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# Stag's Holt Wind Farm, Cambridgeshire: post-construction breeding bird surveys 2011

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On behalf of E.ON Climate and Renewables Ltd

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## SUMMARY

The Stag's Holt wind farm has 9 x 2MW wind turbines, which have been operating since October 2007. An additional turbine was installed in October 2010, within the footprint of the main wind farm. Breeding bird surveys were carried out during April – June 2011 to satisfy a Planning Condition that formed part of the Stag's Holt wind farm planning approval. These surveys aimed to establish how the birds that breed in the area have been affected by the wind farm. The 2011 surveys complete the full three years of the bird monitoring programme.

The breeding bird community within the main study area in all three post-construction survey years (2009, 2010 and 2011) was generally similar to that from the 2003 and 2004 pre-construction baseline. Birds that had been present in close proximity to the wind turbine locations in the baseline year generally at least maintained their populations there after the turbines had been constructed (even within 100m of the turbines). There has been an increase in several populations coincident with the construction of the wind farm, including in proximity to the wind turbines (within 300m).

Only one species, meadow pipit, showed a statistically significant shift in distribution away from the wind turbines following construction, which was surprising given that this species has been shown to be largely unaffected by the presence of wind turbines at several other wind farms in the region. However further examination of this species' habitat preferences showed that this change was likely to be a result of an increase in its preferred habitat, improved grassland, further from the wind turbines and a decrease in that habitat closer to the turbines, coincident with the building of the wind farm.

Overall this monitoring study has found no evidence of any major change in the breeding bird community, and no significant population reduction through displacement. It is clear that the worst-case assumption made in the ES, that birds would be displaced to 300m from the turbines, was not a reasonable worst-case.

## INTRODUCTION

1. Bird surveys were commissioned by E.ON Climate and Renewables Ltd. to satisfy a Planning Condition that formed part of the Stag's Holt wind farm planning approval. These surveys aim to establish how the birds that breed in the area have been affected by the wind farm. This report covers the third and final season's post-construction surveys.
2. The specific objectives of this work were to undertake surveys of the breeding bird populations in and around the wind farm site. The main part of the analysis was to determine if the wind farm had any displacement effect on the local bird populations. If so, one would expect bird densities to be reduced closer to the turbines. Therefore bird distributions have been compared (a) in relation to the distance from the wind turbines, and (b) in relation to their baseline distribution.

## THE STUDY AREA

3. The Stag's Holt wind farm has 9 x 2MW wind turbines, which have been operating since October 2007. It is located on predominantly arable farmland, 4km north-east of March, in north-west Cambridgeshire. An additional turbine was installed in October 2010, within the footprint of the main wind farm (see Figure 1).
4. The study area (all of which was covered during all of the baseline and post-construction surveys) includes the wind farm itself and a 300m buffer around it, plus an additional area adjacent to the west that functions as a reference area to compare changes in bird densities and distribution patterns (see Figure 1). The breeding bird study area covered a total area of 3.5km<sup>2</sup>.
5. The study area is dominated by arable crops (including winter-sown cereals, sugar beet, rape, potatoes and small areas of improved grassland). The field boundaries included typical marginal vegetation, numerous wet ditches, a few small copses, scattered bushes, trees and hedgerow remnants. Most of the ditches are cleared regularly for drainage purposes. The old course of the River Nene passes along the eastern edge of the study area, and the Twenty Foot River formed its southern edge. There have been no major changes to the agricultural management through the baseline and post-construction surveys, though there has been an increase in the amount of improved grassland available on the western edge of the survey area that occurred at the same time as the wind farm was constructed.

## Breeding Bird Survey

### Survey Methods

6. The breeding bird survey was carried out using walkover surveys following the methodology of the Common Birds Census (Gilbert *et al.* 1998) with approximately 2 hours spent surveying per km<sup>2</sup> to standardise the search effort per unit area. Two survey visits per year were carried out for the pre-construction surveys in 2003 and 2004, the first on 1 May and 7 May in 2003 and 2004 respectively and the second on 15 June 2003 and 7 June 2004. In 2009, 2010 and 2011 three survey visits were made (in line with current SNH guidance, Whitfield *et al.* 2005, as recommended by RSPB *in litt.* 24/11/04), on 21 April, 22 May and 15 June 2009, on 19 April, 24 May and 29 June 2010, and on 28 April, 11 May and 7 June 2011. The third visit did not add many additional records with the exception of reed warbler and sedge warbler. All bird locations and behaviour were mapped to 1:10,000 scale, using the standard Common Birds Census notation. Supplementary behavioural observations and notes were made to determine breeding locations as accurately as possible. The surveys avoided strong winds, heavy rain, fog and low cloud. Birds were located by walking, listening and scanning by eye and with binoculars. Birds were considered to be breeding if singing, displaying, carrying nest material, nests or young found, repetitively alarmed adults, disturbance displaying, carrying food or in territorial dispute.
7. The survey data were used to obtain population estimates for all of the bird species breeding on the site. Maps were produced of the breeding pairs recorded during each visit and these were combined to produce an estimate of the overall breeding population for each species. Pairs were considered separate from each other if greater than 1km (waterfowl), 500m (woodpigeon, gamebirds, carrion crow and cuckoo) or 200m (all other species) apart, with this distance reflecting the relative distance that birds might move between survey visits.
8. All of the crops within the survey area were mapped each year, to enable the effects of any habitat changes on the birds over time to be taken into account. This enabled an initial analysis to be undertaken of the more abundant species' habitat preferences. This was carried out using a selection index analysis (Jacobs 1974) for each of these species to draw a quantitative comparison between the use that each key species made of each habitat and the availability of that habitat within the survey area.
9. A more detailed analysis of the habitat factors affecting these species' distribution in combination with the effect of the wind turbines was also carried out. This involved overlaying a 100x100m grid over the study area, using the crop mapping data to determine the predominant crop in each grid square, together with the length of ditch in each grid square (ditches were the predominant field boundary across the survey area and provided an important habitat for several breeding bird species), and the distance of each grid square to the nearest wind turbine.

## Survey Results

### Breeding Bird Surveys

10. The breeding bird population estimates within the study area are given in Table 1. The Table also gives the results from the previous 2003 and 2004 surveys (before the wind farm was constructed). Numbers are given for the whole study area, the area within 300m of the turbines (the distance used for the worst-case disturbance assessment in the Environmental Statement).

**Table 1. Breeding bird population estimates at Stag's Holt in 2009, 2010 and 2011 after construction of the wind farm, with those for the same area for 2003 and 2004 (prior to the construction of the wind farm) given for comparison. Data given for the whole study area and for the zone within 300m of the wind turbines.**

	Study Area					<300m wind turbine				
Species	2003	2004	2009	2010	2011	2003	2004	2009	2010	2011
Great Crested Grebe	6	2	3	4	9	1	1	1	2	4
Grey Heron	3	1	0	0	0	3	1	0	0	0
Mute Swan	4	2	3	2	2	2	2	2	1	1
Greylag Goose	1	0	1	0	1	1	0	0	0	0
Mallard	13	8	16	14	17	7	2	6	6	9
Tufted Duck	1	0	3	1	2	0	0	3	0	2
Buzzard	0	0	0	1	0	0	0	0	0	0
Kestrel	0	1	0	1	1	0	1	0	1	0
Red-legged Partridge	8	3	11	6	13	4	2	5	1	5
Grey Partridge	0	3	2	4	2	0	0	1	1	1
Quail	0	1	0	0	0	0	0	0	0	0
Pheasant	30	7	27	18	19	16	4	14	9	9
Moorhen	8	2	6	6	5	6	1	2	2	2
Coot	1	1	2	2	0	0	0	0	0	0
Stock Dove	16	14	26	7	13	7	11	10	3	9
Woodpigeon	303	42	141	59	288	291	37	21	16	201
Collared Dove	1	0	17	5	7	0	0	0	0	1
Turtle Dove	0	1	0	1	0	0	0	0	0	0
Barn Owl	1	1	1	0	0	0	0	0	0	0
Little Owl	1	0	1	0	1	1	0	0	0	1
Swift	0	0	1	0	0	0	0	0	0	0
Kingfisher	1	0	0	1	1	1	0	0	0	0
Green Woodpecker	0	0	1	0	0	0	0	0	0	0
Great Spotted Woodpecker	0	1	0	0	0	0	0	0	0	0
Skylark	50	36	67	58	55	20	21	26	28	20
Swallow	2	1	6	5	3	1	1	0	2	2
House Martin	0	0	3	0	0	0	0	0	0	0
Meadow Pipit	11	7	13	11	8	6	4	0	1	2
Yellow Wagtail	12	8	25	28	42	7	7	12	17	19
Pied Wagtail	3	5	8	6	4	2	0	2	0	1

Species	Study Area					<300m wind turbine				
	2003	2004	2009	2010	2011	2003	2004	2009	2010	2011
Wren	1	1	24	11	5	1	1	9	5	2
Dunnock	0	0	6	2	2	0	0	3	1	0
Robin	0	0	6	5	3	0	0	0	0	0
Blackbird	4	1	16	6	8	2	0	5	2	2
Song Thrush	0	0	1	1	0	0	0	0	0	0
Mistle Thrush	0	0	1	1	3	0	0	0	0	0
Sedge Warbler	1	13	46	26	41	0	6	17	10	20
Reed Warbler	32	19	67	88	67	10	9	23	36	35
Whitethroat	0	3	6	17	21	0	1	2	6	8
Garden Warbler	0	0	1	2	2	0	0	0	1	1
Blackcap	0	0	2	2	1	0	0	0	0	0
Chiffchaff	0	1	0	0	0	0	0	0	0	0
Willow Warbler	0	0	1	0	0	0	0	0	0	0
Blue Tit	0	0	1	0	4	0	0	0	0	1
Great Tit	0	0	1	2	0	0	0	0	0	0
Magpie	1	0	0	4	2	1	0	0	1	1
Jackdaw	0	0	1	3	0	0	0	0	0	0
Carrion Crow	2	2	6	4	7	1	1	2	3	2
Starling	2	0	7	3	2	0	0	1	1	1
House Sparrow	20	1	14	15	7	0	0	0	0	1
Tree Sparrow	0	0	1	1	0	0	0	0	0	0
Chaffinch	2	3	9	5	7	1	2	4	2	1
Greenfinch	1	0	1	1	0	0	0	0	0	0
Goldfinch	2	0	11	8	24	0	0	2	0	1
Linnet	1	1	31	17	22	0	0	19	5	7
Yellowhammer	1	0	3	2	10	0	0	0	0	0
Reed Bunting	20	18	70	58	50	11	11	32	28	26
Corn Bunting	5	2	22	14	27	4	1	8	6	9

11. The breeding bird populations within the study area were broadly similar in the five years. The only marked drop in numbers within 300m of the turbines in all three post-construction years was meadow pipit. Several species showed considerable increases in this zone following construction of the wind farm, including sedge warbler, reed warbler, whitethroat, linnet and reed bunting. The area within 300m of the wind turbines has continued to support a similar breeding bird community to that which it held prior to construction. The distributions of the breeding birds within the study area are shown in Figures 1 to 20, with the maps for the pre-construction and post-construction years presented side by side for comparison. The more abundant species have been presented separately for clarity.
12. Of the high sensitivity species (all specially protected from disturbance under Schedule 1 of the 1981 Wildlife and Countryside Act), only one, kingfisher, was found breeding in 2011 (1 pair). A single pair was also recorded in 2003 prior to construction and in 2009 and 2010 after construction had been completed. No barn owls were seen in 2011, as

in 2010. A single pair had been seen in all previous years. Quail was recorded in 2004 but not in any other years.

13. The distributions of the more abundant breeding birds (those with a sufficient population size to give a meaningful results) in relation to the wind turbines were investigated further by analysing the distance from each breeding pair location to the nearest turbine location in the three years. If any of these birds were avoiding the turbines, then one would expect a greater distance from the turbines in 2009, 2010 and 2011 after they had been constructed. The results of these analyses are summarised in Table 2, which gives the median distance to the nearest turbines for each species for the five years. The Table also gives the results of the statistical (Kruskal-Wallis non-parametric one-way analysis of variance) analysis of these data, with a null hypothesis of no difference between the years. The H-statistic from the analysis, the sample sizes for each year and the probability associated with the test are given. A probability of less than 0.05 would be required to reject the null hypothesis (i.e. to conclude that there was a significant difference across the years). There was one statistically significant result (i.e.  $p < 0.05$ ), an increase in the median distance to the nearest turbine for meadow pipit in the post-construction years compared with 2003 and 2004. The distribution of this species showed a shift to the western side of the study area away from the wind farm in all three years following construction (Figure 8). All of the other species showed no statistically significant difference in the median distance to the nearest turbine across the five years, though median distances for several species (including stock dove, woodpigeon, yellow wagtail and sedge warbler) were higher in the years after construction of the wind farm. For most of these species however the populations within 300m of the wind farm did not decline following construction but rather the population increase was greater further from the wind turbines.

**Table 2. Median closest turbine distances to breeding birds recorded at Stag's Holt, 2009 and 2010 (post-construction), with those for the same area for 2003 and 2004 (prior to construction of the wind farm) given for comparison.**

Species	Median distance to nearest turbine (m)					H-statistic	P
	2003	2004	2009	2010	2011		
Mallard	289	577	354	290	298	1.88	0.76
Pheasant	316	232	296	410	362	1.20	0.88
Stock Dove	297	183	402	349	392	4.11	0.39
Woodpigeon	271	282	422	999	327	6.64	0.16
Skylark	445	207	465	329	474	4.30	0.37
Meadow Pipit <sup>1</sup>	244	191	1066	932	961	23.3	<0.001
Yellow Wagtail	175	168	319	238	458	7.60	0.11
Sedge Warbler <sup>2</sup>	-	315	458	400	309	0.88	0.83
Reed Warbler	471	321	559	392	289	4.14	0.39
Reed Bunting	288	227	338	346	278	4.11	0.39

<sup>1</sup> Statistically significant increase in the mean distance to the nearest turbine (both pre-construction years v. after).

<sup>2</sup> Insufficient data from 2003 for analysis

Sample sizes are numbers of pairs for whole survey area (given in Table 1 above)

14. The distributions of the three more abundant open ground species (skylark, reed warbler and reed bunting) in relation to the distance from the wind turbines are summarised in Figures 21 to 23. Skylark (Figure 21) numbers were generally higher in the three post-construction years than in the two pre-construction years, with little change in their overall distribution in relation to the wind turbines. Reed warbler (Figure 22) numbers increased after construction of the wind farm, and this increase was particularly marked within 300m of the wind farm in all three of the post-construction years. Reed warblers are well known to be strongly influenced by ditch management (Surmacki 2005) and it is likely that this, rather than anything linked to the wind farm, caused this change (and also a likely contribution to this increase through the additional survey visit in 2009-11). Reed buntings (Figure 23) also increased in numbers in the three post-construction years compared with 2003 and 2004, with that increasing occurring across the study area but particularly within 300m of the wind turbines.
15. The only species to show any indication of displacement by the wind farm was meadow pipit. Numbers have varied between years but no overall trend has been apparent and no evidence of any decline in the survey area as a result of the construction of the wind farm. However there has been a re-distribution of birds between the pre-construction and post-construction surveys, with fewer found within 300m of the wind farm since it was constructed. This has coincided with a loss of improved grassland in proximity to the wind turbines and an increase in that habitat on the western edge of the survey area (further from the turbines). This is investigated further in the following section.

### **Habitat Analysis**

16. It was apparent from the results presented above, particularly in relation to meadow pipit, that changes in habitat availability and distribution may have contributed to some of the observed results. Though the main crops grown within the survey area were similar through all years of the study (predominantly winter cereal and rape) there have been changes in the distributions of those crops and an increase in the amount of improved grassland post-construction (located mainly on the western edge of the survey area, though with less available in the eastern part of the survey area).
17. A two-stage analysis was carried out of the factors affecting bird numbers and distribution across the survey area. Firstly the habitat preferences of the more abundant species were investigated by calculating a preference index (Jacobs' index of selectivity; Jacobs 1974) for each species listed in Table 2 (i.e. those with sufficient data to undertake the analysis). The results summarised over all five years are shown in Table 3. Of particular note in relation to the analysis discussed in the previous section was a strong preference for improved grassland shown by meadow pipits.

**Table 3. Jacob's Selectivity Indices for each of the more abundant species and each of the main habitats/crops.**

Species	Buildings	Cereal	Improved Grass	Rape	River	Other crop
Mallard	-0.27	-0.16	-0.52	-0.31	0.42	-0.43
Pheasant	0.01	-0.36	0.38	0.32	-1.00	-0.34
Woodpigeon	0.43	-0.54	0.31	0.07	-1.00	-0.12
Stock Dove	0.13	-0.25	-0.21	-0.58	-0.40	0.07
Skylark	-1.00	0.26	-0.08	-0.11	-1.00	-0.28
Meadow Pipit	-1.00	-0.13	0.85	-0.66	-1.00	-0.81
Yellow Wagtail	-0.68	0.01	-0.23	-0.01	-0.21	-0.10
Sedge Warbler	-0.65	-0.14	-0.18	0.25	-0.04	-0.32
Reed Warbler	-0.79	-0.24	-0.09	0.19	0.59	-0.32
Reed Bunting	-1.00	-0.26	-0.43	0.50	-0.16	-0.39

18. The second stage of the habitat analysis was to investigate the birds' habitat preferences in combination with the effects of the wind turbines. A logistic regression model was used to explore the factors affecting the presence/absence of each of the more abundant species. The models were fitted using R version 2.12 (R Development Core Team 2010), and using the R GLMM package '*glmmML*' (Broström and Holmberg 2011). Distance to the nearest wind turbine and the length of ditch within each 100x100m grid square were incorporated as covariates and wind farm presence (before/after construction of the wind turbines) and crop type as factors. The wind farm presence and turbine distance were also included together as an interaction factor, to take into account the potential for the birds' distribution in relation to the turbine locations to change following construction of the turbines. Year was included as a clustering factor in the analysis to take into account the potential temporal autocorrelation from sampling over repeated years (Zuur et al. 2009). The results are summarised in Table 4.

**Table 4. Generalised Linear Mixed Modelling (GLMM) results of the factors affecting bird grid square occupancy.**

Species	Statistically significant predictors of presence/absence in grid squares
Mallard	Ditch length (+++)
Pheasant	Ditch length (+++), Improved grass (++) , Rape (++)
Woodpigeon	Improved grass (+++), Other crop (++) , Rape (+), Ditch length (+)
Stock Dove	Other crop (++) , Improved grass (+)
Skylark	Other crop (- - -), Rape (- -)
Meadow Pipit	Improved grass (++) , Ditch length (++) , Wind farm presence (- -), Turbine distance (-), Turbine distance-Wind farm presence interaction (++) .
Yellow Wagtail	Turbine distance (-), Turbine distance-Wind farm presence interaction (+).
Sedge Warbler	Ditch length (+++), Wind farm presence (++) .
Reed Warbler	Ditch length (+++), Wind farm presence (+++).
Reed Bunting	Rape (+++), Ditch length (+++), Turbine distance (-), Turbine distance-Wind farm presence interaction (+).

*+/- indicates statistically significant positive/negative relationship, +++/- - - = p<0.001, ++/- - - = p<0.01, +/- = p<0.05.*

19. For mallard, pheasant, woodpigeon, stock dove and skylark there was no evidence of any effect at all of the wind farm on the birds' distribution. For sedge warbler and reed warbler there was a significant increase in grid square occupancy following the construction of the wind farm (probably relating mainly to coincidental local changes in ditch management resulting in improved habitat for these two predominantly ditch species after construction of the wind farm, and also the additional survey visit in those years).
20. Meadow pipit showed a strong positive association with improved grassland, with occupancy of grid squares significantly higher where those squares were predominantly improved grassland, and also with the length of ditch. As noted above the distribution of improved grassland changed at the same time as the construction of the wind farm, with greater availability at greater distance from the turbines (and a reduction in that habitat in proximity to the wind farm). The birds' distribution reflected this change in habitat availability and meant that their distribution in relation to the turbine locations also changed (resulting in a significant interaction between the wind farm presence and turbine distance and negative associations with both of the variables individually). The strong relationship with the improved grassland habitat would suggest that the main reason behind this effect was the habitat change rather than the presence of the wind farm. It should also be noted that though the birds' distribution changed over the study period, the overall meadow pipit population in the survey area remained at a similar level (Table 1).
21. Yellow wagtail distribution did not show any significant relationship with any crop/habitat but there was a significant interaction between the wind farm presence and turbine distance and a negative association with turbine distance. This species showed a substantial population increase following construction of the wind farm, including within 300m of the turbines (Table 1). Further analysis of the statistical model output indicated a negative relationship with turbine distance prior to construction (with higher yellow wagtail occupancy closer to the turbine locations prior to construction) changed to a flat distribution post-construction (i.e. yellow wagtails were evenly distributed in relation to turbine distance in that period).
22. Reed buntings showed a very strong association with rape and with ditch length, but also a significant interaction between the wind farm presence and turbine distance and a negative association with turbine distance. As for yellow wagtails, this species showed a substantial population increase following construction of the wind farm, including within 300m of the turbines (Table 1). Further analysis of the statistical model output for this species, as for yellow wagtail, indicated a previous negative relationship with turbine distance prior to construction changed to a flat distribution post-construction.

## Conclusions

23. In general it appears that the wind farm has had only minor effects on the breeding bird community. Birds that had been present in close proximity to the wind turbine locations in the baseline year generally at least maintained their populations there after the turbines had been constructed (even within 100m of the turbines). Overall, there were some minor differences between breeding bird populations recorded in the pre-construction baseline and in the first of the post-construction surveys. There has been

an increase in several populations coincident with the construction of the wind farm, including in close proximity to the wind turbines (within 200m) though this is likely to have resulted from habitat change, an additional survey visit in the post-construction surveys and wider population changes rather than any effect associated with the wind farm. Improved habitat along ditches may have benefitted species such as sedge warbler and reed warbler, and an increased area of rape may have contributed to an increase in reed bunting numbers.

24. Meadow pipits did show a shift in distribution away from the wind farm in the three post-construction survey years. This result was initially puzzling as this species has been shown to be largely unaffected by the presence of wind turbines at several other wind farms in the region, including Glassmoor near Whittlesey (Percival et al. 2009a), Red Tile Farm near Chatteris (Percival et al. 2009b), Red House Farm near Holbeach (Percival et al. 2009c) and Deeping St. Nicholas (Percival et al. 2009d). However more detailed analysis incorporating habitat factors as well as distance from the wind turbines has shown that the key significant factor in this observed change in distribution was likely to be a change in the distribution of this species' preferred habitat, improved grassland. This habitat decreased in proximity to the wind turbines but increased further from the turbines over the same period as the wind farm was constructed.
25. Overall therefore this monitoring study has found no evidence of any major change in the breeding bird community, and no significant population reduction through displacement. The results of the three years post-construction monitoring have shown that the local breeding bird community has been largely unaffected by the wind turbines. It is clear that the worst-case assumption made in the ES, that birds would be displaced to 300m from the turbines, was not a reasonable worst-case.

