ANALYSIS REGARDING THE RISK OF COLLISION OF BIRDS WITH THE WIND TURBINES
WIND FARM PESTERA - 2012

1. GENERAL DATA

1.1. Introduction

EDP Renewables has developed in the area of Pestera, Constanta county, a wind farm with a total power of 90 MW, currently operated by S.C. EDP RENEWABLES ROMANIA S.R.L.

The development of the wind farm was done in accordance with the specific legislation in force, in compliance with European and national regulations regarding the development of this kind of projects.

In terms of compliance with the environmental legislation, for building the wind farm, the Environmental Agreement no. 10/2008 issued by EPA Constanta was obtained, based on the assessment study of the environmental impact, prepared by specialists in the field.

Later, after finishing the construction, regulating the operation conditions for the wind farm was done by issuing the environmental permit no. 463/18.10.2010.

Both the Environmental Agreement and the Environmental Permit required the monitoring of biodiversity in the area of the wind farm, that was performed both during its construction and in the first two years of operation of the wind farm and currently specific monitoring activities are performed in the third year of operation of the wind farm.

S.C. EDP RENEWABLES ROMANIA S.R.L. has achieved this monitoring by means of S.C. Blue Terra Consulting SRL, which prepares regular reports that are submitted to the beneficiary and the environmental authorities according to the regulatory documents mentioned above.

1.2. General data regarding the analyzed objective

The wind farm developed by EDP in the area of the administrative territory of the Pestera village, Constanta county, has a total power of 90 MW and comprises of a total of 30 Vestas V90 turbines with a power of 3 MW each.

Regarding the location of the farm in relation to Natura 2000 sites, the following table indicates the distances to the nearest Natura 2000 sites and their position towards the wind farm.

Table no. 1

Natura 2000 Site	Location of the farm in relation to Natura 2000 Site
ROSPA 0001 ALIMAN ADAMCLISI	200m North (turbine 24)
ROSCI 000353 PESTERA-DELENI	1 km West (turbine 26)

Regarding the migration routes, as indicated in the impact study, the wind farm is not located on a main migration route, but given the distance of about 6-7 km between the farm and the Danube, it is possible that specimens of birds flying along the Danube River also reach the farm area during their migration

2. GENERAL DATA REGARDING THE RISK ANALYSIS

2.1. Data and methodologies used for the calculation of the risk analysis

This material represents an analysis of the risk of collision of birds with wind turbines that make up the wind farm from Pestera, Constanta county.

The data used in the analysis are those obtained as a result of monitoring the area for 12 months (November 2011-October 2012).

The methodology used is based on the pattern developed by Scottish Natural Heritage (hereinafter referred to as SNH), that takes into account that, in practice, most birds in their flight are able to detect a wind turbine or an entire farm of turbines and to modify their flight so they can avoid such obstacles.

2.2. Description of the calculation method

The method used for the analyzed wind farm, developed by SNH, aims to estimate the number of collisions of birds with the wind turbines over a period of time. In this case, the period taken into account in this analysis is of one year.

The method is mainly based on the following equation:

Number of birds that can collide with the turbines =
number of birds that fly in the action area of the turbine rotor x
the likelihood that the birds that fly in the action area of the rotors be hit by these

Regarding the number of birds that can collide with the wind turbines, there are two approaches:

A. Birds with regular flights in the area of the wind farm. For the analyzed objective, only species observed in migration in the wind farm area were included in this category. These species are shown in Table. 5 of the Report on the monitoring of biodiversity in the wind farm area, prepared for the entire year 2012. The above mentioned report also describes the methods of monitoring the avifauna used during monitoring.
B. Birds frequently using the wind farm area. This category only took into account, among the species of birds identified in the wind farm area, those species whose flights are frequent in the action area of the wind turbine rotor.

In each of the two cases the likelihood of collision of birds with the wind turbines was calculated, according to the methodology described by SNH.

The calculation of the collision risk is presented in further detail for each of the two cases mentioned above.

CASE 1: MIGRATING BIRDS

In this case the species listed in Table 5 of the annual monitoring report were considered, presented in the Table 4 of this material.

