



INTEGRATED SYSTEM FOR PROTECTION OF BIRDS

REPORT

Monitoring of geese in the territory of Integrated System for Protection of Birds, Winter 2024-2025



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1. INTRODUCTION

The present study was commissioned by AES Geo Energy Ltd., Kaliakra Wind Power, EVN Kavarna, Degrets OOD, Disib OOD, Windex OOD, Long Man Invest OOD, Long Man Energy OOD, Zevs Bonus OOD, Vertikal-Petkov & Sie SD, Wind Park Kavarna East EOOD, Wind Park Kavarna West EOOD, and Millennium Group OOD in order to collect and summarize the information about the performance of the Integrated System for Protection of Birds (ISPB) that includes 114 wind turbines, 95 of which are within the Kaliakra SPA BG0002051 and 19 are in the areas adjacent to the protected zone. Considering the potentially adverse effects on environmental features, notably birds (T-PVS/Inf (2013) 15 <https://tethys.pnnl.gov/publications/wind-farms-and-birds-updated-analysis-effects-wind-farms-birds-and-best-practice>), the ISPB was implemented in 2018. The ISPB aims to provide a systematic monitoring programme, primarily including fatalities through collision with rotating turbine blades, disturbance leading to the displacement of birds from feeding, drinking, roosting or breeding sites (effectively a form of habitat loss), and turbines presenting a barrier to flight movements, thereby preventing access to areas via those movements or increasing energy expenditure to fly around the turbine locations (Hötker et al. 2006, Madders & Whitfield 2006, Masden et al. 2009, 2010, Ferrer et al. 2012, Grünkorn et al. 2016).

Enacting the ISPB includes a combination of radar observations and meteorological data, integrated with field visual observations which jointly used are essential for the accurate risk assessment and ensure that appropriate action is taken immediately. So far as potential adverse impacts of turbine collisions on birds, a Turbine Shutdown System (facilitated by an Early Warning System: EWS) is deployed.

The monitoring studies are based on the requirements of basic normative and methodological documents as follows: Environmental Protection Act, Biological Diversity Act, Bulgarian Red Data Book, Directive 92/43/EEC for habitats and species, and Directive 2009/147/EC on the conservation of wild birds, Protected Areas Act and Order RD-94 of 15.02.2018 of the Minister of Environment and Waters. Best international practices are also incorporated (https://www.seo.org/wp-content/uploads/2014/10/Guidelines_for_Assessing_the_Impact_of_Wind_Farms_on_Birds_and_Bats.pdf). Detailed information about the scope, technical rules and monitoring procedure are publicly available at a dedicated website <https://kaliakrabirdmonitoring.eu/>. A detailed review of the scientific information published in scientific journals and in technical reports was also carried out for the studied area.

This report presents results of the ornithological survey and monitoring at the ISPB (Figure 1) in the period 01 December 2024 to 28 February 2025, including carcass searches and Turbine Shutdown System application. The primary objective of the 2024-2025 wintering bird studies within the ISPB territory was to investigate the possible effects of the wind farms (114 wind turbines) on geese populations, notably the Red-breasted Goose (RBG) (*Branta ruficollis*) due to its conservation status (<https://www.iucnredlist.org/species/22679954/59955354>).

To date, there have been no indications that wind turbines in Kaliakra region has had any adverse impact on wintering geese, including RBG (<http://www.acta-zoologica-bulgaria.eu/downloads/acta-zoologica-bulgaria/2017/69-2-215-228.pdf>). As previously

reported repeatedly the more common goose species is the Greater White-Fronted Goose (GWFG: *Anser albifrons*). The present report describes the latest results, from the 2024-2025 winter monitoring of geese occurrence and searches for any collision casualties in the ISPB territory within Kaliakra.

