Saint Nikola Wind Farm: 2009 Breeding Bird Survey

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Summary

The need for breeding bird survey was identified in the Saint Nikola Wind Farm EMMP and is being undertaken to characterize the breeding bird assemblage within the Saint Nikola Wind Farm and to assess any future changes which may be attributable to the operation of the wind turbines. This report synthesizes the results of 3 months study performed in 2009 with the scope of providing a baseline description of the breeding bird community against which future surveys can be contrasted and analyzed. Three transects running roughly north to south through the wind farm territory have been chosen and surveyed. Two control transects have been chosen outside of the wind farm territory to account for 'natural changes' in breeding bird populations within the project area, which would not be attributable to an effect of the operational turbines. Details of the vegetation along each transect were recorded to account for any habitat-related effects on changes in the breeding bird assemblage in future analyses. This process will need to be repeated immediately prior to future annual surveys. The results of the 2009 survey are assessed against the European Ornithological Atlas Committee's (EOAC) criteria for breeding bird status. A total of 77 species was recorded, including many with national or international classifications of vulnerable or threatened status. Findings do not suggest that the Saint Nikola Wind Farm is of particular conservation importance for its breeding birds, however, and should allow an assessment of any impact of the operational development on the bird assemblage.

Introduction

Recent documentation of the Bulgarian avifauna includes 50 families and 400 species, 286 of them breeding (Bulgarian Breeding Birds Atlas data). One species (*Tetrao tetrix*) has been extinct since the end of 19th century and 10 others have disappeared as nesting birds since the 1950s. Three species (*Pandion haliaaetus, Aegypius monachus* and *Haliaaetus albicilla*) formerly considered absent as breeding species have re-established as nesting after 1993.

73% of European avian species occur in Bulgaria and 52.9% of the breeding birds of Europe nest in the country. 75.5% of the bird species occurring in Bulgaria are breeding, but 28.5% of these occur at the periphery of their distribution. Bulgaria is at the southern limit of the breeding distribution for 37 species, the northern limit for 30 species, and the

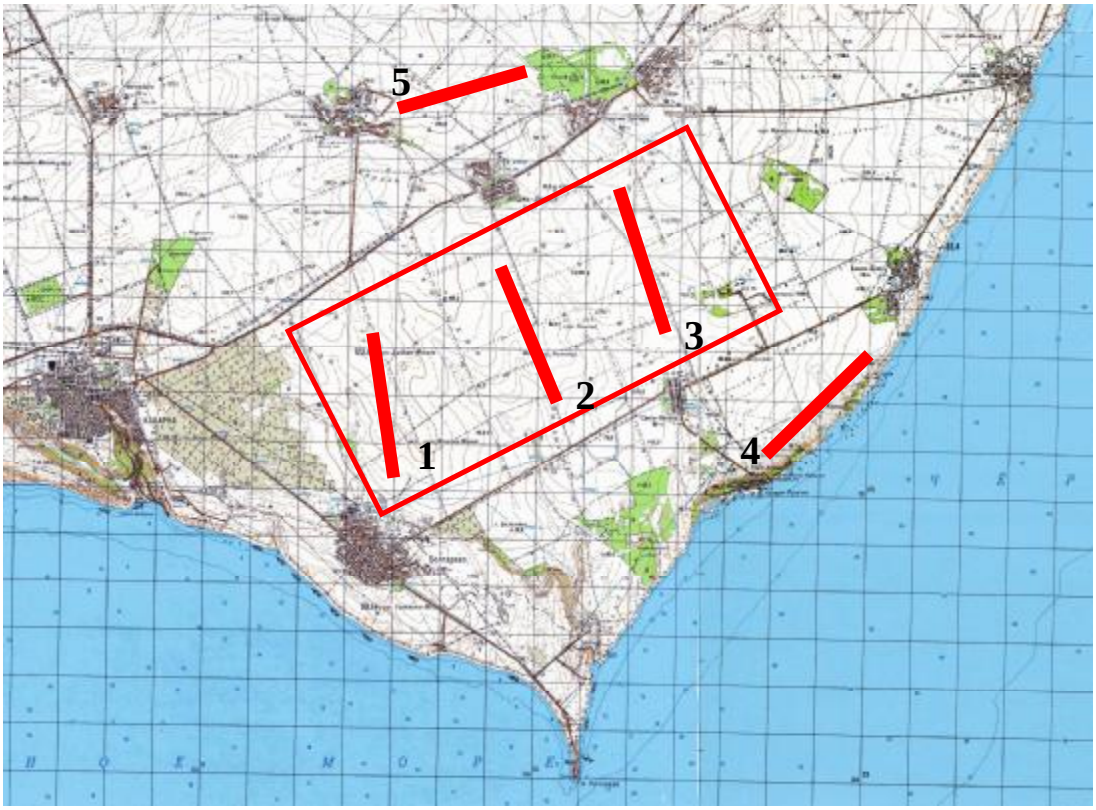
western and eastern limits for 3 species each. The number of breeding bird species according to the recently published Bulgarian Atlas of Breeding Birds varies from 6 to 163 species in all UTM squares of Bulgaria.