For the calculation of the collision risk, all species listed in Table no. 4 were considered,, though, as the table also emphasizes, not all were observed flying high in the action area of the wind turbine rotor, so in the area with risk of collision. But taking into account that these species are migratory and have been observed during migration, it has been considered that such specimens can also reach heights that would pose a risk of collision with the turbines.

Regarding the number of birds of each species allowed for in this case, it is estimated as n x 2, where "n" is the number of birds of each species observed during the monitoring period and 2 represents the number of regular flights of these birds in the wind farm area (spring migration and fall migration).

In order to calculate the risk of collision of birds in this category with the turbines of the wind farm, according to SNH methodology, the following technical data were also used:

Table no. 2

Input data			Output data		
Farm width (largest width of the farm considered perpendicularly to the predominant flight direction) – fig. 1	1	6.64 km	Risk window	W = l x H	996000 mp
Wind turbine height	H	150m	Risk section	A = N x πR^2	190755 mp
No. of turbines that make up the farm	N	30		A/W	0.19
Radius of the turbine rotor	R	45m			

The risk window (W) is a "window", actually a vertical section through the farm whose dimensions are defined as follows:

- Length of the risk window is the largest width of the farm, perpendicularly to the predominant flight direction of birds
- Width of the risk window is the height of the highest turbine of the farm. In our case all turbines have a height of 150m.

The risk section (A) is the plan area occupied by the action radius of all turbine rotors that make up the wind farm.

Table no. 3: Technical features of the turbines

No. of blades	3
Tower height	105m
Blade length	45m
Maximum blade width	3.5m
Maximum angle of slope of the blade	30^0
Rotor diameter	90m
Rotation period	3.72 sec.
Rotor depth	4.4 m

Table no. 4: birds in migration observed in the wind farm area in the period November 2011 - October 2012

Run. No.	Scientific name	Common name	Observation period	Number of specimens	Observations
1.	*Ciconia ciconia*	White stork	April, May	3 spec.	single specimens on the ground/flying (1-3 spec.); flying height 30-40 m; flying direction: S-N, W-E
2.	*Pernis apivorus*	European Honey Buzzard	May	1 spec.	single specimens flying (1 spec.); flying height 40-60 m; flying direction: S-E, N.
3.	*Coturnix coturnix*	The Common Quail	April, May	4 spec.	single specimens on the ground/flying ; flying height 1.5-3 m; flying direction: E, S-E, W.
4	*Apus apus*	The Common Swift	May	11 spec.	Groups of birds flying; flying height 40-50 m; flying direction: S-W, E.
5.	*Merops apiaster*	The European Bee-eater	April, May, June	22 spec.	single specimens flying; flying height 40-60 m; flying direction: S- N-W.
6.	*Coracias garrulus*	The European Roller	May, June	5 spec.	single specimens flying; flying height 15-30m; flying direction: SW-E.
7.	*Upupa epops*	The Hoopoe	April, May	4 spec.	single specimens, groups of birds flying; flying height 8-10 m; flying direction: S- W, N.
8.	*Calandrella brachydactyla*	The Greater Short-toed Lark	May, June	5 spec.	single specimens on the ground/flying ; flying height 3-5 m, 10-15 m;

					flying direction:
9.	*Riparia riparia*	Bank Swallow, European Sand Martin	May, September	18 spec. 5 spec.	groups of birds/ flying; flying height 15-30 m; flying direction: S-N-W.
10.	*Hirundo rustica*	The Barn Swallow	May, June September, October	66 spec.	single specimens / groups of birds/ flying; flying height 3-8 m; 10-15 m; flying direction: E, S- E -W.
11.	*Anthus campestris*	The Tawny Pipit	April, May, June	8 spec.	single specimens flying; flying height 10-20 m; flying direction: S- W, E.
12.	*Lullula arborea*	The Woodlark	April	2 spec.	single specimens; flying height 8-12 m; flying direction: E, S-E, W.
13.	*Motacilla alba*	The White Wagtail	April, September, October	28 spec.	single specimens/ groups of birds; flying height 6-15 m; flying direction: S-W, N.
14.	*Motacilla flava feldegg*	Black-headed Wagtail	May	3 spec.	single specimens flying/ on the vegetation; flying height 6-10 m; flying direction: S-N, W-E.
15.	*Lanius collurio*	The Red-backed Shrike	May, September	10 spec.	single specimens flying/ on bushes; flying height 5-8 m; flying direction: S-N, E-W.
16.	*Oenanthe oenanthe*	The Northern Wheatear	April, May, June	18 spec.	single specimens flying/ on the ground ; flying height 4-8 m; flying direction: S-W, E.
17.	*Sylvia communis*	The Whitethroat	June, September	5 spec.	single specimens flying/ on vegetation; flying height 6-8 m;

