CERNAVODĂ I&II WIND FARMS
Monitoring Report
Of avifauna, flora and habitats

During the operating period of the wind farms

JANUARY-DECEMBER 2011

Client: **EDP Renewables**
SC CERNAVODA POWER SRL BUCHAREST

Prepared by: **SC BLUE TERRA CONSULTING SRL CONSTANŢA**

Subject:
Follow-up on the environmental impact study in view of quantifying the impact on flora, habitats and avifauna – according to the Environmental Permit no. 578/December 29, 2010 issued by the ENVIRONMENTAL PROTECTION AGENCY CONSTANŢA

1. Introduction

1.1. Purpose

The purpose of this report is the quantification of the impact on flora, habitats and avifauna, caused by the performance of activities in Cernavodă I&II Wind Farms.

The monitoring is made according to the provisions of the Environmental Permit no. 578/December 29, 2010 issued by APM (*Environmental Protection Agency*) Constanţa for Cernavodă I&II Wind Farms.

1.2. Reference documents

Environmental Permit no. 578 dated December 29, 2010 for Cernavodă I&II Wind Farms.

Environmental Agreement no. 24 dated December 29, 2008 issued by the Environmental Protection Agency Constanţa;

Monitoring plan for Cernavodă Wind Farm issued by the Office of Petrescu Traian, Environmental Expert;

Report on the environmental impact study for Cernavodă I&II Wind Farms issued by the Office of Petrescu Traian, Environmental Expert;

Supplementary information report, 2010 edition, prepared by WSP Environmental UK;

Management and Monitoring Plan, 2010 edition, prepared by WSP Environmental UK, in compliance with the Environmental and Social Policy of EBRD (European Bank for Reconstruction and Development) and IFC (International Financial Corporation)

Monitoring reports prepared during the period of performing the construction works by SC Blue Terra Consulting SRL.

Service contract between SC Cernavoda Power SRL and SC Blue Terra Consulting SRL.

1.3. Monitoring team

Adriana Selea, engineer – drafter of environmental protection studies;
Dr. Teodor Glavan-Caranghel, drafter of environmental protection studies, member of the Romanian Ornithological Society (*Societatea Ornitologică Română* - SOR).

1.4. Short description of the project

Location:

Cernavodă I&II Wind Farms is located on the land outside the development boundary of Cernavodă City, Saligny Commune and Mircea Vodă Commune of Constanţa County, on the heights of the following hills: Gherghina Hill, Celibichioi Hill, Defcea Hill, Făcliei Hill, Turcului Hill, being roughly inscribed in a quadrilateral with the following boundaries:

- To the east: Celibichioi Valley;
- To the north: Mocanu's Valley, Gherghina Locality, Chirpicilor Valley and Tibrinu Locality;
- To the south: Plantaţiei Valley, Zenoviea Valley and Mircea Vodă, Făclia, Saligny localities;
- To the west: Ştefan cel Mare Locality.

Photo 1: Views of Cernavodă I&II Wind Farms, Constanţa County

Photo 2: Transformer station 20 kV/110 kV

Lands:

The total area of the wind farm is of 2,888.35 ha out of which we specify the following

Components:

Table no. 1 – Main components of Cernavodă I&II Wind Farms

	Measuring unit	Value	Remarks
Wind turbines	pieces	46	Type VESTAS V90 3.0 MW, conical metal tubular tower, diameter of 4.15 - 2.30 m, rotor with 3 blades with a radius of 45 m
Foundation of turbine	pieces	46	Reinforced concrete bases located at 1 m below the natural ground level which will be covered with soil
Technological deck of turbine	pieces	46	Approximately 45 x 35 m meaning 1,575 sqm for each turbine and with a temporary nature during the period of construction works
Transformer station 20 kV/110 kV	pieces	1	According to the applicable Romanian standards
Access road to the wind farm and access roads to the turbines	m	4400	Width of 4 m (2 m for each way) with a structure of 20 cm compacted soil fill + 30 cm bitumen-penetrated tarmac
Underground power line (*linie electrică subterană* – LEA) 110 kV	m	13470	Connects the transformer station to ENEL
Underground power lines (*linie electrică subterană* – LES) 20 kV	m	149973	Cables laid in trenches of 1.2 m depth and 0.7 m width
Weather towers	pieces	2	Deck of 20 x 20 m for each weather tower

According to the analyzed documents, mentioned in article 1.2, the site on which the wind farm was built is not located in a protected natural area.

According to the provisions of the Supplementary information report, 2010 edition, prepared by WSP Environmental UK, SOR made available data according to which Cernavodă site is located at 6.5 km of Dunăre-Ostroave Important Bird Area (IBA) and Special Protection Area (SPA) for birds.

This site houses important numbers of protected species of birds is important for the nesting populations of an important number of bird species and is also important for a great number of species during the migration period. Thus, the Danube River is an important flight path during spring and autumn migration periods, for species like: *Pandion haliaetus*, *Sterna albifrons*, *Phalacrocorax pygmaeus*, *Aythya nyroca*, *Haliaeetus albicilla* and *Plegadis falcinellus*.

Also, Cernavodă I&II Wind Farms are located at approximately 5.7 km of the Natura 2000 Site named Canaralele Dunării (*Danube's Rocks*), SCI (*Site of Community Importance*), 10 km of IBA (*Important Bird Area*)/SPA (*Special Area of Conservation*) Allah Bair-Capidava and 14 km of IBA/SPA Borcea Branch.

Both Natura 2000 sites, which were appointed as SPAs, are important during summer (nesting), winter and for the migration periods; for example, IBA/SPA Allah Bair-Capidava is known for the following species of birds that migrate during spring and autumn: *Accipiter brevipes*, *Aquilla pomarina*, *Circus cyaneus*, *Circus pygargus*, *Halliaeetus albicilla*, *Hieraaetus pennatus* etc., and the second site for the species: *Aythya nyroca*, *Ciconia ciconia*, *Haliaeetus albicilla*, *Pandion haliaetus*, *Phalacrocorax pygmaeus*, *Plegadis falcinellus* and *Sterna albifrons*.

2. Monitoring

2.1. Monitoring programme

In the project area, a programme for monitoring the biodiversity of the area is performed, the aim of which being to identify and quantify the impact caused by the operation of the wind farms mainly on the bird species, habitats and flora of the area, according to the provisions of the contract concluded by S.C. BLUE TERRA CONSULTING S.R.L. and the owner of the project and according to the Environmental Permit no. 578/December 29, 2010 issued by APM Constanţa for the operation of the wind farm.

The present report includes monitoring data for the period January-December 2011, the observations being made by S.C. BLUE TERRA CONSULTING S.R.L. in the context of the inspections made within the boundaries of the wind farm and in its proximity.

2.2. Methods used for the performance of monitoring

Visual direct observations and sampling – direct observations were made on the flora and fauna within the boundaries of Cernavodă I&II Wind Farms, Constanţa County and in its proximity, the phenological features of the plant species and vegetal associations, fauna species (invertebrates and vertebrates) being recorded. The monitoring was made by establishing some observation points/areas within the wind farm, during the vegetation period of the flora species, during the nesting and spring migration periods of the avifauna, the location and registered effect being noted.

In certain conditions, sampling (plant specimens) took place with the aim of establishing subsequently the taxonomic classification.

Observations (optical devices) and photo records – thus the observation and/or record of some phenomena that occur quickly, at large distances or that require a detailed subsequently analysis being possible. This type of observations allows the grasping on site of the ethology of different bird species, without influencing the results with the presence of the observer. In making on-site observations, the following were used: DEKAREM 10 x 50, CARL ZEISS JENA binoculars, one KENKO PRO FIELD 63 ornithological telescope, photographic cameras: CANON EOS 30D.

Subsequent analyses and syntheses made based on the first two methodologies – data obtained during the visual direct observations and those made with special devices have been centralized, verified and interpreted.

Correlation with the existent bibliographic data – general data have been analyzed regarding the local or regional biodiversity (the use of specialized literature represents a procedure which is included in each stage of the monitoring and its role is to support the observer even prior to the beginning of the field observations); guides have been used in order to identify the plant and animal species (invertebrates and vertebrates) in the field or within the analyses and syntheses which result from the observations made (field guides for flora: "Flora României. Determinator ilustrat al plantelor vasculare" (Romanian Flora. Illustrated Guide to the Vascular Plant), vol. I and II (Beldie 1979); bird guides: "Guide des Oiseaux d'Europe" (Peterson and contributors. 1989); Hamlyn Guide. Romanian and European birds. Illustrated guide, 1999; an insect guide: Insecta. Odonata, Fauna RPR, Vol. VII, Fasc. 5 (Cirdei and contributors. 1965); a butterfly guide: Butterflies of Britain & Europe (Tolman and Lewington 1997); a guide for reptiles: Reptilia. Fauna RPR, vol. XIV, Fasc. 2 (Fuhn and contributors. 1961); a mammal guide: Cartea Rosie a Vertebratelor din România. Mamifere (Red Book of Romanian Vertebrates. Mammals (Botnariuc and contributors. 2005); data of the observations from Cernavodă I&II Wind Farms, Constanţa County have been correlated with the results of some foreign wind farm monitoring activities. In conclusion, these permanent correlations with other existent bibliographic data have considerable effects on obtaining results which are as credible as possible of the performed monitoring.