In this study we aimed to identify the bird species breeding in the wind park territory (Saint Nikola Wind Farm: SNWF) and quantify their densities. SNWF is located in NE Bulgaria, close to the Black Sea coast near the cape of Kaliakra and lies between the road from the village of Bulgarevo to St. Nikola (municipality of Kavarna), and the 1st class road E 87 Kavarna to Shabla (Map 1). SNWF consists mainly of arable land with different crops (wheat, sunflower, flax), intercepted with roads and shelter belts. SNKP includes areas outside the original 2000 proposed development site of Kaliakra.

Purpose of the Survey

The need for breeding bird survey was identified in the EMMP and is being undertaken to categorise the breeding bird assemblage within SNWF and to assess any impact of the operational wind farm on this assemblage. The results of the surveys in Year 1 (2009) will enable an assessment to be made of the breeding bird assemblage prior to operation of the wind farm. The results of subsequent surveys will allow an assessment of the impact of the operational wind farm on the breeding bird assemblage.

In order for this assessment to be made the surveys need to be reproducible and therefore they followed fixed transects in 2009. Three transects running roughly north to south through the wind farm territory were chosen (Map 1). Since the breeding bird assemblage in SNWF may change for reasons independent of the construction and operation of the wind turbines, an additional two control transects have been chosen outside of the wind farm territory to account for natural changes in breeding bird populations (Map 1). Knowledge of these trends outside of the influence of the programmed development is important to attribute the level of impact upon breeding birds of the wind turbines post-construction and during operation.



Map 1. Schematic representation of SNWF and the five breeding bird survey transects.

Methods

The methods were based on those used for breeding bird atlas surveys. They are designed to comprehensively categorise the breeding bird assemblage in the survey area. The results of the survey area were assessed against the European Ornithological Atlas Committee's (EOAC) criteria for breeding bird status. Five transects were selected; three in the wind park territory (WPT), one control transect in similar habitat and one within the natural steppe habitat adjacent to the project area. The three transects within the WPT, in the most part, followed shelter belts that run north to south. The control transect is located to the north of the WPT and comprises of habitats that are representative of those within the WPT. Survey results from a fifth transect, within the natural steppe habitat adjacent to the WPT, should better reflect the natural trends in breeding bird assemblage composition and bird density. These results will compliment the results from the WPT and control transects.

Details of the vegetation along each transect were recorded to allow future analysis of changes in the breeding bird assemblage which may result from change in habitat (e.g.

crop type). This process will need to be repeated immediately prior to each year's survey in order to account for the potential influence of habitat change on the breeding bird assemblage within the project area. An inventory of the species composition of the shelter belts has already been completed and any major changes to these will be noted in future surveys.

Each transect was walked once every fortnight during the breeding bird season (April to June). Two observers simultaneously walked the route. Each observer recorded all birds within 500 metres of the centre of the transect with one observer recording all birds exclusively to the left of the route, and the other recording exclusively to the right. The position, species, number and activity of all birds seen were annotated on each map. Where the transect route ran along a shelter belt, observers walked either side of this habitat feature. All birds within the shelter belt were recorded on maps and results discussed between observers at the end of each survey to ensure no double counting of bird records.

The surveys started no earlier than one hour after sunrise and no later than 09:00. Each transect was walked five times over the survey period and the start point was alternated for each survey; survey 1 was run north to south, survey 2 south to north, etc (Table 1). Every species observed was recorded on the maps using two letter species codes (Table 2) with corresponding activity codes (Table 3). The activity codes are vital to allow assessment of the results against the EOAC criteria for breeding activity.

On completion of the first round of surveys the maps were sent to RSK Carter Ecological for digitisation and analysis to ensure that survey coverage and results were adequate. On completion of the final survey all field maps were digitised per species. The surveys will be repeated as detailed in the EMMP with the results being assessed against the 2009 baseline.

Table 1. Breeding Bird Survey Timetable

	Transect 1	Transect 2	Transect 3	Control 1	Steppe Control
Survey 1	7th April	8th April	9th April	10th April	11th April
Survey 2	18th April	19th April	20th April	21th April	22st May
Survey 3	01th May	2th May	3th May	4th May	5th May
Survey 4	17th May	18th May	19th May	20th May	21th May
Survey 5	8th June	9th June	10th June	11th June	12th June

Breeding Bird Species Codes

All birds were recorded on the field maps using two letter codes (Table 2). These codes are based on those used in the UK for all bird surveys; however due to the presence of a very different breeding bird assemblage in Bulgaria some have been made up for the purpose of this survey using unassigned British codes. The codes are made up of two letters and are specific to each species registered; the codes were annotated on the field map with additional detail to indicate species behaviour and number (see following sub-section: Table 3).