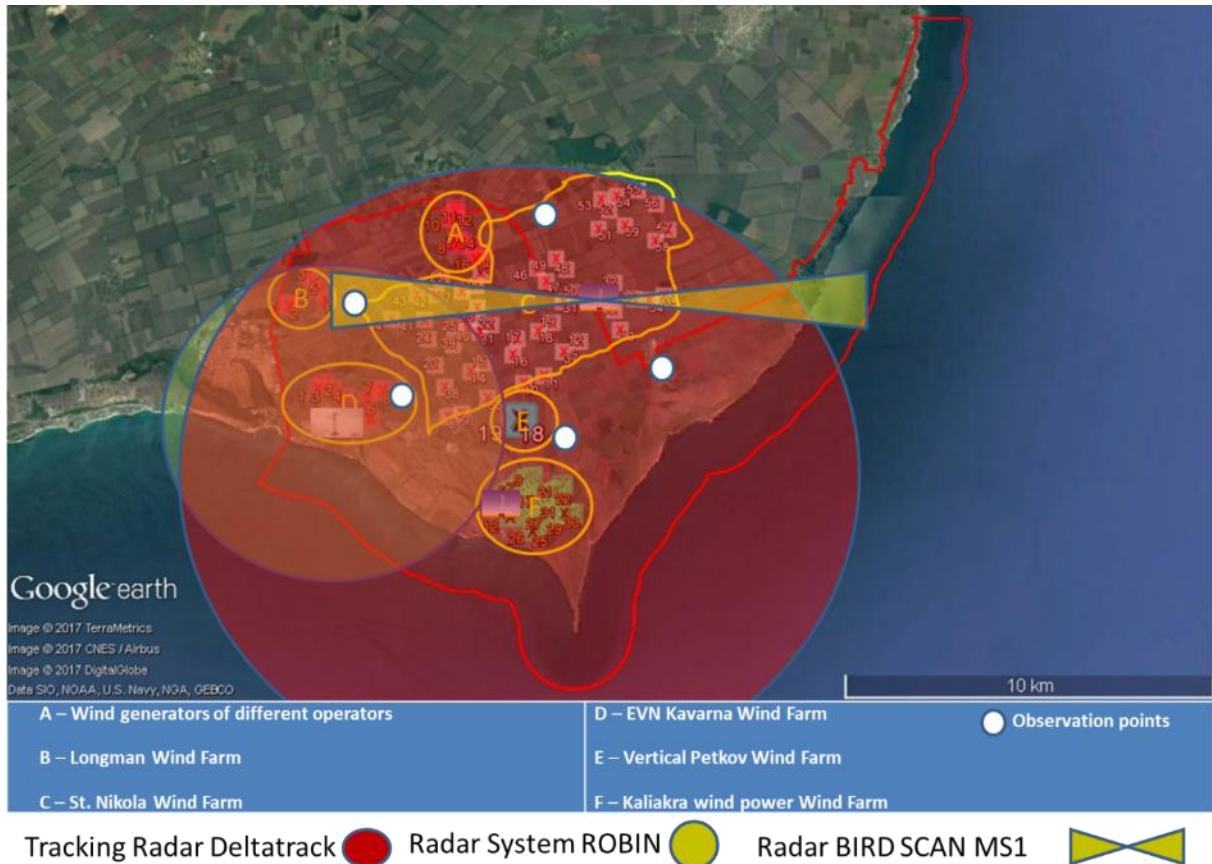


Figure 1. A satellite photo with the location of the wind turbines covered by the ISPB and the boundaries of Kaliakra SPA.

The geese species observed in the territory and behavioral characteristics of the records in previous years are described in detail in previous reports available at the web site of ISPB (<https://kaliakrabirdmonitoring.eu/>).

2. DURATION, METHODS AND EQUIPMENT

The study was carried out between 01 December 2024 and 28 February 2025, covering a total of 90 days, which involved the period of the most intensive movements of wintering geese in the region of northern Bulgarian Black Sea coast (Dereliev et al. 2000).

The counts of the geese were performed in early mornings at take-offs from the roosting sites. The teams were also separated into couples on predetermined counting points at the plots including the ISPB territory and surrounding fields (Figure 1).

The daily routines and all methodological details are described in previous reports available at the web site of ISPB (<https://kaliakrabirdmonitoring.eu/>).