As regards the monitoring January-December period, the following specifications have to be made:

Flora monitoring

The methods used have been aimed to the identification, inventory of the vegetation types, of the species from the area of interest and included:

- Inventory of the flora in the area of interest and its proximity;
- Sampling of vegetal material in case of species which are hard to identify directly in the field;
- Making of photo images in view of establishing the taxonomic identity or, as the case may be, in view of identification in the laboratory, with the help of specialized guides;
- Identification of habitats/vegetal associations based on specific species;
- Identification of samples, verification of the species identified in the field, preparing of plant lists.

Inventory of the plant species from the aimed areas was made on itinerant transects, thus being possible to cover an as large as possible area and was made periodically so that all the vegetation stages and as many species as possible are observed. Following the field visits,

a flora inventory was made, and data regarding the plant phenology were registered. The field observation sheets included: Systematic data regarding species, abundance of species, dominance, phenology etc.

Fauna monitoring

As regards the fauna, a monitoring plan was prepared so that a continuity of data collection is ensured, as well as their correlation with the existent ones. Thus, all the particularities of the area have been shown, as well as details regarding the animal populations present within the site, depending on the taxonomic group to which they belong and the period in which they are present.

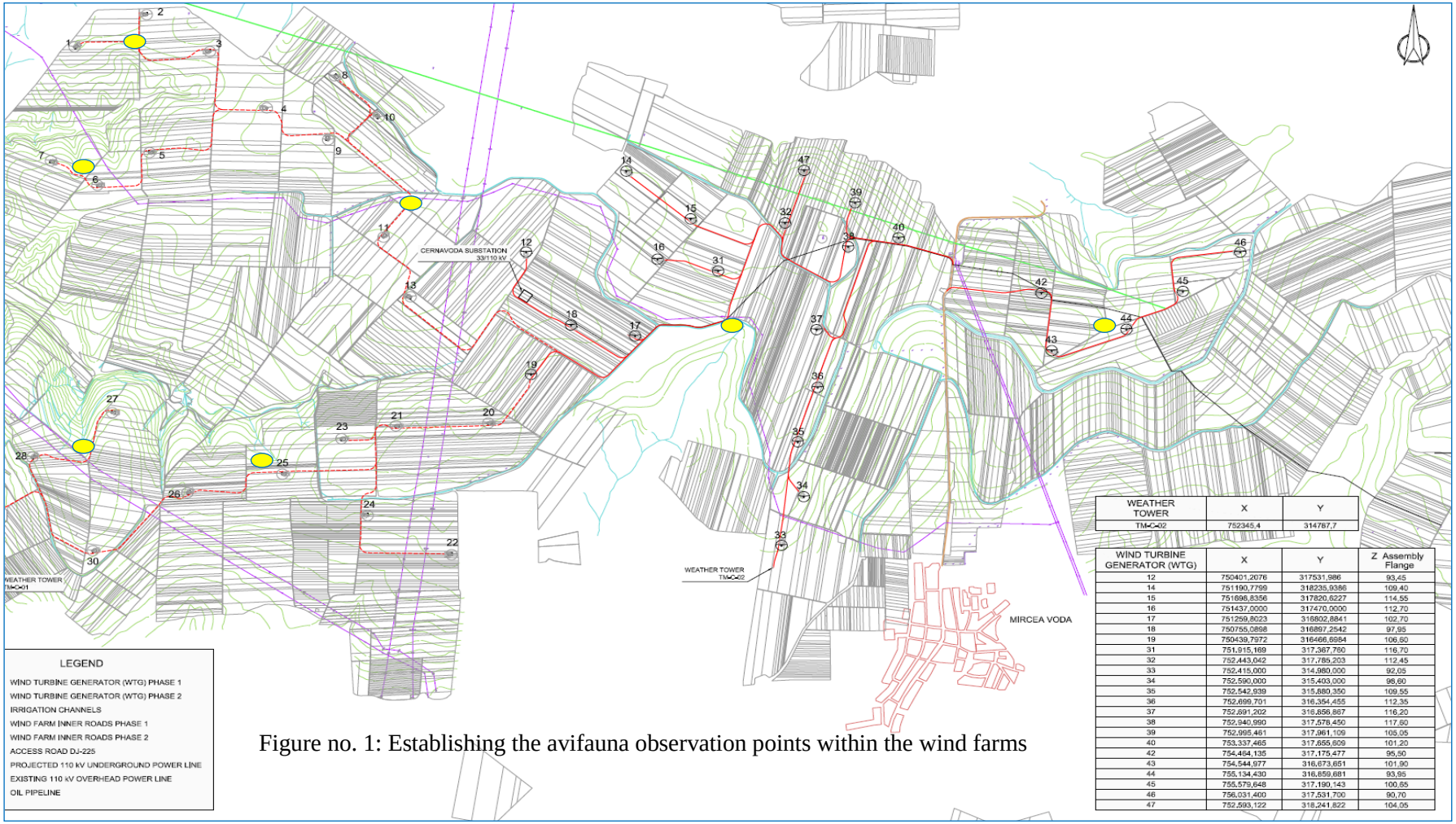
Avifauna monitoring methods

Method of fixed points and transects. Several points of bird registration were chosen on site and in its proximity (150 m for small birds and 350-400 m for observing birds in uncovered places). The method implies the movement to a certain place and the identification of the birds observed in that place in a certain period of time. The use of transects implies the movement of the observer along transects and the registration of birds seen on both sides of the transect. Transects have been established within the study perimeter and in its proximity. The paths had a length of 2-4 km.

In Figure no. 1, the observation points established for the monitoring programme of Cernavodă I&II Wind Farms are shown.

Nest counting/searching. On site identification of nests included finding the bird nests in different places (soil, grassy vegetation, bushes, banks, constructions etc.) which are specific to the respective species identified in the area of the wind farms and its proximity.

Assessment of the birds of prey. The species of birds of prey (buzzards, hawks) which use the migration paths within the area or nest in the area of the wind farms and its proximity were registered, their numbers being evaluated.



WEATHER TOWER	X	Y
TM-02	752345,4	314787,7

WIND TURBINE GENERATOR (WTG)	X	Y	Z Assembly Flange
12	750401,2076	317531,986	93,45
14	751190,7799	318235,9386	109,40
15	751698,8356	317820,6227	114,55
16	751437,0000	317470,0000	112,70
17	751259,8023	316802,8841	102,70
18	750755,0898	316897,2542	97,95
19	750439,7972	316466,6984	106,60
31	751,915,169	317,367,760	116,70
32	752,443,042	317,785,203	112,45
33	752,415,000	314,980,000	92,05
34	752,590,000	315,403,000	98,60
35	752,542,939	315,880,350	109,55
36	752,699,701	316,354,455	112,35
37	752,691,202	316,656,867	116,20
38	752,940,990	317,578,450	117,60
39	752,995,461	317,961,109	105,05
40	753,337,465	317,655,609	101,20
42	754,464,135	317,175,477	95,50
43	754,544,977	316,673,651	101,90
44	755,134,430	316,859,681	93,95
45	755,579,648	317,190,143	100,65
46	756,031,400	317,531,700	90,70
47	752,593,122	318,241,822	104,05

Figure no. 1: Establishing the avifauna observation points within the wind farms

2.3. Results of the monitoring programme

2.3.1. Observations regarding avifauna

The activities related to the monitoring of avifauna (bird species) of the wind farms took place in the period January-December 2011, the following information being recorded in the monitoring sheets: Date, place of observation, species identified in the field, number of specimens, observation periods etc.

The surface of Cernavodă I&II Wind Farms, Constanţa County is made of agricultural land with monoculture farming, represented mainly by grains, sunflower, rape etc. with small insertions of ruderal vegetation.

On the surface of agricultural lands (wide area monocultures), common bird species have been seen, such as:

Galerida cristata – crested lark
Alauda arvensis – Eurasian skylark
Sturnis vulgaris – European starling
Passer montanus – Eurasian tree sparrow
Perdix perdix – grey partridge
Coturnix coturnix – common quail
Upupa epops – hoopoe
Melanocorypha calandra – Calandra lark
Pica pica – black-billed magpie
Corvus frugilegus – Eurasian rook
Corvus corone cornix – hooded crow and others.