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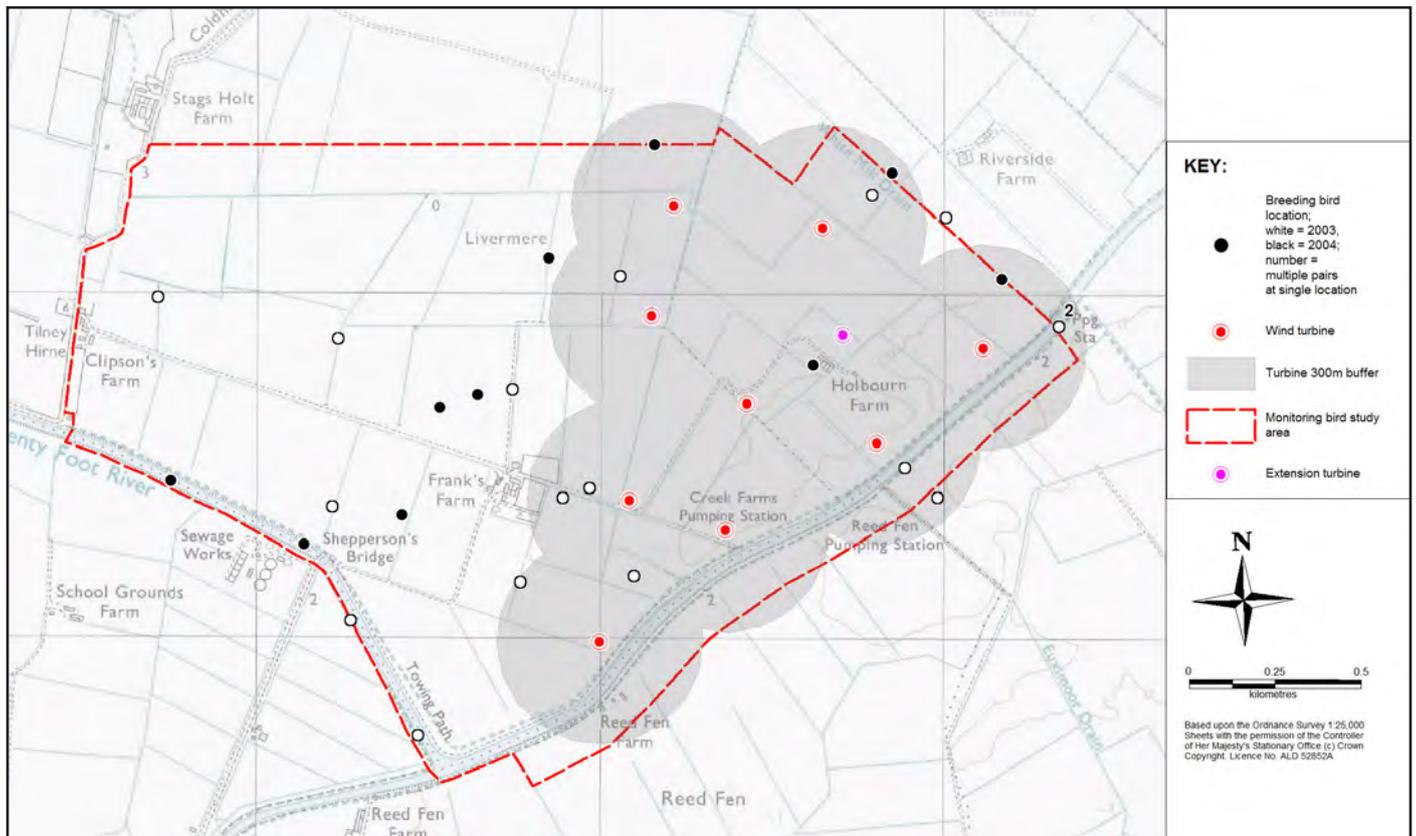
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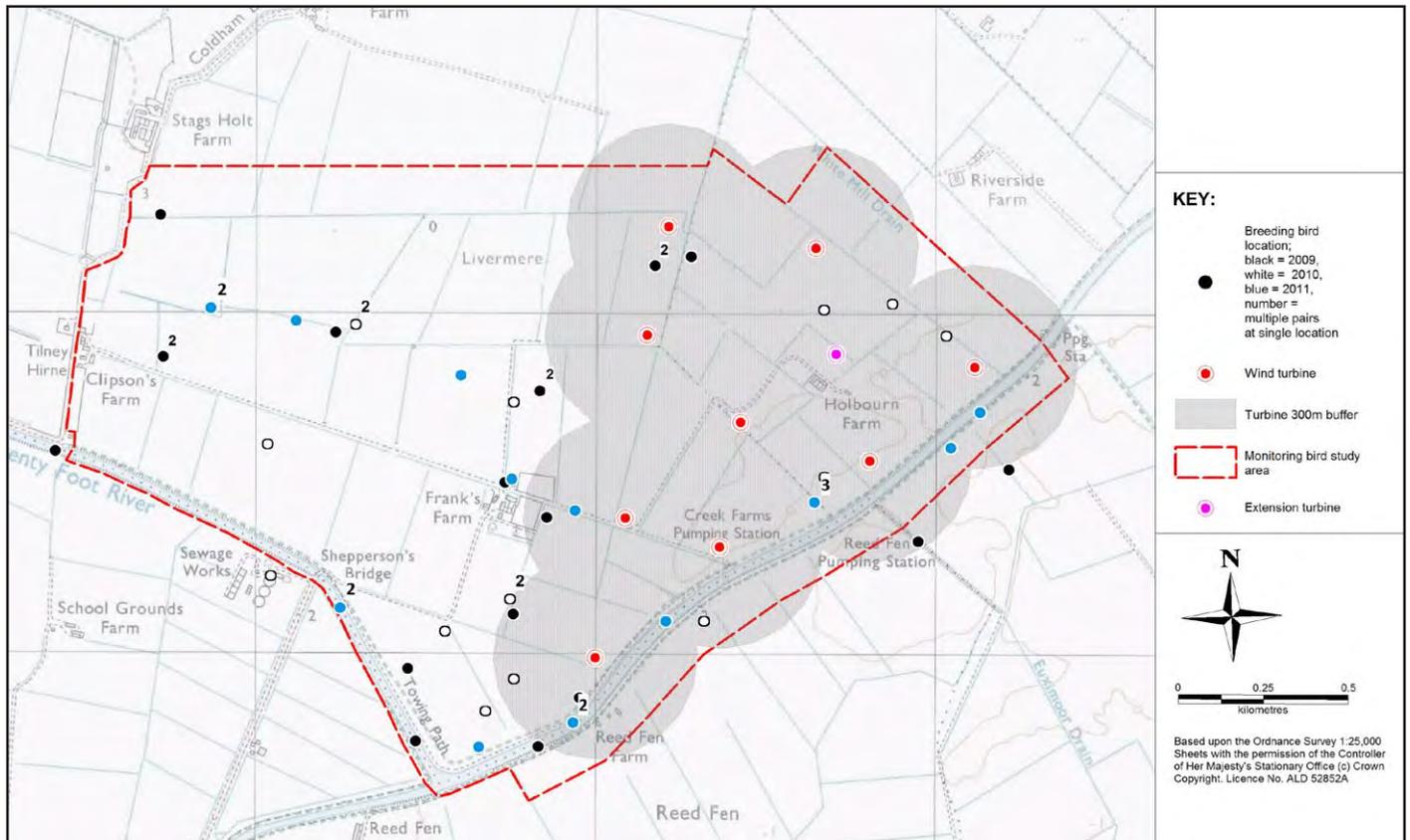
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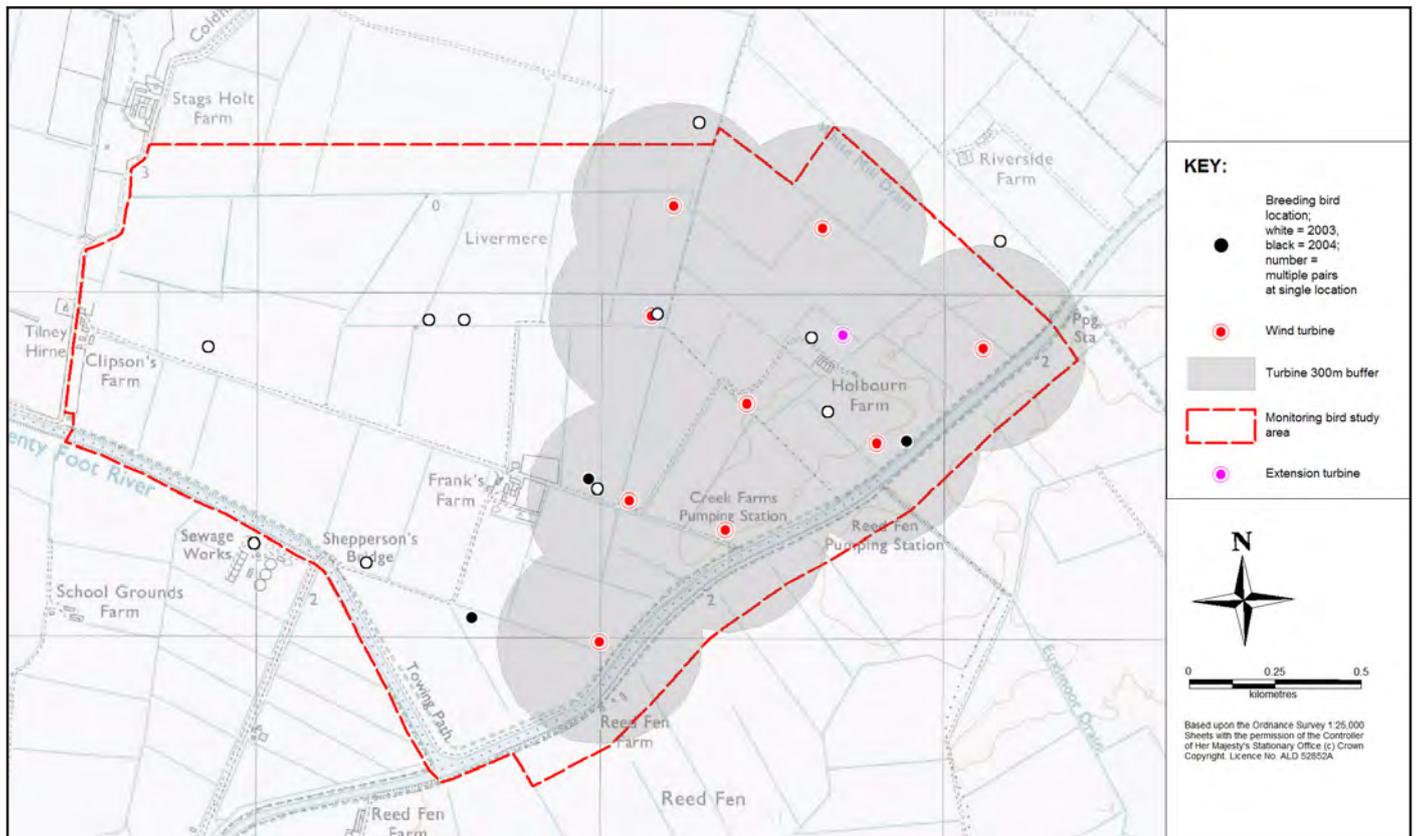
**Figure 1a. Distribution of breeding Mallard in the Stag's Holt survey area prior to construction (2003 and 2004)**



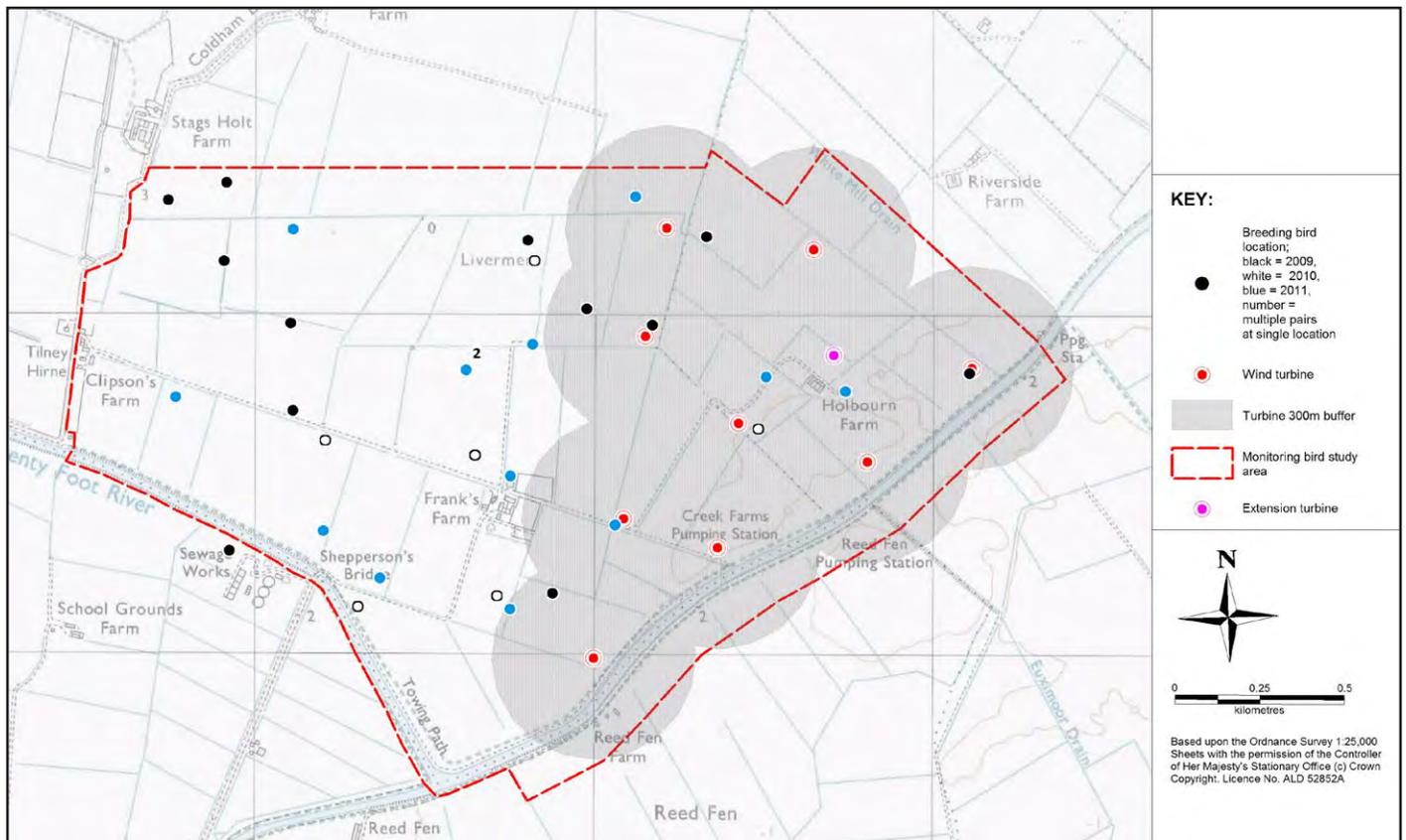
**Figure 1b. Distribution of breeding Mallard in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



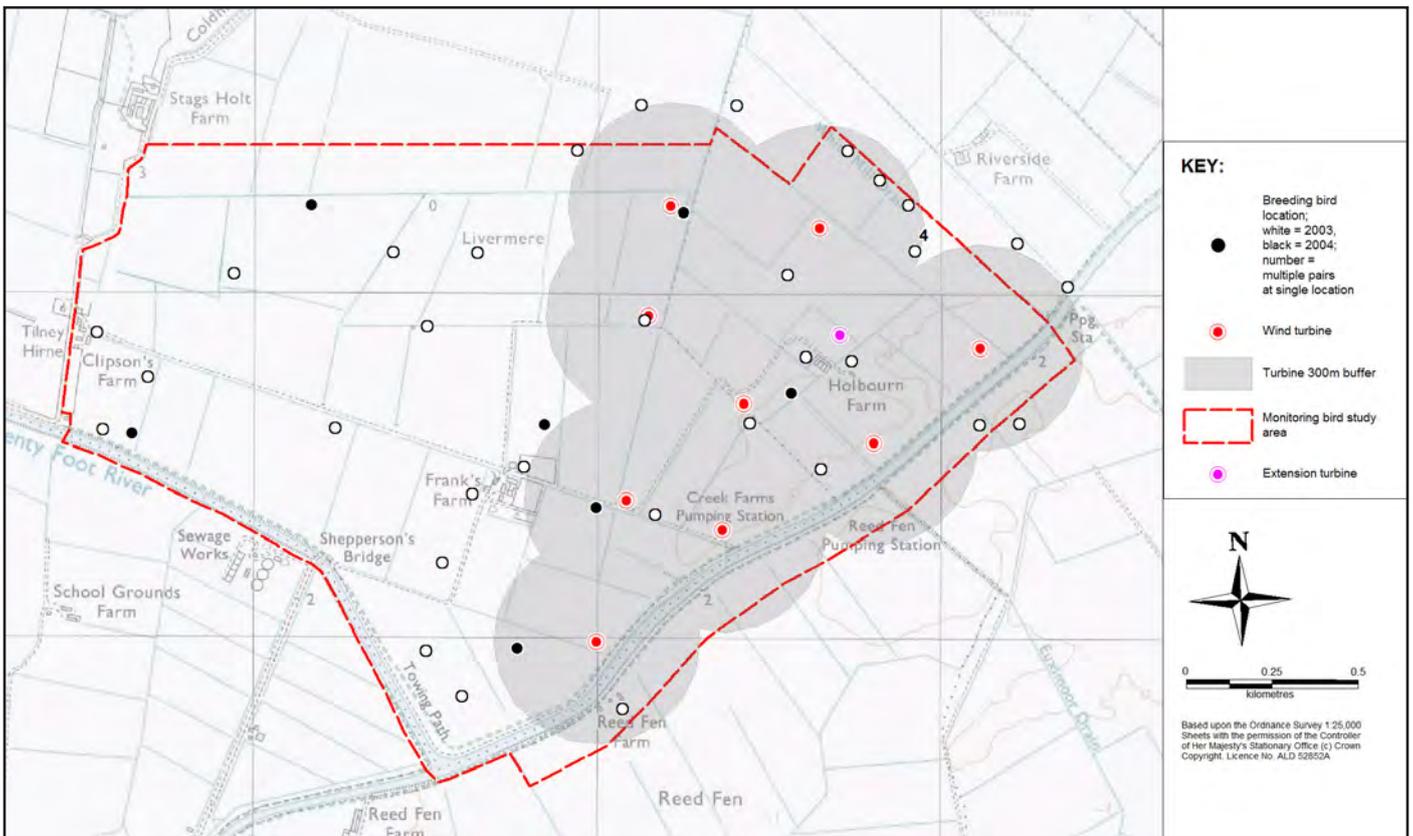
**Figure 2a. Distribution of breeding Red-legged Partridge in the Stag's Holt survey area prior to construction (2003 and 2004)**



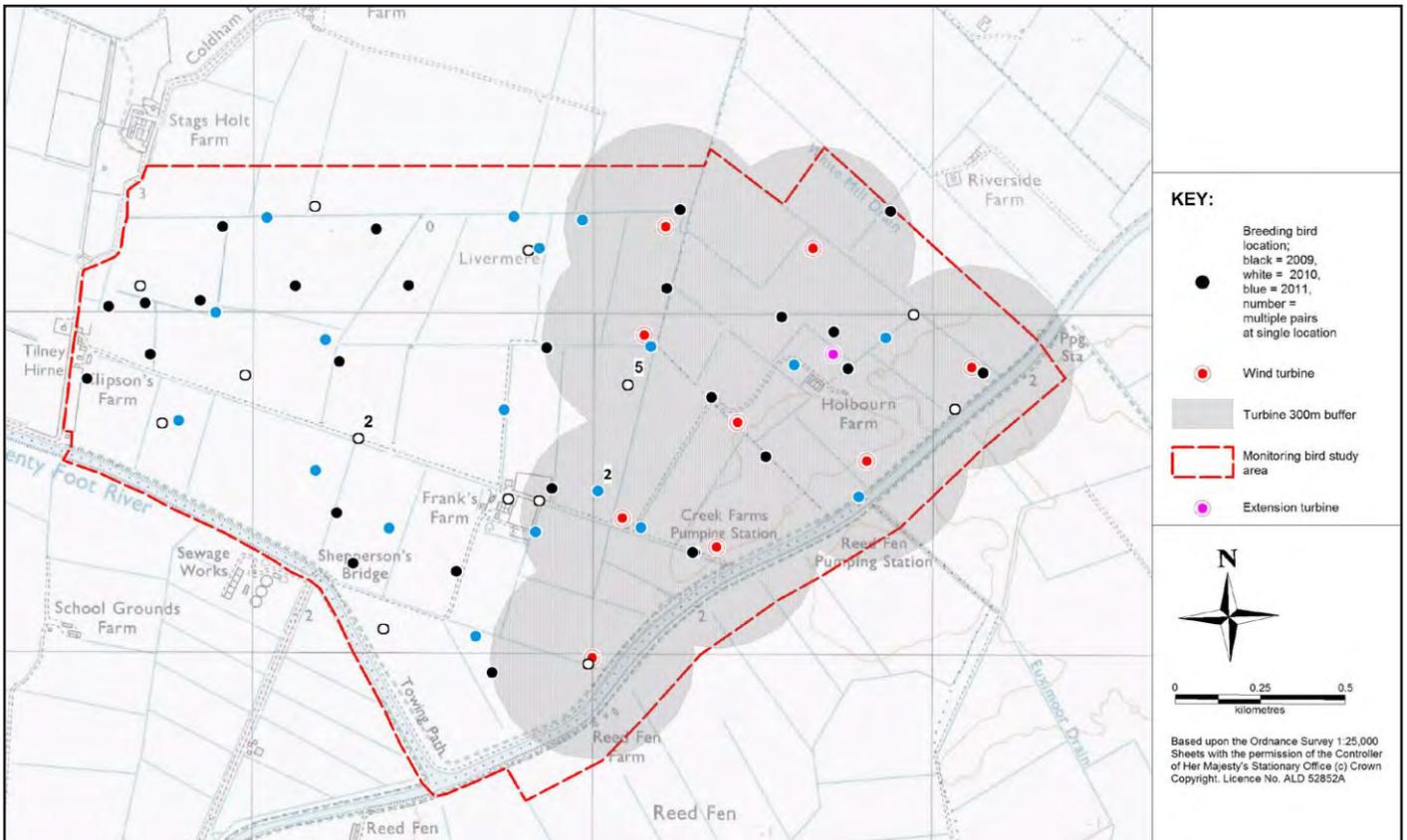
**Figure 2b. Distribution of breeding Red-legged Partridge in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



