (MAY)	(1) (APR)	6 (APR)	(3) (MAY)	3 (APR)	9
Lapwing	4 (APR)	(6) (JUN)	2 (APR)	(24) (JUN)	1 (APR)	7
Knot	70 (APR)	(0)	0	(0)	0	23
Dunlin	32 (MAY)	42 (MAY)	5 (APR)	(1) (MAY)	0	20
Snipe	2 (APR)	(1) (APR)	1 (APR)	(0)	0	1
Black-tailed Godwit	212 (APR)	(94) (APR)	125 (APR)	(0)	0	112
Bar-tailed Godwit	1 (APR)	(0)	1 (APR)	(0)	(1) (MAY)	1
Whimbrel	2 (MAY)	(11) (APR)	6 (APR)	(16) (MAY)	64 (APR)	24
Curlew	133 (APR)	(35) (APR)	18 (APR)	(96) (JUN)	35 (APR)	71
Spotted Redshank	3 (APR)	(0)	0	(0)	0	1
Redshank	29 (APR)	(21) (APR)	24 (APR)	(16) (JUN)	19 (APR)	24
Greenshank	1 (APR)	(1) (APR)	0	(0)	1 (APR)	1
Common Sandpiper	0	(0)	0	(0)	1 (APR)	0
Turnstone	1 (MAY)	(1) (JUN)	1 (APR)	(3) (MAY)	0	1

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Table 4a: Five-year spring peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	Mean Peak
Mediterranean Gull	0	(0)	0	(0)	14 (APR)	5
Black-headed Gull	831 (MAY)	600 (MAY)	465 (JUN)	(1321) (JUN)	2128 (APR)	1069
Lesser Black-backed Gull	1 (MAY)	(5) (JUN)	21 (JUN)	(2) (MAY)	0	7
Herring Gull	57 (JUN)	(9) (JUN)	39 (JUN)	(21) (JUN)	(12) (JUN)	48
Great Black-backed Gull	2 (APR)	4 (MAY)	4 (JUN)	(4) (MAY)	(6) (JUN)	4
Sandwich Tern	2 (MAY)	(2) (APR)	3 (APR)	(1) (MAY)	2 (APR)	2
Common Tern	10 (MAY)	3 (MAY)	6 (APR)	(16) (JUN)	(30) (MAY)	13
Little Tern	1 (MAY)	2 (MAY)	0	(0)	(2) (JUN)	1
Kingfisher	0	(0)	0	(0)	(2) (MAY)	1

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Five year summary for Newtown Estuary

Table4b: Five-year autumn peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	Mean Peak
Little Grebe	7 (OCT)	5 (AUG)	3 (AUG)	3 (AUG)	4 (SEP)	4
Cormorant	(10) (SEP)	(4) (JUL)	9 (JUL)	(4) (OCT)	4 (SEP)	8
Little Egret	16 (OCT)	(34) (SEP)	21 (AUG)	34 (AUG)	26 (SEP)	26
Grey Heron	7 (AUG)	4 (OCT)	(5) (SEP)	5 (JUL)	4 (SEP)	5
Mute Swan	4 (AUG)	(2) (JUL)	6 (OCT)	(5) (OCT)	5 (OCT)	5
Greylag Goose (re-established)	(3) (JUL)	(0)	0	0	0	1
Bar-headed Goose	(0)	(0)	0	1 (JUL)	0	0
Canada Goose	91 (AUG)	(82) (JUL)	122 (JUL)	(350) (OCT)	194 (SEP)	189
Barnacle Goose (naturalised population)	(3) (JUL)	(0)	0	0	0	1
Dark-bellied Brent Goose	43 (OCT)	5 (OCT)	209 (OCT)	(66) (OCT)	374 (OCT)	158
Shelduck	63 (OCT)	25 (OCT)	16 (OCT)	(58) (OCT)	53 (OCT)	43
Wigeon	144 (OCT)	499 (OCT)	332 (OCT)	(203) (OCT)	409 (OCT)	346
Teal	622 (OCT)	917 (OCT)	654 (OCT)	(334) (OCT)	610 (OCT)	701
Mallard	39 (OCT)	43 (OCT)	30 (OCT)	(12) (SEP)	13 (OCT)	31
Pintail	(5) (SEP)	49 (OCT)	12 (OCT)	(52) (OCT)	30 (OCT)	36
Shoveler	0	0	0	0	2 (OCT)	0
Red-breasted Merganser	2 (OCT)	0	1 (OCT)	(1) (OCT)	5 (OCT)	2
Moorhen	23 (AUG)	10 (AUG)	12 (JUL)	(5) (OCT)	(6) (AUG)	15
Oystercatcher	63 (AUG)	77 (AUG)	81 (OCT)	(65) (SEP)	67 (SEP)	72
Ringed Plover	(59) (SEP)	24 (AUG)	57 (AUG)	16 (AUG)	44 (SEP)	40
Golden Plover	(0)	4 (AUG)	77 (OCT)	(37) (SEP)	115 (OCT)	65
Grey Plover	102 (AUG)	113 (OCT)	104 (OCT)	78 (AUG)	51 (SEP)	90
Lapwing	106 (OCT)	249 (OCT)	(47) (SEP)	(165) (OCT)	123 (OCT)	161
Knot	6 (OCT)	(1) (SEP)	9 (OCT)	1 (AUG)	5 (SEP)	5
Little Stint	(0)	1 (OCT)	1 (OCT)	0	3 (SEP)	1
Curlew Sandpiper	(0)	(0)	(4) (SEP)	0	0	1
Dunlin	86 (AUG)	120 (OCT)	87 (OCT)	96 (AUG)	80 (SEP)	94
Ruff	(0)	(0)	(1) (SEP)	0	0	0
Snipe	12 (OCT)	3 (AUG)	1 (OCT)	(3) (SEP)	0	4
Black-tailed Godwit	(87) (SEP)	128 (OCT)	68 (OCT)	(45) (OCT)	117 (OCT)	104
Bar-tailed Godwit	(1) (SEP)	1 (OCT)	(1) (SEP)	0	0	1
Whimbrel	11 (AUG)	7 (AUG)	3 (JUL)	(12) (SEP)	(8) (AUG)	8
Curlew	303 (AUG)	375 (OCT)	406 (OCT)	(224) (SEP)	344 (SEP)	357

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Five year summary for Newtown Estuary

Table 4b: Five-year autumn peak counts, and month in which this was recorded, of each species.

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Species	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	Mean Peak
Spotted Redshank	1 (AUG)	(2) (SEP)	5 (OCT)	(2) (SEP)	0	2
Redshank	91 (AUG)	121 (AUG)	96 (AUG)	(85) (OCT)	122 (SEP)	108
Greenshank	4 (AUG)	4 (OCT)	2 (JUL)	10 (AUG)	18 (SEP)	8
Common Sandpiper	3 (AUG)	1 (AUG)	5 (AUG)	5 (AUG)	8 (SEP)	4
Turnstone	(11) (SEP)	13 (OCT)	18 (AUG)	7 (JUL)	7 (SEP)	11
Black-headed Gull	1500 (OCT)	(320) (SEP)	536 (AUG)	1134 (AUG)	545 (JUL)	929
Common Gull	0	0	1 (OCT)	0	0	0
Lesser Black-backed Gull	1 (AUG)	2 (AUG)	(1) (SEP)	1 (JUL)	5 (OCT)	2
Herring Gull	200 (OCT)	37 (AUG)	32 (OCT)	(18) (SEP)	52 (SEP)	80
Great Black-backed Gull	(8) (SEP)	(3) (SEP)	10 (OCT)	(3) (OCT)	25 (OCT)	18
Sandwich Tern	(0)	1 (OCT)	1 (OCT)	(3) (OCT)	(1) (AUG)	2
Common Tern	12 (AUG)	(17) (SEP)	7 (AUG)	36 (AUG)	22 (JUL)	19
Little Tern	(0)	(0)	0	2 (JUL)	2 (JUL)	1
Kingfisher	(0)	1 (AUG)	(1) (SEP)	0	2 (OCT)	1

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Five year summary for Newtown Estuary

Table 4c: Five-year winter peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	Mean Peak
Great Northern Diver	1 (JAN)	0	0	0	1 (NOV)	0
Little Grebe	(7) (FEB)	(12) (FEB)	16 (JAN)	(13) (DEC)	11 (DEC)	14
Great Crested Grebe	(2) (FEB)	(3) (FEB)	3 (NOV)	3 (NOV)	3 (JAN)	3
Red-necked Grebe	1 (JAN)	0	0	0	0	0
Slavonian Grebe	0	0	1 (MAR)	0	2 (FEB)	1
Black-necked Grebe	0	0	0	0	1 (DEC)	0
Cormorant	5 (NOV)	4 (NOV)	5 (DEC)	4 (NOV)	8 (NOV)	5
Little Egret	12 (DEC)	16 (NOV)	6 (NOV)	9 (NOV)	12 (NOV)	11
Grey Heron	3 (NOV)	3 (NOV)	3 (NOV)	3 (NOV)	2 (NOV)	3
Mute Swan	4 (DEC)	4 (DEC)	4 (DEC)	6 (MAR)	8 (MAR)	5
European White-fronted Goose	1 (DEC)	0	0	0	0	0
Greylag Goose (re-established)	0	(1) (JAN)	0	0	0	0
Canada Goose	166 (JAN)	104 (NOV)	50 (DEC)	58 (FEB)	56 (DEC)	87
Barnacle Goose (naturalised population)	2 (JAN)	0	0	0	0	0
Dark-bellied Brent Goose	1559 (JAN)	(1475) (JAN)	1676 (DEC)	(1472) (JAN)	1180 (DEC)	1472
Shelduck	672 (JAN)	(577) (JAN)	(643) (FEB)	(317) (JAN)	324 (JAN)	554
Wigeon	1200 (JAN)	1009 (DEC)	1165 (DEC)	1018 (NOV)	1369 (JAN)	1152
Teal	1609 (JAN)	1226 (DEC)	934 (DEC)	1287 (NOV)	1286 (JAN)	1268
Mallard	23 (NOV)	64 (NOV)	54 (DEC)	(19) (DEC)	29 (MAR)	43
Pintail	(91) (FEB)	(80) (JAN)	113 (JAN)	(102) (DEC)	59 (DEC)	91
Shoveler	30 (JAN)	4 (NOV)	7 (JAN)	(5) (DEC)	3 (JAN)	11
Eider	0	(1) (JAN)	1 (JAN)	(4) (DEC)	6 (NOV)	3
Common Scoter	0	0	0	0	1 (NOV)	0
Goldeneye	18 (JAN)	16 (DEC)	(22) (FEB)	(16) (DEC)	18 (DEC)	19
Red-breasted Merganser	34 (NOV)	43 (NOV)	17 (NOV)	34 (NOV)	37 (DEC)	33
Goosander	0	0	1 (NOV)	0	1 (JAN)	0
Water Rail	0	0	0	0	1 (DEC)	0
Moorhen	11 (MAR)	10 (NOV)	7 (MAR)	7 (MAR)	7 (MAR)	8
Oystercatcher	71 (JAN)	95 (DEC)	82 (NOV)	78 (FEB)	61 (JAN)	77
Ringed Plover	17 (NOV)	20 (NOV)	32 (JAN)	15 (NOV)	49 (DEC)	27
Golden Plover	75 (DEC)	128 (MAR)	157 (DEC)	169 (MAR)	707 (JAN)	247
Grey Plover	(130) (FEB)	(180) (JAN)	166 (MAR)	182 (FEB)	194 (FEB)	181
Lapwing	1190 (JAN)	1175 (DEC)	1075 (DEC)	(623) (JAN)	1349 (JAN)	1197