Table 2. Bird species codes used in the survey

TWO LETTER CODES FOR BREEDING BIRD SURVEY		
CODE	**Common Name (English)**	**Scientific Name**
A.	**Lesser Spotted Eagle**	***Aquila pomarina***
AI	**Alpine Swift**	***Apus melba***
B.	**Common Blackbird**	***Turdus merula***
BC	**Blackcap**	***Sylvia atricapilla***
BH	**Black-headed Gull**	***Larus ridibundus***
BL	**Bluethroat**	***Luscinia svecica***
BM	**Long legged buzzard**	***Buteo rufinus***
BO	**Barn Owl**	***Tyto alba***
BR	**Bearded Tit**	***Parnurus biarmicus***
BT	**Blue Tit**	***Parus caeruleus***
BX	**Black Redstart**	***Phoenicurus ochruros***
BZ	**Common Buzzard**	***Buteo buteo***
C.	**Carrion Crow**	***Corvus corone corone***
CA	**Great Cormorant**	***Phalacrocorax carbo***
CB	**Corn Bunting**	***Miliaria calandra***
CC	**Chiffchaff**	***Phylloscopus collybita***

CD	**Eurasian Collared Dove**	***Streptopelia decaocto***
CF	**Collared Flycatcher**	***Ficedula albicollis***
CH	**Chaffinch**	***Fringilla coelebs***
CK	**Common Cuckoo**	***Cuculus canorus***
CL	**Cirl Bunting**	***Emberiza cirlus***
CO	**Common Coot**	***Fulica atra***
CS	**Common Shelduck**	***Tadorna tadorna***
CW	**Cetti's Warbler**	***Cettia cetti***
D.	**Hedge Accentor**	***Prunella modularis***
DI	**Dipper**	***Cinclus cinclus***
DL	**Crested Lark**	***Galerida crisata***
DT	**Euasian Penduline Tit**	***Remiz pendulinus***
DV	**Rock Dove**	***Columba livia***
EA	**Golden Eagle**	***Aquila chrysaetos***
ED	**Red Backed Shrike**	***Lanius collurio***
EO	**Eagle Owl**	***Bubo bubo***
EU	**European Roller**	***Coracias garrulus***
EZ	**Black Eared Wheatear**	***Oenanthe hispanica***
FA	**(Blue headed) Yellow Wagtail**	***Motacilla flava flava***
FE	**(Black headed) Yellow Wagtail**	***Motcailla flava feldegg***
FF	**Fieldfare**	***Turdus pilaris***
FH	**Finsch's Wheatear**	***Oenanthe finschii***
FN	**Thrush Nightingale**	***Luscinia luscinia***
FP	**Feral Pigeon**	***Columba livia (domestica)***
FX	**Semi Collard Flycatcher**	***Ficedula semitorquata***
G.	**Green Woodpecker**	***Picus viridis***
GE	**Great Egret**	***Egretta alba***
GI	**Northern Goshawk**	***Accipiter gentilis***
GL	**Grey Wagtail**	***Motacilla cinerea***
GO	**European Goldfinch**	***Carduelis carduelis***
GR	**European Greenfinch**	***Carduelis chloris***
GS	**Great Spotted Woodpecker**	***Dendrocopos major***
GT	**Great Tit**	***Parus major***
GW	**Garden Warbler**	***Sylvia borin***
H.	**Grey Heron**	***Ardea cinerea***
HA	**Pallid Harrier**	***Circus macrourus***
HC	**Hooded Crow**	***Corvus corone cornix***
HE	**Grey Headed Woodpecker**	***Picus canus***
HF	**Hawfinch**	***Coccothraustes coccothraustes***
HH	**Hen Harrier**	***Circus cyaneus***
HI	**Spanish Sparrow**	***Passer hispaniolensis***
HM	**House Martin**	***Delichon urbica***
HP	**Hoopoe**	***Upupa epops***
HS	**House Sparrow**	***Passer domesticus***
HX	**Chukar**	***Alectoris chukar***
HY	**Eurasian Hobby**	***Falco subbuteo***
HZ	**European Honey Buzzard**	***Pernis apivorus***
IC	**Icterine Warbler**	***Hippolais icterina***