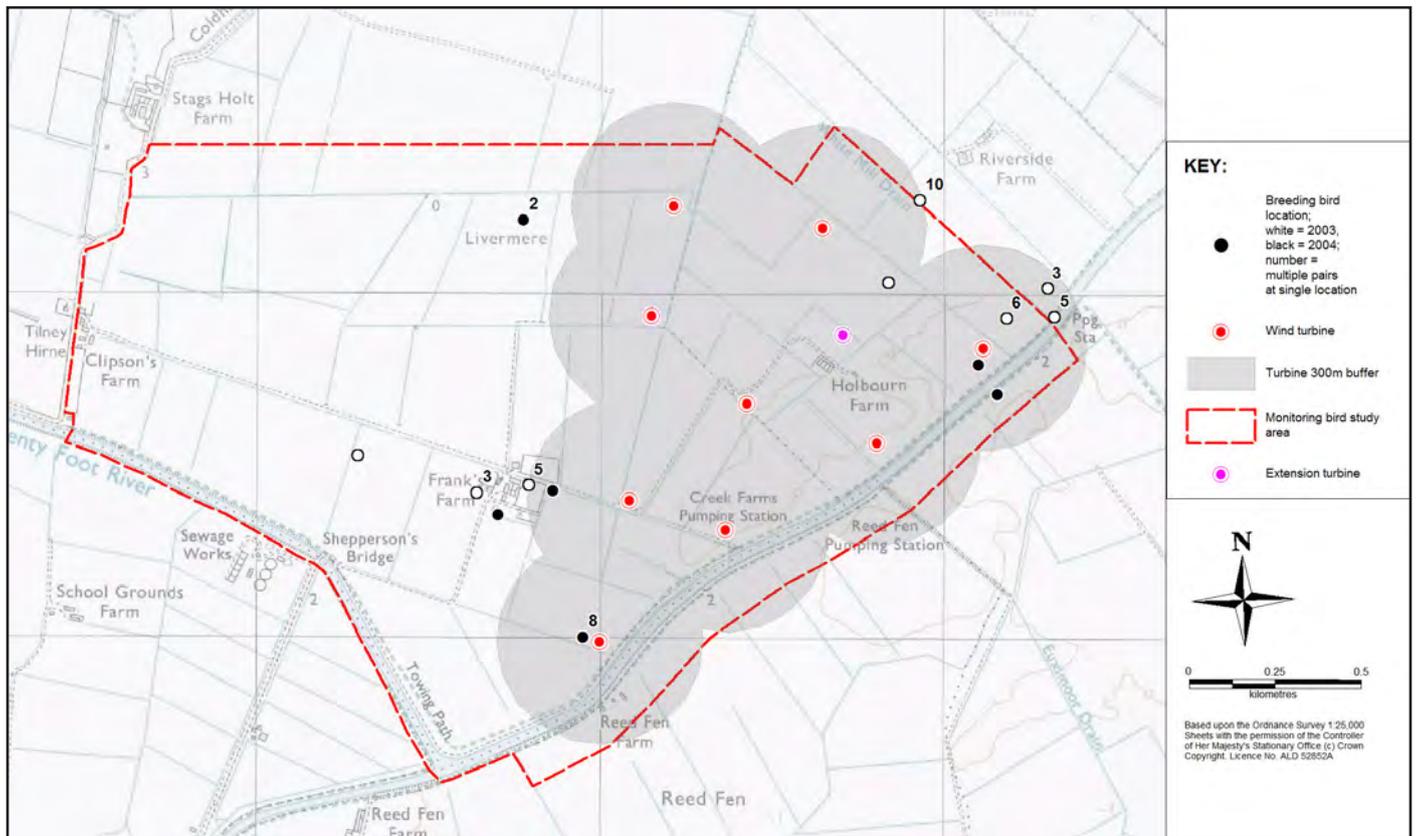
**Figure 3a. Distribution of breeding Pheasant in the Stag's Holt survey area prior to construction (2003 and 2004)**



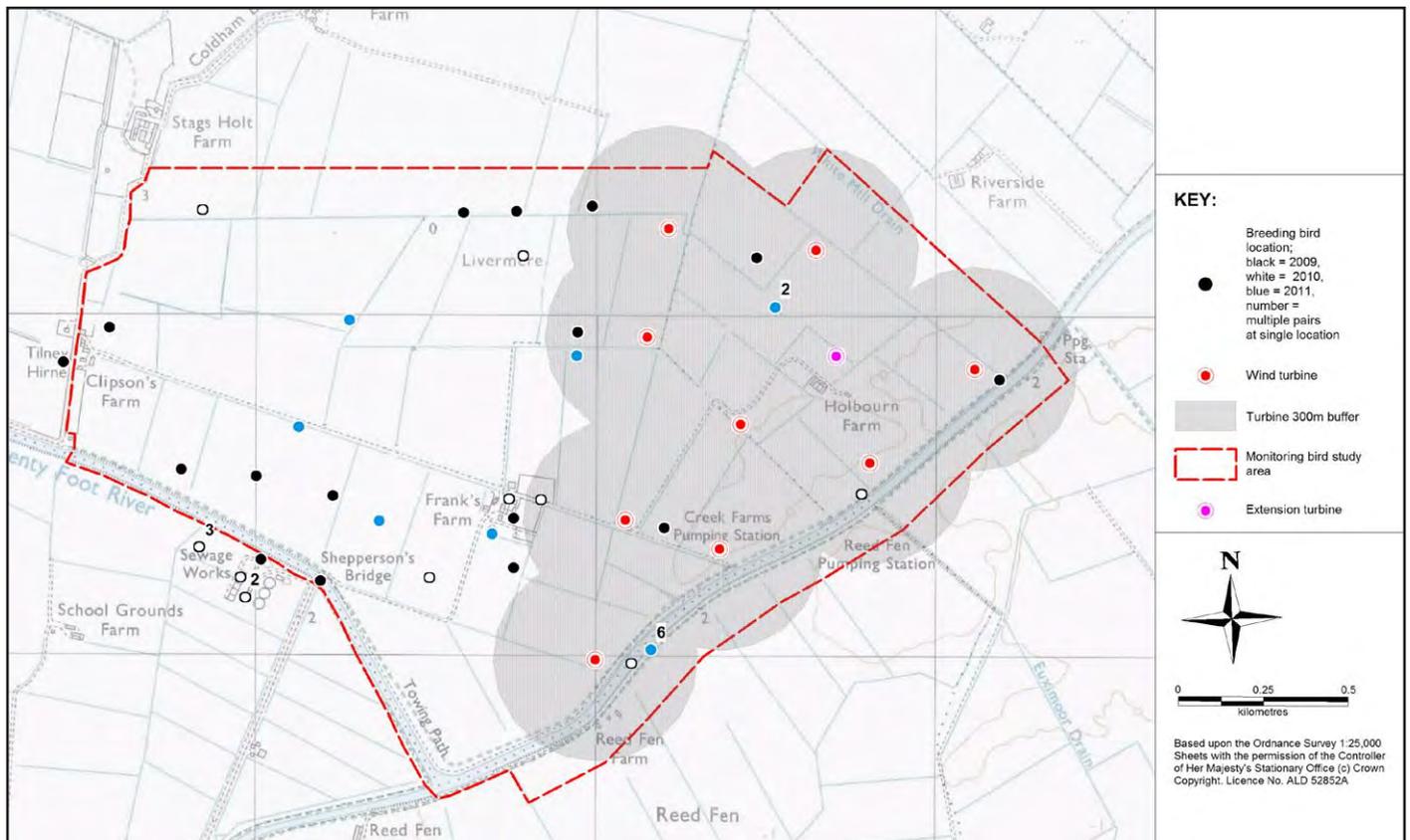
**Figure 3b. Distribution of breeding Pheasant in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



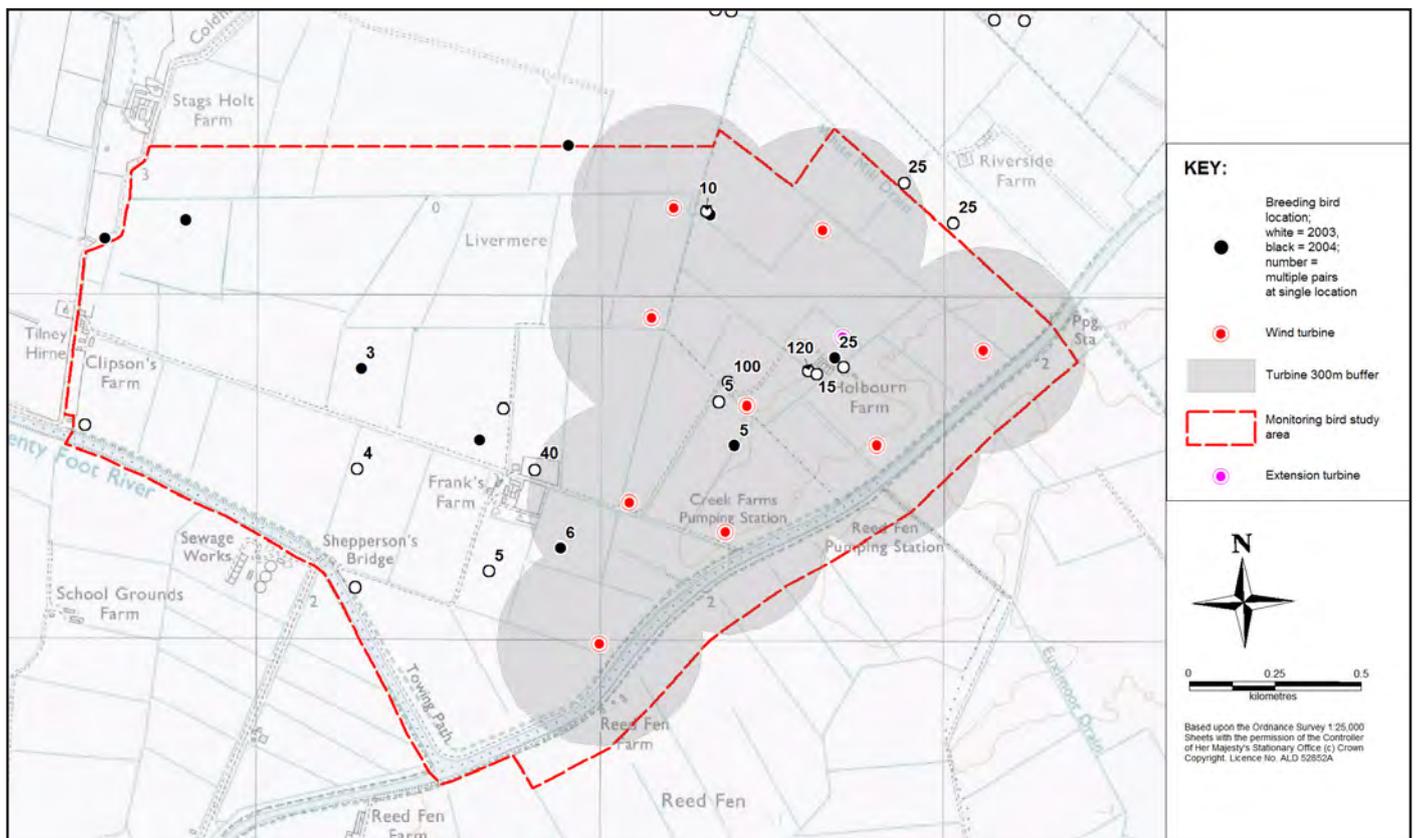
**Figure 4a. Distribution of breeding Stock Doves in the Stag's Holt survey area prior to construction (2003 and 2004)**



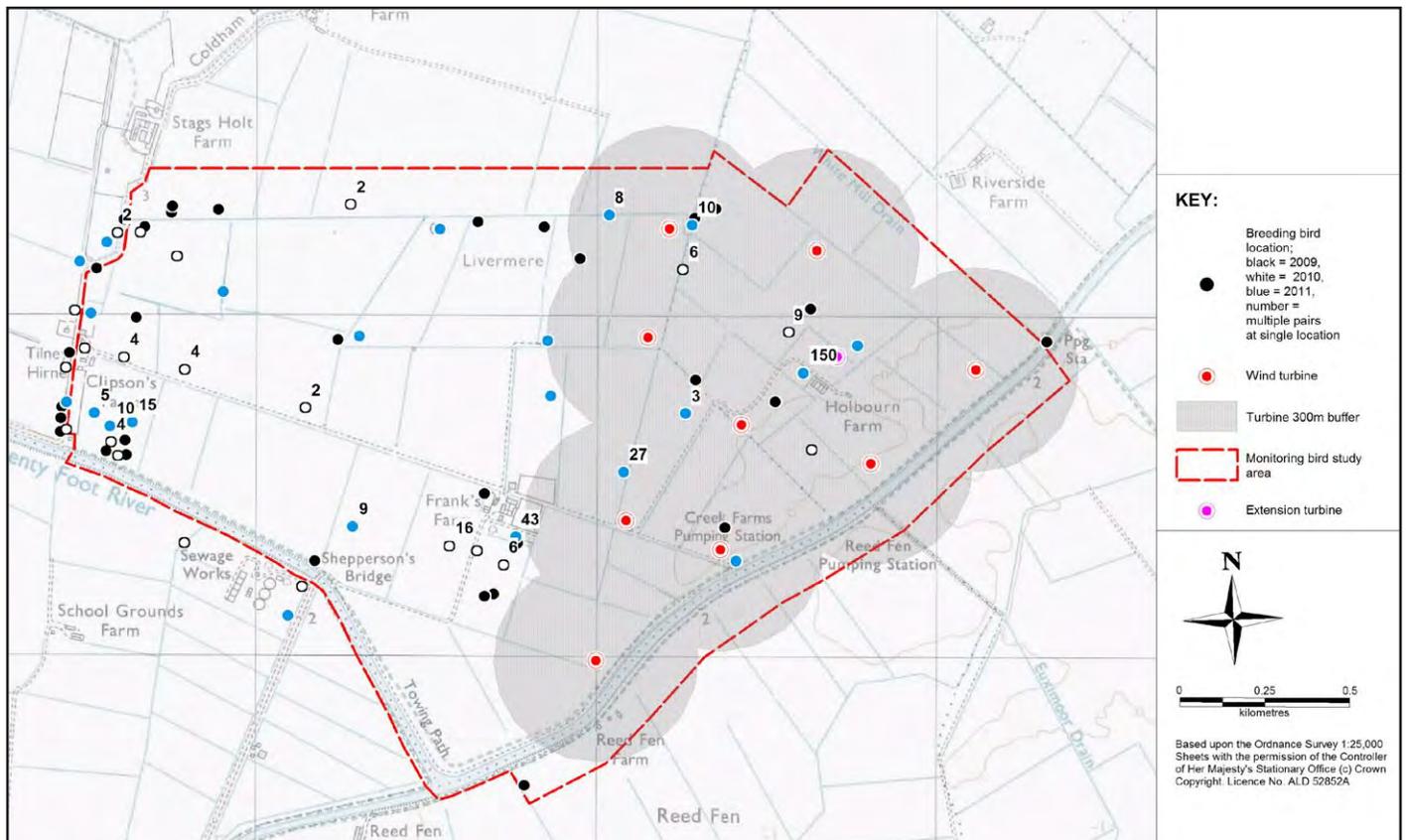
**Figure 4b. Distribution of breeding Stock Doves in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



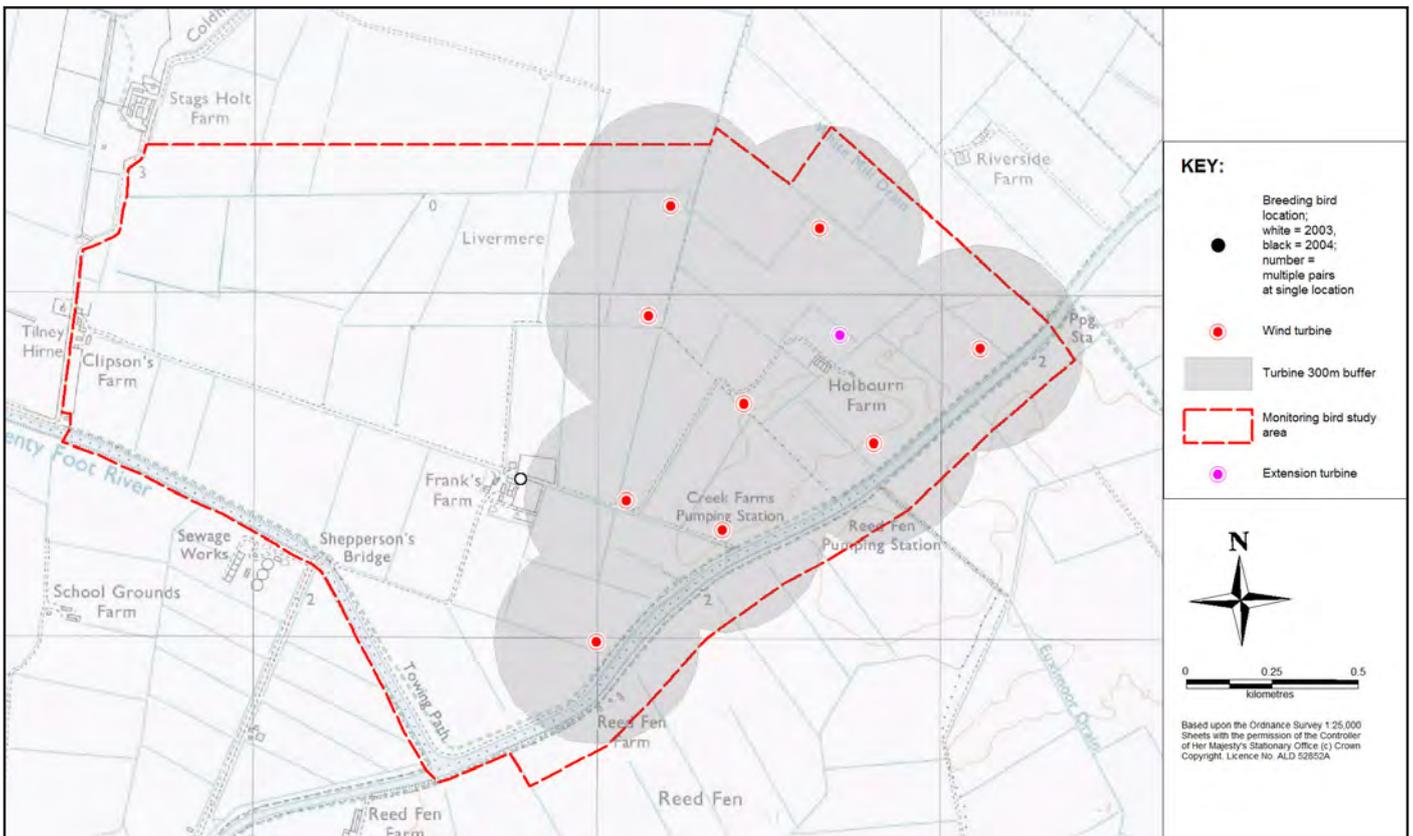
**Figure 5a. Distribution of breeding Woodpigeon in the Stag's Holt survey area prior to construction (2003 and 2004)**



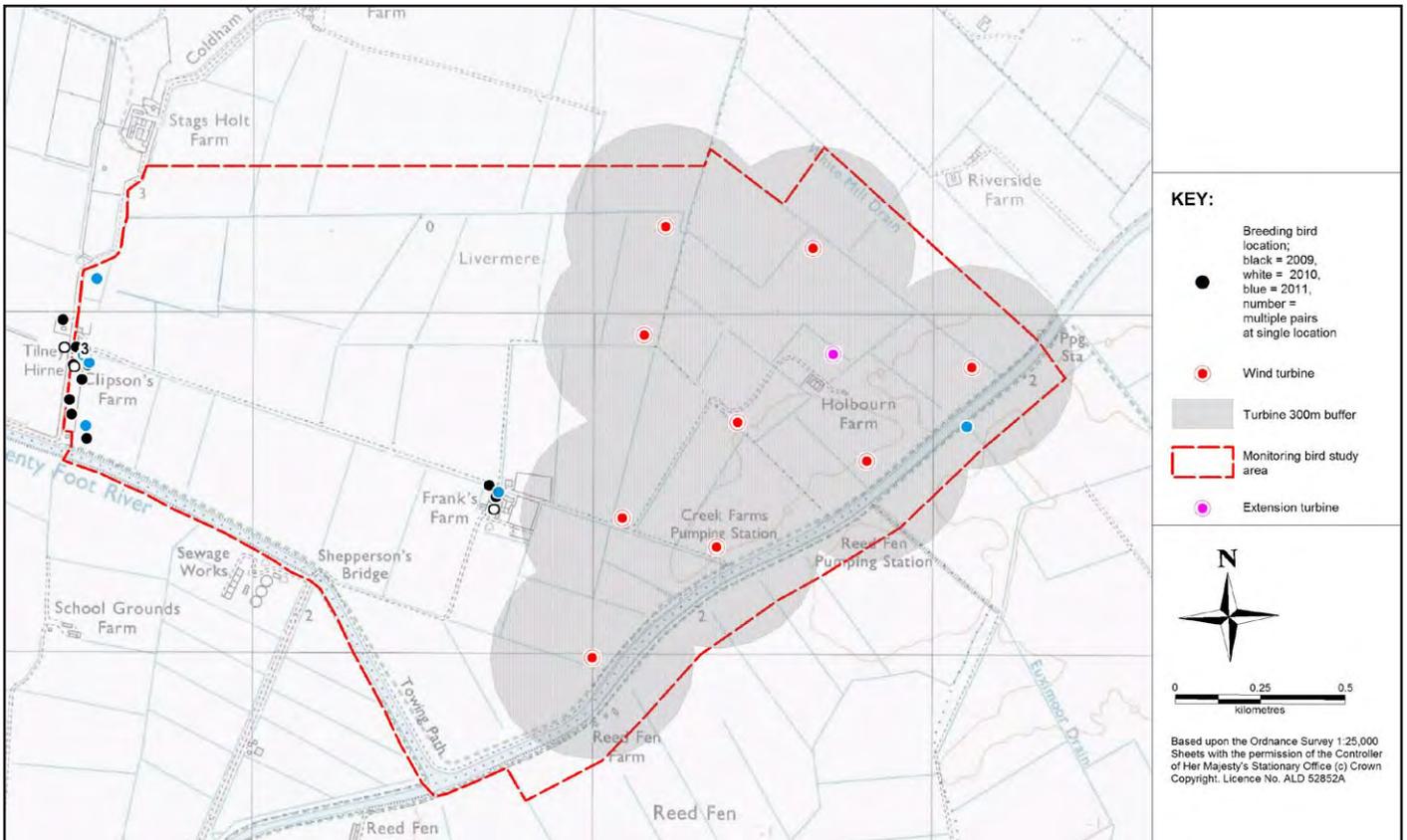
**Figure 5b. Distribution of breeding Woodpigeon in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