					flying direction: S-E, N-W.
18.	*Sylvia atricapilla*	The Blackcap	May, June	2 spec.	single specimens flying/ on bushes; flying height 5-10 m; flying direction: S-N, W-E.
19.	*Oriolus oriolus*	The Golden Oriole	May, June	5 spec.	single specimens flying; flying height 10-15 m; flying direction: S-E, N.
20.	*Saxicola rubetra*	The Whinchat	May, September	6 spec.	single specimens flying/ on vegetation; flying height 3-5 m; flying direction: S-W, E
21.	*Erithacus rubecula*	The European Robin	April, May, October	5 spec.	single specimens flying/ on vegetation; flying height 2-3 m; flying direction: W-NE, WE.
22.	*Luscinia megarhynchos*	The Nightingale	April, May	3 spec.	single specimens flying; flying height 1-3 m; flying direction: S-E, N.
23.	*Passer domesticus*	The House Sparrow	April	8 spec.	single specimens / groups of birds flying height 10-15 m; flying direction: E, S-E, W.
24.	*Emberiza citrinella*	The Yellowhammer	May, June	5 spec.	single specimens / groups of birds/ on vegetation flying height 6-15 m; flying direction: S-W, N.
25.	*Emberiza hortulana*	The Ortolan Bunting	May, June	8 spec.	single specimens / groups of birds/ flying flying height 10-15 m; flying direction: E, S-E, W.

