ANDRIS DEKANTS EXPERT
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Expert specialisation in species, biotopes or their groups: birds

SIA Utilitas Wind,
Reg. No. 40203411869

EXPERT OPINION

No. LDE/2024/01/30

On the impact of the construction and operation of the planned wind farm on the birds in the area, ensuring favourable conservation status for resting, feeding and nesting sites and for specially protected species

*The opinion has been prepared in compliance with Cabinet Regulations No.925 adopted on 30 September 2010, "*Content of the opinion of experts in the field of species and habitat protection and the minimum requirements contained therein*" and the work task of SIA Utilitas Wind.*

Riga, Latvia, 14 May 2024

Group of species on which the opinion is provided: birds

1. Survey of the territory

1.1. Territory

The planned wind farm is located at the Latvian border near Arakste. The area of the planned wind park and its periphery in Lodes Parish of Valmiera Municipality and the adjacent Mulgi Parish in Estonia have been evaluated.

The total area of the planned wind farm is about 16.3 km^2. The territory includes land units with cadastral designation No. 96680010118, 96680010078, 96680010012, 96680010006, 96680010061, 96680010055, 96680010011, 96680010005, 96680010043, 96680010098, 96680010085, 96680010097, 96680010025, 96680010045, 96680010081, 96680010033, 96680010018, 96680010044, 96680010010, 96680010002, 96680010004, 96680010003, 96680010099, 96680010034, 96680010075, 96680010001, 96680010106, 96680010074, 96680010041, 96680010035, 96680010042, 96680010079, 96680010071, 96680010119.

The sites and surroundings of the initially planned wind turbine generators (hereinafter referred to as "WTG") within a radius of approximately 200 m to 400 m have been repeatedly surveyed to assess their potential impact on birds. In the course of the research, the area between the planned stations has also been surveyed, as well as the entire area of the planned park. The surveyed study area is shown in the annex (Figure 31).

Additional surveys have been carried out in land units encompassing the assessed area of the potential wind farm (the above cadastral designations) and the adjacent territory, including Estonia, from one to three kilometres from the Latvian border.

1.2. Research methods

Starting in the spring of 2023, research was carried out on the territory and periphery of the planned wind farm. A number of research methods have been used with the aim of identifying as many species as possible (complete inventory) of specially protected (SP) and micro-reserve (MR) birds that reside, inhabit or nest in the vicinity of the planned WTG or between them during the given season. Additional surveys were also carried out in Estonia, looking for lesser spotted eagles at a distance of about 3 km from the WTG and inventorying adjacent forest plots. At the time the opinion was given, all the species included in the first annex to Directive 2009/147/EEC of the Parliament and of the Council on the protection of wild birds were also assessed. Other bird species were also recorded, including migratory birds.

Research carried out:

  - Repeated walks and inventories of the territory in different months in order to detect bird species or signs of their presence, such as nests or blocks, visually or by the voices of birds. The volume of research allowed the detection of most SPS species at least twice, thereby confirming the territorial nesting behaviour of a particular bird. SPS species were searched (and audio recordings were used to provoke them) in as many suitable habitats (plots) as possible;
- Site-wide search for large nests of those SPS birds of prey who have been established
  - in the territory as nesting birds. When required, large nests found in the trees were
  - checked to determine the species, population and the number of fledglings;
- Surveys from different spots in the area to detect diurnal birds of prey, to assess their migration and routes. These records were made for the main flight directions of the identified species and the nesting areas of birds of prey. In possible nesting areas, nests of birds of prey were searched;
- Night monitoring from different spots to estimate night migration. For night records, audio recordings were also used for owl inventories in each species-appropriate area (but not further than every 1 km);
  - The habitat suitability maps developed in the Owl and Woodpecker Conservation Plan were used in the work. They were used to identify areas for intensified search of these species. A similarly used habitat suitability model was used for the lesser spotted eagle *Clanga pomarina*
  - (unpublished). For the purposes of the survey, all forest tracts to be surveyed were selected according to the age and composition of forest stands. The plots were inventoried by conducting woodpecker and owl inventories or searching for specific SPS species and large nests. Species suitability models were also used
  - in assessing the impact of the potential wind farm as a whole;
- The existing observations of the portal Dabasdati.lv and DDPS "Ozols" since 1 January 2013 have been verified on the studied area and surroundings. Species locations were checked, if necessary, to ascertain their presence.

1.3. Scope of field work

The nature surveys, their duration and the meteorological conditions are summarised in Table 1 of the annex. At all times of the visit, the weather conditions were suitable for the visual or acoustic observations required for this opinion.

For species with smaller nesting areas, the vicinity of the initially planned WTG within a radius of 200-400 m around the planned stations has been studied in depth. Endangered species or species requiring a larger habitat were searched for throughout the study area and on the periphery, as far as possible in each of their possible habitats.

Overall, the amount of fieldwork is sufficient to carry out analyses and make data-driven decisions on the location of WTG and their impacts on bird populations throughout the study area. However, in order to ensure the best possible protection of birds, the monitoring of SPS birds should be continued, including prior to the construction phase of the planned operations. Where necessary, the requirements and actions for favourable conservation status of species should be adapted or supplemented on the basis of newly acquired data.

The collected bird data and mapped habitats were geospatially processed. The results obtained and the maps created allow to judge on the nesting or gathering places of nesting bird species during the study and their composition. For SPS species and species that may have significant impacts from the operation of the WTG, each potential habitat (or observation) where the bird was found is mapped. All observations were geospatially aggregated after each survey. Thus, during the survey, the identification of a SPS bird species was an opportunity to ascertain whether the species had been previously detected in the area, helping to judge on the occupancy of the area.

The routes taken are recorded and used to identify subsequent fieldwork. The routes carried out in the study area are shown in Figure 31 of the annex.

Binoculars Swarovski EL 10x42 WB were used for visual identification of birds, a Garmin GPSMap 66st handheld navigation device was used for navigation and a Huawei phone P30 pro with Locus Map 4.18.2 was used for taking photos. Data mirroring, geospatial processing, and analysis were performed with the use of ArcGIS Desktop 10.8.2.

2. Territory status

The survey area is situated in the neutral zone of the North Vidzeme Biosphere Reserve. Its objective is to achieve a balance, nationally and internationally, between protecting natural diversity, promoting economic development and preserving cultural values. There are no micro-reserves, nature reserves or Natura 2000 sites in the Latvian part of the survey area. The nearest micro-reserve (**ID=185288**) established for protection of the lesser spotted eagle in 2022 is approximately 4 km from the nearest land unit of the proposed wind farm in the direction of Ipiķi. On the Estonian side, several protection areas have been established to protect the lesser spotted eagle. The boundary of the nearest such protected area is approximately 100 m from the border of Latvia (in the west of the research area). The nearest large nest inhabited in this area is a little more than 500 m from the border of Latvia. The second closest such protected area is about 1300 m from the border, in the north of the research area. See Figure 1.

3. Purpose of providing the opinion

To provide an independent assessment of how the planned construction and operation of the wind farm will affect the provision of resting, feeding and nesting sites for birds and the favourable conservation status of specially protected species (within the meaning of Article 7 of the Law on the Protection of Species and Habitats). The opinion provides information that will allow the responsible authorities to make a balanced decision on whether or not to allow the construction of the planned wind farm or part of it and determine the conditions for conducting its operation.

In the wind farm, 19 WTG are planned with a mast of about 165 m high, a rotor diameter of 160 m to 170 m and a total height of 250 m. The location of the lowest rotor is about 80 m, which is at least twice the height of the trees. The power output of a single turbine is up to 7.2 mW. According to the order, at the start of the study locations of 15 WTG with exactly such parameters were planned and evaluated in the area, while four more variants of different locations of 4 WTG were evaluated during the study and in the opinion (Table 2).

The opinion provides recommendations and conditions to be observed to reduce the negative impact on birds in both the research and the surrounding area. In addition, the measures to be taken to mitigate the effects produced are described. Including bird monitoring, which must be started before the planned operations during construction and continued during the park operation. All geospatial data generated during the opinion, including location of species, have been submitted to the contracting authority of the opinion and are available at its disposal. The locations of SPS, together with this opinion, have been submitted to the Nature Conservation Agency.

The opinion contains 33 images and 3 tables. Scientific names of bird species correspond to the BirdLife International Systematic List (Birdlife, 2020).

4. General description of the area under study

The area under study is predominantly forest land, with separate lands for agricultural use. Forest lands are dominated by commercial forests. The main types of growing conditions on the Latvian side are spruce forest (38.5% of the area), narrow-leaved peat (13.8%), wet spruce forest (7.3%), pine-spruce forest (6.5%) and reeds (5.6%). Whereas, the dominant tree species are the silver birch *Betula pendula* (39.1% of the area), the Norway spruce *Picea abies* (23.4%), the pine *Pinus sylvestris* (14% of the area), the grey alder *Alnus incana* (12%) and the common aspen *Populus tremula* (4.52 %). Agricultural land is dominated by sown crops, but at the southern end of the territory there are also permanent grasslands.

The terrain of the territory is mostly flat, but places have a pronounced microrelief. The nearest bodies of water are located near Arakste. At the southern end of the research area there are several homesteads, such as “Puigas”, “Inčkalni”, “Mālkalni”, “Kaktiņi”. Veserupīte flows in the eastern side of the territory and Krūmiņupīte in the west. There are several small high marshes in the area, which are of significant natural value. The Urgas marsh is the largest of them (about 29.2 ha) and the natural values of the marsh have been preserved there. The Bērzu marsh (23.1 ha) is being developed on the Estonian side, but on the Latvian side it has been negatively affected as a result of drying out and is overgrown. The Lucas marsh (13.6 ha) is also negatively affected and overgrown on the Latvian side, but the Veelikses marsh (60.9 ha) on the Estonian side (on the other side of the Lucas marsh) has been discovered with a ridge-hump microrelief.

5. Specially protected habitats identified

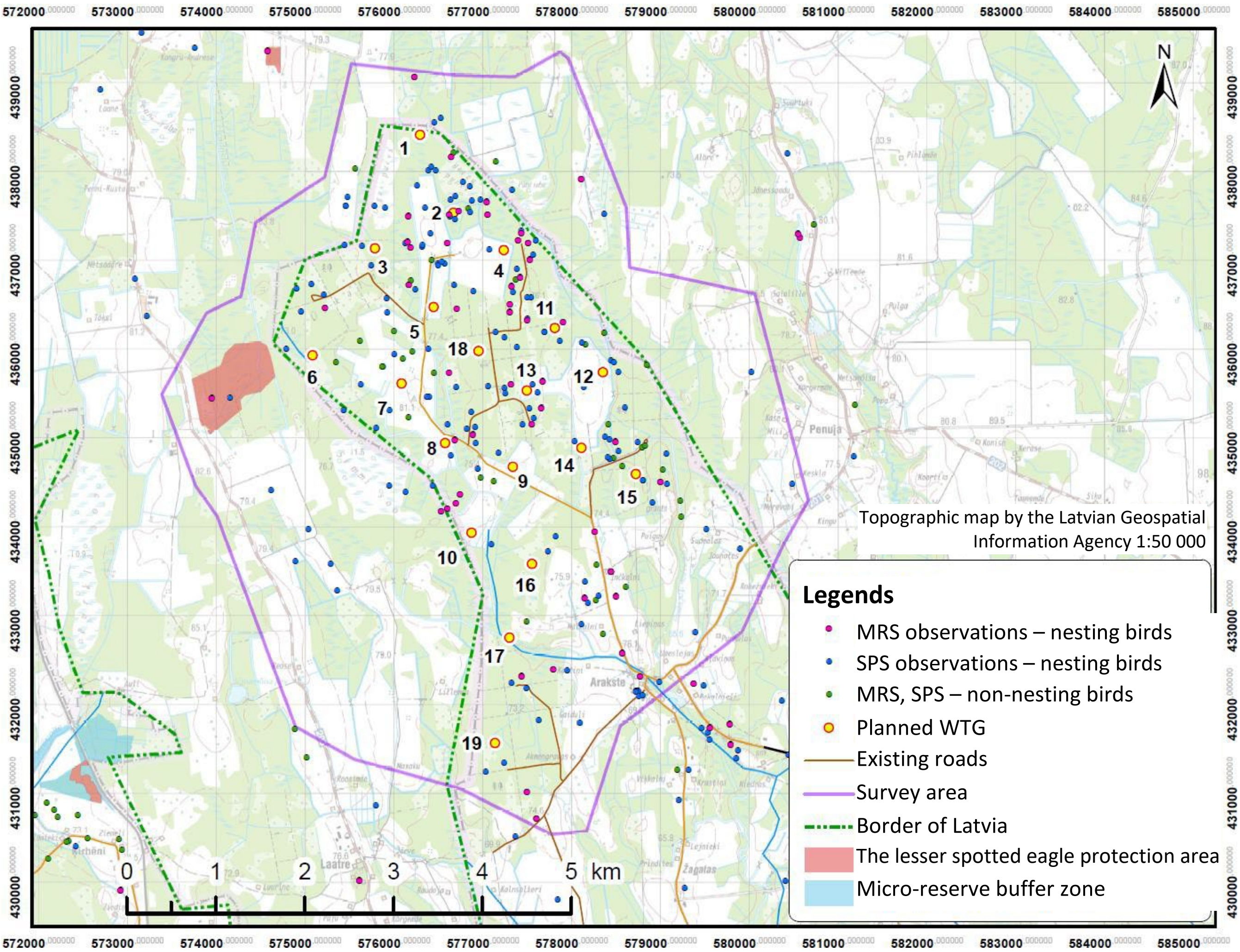
According to the information from the nature data management system Ozols of the Nature Conservation Agency, various specially protected habitats are located in the research area. Active high bogs (7110*), degraded high bogs where natural regeneration is possible or is taking place (7120), marsh forests (91D0*), old or natural boreal forests (9010*), bog forests (9080*), etc.

6. Brief characteristics of the adjacent territory

The adjacent territory is dominated by a forest and mosaic landscape. To the south of the territory there is the Arakstes village and to the north, east and west – Estonia.

7. Identified specially protected species

31 specially protected bird species (SPS), including micro-reserve species (MRS), have been identified in and around the area (Table 3). As part of the opinion, an inventory and mapping of species have been carried out in order to identify as many potential SPS nesting, resting and feeding areas located in the vicinity of the planned WTG as possible. In addition, all observations of other bird species have been summarised. However, annual changes and the fact that identification of species may be incomplete must be taken into account. Therefore, it is possible that in subsequent years, the territories of these species may change and the species may also be found in other places. All sites of SPS observations are shown in Figure 1.



1. Figure Observations of specially protected (SPS) and micro-reserve bird species (MRS), and the planned locations of wind turbine generators.

This section summarises and assesses the most vulnerable, endangered and potentially most affected species found in the area or its periphery. Species descriptions provide information about the possible placement of WTG and approximate distances to the habitats of the identified species. Species descriptions also summarise conclusions about potential impacts of planned activities.

The descriptions of owls and woodpeckers use these results of the ecological niche analysis (habitat suitability for nesting) modelled in the species protection plans in each 500 m x 500 m cell expressed as a percentage in the opinion. For the lesser spotted eagle, unpublished suitability model data have been used. The descriptions also analyse the priority areas allocated in these conservation plans for the conservation of species (for those species for which they have been identified).

7.1. Western capercaillie *Tetrao urogallus*

The western capercaillie is a sedentary species that needs a specific habitat. It stays in its territory all year round. Latvian northern border area is important for the capercaillie and the Estonian and Latvian capercaillie populations exchange.

No pine forests with outstanding or highly suitable habitat for the species have been identified in the survey area. There are no micro-reserves or known nesting sites for capercaillie in the immediate area. The nearest capercaillie micro-reserve (**ID=156264**) is located approximately 16.5 km to the southeast. There are no previously known capercaillie observations in the research area, the closest observation from 2019 was in the Lobiņi marsh, near Ipiķi (the observer was not entirely sure about the species). When inventorying the study area, capercaillies were not visually observed, however, their presence was detected through excrement containing cotton-grass and a nest next to the Lucas/Veelikses marsh in several locations (Figure 2). It is likely that the bird in question came from Estonia and was feeding in its day area in the given place (20 ha in a forest clump), or it was the young bird that did not yet fully participated in the roost. The roosting place was not found, but theoretically there may be one in the vicinity. In this case, the most suitable place for the roost is in the territory of Estonia, in the southern part of the marsh, where there is a wider strip of trees (100-300 m) at the edge of the marsh, and such a roost could contain no more than 2 to 3 roosters (Figure 3).