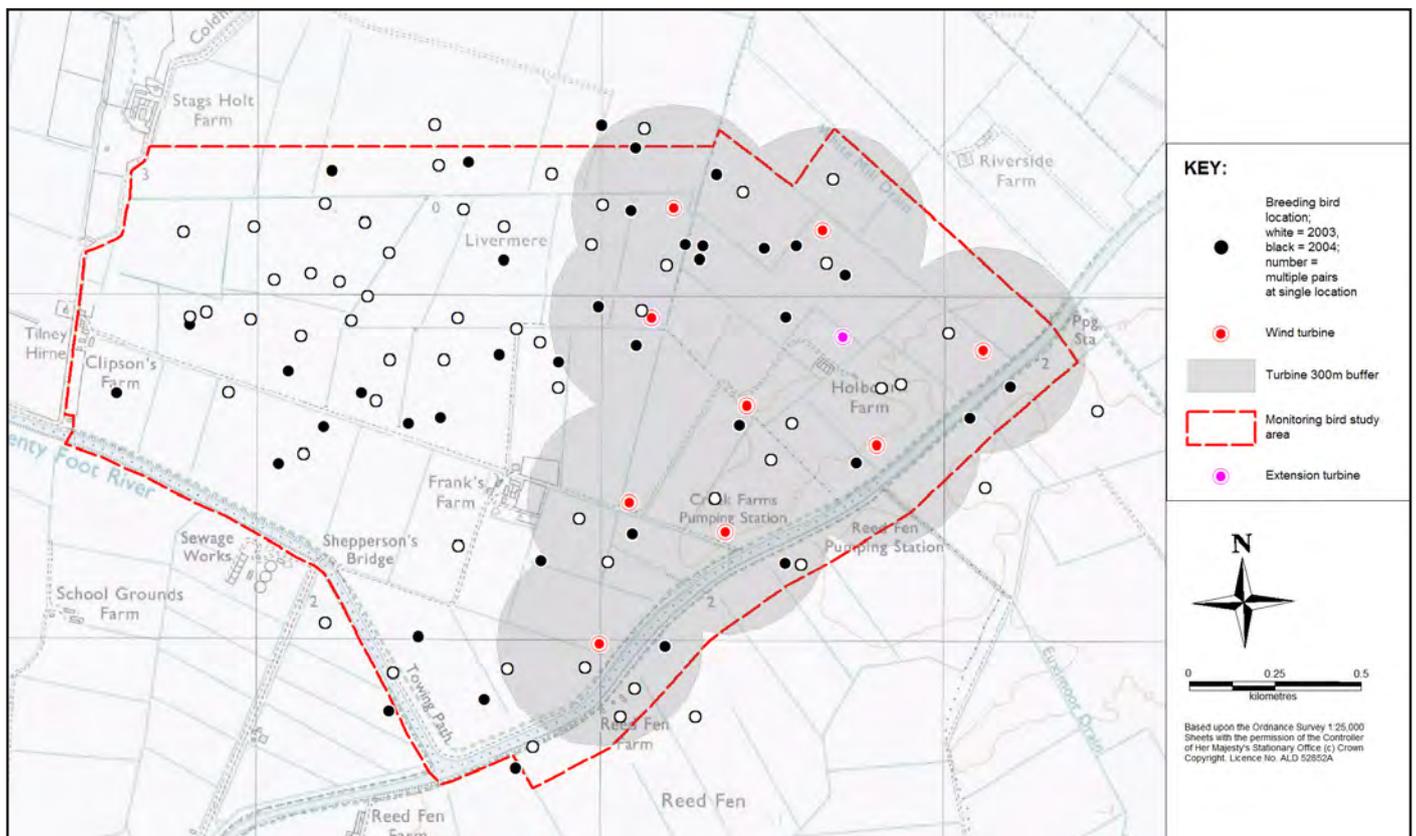
**Figure 6a. Distribution of breeding Collared Doves in the Stag's Holt survey area prior to construction (2003 and 2004)**



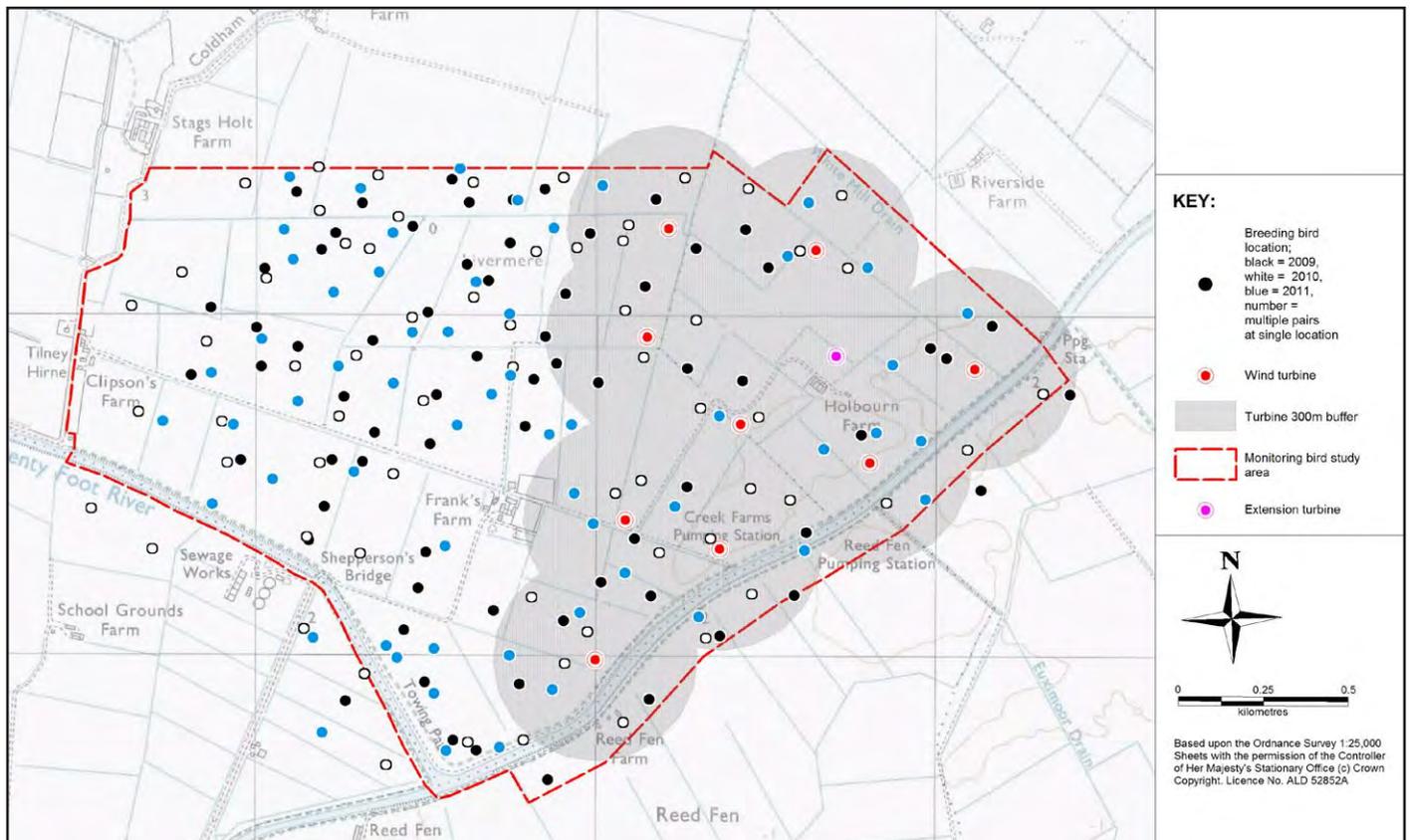
**Figure 6b. Distribution of breeding Collared Doves in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



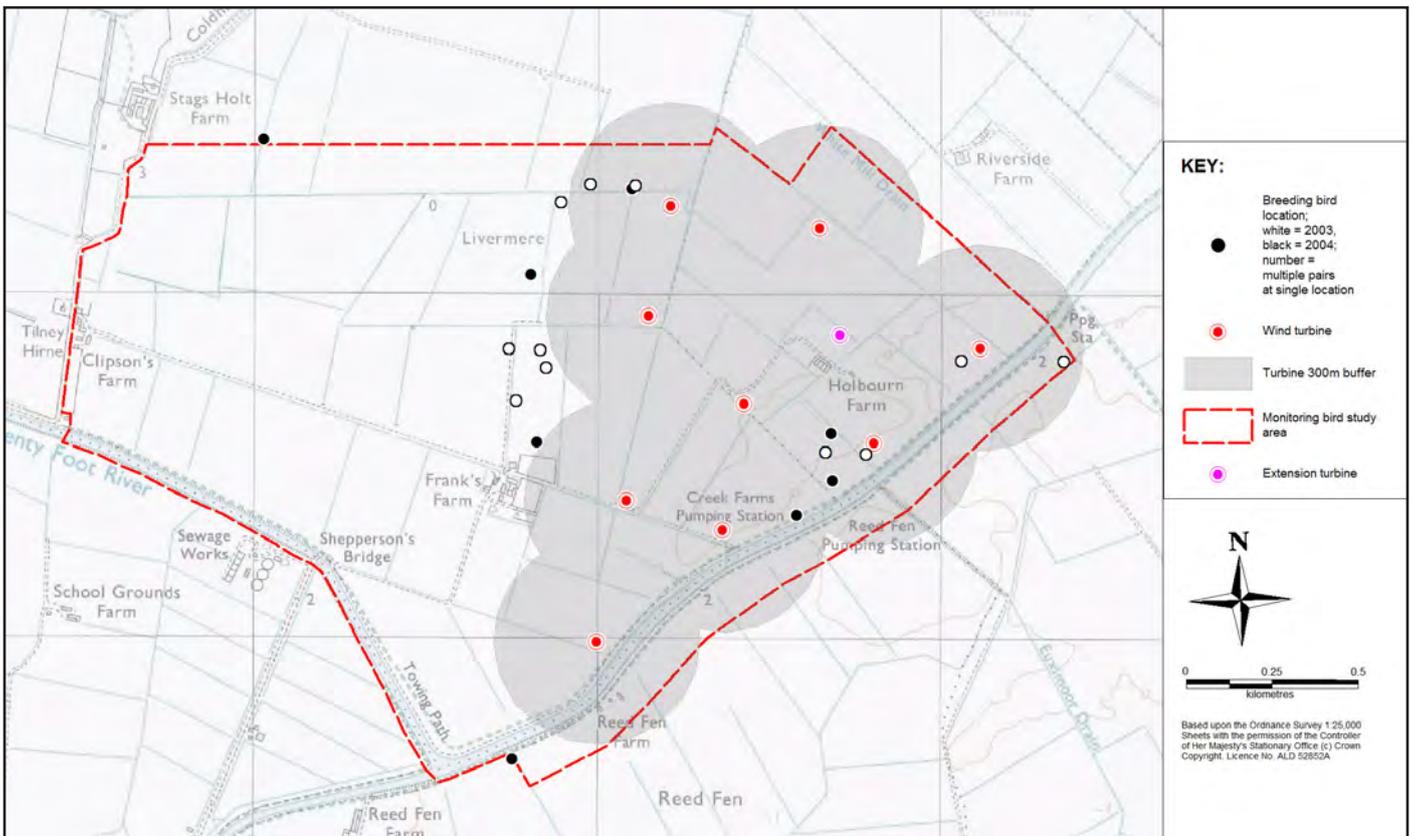
**Figure 7a. Distribution of breeding Skylarks in the Stag's Holt survey area prior to construction (2003 and 2004)**



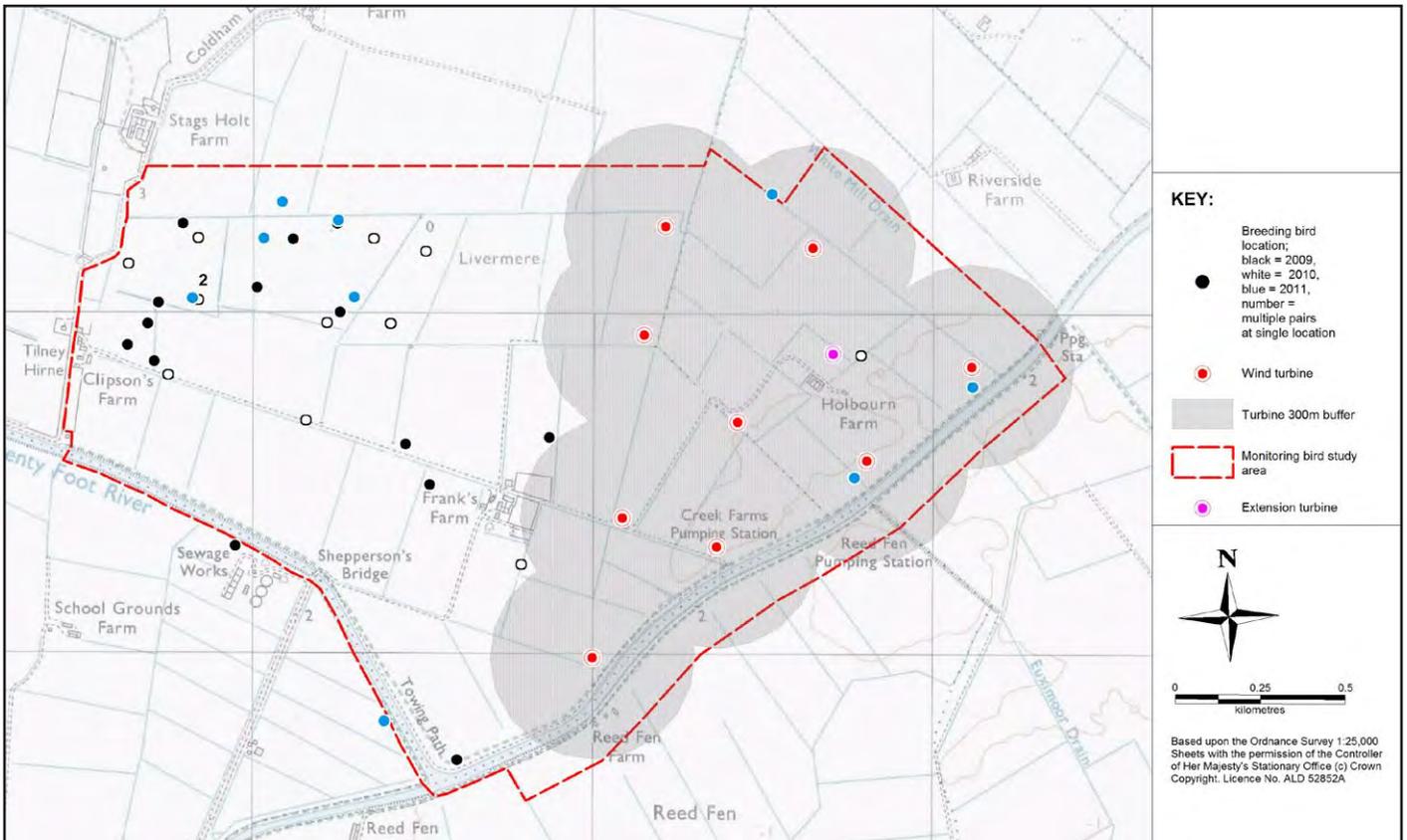
**Figure 7b. Distribution of breeding Skylarks in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



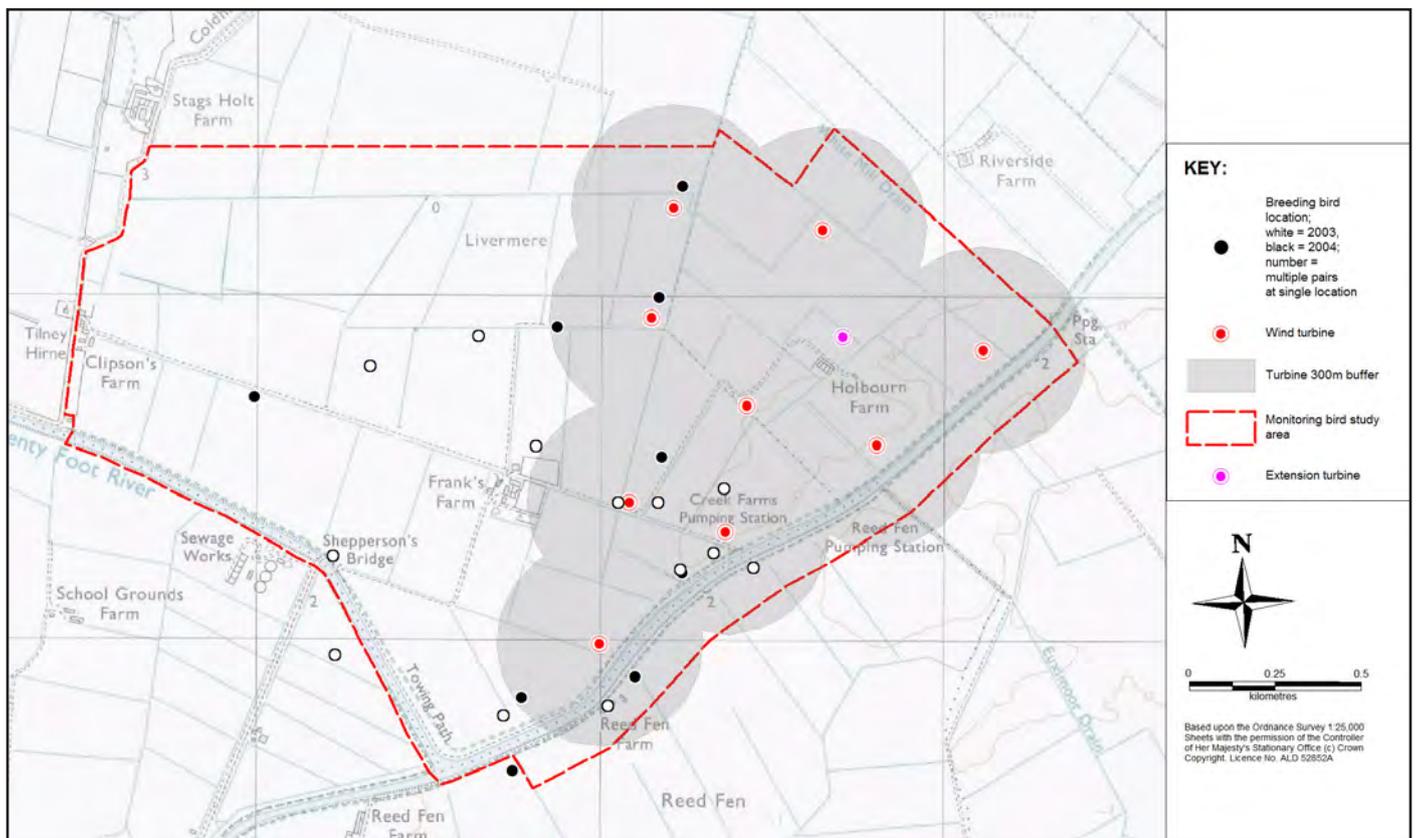
**Figure 8a. Distribution of breeding Meadow Pipits in the Stag's Holt survey area prior to construction (2003 and 2004)**



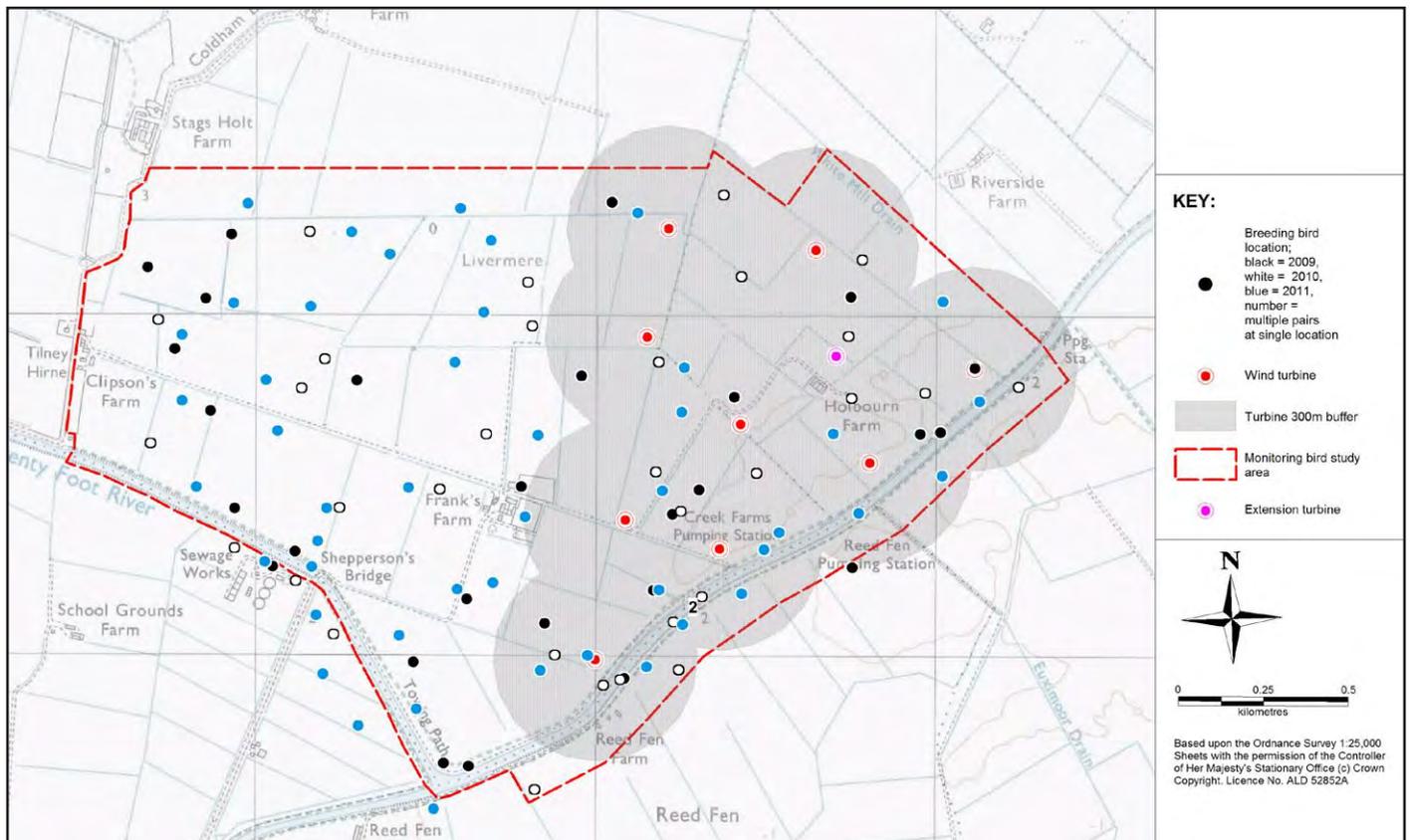
**Figure 8b. Distribution of breeding Meadow Pipits in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