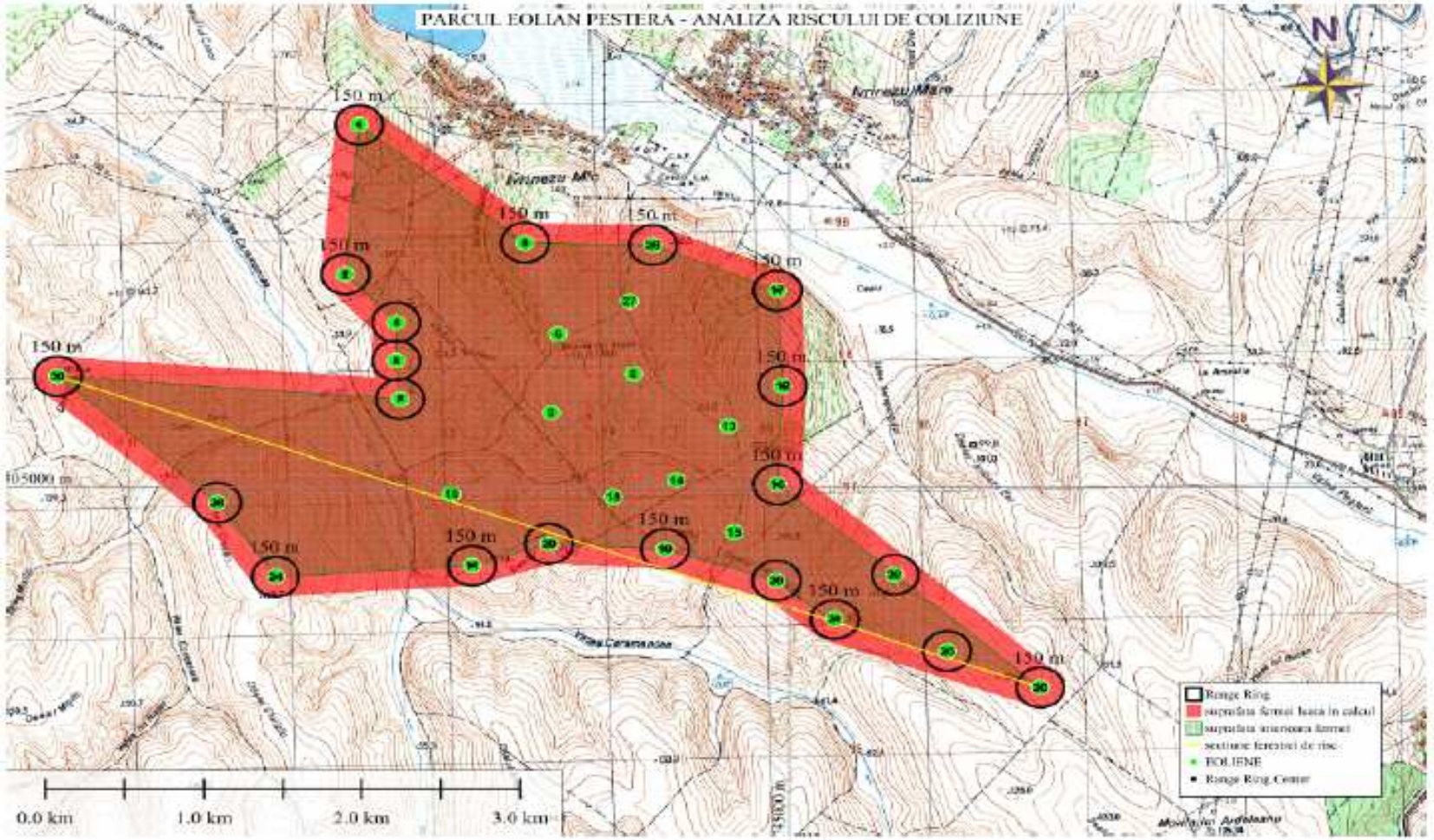

Figure no. 1: technical data on the wind farm (width, risk section, risk window)

The following table presents the results on the risk of collision with the farm turbines of birds in migration observed in the wind farm area during monitoring.

Tabel no. 5

bird species	number of birds	number of birds through the risk window	Length of bird cm	Wingspan cm	way of flying hovering (0) flapping (1)	flying speed m/s	collision likelihood*	no. of birds with risk of collision without any avoidance activities	avoidance rate**	real risk no. of birds/ year
1	2	3	4	5	6	7	8	9	10	11
	N	nxA/W	L	A				Col. 3 x 8		(1-col.10)xcol.9
Ciconia ciconia	3	0.57	110	200	1	12	14.50%	0.08265	95%	0.0041325
Pernis apivorus	1	0.19	55	135	0	17	8.20%	0.01558	98%	0.0003116
Coturnix coturnix	4	0.76	18	27	1	9	10.70%	0.08132	98%	0.0016264
Apus apus	11	2.09	17	47	1	25	5.10%	0.10659	98%	0.0021318
Merops apiaster	22	4.18	28	40	1	17	6.80%	0.28424	98%	0.0056848
Coracias garrulus	5	0.95	30	57	1	12	9.10%	0.08645	98%	0.001729
Upupa epops	4	0.76	28	46	1	12	9.00%	0.0684	98%	0.001368

Calandrella brachydactyla	5	0.95	14	30	1	17	6.10%	0.05795	98%	0.001159
Riparia Riparia	23	4.37	13	22	1	17	6.10%	0.26657	98%	0.0053314
Lanius collurio	10	1.9	18	26	1	12	8.30%	0.1577	98%	0.003154
Lullula arborea	2	0.38	15	26	1	17	6.20%	0.02356	98%	0.0004712
Anthus campestris	8	1.52	16	27	1	9	10.50%	0.1596	98%	0.003192
Motacilla alba	28	5.32	18	28	1	9	10.70%	0.56924	98%	0.0113848
Motacilla flava feldegg	3	0.57	16	27	1	9	10.50%	0.05985	98%	0.001197
Sylvia communis	5	0.95	14	25	1	9	10.40%	0.0988	95%	0.00494
Sylvia atricapilla	2	0.38	13	23	1	9	10.30%	0.03914	95%	0.001957