IQ	**Pygmy Cormarant**	***Ixobrychus minutus***
IZ	**Isabelline Wheatear**	***Oenanthe isabellina***
J.	**Jay**	***Garrulus glandarius***
JD	**Jackdaw**	***Corvus monedula***
JJ	**Sombre Tit**	***Parus Lugubris***
K.	**Common Kestrel**	***Falco tinnunculus***
KF	**Common Kingfisher**	***Alcedo atthis***
KY	**Blue Rock Thrush**	***Monticola solitarius***
KZ	**(Rufous-tailed) Rock Thush**	***Monticola saxatilis***
L.	**Northern Lapwing**	***Vanellus vanellus***
LE	**Long-eared Owl**	***Asio otus***
LG	**Lesser Black-backed Gull**	***Larus fuscus***
LH	**Lesser Grey Shrike**	***Lanius minor***
LI	**Common Linnet**	***Carduelis cannabina***
LO	**Little Owl**	***Athene noctua***
LP	**Little Plover**	***Charadrius dubius***
LS	**Lesser Spotted Woodpecker**	***Dendrocopos minor***
LT	**Long-tailed Tit**	***Aegithalos caudatus***
LW	**Lesser Whitethroat**	***Sylvia curruca***
M.	**Mistle Thrush**	***Turdus viscivorus***
MA	**Mallard**	***Anas platyrhynchos***
MF	**Moustached Warbler**	***Acrocephalus melanopogon***
MG	**Magpie**	***Pica pica***
MH	**Common Moorhen**	***Gallinula chloropus***
ML	**Merlin**	***Falco columbarius***
MO	**Montagu's Harrier**	***Circus pygargus***
MP	**Meadow Pipit**	***Anthus pratensis***
MR	**Eurasian Marsh Harrier**	***Circus aeruginosus***
MS	**Mute Swan**	***Cygnus olor***
MT	**Marsh Tit**	***Parus palustris***
MV	**Crag Martin**	***Ptyonoprogne rupestris***
MW	**Marsh Warbler**	***Acrocephalus palustris***
MZ	**European Bee Eater**	***Merops Apiaster***
N.	**Common Nightingale**	***Luscinia megarhynchos***
NB	**Eurasian Spoonbill**	***Platalea leucorodia***
NH	**Nuthatch**	***Sitta europaea***
NJ	**European Nightjar**	***Caprimulgus europaeus***
NL	**Black Lark**	***Melanopcorypha yeltoniensis***
OB	**Ortolan Bunting**	***Emberiza hortulala***
OF	**Orphean Warbler**	***Sylvia hortensis***
OL	**Eurasian Golden Oriole**	***Oriolus oriolus***
OO	**Woodchat Shrike**	***Lanius senator***
OP	**Osprey**	***Pandion haliaetus***
OR	**White Stork**	***Ciconia ciconia***
OS	**Black Stork**	***Ciconia nigra***
OX	**Eurasian Scops Owl**	***Otus scops***
OY	**Eastern Olivacious Warbler**	***Hippolais pallida***
OZ	**Olive-tree Warbler**	***Hippolais olivetorum***

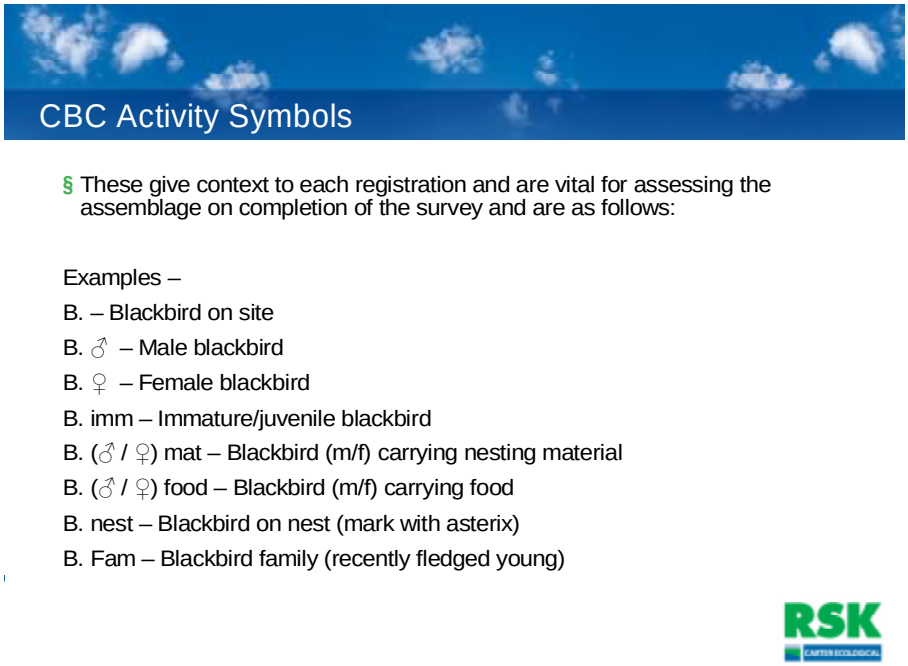
P.	**Grey Partridge**	***Perdix perdix***
PE	**Peregrine**	***Falco peregrinus***
PF	**Pied Flycatcher**	***Ficedula hypoleuca***
PH	**Common Pheasant**	***Phasianus colchicus***
PI	**Pied Wheatear**	***Oenanthe pleschanka***
PW	**White Wagtail**	***Motacilla alba alba***
PY	**Paddyfield Warbler**	***Acrocephalus agricola***
Q.	**Common Quail**	***Coturnix coturnix***
QW	**Great Reed Warbler**	***Acrocephalus arundinaceus***
R.	**European Robin**	***Erithacus rubecula***
RB	**Reed Bunting**	***Emberiza schoeniclus***
RN	**Common Raven**	***Corvus corax***
RO	**Rook**	***Corvus frugilegus***
RR	**Barred Warbler**	***Sylvia nisoria***
RW	**Eurasian Reed Warbler**	***Acrocephalus scirpaceus***
S.	**Skylark**	***Alauda arvensis***
SA	**European Shag**	***Phalacrocorax aristotelis***
SC	**Stonechat**	***Saxicola torquata***
SF	**Spotted Flycatcher**	***Muscicapa striata***
SG	**Common Starling**	***Sturnus vulgaris***
SH	**Eurasian Sparrowhawk**	***Accipiter nisus***
SI	**Common Swift**	***Apus apus***
SL	**Barn Swallow**	***Hirundo rustica***
SM	**Sand Martin**	***Riparia riparia***
SN	**Common Snipe**	***Gallinago gallinago***
SQ	**Common Rosefinch**	***Capodacus erythrinus***
ST	**Song Thrush**	***Turdus philomelos***
SW	**Sedge Warbler**	***Acrocephalus schoenobaenus***
TD	**European Turtle Dove**	***Streptopelia turtur***
TI	**Tawny Pipit**	***Anthus campestris***
TN	**Stone Curlew**	***Burhinus oedicmemus***
TO	**Tawny Owl**	***Strix aluco***
TP	**Tree Pipit**	***Anthus trivialis***
TS	**Eurasian Tree Sparrow**	***Passer montanus***
TX	**Short toed eagle**	***Circaetus gallicus***
UR	**Purple Heron**	***Ardea purpurea***
VF	**Red-footed Faclon**	***Falco vespertinus***
VI	**Savi's Warbler**	***Locustella luscinionides***
VL	**Greater Short-toed Lark**	***Calandrella brachydactyla***
VR	**Red Rumped Swallow**	***Hirundo daurica***
VW	**River Warbler**	***Locustella fluviatilis***
VZ	**Bonelli's Warbler**	***Phylloscopus bonelli***
W.	**Northern Wheatear**	***Oenanthe oenanthe***
WA	**Water Rail**	***Rallus aquaticus***
WC	**Whinchat**	***Saxicola rubetra***
WH	**Common Whitethroat**	***Sylvia communis***
WI	**Water Pipit**	***Anthus spinoletta***
WL	**Woodlark**	***Lullula arborea***