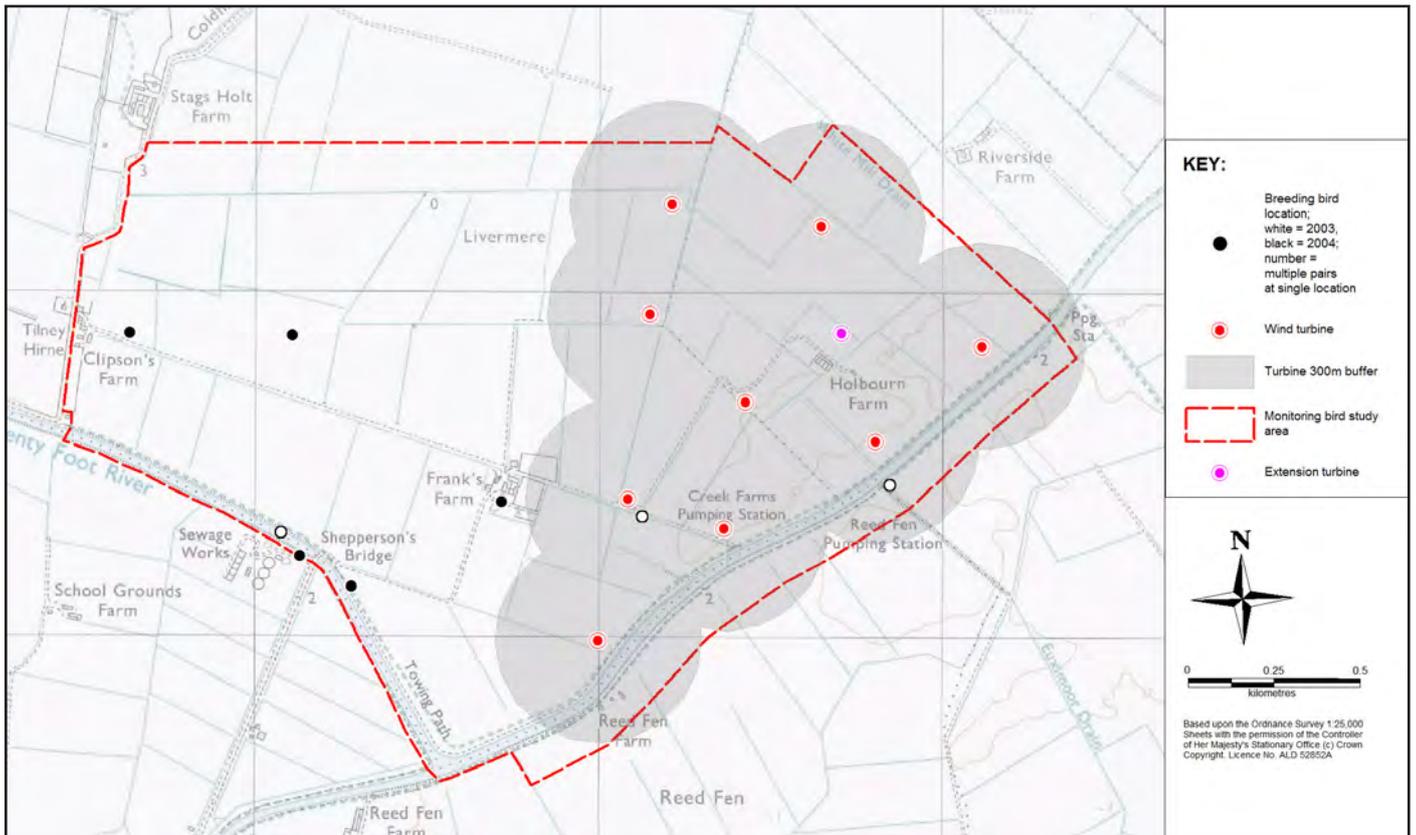
**Figure 9a. Distribution of breeding Yellow Wagtails in the Stag's Holt survey area prior to construction (2003 and 2004)**



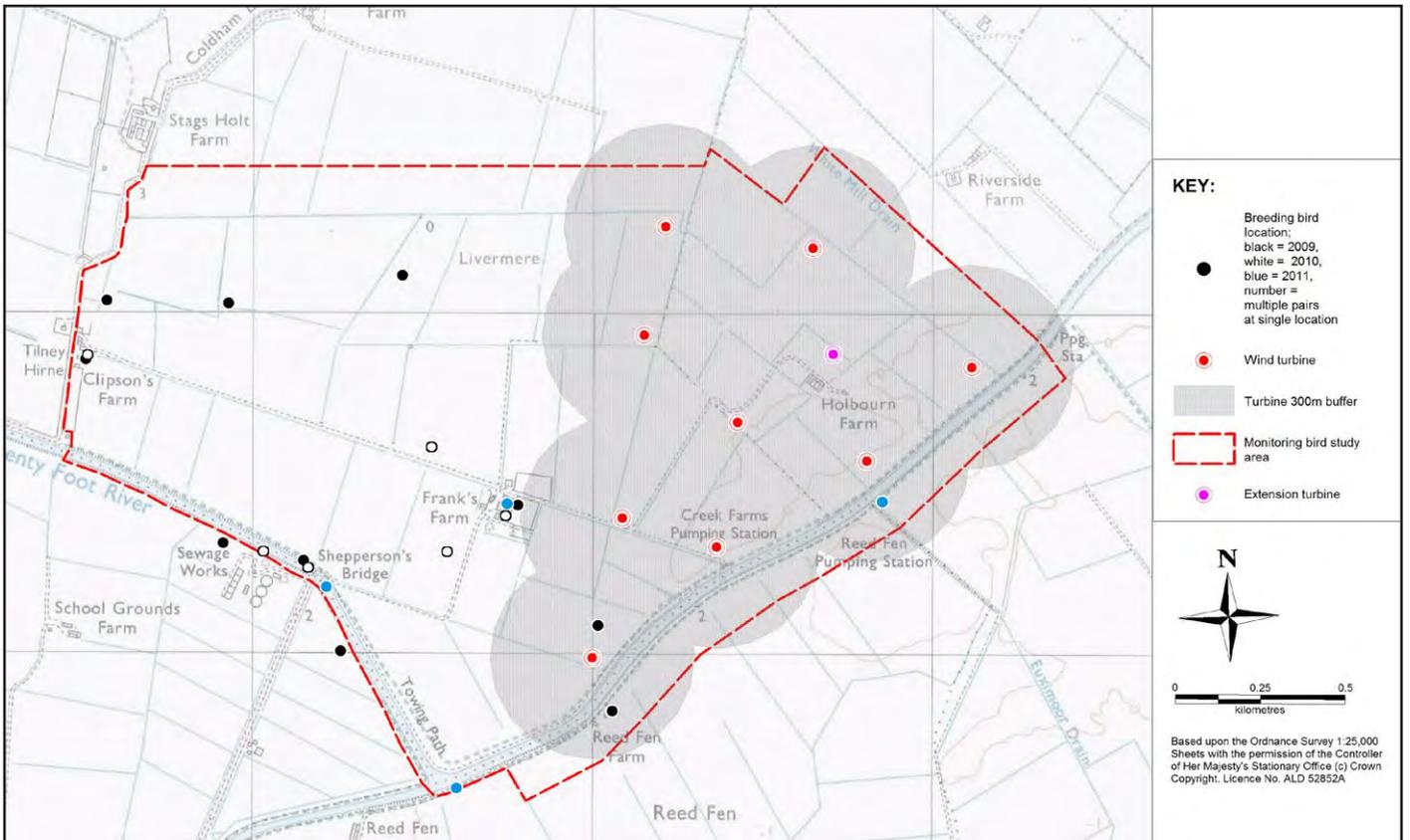
**Figure 9b. Distribution of breeding Yellow Wagtails in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



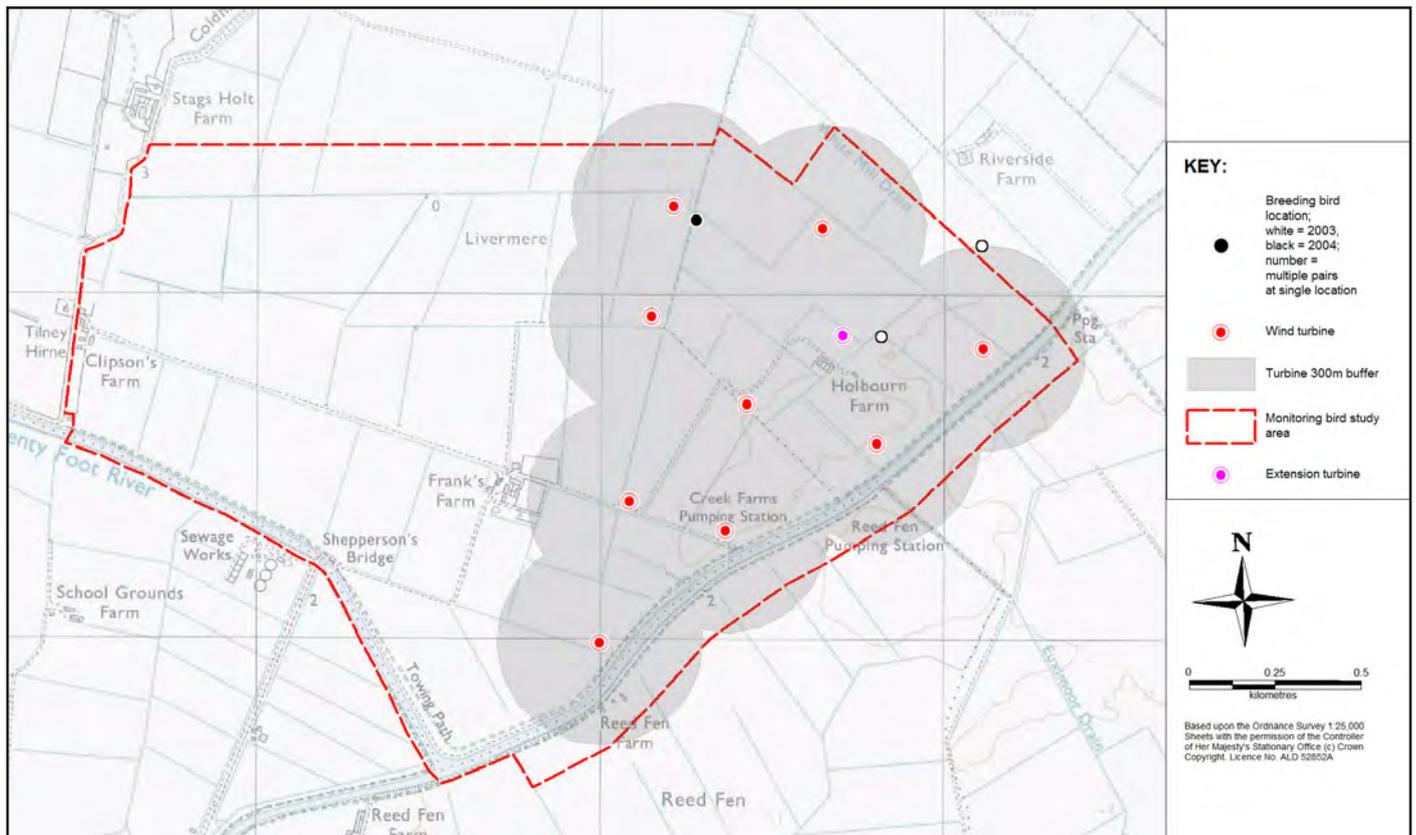
**Figure 10a. Distribution of breeding Pied Wagtails in the Stag's Holt survey area prior to construction (2003 and 2004)**



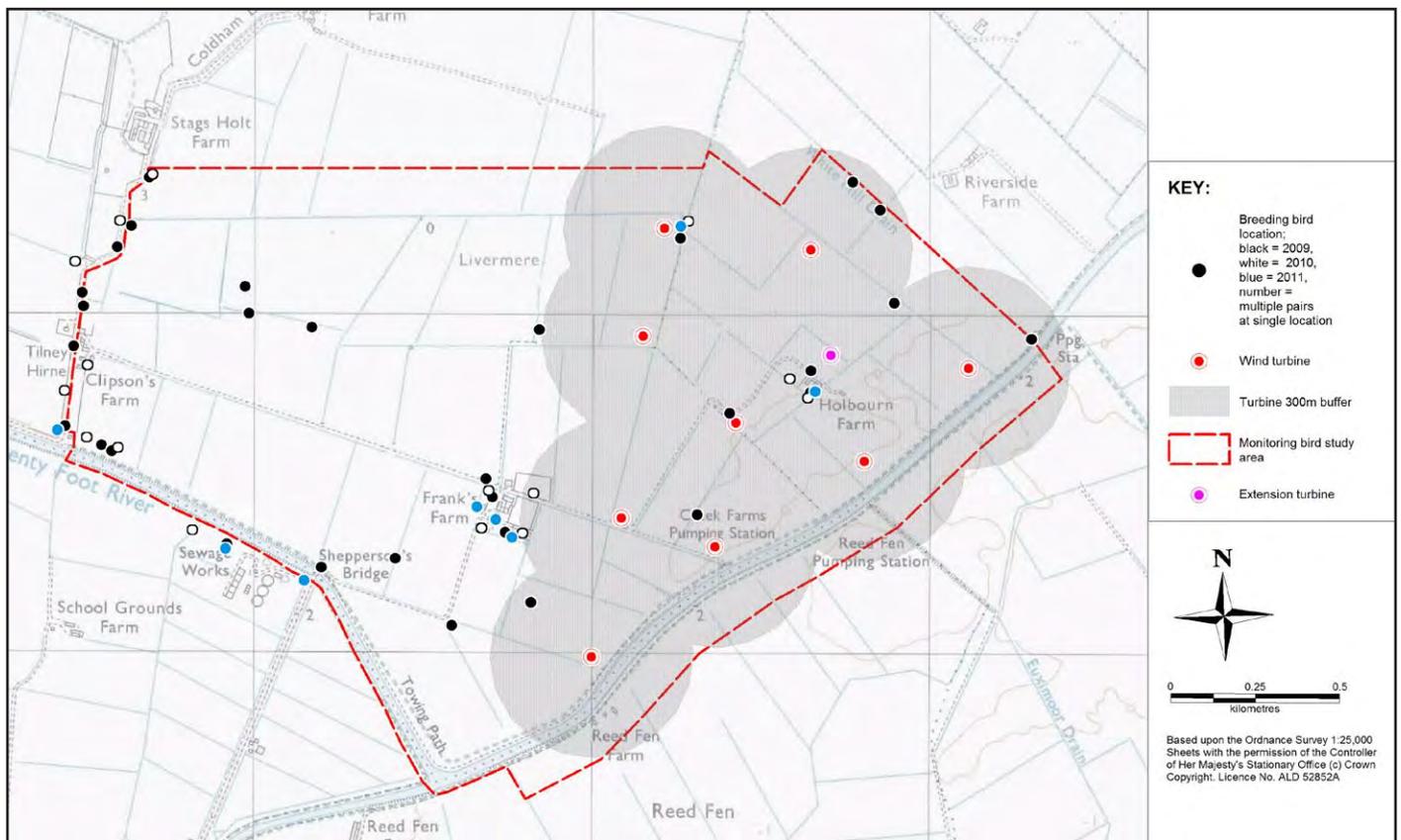
**Figure 10b. Distribution of breeding Pied Wagtails in the Stag's Holt survey area after construction of the wind farm (2009 and 2010)**



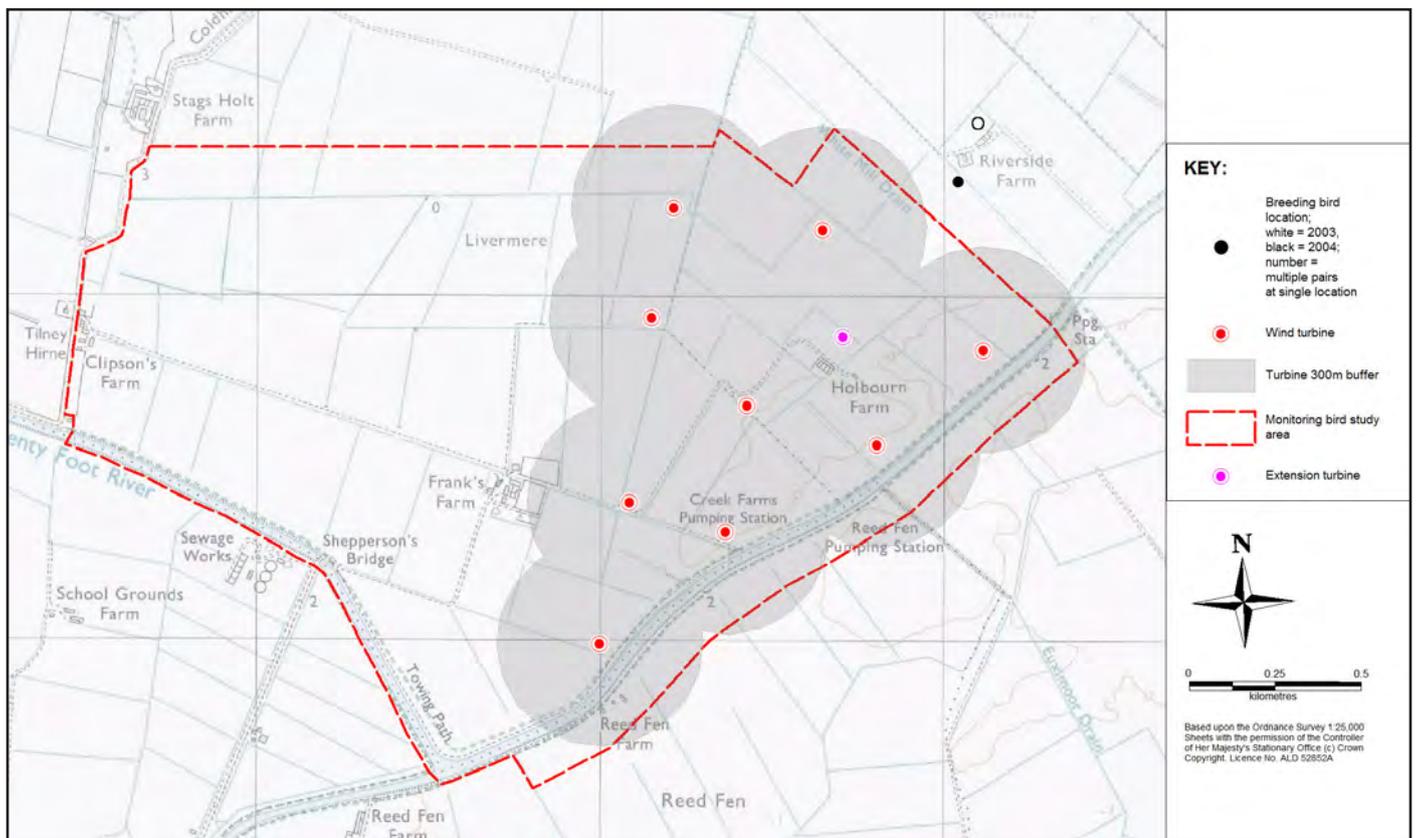
**Figure 11a. Distribution of breeding Wrens in the Stag's Holt survey area prior to construction (2003 and 2004)**



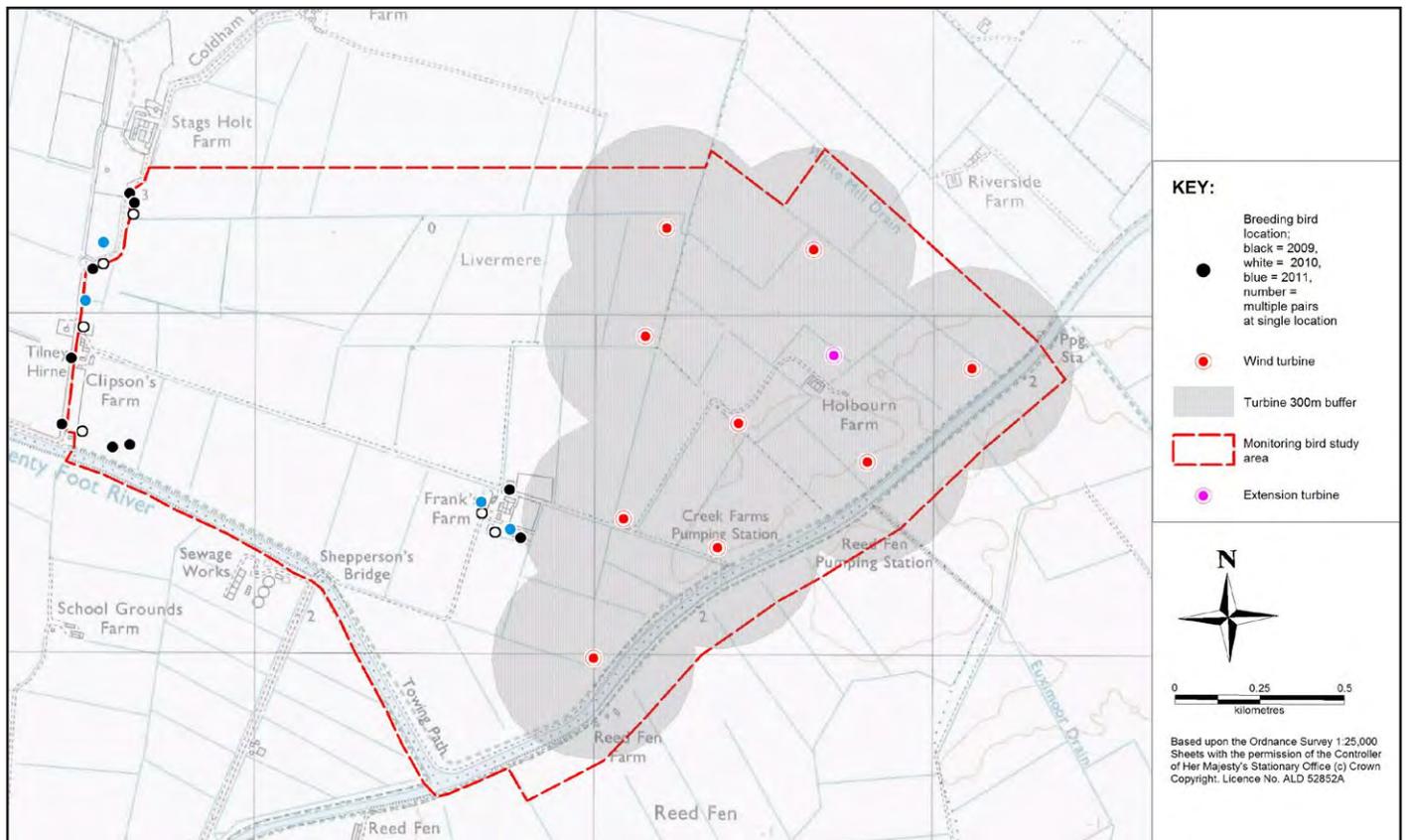
**Figure 11b. Distribution of breeding Wrens in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