* calculated according to the SNH methodology

** according to the specialized literature

CASE 2: BIRDS FREQUENTLY USING THE WIND FARM AREA

In the wind farm area, as a result of the avifauna monitoring for one year a total of 57 species of birds were highlighted, which were presented in Table no. 2 of the monitoring report and in Table no. 7 of this material. But among these species only some have been taken into account when calculating the risk of collision, given that many of the species observed fly at heights much lower than the height of the action area of the turbine rotor, where the risk of collision of birds with wind turbines is particularly present.

Thus, the species that were included in the calculation in this case are shown in Table no. 8.

When making the calculations, technical characteristics of the turbines, listed in Table no. 3 and the data in the following table were taken into account.

Table no. 6

Input data			Output data		
Surface of the wind farm (farm area)- see fig.1	A	11686556 mp	Volume of the farm	$V_w = A \times H$	1752983400 mp
Wind turbine height	H	150m	Volume scanned by the turbine rotor	$V_r = N \times \pi R^2 \times (d+l)$	See table no. 8
No. of turbines that make up the farm	N	30			
Radius of the turbine rotor	R	45m			
Length of the turbine rotor	d	4.4 m			
Length of the bird	1	See table no. 8			

The wind farm area (A) was thus considered: area strictly delimited by the wind turbines (cross-hatched area in Fig. 1), plus surface in the close vicinity with a width of 50m, considering that it also enters the range of action of the rotor (area in red, not cross-hatched on the sketch in Fig. 1)

The volume of the farm (V_w), where there is some risk that birds collide with turbines, is the area bounded as described above - A, multiplied by the height of wind turbines -H.

Table no. 7: Data on the monitoring of the avifauna in the wind farm area in the period November 2010 - October 2011

Run. No.	Scientific name	Common name	Number of specimens						Observations
			Nov. Dec. 2012	Jan. Feb. 2012	Mar. Apr. 2012	May June 2012	July Aug. 2012	Sep. Oct. 2012	
1.	*Ciconia ciconia*	White stork	-		1	2	-	-	single specimens on the ground/ flying
2.	*Buteo buteo*	The Common Buzzard	1	2	2	-	-	2	single specimens /flying
3.	*Aquila pomarina*	Lesser Spotted Eagle	-		-	-	-	1	single specimens /flying
4.	*Circaetus gallicus*	Short-toed Snake Eagle	2	-	-	-	-	1	single specimens /flying
5.	*Buteo rufinus*	The Long-legged Buzzard	1	-	-	-	-	1	single specimens /flying
6.	*Pernis apivorus*	European Honey Buzzard	-	-	-	1	-	-	Only one single specimen seen flying
7.	*Accipiter nisus*	The Eurasian Sparrowhawk	2	2	-	-	-	1	single specimens, groups of birds / flying
8.	*Circus cyaneus*	The Hen Harrier	1	1	-	-	-	-	single specimens /flying
9.	*Falco tinnunculus*	The Common Kestrel	3	2	5	3	3	3	single specimens, groups of birds/flying
10.	*Perdix perdix*	The Grey Partridge	10	4	2	1	-	6	single specimens /flying
11.	*Phasianus colchicus*	The Common Pheasant	6	4	1	3	2	1	single specimens /flying
12.	*Coturnix coturnix*	The Common Quail	-	-	2	2	-	-	single specimens/ on the ground/flying
13.	*Larus*	The Black-headed	15			-	-	12	single specimens,

