No of WTG	Recomendation from the Report	Tactus recomendations for breeding birds
5 **6** **18** **19**	Withdrawal from the construction. Potential feeding area for ***Cicconia nigra*** in the 1 -km buffor zone from the rivers.	**WTG no: 5, 6, 18, 19** It is suggested to allow the construction of turbines no. 5, 6, 18 and 19 but with mandatory installation of detection-reaction systems on all of thems. All of the turbines are outside the 3 km radius zones around nesting places. Location of wind turbines in the planned area allow to use another places as feeding grounds. There are data showing tthe acoidance bahavior of black storks. For birds without avoiding behavior – systems will be sufficient way to minimize the risk of collision. Black stork is well detected by the systems
66 **67** **92**	Turbines located in the 3-km buffer zone from the knowing and possible nesting sites of ***Clanga pomarina***	**WTG no. 67 and 92** - withdrawal from the construction
		WTG no. 66 It is suggested re-analysis of the justification for abandoning the construction of WTG no. 66 in order to conditionally allow its location provided that a detection and response system exists.
5 **6**	Taking into account ***Aquila chrysaetos*** nest it is possible to build the turbines	**WTG no. 5 and 6 -** It is suggested to allow the construction of turbines no. 5 and 6 with mandatory installation of detection-reaction systems on all those turbines.
8 **12**	Withdrawal from the construction, due to location in the buffer zone 3 km around location of ***Aquila chrysaetos*** nest.	**WTG no: 8, 12** It is suggested to allow the construction of turbines no. 8, 12, with mandatory installation of detection-reaction systems on all those turbines.
10 **11** **13** **90**		**WTG no: 10, 11, 13, 90 -** Withdrawal from the construction, due to location in the buffer zone 2 km around location of nest.
43 **44**	Turbines located in 3 km buffer zone from ***Aquila chrysaetos*** nest.	**WTG no: 43, 44** It is suggested to allow the construction of turbines no. 43, and 44 with mandatory installation of detection-reaction systems on all those turbines.
14 **15** **29** **35** **93**	Turbines lacated in 1 km buffer zone from microreserve and breeding places of ***Tetrao tetrao***	**WTG no 15, and 29** It is suggested to allow the construction of turbines no 15 and 29 due to the low risk of negative impact on the species in question, in the case of turbines located more than 900 m from nesting sites and leks.
		WTG no 14, 35, 93 Withdrawal from the construction, due to location in the buffer zone 0,9 km around location of nest.
69	Turbines located in 1 km buffer zone from breeding places of ***Accipiter nisus***	**WTG no 69** Withdrawal from the construction, due to location in the distance less than 500 m from the breeding place
52 **71**		**WTG 52, 71** It is suggested to allow the construction of turbines no 52 and 71 due to the low risk of negative impact on the species in question, in the case of turbines located more than 500 m from nesting site.

Basis for recommendation

Cicconia nigra

Published data do not clearly indicate the presence or absence of a scaring effect from wind turbines [1, 2]. It is therefore difficult to conclude whether avoidance behaviour occurs, resulting in a reduced risk of collision. Data from wind farms in Germany indicate that birds used the wind farm area during flights between nesting sites and feeding grounds (30% of flights) [3, 4].

According to many literature sources, the range of feeding is up to 10 km and more from breeading places [1, 5, 6].

Published data indicate that specific food sources are used in a targeted manner and that not all potential feeding areas are used.

Due to this fact, it is crucial to analyse the feeding area and exclude wind turbines from areas that constitute used feeding grounds [7]. In the vicinity of potential feeding areas that may be used by black storks, it is reasonable to use detection and response systems that enable effective protection by shut down the turbines on demand.

At the same time, the analysis of the literature shows the possibility of targeted, selective improvement of feeding habitats [1].

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Aquila chrysaetos

Published data allow us to assume that golden eagles exhibit avoidance behaviors towards wind turbine [1-4].

They consist in maintaining a distance of several hundred meters from wind turbines.

This distance probably results from the presence of the wind turbine itself and not from the presence of the working rotor.

The lack of avoidance behaviors concerns the occurrence of attractive feeding habitats within the base of the mast.

Considering the fact that attractive feeding grounds are located to the north-east and south-west and west of the nest location, it can be assumed that they exhibit avoidance behaviors towards turbines located on the flight route between the nesting site and feeding grounds rich in food [4]. These data confirm earlier literature reports indicating a lack of avoidance behavior and the use of airspace within existing wind farms if they overlap territorially with feeding grounds [12].