2. Figure Excrement (A) of the capercaillie and most likely its nest (B).

Beyond the nesting and roosting time, capercaillies can be found at a distance of about 3.5 km to 4 km from the centre of the roosting area. As higher-quality habitats for capercaillies tend to decrease, it is important to find as many suitable habitats as possible that will ensure their favourable conservation status. For example, by retaining a strip of forest on the border of Latvia around the Lucas/Veelikses marsh. Moreover, it is important to avoid such changes in the hydrological regime of the forest and marsh (drainage) that would cause harm the vegetation that the capercaillie depends on. The preservation of the forest strip will additionally serve as a buffer zone for the generated noise and the visibility of turbines (including during construction).

Wind farm development can have a significant impact on population of capercaillies, causing deterioration of quality of their habitat, their loss, fragmentation, or noise and shadow pollution.

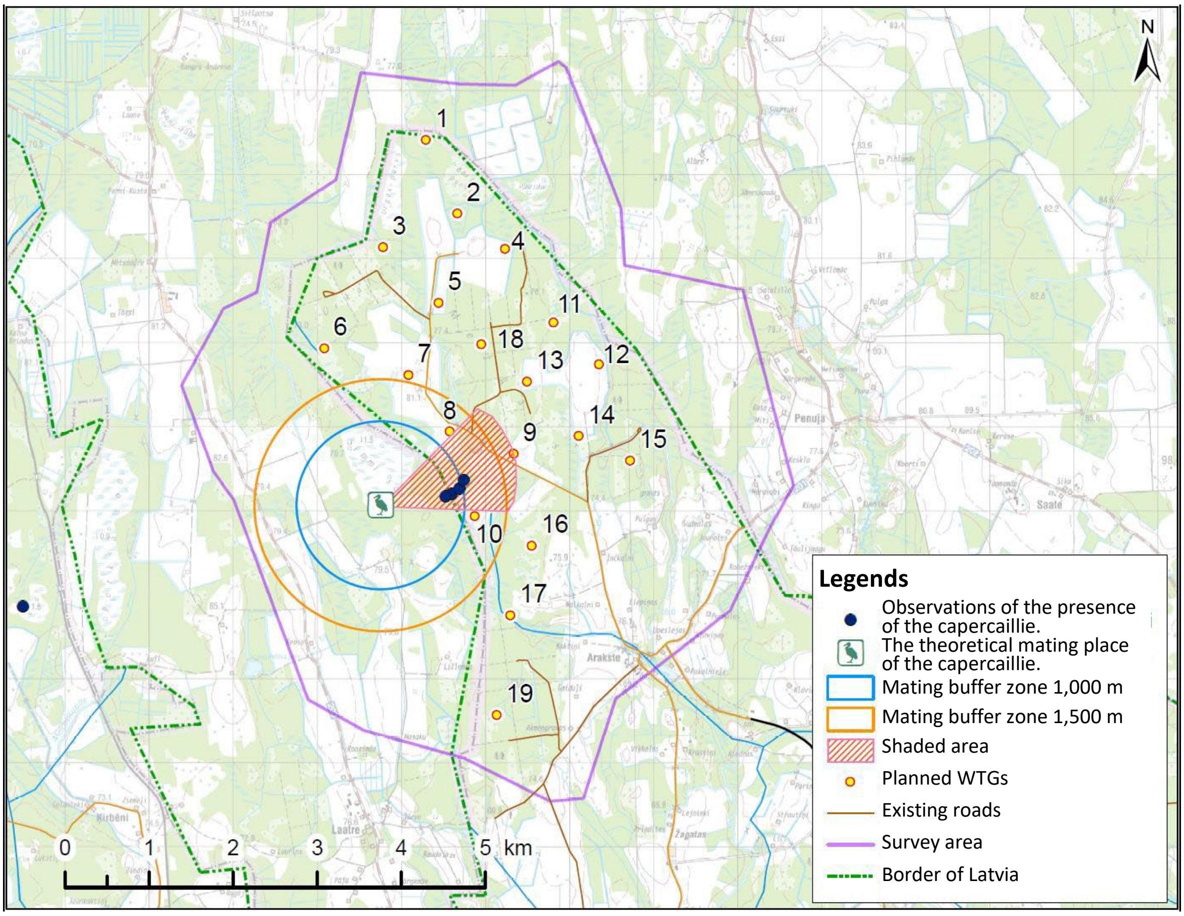
Studies have concluded that, although the areas affected by wind power plants are not completely abandoned, the likelihood of choosing their habitat decreases (as the habitat deteriorates) with an increase in the influence of the turbine (distance, sound, shadow). This negative effect is felt up to 650 m from WTG (Coppes et al., 2020). In turn, a 2021 study in Sweden indicates that the shadow, sound, turbine density and turbine visibility produced by WTG have a significant impact on the choice of resources available to capercaillies up to 865 m (Taubmann et al., 2021).

In the specific case where the planned turbines are located east of the capercaillie habitat and more than 1000 m from the potential roosting site, the negative effects caused by shadow flickering are expected (in particular in the case of WTG **No. 10**). To mitigate this effect during morning hours in April and May (the busiest roosting season of the capercaillie), it is preferable to place WTG **No. 10** as far to the south as possible and WTG **No. 9** to the east as possible, or to keep them off during the morning hours. This will help ensure that the flickering shadow created by power plants will not reach the theoretical roosting ground of the capercaillie. See Figure 3 and the "shadow area" in which the WTG being placed the flickering shadow created can reach the theoretical roosting ground of the capercaillie in the morning hours of spring. For example, at times when the angle of the morning sun above the horizon is less than 14°, the resulting flickering shadow will extend farther than 1 km, while the angle of the sun below 8° above the horizon will create a shadow at a distance of 1,780 m.

Globally, the capercaillie population is not threatened, i.e. it is a species of least concern, but in Latvia there is a lack of quality data for assessing the state of their protection. The population of males is estimated as 1,932. Between 2000 and 2004 and 2013 and 2017, when atlases of nesting birds were compiled in Latvia, a distribution shrinkage that was twice as large (171 5x5 km square) was found rather than their increase (85 5x5 km square) (Ķerus et al., 2021).

Since the capercaillie is a nesting bird that stays in its territory throughout the year, any change in its habitat or disturbance will have a continuous impact. Therefore, in order to ensure the protection of capercaillies, wind park generators should be located as far as possible from the capercaillie habitats, and not closer than 1 km from the centre of a theoretically possible roost of the capercaillie. If the changes result in a WTG planned closer than 1 km, the theoretical location of the roosting area should be verified by specifying if and where it is located, and then adjusting the WTG operation during morning hours in April and May to reduce the impact of noise and flicker.

At present, it is not expected that the construction of the wind farm will result in the destruction of suitable habitats or that the planned wind farm will cause significant harm to the surrounding population of the capercaillie. However, in order to ensure the best possible protection of the capercaillie, it is important that the operation of the stations is as quiet as possible. The risk of collisions with WTG blades is low, but it is possible with a mast. The risk of collisions with overhead power lines or wicker fences is high. The highest risk in the vicinity of WTG **No.8** and **No.10**. In order to reduce the risk of collisions with the mast, it is necessary to take into account the requirements set out in the opinion concerning the colouring and visibility of masts in conditions of poor visibility. In the case of power lines and fences, the requirements for the construction of a wind farm set out in the opinion should be taken into account. When implementing these measures, there will be no significant negative impact on the local population of the capercaillie.



3. Figure Capercaillie observations, buffer zones and shaded area where WTG installation should be avoided. Thus, on spring mornings no shading will be created for the theoretical mating place.

7.2. Black grouse *Lyrurus tetrix*

The black grouse is a nesting bird and stays in the research area all year round, where habitats are suitable for it in the long term. During its nesting season, the black grouse is regularly found in the northern part of the site near all agricultural land plots near the marsh. One bird was sighted most of the time, but the highest number of males observed at the same time was four (in the northern part of the site between Urgas and Bērzu Marshs). A group of 18 birds was sighted in the post-breeding period.

Both globally and locally, in the long term, the population of the black grouse is increasing and it is not recognised as an endangered species, i.e. it is classified as a species of least concern. In the short term, the change of the black grouse population in Latvia is uncertain, so it has been widely estimated as 5885-15 196 males (Ķerus et al., 2021). Whereas, in the results of the national monitoring of birds of the day in 2023, the black grouse was included in the list of birds with a significant decrease in number, with a record low population index of 9.3% from the beginning of the population census in 2005. Therefore, at present, the status of the black grouse protection in Latvia is considered unfavourable (Auniņš et al., 2023).

At present, several planned WTG are located in the vicinity of low rutting farmland. WTG **No. 2** and **No. 5** are located approximately 500 m from the roost with four roosters. 2-3 roosters roost in the vicinity of WTG **No. 7** (200-500m). Whereas, WTG **No.1** and **No.12** are located about 400 m from the site where one roosting bird was found, possibly a satellite rut (Figure 5).

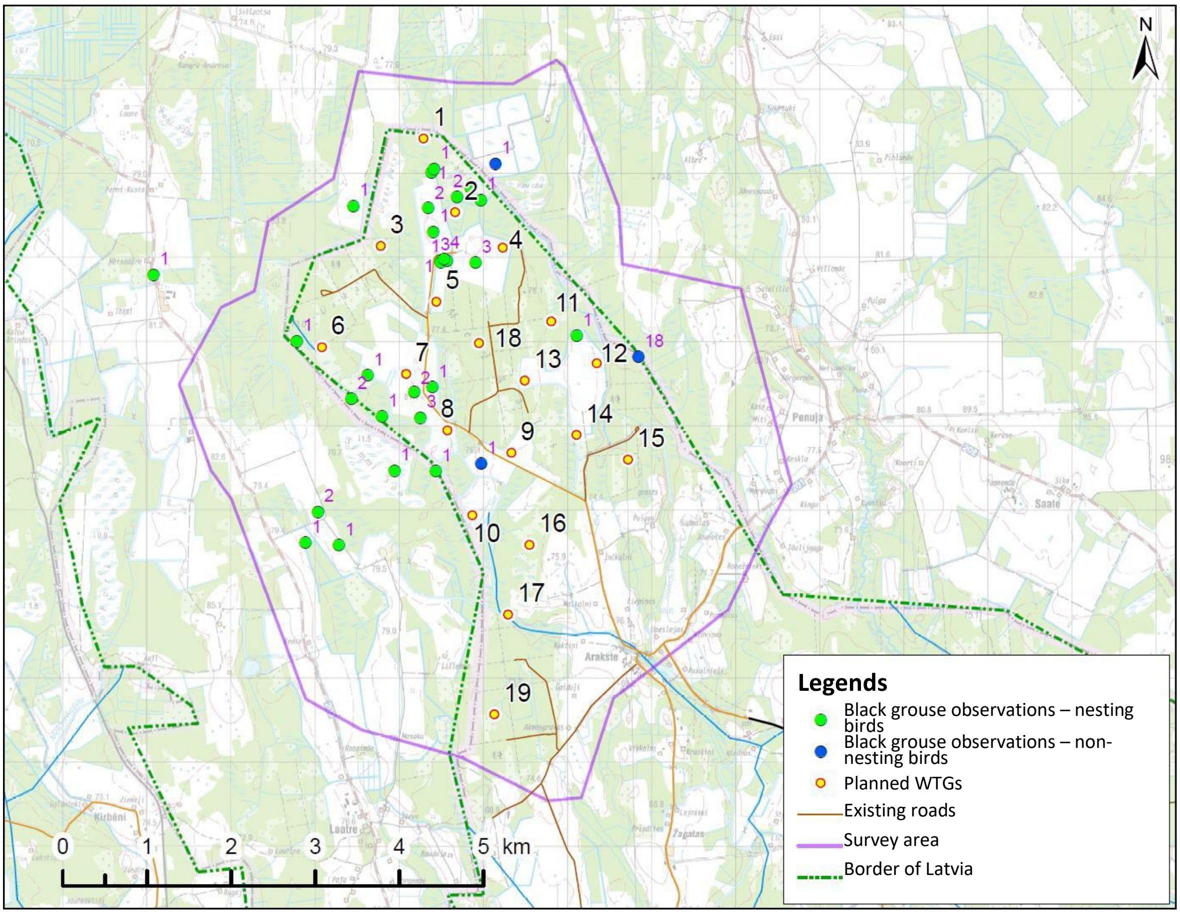
In good and clear weather, when wind speeds are low, the grouse's roosting song can be heard up to 3 km away (Zeiler et al., 2009). When the noise from the WTGs exceeds the song of the grouse, bird communication is disrupted, which can lead to nest abandonment, loss of territory and reduced bird numbers.

The construction of the wind farm will have a negative impact on the black grouse, so it is essential to implement these mitigating measures. One of the solutions is to increase the cut-in wind speed for WTG **No.2, No.4**, **No.5**, **No.7** and **No.8.** Thus, WTG turn on only at increased wind speeds (for example, exceeding 5 m/s) and precipitation when the ambient background noise is high. These measures are essential in the morning hours of spring (15 March to 31 May) - one and a half hours before and at least four to five hours after sunrise. After the first two years of monitoring results, they can be adjusted.

In order not to degrade the habitat of the black grouse, WTG should be located as far as possible from the edges of the marshs and the largest roosts. It is important not to degrade the quality of Urgas and Veelikses marshs, for example, as a result of drying. Overgrowth cleaning and hydrological mode restoration is desirable in the Bērzu marsh, in the territory of Latvia (Figure 4), if possible also in the Lucas marsh. This will provide more roosting areas in the marshs and compensate for the affected roost areas in the vicinity of wind turbine generators.

4. Figure Bērzu Marsh and its overgrowth

The black grouse flies low, so the risk of collisions with WTG blades is low. However, as grouses are not very agile fliers, they are at a higher risk of collisions with various structures, including masts, fences or overhead power lines. This risk is particularly high in low visibility conditions and in spring, when black grouses fly to their breeding grounds in the dark. At these times, they may not be able to see the overhead lines and assess the distance to them (Liepa et al., 2003). The risk of collisions with masts is high at all planned WTG in the northern part. In order to mitigate this risk, it is essential to take into account the requirements set out in the opinion regarding the colouring and visibility of masts in conditions of poor visibility. In the case of power transmission lines and fences, the requirements for the construction of a wind farm specified in the opinion should be taken into account.



5. Figure Black grouse observations and their number in the survey area

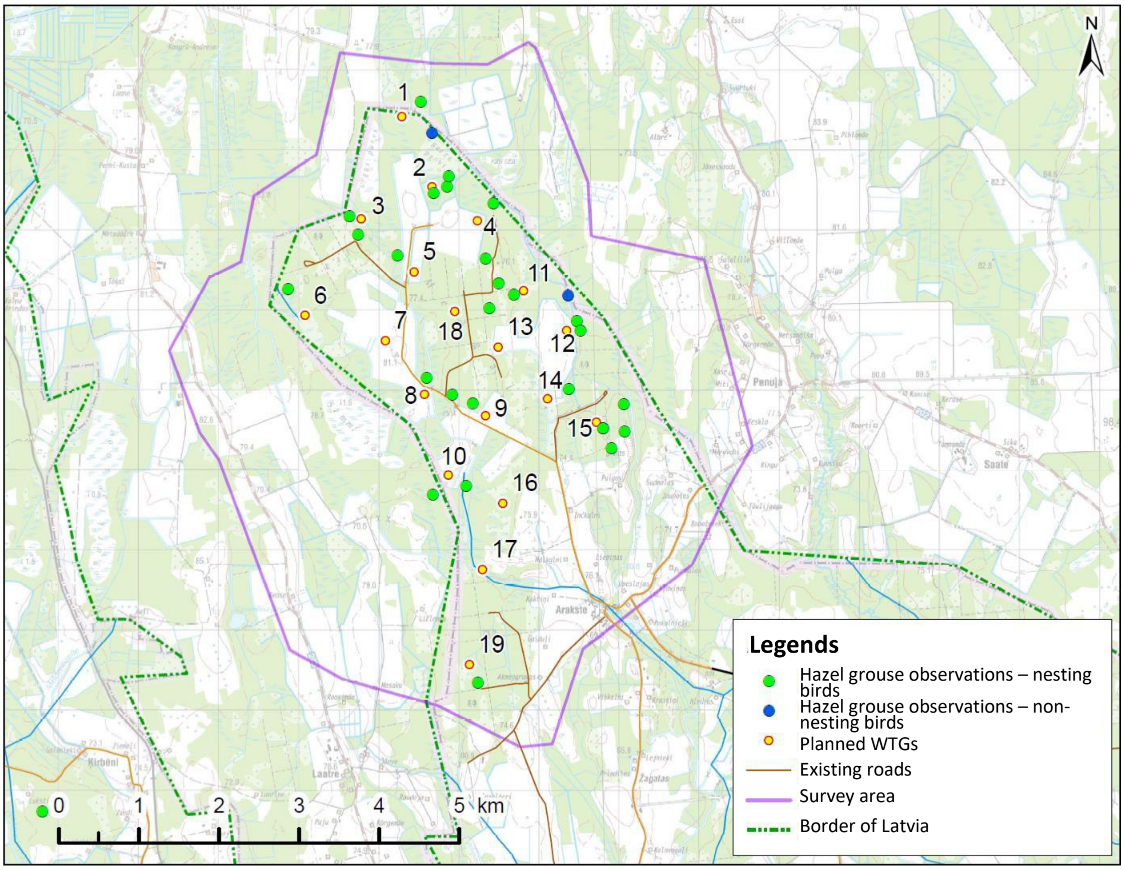
7.3. Hazel grouse *Bonasa bonasia*

The habitat of the hazel grouse is mixed coniferous and deciduous forests. It is a pronounced sedentary, living most of its life in a relatively small area, so any change or disturbance to its habitat will have an ongoing impact on it. The hazel grouse is not globally threatened (i.e. it is classified as a species of least concern), but in Latvia its short-term population is decreasing, whereas the long-term trend is unknown. In Latvia, at the regional level, the hazel grouse is classified as highly endangered (*Endangered*), with a very high risk of extinction, and its number in Latvia sharply decreased by 96% between 2005 and 2022 (Auniņš et al., 2022). The last assessment in 2017 noted that 4858-24069 pairs were nesting at the time (due to the rapid decline, the population amplitude is wide), and one of the main reasons for the change in distribution and number is the increased intensity of deforestation (Ķerus et al., 2021). Measures to protect the hazel grouse are critically important.