	ridibundus	Gull							groups of birds/ flying
14.	*Larus cachinnans*	The Caspian Gull	32	26	-	3	-	-	single specimens, groups of birds/flying
15.	*Columba livia domestica*	The Domestic Pigeon	22	32	3	8	12	-	single specimens, groups of birds/flying
16.	*Streptopelia decaocto*	The Eurasian Collared Dove	10	5	8	4	-	-	groups of birds/ flying
17.	*Apus apus*	The Common Swift	-	-	-	11	-	-	groups of birds/ flying
18.	*Merops apiaster*	The European Bee-eater	-	-	8	14	5	13	single specimens/flying
19.	*Coracias garrulus*	The European Roller	-	-	-	5	-	-	single specimens/flying
20.	*Upupa epops*	The Hoopoe	-	-	1	3	-	-	single specimens
21.	*Dendrocopos medius*	The Middle Spotted Woodpecker	2	-	1	-	-	1	single specimens/flying
22.	*Calandrella brachydactyla*	Greater Short-toed Lark	-	-	3	2	3	-	single specimens/flying
23.	*Melanocorypha calandra*	The Calandra Lark	-	-	6	30	20	-	single specimens/ flying/ on the ground
24.	*Galerida cristata*	The Crested Lark	21	18	2	2	3	2	single specimens/ flying/ on the ground
25.	*Alauda arvensis*	The Skylark	-	-	40	10	15	34	groups of birds/ flying
26.	*Lullula arborea*	The Woodlark	-	-	2	-	-	-	single specimens/flying
27.	*Riparia riparia*	Bank Swallow, European Sand Martin	-	-	-	18	-	5	single specimens/ flying/ on the vegetation in the area
28.	*Hirundo rustica*	The Barn Swallow	-	-	-	22	7	44	groups of birds or single specimens, /flying/ on the ground
29.	*Delichon urbica*	Common House	-	-	-	-	-	24	single specimens/flying

		Martin							
30.	*Anthus campestris*	The Tawny Pipit	-	-	5	3	2	-	single specimens/ flying/ on the vegetation in the area
31.	*Motacilla flava feldegg*	Black-headed Wagtail	-	-	-	3	2	-	single specimens/ flying/ on the ground
32.	*Motacilla alba*	The White Wagtail	-	-	12	-	-	16	single specimens/ flying/ on the ground
33.	*Parus major*	The Great Tit	6	9	-	-	-	8	single specimens, groups of birds/ flying/ on the ground
34.	*Lanius collurio*	The Red-backed Shrike	-	-	-	4	-	6	single specimens/ flying/ on the ground
35.	*Pica pica*	The European Magpie	21	19	10	8	6	23	single specimens/ on the vegetation in the area
36.	*Corvus monedula*	The Jackdaw	10	16	-	8	5	-	single specimens/ on the vegetation in the area
37.	*Corvus frugilegus*	The Rook	45	33	116	70	7	18	groups of birds/ flying/ on the field
38.	*Corvus corone cornix*	The Hooded Crow	18	11	6	2	4	12	single specimens/ on the vegetation in the area
39.	*Sylvia communis*	The Whitethroat	-	-	-	4	-	1	single specimens/ on the vegetation in the area
40.	*Sylvia atricapilla*	The Blackcap	-	-	-	2	1	-	single specimens/ on the vegetation in the area
41.	*Phylloscopus collybita*	The Common Chiffchaff	-	-	-	-	-	3	single specimens
42.	*Phylloscopus sibilatrix*	The Wood	-	-	-	1	-	-	single specimens/ on the vegetation in the area