WO	**Wood Warbler**	***Phylloscopus sibilatrix***
WP	**Common Wood Pigeon**	***Columba palumbus***
WR	**Wren**	***Troglodytes troglodytes***
WT	**Willow Tit**	***Parus montanus***
WW	**Willow Warbler**	***Phylloscopus trochilis***
WY	**Eurasian Wryneck**	***Jynx torquilla***
XL	**Callandra Lark**	***Melanocorypha calandra***
XM	**Middle SpottedWoodpecker**	***Dendrocopos Medrus***
Y.	**Yellowhammer**	***Emberiza citrinella***
YG	**Yellow Legged Gull**	***Larus cachinnass***
YR	**Rock Partridge**	***Alectoris graeca***
ZN	**Black Headed Bunting**	***Emberiza melanocephala***
ZQ	**Rock Bunting**	***Emberiza cia***
ZW	**Syrian Woodpecker**	***Dendrocopos syriacus***

Breeding Bird Activity

All birds exhibit certain behaviour characteristics that allow conclusions to be made as to their breeding status, and these have been incorporated within the EOAC criteria for determining breeding bird status as: confirmed, probable, possible or non-breeding. The symbols used when marking each registration on the field map are given below (Table 3).

Table 3. Activity symbols used for recording bird behaviour during the survey.



CBC Activity Symbols

Examples cont…

(B.) Blackbird singing

CH. Chaffinch contact call

B. Blackbird alarm call

(D.) —— (D.) - Same bird singing at different song posts

D.— —D. – Two different dunnocks (activity codes can also be used)

(WR) —— ? —— (WR) – thought to be same bird but unsure

CBC Activity Symbols

Flight:

C. ——→ Carrion Crow flying from a point to another

—— C. ——→ Carrion crow flying from outside the site in to site

Length of arrow indicates if bird fly over (f/o) or lands on site.

Results

Total number of birds registered during the survey is given in Table 4. 77 bird species were recorded in SNWF during the breeding season of 2009 (Table 5). Two additional species were registered in the control transect in the vicinity of the wind park territory. Three globally threatened species *Coracias garrulus, Ficedula semitorquata* and *Falco vespertinus* were registered in the wind park territory during the breeding season, but were not confirmed as breeding under the EOAC criteria for determining breeding bird status. These species probably breed in SNWF but in low numbers and the breeding status of these species in the wind farm needs further investigation.

31 species of European conservation concern were recorded at SNWF (Table 5). All of these species are common and widespread breeding birds for Bulgaria and so their presence in the wind park territory does not indicate specific need of conservation measures. 22 species of National concern occurred at SNWF (Table 5). These species and the species of European conservation concern should be given special attention in analyses of future monitoring, although the diversity of species with conservation importance do not suggest currently that SNWF is of high significance or unusual for comparable habitats in Bulgaria.

Table 4. Total number of birds registered per transect during the survey.

	transect					
date	**1**	**2**	**3**	**4**	**5**	**Grand**
07-11 April	**399**	**135**	**260**	**88**	**98**	**980**
18-22 April	**403**	**155**	**313**	**103**	**147**	**1121**
01-05 May	**418**	**178**	**439**	**175**	**98**	**1308**
17-21 May	**446**	**218**	**340**	**131**	**136**	**1271**
08-12 June	**570**	**376**	**301**	**233**	**424**	**1904**
Grand Total	**2236**	**1062**	**1653**	**730**	**903**	**6584**

Table 5. Number of species and number of individuals observed per transect during the survey of breeding birds in 2009. Conservation status of species is given as follows: A – globally threatened species; B- species of European conservation concern; C- nationally threatened species.