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Five year summary for Newtown Estuary

Table4c: Five-year winter peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	Mean Peak
Knot	(115) (FEB)	278 (MAR)	206 (JAN)	(173) (JAN)	89 (MAR)	191
Sanderling	0	0	0	0	1 (FEB)	0
Little Stint	0	3 (NOV)	0	0	0	1
Dunlin	1150 (JAN)	1650 (NOV)	1530 (NOV)	(1750) (JAN)	1185 (NOV)	1453
Ruff	0	0	1 (NOV)	0	0	0
Jack Snipe	3 (NOV)	0	0	1 (MAR)	0	1
Snipe	77 (MAR)	(29) (JAN)	11 (NOV)	35 (NOV)	21 (MAR)	36
Woodcock	0	0	0	0	1 (DEC)	0
Black-tailed Godwit	151 (MAR)	(365) (FEB)	130 (MAR)	148 (FEB)	198 (DEC)	198
Bar-tailed Godwit	0	4 (MAR)	2 (NOV)	1 (NOV)	2 (FEB)	2
Curlew	420 (JAN)	(316) (FEB)	(341) (FEB)	(391) (DEC)	282 (JAN)	364
Spotted Redshank	5 (JAN)	(4) (JAN)	3 (JAN)	(8) (DEC)	2 (DEC)	4
Redshank	141 (JAN)	(108) (JAN)	107 (JAN)	142 (NOV)	137 (JAN)	132
Greenshank	2 (JAN)	2 (NOV)	2 (NOV)	(5) (DEC)	3 (NOV)	3
Common Sandpiper	0	0	0	0	1 (DEC)	0
Turnstone	12 (NOV)	15 (NOV)	16 (MAR)	(18) (JAN)	22 (MAR)	17
Mediterranean Gull	0	1 (MAR)	0	8 (MAR)	17 (MAR)	5
Black-headed Gull	1400 (JAN)	(376) (FEB)	426 (MAR)	587 (MAR)	2634 (MAR)	1262
Common Gull	2 (DEC)	3 (DEC)	(7) (FEB)	0	1 (FEB)	3
Lesser Black-backed Gull	1 (DEC)	3 (NOV)	4 (JAN)	(3) (JAN)	2 (NOV)	3
Herring Gull	53 (DEC)	27 (NOV)	36 (DEC)	(48) (JAN)	47 (JAN)	42
Great Black-backed Gull	14 (DEC)	4 (NOV)	5 (DEC)	(4) (JAN)	14 (NOV)	9
Kingfisher	1 (NOV)	1 (NOV)	1 (DEC)	(1) (DEC)	2 (JAN)	1

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Five year summary for Newtown Estuary

Table5: National and International importance of the site for each species.

Figures given indicate the percentage of the relevant qualifying level represented by the five year mean peak count for the species in question

e.g. 50% indicates that the five year mean peak count is half that required for the site to qualify as nationally or internationally important as appropriate for the species in question.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question.

Asterisks indicate that the percentage presented has been derived using a value of 1% of the national population that is less than 50 (50 is normally used as a minimum threshold for designation of sites).

Species	Spring cf National Threshold	Autumn cf National Threshold	Winter cf National Threshold	Spring cf International Threshold	Autumn cf International Threshold	Winter cf International Threshold	Spring 5yr mean peak	Autumn 5yr mean peak	Winter 5yr mean peak
Little Grebe	0%	5%	18%	0%	0%	0%	0	4	14
Great Crested Grebe	1%	0%	2%	0%	0%	0%	1	0	3
Slavonian Grebe	*0%	*0%	*14%	0%	0%	3%	0	0	1
Cormorant	1%	3%	2%	0%	1%	0%	3	8	5
Little Egret	N/A	N/A	N/A	0%	2%	1%	3	26	11
Grey Heron	N/A	N/A	N/A	0%	0%	0%	2	5	3
Mute Swan	2%	1%	1%	2%	1%	1%	7	5	5
Greylag Goose (re-established)	N/A	N/A	N/A	N/A	N/A	N/A	2	1	0
Canada Goose	N/A	N/A	N/A	N/A	N/A	N/A	95	189	87
Barnacle Goose (naturalised population)	N/A	N/A	N/A	N/A	N/A	N/A	0	1	0
Dark-bellied Brent Goose	1%	16%	150%	1%	7%	67%	11	158	1472
Shelduck	13%	5%	71%	3%	1%	18%	98	43	554
Wigeon	0%	9%	28%	0%	2%	8%	0	346	1152
Teal	0%	37%	66%	0%	18%	32%	7	701	1268
Mallard	0%	1%	1%	0%	0%	0%	9	31	43
Pintail	0%	13%	33%	0%	6%	15%	0	36	91
Shoveler	0%	0%	7%	0%	0%	3%	0	0	11
Eider	0%	0%	0%	0%	0%	0%	0	0	3
Goldeneye	0%	0%	8%	0%	0%	0%	0	0	19
Red-breasted Merganser	4%	2%	34%	0%	0%	2%	4	2	33
Moorhen	0%	0%	0%	0%	0%	0%	6	15	8
Oystercatcher	1%	2%	2%	0%	1%	1%	41	72	77
Ringed Plover	1%	13%	8%	0%	5%	4%	2	40	27
Golden Plover	0%	3%	10%	0%	1%	3%	7	65	247
Grey Plover	2%	17%	34%	0%	4%	7%	9	90	181
Lapwing	0%	1%	6%	0%	1%	6%	7	161	1197
Knot	1%	0%	7%	1%	0%	4%	23	5	191
Little Stint	N/A	N/A	N/A	0%	0%	0%	0	1	1
Curlew Sandpiper	N/A	N/A	N/A	0%	0%	0%	0	1	0
Dunlin	1%	5%	26%	0%	1%	11%	20	94	1453

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Five year summary for Newtown Estuary

Table5: National and International importance of the site for each species.

Figures given indicate the percentage of the relevant qualifying level represented by the five year mean peak count for the species in question

e.g. 50% indicates that the five year mean peak count is half that required for the site to qualify as nationally or internationally important as appropriate for the species in question.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question.

Asterisks indicate that the percentage presented has been derived using a value of 1% of the national population that is less than 50 (50 is normally used as a minimum threshold for designation of sites).

Species	Spring cf National Threshold	Autumn cf National Threshold	Winter cf National Threshold	Spring cf International Threshold	Autumn cf International Threshold	Winter cf International Threshold	Spring 5yr mean peak	Autumn 5yr mean peak	Winter 5yr mean peak
Jack Snipe	N/A	N/A	N/A	N/A	N/A	N/A	0	0	1
Snipe	N/A	N/A	N/A	0%	0%	0%	1	4	36
Black-tailed Godwit	75%	69%	132%	32%	30%	57%	112	104	198
Bar-tailed Godwit	0%	0%	0%	0%	0%	0%	1	1	2
Whimbrel	N/A	N/A	N/A	0%	0%	0%	24	8	0
Curlew	5%	24%	24%	2%	9%	9%	71	357	364
Spotted Redshank	N/A	N/A	N/A	0%	0%	0%	1	2	4
Redshank	2%	9%	11%	2%	8%	10%	24	108	132
Greenshank	N/A	N/A	*50%	0%	0%	0%	1	8	3
Common Sandpiper	N/A	N/A	N/A	0%	0%	0%	0	4	0
Turnstone	0%	2%	3%	0%	1%	2%	1	11	17
Mediterranean Gull	N/A	N/A	N/A	0%	0%	0%	5	0	5
Black-headed Gull	6%	5%	7%	5%	5%	6%	1069	929	1262
Common Gull	0%	0%	0%	0%	0%	0%	0	0	3
Lesser Black-backed Gull	N/A	N/A	N/A	N/A	N/A	N/A	7	2	3
Herring Gull	1%	2%	1%	0%	1%	0%	48	80	42
Great Black-backed Gull	1%	5%	2%	0%	0%	0%	4	18	9
Sandwich Tern	N/A	N/A	N/A	0%	0%	0%	2	2	0
Common Tern	N/A	N/A	N/A	1%	1%	0%	13	19	0
Little Tern	N/A	N/A	N/A	0%	0%	0%	1	1	0
Kingfisher	N/A	N/A	N/A	0%	0%	0%	1	1	1

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Five year summary for Newtown Estuary

Table 1: Total Counts - All Species Combined.

Peak monthly total = maximum of the sum of the counts of all species within each month.

Seasonal peaks = sum of the maximum counts of all species within each season.

Year	Peak Monthly Total	Spring Peak	Autumn Peak	Winter Peak
99/00	8915 (JAN)	2926	3077	11466
00/01	8886 (JAN)	2525	3779	9746
01/02	8888 (JAN)	N/C	3519	10157
02/03	7833 (JAN)	1526	3877	10435
03/04	6280 (DEC)	1796	4279	8569
MEAN		2193	3706	10075

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Five year summary for Newtown Estuary

Table2: Five-year average monthly counts of each species.