Other bird species are found in the area of the wind farms, which are in search of food and come from the proximal localities (Mircea Vodă). Among which, we specify the following:
Corvus monedula – Eurasian jackdaw
Passer domesticus – house sparrow
Sturnis vulgaris – European starling
Columba livia domestica – domestic pigeon
Streptopelia decaocto – Eurasian collared dove
Galerida cristata – crested lark
Hirundo rustica – barn swallow
Motacilla alba – white wagtail and others.

Among the bird species having a certain protection status (Annex 3 of Government Emergency Ordinance 57/2007, Annex 4B of Government Emergency Ordinance 57/2007) the following have been observed: *Falco tinnunculus* (Eurasian kestrel), *Merops apiaster* – European bee-eater, *Coracias garrulus* – blue roller, *Anthus campestris* – tawny pipit, *Carduelis carduelis* – European goldfinch, *Miliaria calandra* – corn bunting and others.

In this period of time, the area of the wind farms represents a hunting ground for the diurnal birds of prey (buzzard, hawks) to which it offers their food consisting of insects (locusts, dragonflies), reptiles (lizards), mammals (common voles). The respective fauna species represent an important food source for this group of birds. The species of birds of

prey which were more frequently identified in the area during the monitoring period are: *Falco tinnunculus* (Eurasian kestrel) si *Buteo buteo* (common buzzard).

We also mention other bird species with a high degree of adaptability, such as: Gulls (for example, yellow-legged gull - *Larus michahellis*, common black-headed gull - *Larus ridibundus*, Eurasian rook - *Corvus frugilegus* and others, may be observed flying and also on the surface of the agricultural lands. Thus, during the agricultural works, these species follow the agricultural machineries (tractors, combines), feeding themselves with the insects on the ground (Photo 3).

Photo 3: Agricultural works within the wind farms. Species: *Larus michahellis*, *Larus ridibundus* and *Corvus frugilegus* feeding themselves in the area

We notice that in the area, the agricultural lands with monoculture crops are prevailing and only on small portions, at the edge of the roads, irrigation ditches etc. there are areas with ruderal vegetation.

Thus, the biodiversity of the wind farms area and of its proximity is somehow limited due to the extended agricultural surfaces (mainly monotonous crops of grain, sunflower etc.), low values being registered.

As regards the avifauna migration issues, we notice the fact that bird movement during migration in Dobrogea is linked, mainly, to the seaside of the Black Sea and the coastline lakes (Ciochia, V. 1984). Due to these reasons, in the area of the wind farms and its

proximity, bird species which prefer the uncovered places (storks, birds of prey, quails, larks, pipits, wagtails and others) may be identified, seabirds preferring the humid areas on the seashore and their presence in the area of the wind farm being very unlikely.

Within the programme for monitoring the avifauna of Cernavodă I&II Wind Farms, Constanţa County (January-December 2011), 43 bird species have been seen (Tables no. 2 and 4).

From a phenological point of view, the observed bird species have been grouped as follows (Figure no. 2):

- Sedentary birds: 15 species
- Partially migratory birds: 10 species
- Summer resident birds: 16 species
- Winter resident birds: 2 species
- Birds of passage: 1 species

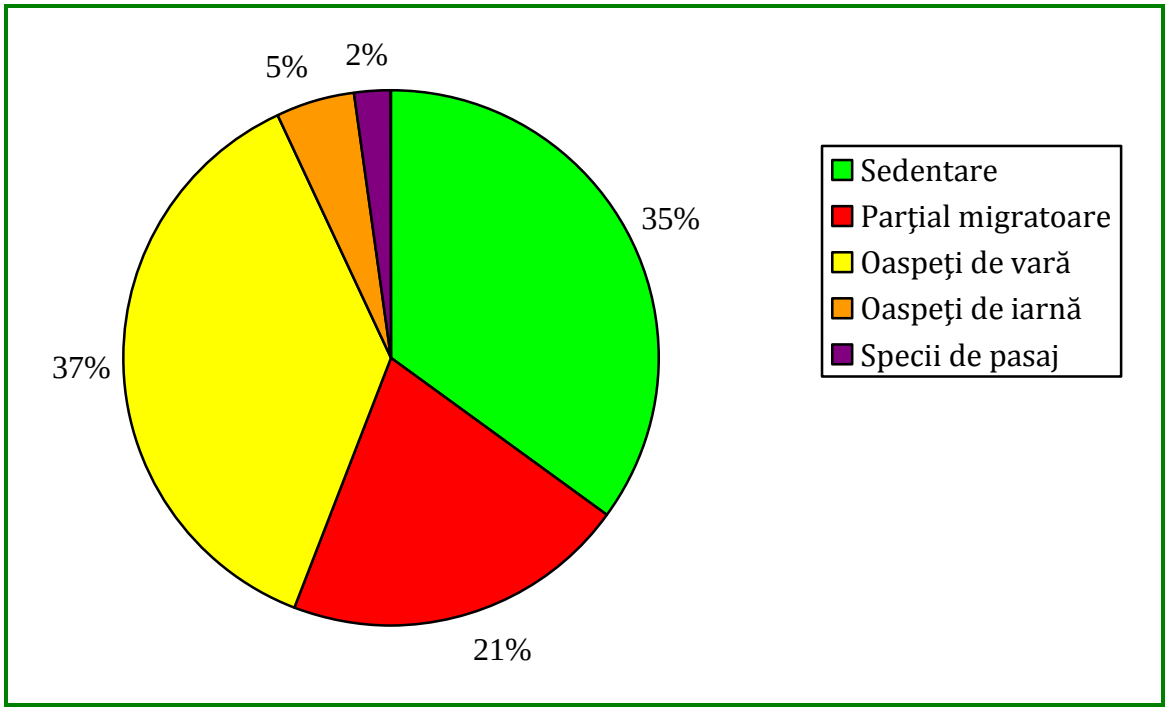


Figure no. 2: Categories of bird species identified in the site area

Table no. 2: List of the birds, which were seen in the area of Cernavodă I&II Wind Farms, Constanţa County in 2011

No.	Scientific name	Common name	Family	Order	F type	E type	R type	Abd.	Birds Directive 79/409/EEC, Annex I	Annex 3 of GEO 57/2007	Annex 4B of GEO 57/2007	IUCN* category
1.	*Ciconia ciconia*	European white stork	Ciconiidae	Ciconiiformes	OV	Acv	N	SR				LC
2.	*Circus cyaneus*	Northern harrier	Accipitridae	Falconiformes	OI	Ter	N	SFR				There are no data
3.	*Buteo buteo*	Common buzzard	Accipitridae	Falconiformes	MP	Ter	C	SC				LC
4.	*Buteo rufinus*	Long-legged buzzard	Accipitridae	Falconiformes	P, OV	Ter	N	SR				LC
5.	*Falco tinnunculus*	Eurasian kestrel	Falconidae	Falconiformes	MP	Ter	C	SC				LC
6.	*Perdix perdix*	Grey partridge	Phasianidae	Galliformes	S	Ter	C	SC				LC
7.	*Phasianus colchicus*	Ring-necked pheasant	Phasianidae	Galliformes	S	Ter	C	SC				There are no data
8.	*Coturnix coturnix*	Common quail	Fasianidae	Galiiformes	OV	Ter	C	SC				LC
9.	*Larus ridibundus*	Common black-headed gull	Laridae	Charadriiformes	MP	Acv	N	SN				LC
10.	*Larus michahellis*	Yellow-legged gull	Laridae	Charadriiformes	S	Acv	N	SR				NT
11.	*Columba livia domestica*	Domestic pigeon	Columbidae	Columbiformes	S	Ter	N	SC				LC

12.	*Streptopelia turtur*	Turtle dove	Columbidae	Columbiformes	OV	Ter	N	SFR				LC
13.	*Streptopelia decaocto*	Eurasian collared dove	Columbidae	Columbiformes	S	Ter	N	SR				LC
14.	*Merops apiaster*	European bee-eater	Meropidae	Coraciiformes	OV, P	Ter	C	SR				LC
15.	*Coracias garrulus*	Blue roller	Coraciidae	Coraciiformes	OV	Ter	PC	SFR				LC
16.	*Upupa epops*	Hoopoe	Upupidae	Coraciiformes	OV	Ter	N	SR				LC
17.	*Melanocorypha calandra*	Calandra lark	Alaudidae	Passeriformes	MP	Ter	C	SC				LC
18.	*Galerida cristata*	Crested lark	Alaudidae	Passeriformes	S	Ter	N	SC				LC
19.	*Alauda arvensis*	Eurasian sky lark	Alaudidae	Passeriformes	MP	Ter	C	SC				LC
20.	*Hirundo rustica*	Barn swallow	Hirundinidae	Passeriformes	OV	Ter	N	SC				LC
21.	*Anthus campestris*	Tawny pipit	Motacillidae	Passeriformes	OV	Ter	C	SR				LC
22.	*Motacilla alba*	White wagtail	Motacillidae	Passeriformes	OV	Ter	N	SC				There are no data
23.	*Lanius collurio*	Red-backed shrike	Laniidae	Passeriformes	OV	Ter	C	SR				LC
24.	*Lanius minor*	Lesser grey shrike	Laniidae	Passeriformes	OV	Ter	C	SR				LC
25.	*Pica pica*	Black-billed magpie	Corvidae	Passeriformes	S	Ter	C	SN				LC