		Warble							
43.	*Phylloscopus trochillus*	The Willow Warble	-	-	-	-	-	2	single specimens
44.	*Muscicapa striata*	The Spotted Flycatcher	-	-	-	-	-	2	single specimens/ on the vegetation in the area
45.	*Oenanthe oenanthe*	The Northern Wheatear	-	-	11	7	3	-	single specimens/ on the vegetation in the area
46.	*Saxicola rubetra*	The Whinchat	-	-	-	3	-	3	single specimens/ on the vegetation in the area
47.	*Erithacus rubecula*	The European Robin	-	-	2	2	-	1	single specimens/flying
48.	*Luscinia megarhynchos*	The Nightingale	-	-	2	1	-	-	single specimens/ on the vegetation in the area
49.	*Turdus philomelos*	The Song Thrush	-	-	-	2	-	3	single specimens/ flying/ on the ground
50.	*Turdus merula*	The Common Blackbird	-	-	-	1	1	4	single specimens,groups of birds/ flying/ on the vegetation in the area
51.	*Turdus pilaris*	The Fieldfare	20	-	-	-	-	15	single specimens, groups of birds/ flying
52.	*Oriolus oriolus*	The Golden Oriole	-	-	-	5	2	-	single specimens/flying
53.	*Sturnus vulgaris*	The Common Starling	16	21	52	-	-	-	groups of birds/ flying
54.	*Passer domesticus*	The House Sparrow	27	22	20	11	-	-	single specimens/flying
55.	*Passer hispaniolensis*	The Spanish Sparrow	-	-	8	-	-	-	single specimens/ on the vegetation in the area

56.	*Passer montanus*	The Eurasian Tree Sparrow	16	23	5	-	-	2	single specimens/ flying/ on the vegetation in the area
57.	*Fringilla coelebs*	The Chaffinch	32	14	6	3	2	37	single specimens/ flying/ on the vegetation in the area
58.	*Fringilla montifringilla*	The Brambling	-	-	-	-	-	5	single specimens/ flying/ on the vegetation in the area
59.	*Carduelis spinus*	The Eurasian Siskin	14	4	-	-	-	6	single specimens/ flying/ on the vegetation in the area
60.	*Carduelis carduelis*	The European Goldfinch	9	7	-	6	-	-	single specimens/ flying/ on the vegetation in the area
61.	*Carduelis cannabina*	The Linnet	18	12	3	-	-	-	single specimens/flying
62.	*Emberiza citrinella*	The Yellowhammer	14	13	5	-	-	-	single specimens/ flying/ on the vegetation in the area
63.	*Emberiza hortulana*	The Ortolan Bunting	-	-	-	8	4	-	single specimens/ flying/ on the vegetation in the area
64.	*Emberiza melanocephala*	The Black-headed Bunting	-	-	-	5	1	-	single specimens/ flying/ on the vegetation in the area
65.	*Miliaria calandra*	The Corn Bunting	-	-	6	12	3	19	single specimens/ flying/ on the vegetation in the area

Table no. 8 summarizes the results regarding the risk of collision with the farm turbines of birds that frequently use the air space of the wind farm during the monitoring period (November 2011-October 2012).

Tabel no. 8

Bird species	Length of the bird (cm)	Wingspan (cm)	d+l (m)	Vr	No. of birds observed in the farm area	No. of days/year	no. of birds in Vw –N (occupation degree)	Vr/Vw	NxVr/Vw	v (flying speed - m/s	t=(d+l)/v	no. Birds between the rotors	Collision likelihood	no. of birds with risk of collision without any avoidance activities	Avoidance rate	Real risk no. of birds/ year
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ciconia ciconia	110	200	5.5	1049152.5	3	30	90	0.00060	0.05	12	0.46	0.12	0.145	0.02	0.95	0.0009
Aquila pommarina	60	160	5.0	953775	1	15	15	0.00054	0.01	15	0.33	0.02	0.1	0.002	0.98	0.00005
Circaetus gallicus	70	175	5.1	972850.5	3	30	90	0.00055	0.05	15	0.34	0.15	0.11	0.016	0.98	0.00032
Pernis apivorus	55	140	4.95	944237.25	1	15	15	0.00054	0.01	17	0.29	0.03	0.1	0.003	0.98	0.00006
Accipiter nissus	36	70	4.76	907993.8	5	45	225	0.00052	0.12	17	0.28	0.42	0.074	0.03	0.98	0.0006
Circus cyaneus	48	112	5.52	1052967.6	2	30	60	0.0006	0.04	15	0.37	0.10	0.09	0.01	0.98	0.0002