When compiling the inventory data, it is concluded that the forests of the study area are an important habitat for the hazel grouse. The hazel grouse is found throughout the area of the planned wind farm in at least 15 habitats (see Figure 6). For the hazel grouse, developing a wind farm in the forest will have a negative impact. The most significant impacts may be from the degradation or loss of available habitats and the risk of collisions with turbine masts. At least five WTG (**No.2, No.3, No.11, No.12**, **No.15**) are currently planned closer than 200 m from the nearest known hazel grouse habitat, while 17 planned WTG are located within 500 m (additional WTG: **No.1, No.4, No.5, No.6, No.8, No.9, No.10, No.14, No.13, No.16, No.18, No.19**).

There are no detailed studies on the impact of wind farms on the hazel grouse. However, it is likely that the most significant negative impacts on the hazel grouse may result from the reduction of available habitat. This decline can range from a decline in habitat quality to habitat destruction. The quality of the habitat can be degraded by both the sounds produced (similar to other herbivorous birds), both due to increased anthropogenic disturbance. Since the risk of collisions with the wind turbine mast, overhead lines and fences is likely to be high, it is essential to take into account the wind farm construction requirements set out in the opinion and the requirements for the colouring and visibility of the masts in conditions of poor visibility. The risk of collisions with the WTG blades is low, since the flight of the hazel grouse is mostly low.

The implementation of the recommendations of this opinion, the planning recommendations, the mitigation measures, including noise limitation guidelines, without reducing the area of habitats available to the hazel grouse, by building stations only in young forests and away from old forests, are not expected to have a significant negative impact.



6. Figure Observations of the hazel grouse.

7.4. Grey partridge *Perdix perdix*

The grey partridge is a sedentary species that lives in open farmland all year round. Although globally and in the long term, the population of the grey partridge in Latvia is decreasing, it is not currently recognised as an endangered species i.e. it is classified as a species of least concern. In the short term, its number is stable in Latvia, and between 500 and 1100 pairs are nesting (Ķerus et al., 2021).

One songbird was spotted in the survey area in farmland between larger forest areas near WTG **No.12** and **No.14**, as well as around Arakste.

The risk of collisions with the wind turbine mast, overhead lines and fences is likely to be high, so it is essential to comply with the requirements for the construction of a wind farm indicated in the opinion and for the coloration and visibility of the mast in conditions of poor visibility. The risk of collisions with WTG blades is low.

As the density of this species is low in the area and the most important habitats for the grey partridge are located outside the planned wind farm area, the construction of the wind farm is not expected to have a significant negative effect on the local population of the grey partridge.

7.5. Black stork *Ciconia nigra*

The black stork is a long-distance migratory bird that mainly inhabits old and larger forests with watercourses and water bodies for nesting in Latvia. The nesting areas are diversions from each other and are flanked by large feeding areas, in which the stork predominantly catches a variety of freshwater fish by wading through shallow waters.

Although globally the black stork does not qualify as an endangered species (i.e. it is classified as a species of least concern), in Latvia its long-term and short-term population is shrinking, and at the regional level it is critically endangered, with an extremely high risk of extinction. 85-140 pairs nest in Latvia (Ķerus et al., 2021), and the protection of each individual on a Latvian scale is essential.

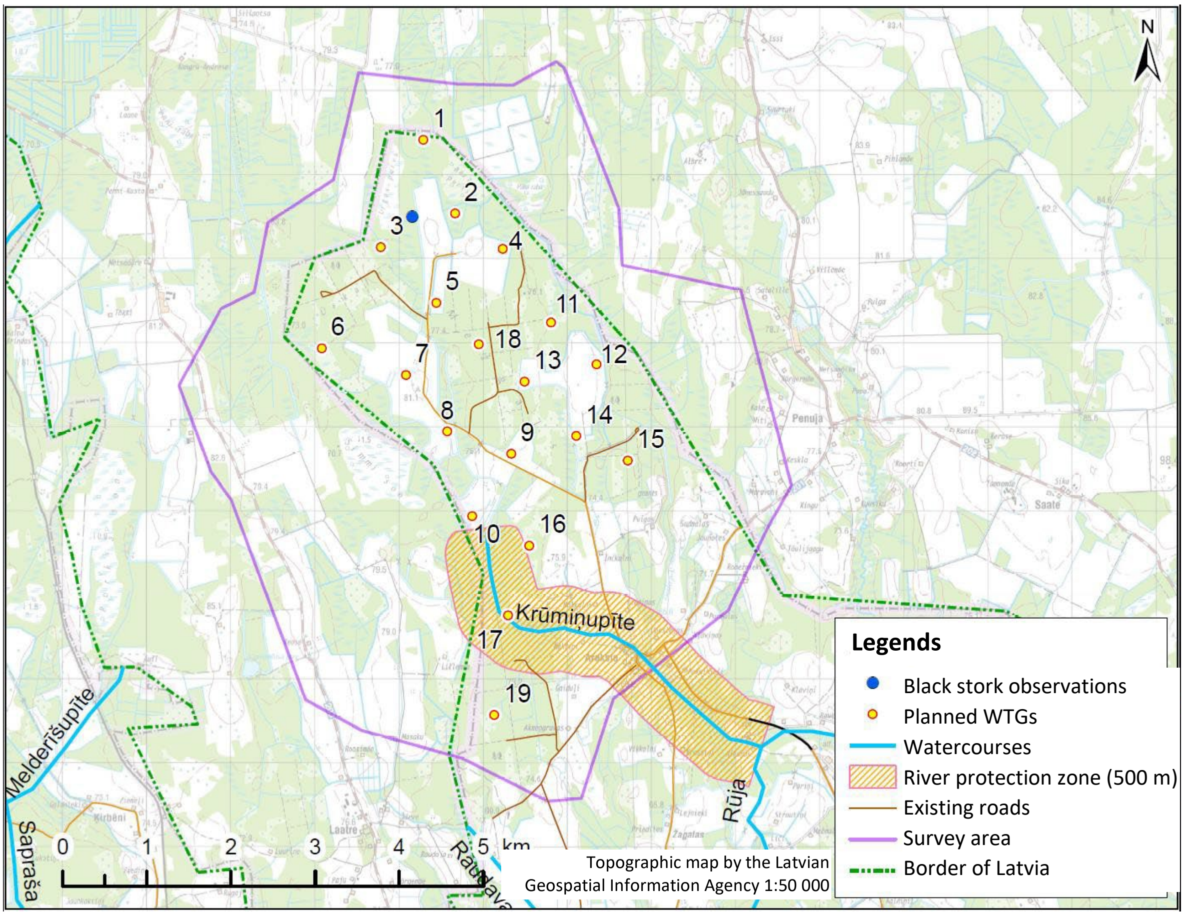
One black stork was spotted in the survey area in spring (8 May), it circled over the site and flew in the direction of Estonia (Figure 8). It is believed to have been a passing bird. No black stork feeding or nesting sites have been recorded in the vicinity of the observation. From April to September, the black stork can appear in the park by passing by or feeding, for example, at Krūmiņupīte (Figure 7) near Arakste, not far from the nest of the lesser spotted eagle (near WTG **No.17**), or in the eastern part of the territory along Veserupīte**.** Approaching WTG **No.10**, Krūmiņupīte becomes a small stream and is unlikely to be a viable feeding place.

7. Figure Krūmiņupīte at the planned WTG **No.17**, which is a perspective feeding place of the black stork. 7 May 2023

In the expert's opinion, a protection zone of approximately 1 km wide (500 m on either side from the middle of the river) should be maintained along Krūmiņupīte, which is a potentially suitable feeding area for the black stork (Figure 8). To avoid limiting the availability of feeding places and to reduce risks of collisions, WTG **No.17** should be planned in another location.

The nearest known black stork nest is in Estonia, approximately 12 km from the nearest planned WTG **No.1**.

To reduce the risk of collisions, it is also essential to respect the technical requirementsfor WTG as indicated in the opinion.



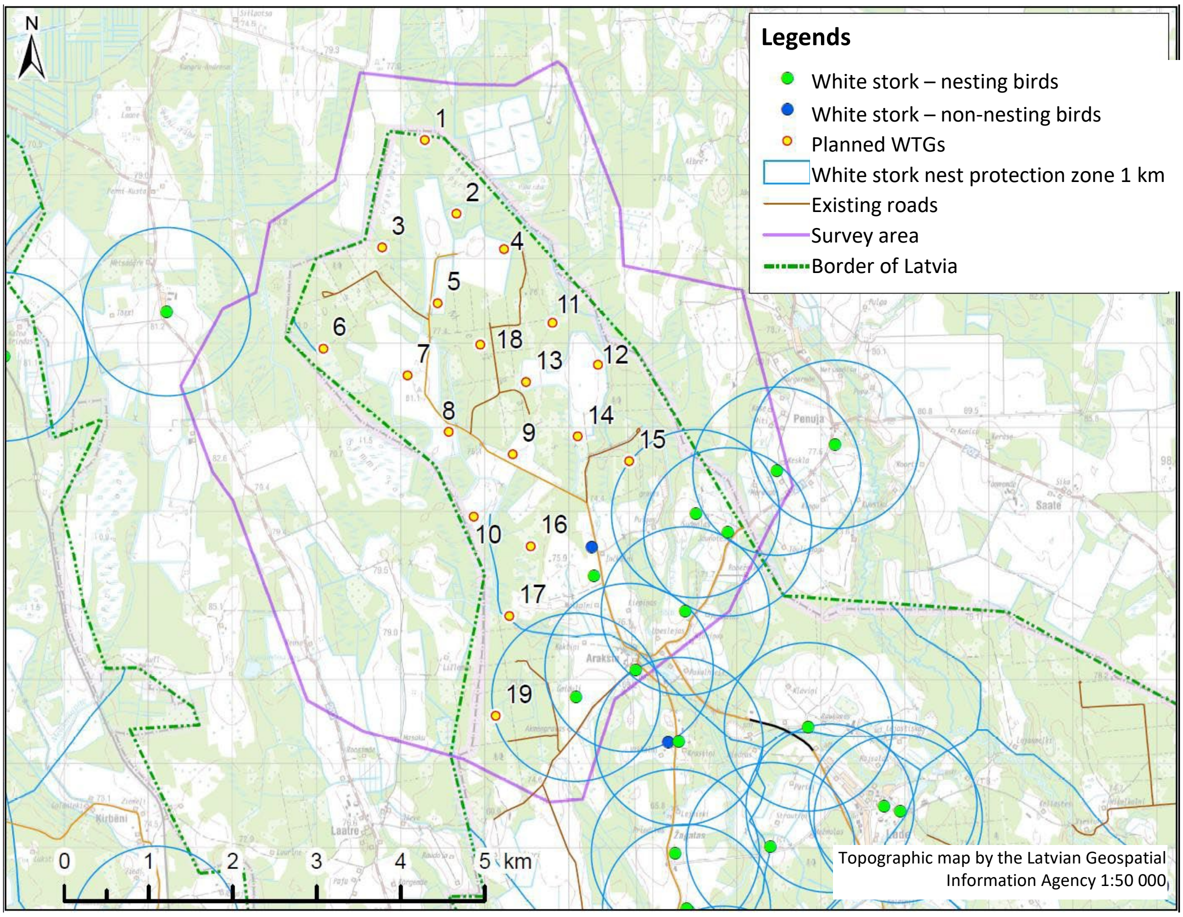
8. Figure Observations of the black stork in the vicinity of the study area and the protective zone of rivers.

7.6. White stork *Ciconia ciconia*

The white stork is a migratory bird that in Latvia usually chooses nesting sites near human habitation. At least six occupied nests were recorded in the south of the study area and a further nine nests in the surrounding area (see Figure 9).

Both in Latvia and globally, the population of the white stork is increasing. There are between 13,500 and 14,200 pairs nesting in Latvia, and its population is rated as safe both locally and globally (i.e. it is classified as a species of least concern; Ķerus et al., 2021).

The white stork inhabits farmland, where it forages in the open landscape within a radius of 1 km to 2 km of its nest. As all the nearest planned WTG are located in a forest landscape and at least 1 km away from the nest, the storks are not expected to feed near WTG. In general, both during nesting and during migration, the risk of collisions is most likely low and the overall impact of the park is insignificant. To mitigate the risk, the requirements and activities for ensuring the favourable protection status must be ensured, as provided in the opinion.



9. Figure White stork nests and observations

7.7. Pygmy owl *Glaucidium passerinum*

The pygmy owl is a sedentary inhabitant of old mixed forests and coniferous forests. A micro-reserve can be established to protect its habitat. The forests in the area are considered suitable for nesting, passage and wintering: resting, feeding and nesting. The number of pairs nesting in Latvia is between 3,671 and 9,464. The population of the pygmy owl in Latvia is decreasing over the long term (Ķerus et al., 2021), and the most significant reason for this is forestry (Avotiņš jun., 2019).

According to the habitat suitability model of the species protection plan (Avotiņš jun., 2019), the suitability of the species in the planned WTG cells ranges from 1.9% to 67.8%, with an average value between all planned stations of 34.4%. One of the currently planned 19 WTGs (**No.18**) is located in the pygmy owl priority protected area and WTG **No.11** is at a distance of approximately 10 m from this priority area, consisting of five 500x500 m cells. At the northern end of this priority protected area (upper cell with a suitability of 61.1%), successful nesting of the pygmy owl with juveniles was observed. After assessing the current situation in nature and suitable plots, this northern end of the priority area and at least one more cell 500x500 m to the north is the most suitable for the pygmy owl (suitability according to the model - 55.4%). The detected juveniles and currently suitable habitat are located approximately 550 m to 850 m from WTGs **No.18** and **No.11**. Both of these WTG are planned at the sites unsuitable for the pygmy owl, since the WTG will remain throughout the park for the duration of its service life (20 to 30 years). The location of the other planned generators is outside the priority conservation areas defined in the Species Conservation Plan (Figure 10). The following is the list of all stations located less than 1,344 m (the noise pollution buffer distance adopted in the Species Conservation Plan) from the priority protected area of the pygmy owl: WTG **No.2** - 900 m, **No.3** - 1260 m, **No.4** - 230 m, **No.5** - 370 m, **No.13** - 710 m, **No.8 - 220 m, No.9** - 230 m, **No.10** - 960 m, **No.12** - 570 m, **No.13** - 195 m, **No.14** - 810 m, **No.16** - 1340 m. It should be noted that the currently planned WTG are surrounded on all sides by the priority protected area of the pygmy owl. Therefore, special care must be taken to avoid the risk of reducing the quality and importance of this priority protected area.