26.	*Corvus monedula*	Eurasian jackdaw	Corvidae	Passeriformes	S	Ter	N	SN				LC
27.	*Corvus frugilegus*	Eurasian rook	Corvidae	Passeriformes	S	Ter	N	SN				LC
28.	*Corvus corone cornix*	Hooded crow	Corvidae	Passeriformes	S	Ter	C	SC				LC
29.	*Troglodytes troglodytes*	Winter wren	*Troglodytidae*	Passeriformes	S	Ter	C	SC				LC
30.	*Sylvia communis*	Whitethroat	Sylviidae	Passeriformes	OV	Ter	C	SC				LC
31.	*Phylloscopus collybita*	Chiffchaff	Turdidae	Passeriformes	OV	Ter	C	SC				LC
32.	*Oenanthe oenanthe*	Northern wheatear	Turdidae	Passeriformes	OV	Ter	C	SC				
33.	*Saxicola rubetra*	European whinchat	Turdidae	Passeriformes	OV	Ter	C	SR				
34.	*Saxicola torquata*	Stonechat	Turdidae	Passeriformes	OV	Ter	C	SR				
35.	*Sturnus vulgaris*	European starling	Sturnidae	Passeriformes	MP	Ter	PC	SC				
36.	*Passer domesticus*	House sparrow	Passeridae	Passeriformes	S	Ter	C	SN				
37.	*Passer montanus*	Eurasian tree sparrow	Passeridae	Passeriformes	S	Ter	C	SN				
38.	*Fringilla coelebs*	Common chaffinch	Fringillidae	Passeriformes	MP	Ter	PC	SC				

39.	*Carduelis spinus*	Eurasian siskin	Fringillidae	Passeriformes	MP, OI	Ter	PC	SC				
40.	*Carduelis carduelis*	European goldfinch	Fringillidae	Passeriformes	S	Ter	N	SC				
41.	*Carduelis cannabina*	Eurasian linnet	Fringillidae	Passeriformes	MP	Ter	PC	SR				
42.	*Emberiza citrinella*	Yellowhammer	Emberizidae	Passeriformes	S	Ter	C	SC				
43.	*Miliaria calandra*	Corn bunting	Emberizidae	Passeriformes	MP	Ter	C	SR				

Legend: F type – phenological type (S – sedentary birds; MP – partially migratory birds; OV – summer resident birds; OVP – summer resident birds of passage; OIP – winter resident birds and/or birds of passage; E type – ecological type (Acv – sea birds; Ter – terrestrial birds); R type – reproduction type (C – nesting; N – non-nesting; PC – potential nesting); Abd. - abundance (SN – numerous species; SC - common species; SR - rare species; SFR - very rare species).

*Note: According to the international abbreviations used by IUCN - LC (LEAST CONCERN) = the least vulnerable species

Table no. 3. Monitoring data for the avifauna of Cernavodă I&II Wind Farms, Constanţa County, in 2011

No.	Scientific name	Common name	Number of specimens	Phenology	Ecology

			Januar y	Februar y	Marc h	Apri l	Ma y	June	Jul y	Augus t	Septemb er	Octobe r	Novemb er	Decemb er		
1.	*Ciconia ciconia*	European white stork					16								OV	terrestri al bird
2.	*Circus cyaneus*	Northern harrier		1											OI	terrestri al bird
3.	*Buteo buteo*	Common buzzard	2	1			1		1	1		1	1		MP	terrestri al bird
4.	*Buteo rufinus*	Long-legged buzzard											2		P, OV	terrestri al bird
5.	*Falco tinnunculus*	Eurasian kestrel	2	1			2		2	1	1	1	3	1	MP	terrestri al bird
6.	*Perdix perdix*	Grey partridge	23	15				-				6	16	14	S	terrestri al bird
7.	*Phasianus colchicus*	Ring-necked pheasant	1					3		2			2		S	terrestri al bird
8.	*Coturnix coturnix*	Common quail						6	5						OV	terrestri al bird
9.	*Larus ridibundus*	Common black-headed gull	23	15	45			34	28				14	16	MP	terrestri al bird
10.	*Larus michahellis*	Yellow-legged gull	12	27	31			18	15				38	17	S	sea bird
11.	*Columba livia domestica*	Domestic pigeon	21	16	27			26	18				25	18	S	terrestri al bird
12.	*Streptopelia turtur*	Turtle dove							5	8	7				S	terrestri al bird
13.	*Streptopelia decaocto*	Eurasian collared dove	9	7				15	21				8	13	OV	terrestri al bird
14.	*Merops apiaster*	European bee-eater						9	7		8				OV, P	terrestri al bird
15.	*Coracias garrulus*	Blue roller							6		4				OV	terrestri al bird
1	*Upupa epops*	Hoopoe						3	2						OV	terrestri al bird

6.																
17.	*Melanocorypha calandra*	Calandra lark						4	6				15		MP	terrestrial bird
18.	*Galerida cristata*	Crested lark	4	7	6			8		7	6		6	5	S	terrestrial bird
19.	*Alauda arvensis*	Eurasian sky lark			17			15	12	14	19	23			MP	terrestrial bird
20.	*Hirundo rustica*	Barn swallow						15	23	14	37				OV	terrestrial bird
21.	*Anthus campestris*	Tawny pipit						3	2		3				OV	terrestrial bird
22.	*Motacilla alba*	White wagtail				26	5	9	8	6	14	35			OV	terrestrial bird
23.	*Lanius collurio*	Red-backed shrike						7	6	8	9				OV	terrestrial bird
24.	*Lanius minor*	Lesser grey shrike							2	1	3				OV	terrestrial bird
25.	*Pica pica*	Black-billed magpie	7	14	6	4	5	6	8	4	5	7	8	12	S	terrestrial bird
26.	*Corvus monedula*	Eurasian jackdaw	18	26	25	16									S	terrestrial bird
27.	*Corvus frugilegus*	Eurasian rook	190	150	235	270		35	14	32	45	152	243	235	S	terrestrial bird
28.	*Corvus corone cornix*	Hooded crow	24	18	24	17		25	14	15	9	12	6	10	S	terrestrial bird
29.	*Troglodytes troglodytes*	Winter wren			2							1			OV	terrestrial bird
30.	*Sylvia communis*	Whitethroat					2	3		2					OV	terrestrial bird
31.	*Phylloscopus collybita*	Chiffchaff							8	12	15	23			OV	terrestrial bird
32.	*Oenanthe oenanthe*	Northern wheatear						8	7	10					OV	terrestrial bird

33.	*Saxicola rubetra*	European whinchat						1			2				OV	terrestrial bird
34.	*Saxicola torquata*	Stonechat									3	2			OV	terrestrial bird
35.	*Sturnus vulgaris*	European starling	65	25			12		70		32	150	350	160	MP	terrestrial bird
36.	*Passer domesticus*	House sparrow	45	36				16	25	21	38	24	25	34	S	terrestrial bird
37.	*Passer montanus*	Eurasian tree sparrow	26	17				14	28	34	17	31	14	23	S	terrestrial bird
38.	*Fringilla coelebs*	Common chaffinch	9	14	15	10							12	8	MP	terrestrial bird
39.	*Carduelis spinus*	Eurasian siskin	5	4									7	8	MP, OI	terrestrial bird
40.	*Carduelis carduelis*	European goldfinch	7	6						7		14	16	9	S	terrestrial bird
41.	*Carduelis cannabina*	Eurasian linnet	10	8					5		4	13	6	5	MP	terrestrial bird
42.	*Emberiza citrinella*	Yellowhammer	12	15			8	5	6				7	6	S	terrestrial bird
43.	*Miliaria calandra*	Corn bunting					6	5	4						MP	terrestrial bird

Abbreviations: OV – summer resident species; MP – partially migratory birds; S – sedentary birds; OI – winter resident birds, P – birds of passage.