Ornithologists who carried out the survey

➤ **Prof. Dr. Pavel Zehtindjiev - Senior Field Ornithologist**

Over 35 years of research in ornithology. Over 85 scientific publications in international ornithological journals. Member of European Ornithologists Union and number of conservation organisations. Winner of the Revolutionary Discovery Award for the Ornithology of the American Ornithological Society in 2016 – The Cooper Ornithological Society.

Over 10 years of experience in impact monitoring of wind turbines on breeding, migrating and wintering bird species in the region of Kaliakra. Former longtime member of BSPB.

➤ **Ivaylo Antonov Raykov - Field ornithologist**

Museum of Natural History, Varna

Member of BSPB. Author of over 20 scientific publications in international journals.

Over 10 years of experience in impact monitoring in the region of Kaliakra. Member of BSPB.

➤ **Kiril Ivanov Bedev - Field ornithologist**

Researcher in Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences.

Active member of conservation organization Green Balkans. Long term study on migrating birds and biodiversity of Burgas lakes. Author of three articles in Bulgarian Red Data Book. Expertise in biotechnology, conservation biology and environmental monitoring. Over 10 years of experience in impact monitoring of wind parks in Bulgaria. Member of Balkani NGO for conservation of birds and nature.

➤ **Hristo Gardov – Field ornithologist**

Experienced biologist, participant in number of field studies of birds as part of many conservation projects. BSPB active member. Member of The Wildlife Conservation Society (WCS) and member of the management of the organization.

➤ **Nikolay Yordanov – Field ornithologist**

PhD student in Bulgarian Academy of Science, Institute of Biodiversity and Ecosystem Research. Three years monitoring of soaring birds in preconstruction stage of WF projects experience. Responsible for Radar application in the field survey of birds.

➤ **Vasil Panayotov Dimitrov - Field ornithologist**

Trained to monitor the severity of collisions of birds with wind turbines. Representative of local conservation organization in Balgarevo, Kavarna.

➤ **Jelyazko Dimitrov - Field ornithologist**

Member of BSPB from 31.12.2006 to 31.12.2010. Trained to monitor the severity of collisions of birds with wind turbines.

Types of data collected

During the survey in winter 2024-2025 the same standard data were recorded in order to be comparable with previous winter monitoring studies' results. All details concerning the data collected as well as the utilized protocols for collision monitoring and visual observations are given in previously published reports lodged at the ISPB web site (<https://kaliakrabirdmonitoring.eu/>).

3. RESULTS

The 90 days of the study encompassed the whole period when geese were recorded in the region during 2024-2025.

Total number of observed goose species and their numbers

In total, relatively low numbers of geese of all observed species were present in the ISPB territory during the winter 2024-2025. Relatively low numbers of wintering geese were also observed in Bulgaria and Romania in general in the winter season 2024-2025. <https://bspb.org/>

Table 1. The number of observed geese by dates of different species (data from visual observations). The dates with zero observed birds are not included. Species involve Greater White-fronted Goose (GWFG: *Anser albifrons*), Greylag Goose (*Anser anser*) and RBG (*Branta ruficollis*).

Date	A. albifrons	Anser/Branta	Total
08.01.2025	85		85
22.01.2025		2500	2500
22.01.2025		3500	3500
22.01.2025		1300	1300
22.01.2025		800	800
26.01.2025	7		7
28.01.2025	26		26
29.01.2025	20		20
10.02.2025	33		33
15.02.2025	82		82
Grand Total	253	8100	8353

The first GWFG was recorded by observers in the territory at the beginning of January. The last GWFG was observed on 15 February. All observed RBG were in mixed flocks with GWFG and observed at a long distance at dawn when precise identification of single individuals in such flocks was not possible. The days with observed geese in ISPB territory are presented in Table 1. The maximum number of geese flocks was observed on 22 January. No geese were observed within the turbine arrays. The reason for the relatively low number of wintering geese in Bulgaria in general was likely due to the mild winter of 2024-2025. Detailed analyses of correlation between ambient temperature and number of geese in Saint Nikola Wind Farm (SNWF) territory in the last 14 years, and discussion of the role of temperature, are presented in a previous report for part of the same territory (<http://www.aesgeoenergy.com/site/images/Winter%20Report%202016-2017.pdf>).