Figure in parentheses give number of complete and incomplete counts upon which the average is based. Incomplete counts are excluded from calculation where, if included, they would depress the mean.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Great Northern Diver	0(4,.)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(5,.)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	0(4,1)	0(4,.)
Little Grebe	1(3,1)	1(2,2)	0(2,2)	1(3,.)	4(4,.)	7(4,1)	10(5,.)	14(3,2)	11(2,3)	16(3,2)	13(4,1)	13(2,2)
Great Crested Grebe	1(3,1)	1(2,2)	1(2,2)	0(3,.)	0(4,.)	0(4,1)	1(5,.)	5(3,2)	5(2,3)	7(3,2)	3(4,1)	2(2,2)
Slavonian Grebe	0(3,1)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(5,.)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	1(4,1)	1(2,2)
Cormorant	5(3,1)	4(2,2)	6(2,2)	3(3,.)	4(4,.)	6(4,1)	6(5,.)	7(3,2)	6(2,3)	8(3,2)	8(4,1)	4(2,2)
Little Egret	5(3,1)	4(2,2)	5(2,2)	13(3,.)	21(4,.)	31(4,1)	18(5,.)	14(3,2)	17(2,3)	12(3,2)	13(4,1)	10(2,2)
Grey Heron	1(3,1)	1(2,2)	1(2,2)	1(3,.)	4(4,.)	4(4,1)	3(5,.)	4(3,2)	1(2,3)	3(3,2)	2(4,1)	2(2,2)
Mute Swan	7(3,1)	6(2,2)	3(2,2)	2(3,.)	4(4,.)	4(4,1)	3(5,.)	6(3,2)	5(2,3)	4(3,2)	7(4,1)	5(2,2)
Greylag Goose (re-established)	0(3,1)	1(2,2)	0(2,2)	0(3,.)	0(4,.)	0(5,.)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	1(4,1)	0(2,2)
Canada Goose	15(3,1)	15(2,2)	149(2,2)	154(3,.)	116(4,.)	153(4,1)	15(5,.)	155(3,2)	107(2,3)	139(3,2)	20(4,1)	8(2,2)
Barnacle Goose (naturalised population)	0(4,.)	0(4,.)	0(2,2)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	0(4,1)	0(2,2)
Dark-bellied Brent Goose	20(3,1)	1(2,2)	0(2,2)	0(3,.)	0(4,.)	6(4,1)	244(5,.)	1183(3,2)	1326(2,3)	1600(3,2)	1513(4,1)	853(2,2)
Light-bellied Brent Goose (Svalbard population)	0(4,.)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(5,.)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	0(4,1)	0(2,2)
Shelduck	95(3,1)	29(2,2)	39(2,2)	15(3,.)	11(4,.)	11(4,1)	48(5,.)	172(3,2)	250(2,3)	280(3,2)	333(4,1)	157(2,2)
Wigeon	0(3,1)	0(2,2)	0(2,2)	0(3,.)	1(4,.)	57(4,1)	408(5,.)	934(3,2)	917(2,3)	1170(3,2)	985(4,1)	287(2,2)
Gadwall	1(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(2,2)
Teal	7(3,1)	0(2,2)	0(2,2)	1(3,.)	68(4,.)	557(4,1)	602(5,.)	1058(3,2)	1045(2,3)	1087(3,2)	867(4,1)	165(2,2)
Mallard	26(3,1)	23(2,2)	32(2,2)	13(3,.)	11(4,.)	25(4,1)	50(5,.)	67(3,2)	54(2,3)	64(3,2)	45(4,1)	38(2,2)
Pintail	1(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	15(4,1)	20(5,.)	36(3,2)	45(2,3)	79(3,2)	65(4,1)	19(2,2)
Shoveler	0(3,1)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	1(5,.)	2(3,2)	2(2,3)	4(3,2)	0(4,1)	1(2,2)
Eider	0(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	3(4,1)	4(5,.)	1(3,2)	0(2,3)	1(3,2)	0(4,1)	0(2,2)
Common Scoter	0(4,.)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(3,2)	1(2,3)	0(3,2)	0(5,.)	0(4,.)
Goldeneye	0(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	8(3,2)	17(2,3)	15(3,2)	13(4,1)	4(2,2)
Red-breasted Merganser	1(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	8(5,.)	31(3,2)	39(2,3)	19(3,2)	20(4,1)	11(2,2)
Water Rail	0(4,.)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	1(5,.)	0(3,2)	0(2,3)	0(3,2)	0(5,.)	0(4,.)
Moorhen	3(3,1)	3(2,2)	1(2,2)	6(3,.)	3(4,.)	4(4,1)	6(5,.)	7(3,2)	6(2,3)	2(3,2)	6(4,1)	4(2,2)
Coot	0(3,1)	1(2,2)	0(2,2)	1(3,.)	1(4,.)	0(4,1)	0(5,.)	0(3,2)	0(2,3)	1(3,2)	1(4,1)	1(2,2)
Oystercatcher	55(3,1)	32(2,2)	30(2,2)	33(3,.)	64(4,.)	84(4,1)	91(5,.)	90(3,2)	94(2,3)	95(3,2)	89(4,1)	78(2,2)
Ringed Plover	4(3,1)	5(2,2)	2(2,2)	2(3,.)	51(4,.)	32(4,1)	25(5,.)	19(3,2)	34(2,3)	32(3,2)	16(4,1)	4(2,2)
Golden Plover	3(3,1)	1(2,2)	0(2,2)	0(3,.)	4(4,.)	5(4,1)	105(5,.)	409(3,2)	593(2,3)	527(3,2)	377(4,1)	317(2,2)
Grey Plover	11(3,1)	2(2,2)	2(2,2)	0(3,.)	60(4,.)	38(4,1)	105(5,.)	153(3,2)	200(2,3)	177(3,2)	113(4,1)	93(2,2)
Lapwing	4(3,1)	3(2,2)	4(2,2)	36(3,.)	38(4,.)	27(4,1)	98(5,.)	563(3,2)	790(2,3)	1118(3,2)	559(4,1)	44(2,2)
Knot	6(3,1)	0(2,2)	0(2,2)	1(3,.)	3(4,.)	7(4,1)	2(5,.)	121(3,2)	194(2,3)	251(3,2)	77(4,1)	75(2,2)
Sanderling	0(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(5,.)	0(5,.)	0(3,2)	0(4,1)	0(2,2)
Curlew Sandpiper	0(3,1)	0(4,.)	0(2,2)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(3,2)	0(2,3)	0(5,.)	0(4,1)	1(2,2)

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Table2: Five-year average monthly counts of each species.

Figure in parentheses give number of complete and incomplete counts upon which the average is based.
Incomplete counts are excluded from calculation where, if included, they would depress the mean.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Purple Sandpiper	0(3,1)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(5,.)	0(5,.)	0(5,.)	0(2,3)	0(3,2)	0(4,1)	0(2,2)
Dunlin	124(3,1)	22(2,2)	0(2,2)	30(3,.)	83(4,.)	73(4,1)	238(5,.)	1103(3,2)	1219(2,3)	1513(3,2)	1184(4,1)	663(2,2)
Ruff	0(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	1(4,1)	0(2,2)
Jack Snipe	0(3,1)	0(2,2)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	0(4,1)	0(2,2)
Snipe	4(3,1)	0(2,2)	0(2,2)	0(3,.)	1(4,.)	2(4,1)	2(5,.)	30(3,2)	27(2,3)	21(3,2)	13(4,1)	4(2,2)
Black-tailed Godwit	86(3,1)	2(2,2)	4(2,2)	25(3,.)	85(4,.)	71(4,1)	73(5,.)	199(3,2)	300(2,3)	124(3,2)	32(4,1)	197(2,2)
Bar-tailed Godwit	2(3,1)	3(2,2)	0(2,2)	0(3,.)	3(4,.)	1(4,1)	0(5,.)	2(3,2)	3(2,3)	4(3,2)	2(4,1)	5(2,2)
Whimbrel	5(3,1)	9(2,2)	4(2,2)	8(3,.)	4(4,.)	0(4,1)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	1(4,1)	0(2,2)
Curlew	113(3,1)	11(2,2)	26(2,2)	249(3,.)	192(4,.)	235(4,1)	180(5,.)	207(3,2)	220(2,3)	256(3,2)	349(4,1)	161(2,2)
Spotted Redshank	0(3,1)	1(2,2)	0(2,2)	1(3,.)	2(4,.)	2(4,1)	2(5,.)	1(3,2)	7(2,3)	2(3,2)	2(4,1)	1(2,2)
Redshank	27(3,1)	11(2,2)	20(2,2)	112(3,.)	98(4,.)	115(4,1)	111(5,.)	105(3,2)	74(2,3)	101(3,2)	85(4,1)	45(2,2)
Greenshank	1(3,1)	1(2,2)	0(2,2)	5(3,.)	4(4,.)	9(4,1)	6(5,.)	1(3,2)	1(2,3)	1(3,2)	0(4,1)	0(2,2)
Green Sandpiper	0(4,.)	0(4,.)	0(2,2)	0(3,.)	1(4,.)	0(4,1)	0(5,.)	0(3,2)	0(5,.)	0(3,2)	0(4,1)	0(2,2)
Common Sandpiper	1(3,1)	1(2,2)	0(2,2)	7(3,.)	10(4,.)	4(4,1)	1(5,.)	0(3,2)	1(2,3)	0(3,2)	1(4,1)	0(2,2)
Turnstone	3(3,1)	4(2,2)	1(2,2)	3(3,.)	12(4,.)	12(4,1)	9(5,.)	13(3,2)	12(2,3)	12(3,2)	9(4,1)	16(2,2)
Mediterranean Gull	50(3,1)	10(2,2)	1(2,2)	0(3,.)	1(4,.)	0(4,1)	0(5,.)	0(5,.)	0(2,3)	0(3,2)	2(4,1)	47(2,2)
Black-headed Gull	1332(3,1)	1216(2,2)	900(2,2)	349(3,.)	410(4,.)	467(4,1)	184(5,.)	161(3,2)	94(2,3)	79(3,2)	379(4,1)	988(2,2)
Common Gull	0(4,.)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(3,2)	0(2,3)	0(3,2)	0(4,1)	0(2,2)
Lesser Black-backed Gull	1(3,1)	1(2,2)	1(2,2)	0(3,.)	1(4,.)	1(4,1)	1(5,.)	1(3,2)	1(2,3)	1(3,2)	1(4,1)	0(2,2)
Herring Gull	25(3,1)	19(2,2)	29(2,2)	63(3,.)	33(4,.)	36(4,1)	23(5,.)	35(3,2)	45(2,3)	75(3,2)	25(4,1)	17(2,2)
Western Yellow-legged Gull	0(4,.)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(3,2)	0(5,.)	0(5,.)	0(5,.)	0(4,.)
Great Black-backed Gull	5(3,1)	6(2,2)	5(2,2)	3(3,.)	4(4,.)	4(4,1)	10(5,.)	7(3,2)	10(2,3)	3(3,2)	6(4,1)	3(2,2)
Sandwich Tern	4(3,1)	3(2,2)	3(2,2)	1(3,.)	10(4,.)	5(4,1)	0(5,.)	0(3,2)	0(5,.)	0(5,.)	0(4,1)	2(2,2)
Common Tern	0(3,1)	13(2,2)	10(2,2)	19(3,.)	65(4,.)	4(4,1)	0(5,.)	0(3,2)	0(5,.)	0(5,.)	0(5,.)	0(2,2)
Little Tern	0(3,1)	3(2,2)	1(2,2)	0(3,.)	3(4,.)	0(4,1)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,.)
Black Tern	0(4,.)	0(4,.)	0(4,.)	0(3,.)	0(4,.)	0(4,1)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(5,.)	0(4,.)
Kingfisher	0(3,1)	0(2,2)	0(2,2)	1(3,.)	0(4,.)	1(4,1)	2(5,.)	2(3,2)	3(2,3)	1(3,2)	2(4,1)	1(2,2)