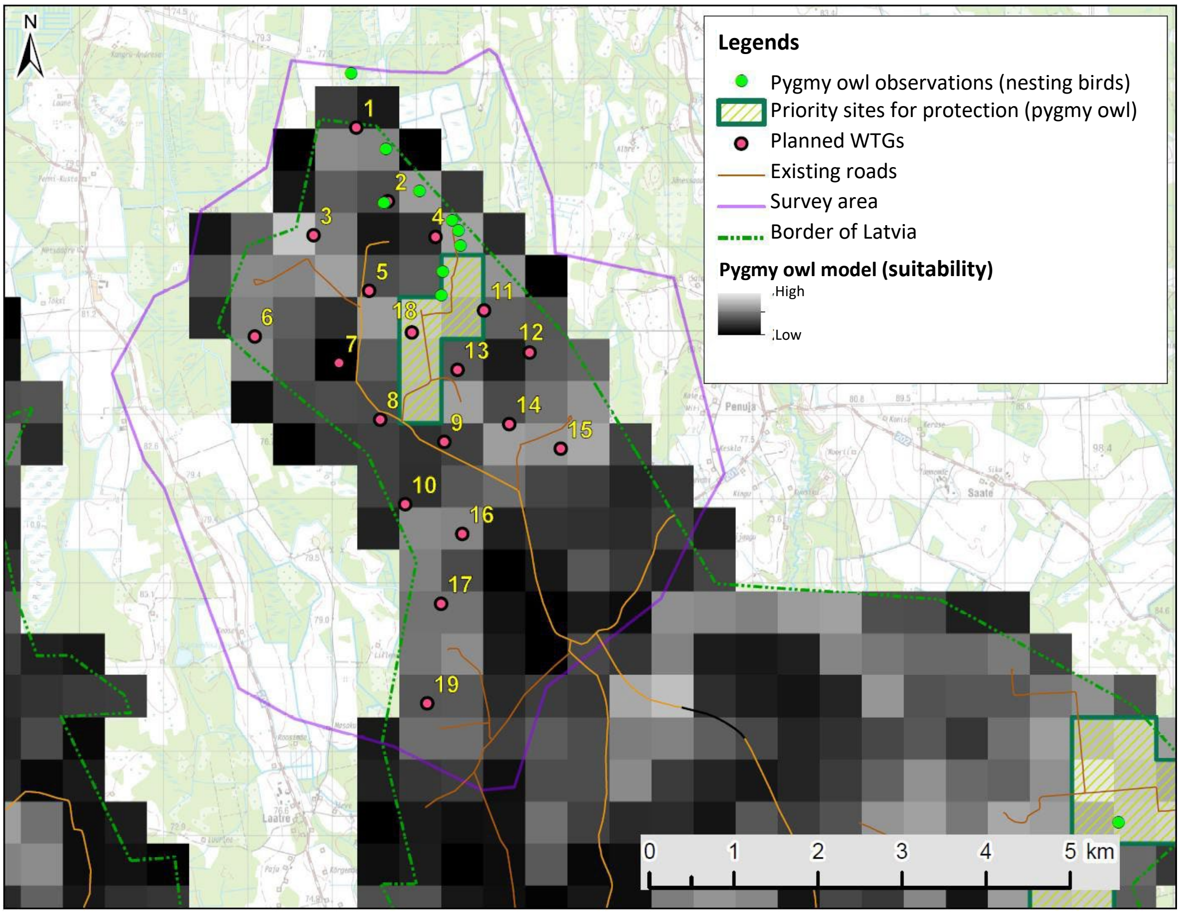
The pygmy owl has been recorded in at least four or five locations of the study area, mostly in its northern part, both within and close to the priority protected area. The approximate distance from the pygmy owl observations to the nearest wind turbine currently planned is 60 m and 390 m (WTG **No. 2**) and 280 m (WTG **No. 4**). The closest observation near WTG **No.2** was on 17 April, and two observations in the vicinity of WTG **No.4** were on 7 April and one on 8 April.

When developing a wind park, it is important not to reduce or worsen the habitats of the pygmy owl, to preserve priority protection sites, ensuring an appropriate mode of silence in them. According to the species protection plan, the noise pollution level should not exceed 35 dB. To ensure an adequate quiet regime in priority protection and nesting sites, the WTG should be planned as far away from these areas as possible, or the operation of the WTG should be limited at certain times.

If WTGs **No.18** and **No.11** start operating at times when the ambient background noise exceeds 35 dB, but the station reaches its highest speed (and sound) at a time when the ambient background noise is 60 dB, it is unlikely that the noise will cause any disturbance. When ambient background noise reaches 60 dB, there are no operational limitations for WTG.

However, given that the noise generated by WTGs around the priority protection area (for WTG closer than 1,344 m) can add up to produce significant noise pollution, it is important to carry out an additional assessment. It is necessary to model the noise produced by the WTG and then to assess how this will affect the quality of the habitat of the pygmy owl and the priority habitats to be protected. If the noise generated by the wind farm significantly disturbs the pygmy owl population there, restrictions and conditions should be considered to ensure the favourable conservation status of the pygmy owl. The pygmy owl needs forests that are little affected by economic activities, so it is important to preserve and maintain a sufficiently large habitat with adult and overgrown forests, reducing the impact of economic activity (Avotiņš jun., 2019).

The risk of collisions, mostly associated with the mast, is likely to be low, but the requirements and actions to ensure favourable protection status set out in the opinion must be respected.



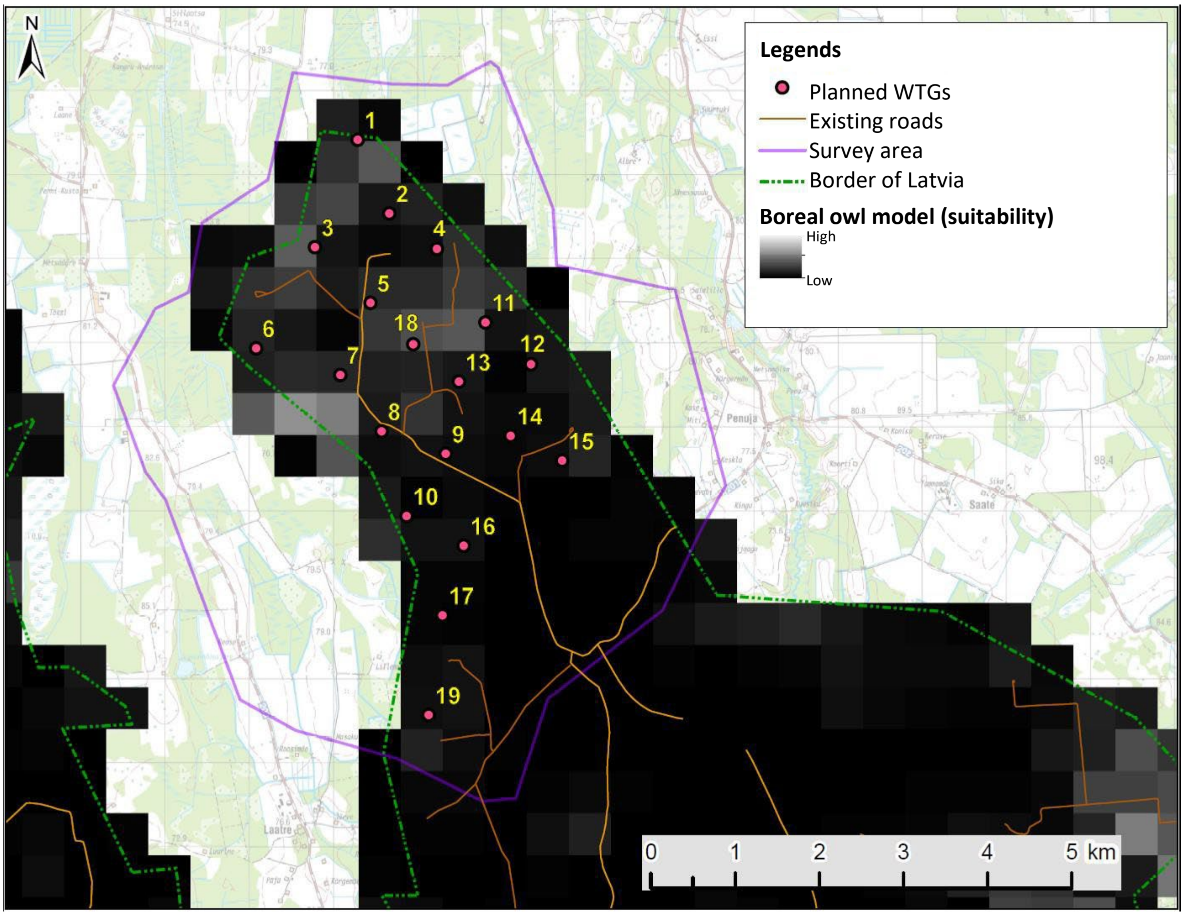
10. Figure Pygmy owl observations, suitability model and priority areas for conservation

7.8. Boreal owl *Aegolius funereus*

The boreal owl inhabits larger old mixed and coniferous forests. The species can form micro-reserves to protect the habitat. To ensure a favourable conservation status, it is essential to maintain and sustain a sufficiently large habitat with mature and overgrown coniferous stands, minimising the impact of economic activities and limiting sound pollution (Avotiņš jun., 2019). The territory of the wind park is partially suitable for the boreal owl and has not been identified in the territory of the species concerned when carrying out the inventory the boreal owl.

In accordance with the habitat suitability model of the boreal owl developed within the framework of the plan for the protection of owls (Avotiņš jun., 2019), the suitability of the planned WTG cells ranges from 3 to 35%. The highest suitability is near WTGs **No.07** and **No.08**, where it reaches 47% and 54% respectively. The study area is outside the priority conservation areas identified in the species conservation plan (Figure 11).

Subject to the requirements and actions to ensure the favourable protection status set out in the opinion, the risk of impact is low.



11. Figure The boreal owl suitability model

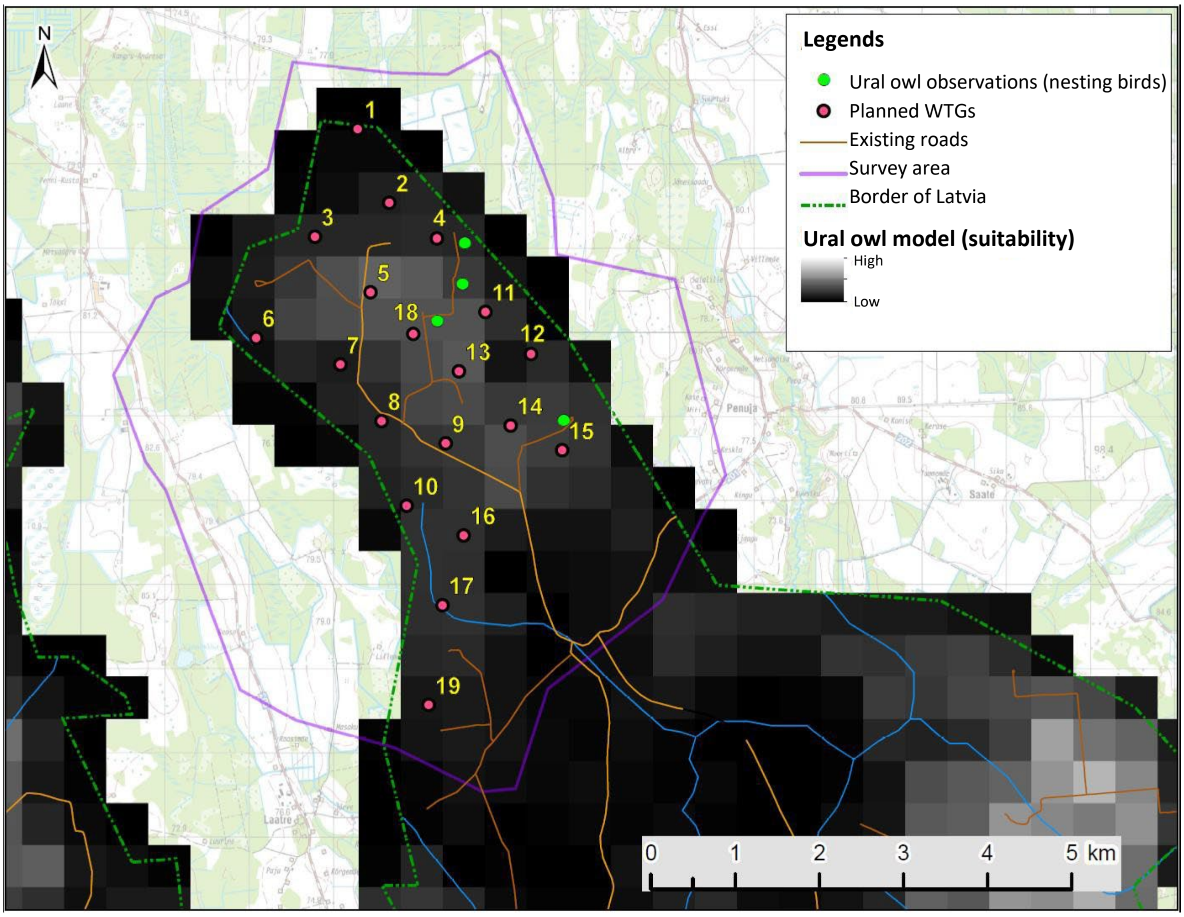
7.9. Ural owl *Strix uralensis*

The Ural owl is a sedentary bird that inhabits mostly large, continuous forest stands. The territory is characterised as a medium-sized forest massif, where the Ural owl was found in four areas (Figure 12). There were two observations of the pygmy owl in the priority conservation areas and one at a distance of 150 m from these.

According to the model of the species conservation plan (Avotiņš jun., 2019), the species suitability in the planned WTG cells ranges from 1.7% to 36.2%, with an average value among all planned WTG of 18.9%. The proposed WTGs are located outside the priority conservation areas identified in the Ural owl conservation plan and there are no such areas in the immediate vicinity.

The Ural owl was found at a distance of about 330 m from WTG **No.4**, 430 m from WTG **No.11,** 650 m from WTG **No.13,** 320 m from WTG **No.18**, 630 m from WTG **No. 14** and 360 m from WTG **No.15.** Negative impacts are associated with the abandonment of nesting territories due to disturbance (e.g. sound) or habitat destruction (logging) (Avotiņš jun., 2019).

Forest fragmentation is one of the most significant negative influencing factors (Rueda et al., 2013). Low-impact forests should be preserved by providing a sufficiently large habitat with adult and overgrown forests, reducing the impact of economic activity (Avotiņš jun., 2019). In addition, potential nesting sites such as trunks, trees with large cavities and large nests should be preserved. The risk of collisions with the mast of the generator is medium. To mitigate risks, the requirements and actions to ensure favourable protection status set out in the opinion should be complied with.



12. Figure Ural owl observations and the site suitability model

7.10. Eurasian eagle-owl *Bubo bubo*

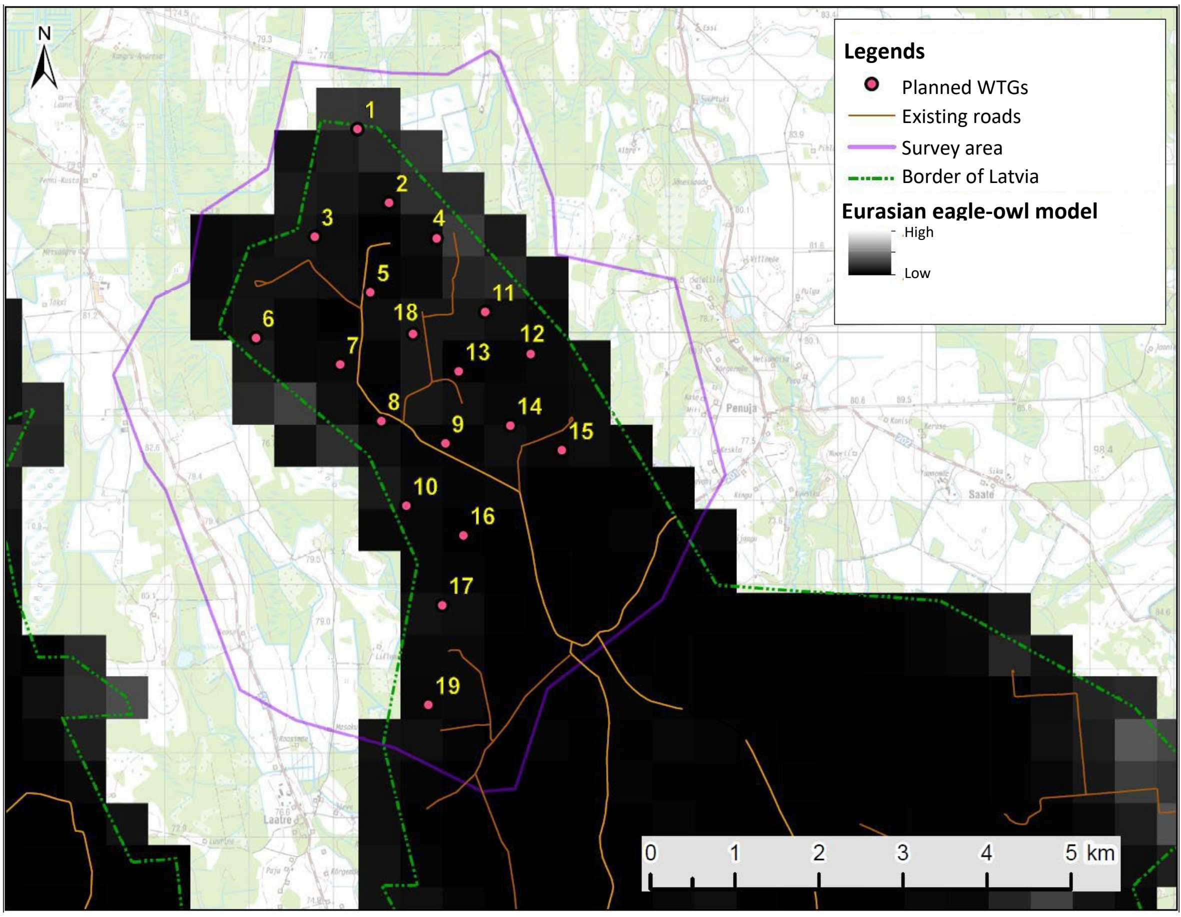
The Eurasian eagle-owl is a sedentary bird and the largest eagle-owl, inhabiting a variety of biotopes, including woodlands. The Eurasian eagle-owl is a particularly protected species, for the protection of which a micro-reserve can be formed at the nesting site.