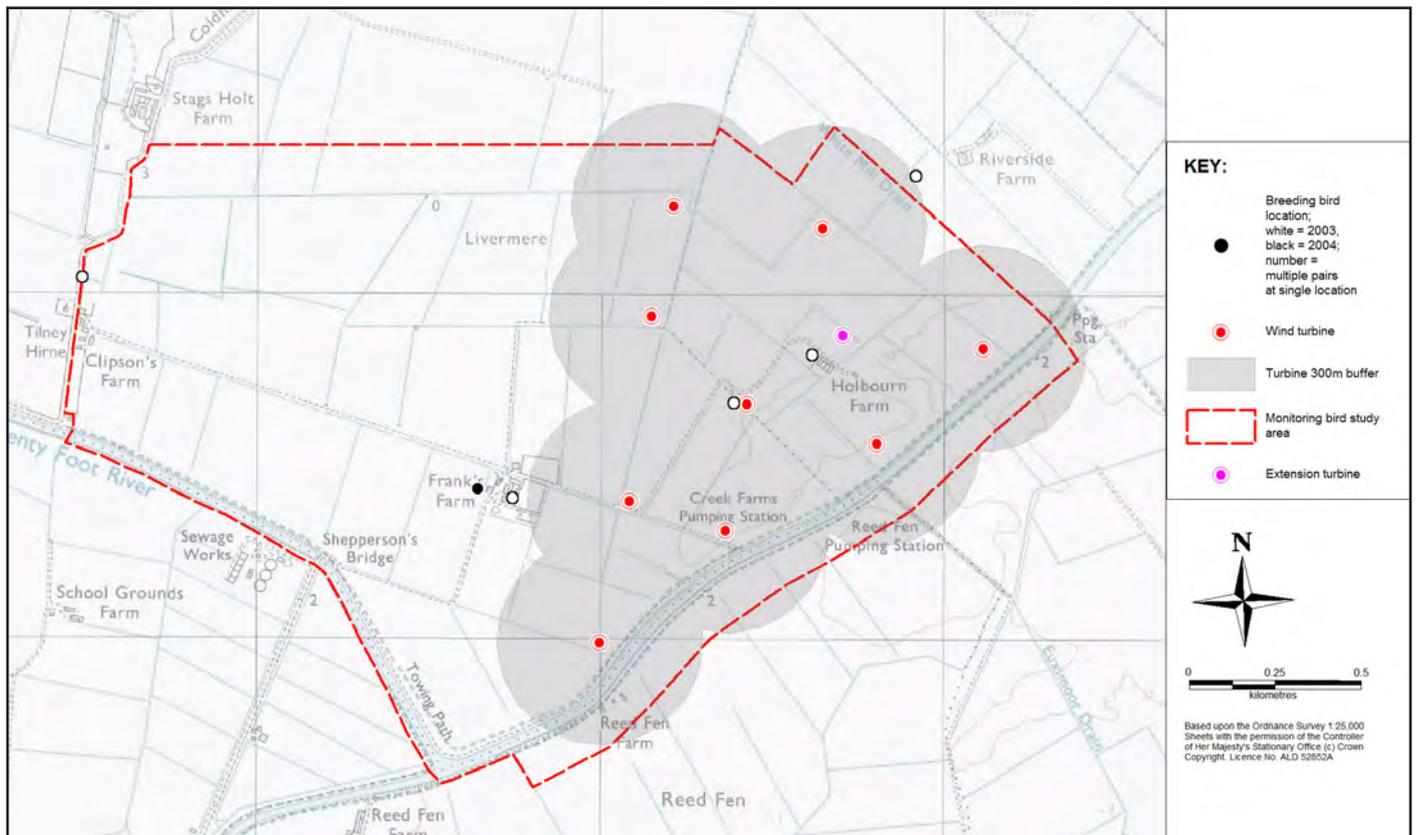
**Figure 12a. Distribution of breeding Robins in the Stag's Holt survey area prior to construction (2003 and 2004)**



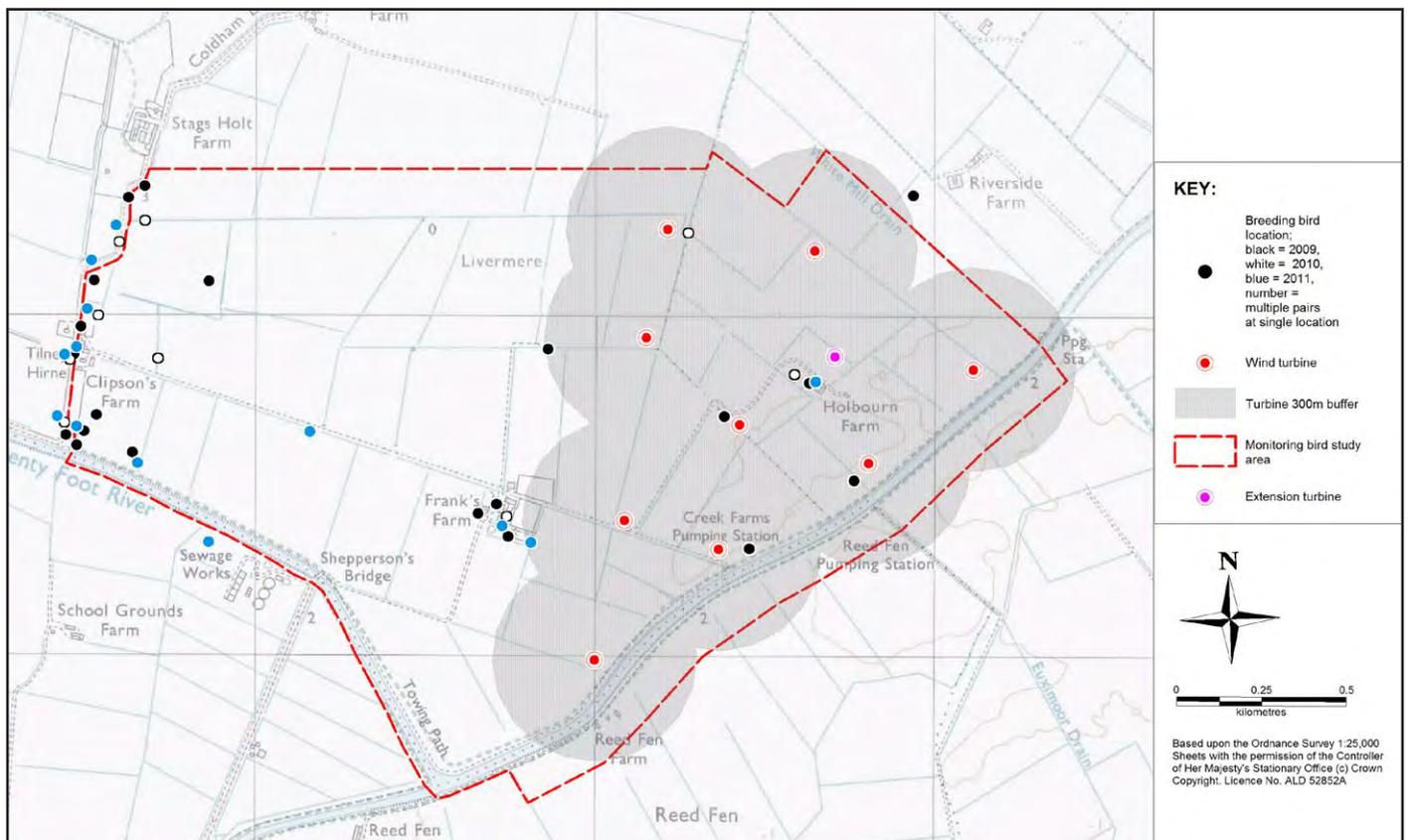
**Figure 12b. Distribution of breeding Robins in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



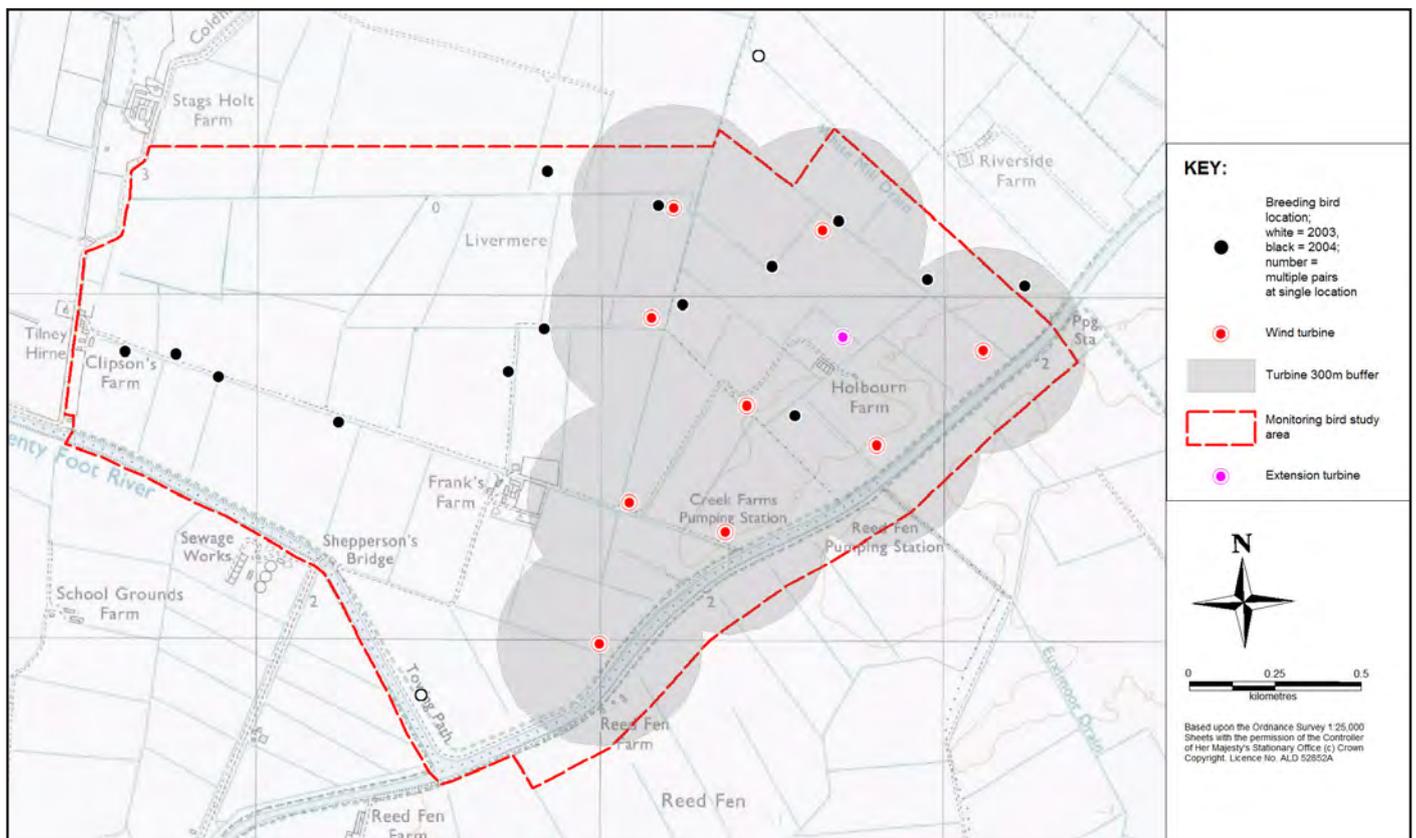
**Figure 13a. Distribution of breeding Blackbirds in the Stag's Holt survey area prior to construction (2003 and 2004)**



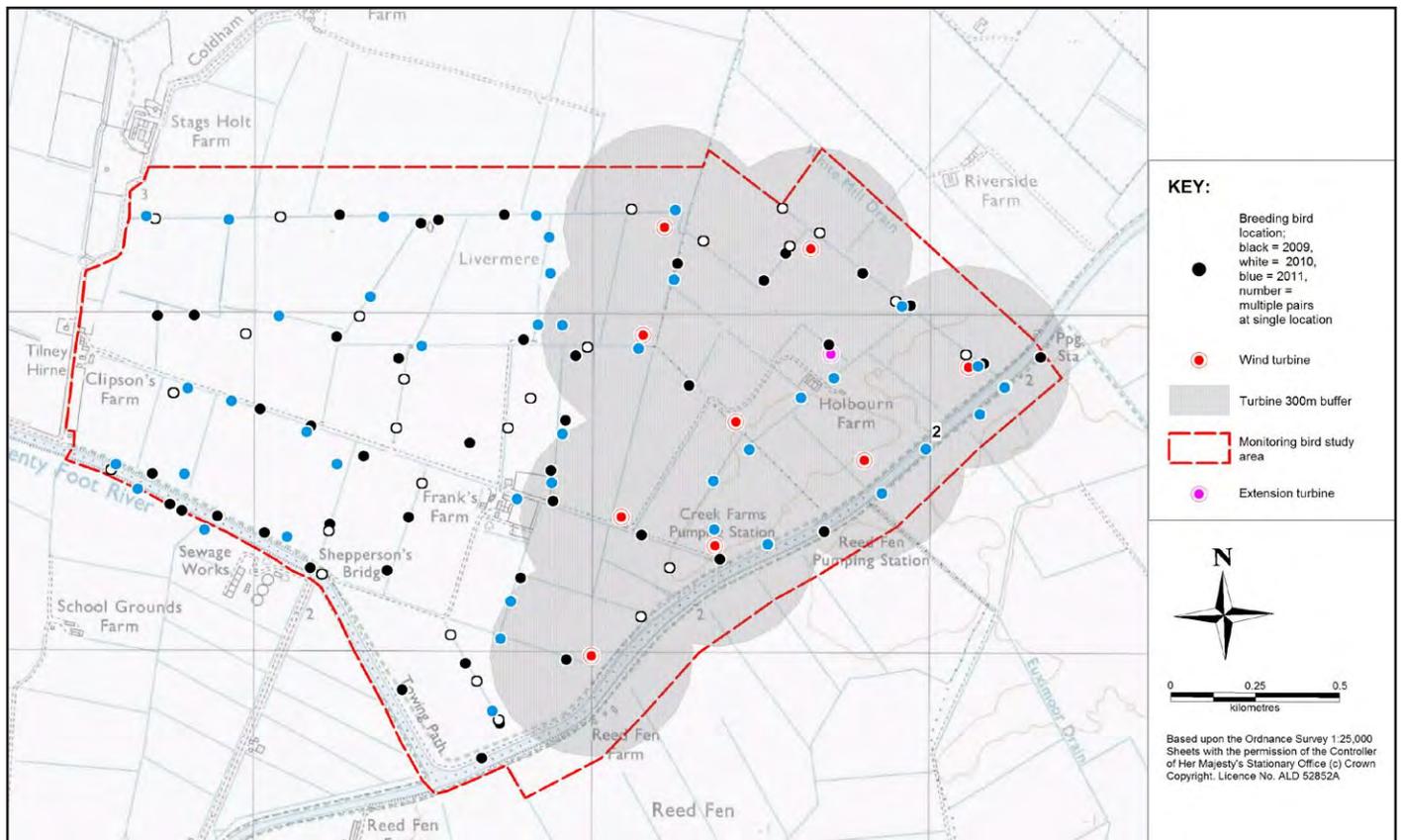
**Figure 13b. Distribution of breeding Blackbirds in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



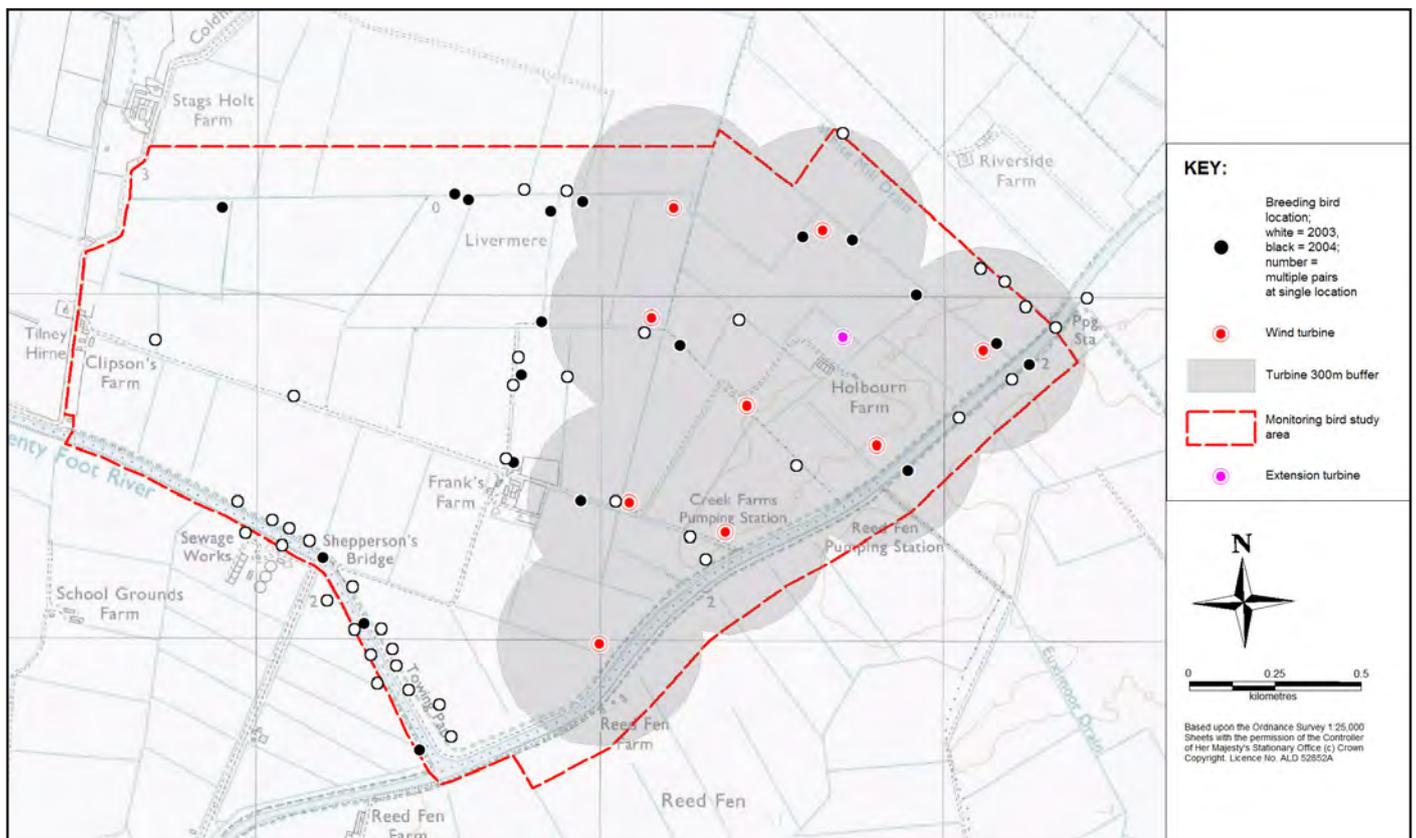
**Figure 14a. Distribution of breeding Sedge Warblers in the Stag's Holt survey area prior to construction (2003 and 2004)**



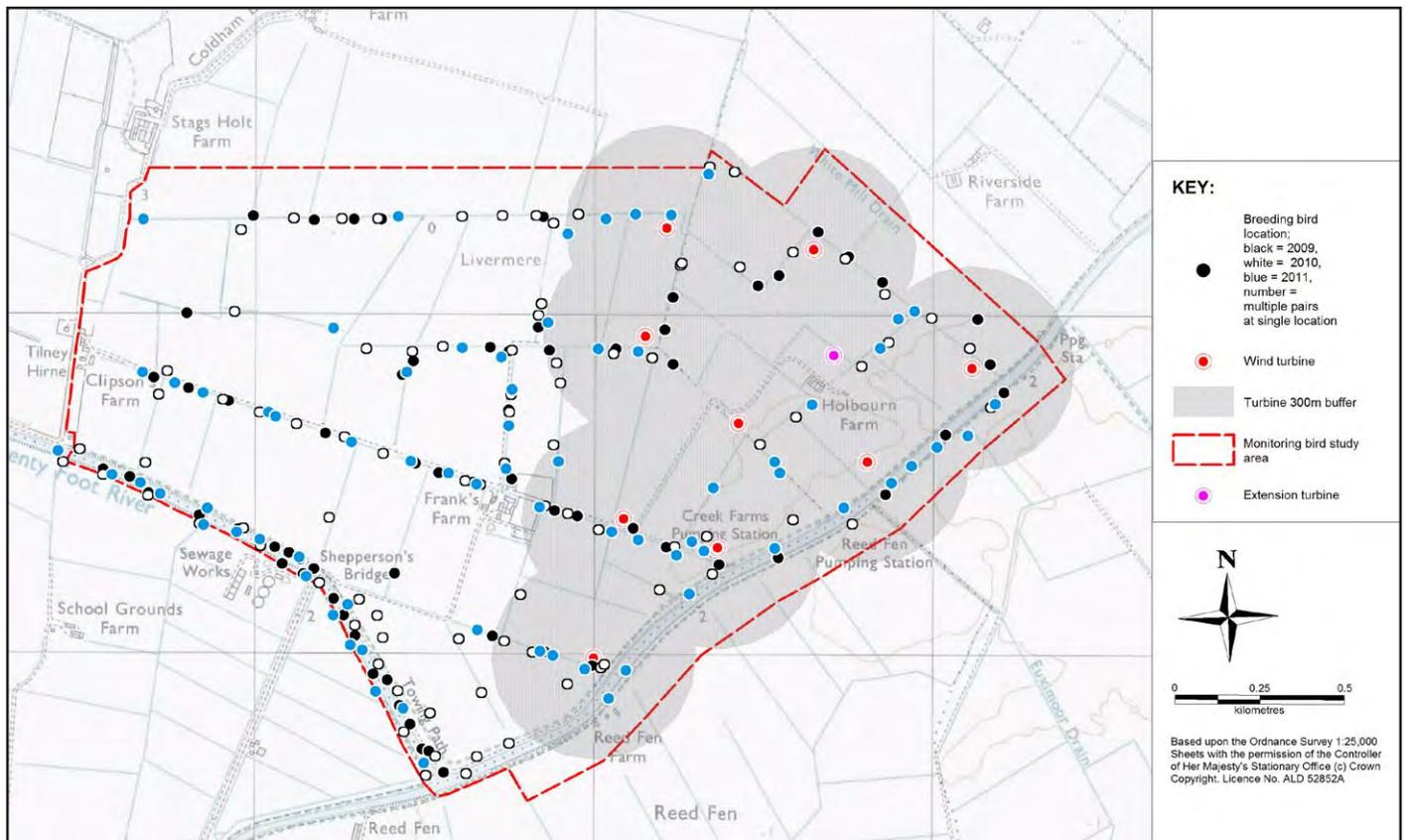
**Figure 14b. Distribution of breeding Sedge Warblers in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