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Five year summary for Newtown Estuary
Table3: Five-year peak monthly counts of each species.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Great Northern Diver	0	0	0	0	0	0	0	0	1	0	0	0
Little Grebe	2	1	0	1	6	12	16	15	11	17	16	16
Great Crested Grebe	1	1	1	0	0	0	3	7	8	8	5	5
Slavonian Grebe	0	0	0	0	0	0	0	0	0	0	2	1
Cormorant	5	4	9	3	9	8	11	10	12	12	15	5
Little Egret	7	6	5	15	28	41	27	17	20	22	18	10
Grey Heron	2	2	2	2	5	6	6	4	2	5	2	2
Mute Swan	11	7	4	2	5	7	7	7	9	5	9	7
Greylag Goose (re-established)	0	2	0	0	0	0	0	0	1	0	2	0
Canada Goose	20	20	168	166	210	291	39	376	174	205	28	10
Barnacle Goose (naturalised population)	0	0	0	0	0	0	0	1	0	0	0	0
Dark-bellied Brent Goose	52	3	0	1	0	23	453	1324	1399	1800	1779	1201
Light-bellied Brent Goose (Svalbard population)	0	0	0	0	0	0	0	0	1	1	1	0
Shelduck	118	34	44	24	18	19	88	190	309	330	414	212
Wigeon	1	0	0	1	2	84	606	1155	1278	1237	1335	547
Gadwall	3	0	0	0	1	1	0	0	0	0	0	0
Teal	12	0	0	3	82	635	840	1390	1431	1161	1191	245
Mallard	35	34	41	19	23	57	95	103	101	96	61	56
Pintail	4	0	0	0	0	29	31	54	54	110	75	36
Shoveler	0	0	0	0	0	0	2	3	4	6	1	3
Eider	0	0	0	0	0	12	18	2	0	2	1	0
Common Scoter	0	0	0	0	1	0	0	0	4	0	0	0
Goldeneye	0	0	0	0	0	0	2	12	29	18	18	8
Red-breasted Merganser	3	0	0	0	0	0	18	47	39	29	39	14
Water Rail	0	0	0	0	0	0	1	0	0	0	0	0
Moorhen	5	4	2	10	9	9	11	12	10	3	9	6
Coot	1	1	0	2	2	0	0	1	1	2	2	2
Oystercatcher	67	41	30	38	88	114	127	112	109	96	96	80
Ringed Plover	7	5	3	4	56	68	56	40	50	100	22	4
Golden Plover	10	1	0	0	8	20	240	500	700	730	580	625
Grey Plover	21	3	6	0	77	53	137	192	266	237	170	112
Lapwing	8	5	6	68	71	57	213	1085	1003	1801	750	83
Knot	9	1	0	1	6	11	4	350	279	352	248	116
Sanderling	0	0	0	0	0	1	0	0	0	0	0	0
Curlew Sandpiper	0	0	0	0	0	0	1	1	0	0	0	1
Purple Sandpiper	0	0	0	0	0	0	0	0	0	1	1	1
Dunlin	340	69	0	69	119	118	780	1470	1478	1954	1430	1225

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Five year summary for Newtown Estuary
 Table3: Five-year peak monthly counts of each species.

Species	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Ruff	1	0	0	0	0	0	0	0	0	0	2	1
Jack Snipe	0	0	0	0	0	0	0	0	2	0	0	0
Snipe	9	0	0	0	1	4	7	76	64	40	38	6
Black-tailed Godwit	112	4	7	37	98	90	105	367	510	231	63	233
Bar-tailed Godwit	4	4	0	0	11	2	0	7	4	9	6	10
Whimbrel	13	16	7	12	6	1	1	1	0	1	2	0
Curlew	137	19	36	350	277	288	253	310	240	310	451	260
Spotted Redshank	1	2	0	2	4	5	6	1	7	6	2	2
Redshank	33	13	26	167	131	174	175	130	81	153	108	66
Greenshank	1	1	0	7	8	14	9	1	1	2	0	1
Green Sandpiper	0	0	0	0	2	0	0	0	0	0	0	0
Common Sandpiper	3	1	0	11	14	5	2	1	1	0	1	0
Turnstone	6	9	4	5	29	19	16	16	19	19	19	24
Mediterranean Gull	65	23	1	0	3	0	0	0	0	0	3	80
Black-headed Gull	2204	1826	2000	557	535	700	373	255	180	169	903	1175
Common Gull	0	0	0	0	0	1	0	1	1	1	1	0
Lesser Black-backed Gull	3	2	2	0	2	2	2	1	3	3	4	0
Herring Gull	43	25	43	183	82	44	35	46	62	146	35	33
Western Yellow-legged Gull	0	0	0	0	0	0	1	0	0	0	0	0
Great Black-backed Gull	9	10	7	5	7	7	21	14	14	6	16	5
Sandwich Tern	5	5	5	1	28	13	1	0	0	0	0	4
Common Tern	0	23	14	32	138	10	1	0	0	0	0	0
Little Tern	0	4	3	0	12	0	0	0	0	0	0	0
Black Tern	0	0	0	0	0	1	0	0	0	0	0	0
Kingfisher	0	0	0	1	1	2	4	3	3	4	4	1

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Five year summary for Newtown Estuary

Table 4a: Five-year spring peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	Mean Peak
Little Grebe	0	2 (APR)	N/C	2 (APR)	(1) (MAY)	1
Great Crested Grebe	1 (APR)	1 (APR)	N/C	1 (MAY)	(0)	1
Cormorant	(9) (JUN)	5 (APR)	N/C	5 (APR)	(6) (JUN)	6
Little Egret	3 (APR)	7 (APR)	N/C	6 (MAY)	(4) (JUN)	5
Grey Heron	(2) (MAY)	2 (APR)	N/C	1 (APR)	(2) (JUN)	2
Mute Swan	(6) (MAY)	5 (MAY)	N/C	11 (APR)	(2) (APR)	8
Greylag Goose (re-established)	0	0	N/C	0	(2) (MAY)	1
Canada Goose	(168) (JUN)	125 (JUN)	N/C	155 (JUN)	(127) (JUN)	149
Dark-bellied Brent Goose	3 (APR)	52 (APR)	N/C	5 (APR)	(11) (APR)	20
Shelduck	87 (APR)	118 (APR)	N/C	79 (APR)	(36) (JUN)	95
Wigeon	1 (APR)	0	N/C	0	(0)	0
Gadwall	0	0	N/C	3 (APR)	(0)	1
Teal	4 (APR)	12 (APR)	N/C	5 (APR)	(3) (APR)	7
Mallard	18 (APR)	41 (JUN)	N/C	34 (MAY)	(28) (JUN)	31
Pintail	0	0	N/C	4 (APR)	(0)	1
Red-breasted Merganser	0	3 (APR)	N/C	0	(0)	1
Moorhen	5 (APR)	1 (APR)	N/C	4 (APR)	(2) (APR)	3
Coot	0	0	N/C	1 (APR)	(0)	0
Oystercatcher	67 (APR)	54 (APR)	N/C	43 (APR)	(32) (MAY)	55
Ringed Plover	(2) (MAY)	7 (APR)	N/C	5 (MAY)	(3) (JUN)	6
Golden Plover	0	10 (APR)	N/C	0	(0)	3
Grey Plover	(1) (JUN)	21 (APR)	N/C	12 (APR)	(6) (JUN)	17
Lapwing	(6) (JUN)	3 (JUN)	N/C	8 (APR)	(6) (APR)	6
Knot	0	8 (APR)	N/C	9 (APR)	(1) (MAY)	6
Dunlin	(7) (MAY)	340 (APR)	N/C	26 (APR)	(69) (MAY)	183
Ruff	0	1 (APR)	N/C	0	(0)	0
Snipe	9 (APR)	0	N/C	2 (APR)	(1) (APR)	4
Black-tailed Godwit	80 (APR)	66 (APR)	N/C	112 (APR)	(2) (APR)	86
Bar-tailed Godwit	0	3 (APR)	N/C	4 (APR)	(0)	2
Whimbrel	(16) (MAY)	7 (JUN)	N/C	10 (MAY)	(13) (APR)	12
Curlew	82 (APR)	121 (APR)	N/C	137 (APR)	(33) (JUN)	113
Spotted Redshank	(2) (MAY)	0	N/C	1 (APR)	(0)	1
Redshank	16 (APR)	31 (APR)	N/C	33 (APR)	(22) (JUN)	27

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Table4a: Five-year spring peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	Mean Peak
Greenshank	1 (APR)	1 (APR)	N/C	0	(1) (APR)	1
Common Sandpiper	(1) (MAY)	3 (APR)	N/C	1 (MAY)	(0)	2
Turnstone	(9) (MAY)	6 (APR)	N/C	4 (APR)	(4) (JUN)	6
Mediterranean Gull	37 (APR)	49 (APR)	N/C	65 (APR)	(2) (MAY)	50
Black-headed Gull	2204 (APR)	1349 (APR)	N/C	689 (MAY)	(1300) (MAY)	1414
Lesser Black-backed Gull	(2) (MAY)	3 (APR)	N/C	1 (JUN)	(2) (JUN)	2
Herring Gull	(40) (JUN)	43 (APR)	N/C	25 (APR)	(43) (JUN)	38
Great Black-backed Gull	(7) (MAY)	4 (JUN)	N/C	9 (APR)	(10) (MAY)	8
Sandwich Tern	5 (APR)	3 (APR)	N/C	5 (JUN)	(5) (MAY)	5
Common Tern	(23) (MAY)	14 (JUN)	N/C	7 (MAY)	(14) (MAY)	15
Little Tern	(2) (MAY)	4 (MAY)	N/C	2 (MAY)	(3) (JUN)	3

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Five year summary for Newtown Estuary

Table4b: Five-year autumn peak counts, and month in which this was recorded, of each species.

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Species	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	Mean Peak
Little Grebe	6 (OCT)	12 (SEP)	8 (OCT)	16 (OCT)	10 (OCT)	10
Great Crested Grebe	0	0	1 (OCT)	0	3 (OCT)	1
Cormorant	2 (JUL)	7 (OCT)	7 (SEP)	11 (OCT)	9 (AUG)	7
Little Egret	(30) (SEP)	38 (SEP)	22 (SEP)	22 (SEP)	41 (SEP)	31
Grey Heron	(4) (SEP)	5 (AUG)	6 (SEP)	5 (AUG)	5 (AUG)	5
Mute Swan	4 (AUG)	7 (OCT)	3 (OCT)	7 (SEP)	4 (SEP)	5
Canada Goose	210 (AUG)	166 (JUL)	291 (SEP)	150 (SEP)	188 (AUG)	201
Dark-bellied Brent Goose	18 (OCT)	235 (OCT)	134 (OCT)	453 (OCT)	379 (OCT)	244
Shelduck	36 (OCT)	24 (JUL)	26 (OCT)	77 (OCT)	88 (OCT)	50
Wigeon	204 (OCT)	439 (OCT)	367 (OCT)	425 (OCT)	606 (OCT)	408
Gadwall	0	0	0	0	1 (AUG)	0
Teal	509 (OCT)	635 (SEP)	840 (OCT)	631 (SEP)	776 (OCT)	678
Mallard	51 (OCT)	69 (OCT)	95 (OCT)	29 (OCT)	23 (AUG)	53
Pintail	17 (OCT)	11 (OCT)	31 (OCT)	29 (SEP)	23 (SEP)	22
Shoveler	0	0	2 (OCT)	0	2 (OCT)	1
Eider	0	0	0	0	18 (OCT)	4
Common Scoter	0	1 (AUG)	0	0	0	0
Goldeneye	0	0	0	0	2 (OCT)	0
Red-breasted Merganser	0	8 (OCT)	1 (OCT)	11 (OCT)	18 (OCT)	8
Water Rail	0	0	1 (OCT)	1 (OCT)	1 (OCT)	1
Moorhen	9 (AUG)	10 (JUL)	11 (OCT)	5 (OCT)	2 (OCT)	7
Coot	0	0	0	2 (JUL)	0	0
Oystercatcher	51 (OCT)	83 (AUG)	96 (OCT)	127 (OCT)	102 (OCT)	92
Ringed Plover	56 (OCT)	55 (AUG)	32 (OCT)	43 (AUG)	68 (SEP)	51
Golden Plover	83 (OCT)	240 (OCT)	92 (OCT)	75 (OCT)	34 (OCT)	105
Grey Plover	96 (OCT)	73 (OCT)	106 (OCT)	137 (OCT)	115 (OCT)	105
Lapwing	82 (OCT)	213 (OCT)	77 (OCT)	94 (OCT)	32 (AUG)	100
Knot	4 (AUG)	8 (SEP)	1 (OCT)	7 (SEP)	11 (SEP)	6
Sanderling	0	0	0	1 (SEP)	0	0
Curlew Sandpiper	1 (OCT)	0	0	0	0	0
Dunlin	120 (OCT)	112 (AUG)	190 (OCT)	119 (AUG)	780 (OCT)	264
Snipe	(1) (SEP)	2 (SEP)	2 (SEP)	1 (AUG)	7 (OCT)	3
Black-tailed Godwit	98 (AUG)	105 (OCT)	68 (OCT)	84 (SEP)	64 (AUG)	84