Table no. 4: Monitoring the avifauna of Cernavodă I&II Wind Farms, Constanţa County, during winter (January, February, November, December 2011)

No.	Scientific name	Common name	Number of specimens				Phenology	Ecology	Remarks
			November	December	January	February			
1.	*Circus cyaneus*	Northern harrier	0	1	0	1	OI	terrestrial bird	singular specimens/flying
2.	*Buteo buteo*	Common buzzard	2	1	2	1	MP	terrestrial bird	singular specimens/flying
3.	*Falco tinnunculus*	Eurasian kestrel	3	1	2	1	MP	terrestrial bird	singular specimens, groups of birds/flying
4.	*Perdix perdix*	Grey partridge	16	14	23	15	S	terrestrial bird	singular specimens/flying
5.	*Phasianus colchicus*	Ring-necked pheasant	2	1	1	0	S	terrestrial bird	singular specimens/flying
6.	*Larus ridibundus*	Common black-headed gull	14	16	23	15	MP	terrestrial bird	singular specimens
7.	*Larus michahellis*	Yellow-legged gull	38	17	12	27	S	sea bird	singular specimens/groups of birds flying
8.	*Columba livia domestica*	Domestic pigeon	25	18	21	16	S	terrestrial bird	singular specimens/flying
9.	*Streptopelia decaocto*	Eurasian collared dove	8	13	9	7	S	terrestrial bird	groups of birds flying
10.	*Galerida cristata*	Crested lark	6	5	4	7	S	terrestrial bird	singular specimens/flying
11.	*Pica pica*	Black-billed magpie	9	12	7	14	S	terrestrial bird	singular specimens flying/lying on the ground
12.	*Corvus monedula*	Eurasian jackdaw	25	16	18	26	S	terrestrial bird	singular specimens flying/lying on the ground
13.	*Corvus frugilegus*	Eurasian rook	235	270	190	150	S	terrestrial bird	singular specimens, groups of birds/flying/on the

									ground
14.	*Corvus corone cornix*	Hooded crow	24	17	24	18	S	terrestrial bird	singular specimens flying/lying on the ground
15.	*Sturnus vulgaris*	European starling	350	160	65	25	MP	terrestrial bird	singular specimens, groups of birds/flying/on the ground
16.	*Passer domesticus*	House sparrow	25	34	45	36	S	terrestrial bird	singular specimens, groups of birds/flying/on the vegetation within the area
17.	*Passer montanus*	Eurasian tree sparrow	14	23	26	17	S	terrestrial bird	singular specimens, groups of birds/flying/
18.	*Fringilla coelebs*	Common chaffinch	12	8	9	14	MP	terrestrial bird	singular specimens/flying
19.	*Carduelis spinus*	Eurasian siskin	7	8	5	4	MP, OI	terrestrial bird	singular specimens/on the vegetation within the area
20.	*Carduelis carduelis*	European goldfinch	16	9	7	6	S	terrestrial bird	singular specimens/flying
21.	*Carduelis cannabina*	Eurasian linnet	6	5	10	8	MP	terrestrial bird	singular specimens/on the vegetation within the area
22.	*Emberiza citrinella*	Yellowhammer	7	6	12	15	S	terrestrial bird	singular specimens flying/on the vegetation within the area

Abbreviations: MP – partially migratory birds; S – sedentary birds; OI – winter resident birds.

From Annex I, Birds Directive, 8 species have been seen (see Table 2: *Ciconia ciconia, Circus cyaneus, Buteo rufinus, Coracias garrulus, Anthus campestris, Melanocorypha calandra, Lanius collurio, Lanius minor).* In most cases, the presence of these species is accidental and does not represent a constant of the avifauna on site. From Annex 3 of Government Emergency Ordinance 57/2007, 8 bird species have been also registered (*Ciconia ciconia, Circus cyaneus, Buteo buteo, Coracias garrulus, Melanocorypha calandra, Anthus campestris, Lanius collurios and Lanius minor).* From Annex 4B of Government Emergency Ordinance 57/2007, 10 bird species have been identified (*Falco tinnunculus, Perdix perdix, Merops apiaster, Upupa epops, Motacilla alba, Phylloscopus collybita, Carduelis spinus, Carduelis carduelis, Carduelis cannabina and Miliaria calandra*). The other species are included in Annex II of the Birds Directive, or in Annexes II, III of Bern and Bonn Conventions, the others not being included in protection lists.

Ciconia ciconia (Ciconiidae family) – European white stork

European status: Vulnerable species. SPEC category: 2. Included in Birds Directive, Annex 1; Bern Convention, Annex II; Bonn Convention, Annex II.

Summer resident species. It does not nest in the area of the wind farms, but it nests in the adjacent localities. It has been seen flying over the site in numbers of tens of specimens. Flight directions cannot be specified, but the tendency is on north-south direction; it is considered a rare species (SR) for the wind farms.

Circus cyaneus (Accipitridae family) – Northern harrier

European status: Species with reduced number of specimens. SPEC category: 3 (species which are not concentrated in Europe and which have an unfavourable status). Included in Annex I of Birds Directive; Annex II of Bern Convention and Annex II of Bonn Convention.

Winter resident birds of passage. It prefers forested places and open spaces. On site, the species was seen flying, in the north-eastern part of the wind farms, at relatively large distance. It is a rare species (SR) for the wind farms.

Buteo buteo (Accipitridae family) – common buzzard

European status: Stable species. SPEC category: -. Included in Bern Convention, Annex II; Bonn Convention, Annex II.

Partially migratory species. Probably it nests in the forest in the south-western part of the wind farms. The species was seen flying at a high enough height. It is considered a rare species (SR) for the site area.

Falco tinnunculus (Falconidae family) – Eurasian kestrel

European status: Declining species. SPEC category: 3. Included in Bern Convention, Annex II; Bonn Convention, Annex II.

Partially migratory species. Probably it nests in the forest in the south-western part of the wind farms. The species was seen only flying, in reduced numbers and it is considered a rare species (SR) for the site.

Larus ridibundus (Laridae family) – common black-headed gull

European status: Stable species. SPEC category: -. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Partially migratory species. It does not nest in the wind farms. On site, it was seen flying at variable heights and on the ground. Flight direction - east-west; it is considered a rare species (SR) for the site area.

Figure 6. *Larus michahellis Larus Larus michahellis, Larus ridibundus, Corvus frugilegus* specimens *identified within the boundaries and in proximity of the wind farms*

Larus michahellis (Laridae family) – yellow-legged gull

European status: Stable species. SPEC category: -. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Sedentary species. It does not nest in the wind farms. On site, it was seen flying at variable heights and on the ground. Flight direction - east-west; it is considered a rare species (SR) for the site area.

Streptopelia decaocto (Columbidae family) – Eurasian collared dove

European status: Stable species. SPEC category: -. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Sedentary species. It does not nest in the area, but it nests in the adjacent localities (Mircea Vodă). It was seen flying in the area of the wind farms in search of food. It is considered a common species (SC) for the wind farms.

Merops apiaster (Meropidae family) – European bee-eater

European status: Declining species. SPEC category: 3. Included in Bern Convention, Annex II; Bonn Convention, Annex II.

Summer resident species. It nests in the proximity of the wind farms (loess banks in the northern, north-western part). It was seen flying, at variable heights. It is a rare species (SR) for the site.

Figure 7. Possible nesting places for *Merops apiaster, Coracias garrulus, Sturnus vulgaris, Passer domesticus, Passer montanus* (quarry located in the north-eastern part of the wind farms, steep banks in the western area)

Coracias garrulus (Coraciidae family) – blue roller

European status: Vulnerable species. SPEC category: 2. Included in Birds Directive, Annex 1; Bern Convention, Annex II; Bonn Convention, Annex II.

Summer resident species. Identified when nesting outside the wind farms, northern, north-western area. Singular specimens were identified flying. It is a very rare species (SFR) for the site.

Upupa epops (Upupidae family) - hoopoe

European status: Stable species. SPEC category: -. Included in Bern Convention, Annex II.

Summer resident species. It does not nest in the area of the wind farms, but it nests in the adjacent localities (Peştera). In the area, it is seen accidentally, especially at the south-western boundary of the wind farms. It was seen flying in search of food. It is a rare species (SR) for the site area.

Melanocorypha calandra (Alaudidae family) – Calandra lark

European status: Declining species. SPEC category: 3. Included in Birds Directive, Annex 1; Bern Convention, Annex II.

Sedentary species. It nests in the area of the wind farms in agricultural lands. It was seen flying as isolated specimens and groups of birds. It is considered a rare species (SR) for the site.

Galerida cristata (Alaudidae family) – crested lark

European status: Declining species. SPEC category: 3. Included in Bern Convention, Annex III.

Sedentary species. It does not nest in the area of the wind farm. It was seen flying, and on the ground at the edge of the access roads to the wind farms, in small numbers. It is considered a rare species (SR) for the site.


Figure 8. Grain crops. Altricial habitats for *Alauda arvensis* and *Coturnix coturnix*

Alauda arvensis (Alaudidae family) – Eurasian sky lark

European status: Vulnerable species. SPEC category: 3. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Partially migratory species. It nests in the area of the wind farms in agricultural lands. It was seen both flying and on the ground. It is a common species (SC) for the site.

Coturnix coturnix (Fasianidae family) – common quail

European status: Vulnerable species. SPEC category: 3. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III; Bonn Convention, Annex II.

Summer resident species. It nests in large numbers in the wind farms, in areas with crops. It is considered a common species (SC) for the wind farms.

Hirundo rustica (Hirundinidae family) – barn swallow

European status: Declining species. SPEC category: 3. Included in Bern Convention, Annex III.