The eight winters (2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, 2022-2023, 2023-2024 and 2024-2025) were very mild with day temperatures reaching over 10⁰ C even in January. The milder winter conditions and the lack of snow, which allowed good grazing for the birds further north-east in Ukraine and Russia, resulted in a very late arrival of RBG in their wintering grounds along the western Black Sea coast and very low numbers compared to previous seasons.

Recent research cited in previous reports has shown that both GWFG and RBG are not ‘traditional’ in their choice of wintering areas but react to annual variations and changing conditions within a wintering season on food availability, driven largely by weather (and hence climatic trends over the longer-term). The underlying strategy of the geese appears to be to winter as far north (and as close to the breeding grounds) as possible. In milder winters or mild periods within a winter, geese are recorded further north: in colder winters or cold periods within a winter they are forced further south. The ISPB territory is in the south of the putative wintering possibilities, and to the south of roost/freshwater drinking locations (Durankulak and Shabla lakes) used as focal sites when geese use the wider Dobroudzha region. As well as a reduction in geese being recorded at ISPB territory (and SNWF), recent mild winters have been accompanied by many observations across the European continent suggesting a recent increase in the focal species using wintering areas further north, most likely as a result of global climatic warming. This shift of wintering ranges has been observed in various bird taxa (Estrada et al., 2016).

Spatial distribution of feeding geese in the ISPB territory

The flocks of geese tracked and confirmed visually are presented in maps below. Due to the lack of wintering geese in this winter spatial analysis was not possible.