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Species	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	Mean Peak
Bar-tailed Godwit	(2) (SEP)	11 (AUG)	1 (SEP)	0	0	3
Whimbrel	4 (JUL)	7 (JUL)	0	12 (JUL)	6 (AUG)	6
Curlew	(287) (SEP)	350 (JUL)	288 (SEP)	277 (AUG)	166 (SEP)	274
Spotted Redshank	1 (AUG)	5 (SEP)	6 (OCT)	4 (AUG)	1 (SEP)	3
Redshank	175 (OCT)	167 (JUL)	131 (OCT)	174 (SEP)	99 (AUG)	149
Greenshank	7 (JUL)	8 (AUG)	14 (SEP)	6 (JUL)	9 (SEP)	9
Green Sandpiper	0	2 (AUG)	0	1 (AUG)	0	1
Common Sandpiper	9 (AUG)	14 (AUG)	5 (SEP)	14 (AUG)	4 (SEP)	9
Turnstone	10 (OCT)	7 (SEP)	16 (OCT)	12 (SEP)	29 (AUG)	15
Mediterranean Gull	0	0	0	0	3 (AUG)	1
Black-headed Gull	557 (JUL)	507 (SEP)	482 (SEP)	700 (SEP)	412 (AUG)	532
Common Gull	0	0	0	0	1 (SEP)	0
Lesser Black-backed Gull	2 (AUG)	2 (SEP)	0	2 (OCT)	1 (OCT)	1
Herring Gull	183 (JUL)	82 (AUG)	35 (OCT)	28 (SEP)	44 (SEP)	74
Western Yellow-legged Gull	1 (OCT)	0	0	0	0	0
Great Black-backed Gull	7 (AUG)	15 (OCT)	6 (OCT)	7 (SEP)	21 (OCT)	11
Sandwich Tern	1 (JUL)	8 (AUG)	13 (SEP)	5 (SEP)	28 (AUG)	11
Common Tern	138 (AUG)	32 (JUL)	10 (SEP)	57 (AUG)	42 (AUG)	56
Little Tern	0	0	0	12 (AUG)	0	2
Black Tern	(1) (SEP)	0	0	0	0	0
Kingfisher	0	4 (OCT)	2 (OCT)	4 (OCT)	1 (OCT)	2

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Five year summary for Newtown Estuary

Table 4c: Five-year winter peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	Mean Peak
Great Northern Diver	0	(0)	(1) (DEC)	0	(0)	0
Little Grebe	16 (MAR)	16 (JAN)	15 (NOV)	17 (JAN)	(14) (FEB)	16
Great Crested Grebe	(8) (JAN)	8 (JAN)	(5) (DEC)	8 (DEC)	(6) (NOV)	8
Slavonian Grebe	2 (FEB)	(0)	0	0	(0)	1
Cormorant	4 (NOV)	(8) (NOV)	15 (FEB)	12 (JAN)	(12) (DEC)	11
Little Egret	16 (DEC)	(20) (DEC)	18 (FEB)	22 (JAN)	(11) (NOV)	19
Grey Heron	4 (NOV)	1 (JAN)	4 (NOV)	5 (JAN)	(3) (NOV)	4
Mute Swan	9 (FEB)	(5) (NOV)	(9) (DEC)	5 (NOV)	(5) (DEC)	8
Greylag Goose (re-established)	2 (FEB)	2 (FEB)	(1) (DEC)	0	(0)	1
Canada Goose	143 (NOV)	145 (JAN)	(174) (DEC)	150 (JAN)	(376) (NOV)	198
Barnacle Goose (naturalised population)	0	(0)	0	0	(1) (NOV)	0
Dark-bellied Brent Goose	(1727) (JAN)	1800 (JAN)	1660 (JAN)	1779 (FEB)	(1235) (DEC)	1746
Light-bellied Brent Goose (Svalbard population)	0	(0)	0	1 (FEB)	(1) (DEC)	1
Shelduck	(330) (JAN)	267 (FEB)	414 (FEB)	346 (FEB)	(309) (DEC)	342
Wigeon	1278 (DEC)	1162 (JAN)	1335 (FEB)	1242 (FEB)	(1007) (JAN)	1254
Teal	1431 (DEC)	1145 (JAN)	(992) (DEC)	1216 (NOV)	(1142) (DEC)	1264
Mallard	55 (NOV)	48 (JAN)	103 (NOV)	48 (JAN)	(64) (DEC)	64
Pintail	72 (FEB)	58 (JAN)	75 (FEB)	110 (JAN)	(93) (JAN)	82
Shoveler	4 (DEC)	6 (JAN)	6 (JAN)	0	(2) (JAN)	4
Eider	1 (NOV)	(0)	0	2 (JAN)	(2) (NOV)	1
Common Scoter	0	(0)	(4) (DEC)	0	(0)	1
Goldeneye	(17) (JAN)	(8) (DEC)	18 (JAN)	17 (FEB)	(29) (DEC)	21
Red-breasted Merganser	47 (NOV)	(30) (NOV)	31 (NOV)	39 (DEC)	(26) (NOV)	39
Moorhen	12 (NOV)	7 (FEB)	(6) (MAR)	6 (FEB)	(6) (DEC)	8
Coot	0	(0)	(2) (MAR)	2 (FEB)	(2) (JAN)	2
Oystercatcher	78 (DEC)	96 (JAN)	95 (JAN)	112 (NOV)	(83) (DEC)	95
Ringed Plover	(100) (JAN)	(50) (DEC)	40 (NOV)	20 (FEB)	(41) (JAN)	50
Golden Plover	(637) (JAN)	730 (JAN)	378 (JAN)	700 (DEC)	(500) (NOV)	611
Grey Plover	173 (NOV)	(266) (DEC)	170 (FEB)	237 (JAN)	(241) (DEC)	217
Lapwing	1085 (NOV)	975 (JAN)	1801 (JAN)	577 (JAN)	(566) (DEC)	1110
Knot	(223) (JAN)	352 (JAN)	(123) (DEC)	350 (NOV)	(248) (FEB)	351
Curlew Sandpiper	0	(0)	1 (NOV)	1 (MAR)	(0)	1
Purple Sandpiper	0	1 (FEB)	1 (JAN)	0	0	0

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Five year summary for Newtown Estuary

Table4c: Five-year winter peak counts, and month in which this was recorded, of each species.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question. Incomplete counts are excluded from calculation where, if included, they would depress the mean. When all counts are considered to be incomplete the maximum replaces the mean.

Species	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	Mean Peak
Dunlin	(1954) (JAN)	(1470) (NOV)	1430 (FEB)	1439 (JAN)	(1190) (FEB)	1573
Ruff	0	(0)	2 (FEB)	0	(0)	1
Jack Snipe	0	(0)	0	0	(2) (DEC)	1
Snipe	25 (NOV)	(76) (NOV)	(6) (DEC)	18 (DEC)	(64) (DEC)	46
Black-tailed Godwit	(179) (JAN)	(86) (NOV)	231 (JAN)	510 (DEC)	(173) (MAR)	371
Bar-tailed Godwit	2 (DEC)	4 (JAN)	9 (JAN)	10 (MAR)	(2) (MAR)	6
Whimbrel	(1) (JAN)	(0)	2 (FEB)	0	(1) (NOV)	1
Curlew	428 (FEB)	399 (FEB)	451 (FEB)	310 (NOV)	(260) (MAR)	397
Spotted Redshank	6 (DEC)	(4) (DEC)	(4) (DEC)	7 (DEC)	(0)	7
Redshank	122 (NOV)	(81) (DEC)	108 (FEB)	153 (JAN)	(47) (FEB)	128
Greenshank	1 (NOV)	(1) (NOV)	2 (JAN)	0	(1) (NOV)	1
Common Sandpiper	1 (NOV)	(1) (DEC)	1 (FEB)	0	(0)	1
Turnstone	8 (NOV)	(15) (NOV)	19 (JAN)	24 (MAR)	(20) (MAR)	18
Mediterranean Gull	13 (MAR)	2 (FEB)	(5) (MAR)	80 (MAR)	(15) (MAR)	32
Black-headed Gull	1175 (MAR)	356 (FEB)	224 (FEB)	801 (MAR)	(700) (MAR)	651
Common Gull	(1) (JAN)	(0)	0	1 (NOV)	(1) (DEC)	1
Lesser Black-backed Gull	(3) (JAN)	(0)	4 (FEB)	1 (FEB)	(1) (DEC)	3
Herring Gull	62 (DEC)	39 (JAN)	146 (JAN)	41 (JAN)	(50) (JAN)	72
Great Black-backed Gull	8 (DEC)	(5) (DEC)	14 (NOV)	8 (DEC)	(16) (FEB)	12
Sandwich Tern	0	(0)	0	4 (MAR)	(0)	1
Kingfisher	3 (DEC)	(1) (NOV)	2 (NOV)	4 (JAN)	(1) (DEC)	3

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Five year summary for Newtown Estuary

Table5: National and International importance of the site for each species.

Figures given indicate the percentage of the relevant qualifying level represented by the five year mean peak count for the species in question

e.g. 50% indicates that the five year mean peak count is half that required for the site to qualify as nationally or internationally important as appropriate for the species in question.

Where a count is enclosed by parentheses this indicates that it was considered incomplete i.e. those parts of the site not visited typically holds at least 25% of the species in question.