Globally, the Eurasian eagle-owl does not qualify as an endangered species (i.e. it is classified as a species of least concern), but due to the small number of nesting pairs in Latvia, it is classified as critically endangered, with an extremely high risk of extinction. According to the latest number estimate, 7-73 pairs nest in Latvia, and this population has decreased in the short term, but long-term changes are unknown (Ķerus et al., 2021). The most significant negative impact is considered to be deforestation, especially during the nesting period of the Eurasian eagle-owl. It destroys woodlands important for the nesting of the Eurasian eagle-owl, creates an unfavourable fragmentation and disruption (Avotiņš jun., 2019).

According to a study in Norway (Husby et al., 2022), 41% of Eurasian eagle-owls leave their nesting territories located 4 km to 5 km from WTGs. Most of all, those areas that were closer to WTGs were abandoned. The disturbance already created during construction is indicated as significant. Another potential risk (which can be deadly) is overhead power lines (Rubolini et al., 2001). Therefore, to mitigate this risk, buried cable lines along roads should be used in wind farms where there is a potential for the Eurasian eagle-owl habitats.

According to the species conservation plan (Avotiņš jun., 2019), there are no priority protection areas for the Eurasian eagle-owl in the research area and in the immediate vicinity. The species suitability in the planned WTG cells ranges from 1.7% to 19.2%, with an average value among all planned WTG of 5.4% (Figure 13). Historical data and site inventories have not revealed the presence of the eagle-owl in the study area and its surroundings.

The risk of collisions, mostly associated with the mast, is low. The requirements and actions to ensure favourable protection status set out in the opinion must be complied with.



13. Figure The Eurasian eagle-owl suitability model

7.11. Three-toed woodpecker *Picoides tridactylus.*

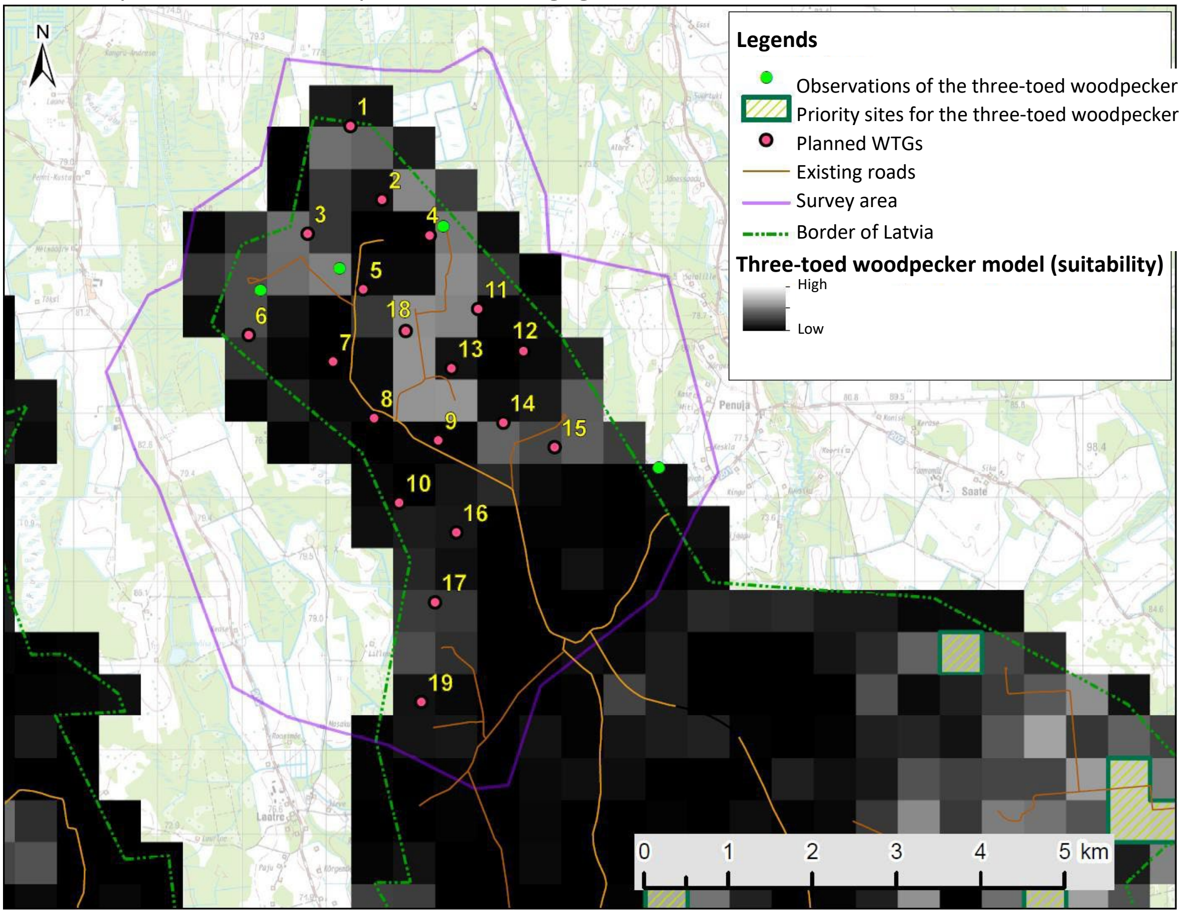
The three-toed woodpecker is a sedentary species, mainly inhabiting coniferous and mixed forests, as well as alder thickets. The following potentially suitable habitats have been identified in some locations in the study area.

At the global level, the three-toed woodpecker is not considered a species of least concern, but at the regional level in Latvia it is critically endangered, with an extremely high risk of extinction, and therefore its conservation requires special attention. To protect the three-toed woodpecker, it is possible to form a micro-reserve at the nesting site. According to the latest estimate of the number, 1000-2000 pairs nest in Latvia, and although the population decreases in the short term, it is stable in the long term (Ķerus et al., 2021).

According to the three-toed woodpecker conservation plan (Bergmanis et al., 2020), the species suitability in the planned WTG cells ranges from 0.1% to 56.5%, with an average of 15.7% across all planned WTG. There are no priority protection areas for the three-toed woodpecker within and adjacent to the study area (Figure 14). The nearest such areas are located at a distance of about 5 km south-east from WTG **No.15**.

The three-toed woodpecker was recorded at four sites during the breeding season. The approximate distances from the observations to the nearest planned WTG are 190 m (WTG **No.4**), 375 m (WTG **No.5**) and 550 m (WTG **No.6**).

Since the planned WTG are outside the habitats of three-toed woodpeckers, the habitats will be conserved. There is a lack of research on how noise pollution affects the three-toed woodpecker and its habitat selection. While it is believed that the conservation of existing habitats is paramount, it is advisable to keep abreast of changes in the area for this species and to comply with the technical requirements provided in the opinion for noise mitigation at WTGs. The risk of collisions with blades is low, but it is important to observe the requirements set out in the opinion concerning the colour of the mast and its visibility in conditions of poor visibility, as well as the instructions for the location of WTGs. In view of these requirements, the impact will be negligible.



14. Figure Three-toed woodpecker observations, suitability model and priority protection areas

7.12. White-backed woodpecker *Dendrocopos leucotos*

The white-backed woodpecker inhabits old deciduous and mixed forests, including open landscapes. It is more common in eastern and northern Latvia. At the global and regional level this species is not endangered (i.e. it is classified as a species of least concern).

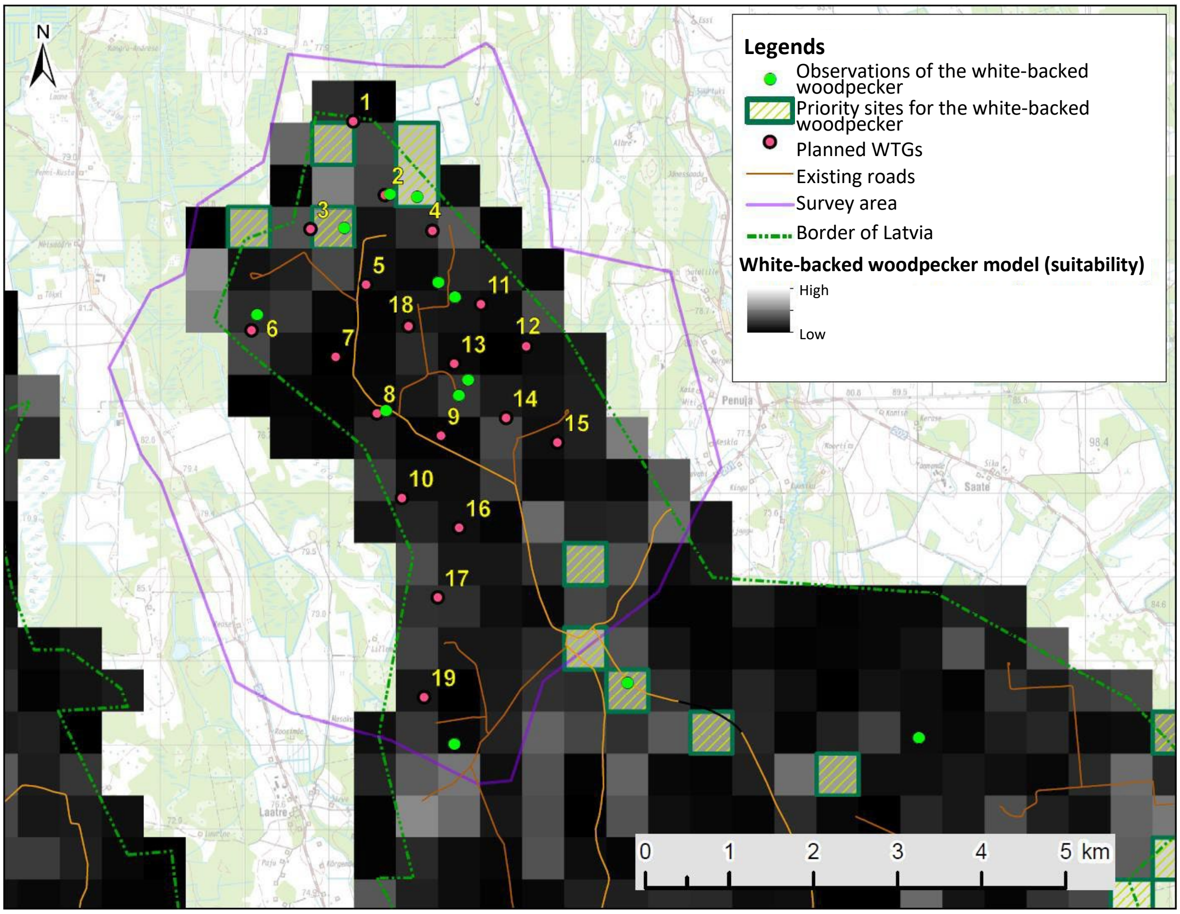
According to the latest assessment, between 4,000 and 7,000 pairs of white-backed woodpeckers nest in Latvia, and although the short-term trends of the population are not clear, in the long term it is growing (Ķerus et al., 2021). For the white-backed woodpecker, it is possible to form a micro-reserve at the nesting site.

The species suitability according to the species conservation plan (Bergmanis et al., 2020) in the planned WTG cells varies from 1.8% to 32.4%, with an average value among all planned stations of 12.6%. Although currently planned WTG are outside the priority protection areas identified in the species conservation plan, there are several sites in the study area (especially at the northern end), and WTG planned close to them. The nearest priority protection area (with a pixel value of 63.2%) is located approximately 10 m from the planned WTG **No.1**, but the presence of the bird in the year of the survey in this area was not detected. Another protection area (with a pixel value of 75.1%, which also contains a white-backed woodpecker nest) is approximately 130 m from the currently planned WTG **No.2** and 290 m from WTG **No.4**. In turn, WTG **No.3** is located approximately 10 m away from the priority protection area with a pixel value of 56.4%, where the nesting white-backed woodpecker has been detected. In total, four to six potentially suitable habitats have been identified in the area (Figure 15).

During nesting, the white-backed woodpecker was also found at a distance of approximately 200 m from WTG **No.6**, 120 m from WTG **No.8**, 520 m from WTG **No.9**, 320 m from WTG **No.11**, 250 m from WTG **No.13** and 660 m from WTG **No.19**. During nesting, the white-backed woodpecker is likely to use an area of more than 2 km^2, which means that it may be present in the vicinity of all planned WTG. In general, the study area is characterised as important for nesting, resting and feeding of the white-backed woodpecker, where it can be found throughout the year.

To maintain the good quality of the habitats of the white-backed woodpecker, it is important not to destroy or drain them. Their hydrological regime must also be preserved. WTG should be planned as far away as possible from the priority protected areas and habitats of the white-backed woodpecker. In this way, habitats will not be fragmented and will have the least possible negative effect. Although there is a lack of research of how the sound produced by wind farms affects the white-backed woodpecker, caution should be observed and further monitoring should be carried out, assessing the effects caused by noise and interference.

The risk of collisions with the blades is low, but the exact effect is unknown. The requirements for the colour of the mast and its visibility in conditions of low visibility must be taken into account. The location of the WTG and the noise reduction instructions must also be observed.