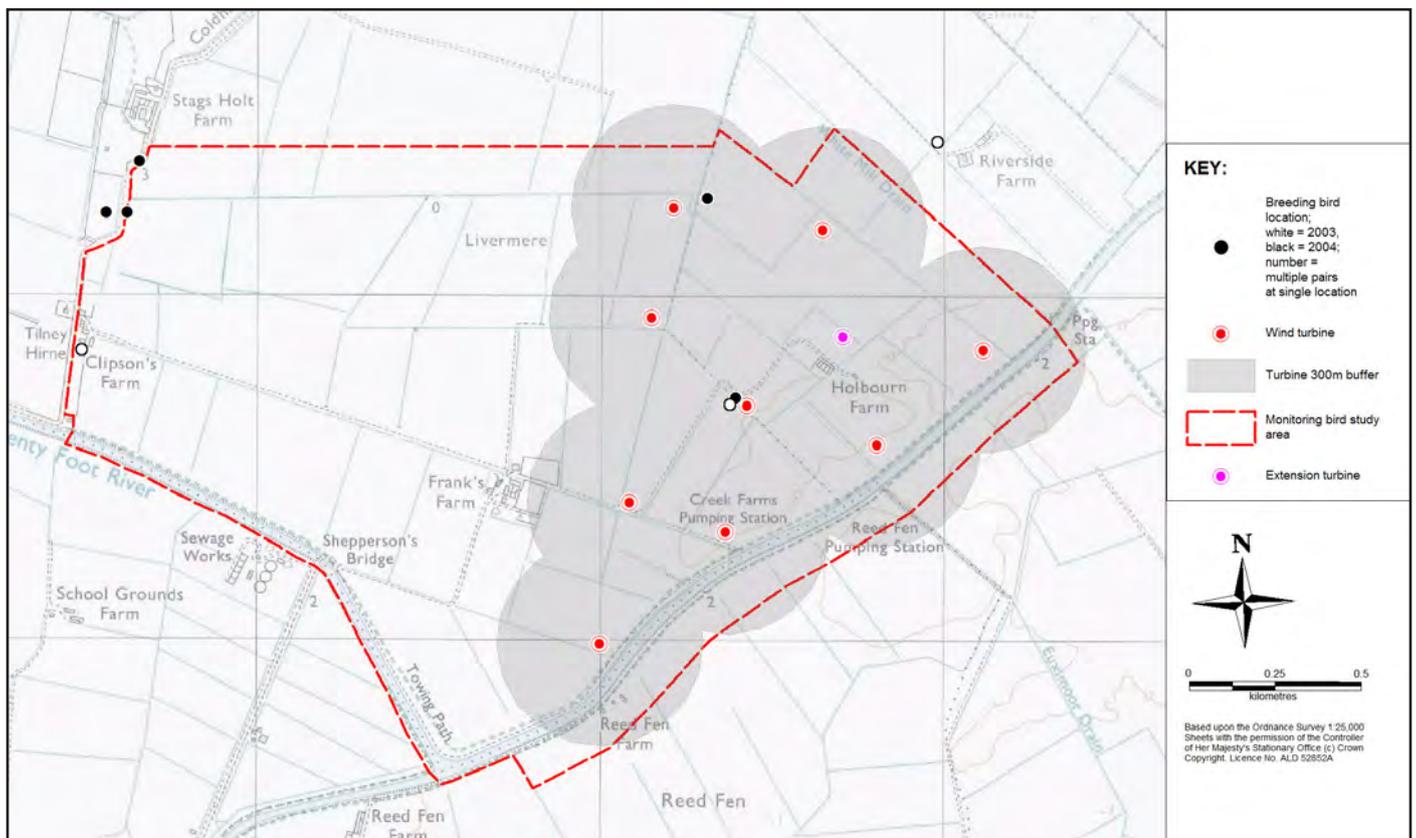
**Figure 15a. Distribution of breeding Reed Warblers in the Stag's Holt survey area prior to construction (2003 and 2004)**



**Figure 15b. Distribution of breeding Reed Warblers in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



**Figure 16a. Distribution of breeding Chaffinches in the Stag's Holt survey area prior to construction (2003 and 2004)**



**Figure 16b. Distribution of breeding Chaffinches in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**

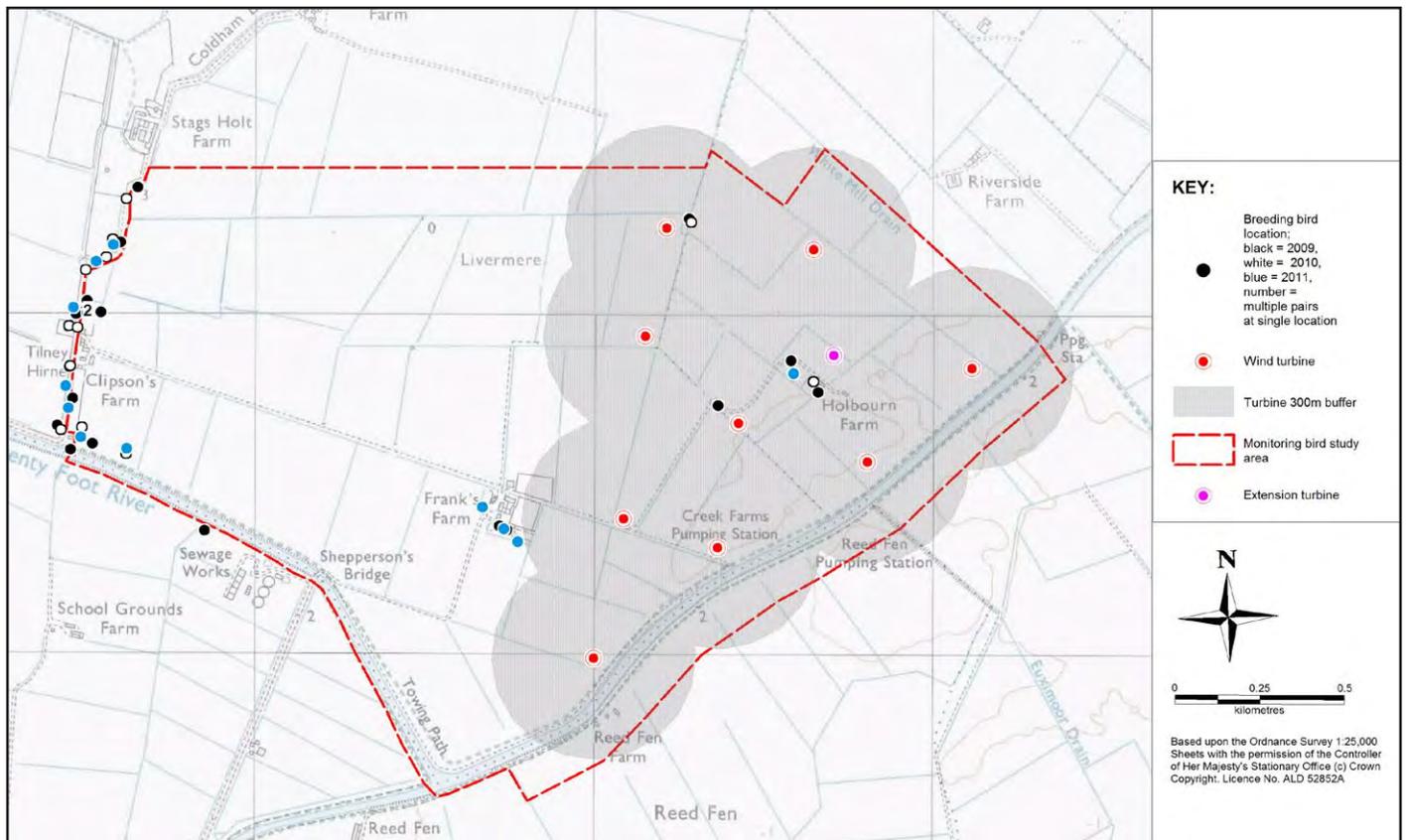


Figure 17a. Distribution of breeding Linnets in the Stag's Holt survey area prior to construction (2003 and 2004)

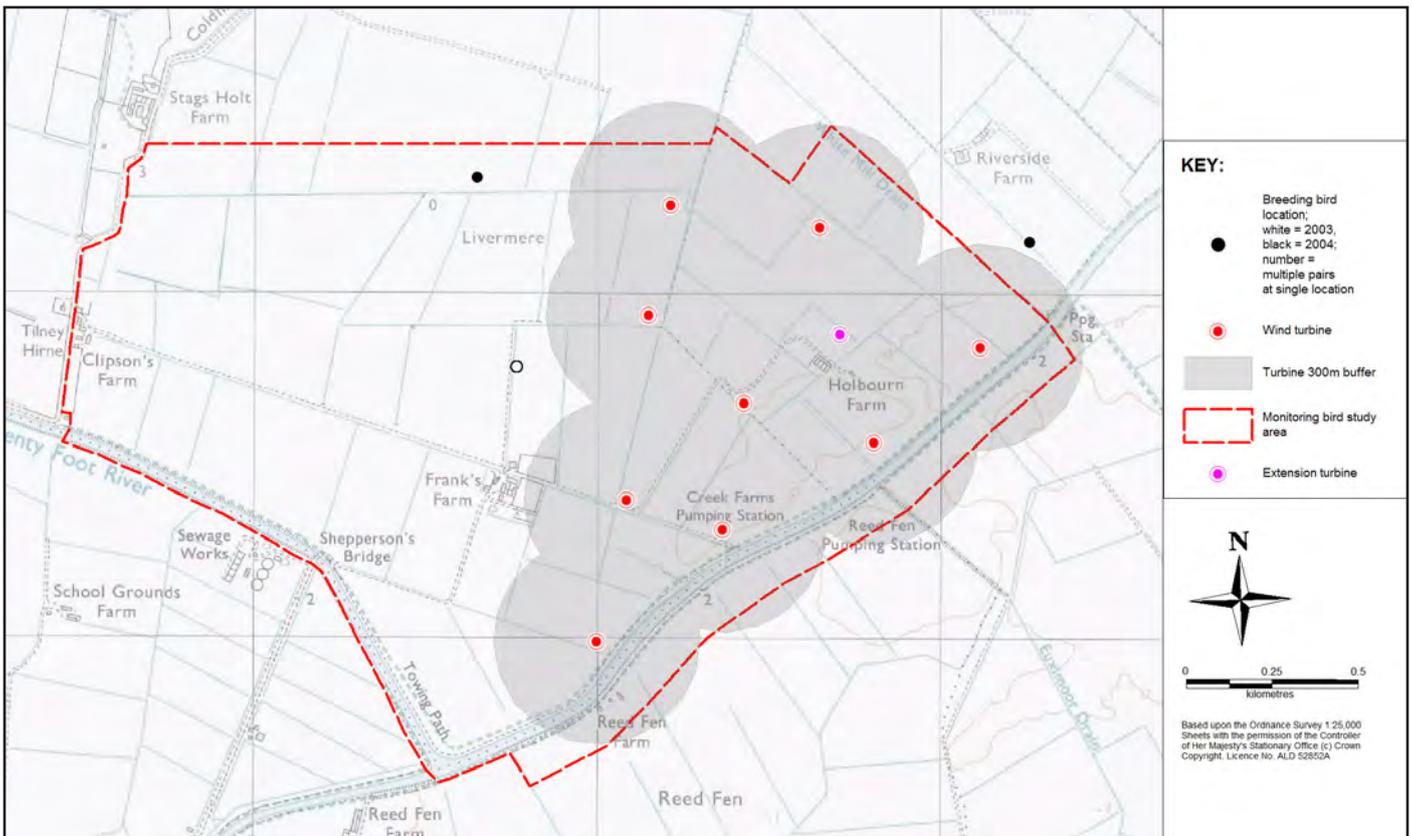
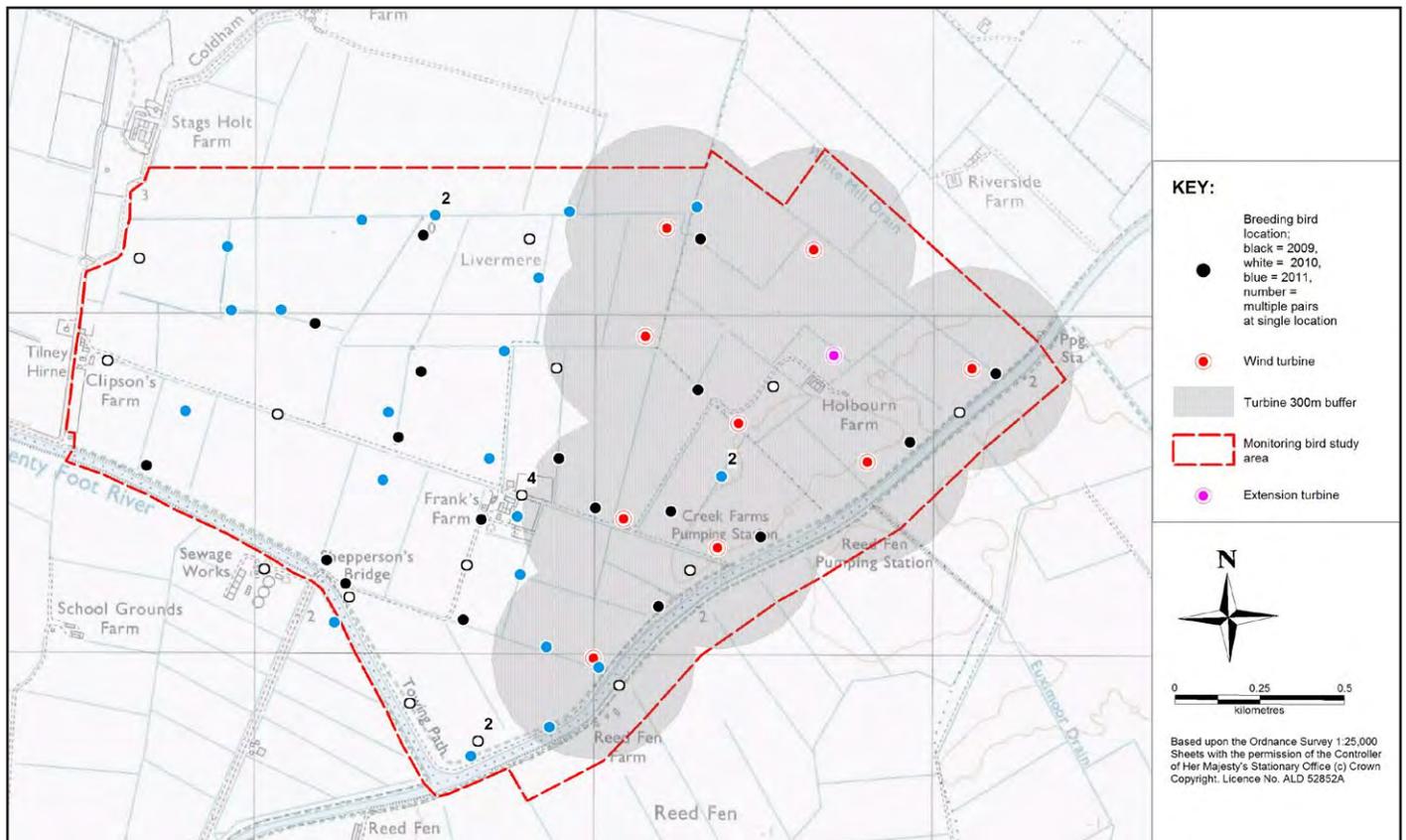
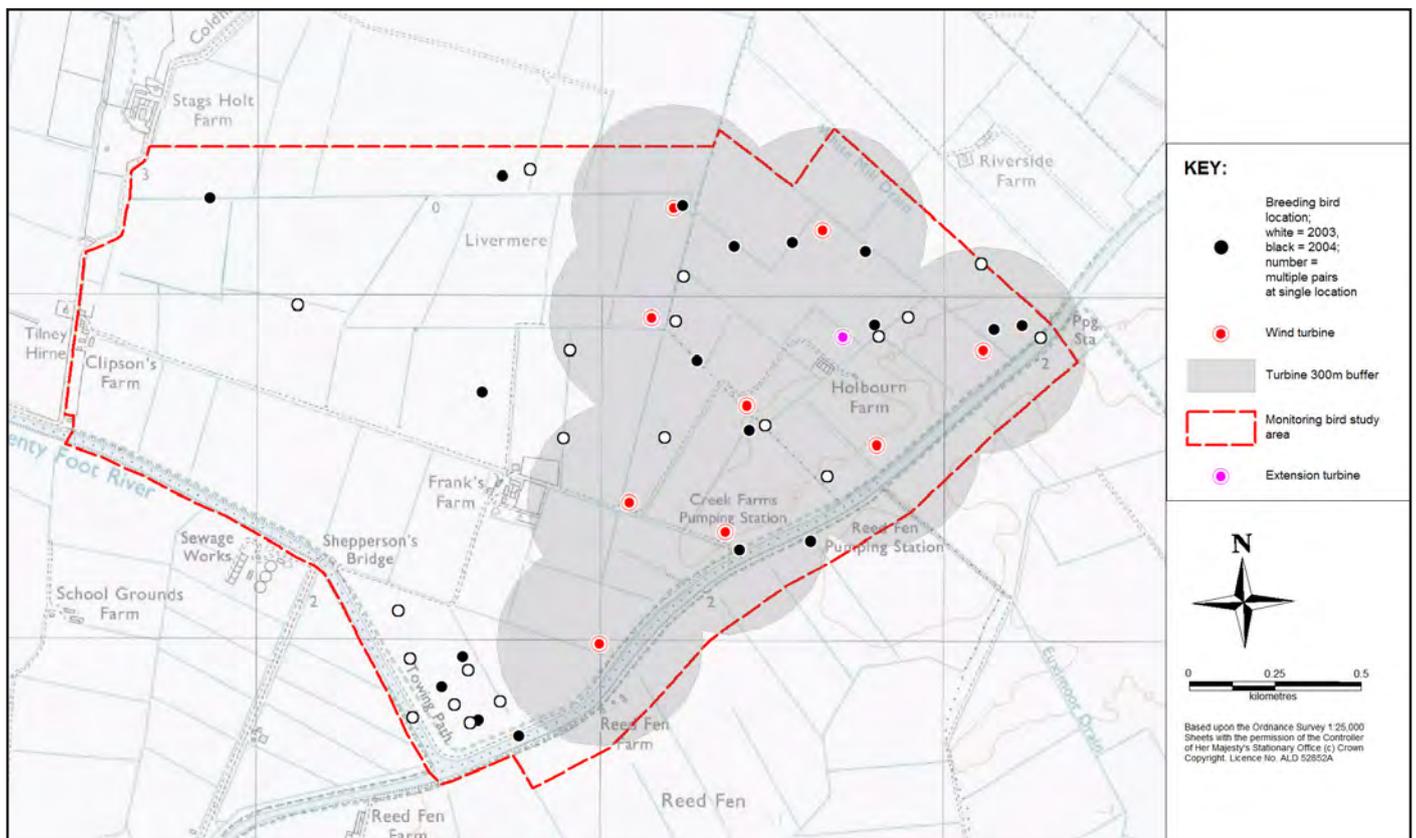


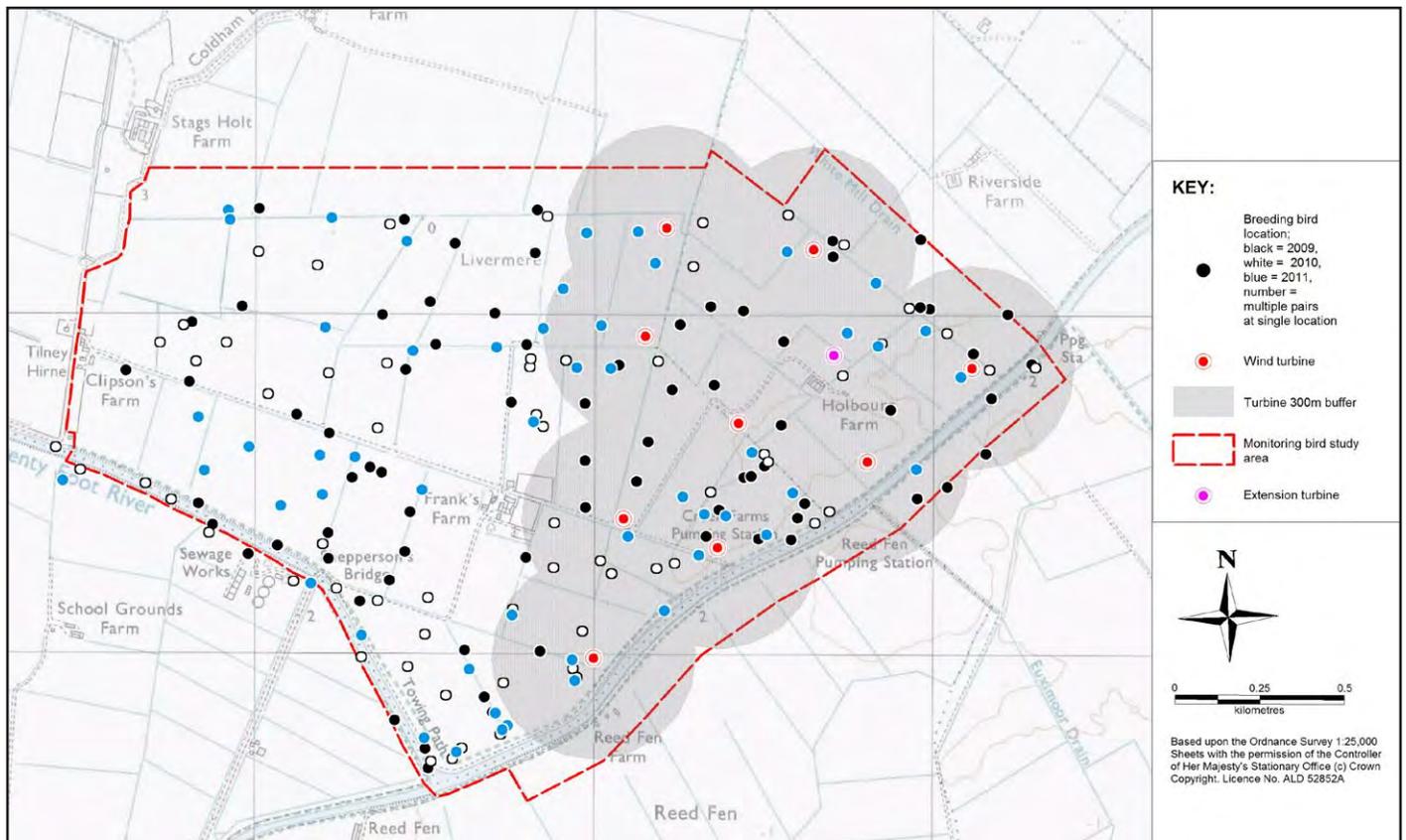
Figure 17b. Distribution of breeding Linnets in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)