Asterisks indicate that the percentage presented has been derived using a value of 1% of the national population that is less than 50 (50 is normally used as a minimum threshold for designation of sites).

Species	Spring cf National Threshold	Autumn cf National Threshold	Winter cf National Threshold	Spring cf International Threshold	Autumn cf International Threshold	Winter cf International Threshold	Spring 5yr mean peak	Autumn 5yr mean peak	Winter 5yr mean peak
Little Grebe	1%	13%	21%	0%	0%	0%	1	10	16
Great Crested Grebe	1%	1%	5%	0%	0%	0%	1	1	8
Slavonian Grebe	*0%	*0%	*14%	0%	0%	3%	0	0	1
Cormorant	3%	3%	5%	1%	1%	1%	6	7	11
Little Egret	N/A	N/A	N/A	0%	2%	1%	5	31	19
Grey Heron	N/A	N/A	N/A	0%	0%	0%	2	5	4
Mute Swan	2%	1%	2%	2%	1%	2%	8	5	8
Greylag Goose (re-established)	N/A	N/A	N/A	N/A	N/A	N/A	1	0	1
Canada Goose	N/A	N/A	N/A	N/A	N/A	N/A	149	201	198
Dark-bellied Brent Goose	2%	25%	178%	1%	11%	79%	20	244	1746
Light-bellied Brent Goose (Svalbard population)	N/A	N/A	N/A	N/A	N/A	N/A	0	0	1
Shelduck	12%	6%	44%	3%	2%	11%	95	50	342
Wigeon	0%	10%	31%	0%	3%	8%	0	408	1254
Gadwall	1%	0%	0%	0%	0%	0%	1	0	0
Teal	0%	35%	66%	0%	17%	32%	7	678	1264
Mallard	1%	2%	2%	0%	0%	0%	31	53	64
Pintail	0%	8%	29%	0%	4%	14%	1	22	82
Shoveler	0%	1%	3%	0%	0%	1%	0	1	4
Eider	0%	1%	0%	0%	0%	0%	0	4	1
Common Scoter	0%	0%	0%	0%	0%	0%	0	0	1
Goldeneye	0%	0%	8%	0%	0%	1%	0	0	21
Red-breasted Merganser	1%	8%	40%	0%	0%	2%	1	8	39
Water Rail	N/A	N/A	N/A	N/A	N/A	N/A	0	1	0
Moorhen	0%	0%	0%	0%	0%	0%	3	7	8
Coot	0%	0%	0%	0%	0%	0%	0	0	2
Oystercatcher	2%	3%	3%	1%	1%	1%	55	92	95
Ringed Plover	2%	17%	15%	1%	7%	7%	6	51	50
Golden Plover	0%	4%	24%	0%	1%	7%	3	105	611
Grey Plover	3%	20%	41%	1%	4%	9%	17	105	217
Lapwing	0%	1%	6%	0%	1%	6%	6	100	1110

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Asterisks indicate that the percentage presented has been derived using a value of 1% of the national population that is less than 50 (50 is normally used as a minimum threshold for designation of sites).

Species	Spring cf National Threshold	Autumn cf National Threshold	Winter cf National Threshold	Spring cf International Threshold	Autumn cf International Threshold	Winter cf International Threshold	Spring 5yr mean peak	Autumn 5yr mean peak	Winter 5yr mean peak
Knot	0%	0%	13%	0%	0%	8%	6	6	351
Curlew Sandpiper	N/A	N/A	N/A	0%	0%	0%	0	0	1
Dunlin	9%	13%	28%	1%	2%	12%	183	264	1573
Ruff	*0%	*0%	*14%	N/A	N/A	N/A	0	0	1
Jack Snipe	N/A	N/A	N/A	N/A	N/A	N/A	0	0	1
Snipe	N/A	N/A	N/A	0%	0%	0%	4	3	46
Black-tailed Godwit	57%	56%	247%	25%	24%	106%	86	84	371
Bar-tailed Godwit	0%	0%	1%	0%	0%	1%	2	3	6
Whimbrel	N/A	N/A	N/A	0%	0%	0%	12	6	1
Curlew	8%	18%	26%	3%	7%	9%	113	274	397
Spotted Redshank	N/A	N/A	N/A	0%	0%	1%	1	3	7
Redshank	2%	12%	11%	2%	11%	10%	27	149	128
Greenshank	N/A	N/A	*17%	0%	0%	0%	1	9	1
Green Sandpiper	N/A	N/A	N/A	0%	0%	0%	0	1	0
Common Sandpiper	N/A	N/A	N/A	0%	0%	0%	2	9	1
Turnstone	1%	3%	4%	1%	2%	2%	6	15	18
Mediterranean Gull	N/A	N/A	N/A	1%	0%	0%	50	1	32
Black-headed Gull	7%	3%	3%	7%	3%	3%	1414	532	651
Common Gull	0%	0%	0%	0%	0%	0%	0	0	1
Lesser Black-backed Gull	N/A	N/A	N/A	N/A	N/A	N/A	2	1	3
Herring Gull	1%	2%	2%	0%	1%	1%	38	74	72
Great Black-backed Gull	2%	3%	3%	0%	0%	0%	8	11	12
Sandwich Tern	N/A	N/A	N/A	0%	1%	0%	5	11	1
Common Tern	N/A	N/A	N/A	1%	3%	0%	15	56	0
Little Tern	N/A	N/A	N/A	1%	1%	0%	3	2	0
Kingfisher	N/A	N/A	N/A	0%	0%	0%	0	2	3

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WeBS Low Tide Count data for the winter 1999/2000 for Newtown Harbour
Table 1: Raw monthly totals counted for the whole site

Species	Nov	Dec	Jan	Feb	Maximum count	Month of maximum count
Little Grebe	24	11	22	22	24	Nov
Great Crested Grebe	2	4	1	7	7	Feb
Slavonian Grebe	.	.	.	6	6	Feb
Cormorant	5	7	10	6	10	Jan
Little Egret	14	23	6	21	23	Dec
Grey Heron	3	2	1	6	6	Feb
Mute Swan	8	7	3	8	8	Nov, Feb
Canada Goose	48	46	75	61	75	Jan
Barnacle Goose	.	.	.	1	1	Feb
Dark-bellied Brent Goose	1122	1288	1279	1616	1616	Feb
Shelduck	307	177	293	438	438	Feb
Wigeon	564	950	922	845	950	Dec
Teal	978	1259	580	1026	1259	Dec
Mallard	89	23	64	32	89	Nov
Pintail	39	40	60	41	60	Jan
Shoveler	.	1	.	.	1	Dec
Goldeneye	21	12	19	20	21	Nov
Red-breasted Merganser	64	24	9	11	64	Nov
Water Rail	.	.	1	.	1	Jan
Moorhen	2	9	3	8	9	Dec
Oystercatcher	110	37	64	65	110	Nov
Ringed Plover	16	12	10	44	44	Feb
Golden Plover	801	483	1027	1449	1449	Feb
Grey Plover	93	124	82	140	140	Feb
Lapwing	429	531	430	1409	1409	Feb
Knot	42	167	175	245	245	Feb
Dunlin	3855	1818	2197	2531	3855	Nov
Jack Snipe	.	.	1	.	1	Jan
Snipe	1	3	9	2	9	Jan
Woodcock	.	1	.	.	1	Dec
Black-tailed Godwit	218	104	13	117	218	Nov
Bar-tailed Godwit	.	2	2	2	2	Dec, Jan, Feb

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Species	Nov	Dec	Jan	Feb	Maximum count	Month of maximum count
Curlew	95	182	77	332	332	Feb
Spotted Redshank	6	.	.	5	6	Nov
Redshank	100	65	84	113	113	Feb
Greenshank	2	1	1	1	2	Nov
Common Sandpiper	.	.	.	2	2	Feb
Turnstone	13	6	22	9	22	Jan
Kingfisher	6	2	3	2	6	Nov

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WeBS Low Tide Count data for the winter 1999/2000 for Newtown Harbour
Table 2: Overall counted area per month (in hectares)

Sector code	Intertidal	Sub-tidal	Non-tidal	Total	Months counted
DN001	27	6	5	38	Nov,Dec,Jan,Feb
DN002	7	28	0	35	Nov,Dec,Jan,Feb
DN003	31	11	5	47	Nov,Dec,Jan,Feb
DN004	29	118	15	162	Nov,Dec,Jan,Feb
DN005	7	3	0	10	Nov,Dec,Jan,Feb
DN006	20	3	0	23	Nov,Dec,Jan,Feb
DN007	27	0	2	29	Nov,Dec,Jan,Feb
DN008	16	0	9	25	Nov,Dec,Jan,Feb
DN009	8	7	0	15	Nov,Dec,Jan,Feb
DN010	17	1	0	18	Nov,Dec,Jan,Feb
DN011	18	0	0	18	Nov,Dec,Jan,Feb
DN012	19	2	0	21	Nov,Dec,Jan,Feb
Total	226	179	36	441	

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WeBS Low Tide Count data for the winter 1999/2000 for Newtown Harbour

Table 3: Peak and mean densities for each species on relevant count sections

Areas in hectares, densities in birds per hectare

Data for gulls and terns not presented, since counting optional and thus statistics unreliable

Sector code	Species	Preferred habitat	Area of preferred habitat	Peak count	Peak density	Mean count	Mean density
DN001	Little Grebe	Sub-tidal	6	5	0.83	1	0.21
DN001	Grey Heron	Intertidal & non-tidal	32	1	0.03	0	0.01
DN001	Dark-bellied Brent Goose	All habitats	38	120	3.16	32	0.84
DN001	Shelduck	All habitats	38	37	0.97	14	0.36
DN001	Wigeon	All habitats	38	40	1.05	12	0.32
DN001	Teal	All habitats	38	30	0.79	17	0.45
DN001	Pintail	All habitats	38	3	0.08	1	0.02
DN001	Goldeneye	Sub-tidal	6	5	0.83	3	0.42
DN001	Red-breasted Merganser	Sub-tidal	6	2	0.33	1	0.08
DN001	Moorhen	All habitats	38	1	0.03	0	0.01
DN001	Oystercatcher	Intertidal	27	5	0.19	3	0.09
DN001	Ringed Plover	Intertidal	27	1	0.04	0	0.01
DN001	Golden Plover	Intertidal & non-tidal	32	420	13.13	138	4.31
DN001	Grey Plover	Intertidal	27	34	1.26	10	0.38
DN001	Lapwing	Intertidal & non-tidal	32	82	2.56	37	1.16
DN001	Dunlin	Intertidal	27	180	6.67	83	3.06
DN001	Woodcock	Intertidal & non-tidal	32	1	0.03	0	0.01
DN001	Black-tailed Godwit	Intertidal & non-tidal	32	80	2.50	26	0.80
DN001	Curlew	Intertidal & non-tidal	32	26	0.81	13	0.41
DN001	Redshank	Intertidal & non-tidal	32	10	0.31	3	0.09
DN001	Kingfisher	All habitats	38	1	0.03	0	0.01
DN007	Little Grebe	Sub-tidal	0	1	(0.03)	1	(0.03)
DN007	Great Crested Grebe	Sub-tidal	0	1	(0.03)	0	(0.01)
DN007	Cormorant	Sub-tidal	0	1	(0.03)	1	(0.02)
DN007	Little Egret	Intertidal & non-tidal	29	1	0.03	1	0.03
DN007	Canada Goose	All habitats	29	2	0.07	1	0.02
DN007	Dark-bellied Brent Goose	All habitats	29	274	9.45	144	4.95
DN007	Shelduck	All habitats	29	289	9.97	119	4.09
DN007	Mallard	All habitats	29	2	0.07	1	0.03
DN007	Pintail	All habitats	29	2	0.07	1	0.02
DN007	Red-breasted Merganser	Sub-tidal	0	2	(0.07)	1	(0.02)
DN007	Oystercatcher	Intertidal	27	21	0.78	18	0.65