The published data [1] indicate that birds maintain a significantly smaller distance in the case of turbines operating at higher wind speeds. This confirms the validity of installing systems and implementing on-demand shutdowns to minimize the risk of collisions, especially at higher wind speeds. It is possible that at lower wind speeds, shutdowns will not be necessary if analysis of data from the systems shows avoidance behavior of birds at lower wind speeds.

At the same time, the study showed that the birds avoided moving inside the wind farm [1].

The amended Federal Nature Conservation Act in Germany (Viertes Gesetz zur Änderung des Bundesnaturschutzgesetzes Vom 20. Juli 2022, Bundesgesetzblatt Jahrgang 2022 Teil I Nr. 28, ausgegeben zu Bonn am 28. Juli 2022) has reduced the minimum distance for locating turbines introduced in 2014 (LAG VSW) (2014) from 3 km to 1 km.

The provisions of the act indicate that at a distance of up to 1 km from nests, relative to the location of wind turbines, the risk of collision is very high and the location of wind turbines between 1 and 3 km from nests still generates a high risk of collision, however it is assumed that it can be minimized by installing detection and response systems enabling automatic shutdown of turbines in the event of detection of birds in the collision risk zone.

The abandonment of wind turbine locations within 2.5 km of the nest in order to allow birds to fly in and out of the nest freely seems to be a reasonable compromise.

At the same time, the installation of detection-reaction systems on turbines located in a zone over 2.5 km from the nest, located on the route of flight to feeding grounds, allows for minimizing the risk of collisions by enabling turbine shutdowns on demand. This kind of systems are quite sufficient in reducing the risk of collision [6-11].

As published data indicate [4], the greatest risk of collisions concerns birds moving at the height of the rotor. The probability of collisions for birds moving high above the rotor is low.

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Clanga pomarina

Published data indicate that lesser spotted eagles do not avoid turbines [1].

Less than 60% of territorial bird flights occur at an altitude below 200 m (at collision height) [2]. Telemetry studies show that space use changes from year to year [3].

The amended Federal Nature Conservation Act in Germany (Viertes Gesetz zur Änderung des Bundesnaturschutzgesetzes Vom 20. Juli 2022, Bundesgesetzblatt Jahrgang 2022 Teil I Nr. 28, ausgegeben zu Bonn am 28. Juli 2022) has reduced the minimum distance for locating turbines introduced in 2014 (LAG VSW) (2014) from 3 km to 1,5 km.

Birds use the feeding area in a distance over 6 km from their nests [4] and published data show that all open spaces are used as a feeding grounds.

Published data show, that shuting down the turbine during daytime (from 7.00 am to 7 pm) should be effective way to protect birds agains collision [5]. Taking into account that there is possible to use shut down on demand (SDOD), the systems could be the suffiecient sollution. Unpublished data from Poland shows, that birds nesting in the vicinity of wiand farm (one part of the wind farm is located in Natura 2000 area), using the systems can be a quite sufficient sollution to minimize the risk of collision, even when birds steel use the wind farm area as a feeding ground and as a flying route beetwen nesting area and feedind area.

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Tetrao urogallus

Tetrao urogallus, a forest grouse species is known as sensitive to disturbance by human presence and infrastructure [1].

Published data from six central European study regions, showing avoidance of wind turbines up to 650 m [2]. Another data [1] shows taht during summer, there was reduced resource selection with increasing proximity to the turbines (up to 865 m), turbine density, noise, shadow and visibility. Furthermore, the authors noted an avoidance of turbine access roads. Due to the high collinearity of the wind turbine predictors it was not possible to identify the specific mechanism causing turbine avoidance but cited study reveals that forest dwelling species with known sensitivity to other forms of human disturbance (i.e. recreation) are also likely to be affected by wind turbine presence. The authors provide proximity thresholds (865m) below which effects are likely to be present as a basis for conservation planning

The same authors shows that the probability of selection the habitat decreased with increasing noise emissions from 43 dB onwards, and below this value no effect be demonstrated [1]. It is tru that at the dystanse 300 meters away from the tubine the sounds produced by a large wind energy project range from 35 to 45 decibels [3].

Taking into account the avoidance behaviour up to 900 h m from the turbines, it appears that noise levels at this distance will not have a significant impact on birds.

There is a little published data showing the impact on birds due to shadow. Data from Sweden [1] shows that the probability of habitat selection was reducedby *Tetrao urogallus* in areas with more than 8 h of meteorologically probable shadow per year. Authors show salso that the selection probability also decreased in areas where more than four wind turbines were visible as well as with increasing proximity to turbine access roads.