N	Code	Species name	Cons. Status	Tr. 1	Tr. 2	Tr. 3	Tr. 4	Tr. 5
1	B.	*Turdus merula*		180	28	24		27
2	BC	*Sylvia atricapilla*		10		1		1
3	BM	*Buteo rufinus*	BC			6		1
4	BO	*Tyto alba*	BC			1		
5	BX	*Phoenicurus ochruros*		4		7		
6	BZ	*Buteo buteo*	C	9	1	4		
7	CA	*Phalacrocorax carbo*				15		
8	CB	*Miliaria calandra*	B	24	8	37		60
9	CC	*Phylloscopus collybita*		7	2	18		
10	CD	*Streptopelia decaocto*			11			7
11	CF	*Ficedula albicollis*	C	6	2			
12	CH	*Fringilla coelebs*		18	1			
13	CK	*Cuculus canorus*		13		5		6
14	CL	*Emberiza cirlus*		3				
15	DL	*Galerida crisata*	B		8			
16	ED	*Lanius collurio*	B	62	20	18	7	11
17	EU	*Coracias garrulus*	ABC			1		
18	FE	*Motcailla flava feldegg*		58	86	81		15
19	FF	*Turdus pilaris*		3	6			
20	FN	*Luscinia luscinia*		4		2		
21	FX	*Ficedula semitorquata*	ABC	2		1		
22	G.	*Picus viridis*	B	28				
23	GO	*Carduelis carduelis*	B	6	8	1		7
24	GR	*Carduelis chloris*						3
25	GS	*Dendrocopos major*			2			
26	GT	*Parus major*			3	2		1
27	H.	*Ardea cinerea*			4	9		
28	HC	*Corvus corone cornix*		2	10			3
29	HE	*Picus canus*	BC					1
30	HF	*Coccothraustes coccothraustes*		20	3			9
31	HI	*Passer hispaniolensis*		23	20	144		3
32	HM	*Delichon urbica*	**B**	28		11		
33	HP	*Upupa epops*	B	7	3	4	12	2
34	HS	*Passer domesticus*	**B**		33			1
35	HY	*Falco subbuteo*	C		1	1		
36	J.	*Garrulus glandarius*		57	30	22		18
37	K.	*Falco tinnunculus*	**B**	20	1			

38	LH	*Lanius minor*	BC	33	10	28	4	12
39	LI	*Carduelis cannabina*			1	3		1
40	LW	*Sylvia curruca*			1	2		1
41	MG	*Pica pica*		6	17	9		6
42	MR	*Circus aeruginosus*	C			2		
43	MZ	*Merops Apiaster*	BC	16	2	3		2
44	N.	*Luscinia megarhynchos*		14	12	11		7
45	NH	*Sitta europaea*				1		
46	OB	*Emberiza hortulala*	BC	41	10	23		32
47	OL	*Oriolus oriolus*		166	32	40	2	36
48	OO	*Lanius senator*	B	10			1	3
49	PE	*Falco peregrinus*	C			2		
50	PF	*Ficedula hypoleuca*	C	52	14	49		2
51	PW	*Motacilla alba alba*		4	4	5		1
52	Q.	*Coturnix coturnix*	B	18	6	6		2
53	R.	*Erithacus rubecula*		8		9		
54	RR	*Sylvia nisoria*	C	6		1		2
55	RW	*Acrocephalus scirpaceus*				2		
56	S.	*Alauda arvensis*	B	956	375	651		161
57	SC	*Saxicola torquata*				1		
58	SF	*Muscicapa striata*	B	22	8	9		
59	SG	*Sturnus vulgaris*	B	80	128	3		367
60	SH	*Accipiter nisus*	C	1				
61	SI	*Apus apus*		8	4	14		
62	SL	*Hirundo rustica*	B	34	57	50		47
63	SM	*Riparia riparia*	BC		2			
64	SN	*Gallinago gallinago*	BC			1		
65	ST	*Turdus philomelos*		17		4		
66	TD	*Streptopelia turtur*	B	32	6	25		5
67	TI	*Anthus campestris*	BC	14	1	0	16	3
68	TP	*Anthus trivialis*		12	4	7		6
69	VF	*Falco vespertinus*	ABC		1	19		
70	W.	*Oenanthe oenanthe*	B	4	8	5		
71	WC	*Saxicola rubetra*		10	24	32		2
72	WH	*Sylvia communis*		10	7	20	9	5
73	WO	*Phylloscopus sibilatrix*	B	15	6	2		1
74	WR	*Troglodytes troglodytes*				1		
75	WW	*Phylloscopus trochilis*		8	2	22		2
76	XL	*Melanocorypha calandra*	BC	34	14	134	679	7
77	Y.	*Emberiza citrinella*			1			
78	ZN	*Emberiza melanocephala*	B	9	10	35		10
79	ZW	*Dendrocopos syriacus*	C			3		1

The average numbers of birds per species per transect are presented in Table 6. Recorded densities of birds in the 2009 survey are comparable with those given in the recently published Atlas of Breeding Birds in Bulgaria, however, and do not indicate any special conservation importance of the wind park territory.