Figure 2. Flock of 85 GWFG (blue line) observed on 08.01.2025

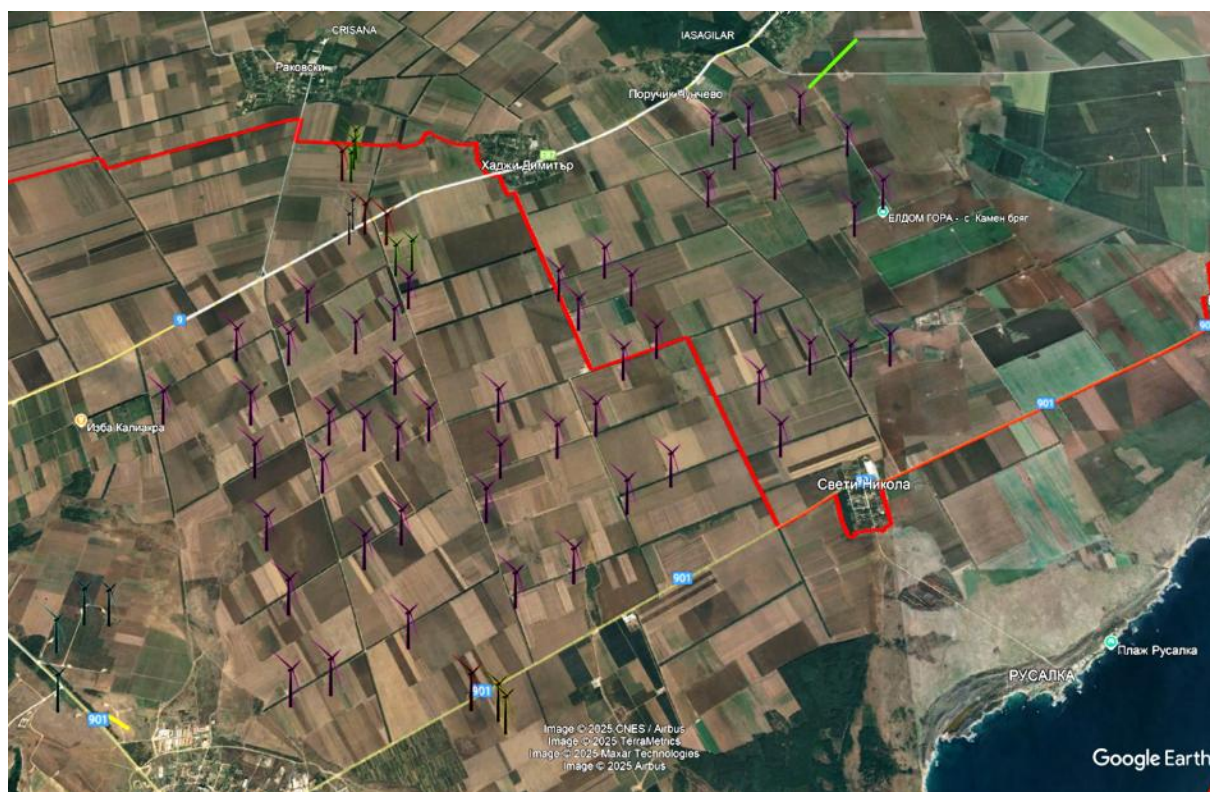


Figure 3. Mixed flocks of 8100 greater white-fronted and red-breasted geese (green), recorded on January 22, 2025; 7 greater white-fronted geese (yellow), recorded on January 26, 2025.



Figure 4. Flock of 26 greater white-fronted geese (pink), recorded on January 28, 2025; Flock of 20 greater white-fronted geese (green), recorded on January 29, 2025.



Figure 5. Flock of 33 greater white-fronted geese (yellow), recorded on February 10, 2025; Flock of 82 greater white-fronted geese (green), recorded on February 15, 2025.

Carcass monitoring results

All 114 turbines were programmed to be searched every seventh day in the periods of autumn and spring migration as well as during the wintering period of geese. The rest of the time during the whole year every turbine was searched once per month if the areas under turbines were accessible. During the winter monitoring (subject of this report) all 114 turbines were searched for carcasses during the whole winter survey period (01 December 2024 –28 February 2025) when more birds were at risk of collision. The frequencies of searches are presented in Table 2.

The mild weather in the 2024-2025 winter did not limit the programmed searches in the study period due to snow cover (as noted in some previous reports regarding SNWF). In a limited number of days with heavy rain, however, the plots of 200 x 200 metres under turbines were searched from the turbine base (stairs and platform around 3 metres high) by binoculars. The large size with substantial white plumage of any geese carcasses renders them clearly visible, especially in the predominant agricultural habitat at this time of year (largely bare soil): the elevated observation points using binoculars at turbine base stairs/platform will have increased their potential detection. Use of binoculars, with a potentially obvious target of extensive white plumage remains in search areas of bare soil make it easy to detect such remains at distance.

On the other hand, with a rain-saturated soil the programme was aware that walked transects in these muddy conditions could affect the local farmers' plans for the following growing and harvesting season. Nevertheless, over 95 % of the programmed searches under the 7 day-interval protocol using walked transects in the 200 x 200 metres plots were completed.

Critically and additionally, in the 2024-2025 winter there were no observed records of geese, of any species, using the study area which could have generated a potential collision victim. And, therefore, any observable remains from collision.

Searcher efficiency and carcass persistence has been examined three times during winter monitoring at the part of the ISPB territory – in February 2010, in January 2016 and in January 2022 (see SNWF monitoring reports <http://www.aesgeoenergy.com/site/Studies.html> and [Report Winter 2021-2022](#)). The results were similar and broadly confirm the efficiency in searches and carcass removal rates under turbines for a programme of searches every seven days.