Summer resident species. It does not nest in the area of the wind farms; its nests are located in the adjacent localities (Mircea Vodă). In the area, it is seen mainly in search of food. It was not seen in large flocks (3-5 specimens). It is considered a common species (SC) for the site.

Anthus campestris (Motacillidae family) – tawny pipit

European status: Declining species. SPEC category: 3. Included in Birds Directive, Annex 1; Bern Convention, Annex II.

Summer resident species. It nests in the area of the wind farms, in lands with low vegetation. It was seen flying, as singular specimens. It is considered a rare species (SR) for the site.

Figure 9. Habitat with low vegetation for *Anthus campestris* (species which was identified mainly during migration)

Motacilla alba (Motacilide family) – white wagtail

European status: Stable species. SPEC category: -. Included in Bern Convention, Annex II.

Summer resident species. It does not nest in the area of the wind farms. It was seen flying and on the ground, in small numbers (isolated specimens and groups of birds). It is considered a very rare species (SR) for the site.

Figure 10. Altricial habitat for *Lanius collurio* and *Lanius minor*

Lanius minor (Laniidae family) – lesser grey shrike

European status: Declining species. SPEC category: 3. Included in Birds Directive, Annex 1; Bern Convention, Annex II.

Summer resident species. It nests in the area of the wind farms. It was seen flying and on the ground, in the underbrush, as isolated specimens in the north-western part of the wind farms. It is considered a very rare species (SR) for the site.

Pica pica (Corvidae family) – black-billed magpie

European status: Stable species. SPEC category: -. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Sedentary species. It nests in the area of the wind farms, where it is seen flying, rarely on the ground, in small numbers of specimens. It is a common species (SC) for the site.

Corvus monedula (Corvidae family) – Eurasian jackdaw

In Europe, it is considered a stable species, being included in NonSPEC-E (species concentrated in Europe and with a favourable conservation status) category. It is included in Annex II-2 of Birds Directive.

Sedentary species. It does not nest in the area of the wind farms, where it is seen flying, rarely on the ground, in small numbers of specimens. It is a common species (SC) for the site.

Corvus frugilegus (Corvidae family) – Eurasian rook

European status: Stable species. SPEC category: -. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Sedentary species. It does not nest in the area of the wind farms, where it is seen flying and on the ground, in average numbers, especially when feeding. It is a numerous species (SN) for the site.

Corvus corone cornix (Corvidae family) – hooded crow

European status: Stable species. SPEC category: -. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Sedentary species. It does not nest in the area of the wind farms, where it is seen flying and on the ground, in small numbers. It is a numerous species (SN) for the site.

Oenanthe oenanthe (Turdidae family) – Northern wheatear

European status: Stable species. SPEC category: -. Included in Bern Convention, Annex II; Bonn Convention, Annex II.

Summer resident species. It nests in the area of the wind farms. It was seen flying and on the ground, as isolated specimens in the south-eastern part of the wind farms. It is considered a rare species (SR) on site.

Sylvia communis (Sylviidae family) - whitethroat

European status: Stable species. SPEC category: 4. Included in Bern Convention, Annex II; Bonn Convention, Annex II.

It is a summer resident species which is frequently seen in all the regions of the country. Sylvia communis nests in the area of the wind farms on underbrush (bushes) areas. It was seen as singular specimens. It is considered a rare species (SR) for the site.

Sturnus vulgaris (Sturnidae family) – European starling

European status: Stable species. SPEC category: -. Included in Birds Directive, Annex 2.2; Bern Convention, Annex III.

Sedentary species. It does not nest in the area of the wind farms; it was seen flying in average numbers. It is a rare species (SR) for the site.

Passer domesticus (Passeridae family) – house sparrow

European status: Stable species. SPEC category: -. Included in Bern Convention, Annex III.

Sedentary species. It nests in the area of the wind farms, where it is seen flying and on the ground, in average and large numbers. It is a numerous species (SN) for the site.

Passer montanus (Passeridae family) – Eurasian tree sparrow

European status: Stable species. SPEC category: -. Included in Bern Convention, Annex III.

Sedentary species. It nests in the area of the wind farms, where it is seen flying and on the ground, in average and large numbers. It is a numerous species (SN) for the site.

Carduelis carduelis (Fringillidae family) – European goldfinch

European status: Stable species. SPEC category: -. Included in Bern Convention, Annex II.

Sedentary species. It nests in the area of the wind farms, where it is seen flying and on the ground, in small numbers. While nesting, it was also seen in Mircea Vodă Locality, located adjacent to the wind farms. It is considered a common species (SC) for the site.

Figure 11. Altricial habitat for *Emberiza citrinella*, *Miliaria calandra* and *Sylvia communis*

Carduelis cannabina (Fringillidae family) – Eurasian linnet

European status: Stable species. SPEC category: 4. Included in Bern Convention, Annex II.

Partially migratory species. It nests in the area of the wind farms, where it is seen flying and on the ground, in average numbers. It is considered a common species (SR) for the site.

Emberiza citrinella (Emberezidae family) - yellowhammer

European status: Stable species. SPEC category: 4. Included in Bern Convention, Annex II.

Sedentary species. It nests in the area of the wind farms, where it is seen flying and on the ground, in average numbers. It is considered a rare species (SC) for the site.

Miliaria calandra (Emberezidae family) – corn bunting

European status: Stable species. SPEC category: 4. Included in Bern Convention, Annex III.

Partially migratory species. It nests in the area of the wind farms, at the edge of agricultural crops with thick vegetation, where it is seen flying and on the ground, in small numbers (Figure 4). It is considered a rare species (SR) for the site.

Among the observed species, 15 species are migratory, as shown in Table no. 5.

Table no. 5: Monitoring of migratory species in the area of Cernavodă I&II Wind Farms, Constanţa County

No.	Scientific name	Common name	Observation period (month/months)	Number of specimens	Phenology	Remarks
1.	*Ciconia ciconia*	European white stork	05.2011	16 specimens	OV	groups of birds (36 specimens); flight altitude – 150-200 m; flight direction: S-N, V
2.	*Buteo buteo*	Common buzzard	05/10/11.2011	3 specimens	MP	singular specimens flying; flight altitude – 120-150 m; flight direction: S-E, N
3.	*Buteo rufinus*	Long-legged buzzard	11.2011	2 specimens	P, OV	singular specimens flying; flight altitude – 90-150 m; flight direction: S-E, N
4.	*Merops apiaster*	European bee-eater	06/07/09.2011	24 specimens	OV, P	singular specimens flying; flight altitude – 150-200 m; flight direction: S-V, N.
5.	*Coracias garrulus*	Blue roller	07/09.2011	10 specimens	OV	singular specimens flying; flight altitude – 50-60 m; flight direction: S-E, N
6.	*Upupa epops*	Hoopoe	06/07.2011	5 specimens	OV	singular specimens, groups of birds flying; flight altitude – 30-40 m; flight direction: S-N-V.
7.	*Alauda arvensis*	Eurasian sky lark	03/06/07/08/09/10.2011	100 specimens	MP	singular specimens flying; flight altitude – 40-60 m; flight direction: S-E, N.
8.	*Hirundo rustica*	Barn swallow	03/04/05/07/09.2011	58 specimens	OV	group of birds/singular specimens flying (3-5 specimens); flight altitude 35-40 m; flight direction: S-V, E.

9.	*Anthus campestris*	Tawny pipit	04/05.2011	4 specimens	OV	singular specimens; flight altitude – 25-30 m; flight direction: E, S-E, V.
10.	*Motacilla alba*	White wagtail	04/05/09/10.2011	37 specimens	OV	singular specimens; flight altitude – 20-30 m; flight direction: S-V, N.
11.	*Lanius collurio*	Red-backed shrike	05/09.2011	7 specimens	OV	singular specimens flying; flight altitude – 40-50 m; flight direction: S-V, E
12.	*Lanius minor*	Lesser grey shrike	05/07/09.2011	3 specimens	OV	singular specimens flying; flight altitude – 40-50 m; flight direction: S-V, E
13.	*Sylvia communis*	Whitethroat	04/05.2011	4 specimens	MP	singular specimens flying; flight altitude – 35-40 m; flight direction: S-E, N.
14.	*Coturnix coturnix*	Common quail	04/05.2011	12 specimens	OV	group of birds/singular specimens; flight altitude – 40-50 m; flight direction: S-N-V
15.	*Fringilla coelebs*	Common chaffinch	03/04/05.2011	35 specimens	MP	groups of birds/singular specimens (2-3 specimens); flight altitude – 40-50 m; flight direction: S-V, E.

Abbreviations: OV – summer resident species; MP – partially migratory birds; S – sedentary birds; OI – winter resident birds, P – birds of passage.