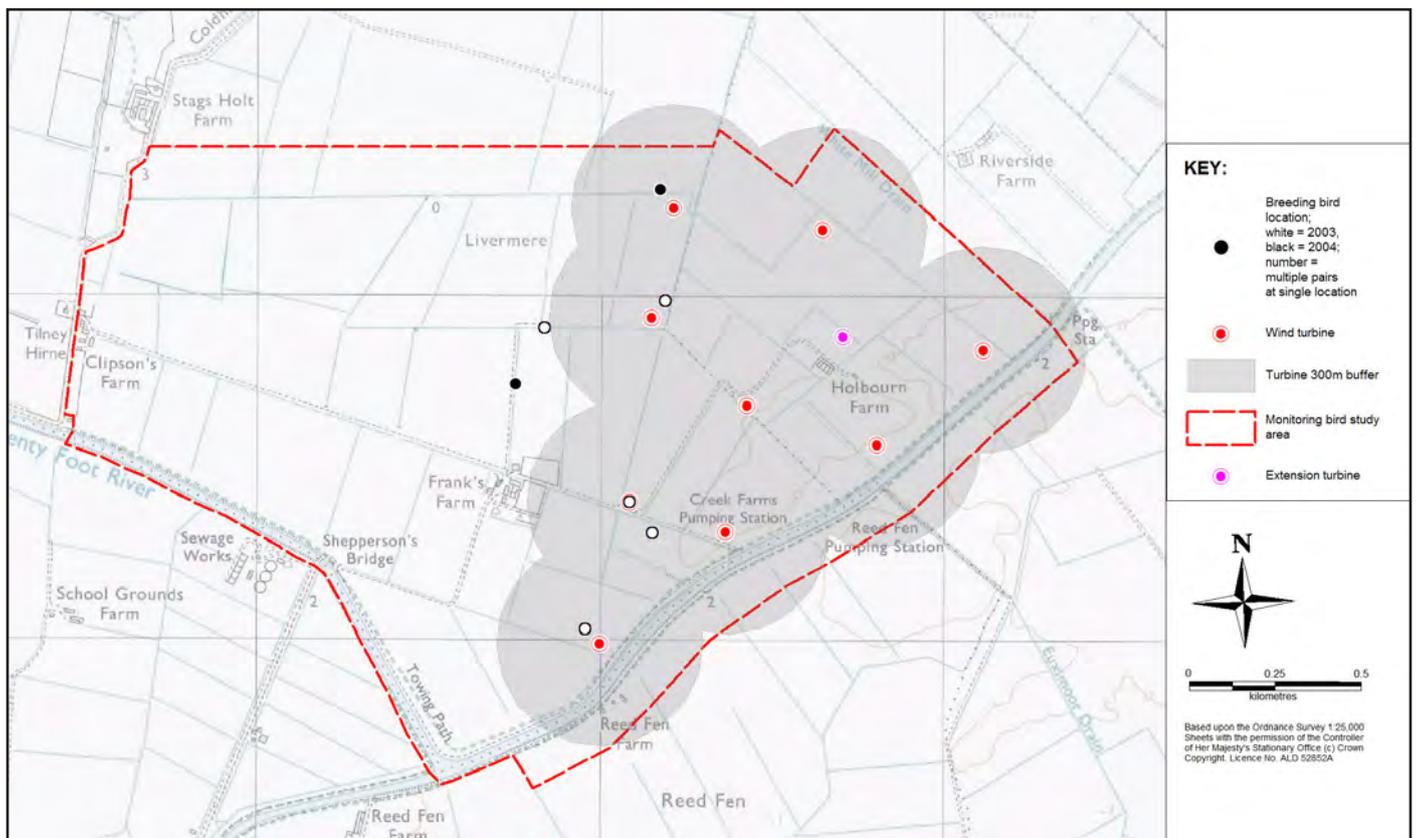
**Figure 18a. Distribution of breeding Reed Buntings in the Stag's Holt survey area prior to construction (2003 and 2004)**



**Figure 18b. Distribution of breeding Reed Buntings in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**



**Figure 19a. Distribution of breeding Corn Buntings in the Stag's Holt survey area prior to construction (2003 and 2004)**



**Figure 19b. Distribution of breeding Corn Buntings in the Stag's Holt survey area after construction of the wind farm (2009, 2010 and 2011)**

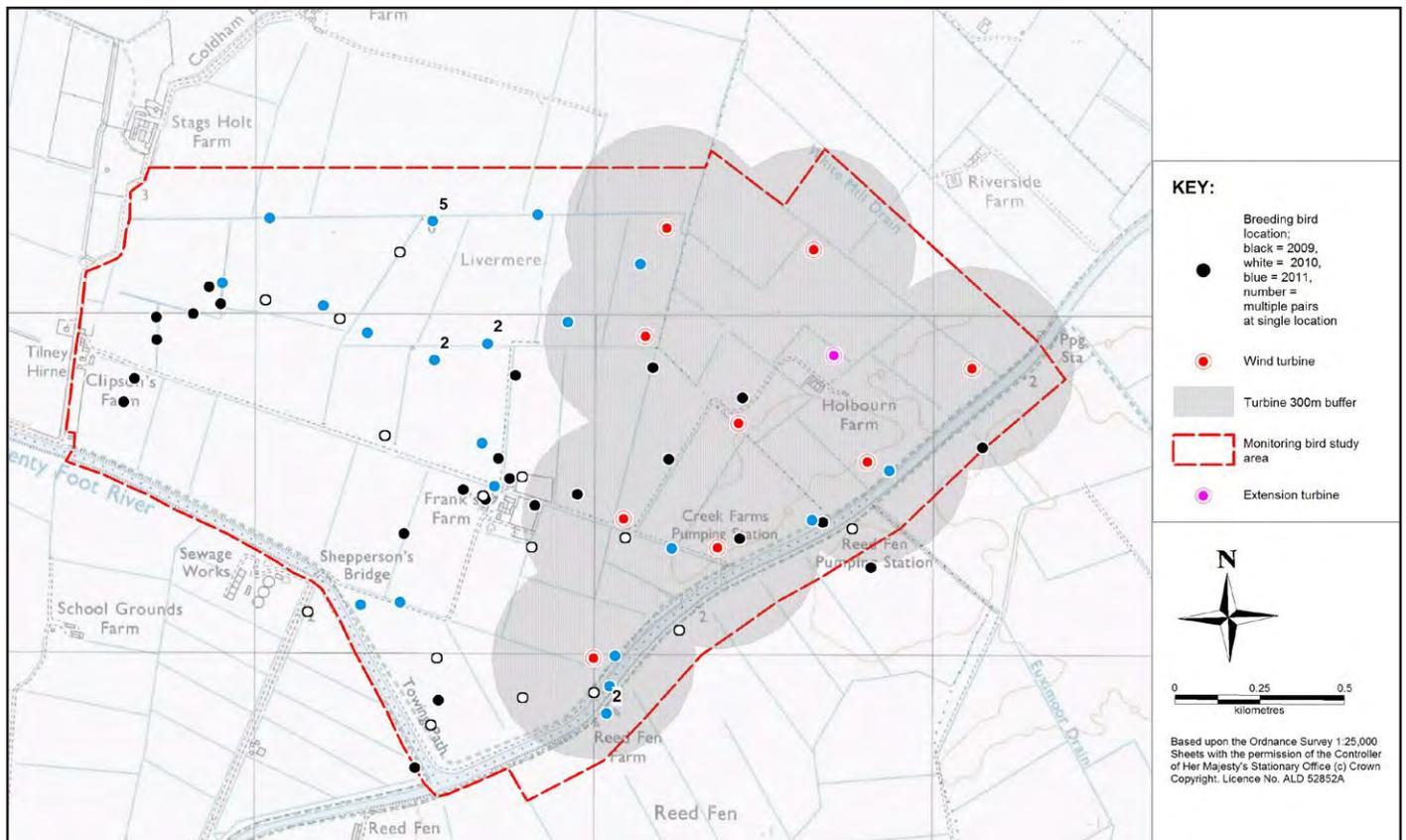




Figure 20c. Distribution of other breeding birds in the Stag's Holt survey area after construction of the wind farm (2010).

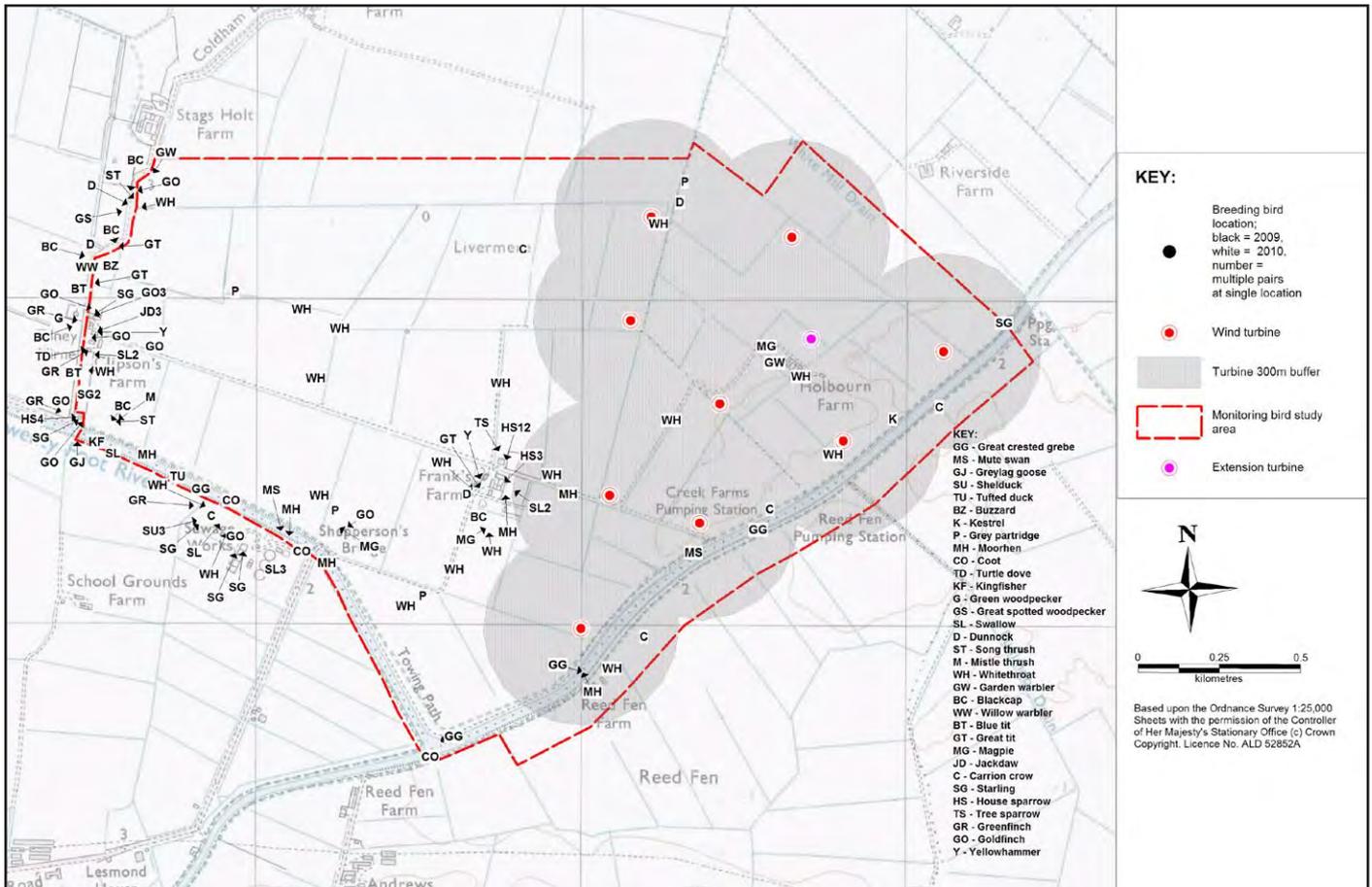
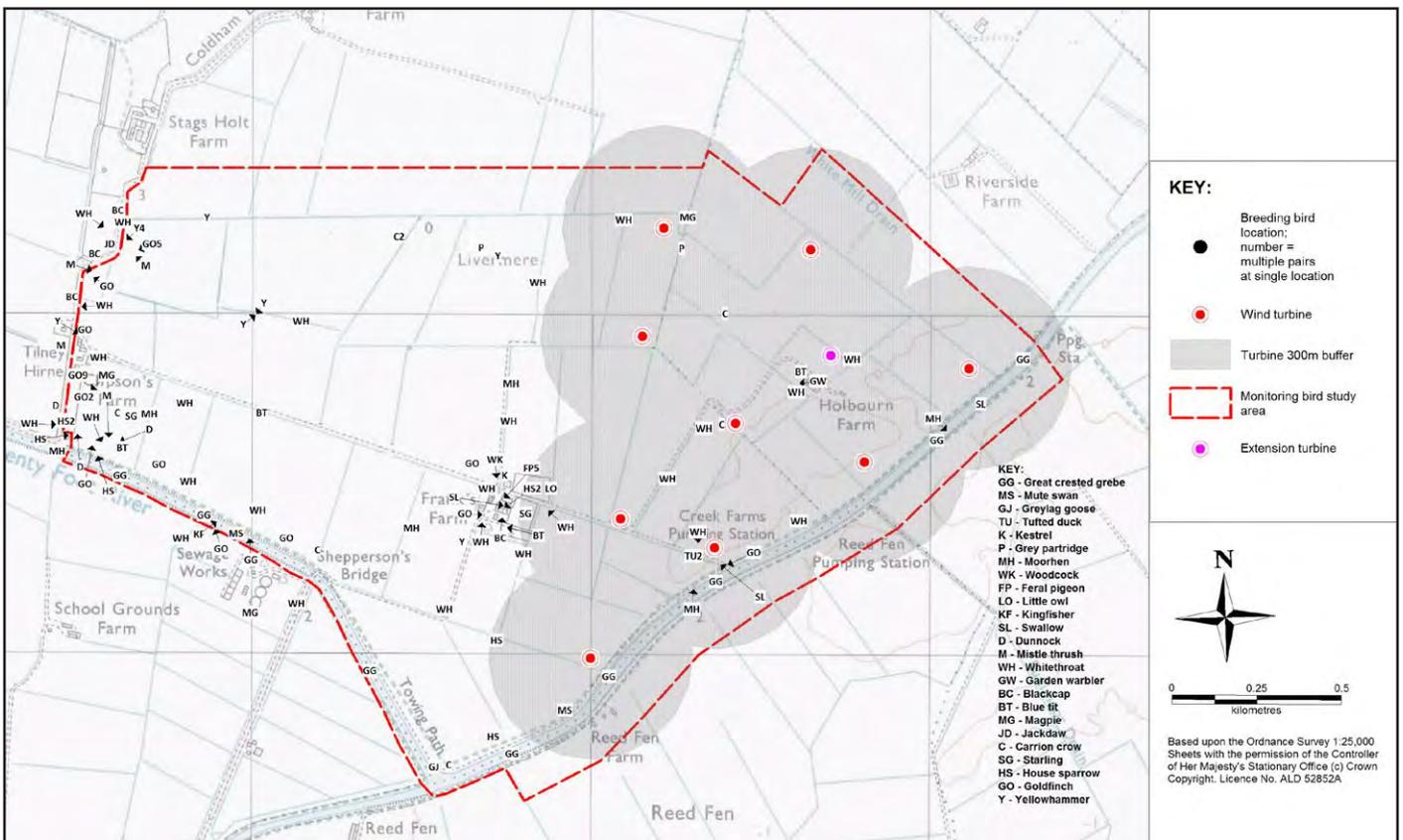
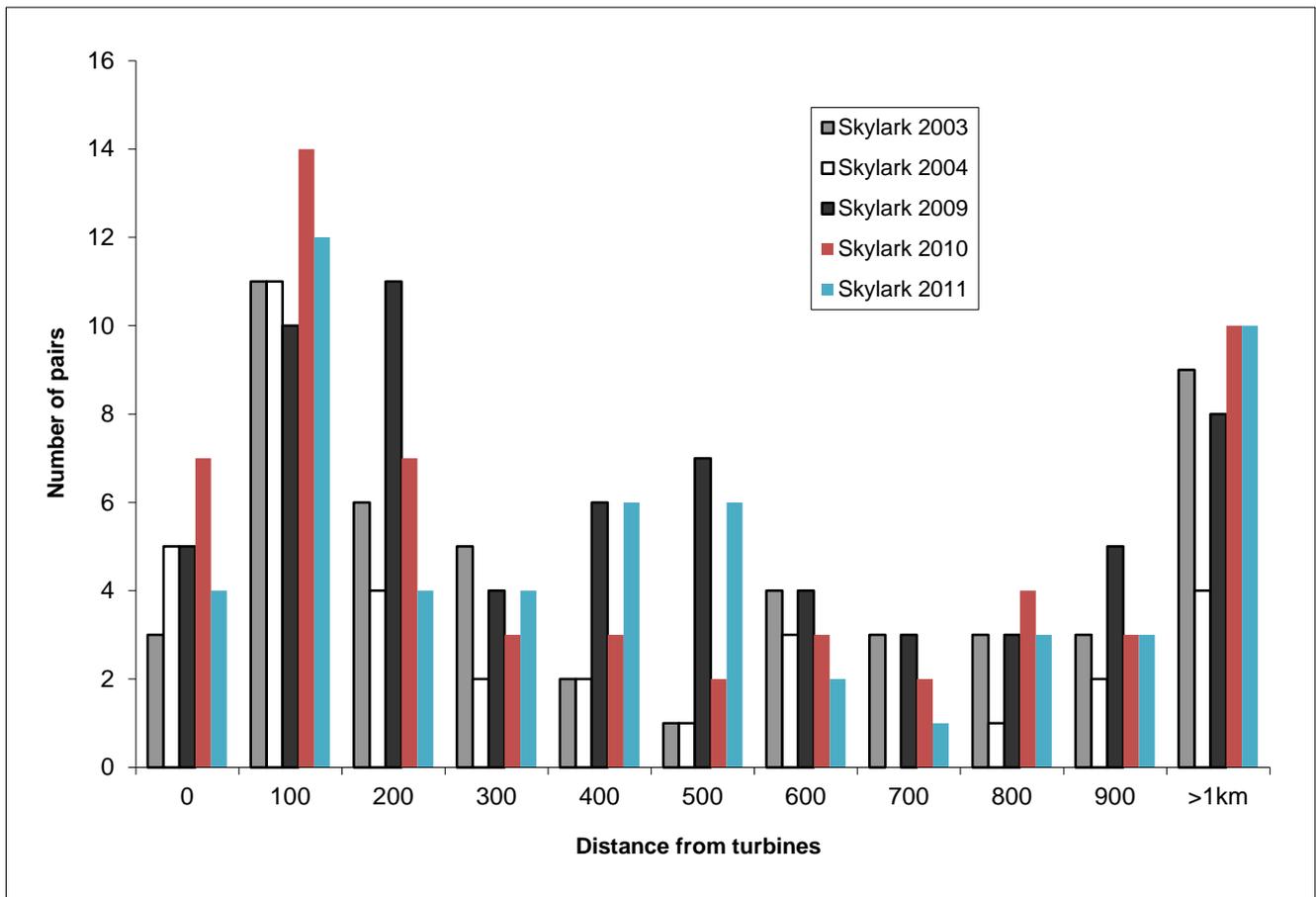


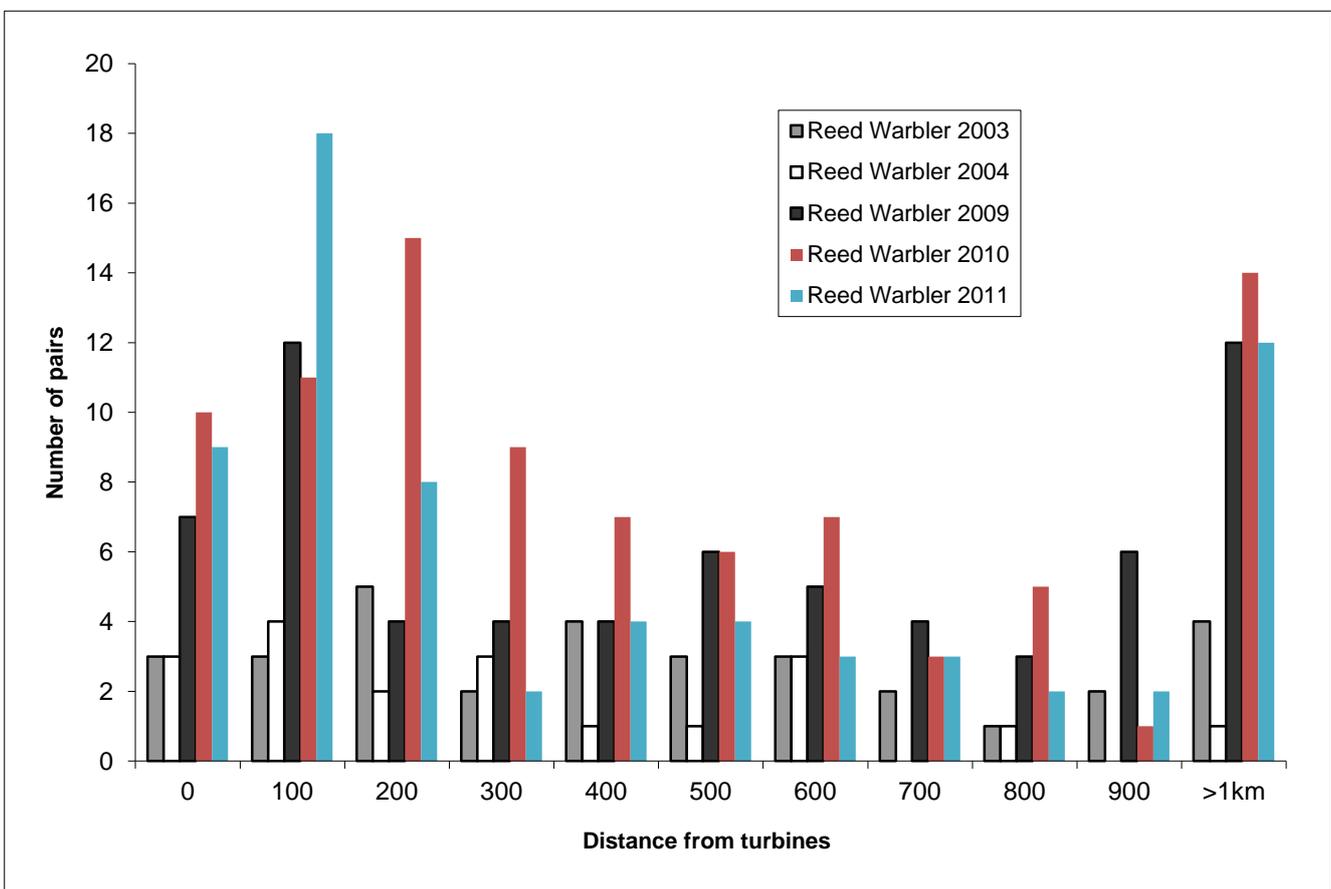
Figure 20d. Distribution of other breeding birds in the Stag's Holt survey area after construction of the wind farm (2011).



**Figure 21. Distribution of breeding skylark in relation to distance from the wind turbines, pre-construction (2003 and 2004) and post-construction (2009, 2010 and 2011)**



**Figure 22. Distribution of breeding reed warblers in relation to distance from the wind turbines, pre-construction (2003 and 2004) and post-construction (2009, 2010 and 2011)**



**Figure 23. Distribution of breeding reed buntings in relation to distance from the wind turbines, pre-construction (2003 and 2004) and post-construction (2009, 2010 and 2011)**