Table 2. Number of searches per turbine during the winter monitoring 2024-2025

Turbine code	December	January	February	Total
ABBalgarevo	2	4	4	10
ABΓ1	2	5	4	11
ABΓ2	2	5	4	11
ABΓ3	2	5	4	11
ABΓ4	2	5	4	11
AE10	2	4	4	10
AE11	2	4	4	10
AE12	2	4	4	10
AE13	2	4	4	10
AE14	3	4	4	11
AE15	3	4	4	11
AE16	2	4	4	10
AE17	2	4	4	10
AE18	2	4	4	10
AE19	2	4	4	10
AE20	3	4	4	11
AE21	2	4	4	10
AE22	2	4	4	10
AE23	2	4	4	10
AE24	4	4	4	12
AE25	4	4	4	12
AE26	2	4	4	10
AE27	2	4	4	10
AE28	2	4	4	10
AE29	4	4	4	12
AE31	2	4	4	10
AE32	2	4	4	10
AE33	2	4	4	10
AE34	2	4	4	10
AE35	2	4	4	10
AE36	3	4	3	10
AE37	2	4	4	10
AE38	3	4	4	11
AE39	3	4	4	11
AE40	4	4	4	12
AE41	4	4	4	12
AE42	4	4	4	12
AE43	4	4	4	12
AE44	4	4	4	12
AE45	2	4	4	10
AE46	2	4	4	10
AE47	2	4	4	10
AE48	2	4	4	10
AE49	2	4	4	10
AE50	2	4	4	10
AE51	2	4	4	10
AE52	2	4	4	10
AE53	2	4	4	10
AE54	2	4	4	10
AE55	2	4	4	10
AE56	2	4	4	10
AE57	2	4	4	10
AE58	2	4	4	10
AE59	2	4	4	10
AE60	2	4	4	10
AE8	3	4	4	11
AE9	3	4	4	11
DBΓ1	2	5	4	11
DBΓ1HSW250	2	4	4	10
DBΓ2	2	5	4	11
DBΓ2MN600	2	4	4	10
DBΓ3	2	5	4	11
DBΓ4	2	4	4	10
DBΓ5	2	4	4	10

ISPB Kaliakra – Wintering geese 2024-2025

DC1			1	1
DC1	2	4	3	9
DC2	2	4	4	10
E00	2	4	4	10
E01	2	4	4	10
E02	2	4	4	10
E04	2	4	4	10
E05	2	4	4	10
E07	2	4	4	10
E08	2	4	4	10
E09	2	4	4	10
M1	2	4	4	10
M10	2	4	4	10
M11	2	4	4	10
M12	2	4	4	10
M13	2	4	4	10
M14	2	4	4	10
M15	2	4	4	10
M16	2	4	4	10
M17	2	4	4	10
M18	2	4	4	10
M19	2	4	4	10
M2	2	4	4	10
M20	2	4	4	10
M21	2	4	4	10
M22	2	4	4	10
M23	2	4	4	10

M24	2	4	4	10
M25	2	4	4	10
M26	2	4	4	10
M27	2	4	4	10
M28	2	6	4	12
M29	2	6	4	12
M3	2	4	4	10
M30	2	6	4	12
M31	2	6	4	12
M32	2	6	4	12
M33	2	6	4	12
M34	2	6	4	12
M35	2	6	4	12
M4	2	4	4	10
M5	2	4	4	10
M6	2	4	4	10
M7	2	4	4	10
M8	2	4	4	10
M9	2	4	4	10
VP1	2	4	4	10
VP2	2	4	4	10
ABZevs	2	5	4	11
ABMillenium group	2	4	4	10
ABMillenium group Mikon	2	4	4	10
Grand Total	252	480	455	1187