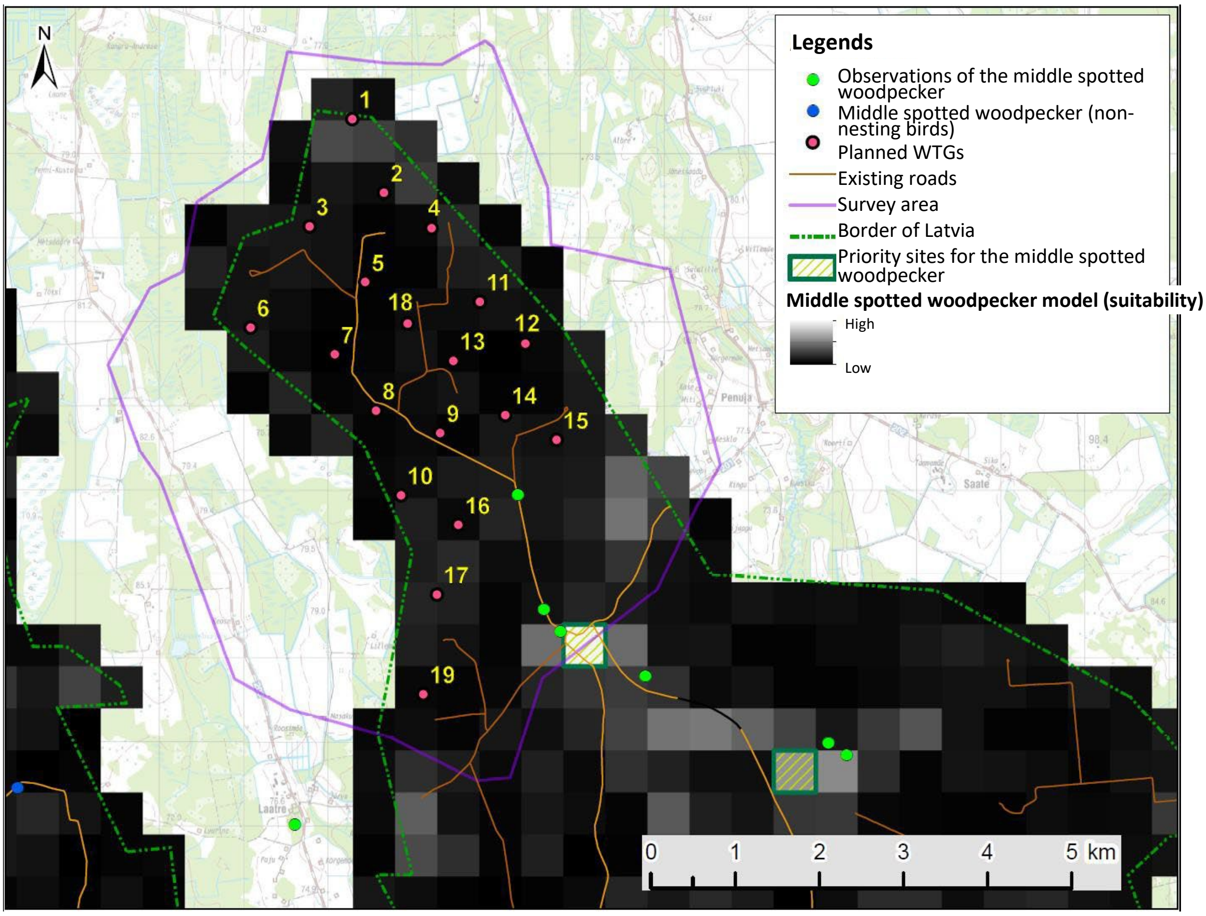


15. Figure White-backed woodpecker observations, suitability model and priority protection areas

7.13. Middle spotted woodpecker *Dendrocoptes medius*

The middle spotted woodpecker is a sedentary species that lives mainly in broadleaved and mixed oak forests. No habitats suitable for this species have been identified in the vicinity of the proposed WTG. There are no priority areas identified in the species conservation plan (Bergmanis et al., 2020) in the vicinity of the proposed WTG. The nearest such area is more than 1,500 m from planned WTG (Figure 16). Both locally and globally, the middle spotted woodpecker population is safe, and in the long term its population in Latvia is growing, as well as its distribution increases significantly (Ķerus et al., 2021).

The nearest record of the middle spotted woodpecker is approximately 800 m from WTG **No.16** and **No.15**. Most observations are around priority protected areas, in the south of the territory. The species suitability modelled in the species conservation plan for the planned WTG cells ranges from 0.1% to 13.8%, with an average value among all planned WTGs of 5.8%. The risk of collisions with blades or masts is low and the impact of the proposed wind farm, including noise, will not be significant.



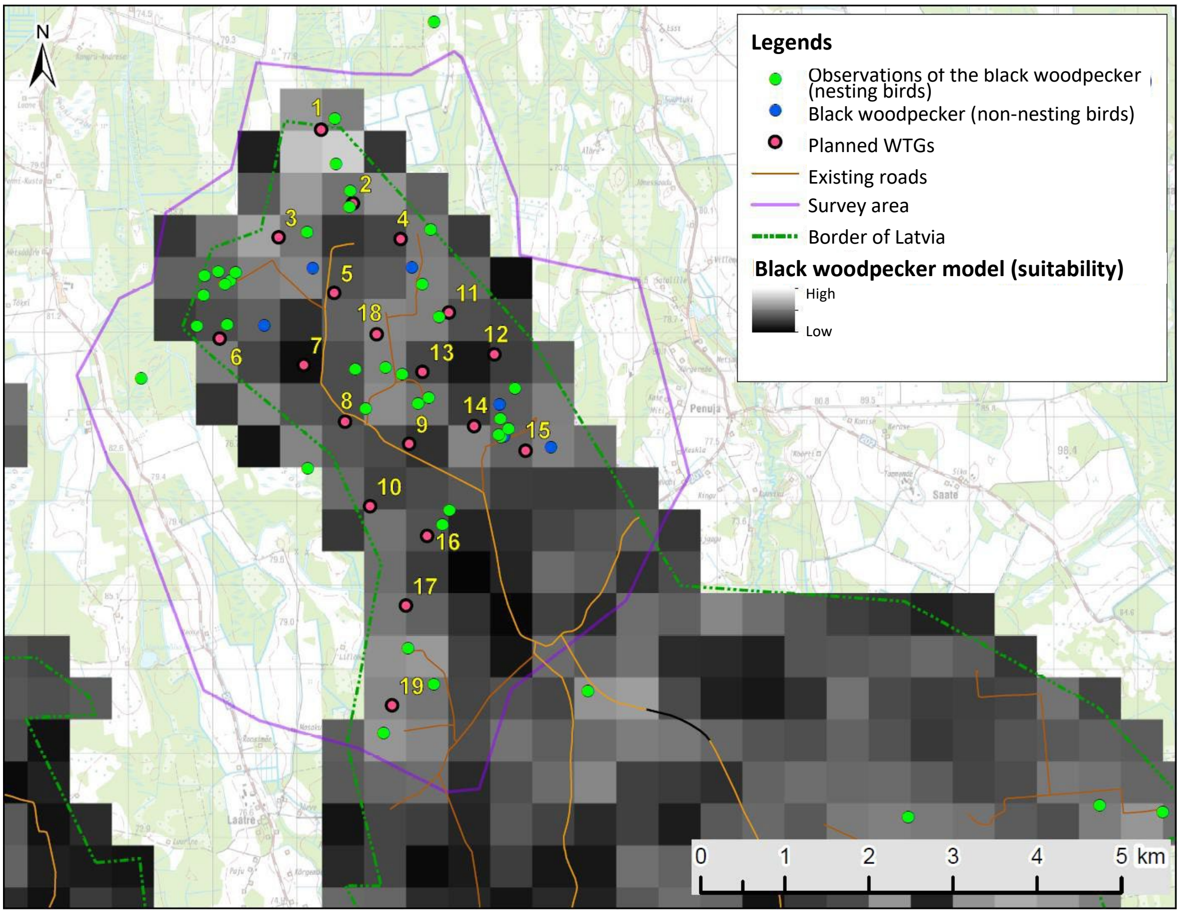
16. Figure Medium spotted woodpecker observations, suitability model and priority protection areas

7.14. Black woodpecker *Dryocopus martius*

The black woodpecker is a species that lives in forests. It is a sedentary species, with extensive breeding territories. As a result of the study, it was found that the entire area of the forest massif is suitable in the long term for nesting of the black woodpecker and is the most common specially protected species found. In, the black woodpecker was evenly detected throughout the study area. During the breeding season, it has been detected in at least 10 to 14 locations, of which about 10 are in the immediate vicinity of the WTG. In the long term, the species is expected to continue to be present throughout the wind farm. According to the species conservation plan model (Bergmanis et al., 2020), the species suitability in the planned WTG cells ranges from 8.3% to 63.3%, with an average value among all planned WTGs of 37.3% (Figure 17). These values are the highest among the woodpecker and owl species in the study area.

The construction of the wind farm will have a negative impact on the habitats of the black woodpecker near the generators. Ensuring the favourable status of the black woodpecker is important for other protected species, such as the Tengmalm's owl, the pygmy owl and the stock dove, which use the hollowed-out cavity of the black woodpecker as secondary cavity nesting sites. The cumulative harm of the noise generated has not been studied, but it is possible to occur. These effects should therefore be minimised as much as possible, as well as monitoring of the species should be continued prior to construction and during operation of the park.

Although the risk of collisions with WTG blades is low, the black woodpecker's active flight in the wider area means that its risk of collisions with masts is much higher throughout the year. It is therefore necessary to comply with the requirements laid down in the opinion concerning the colour of the mast and its visibility in conditions of poor visibility, which will reduce this risk. To ensure a favourable conservation status, the habitats of the black woodpecker should be preserved in their existing quality, preserving large diameter and old ecological trees, and the WTG location requirements described in the opinion should be respected.



17. Figure The black woodpecker observations and the site suitability model

7.15. Grey-headed woodpecker *Picus canus*

The grey-headed woodpecker is mainly found in mosaic landscapes, but avoids larger woodlands. At the global and regional level, this species is not threatened (i.e. it is classified as a species of least concern). According to the latest assessment, 3000-5000 pairs of the grey-headed woodpecker nest in Latvia, and although the short-term trends of the population are not clear, there is an increase in the long term (Ķerus et al., 2021).

According to the species conservation plan model (Bergmanis et al., 2020), the suitability of the grey-headed woodpecker in the planned WTG cells ranges from 3.6% to 64.1%, with an average value among all planned generators of 30.2% (Figure 18).

The grey-headed woodpecker as a nesting bird was found in 4-5 places - in the vicinity of WTG **No.3, No.4, No.6, No.8** and **No.13**. WTG **No.8** and **No.13** belong to the same area, so in total the planned wind farm could have three or four nesting sites. Outside the nesting time, this species can be found throughout the territory.

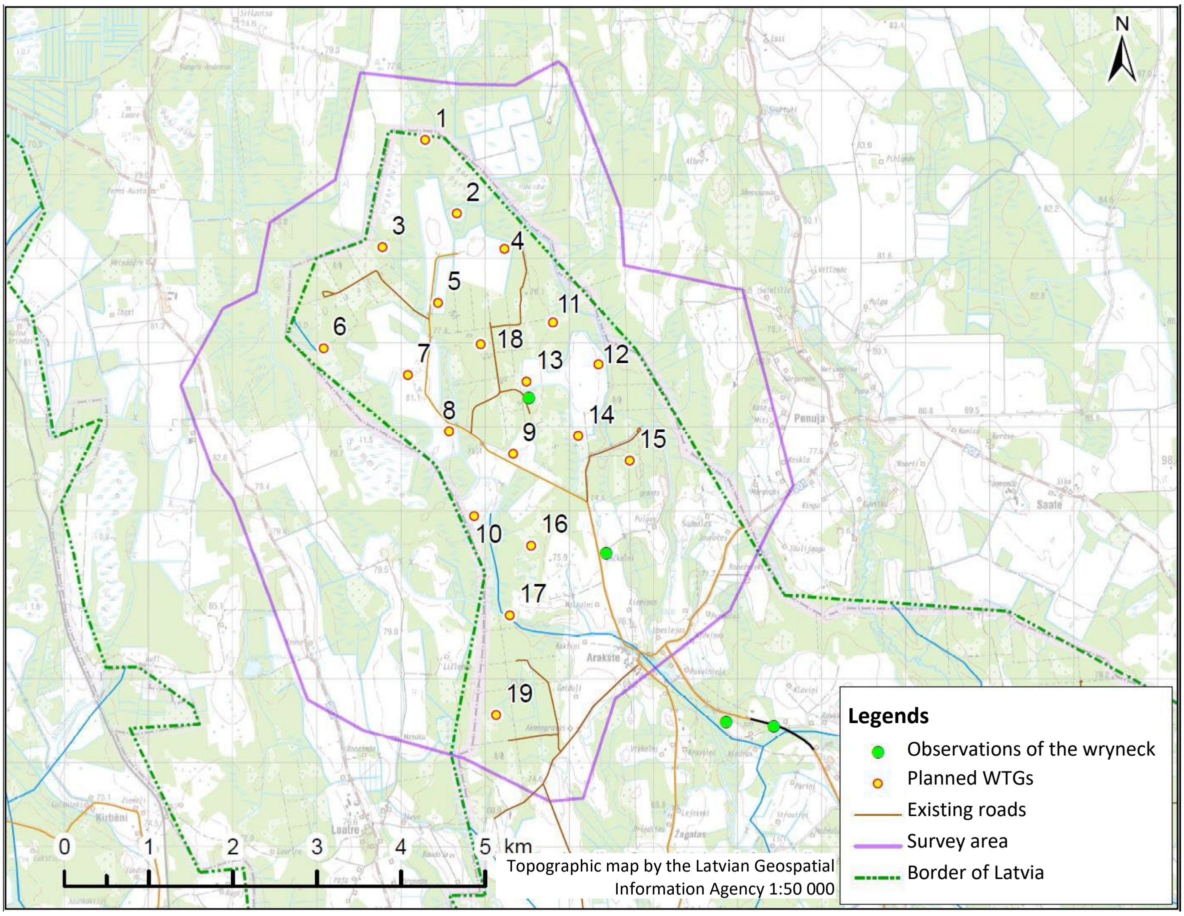
The risk of collisions with the WTG blades at the planned height is low, but the risk of collisions with the mast during migration may be medium, so it is important to ensure that the mast is painted and visible in low visibility conditions. Construction of a wind farm is unlikely to result in a significant negative impact on the nesting habitats of the grey-headed woodpecker, however, caution should be exercised as the impact of the noise generated is currently unknown. Therefore, the location of WTG and the noise reduction instructions must be taken into account.

18. Figure The grey-headed woodpecker observations and the site suitability model

7.16. **Wryneck** *Jynx torquilla*

The wryneck is a long-distance migrant bird that inhabits open landscapes and woodlands near grasslands. Globally and regionally, its population is secure, with an increasing trend. In the last number assessment, its population in Latvia is estimated at between 4,000 and 10,000 pairs (Ķerus et al., 2021).

The wryneck is found in the central part of the territory in two places where its nesting is possible. The nearest planned WTG **No.13** is located at a distance of about 200 m from the wryneck observation during nesting. The second record is at the Inčkalni houses, which are approximately 890 m from WTG **No.16** (Figure 19). The negative effects of noise are currently unknown. The risk of collisions with blades is low, but during migration there is a risk of collisions with the mast, so it is important to ensure that the mast is painted and visible in low-visibility conditions. If these requirements are met, the resulting impacts will be insignificant.



19. Figure Observations of the wryneck

7.17. Lesser Spotted Eagle *Clanga pomarina*

The lesser spotted eagle is a long-distance migrant bird that returns to Latvia from its wintering grounds in early April. Latvia is a very important habitat for the lesser spotted eagle, as almost half of all European lesser spotted eagle live there, which is about 23% of the world's population. Thus, in the global context, Latvia has a great importance and responsibility for ensuring the beneficial protection status of this species. The lesser spotted eagle is currently not a threatened species (i.e. it is classified as a species of least concern) both globally and regionally. According to the latest estimate, between 3,753 and 4,914 pairs breed in Latvia, and the population trend is stable in the long term but increasing in the short term (Ķerus et al., 2021). To protect the lesser spotted eagle, it is possible to form a micro-reserve at its nesting site.

In Latvia, 90% of the lesser spotted eagle nests are located within 400 m of the forest edge, close to grasslands. According to the lesser spotted eagle conservation plan in Latvia (Bergmanis, 2019), the bird feeds mainly on land used extensively for agriculture – mostly meadows and pastures (64%), but also on fallow land (22%) and less frequently on arable land with sown crops (9%). Particularly suitable are mown meadows and harvested crops, where food items are readily available. The threshold for the closest distance from the nest to the wind park set in the plan is close to 3 km (2,765 m) or even 5 km, with the emphasis that such parks are not potentially built in the most significant hunting habitats (open and mosaic landscape). On the other hand, a study carried out in Germany (Meyburg, 2021), where the lesser spotted eagle is at high risk of extinction, determined by means of GPS transmitters that an area of at least 6 km around nests where the construction of WTGs would not be permissible in any way.

Five occupied nests of the lesser spotted eagle and associated feeding areas have been identified in the vicinity of the proposed wind farm (Figure 20). All known large nests are shown in Figure 21. Three inhabited nests of the lesser spotted eagle within 2.8 km are planned for between three and eight WTGs. In total, 14 out of 19 WTGs are designed closer than the minimum distance from an inhabited nest established in the lesser spotted eagle conservation plan. The distances of these WTGs from the nests are as follows:

a) The nearest detected nest of the lesser spotted eagle from the WTG is a distance of about 450 m (WTG **No.17**), 810 m from WTG **No.19,** 1,300 m from WTG **No.16**, 1,710 m from WTG **No.10**, 2,360 m from WTG **No.9**, 2,610 from WTG **No.15**, 2,655 m from WTG **No.14**, 2,760 m from WTG **No.8**.

b) The second nest was found in the protected area of the lesser spotted eagle in Estonia (ID= **680341820**). The protected area is located 460 m from WTG **No. 6**. The inhabited nest of this protected area is approximately 1,200 m from WTG **No.6**, 2,145 m from WTG **No.7**, 2,490 m from WTG **No.3**, 2,680 m from WTG **No.8** and 2,700 m from WTG **No.5**.

c) The third nest was also found in the protected area of the lesser spotted eagle (ID= **1115379091**) in Estonia. The inhabited nest of this area is approximately 1,850 m from WTG **No. 1**, 2,450 m from WTG **No. 3** and 2,670 m from WTG **No. 2**.