Buteo buteo	46	112	4.86	927069.3	7	60	420	0.0005	0.22	17	0.29	0.78	0.08	0.06	0.98	0.001
Buteo rufinus	58	142	5.82	1110194.1	2	30	60	0.0006	0.04	15	0.39	0.10	0.10	0.01	0.98	0.0002
Falco tinnunculus	30	68	5.08	969035.4	19	180	3420	0.0006	1.89	15	0.34	5.58	0.08	0.45	0.98	0.009
Merops apiaster	28	40	4.68	892733.4	40	60	2400	0.0005	1.22	17	0.28	4.44	0.09	0.40	0.98	0.008
Coracias garrulus	30	57	4.7	896548.5	5	15	75	0.0005	0.04	12	0.39	0.10	0.09	0.01	0.98	0.0002
Pica pica	45	55	4.85	925161.75	87	180	15660	0.0005	8.26	9	0.54	15.34	0.13	1.99	0.95	0.100
Corvus monedula	33	68	4.73	902271.15	47	60	2820	0.0005	1.45	9	0.53	2.76	0.10	0.28	0.95	0.014
Corvus frugilegus	46	85	4.86	927069.3	289	180	52020	0.0005	27.51	12	0.41	67.93	0.10	6.79	0.98	0.136
Corvus corone cornix	46	90	4.86	927069.3	53	180	9540	0.0005	5.05	12	0.41	12.46	0.10	1.25	0.98	0.025
Larus ridibundus	38	91	4.78	911808.9	27	35	945	0.0005	0.49	12	0.40	1.23	0.10	0.12	0.98	0.002
Larus cachinnans	57	135	4.97	948052.35	61	45	2745	0.0005	1.48	12	0.41	3.58	0.11	0.39	0.98	0.008
Alauda arvensis	18	33	4.58	873657.9	99	60	5940	0.0005	2.96	17	0.27	10.99	0.11	1.18	0.98	0.024
Hirundo rustica	19	33	4.59	875565.45	73	45	3285	0.0005	1.64	17	0.27	6.08	0.06	0.39	0.98	0.008
Sturnus vulgaris	21	36	4.61	879380.55	89	60	5340	0.0005	2.68	17	0.27	9.88	0.07	0.64	0.98	0.013

Observations:

- Column 4: d- represents the depth of the turbine rotor, 4.4m (it is highlighted in table no. 3). Column 4 represents the sum between this depth of the turbine rotor and the length of the birds (see column 2);

- Column 6: represents the number of birds of each species observed in the wind farm area, as a result of the monitoring.

- Column 7: represents an estimation of the number of days within a year when the bird species identified after the survey are considered to fly in the farm area. The number of days is estimated according to the number of months when the species was identified in the farm area, according to the data indicated in table no. 7, considering that birds spent on average 4 hours/day in the wind farm area.

- Column 8= col.6 x col.7

- Column 12: represents the time necessary for a bird to fly over the entire distance representing the depth of the rotor

- Column 14: the likelihood was calculated according to the SNH methodology

3. RESULT INTERPRETATION AND CONCLUSIONS

Obviously a risk of collision of birds with the wind turbines exists only when a bird is flying within the rotor sweep area or when it can be affected by the turbulences caused by the rotors.

The behavior during the flight, including the height at which birds fly, varies considerably between species. Many birds sometimes barely reach the action area of the rotor, while others perform routine flights in these areas and others fly at heights much higher than this area.

There are also various types of flights such as hovering, flying in circles in the air, flying horizontally and vertically, which is characteristic for certain species of birds or certain activities that may pose different risks of collision. The variation of the visibility conditions during the day or night, or due to weather conditions, is also likely to influence the risk of bird collision with the turbines.

For example, although few data are available, it seems that most collisions that occur are the result of the fact that birds do not notice wind turbines due to poor visibility conditions, rather than of the fact that they cannot avoid a turbine visible.

As far as the analyzed farm is concerned, as shown in tables no. 5 and no. 8, one can notice that all values that emphasize the real risk of collision of birds with the wind turbines (column 11 of Table no. 5 and column 17 of Table no. 8) are subunits, which leads to the conclusion that in the second year of operation of the wind farm it is very unlikely that mortality occurs in the populations of birds that cross the wind farm area due to collision with the wind turbines.