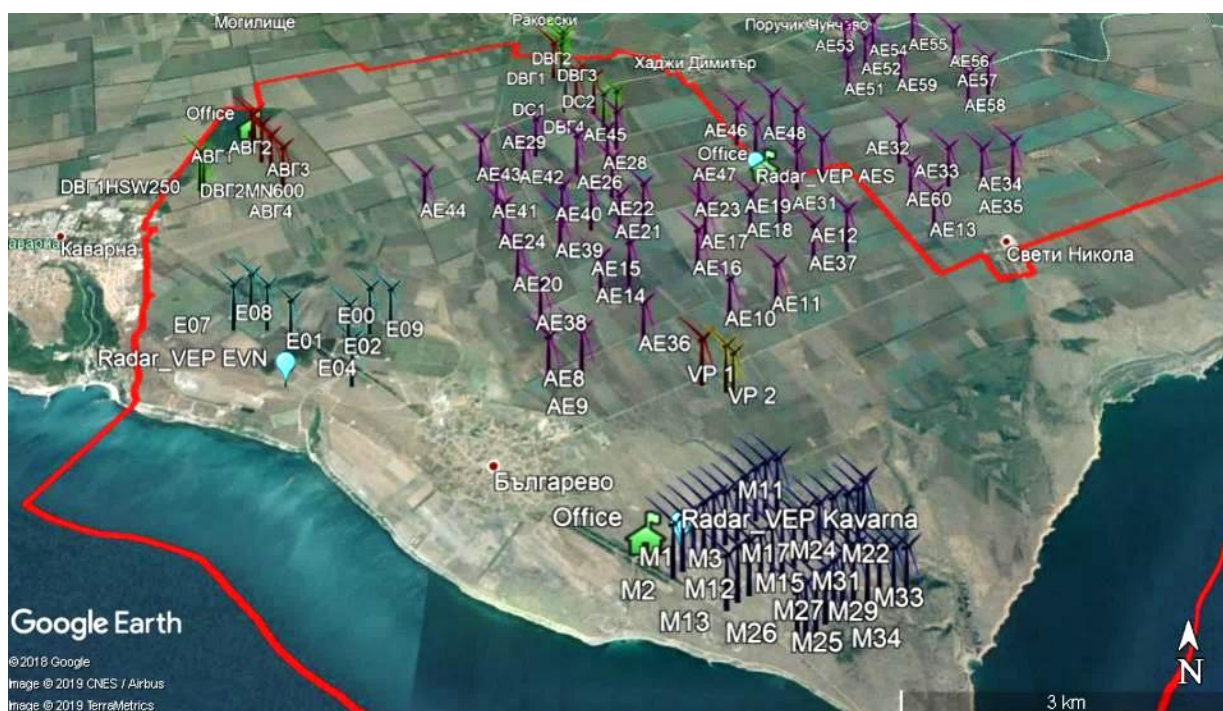


Figure 6. Locations of turbines searched for collision victims according to codes for turbines given in Table 2.

Systematic searches under 114 turbines covered by ISPB (Table 2, Figure 3) in the period 01 December 2024 – 28 February 2025 resulted in four intact carcasses which can be associated with collision with wind turbines. Details of the collision victims recorded in the ISPB during winter 2024-2025 are presented in Table 3.

Table 3. Collision victims in ISPB in winter 2024-2025.

Date	Latin name	Red Data book	IUCN
27.01.2025	<i>Lullula arborea</i>	Not Listed	Least Concern
31.01.2025	<i>Sturnus vulgaris</i>	Not Listed	Least Concern
03.02.2025	<i>Accipiter nisus</i>	Endangered	Least Concern
07.02.2025	<i>Phasianus colchicus</i>	Not Listed	Least Concern

No body parts or intact remains of geese which could be considered as collision victims were detected after an accumulation of 1187 searches under 114 turbines in the period 01 December 2024 – 28 February 2025. Therefore, no evidence for collision of any goose species, including RBG, has been found in the winter 2024-2025 when geese can be present according to monitoring results from previous winters in the same territory.

There were no circumstances in the 2024-2025 winter which required the Turbine Shutdown System (TSS).

4. CONCLUSIONS

The mild 2024-2025 winter is the main reason for low number of wintering geese in ISPB territory.

No remains of geese that could be attributed to collision with turbines were found during systematic searches under operational turbines not only in the 2024-2025 winter but also in any of the 17 winters when all 114 turbines or 52 turbines at SNWF (part of ISPB) has been operational and searched systematically every winter season.

From research associated directly with ISPB described in the present and previous reports (and see previous SNWF winter reports on the AES Geo Energy website, and earlier surveys from this part of the same territory) the study area continues to be a potential feeding ground for RBG as well as GWFG, but it also remains an unimportant area for both species, as indicated in pre-construction studies. The presence of wintering geese is associated with colder winters when feeding grounds in the northern part of the wintering range of geese are covered by snow and lakes with fresh water are frozen.

Based on previous studies in the same territory when geese were observed, the investigated 114 wind turbines present no material threat through preventing use of food supplies: especially in light of other agricultural practices such as crop type and field size of the preferred crop of feeding geese.

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