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WeBS Low Tide Count data for the winter 1999/2000 for Newtown Harbour

Table 3: Peak and mean densities for each species on relevant count sections

Areas in hectares, densities in birds per hectare

Data for gulls and terns not presented, since counting optional and thus statistics unreliable

Sector code	Species	Preferred habitat	Area of preferred habitat	Peak count	Peak density	Mean count	Mean density
DN007	Ringed Plover	Intertidal	27	5	0.19	2	0.07
DN007	Golden Plover	Intertidal & non-tidal	29	562	19.38	329	11.33
DN007	Grey Plover	Intertidal	27	73	2.70	50	1.84
DN007	Lapwing	Intertidal & non-tidal	29	450	15.52	138	4.76
DN007	Knot	Intertidal	27	219	8.11	126	4.67
DN007	Dunlin	Intertidal	27	1750	64.81	1475	54.63
DN007	Bar-tailed Godwit	Intertidal	27	2	0.07	1	0.02
DN007	Curlew	Intertidal & non-tidal	29	124	4.28	49	1.70
DN007	Redshank	Intertidal & non-tidal	29	35	1.21	16	0.53
DN007	Turnstone	Intertidal	27	7	0.26	4	0.15
DN008	Little Grebe	Sub-tidal	0	2	(0.08)	1	(0.02)
DN008	Cormorant	Sub-tidal	0	3	(0.12)	2	(0.08)
DN008	Little Egret	Intertidal & non-tidal	25	4	0.16	2	0.09
DN008	Dark-bellied Brent Goose	All habitats	25	328	13.12	237	9.47
DN008	Shelduck	All habitats	25	91	3.64	69	2.75
DN008	Wigeon	All habitats	25	30	1.20	8	0.30
DN008	Teal	All habitats	25	16	0.64	4	0.16
DN008	Mallard	All habitats	25	31	1.24	8	0.33
DN008	Red-breasted Merganser	Sub-tidal	0	3	(0.12)	1	(0.03)
DN008	Oystercatcher	Intertidal	16	8	0.50	7	0.45
DN008	Ringed Plover	Intertidal	16	22	1.38	11	0.70
DN008	Golden Plover	Intertidal & non-tidal	25	375	15.00	170	6.80
DN008	Grey Plover	Intertidal	16	31	1.94	26	1.64
DN008	Lapwing	Intertidal & non-tidal	25	34	1.36	11	0.45
DN008	Knot	Intertidal	16	40	2.50	31	1.95
DN008	Dunlin	Intertidal	16	500	31.25	312	19.48
DN008	Snipe	Non-tidal	9	1	0.11	0	0.03
DN008	Curlew	Intertidal & non-tidal	25	22	0.88	11	0.43
DN008	Spotted Redshank	Intertidal & non-tidal	25	3	0.12	1	0.04
DN008	Redshank	Intertidal & non-tidal	25	12	0.48	8	0.30
DN008	Common Sandpiper	Intertidal & non-tidal	25	1	0.04	0	0.01
DN008	Turnstone	Intertidal	16	2	0.13	1	0.08

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Table 3: Peak and mean densities for each species on relevant count sections

Areas in hectares, densities in birds per hectare

Data for gulls and terns not presented, since counting optional and thus statistics unreliable

Sector code	Species	Preferred habitat	Area of preferred habitat	Peak count	Peak density	Mean count	Mean density
DN008	Kingfisher	All habitats	25	1	0.04	0	0.01
DN009	Little Grebe	Sub-tidal	7	6	0.86	3	0.43
DN009	Great Crested Grebe	Sub-tidal	7	2	0.29	1	0.07
DN009	Cormorant	Sub-tidal	7	1	0.14	0	0.04
DN009	Little Egret	Intertidal & non-tidal	8	2	0.25	1	0.16
DN009	Mute Swan	Sub-tidal	7	2	0.29	1	0.07
DN009	Canada Goose	All habitats	15	2	0.13	1	0.03
DN009	Dark-bellied Brent Goose	All habitats	15	152	10.13	70	4.65
DN009	Shelduck	All habitats	15	10	0.67	7	0.48
DN009	Wigeon	All habitats	15	5	0.33	1	0.08
DN009	Teal	All habitats	15	5	0.33	1	0.08
DN009	Pintail	All habitats	15	2	0.13	1	0.03
DN009	Goldeneye	Sub-tidal	7	4	0.57	2	0.21
DN009	Red-breasted Merganser	Sub-tidal	7	15	2.14	5	0.75
DN009	Oystercatcher	Intertidal	8	17	2.13	12	1.50
DN009	Golden Plover	Intertidal & non-tidal	8	550	68.75	303	37.84
DN009	Grey Plover	Intertidal	8	5	0.63	2	0.28
DN009	Lapwing	Intertidal & non-tidal	8	41	5.13	11	1.34
DN009	Dunlin	Intertidal	8	1730	216.25	561	70.09
DN009	Black-tailed Godwit	Intertidal & non-tidal	8	84	10.50	34	4.25
DN009	Bar-tailed Godwit	Intertidal	8	2	0.25	1	0.13
DN009	Curlew	Intertidal & non-tidal	8	7	0.88	5	0.56
DN009	Redshank	Intertidal & non-tidal	8	9	1.13	7	0.81
DN009	Turnstone	Intertidal	8	2	0.25	1	0.09
DN009	Kingfisher	All habitats	15	1	0.07	0	0.02
DN011	Cormorant	Sub-tidal	0	1	(0.06)	0	(0.01)
DN011	Little Egret	Intertidal & non-tidal	18	1	0.06	0	0.01
DN011	Grey Heron	Intertidal & non-tidal	18	1	0.06	1	0.04
DN011	Mute Swan	Sub-tidal	0	3	(0.17)	1	(0.04)
DN011	Dark-bellied Brent Goose	All habitats	18	105	5.83	56	3.11
DN011	Shelduck	All habitats	18	1	0.06	0	0.01
DN011	Wigeon	All habitats	18	209	11.61	129	7.15

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WeBS Low Tide Count data for the winter 1999/2000 for Newtown Harbour
Table 3: Peak and mean densities for each species on relevant count sections

Areas in hectares, densities in birds per hectare

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Sector code	Species	Preferred habitat	Area of preferred habitat	Peak count	Peak density	Mean count	Mean density
DN011	Teal	All habitats	18	140	7.78	114	6.32
DN011	Mallard	All habitats	18	74	4.11	27	1.51
DN011	Pintail	All habitats	18	8	0.44	5	0.25
DN011	Red-breasted Merganser	Sub-tidal	0	4	(0.22)	1	(0.07)
DN011	Moorhen	All habitats	18	8	0.44	3	0.15
DN011	Oystercatcher	Intertidal	18	2	0.11	1	0.03
DN011	Golden Plover	Intertidal & non-tidal	18	3	0.17	1	0.04
DN011	Grey Plover	Intertidal	18	1	0.06	0	0.01
DN011	Lapwing	Intertidal & non-tidal	18	175	9.72	118	6.56
DN011	Dunlin	Intertidal	18	35	1.94	12	0.67
DN011	Black-tailed Godwit	Intertidal & non-tidal	18	8	0.44	3	0.15
DN011	Curlew	Intertidal & non-tidal	18	4	0.22	3	0.18
DN011	Spotted Redshank	Intertidal & non-tidal	18	2	0.11	1	0.03
DN011	Redshank	Intertidal & non-tidal	18	16	0.89	10	0.53
DN011	Greenshank	Intertidal & non-tidal	18	1	0.06	1	0.03
DN011	Kingfisher	All habitats	18	1	0.06	1	0.04

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Table 4: Mean count and density for each species for the whole site*Densities in birds per hectare**Data for gulls and terns not presented, since counting optional and thus statistics unreliable. Note these values are the sums of the values from Table 3 and thus take into account monthly variation in coverage.*

Species	Preferred habitat	Total area of preferred habitat	Mean site count	Mean site density
Little Grebe	Sub-tidal	179	20	0.11
Great Crested Grebe	Sub-tidal	179	4	0.02
Slavonian Grebe	Sub-tidal	179	2	0.01
Cormorant	Sub-tidal	179	7	0.04
Little Egret	Intertidal & non-tidal	262	16	0.06
Grey Heron	Intertidal & non-tidal	262	3	0.01
Mute Swan	Sub-tidal	179	7	0.04
Canada Goose	All habitats	441	58	0.13
Barnacle Goose	All habitats	441	0	0.00
Dark-bellied Brent Goose	All habitats	441	1327	3.01
Shelduck	All habitats	441	304	0.69
Wigeon	All habitats	441	821	1.86
Teal	All habitats	441	961	2.18
Mallard	All habitats	441	52	0.12
Pintail	All habitats	441	45	0.10
Shoveler	All habitats	441	0	0.00
Goldeneye	Sub-tidal	179	18	0.10
Red-breasted Merganser	Sub-tidal	179	27	0.15
Water Rail	Intertidal & non-tidal	262	0	0.00
Moorhen	All habitats	441	6	0.01
Oystercatcher	Intertidal	226	69	0.31
Ringed Plover	Intertidal	226	21	0.09
Golden Plover	Intertidal & non-tidal	262	940	3.59
Grey Plover	Intertidal	226	110	0.49
Lapwing	Intertidal & non-tidal	262	700	2.67
Knot	Intertidal	226	157	0.70
Dunlin	Intertidal	226	2600	11.51
Jack Snipe	Intertidal & non-tidal	262	0	0.00
Snipe	Non-tidal	36	4	0.11
Woodcock	Intertidal & non-tidal	262	0	0.00
Black-tailed Godwit	Intertidal & non-tidal	262	113	0.43

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Table 4: Mean count and density for each species for the whole site*Densities in birds per hectare**Data for gulls and terns not presented, since counting optional and thus statistics unreliable. Note these values are the sums of the values from Table 3 and thus take into account monthly variation in coverage.*

Species	Preferred habitat	Total area of preferred habitat	Mean site count	Mean site density
Bar-tailed Godwit	Intertidal	226	2	0.01
Curlew	Intertidal & non-tidal	262	172	0.66
Spotted Redshank	Intertidal & non-tidal	262	3	0.01
Redshank	Intertidal & non-tidal	262	91	0.35
Greenshank	Intertidal & non-tidal	262	1	0.00
Common Sandpiper	Intertidal & non-tidal	262	1	0.00
Turnstone	Intertidal	226	13	0.06
Kingfisher	All habitats	441	4	0.01