In the following table, the nesting birds seen in the site area (23 species) are shown

Table no. 6: Monitoring of avifauna – species seen in the nesting period in the area of Cernavodă I&II Wind Farm, Constanţa County

No.	Scientific name	Common name	Phenology	Nesting	Remarks
1.	*Buteo buteo*	Common buzzard	MP	possibly nesting in the area adjacent to the wind farm	singular specimens, groups of birds/flying
2.	*Falco tinnunculus*	Eurasian kestrel	MP	nests in the lands adjacent to the wind farm	singular specimens/flying
3	*Perdix perdix*	Grey partridge	S	nests in the area adjacent to the wind farm	groups of birds/on the ground
4.	*Phasianus colchicus*	Ring-necked pheasant	S	nests in the area of the wind farm	singular specimens/flying/lying on the ground
5.	*Coturnix coturnix*	Common quail	OV	nests in the area of the wind farm	singular specimens/singing
6.	*Merops apiaster*	European bee-eater	OV, P	nests in the lands adjacent to the wind farm	groups of birds flying
7.	*Coracias garrulus*	Blue roller	OV	possibly nests in the lands adjacent to the wind farm	singular specimens/flying
8.	*Melanocorypha calandra*	Calandra lark	MP	nests in the area of the wind farm	singular specimens/flying
9.	*Alauda arvensis*	Eurasian sky lark	MP	nests in the area of the wind farm	singular specimens/flying
10.	*Anthus campestris*	Tawny pipit	OV	possibly nests in the area of the wind farm	singular specimens/on the ground
11.	*Lanius collurio*	Red-backed shrike	OV	nests in the area of the wind farm	singular specimens flying/on the vegetation within the area
12.	*Lanius minor*	Lesser grey shrike	OV	nests on the lands adjacent to the wind farm	singular specimens flying/on the vegetation within the area
13.	*Pica pica*	Black-billed magpie	S	nests in the area of the wind farm	singular specimens, groups of birds flying/on the ground
14.	*Corvus corone cornix*	Hooded crow	S	nests in the area of the wind farm, adjacent forest plantations	singular specimens flying/lying on the ground

15.	*Sylvia communis*	Whitethroat	OV	nests in the area of the wind farm	singular specimens/on the vegetation within the area
16.	*Sturnus vulgaris*	European starling	MP	nests in the lands adjacent to the wind farm (quarries, steep banks, localities)	singular specimens, groups of birds/flying/on the ground
17.	*Passer domesticus*	House sparrow	S	nests in the lands adjacent to the wind farm, especially in localities	singular specimens, groups of birds/flying/on the vegetation within the area
18.	*Passer montanus*	Eurasian tree sparrow	S	nests in the lands adjacent to the wind farm (quarries, steep banks)	singular specimens, groups of birds/flying/
19.	*Emberiza citrinella*	Yellowhammer	S	nests in the area of the wind farm and in the adjacent lands	singular specimens flying/on the vegetation within the area
20.	*Miliaria calandra*	Corn bunting	MP	nests in the area of the wind farm and in the adjacent lands	singular specimens flying/on the vegetation within the area

Abbreviations: OV – summer resident species; MP – partially migratory birds; S – sedentary birds; P – birds of passage.

2.3.2. Observations related to the mammal species

The programme for monitoring the biodiversity in the area of Cernavodă I&II Wind Farms also included studies of the Chiropterans (bats) including mostly species which are protected.

As regards the bats, they represent a group of nocturnal insectivore mammals which, due to the more and more accentuated anthropic impact during the last period, started to decline at European level and their conservation has to be seen as a priority.

As mentioned earlier in the present study, the wind turbines of Cernavodă I&II Wind Farms, Constanţa County are located in an open habitat – agricultural crops. No lines of trees or bushes are present (as connection elements between the bats' shelters and the feeding areas). During summer, such a habitat may be used as flight path only by few species, the resident ones. Therefore, in this period, the negative impact on the bats, in the area of the wind farms, is minimum. This is owed to the fact that there are no shelters to be used by the bats near the site. Among all the habitats used by the bats, the open areas, represented by agricultural crops, are the least frequented.

As regard the chiropterans, the following issues have been noticed:

- The bat species which are present in the area and in the areas which represent potential hunting routes and flight routes, during the period of summer colony formation and the migration period;
- Inventory of the potential shelters, around the wind farms, by correlation with the previous studies;
- The degree in which the habitat is used by the bats (with the help of ultrasound detectors).

It is known that the flight of bats is made:

- From the shelter to the feeding place (along the lines of trees or bushes, in the forests, at the edge of the forest or in open space);
- From the summer shelter to the winter shelter and back (these are migration routes, performed in open space or along the tree lines).

As regards the feeding areas, the bats prefer forested areas, the edge of forests, clearings, humid habitats and localities. They shelter in forests, parks, localities and underground shelters.

During the field assessments, records have been made, with the help of the time expansion detector. The heterodyne detector was also used, for a better identification of the chiropteran species. The records have been made in fixed points and on transects.

Among the species identified until now in the area of Cernavodă I&II Wind Farms, 3 species can be found in Annex 4 of the Habitats Directive, being Species of Community Interest.

During the monitoring performed in the area of Cernavodă I&II Wind Farms, Constanţa County, the flight activity of chiropteran species was very limited. Several flight routes have been registered, for the following species: *Nyctalus noctula, Pipistrellus pipistrellus* and *Pipistrellus nathusii.*

No feeding areas have been registered within the boundaries of the wind farms. They could be found in the adjacent localities and in the near forests.

As regards other species of mammals, in the area have been identified hills made by *Talpa europaea* (European mole), and in the surrounding agricultural crops, specimens of *Microtus arvalis* (common voles) have been identified, Figure 12.

Figure 12. Agricultural ecosystems, habitats specific to *Talpa europaea* and *Microtus arvalis*

Talpa europaea (European mole), Talpidae family, Soricomorpha order

Common species in the entire country, especially in plains and hills. On site, it was seen in agricultural lands and pastures, in relatively high number of specimens. It is not included in any European or national protection list (Habitats Directive) and it does not need special conservation measures.

Figure 13. Molehills in the arable land within the boundaries of the wind farms

Microtus arvalis (common vole), Cricetidae family, Rodentia order

Common species in all the plains of the country. On site, it was seen in agricultural lands and pastures, in a small number of specimens. It is not included in any European or national protection list (Habitats Directive) and it does not need special conservation measures.

In the areas which are adjacent to the wind farms and have low vegetation, in the irrigation ditches at the edge of the roads, the European ground squirrel - *Spermophilus citellus* has been seen.

Spermophilus citellus (European ground squirrel), Sciuridae family, Rodentia order

Typical steppe species. It lives in fields, pastures, ditches, at the edge of the roads etc. Vulnerable species. Included in Annex III of Habitats Directives 92/43/EEC, Natura 2000, Bern Convention

Figure 14. Edges of the irrigation ditches in the southern area of the wind farms. Habitat which is preferred by *Spermophilus citellus*

On the site of Cernavodă I&II Wind Farms, no microcolonies (up to several tens of galleries) of this species have been identified until now, the local population of European ground squirrels being reduced as numbers.

However, we recommend that during the period of performing the maintenance works for the wind farms, moving the motor vehicles on the access roads etc. the speed limits to be observed, and the disturbance of the species specimens to be diminished as follows:

- Movement of the motor vehicles on the established routes, with average speeds, in order to prevent the physical extermination of the species specimens by crushing;
- Preservation of the existent vegetation in the area (agricultural crops with favourable insertions of steppe vegetation and of the usage of the land (pasture).

Other species of mammals have been identified: *Lepus europaeus* – European brown hare; *Vulpes vulpes* – red fox and *Capreolus capreolus* – European roe deer.

Lepus europaeus (European brown hare), Leporidae family, Lagomorpha order

Common species, spread in the entire country, especially in plains and hills. On site, it was seen in agricultural lands, on the boundary with lawn, pasture and forest sectors. It is not included in any European or national protection list (Habitats Directive) and it does not need special conservation measures.

Vulpes vulpes (red fox), Carnivora order, Canidae

Species with a wide distribution in Dobrogea area, including in the analysed area. Within the boundaries of Cernavodă I&II Wind Farms and in its proximity, singular specimens have been identified, which were in transit (passing). Probably the species populates the adjacent lands, located outside the wind farms.

Capreolus capreolus (European roe deer), Artiodactyla order, Cervidae family

Species which can be found in relatively high numbers in Dobrogea. During summer, it prefers shaded and cool places, during winter - sunny places which are protected against the wind. In the study perimeter, singular specimens and groups of animals belonging to this species and which were in transit (passing) have been identified.

2.3.3. Observations related to amphibian and reptilian species (herpetofauna)

Herpetofauna is represented by *Lacerta taurica* (Crimean lizard), of which few specimens have been identified at the edge of the agricultural crops and *Lacerta viridis* (European green lizard).

Distribution and numbers of the reptilian species which have been identified is in close connection with the numbers of insects – especially orthopterans in the area where the wind farms are located and in its proximity.