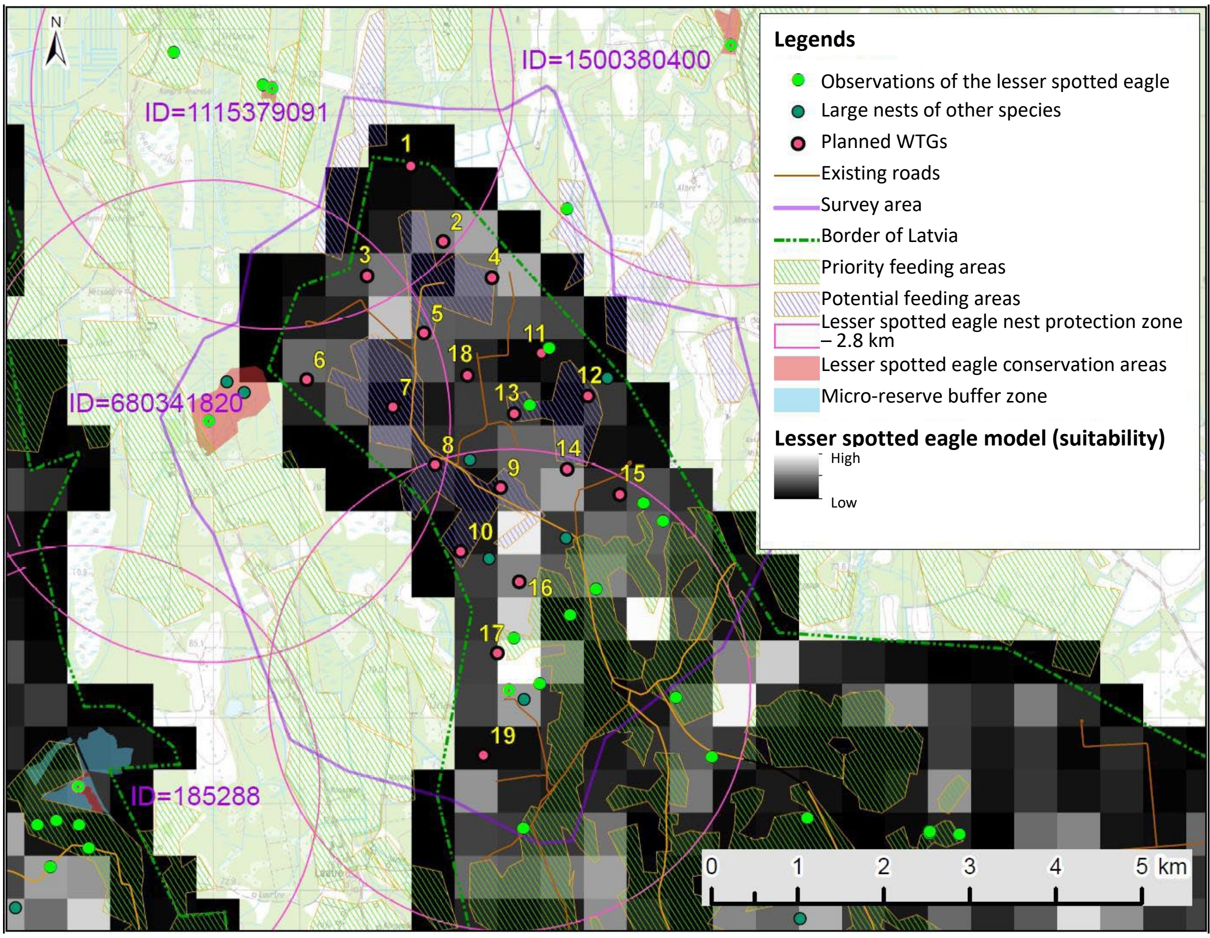
A nearby nest is suspected in the vicinity of WTG **No.15**, as a young bird that has left the nest has been found near agricultural land, and was fed by its parents in this area for at least a month. However, repeated searches of possible woodlands in both 2023 and 2024 found no nest in the vicinity of the WTG. Before the construction phase of the planned operations, it would be necessary to find out the location of this nest. It is believed that this pair of eagles fly to feed in an easterly direction on both sides of the V176 highway, where grasslands are suitable for foraging.

WTG **No.17** and **No.19** are very close to a successful nest on the territory of Latvia, so their construction is likely to cause significant harm, and from the point of view of species protection it is recommended to place the WTG in another location, away from the nest of the lesser spotted eagle. If necessary, the distance of WTG **No. 6** must be aligned with the requirements of Estonia. In addition to the distances of the WTGs from the nests, it must be taken into account that although there are several populated nests of the lesser spotted eagle in the area, it has been found that the most potentially significant hunting habitats are directly near the nests, and not in the central part of the planned wind park. One reason why the central area of the planned wind farm is not important for feeding is the relatively small amount of agricultural land under sown crops, while permanent grassland is not found. The second barrier is a 1.5 km-wide forest strip between the eagle nests in Estonia and the agricultural areas in the wind farm. These factors generally contribute to the lesser spotted eagle's preference for foraging in large areas around the nest, and the planned wind farm area is not a priority foraging area for the lesser spotted eagle, although it may be. After several hours of observations during active feeding, the lesser spotted eagle was not found on the agricultural lands of the planned park. The eagle was found in the territory of the park twice — at WTG **No.11** (May 8) and **No.13** (May 7). The observation on 7 May was made from a distance of about 1.5 km, when the bird circled over the area. On 8 May, the eagle was found flying over the forest. When searching the surrounding area repeatedly, the nest was not found, and during the season the presence of an eagle in this area was no longer detected.

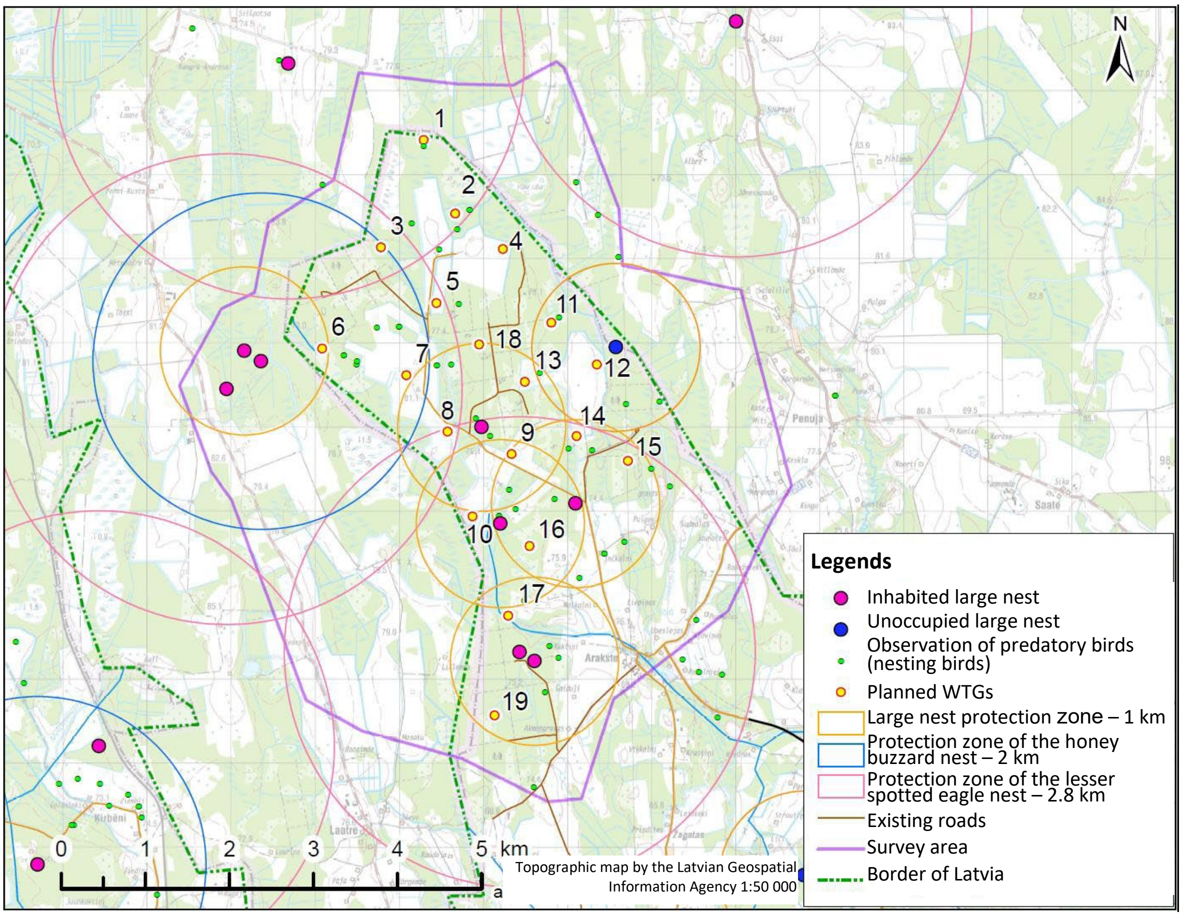
According to the LIFE+ project "Ensuring the protection of the lesser spotted eagle in Latvia" (2017–2021), the suitability of the species in the planned WTG cells varies from 0.1% to 64.4%, with an average value between all planned stations of 27.1%. Higher suitability is around priority feeding areas. For example, in the vicinity of WTG **No.17** - 100% (where the nest is also inhabited), also in the vicinity of WTG **No.9** and **No.10** (suitability of 92.3%). However, most of the suitable forests have been felled there and common buzzards are currently nesting.

Given that the nesting and main feeding areas are near the park, although WTG **No.1, No.2, No.3, No.5, No.6, No.7, No.8, No.9, No.10, No.14, No.15** and **No.16** are located in an area of 2800 m from a populated nest, it is not expected that WTG, equipped with bird identification systems, would have a significant negative impact on the lesser spotted eagle or divide its habitat. It should be taken into account that the lesser spotted eagle can stay in the territory of the entire park from April to October and its presence can make the WTG stop frequently. In the future, nesting of the lesser spotted eagle in the vicinity of WTG is theoretically possible.

Adherence to the location of the designated WTG and the requirements and actions to ensure favourable conservation status described in the opinion will significantly reduce the risk of harm and collisions for all birds of prey in general, including the lesser spotted eagle.



20. Figure Observations of the lesser spotted eagle, habitat suitability and large nests found



21. Figure Detected large nests and protection zones

7.18. European honey buzzard *Pernis apivorus*

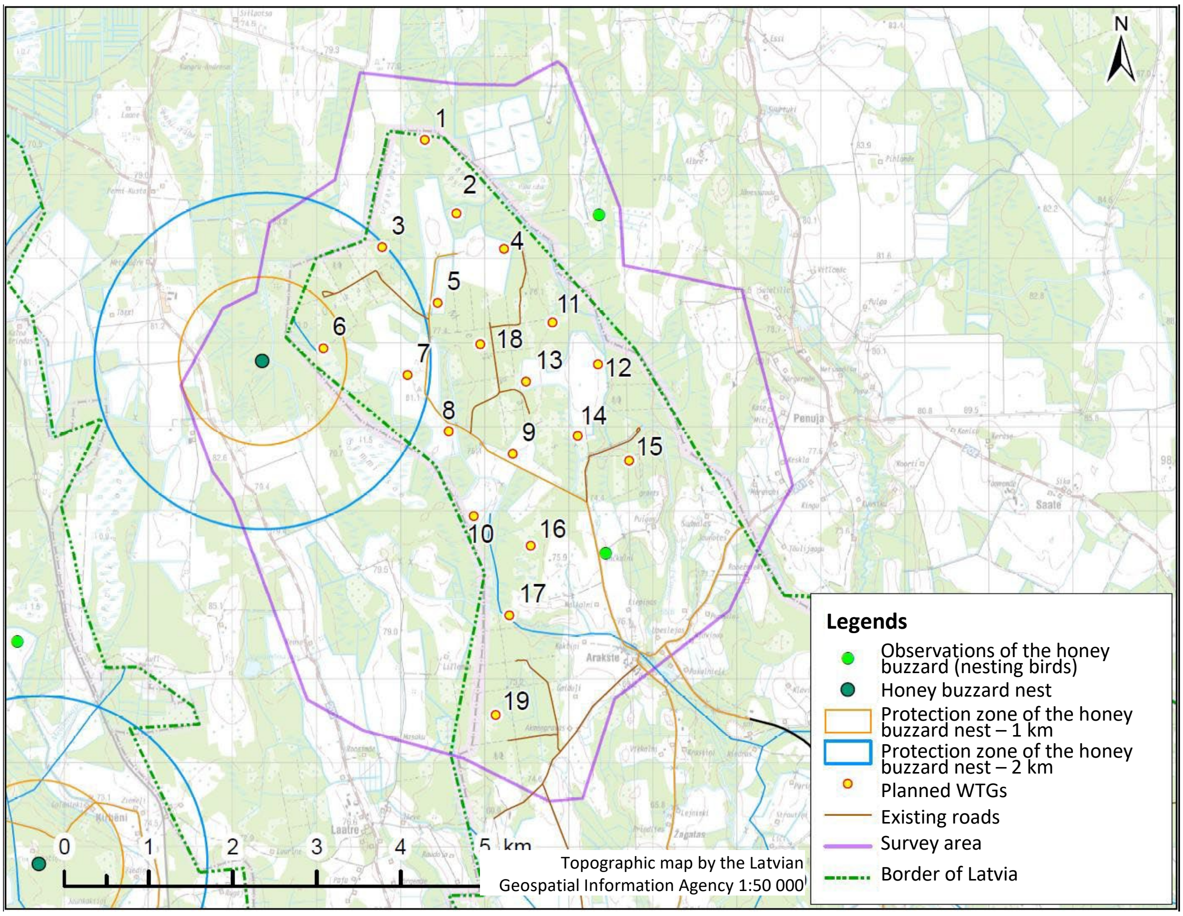
The European honey buzzard is a long-distance migratory bird that inhabits various types of forests in Latvia. During the survey, one nest was found in the lesser spotted eagle conservation area in Estonia (ID **680341820**). The distance from the nest to the nearest currently planned WTG **No.6** is about 740 m, to WTG **No.7** about 1,730 m and to WTG **No.3** about 1,970 m. The study area, especially its periphery, is characterised as well populated and well suited for the long term, with the honey buzzard residing from approximately the second decade of May to mid-September.

In accordance with the 2012 and 2017 Swedish guidelines for birds and bats in relation to wind energy, the minimum established distance for various large and medium-sized birds of prey is 1000 m from the nest (Rydell et al., 2017). A study of the honey buzzard in Germany (Ziesemer et al., 2015) concluded that its habitat size is up to 3,000 m. The size of the average nesting area is at a distance of between 1,000 m and 2,000 m from the nest. Within a radius of about 2,000 m, the honey buzzard guards its territory, so this would be approximately the safe distance from the nests, where it is desirable to avoid the construction of WTG. The smallest distance is 1,000 m.

It should be taken into account that during the study, 99% GPS location points of the nesting honey buzzard males were obtained at a distance of 4,000 m from the nest. By contrast, a Dutch study mentions that males mostly feed up to 6000 m from the nest, while females feed up to 9,000 m (van Manen et al., 2011). Flying distances from the nest in Latvia are unknown and may be different in large forest massifs. This distance in Latvia is likely to be different, because in the German and Dutch studies the European honey buzzard nested in a type of forest whose name in Latvian corresponds to “mosaic woodland”, and the distance from the nest was related to the availability of food in the area.

The planned wind farm generators are currently located close to the area populated by the European honey buzzard. Therefore, it is expected that during the breeding season European honey buzzards (one to two pairs) may be regularly observed near all the planned WTGs. Foraging overflights of the European honey buzzard are mostly low, but roost flights and protection of the territory are at the height of the rotors. The WTG should therefore be built as far as possible from all known nests of the European honey buzzard. From a known nest on the periphery of the territory, the desired distance is around 2,000 m (Figure 22).

The risk of collisions is medium to high. To minimise the risk of collisions and impacts, it is necessary to comply with the technical and location requirements to the WTG set out in the opinion, including bird detection systems.