The authors [1], analyzing published data focusing on representatives of the family, also suggest the possibility of birds becoming accustomed to the presence of a wind farm. The habituation of capercaillies to wind turbines may mean that they completely avoid habitats in the first years after construction [4] and then adapt to the presence of turbines and use habitats at a distance of more than 800 m from wind turbines.

Taking the above into account, it is recommended to use a 900 m buffer around capercaillie breeding sites and leks in order to minimize the negative impact of turbines on the breeding population.

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Strix uralensis

There are limited data showing the impact of wind turbines on *Strix aluco* and other species of owls. The results are sent that the eagle owl is susceptible to anthropogenic disturbances due to which the power source was unavailable [1]. The results of the study shows that territorial eagle owls within 4–5 km from the wind farm and power line construction disturbance left their territories to a significantly higher extent (41% reduction in the number of territories with eagle owls) compared with the eagle owls in territories further away (23% reduction) [1]. Published data about the impact of noise on owls in agricultural or forest habitats are limited or unavailable, but ther are data about impact of traffic noise of population of owls living in the cities [2]. However published data do not enable to draw any strong conclusion about the effect of traffic noise on owls. Noise barriers can have an additional advantage of reducing bird mortality by collision with vehicles by forcing birds to fly over passing vehicles but this measure should always consider possible barrier effects on other animals.

It coud be true that during wind farm construction, strong anthropogenic noise is likely an important disturbing factor for every species of owls in the surrounding areas.

Owls are, to a large extent, acoustically specialized predators, and therefore potentially vulnerable to noise. The morphology of eagle owl wings makes it possible to fly almost silently [1], as an adaptation to finding prey by listening while flying.

Numerous studies on various species of owls have shown that they are sensitive to noise (chainsaws, construction equipment, human presence). Noise generated within a radius of 55 to 150 m from the owls' location was an impulse to avoidance behavior in the above studies [3, 4, 5, 6].

Such an effect was least visible in the case of the eagle owl [7] Considering the sensitivity of owls to anthropogenic noise, it can be concluded that the scaring effect in the case of individual species of owls will cause them to avoid the immediate vicinity of wind turbines at a distance of at least 300 m, where the noise generated by the working rotor drops to the level of 35-35 dB. It is probably the avoidance of turbines that results in the relatively low mortality of owls recorded on wind farms in Europe [8, 9].

In Poland, we don’t have data about Ural owl nests near wind farms (this only applies to data from pre-investment and post-investment monitoring). Taking into account data from pre- and post construction monitoring (unpubished data, available in Regional Directirates of

Environmental Protection) and another species of owls (*Asio otus, strix aluco*) we can conclude that no situations of abandoning nesting sites were recorded but both of species are typical for urban areas and they may be less susceptible to the impact of anthropogenic noise.

Observations from Germany from post-investment monitoring indicate that the long-eared owl, which is a numerous species, clearly avoids turbines located in forests. A similar situation was observed in the case of the boreal owl, which was recorded only on the edge of a 1 km buffer from wind turbines despite the existence of good habitats (Wylegała, unpublished data).

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Accipiter nisus

Available collision data for this species indicate that it is not particularly susceptible to collisions with wind turbines [1, 2]. This species although quite common in Germany were only rarely recorded as victims of turbines [3]. This conclusion is still actual, given the fact that more recent data on the number of collisions of this species recorded at wind farms in Germany [1].

Probably due to the high prevalence of the species in europe and its status (not endangered species) for which there have been no reported cases of collisions on wind farms in europe, the species has not been the subject of many studies on the negative impact of wind farms and, consequently, there are few publications on this subject. However, available data from surveys conducted in greece indicate that birds avoided entering the zone of direct risk of collision, while flights in the vicinity of wind turbines within the operating farm were recorded [4].

Taking into account this information and the current state of knowledge on the subject, it can be concluded that at present there is no basis for predicting a significant impact of wind turbines on the populations of this species and, consequently, it is possible to consider allowing turbines located at a distance of no less than 500 m from breeding sites.

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Most of the turbines that can cause problems related to collisions are located far enough from the meadow. Geese, cranes and swans have been recorded flying and/or feeding here.

Although collisions have been recorded in wind farms in Europe for these groups of birds, they are not particularly vulnerable to collisions. In my opinion, both in the case of geese and cranes, collisions are relatively rare in comparison to the commonness of occurrence in individual areas and the recorded numbers of individual concentrations of birds.

At the same time, the available published data have not shown a significant barrier effect that would translate into the loss of function of individual ecological corridors.

I agree with the other conclusions and conclusions of the author regarding the Luksti pläavi area, regarding both the proposed protective measures and the assessment of the possible impact of the wind farm on this area.