Podarcis taurica (Balkan wall lizard).

Species which is included in Habitats Directive, Annex 4, Bern Convention. Specimens of this species have been identified in the study perimeter and in areas with steppe vegetation, lawn and pasture sectors. The habitat of the Balkan wall lizard - *Podarcis taurica* is located on lands of the peripheral areas of the wind farm, irrigation ditches etc.

Lacerta viridis (Lacertidae family) – European green lizard

European green lizard is a species which is rarely found on the study territory, included in Habitats Directive, Annex 4. It was seen in the areas adjacent to the wind farms, at the edge of the access roads etc.

Until now, no other reptilian species have been identified, including *Testudo graeca* (Greek tortoise), specific to the steppe habitats of Dobrogea, species which is protected at European and national level. One of the causes are the lack of natural steppe vegetation areas, the use of extensive farming, of grazing, the physical extermination of specimens etc. which diminish to minimum the presence of the species in the wind farms area and in its proximity.

2.3.4. Observations related to the terrestrial invertebrate fauna (insects)

The terrestrial invertebrates (insects) in the area of Cernavodă I&II Wind Farms, Constanţa County have registered a relatively low diversity, being represented, mainly, by orthopterans and lepidopterans. One of the causes is the presence of few types of vegetation associations (agricultural lands, pastures), with a limited number of species, fact which do not allow the development of a large number of invertebrate species.

Thus, at the edge of the agricultural crops, species which are typical to the anthropized ecosystems of agroecosystem type appear, such as some coleopteran (cereal leaf beetle), heteropteran (cereal bug), orthopteran (grasshoppers as *Decticus* and *Calliptamus*) species.

Entomofauna (insects) near the agricultural crops is represented by specific species. On site, a series of species have been identified, the development cycle of which takes place on cereals or brasicaceae (rape crops). The following heteropteran species have been identified – *Eurygaster maura*, *Eurygaster austriaca*, *Eurygaster integriceps* (sunn pest) which indicates the lack of efficient treatment with chemical substances, coleopteran – *Anisoplia austriaca*, *Anisoplia segetum* (cereal leaf beatles), *Anoxia villosa* (scarabeid betles), *Malachius bipustulatus* (Malachidae), *Trichodes apiarius;* orthopteran – *Decticus verrucivorus*, *Platycleis* sp., *Poecilimon* sp., *Chorthippus brunneus*, *Chorthippus albomarginatus*, *Omocestus ruffipes*, *Sthenobothrus lineatus* etc.

Among lepidopterans, in the area were present species which are resistant to the anthropic impact, such as *Pieris rapae*, *Pontia daplidice*, *Colias croceus*, *Pararge megera*, *Polyommatus icarus*, *Aricia agestis*, *Carcharodus alceae*, *Autographa gamma*, *Helicoverpa armigera*. *Odonates* (dragonflies) are represented by large, good flier species such as *Anax imperator* and *Aeschna* sp., which hunt several insects in agricultural crops.

Among *dipterans,* we have noticed bombilides - *Bombylus* sp., *Anthrax* sp. (nectarivore species attracted by the inflorescences of *Melilothus*) and species of prey – *Asilus* sp. (which feed with other insects – diptera, orthopteres, hymenopteres).

Hymenopteres have been represented by species of Apis (Apinae – *Apis mellifica*, Bombinae – *Bombus agrorum*, *Bombus hortorum*, Halictidae – *Halictus* sp.), and Vespoidea – *Polystes* sp., *Scolia hirta*.

Among *gastropods* (snails), the following have been seen in the area: *Cernuella virgata, Cepaea vindobonensis*, *Helix pomatia*, *Chondrula tridens*.

2.3.5. Flora and habitats

The main habitat found in the area of the wind farms is represented by anthropized ecosystems: Cereal plants and industrial crops. Thus, the lands within the area of the wind farms are mostly agricultural lands with grain, barley, sunflower, corn or rape crops (Figure 15).

Figure 15. Cereal plants and industrial crops within the boundaries of the wind farms

The lack of surface with steppe vegetation is visible. Thus, at the edge of the access roads to Cernavodă I&II Wind Farms, Constanța County, the irrigation ditches and to the wind turbines, weeds have been identified represented by ruderal species such as: *Centaurea solstitialis, Carthamus lanatus, Carduus thoermeri* and *Conium maculatum* (poison hemlock), *Convolvulus arvensis* (field bindweed), *Polygonum aviculare* (common knotgrass), *Schlerochloa dura*, *Descurainia sophia* (herb sophia), *Seseli campestre*, *Sisymbrium orientale*, *Delphinium orientale* (hairy knight's-spur), *Hordeum murinum* (false barley), *Ballota nigra*, Heliotropium *europaeum* (European heliotrope), *Echium vulgarae* (viper's bugloss) or vegetal taxons migrated from the adjacent crops – *Setaria viridis* (green foxtail), *Avena fatua* (common wild oat), *Sorgum halepense* (Johnsongrass).

Figure 16. Ruderal vegetation in the area of the wind farms

We also mention other plant species from the flora identified in the wind farms: *Bromus erectus* (upright brome), *Setaria viridis* (green foxtail), *Verbascum phlomoides* (Wooly Mullein), *Onopordon acanthium* (Scotch thistle), *Eryngium campestre* (field eryngo), *Xeranthemum annum* (immortelle), *Papaver rhoeas* (corn poppy), *Convolvulus arvensis* (field bindweed), *Cannabis ruderalis* (wind marijuana), *Stachys annua* (annual hedgenettle),

Lathyrus tuberosus (tuberous pea), *Vicia cracca* (tufted vetch), *Consolida regalis* (royal knight's-spur), *Centaurea solstitialis* (yellow star-thistle), *Anagalis arvensis* (scalet pimpernel), *Althea rosea* (rose mallow), *Reseda lutea* (wild mignonette), *Salvia aethiopis* (Mediterranean sage), *Achillea millefolium* (common yarrow), *Cichorium intybus* (common chicory), *Agrimonia eupatoria* (churchsteeples), *Xanthium strumarium* (rough cocklebur), *Heliotropium europeum* (European heliotrope) and others.

3. Conclusions

- The site of Cernavodă I&II Wind Farms includes, mainly, agricultural crops, with small insertions of surfaces with ruderal vegetation, the area being crossed by access roads to the wind turbines;
- The vegetal associations which are typical to agro-ecosystems and include ruderal species, with a limited number of flora species are predominant. Identified associations does not contain conservation reliant plant species, included in the Romanian or European Red Lists, Annexes to Bern Convention or the Habitats Directive, the vegetation being composed of common species;
- Weed vegetation mixed with other ruderal species grows at the edge of the access roads, irrigation ditches etc.
- Installation in the area of the wind turbines does not create major imbalances in the agroecosystems within the area, already affected by the anthropic impact;
- The terrestrial vertebrate and invertebrate fauna within the site area of Cernavodă I&II Wind Farms are represented, mainly, by common species which are frequently found in highly anthropized ecosystems. Their presence in the area is an outcome of the way in which the lands are used;
- As regards the entomofauna, we specify the followings: if the current system of land use is kept, it will maintain a favourable conservation status;
- Herpetofauna is represented by common species for anthropized ecosystems, within the area, there is no risk of disappearance of the identified species, which are resistant to the anthropic impact, being adapted to the new environmental conditions;
- Mammal fauna of the study area is characterized, mainly, by the presence of common species specific to steppe areas and agroecosystems;

- As regards the monitoring of the avifauna of the wind farms area and its proximity, 43 species of birds have been identified out of which 16 migratory species and 17 nesting species;

- The bird species which nest in the area of the wind farms (agricultural crops, ruderal vegetation) are in general common species, typical to such habitats, and their presence in the area proves the fact that they are not negatively affected by the activity specific to the operation of the wind farms;

- As regards the avifauna migration, one of the important corridors in Dobrogea area is located on the seashore of the Black Sea and along the Danube coastline lakes (Ciochia, V. 1984), at considerable distances to the Cernavodă I&II Wind Farms (approximate 45 km), where, in general, the seabirds migrate (ducks, geese, shorebirds etc.). For the rest of the migratory species, the wind farms location does not represent an area which is favourable to shelter, rest or feed for a long period (for example, the landscape is less attractive, including monoculture crops, high aridity, reduced humidity, low percent of natural steppe vegetation, forests/tree plantations);

- An intense migration of the large species was not registered in the area of the wind farms and its proximity (birds of prey, storks etc.). The noticed presences (*Circus cyaneus*, *Buteo rufinus*, *Ciconia ciconia*) were represented by singular specimens, in transit;

- As regards the impact on the avifauna, during the period of performing the monitoring (January-December 2011), in the area of the wind farms, no dead specimens of birds have been identified and reported which could have resulted from the possible collisions of birds with the moving blades of the wind turbines or with the tower (pillar) of the wind power plants.

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