Variations in bird numbers according to different transects and to different species likely reflect spatial differences in the distribution of crops and habitats. Repetition of crop and broad habitat records in future surveys should allow long-term monitoring of these influences which can therefore be accounted for when assessing any impact of the operation of the wind farm.

Table 6. Average number of individuals established per transect during the survey. See Table 5 for conservation status codes.

N	Code	Species name	Cons. Status	Tr. 1	Tr. 2	Tr. 3	Tr. 4	Tr. 5
1	B.	*Turdus merula*		18,0	5,6	4,8		5,4
2	BC	*Sylvia atricapilla*		1,0		1,0		1,0
3	BM	*Buteo rufinus*	BC			1,2		0,2
4	BO	*Tyto alba*	BC			1,0		
5	BX	*Phoenicurus ochruros*		0,4		1,4		
6	BZ	*Buteo buteo*	C	1,5	0,2	0,8		
7	CA	*Phalacrocorax carbo*				3,0		
8	CB	*Miliaria calandra*	B	4,8	1,6	7,4		12,0
9	CC	*Phylloscopus collybita*		0,7	0,2	3,6		
10	CD	*Streptopelia decaocto*			2,2			1,4
11	CF	*Ficedula albicollis*	C	0,6	0,4			
12	CH	*Fringilla coelebs*		1,8	0,2			
13	CK	*Cuculus canorus*		1,3		1,0		0,6
14	CL	*Emberiza cirlus*		0,3				
15	DL	*Galerida crisata*	B		1,6			
16	ED	*Lanius collurio*	B	6,2	4,0	3,6	1,4	2,2
17	EU	*Coracias garrulus*	ABC			0,2		
18	FE	*Motcailla flava feldegg*		5,8	8,6	16,2		3,0
19	FF	*Turdus pilaris*		0,6	1,2			
20	FN	*Luscinia luscinia*		0,4		0,4		
21	FX	*Ficedula semitorquata*	ABC	0,2		0,2		
22	G.	*Picus viridis*	B	2,8				

23	GO	*Carduelis carduelis*	B	0,6	1,6	1,0		0,7
24	GR	*Carduelis chloris*						3,0
25	GS	*Dendrocopos major*			0,4			
26	GT	*Parus major*			0,6	0,4		1,0
27	H.	*Ardea cinerea*			0,8	1,8		
28	HC	*Corvus corone cornix*		0,2	1,0			0,6
29	HE	*Picus canus*	BC					0,2
30	HF	*Coccothraustes coccothraustes*		1,8	0,6			1,8
31	HI	*Passer hispaniolensis*		2,3	4,0	28,8		0,6
32	HM	*Delichon urbica*	**B**	2,8		2,2		
33	HP	*Upupa epops*	B	0,7	0,3	0,8	2,4	0,4
34	HS	*Passer domesticus*	**B**		6,6			1,0
35	HY	*Falco subbuteo*	C		0,2	0,2		
36	J.	*Garrulus glandarius*		5,7	6,0	4,4		3,6
37	K.	*Falco tinnunculus*	**B**	2,0	0,2			
38	LH	*Lanius minor*	BC	6,6	2,0	5,6	0,8	2,4
39	LI	*Carduelis cannabina*			0,2	0,6		0,2
40	LW	*Sylvia curruca*			1,0	0,4		1,0
41	MG	*Pica pica*		0,3	3,4	1,8		1,2
42	MR	*Circus aeruginosus*	C			0,4		
43	MZ	*Merops apiaster*	BC	3,2	0,4	0,6		0,4
44	N.	*Luscinia megarhynchos*		2,3	2,4	2,2		1,4
45	NH	*Sitta europaea*				0,2		
46	OB	*Emberiza hortulala*	BC	4,1	2,0	4,6		6,4
47	OL	*Oriolus oriolus*		33,2	6,4	8,0	0,4	7,2
48	OO	*Lanius senator*	B	1,7			1,0	0,6
49	PE	*Falco peregrinus*	C			0,4		
50	PF	*Ficedula hypoleuca*	C	5,2	2,8	9,8		2,0
51	PW	*Motacilla alba alba*		0,4	0,8	1,0		0,2
52	Q.	*Coturnix coturnix*	B	1,8	0,6	1,2		1,0
53	R.	*Erithacus rubecula*		0,8		1,8		
54	RR	*Sylvia nisoria*	C	1,2		0,2		0,4
55	RW	*Acrocephalus scirpaceus*				0,4		
56	S.	*Alauda arvensis*	B	95,6	75,0	###		32,2
57	SC	*Saxicola torquata*				0,2		
58	SF	*Muscicapa striata*	B	2,2	1,6	1,8		
59	SG	*Sturnus vulgaris*	B	8,0	32,0	0,6		73,4
60	SH	*Accipiter nisus*	C	0,2				
61	SI	*Apus apus*		0,8	0,8	2,8		
62	SL	*Hirundo rustica*	B	3,4	5,7	10,0		9,4
63	SM	*Riparia riparia*	BC		0,4			
64	SN	*Gallinago gallinago*	BC			0,2		
65	ST	*Turdus philomelos*		1,7		0,8		
66	TD	*Streptopelia turtur*	B	3,2	1,2	5,0		5,0