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Appendix 4

Results of wintering golden plover surveys

Table 1: Wintering golden plover survey results

Date	Survey duration	Weather conditions	Golden plover recorded	Other waders recorded	Map number
26/1/06	07:30 – 16:30	Overnight frost. Overcast, sunny spells in afternoon. East breeze.	3 flocks	Lapwing	Map 28
2/2/06	07:15 – 10:00	Cold. Slightly misty. Light, variable breeze	1 flock	No	Map 29
8/2/06	07:20 – 17:15	Fine, prolonged sunny spells. Light north-west breeze.	No	Lapwing	Map 30
10/2/06	08:00 – 16:45	Overnight frost. Bright and sunny. Light northerly breeze.	1 flock	Lapwing	Map 31
14/2/06	08:00 – 17:45	Sunny spells in morning, rain showers from 15:00. Moderate south-west wind.	No	Lapwing	Map 32
23/2/06	07:30 – 17:45	Overcast. Prolonged snow from 10:45 – 14:15. Mix of sleet, snow and rain from 14:15 onwards	No	Lapwing Redshank Curlew Dunlin	Map 33
3/3/06	08:00 – 17:45	Prolonged sunny spells. Light east breeze. Heavy snow showers 15:00 – 16:30	No	Lapwing	Map 34
8/3/06	08:00 – 18:00	Misty all day, with poor visibility at times. Blustery south-east wind. Occasional showers throughout day	Single bird	Lapwing Curlew Black-tailed godwit	Map 35
14/3/06	06:30 – 18:00	Mild. Occasional sunny spells. Light easterly breeze.	No	No	Map 36
22/3/06	08:00 – 19:00	Overcast, occasional sunny spells between 15:00 – 16:00. Strong north-east breeze.	No	Lapwing Curlew	Map 37
31/3/06	07:15 – 17:45	Overcast and misty until 13:30. Sunny spells from 13:30 onwards. Blustery south-west wind.	1 flock	Snipe Curlew Black-tailed godwit Redshank	Map 38

Appendix 5

Collision risk modelling calculations

West Wight Wind Farm: Collision Risk Assessment TOR data for 6 turbines

Number of turbines (N)	6
Area of wind farm (A)	294.5 ha
Rotor radius (R)	41 m
Rotor diameter (d)	82 m
Tower height	59 m
Blades per turbine (b)	3
Chord max (blade width) (c)	3 m
Pitch (γ)	3.5°
Blade rotation (R)	4.17 sec
Merlin	
- wingspan (w)	0.62 m
- length (l)	0.30 m
- speed (v)	12 m / sec
Golden plover	
- wingspan	0.76 m
- length	0.29 m
- speed	8 m / sec
Peregrine	
- wingspan	1.1 m
- length	0.48 m
- speed	14 m / sec
Survey period winter	40 hours in 2 months
Survey period breeding	0 hours
Daylight hours winter	
Daylight hours breeding	

Merlin

1 - Flight risk volume = V_W

$$\begin{aligned}V_W &= Ad \\ &= 2,945,500 \times 82 \\ &= 241,531,000 \text{ m}^3\end{aligned}$$

2 - Combined volume swept out by wind farm rotors = V_R

$$\begin{aligned}V_R &= N \pi r^2 (c + l) \\ &= 6 \times \pi \times 41^2 \times (3 + 0.3) \\ &= 104,511 \text{ m}^2\end{aligned}$$

3 - Bird occupancy within flight risk volume = n

$$\begin{aligned}n &= \text{number of birds} \times \text{time spent in } V_R \\ &= 1 \times 60 \\ &= 60 \text{ birds per 40 hours} \\ &= 907.5 \text{ birds per 2 months}\end{aligned}$$

4 - Bird occupancy of the volume swept by rotors = O

$$\begin{aligned}O &= n (V_R \setminus V_W) \\ &= 907.5 (104,511 / 241,531,000) \\ &= 0.39267525 \text{ bird-secs}\end{aligned}$$

5 - Time taken for bird to make transit through rotor = t

$$\begin{aligned}t &= (c + l) / v \\ &= (3 + 0.3) / 12 \\ &= 0.275 \text{ sec}\end{aligned}$$

6 - Number of birds passing through rotors

$$\begin{aligned}&= n (V_R \setminus V_W) / t \\ &= 0.39267525 / 0.275 \\ &= 1.42791 \text{ birds}\end{aligned}$$

Plug into SNH spreadsheet – 6.3%

Collision risk without avoidance

$$\begin{aligned}6.3\% \times 1.42791 \\ &= 0.08995833\end{aligned}$$

Collision risk without avoidance and assuming turbines in operation 80% of time

$$\begin{aligned}80\% \times 0.08995833 \\ &= 0.071966664\end{aligned}$$

Collision risk with avoidance

$$\begin{aligned}0.05 \times 0.071966664 \\ &= 0.0035983332 \text{ merlin every 2 months}\end{aligned}$$

Merlin present for 6/12 months, annual mortality
= 0.0035983332×3
= 0.0107949996 merlin per year

25 year mortality = $0.26987499 \pm 10\%$

Golden Plover – all flights included

1 - Flight risk volume = V_W

$$\begin{aligned}V_W &= Ad \\ &= 2,945,500 \times 82 \\ &= 241,531,000 \text{ m}^3\end{aligned}$$

2 - Combined volume swept out by wind farm rotors = V_R

$$\begin{aligned}V_R &= N \pi r^2 (c + l) \\ &= 6 \times \pi \times 41^2 \times (3 + 0.29) \\ &= 104,194 \text{ m}^2\end{aligned}$$

3 - Bird occupancy within flight risk volume = n

$$\begin{aligned}n &= \text{number of birds} \times \text{time spent in } V_R \\ &= 210 \times 585 \\ &= 122,850 \text{ birds per 40 hours} \\ &= 1,858,107 \text{ birds per 2 months}\end{aligned}$$

4 – Bird occupancy of the volume swept by rotors = O

$$\begin{aligned}O &= n (V_R \setminus V_W) \\ &= 1,858,107 (104,194 / 241,531,000) \\ &= 801.56878 \text{ bird-secs}\end{aligned}$$

5 – Time taken for bird to make transit through rotor = t

$$\begin{aligned}t &= (c + l) / v \\ &= (3 + 0.29) / 8 \\ &= 0.41125 \text{ sec}\end{aligned}$$

6 – Number of birds passing through rotors

$$\begin{aligned}&= n (V_R \setminus V_W) / t \\ &= 801.56878 / 0.41125 \\ &= 1,949.1034 \text{ birds}\end{aligned}$$

Plug into SNH spreadsheet – 7.0%

Collision risk without avoidance

$$\begin{aligned}7.0\% \times 1,949.1034 \\ = 136.43724\end{aligned}$$

Collision risk without avoidance assuming turbines operating 80% of time

$$\begin{aligned}80\% \times 136.43724 \\ = 109.149792\end{aligned}$$

Collision risk with avoidance

$$0.05 \times 109.149792 \\ = 5.4574896 \text{ golden plover every 2 months}$$

$$\text{Golden plover present for 6/12 months, annual mortality} \\ = 6.821862 \times 3 \\ = 16.3724688 \text{ golden plover per year}$$

$$25 \text{ year mortality} = 409.31172 \pm 10\%$$

Golden plover – abnormal flight removed

1 - Flight risk volume = V_w

$$V_w = Ad \\ = 2,945,500 \times 82 \\ = 241,531,000 \text{ m}^3$$

2 - Combined volume swept out by wind farm rotors = V_R

$$V_R = N \pi r^2 (c + l) \\ = 6 \times \pi \times 41^2 \times (3 + 0.29) \\ = 104,194 \text{ m}^2$$

3 - Bird occupancy within flight risk volume = n

$$n = \text{number of birds} \times \text{time spent in } V_R \\ = 209 \times 240 \\ = 50,160 \text{ birds per 40 hours} \\ = 758,670 \text{ birds per 2 months}$$

4 – Bird occupancy of the volume swept by rotors = O

$$O = n (V_R \setminus V_w) \\ = 758,670 (104,194 / 241,531,000) \\ = 327.282468 \text{ bird-secs}$$

5 – Time taken for bird to make transit through rotor = t

$$t = (c + l) / v \\ = (3 + 0.29) / 8 \\ = 0.41125 \text{ sec}$$

6 – Number of birds passing through rotors

$$= n (V_R \setminus V_w) / t \\ = 327.282468 / 0.41125 \\ = 795.82363 \text{ birds}$$

Plug into SNH spreadsheet – 7.0%

Collision risk without avoidance

$$7.0\% \times 795.82363 \\ = 55.707654$$

Collision risk without avoidance assuming turbines operating 80% of time
 $80\% \times 55.707654$
 $= 44.5661232$

Collision risk with avoidance
 0.05×44.5661232
 $= 2.22830616$ golden plover every 2 months

Golden plover present for 6/12 months, annual mortality
 $= 2.22830616 \times 3$
 $= 6.68491848$ golden plover per year

25 year mortality = $167.122962 \pm 10\%$

Peregrine

1 - Flight risk volume = V_W
 $V_W = A d$
 $= 2,945,500 \times 82$
 $= 241,531,000 \text{ m}^3$

2 - Combined volume swept out by wind farm rotors = V_R
 $V_R = N \pi r^2 (c + l)$
 $= 6 \times \pi \times 41^2 \times (3 + 0.48)$
 $= 110,211 \text{ m}^2$

3 - Bird occupancy within flight risk volume = n
 $n = \text{number of birds} \times \text{time spent in } V_R$
 $= 1 \times 105$
 $= 105 \text{ birds per 40 hours}$
 $= 1588.13 \text{ birds per 2 months}$

4 – Bird occupancy of the volume swept by rotors = O
 $O = n (V_R \setminus V_W)$
 $= 1588.13 (110,211 / 241,531,000)$
 $= 0.72466372 \text{ bird-secs}$

5 – Time taken for bird to make transit through rotor = t
 $t = (c + l) / v$
 $= (3 + 0.48) / 14$
 $= 0.24857 \text{ sec}$

6 – Number of birds passing through rotors
 $= n (V_R \setminus V_W) / t$
 $= 0.72466372 / 0.24857$
 $= 2.9153306 \text{ birds}$

Plug into SNH spreadsheet – 7.0%

Collision risk without avoidance

$$7.0\% \times 2.9153306 \\ = 0.20407314$$

Collision risk without avoidance assuming turbines in operation 80% of time

$$80\% \times 0.20407314 \\ = 0.163258512$$

Collision risk with avoidance

$$0.05 \times 0.163258512 \\ = 0.0081629256 \text{ peregrine every 2 months}$$

Peregrine present for 12/12 months, annual mortality

$$= 0.0081629256 \times 6 \\ = 0.0489775536 \text{ peregrine per year}$$

$$25 \text{ year mortality} = 1.22443884 \pm 10\%$$