67	TI	*Anthus campestris*	BC	1,4	0,2	0,0	3,2	0,6
68	TP	*Anthus trivialis*		1,2	0,8	1,4		1,2
69	VF	*Falco vespertinus*	ABC		0,2	3,8		
70	W.	*Oenanthe oenanthe*	B	0,6	1,6	1,0		
71	WC	*Saxicola rubetra*		1,0	4,8	6,4		2,0
72	WH	*Sylvia communis*		2,0	0,7	4,0	1,8	1,0
73	WO	*Phylloscopus sibilatrix*	B	1,5	1,2	0,4		1,0
74	WR	*Troglodytes troglodytes*				0,2		
75	WW	*Phylloscopus trochilis*		0,8	0,4	4,4		2,0
76	XL	*Melanocorypha calandra*	BC	6,8	2,8	26,8	135,8	1,4
77	Y.	*Emberiza citrinella*			0,2			
78	ZN	*Emberiza melanocephala*	B	1,8	2,0	7,0		1,7
79	ZW	*Dendrocopos syriacus*	C			0,6		1,0

Conclusions

1. The breeding bird survey in 2009 recorded 77 bird species with varying degrees of breeding evidence at the wind park territory.

2. Of the species which were recorded, 31 have conservation value: 3 species are globally threatened; 32 are species of European conservation concern and 22 are nationally threatened species.

3. Information on the diversity and abundance of breeding species do not indicate that the wind park territory is an important area for any of these bird species.

4. Collective quantitative indices indicate non-random distribution of breeding birds by habitat through the wind park territory, as would be expected given different species' habitat requirements.

5. The methods used during 2009 and the collected quantitative information should allow long term monitoring of breeding birds, and an assessment of any potential impact of the operational wind farm, as required by the development's EMMP.

APPENDIX I

Breeding Bird Audit (by RSK)

On Friday we had a close out meeting in the AES office and we are writing to confirm the outcomes of this meeting.

As you are aware RSK involvement with the ornithological works have now come to a close with this element of the project being taken forward by Mike Madders of Natural Research. As far as we are aware Mike is planning to visit the site in early – mid July to look at and assist with the radar set up so it is fully functional for the autumn migration and mitigation monitoring due to start in August. Tristan and I will meet with Mike in Scotland before his site visit in July to 'hand-over' the bird work and ensure that he has all of the relevant documents etc, to that end can you please start to write up the breeding bird surveys and let us know if you need any support with the figures?

Breeding Bird Audit

Overall RSK are very pleased with the level of survey effort and execution of a survey technique new to your team.
The consistent use of the same survey team was noted as being particularly good and should help to reduce any bias encountered when using a large number of people for this type of survey.
The level of communication between the two surveyors whilst completing surveys either side of the shelter belts was very good and will have reduced the level of double counting of birds across the shelter belts.
Species identification was generally very good however some additional training concerning confusion species would be of benefit to Nurel.
The major change for next years survey needs to be that both recorders note down observations and these are done directly on to rough field maps and not in to notebooks.
It was noted that there was some level of under-recording of some species and number of birds present within the survey area. In addition activity codes were not utilised as much as they could have been. This needs to be incorporated into next years survey however some account of 2009 survey 'error' will need to be accounted for in future years reports.
Despite this it is felt that a robust inventory of the species present on the site was completed and this should be a useful baseline of activity against which the results of future surveys can be assessed.

Generally however the surveys that have been completed have resulted in a comprehensive picture of breeding bird activity across the wind park site with all species present being recorded. The control transect is very good and the species assemblage highly representative of that present within the wind park territory – lets just hope that it stays free of development and remains an affective control. The selection of the three transects across the wind park territory gives very good coverage of the wind park and will allow for any changes in the breeding bird assemblage post construction and operation to be accounted for.

It should be noted that the results of the BBS indicate that the wind park territory functions as a farmland/steppe habitat breeding bird site, limited in its extent to passerines

with very few raptors or other large birds of conservation concern being recorded breeding in the wind park territory. Recent research suggests that the impacts of wind farms/turbines on passerine assemblages are limited and not significantly negative. Hopefully the results of future breeding birds survey at Kavarna will reflect this.

May we take this opportunity to thank you very much for all your hard work over the last 12 months especially for being so accommodating and hospitable when we have been to the site. Could you also please pass on our thanks and gratitude to Vesi and Nurel and to Evo for all of his hard work with Jan and the bats last week?

Hope all is well and we will keep in touch.

Kind Regards,

Mark and Tristan

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APPENDIX II

Digital distributions of every established species (79) per transect are available in PDF files and will be delivered on request from AES Geo Power.