22. Figure The European honey buzzard observations, nests and recommended protection zones

7.19. Common buzzard *Buteo buteo*

The common buzzard is a diverse forest-dweller and is not currently listed as a specially protected species. At the moment, only their large nests are protected (Cabinet Regulation No. 935 “Regulations on felling trees in the forest”, Article 54.2). However, the common buzzard can be found all year round in Latvia and is the most common bird of prey in the country. Globally, the common buzzard is not an endangered species (i.e. it is classified as a species of least concern), but in Latvia the common buzzard population is sensitive (classified as vulnerable), and there is a decrease in this population both in the long and short term. The number of pairs nesting in Latvia is estimated at between 17,301 and

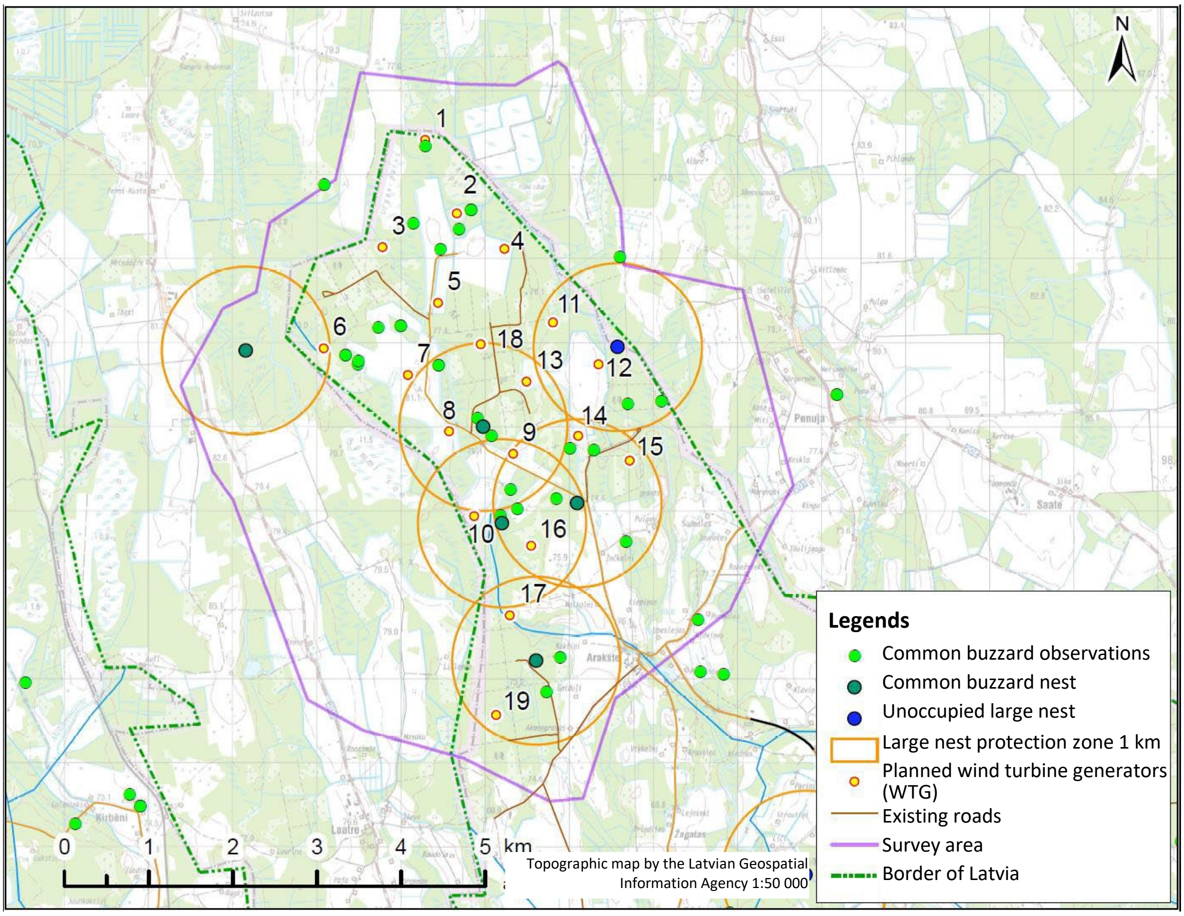
29,720 pairs nest in Latvia (Ķerus et al., 2021). Between 2005 and 2022, their population in Latvia decreased by 50%, and between 1995 and 2022 it decreased by as much as 70% (Auniņš et al., 2022). The index for 2023 remained the same as the previous year, and these are the lowest indices of this species in the history of observations, therefore at present the protection status of the common buzzard in Latvia is considered unfavourable (Auniņš et al., 2023).

The common buzzard is also the most commonly recorded diurnal bird of prey species in the study area. The whole site is characterised as an important nesting, resting and feeding area for the common buzzard, where it can be found throughout the year, especially during the nesting season. Therefore, in general the harm of the planned actions is considered high.

The common buzzard is a species that shows little or no avoidance behaviour in the vicinity of WTG (Bose et al., 2020) and may build nests between the existing WTG. It is the species of bird of prey most often found dead near WTG in northern Europe. It is mainly adult birds that are killed (Langgemach et al., 2023). The construction of wind farms on forest lands, forest edges or near common buzzard nests will cause even more severe harm to the dwindling Latvian population with an unfavourable conservation status. Therefore, special care must be taken to reduce as much as possible any activities that may contribute to further population decline.

At least five inhabited common buzzard nests have been found in the study area (see Fig. 23), and another nest is likely near the planned WTG **No.6**, where the bird has been regularly observed during the season. The nearest known nest is approximately 340 m from the planned WTG **No.10** and approximately 440 m from WTG **No.16**. At a distance of 740 m from WTG **No.16** there is another nest. The nearest nest is 420 m away from WTG **No.8** and 480 m away from WTG **No.9**. The nearest nest from WTG **No.17** is 620 m away and from WTG **No.19** - 800 m away. Also from WTG **No.14** and **No.15**, the nearest inhabited nest of common buzzards is about 800 m away. WTG **No.6** is located approximately 920 m from the nest and WTG **No.18** is approximately 980 m away. It should be noted that WTG **No.12** is also located about 300 m from the edge of the clearing of the large nest, close to the Latvian border, and the nest was uninhabited in 2023, and it is unclear what bird has occupied it previously. On the other hand, no large nests of common buzzards or other species have been found near 1000 m from WTG **No.1, No.2, No.3, No.4, No.5** and **No.7**. However, common buzzards have been found near all these stations. When building stations closer than 1,000 m to known nests, there are risks of both collisions and abandonment of the territory.

To minimise potential risks and negative impacts, WTG should be planned as far away from known nests as possible. Stations should be planned so that they do not act as an obstacle between the nest and the feeding area (lands used for agriculture). As the common buzzard is continuously present throughout the site, its population is in long-term decline and the risk of collisions is high, making it essential to comply with the technical requirements for generators, in particular for bird detection systems.



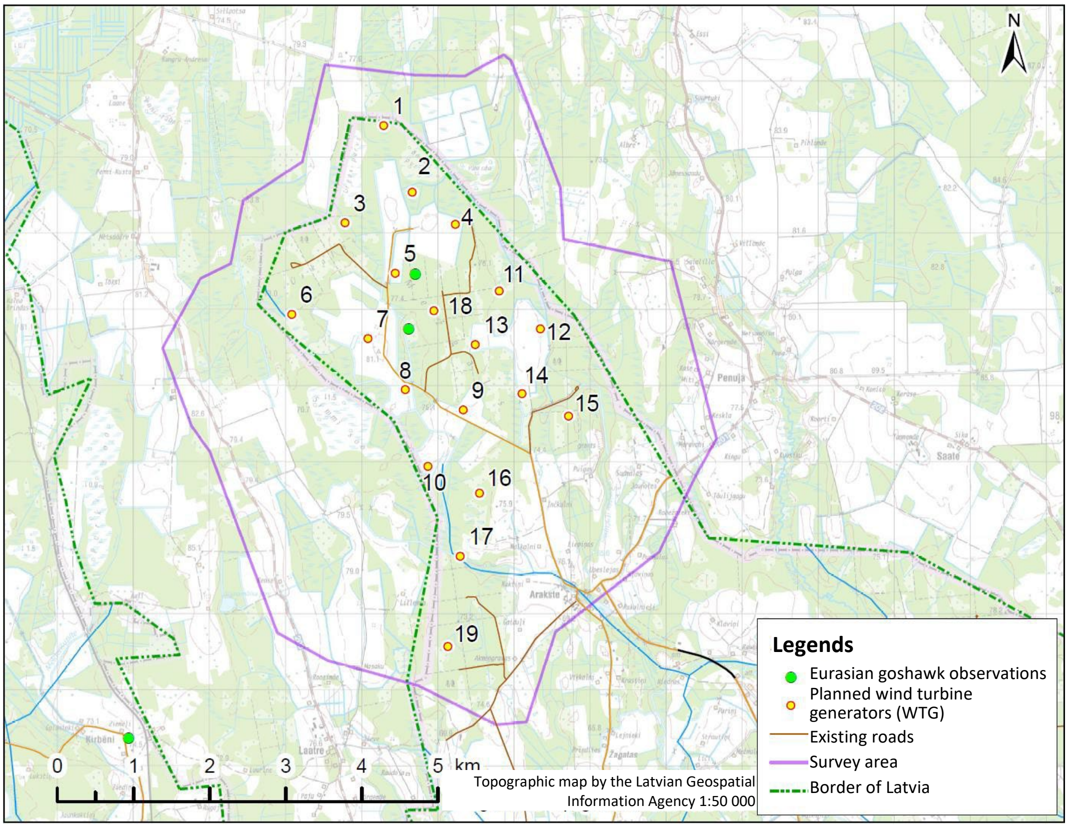
23. Figure 3.1.2. Common buzzard observations, nests and buffer zones

7.20. Eurasian goshawk *Accipiter gentilis*

The Eurasian goshawk is a species inhabiting forests, a sedentary species for the protection of which it is possible to establish micro-reserves. Although on a global scale the Eurasian goshawk does not qualify as an endangered species but rather as a species of least concern, the population has decreased. In the Latvian context, the status of the Eurasian goshawk population is endangered, with a very high risk of extinction. The latest number rating indicates that between 428 and 13,272 pairs nest in Latvia, and this wide range is explained by the sharp decline. In the short term, the population is declining, but its long-term changes are unknown (Ķerus et al., 2021).

During the study, on 7 May, one Eurasian goshawk was observed twice (the observation was made from an approximate distance of 1,500 m) in the area between the planned WTG **No.5, No.7** and **No.18** (Figure 24). Although no nest or reoccurrence of the species was detected during the search of the surrounding forests, it is possible that the Eurasian goshawk nests on the periphery of the site. The Eurasian goshawk can be found in the area throughout the year, and the surrounding forests are suitable for nesting, increasing the risk of impacts and collisions throughout the lifetime of the wind farm.

It is important not to destroy the habitats of the Eurasian goshawk (adult forests). There is a risk of collisions with the blades (due to low flight) and the middle of the masts (Langgemach et al., 2023). The technical requirements of the stations set out in the opinion must be observed, both for the visibility of the masts and the bird detection systems.



24. Figure 3.1.2. Eurasian goshawk observations

7.21. White-tailed eagle *Haliaeetus albicilla*

The white-tailed eagle inhabits forests, which are usually close to water bodies, and stays in Latvia throughout the year. Juveniles tend to wander long distances, while adults mostly stay close to the breeding area. Although their long-term population in Latvia is growing and is in the range of 120 to 150 pairs (Ķerus et al., 2021), the white-tailed eagle is a species that does not particularly avoid wind turbines, and relatively often dies on collision with them (Lie Dahl et al., 2013), including in Latvia.

The nearest known territory of the white-tailed eagle is in Estonia, approximately 8 km north of WTG **No.1** at Karistes lake. During the survey, the white-tailed eagle was detected twice: in spring and autumn. Both times, the bird flying over the area was immature and had not reached breeding age. These observations were carried out between WTG **No.11, No.12** and **No.14**.

Although the current risk of collisions is assessed as low, it is essential to comply with the technical requirements of the stations set out in the opinion, both regarding the visibility of the masts and the bird detection systems.

7.22. Hen harrier *Circus cyaneus*

The hen harrier is mostly a close-ranging migratory bird that nests on the ground in an open landscape. The hen harrier in Latvia is considered a very rare nesting bird, but it is relatively common as a passerine. According to a count carried out in 2021 (Kerus et al.), few or no birds nest in Latvia.

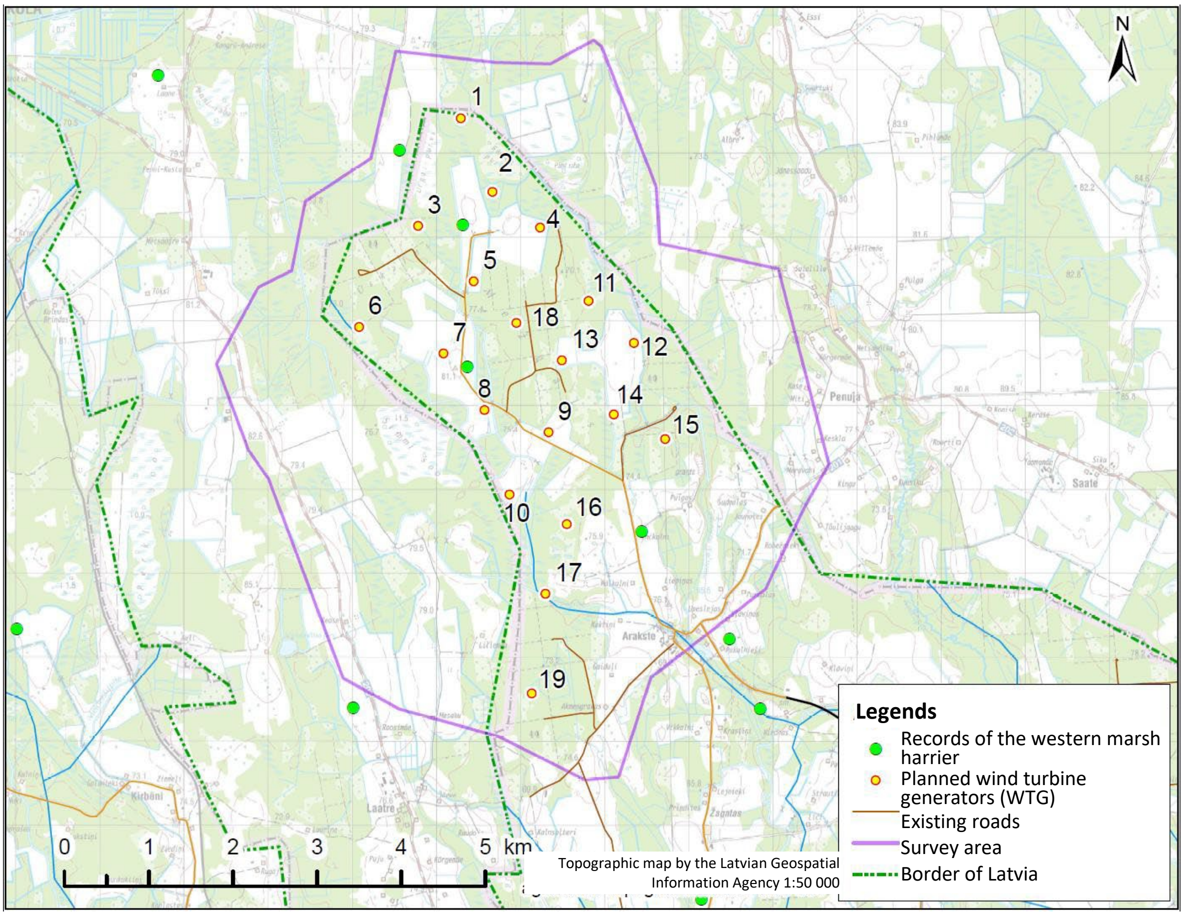
In the study area, one passerine bird was observed in low flight in an agricultural landscape near Arakste on April 16. When hunting, hen harriers fly at a height of a few metres. However, reaching the edge of a field or forest, they can take on a great height to cross, for example, a forest massif. The impact and collision risk is considered as low. It is important to comply with the technical requirements of the stations indicated in the opinion, especially regarding the visibility of the masts.

7.23. Western marsh harrier *Circus aeruginosus*

The western marsh harrier is a long-distance migratory bird that returns to Latvia in late March and early April. Breeding in Latvia is usually associated with water bodies, but they often fly to agricultural landscapes in search of food. Short-term and long-term population changes are unclear and unknown, but it is the second most frequently nesting large species of birds of prey in Latvia (Ķerus et al., 2021).

During the study, three observations on agricultural land, near WTG **No.5**, between WTG **No.7** and **No.8**, as well as at Arakste. Several records were also made in the periphery (see Figure 25), but these were all associated with low feeding flight and the western marsh harrier is not thought to nest near any of the planned generators.

Western marsh harriers do not exhibit compelling avoidance behaviour, however, the risks of collisions due to low flight are also not high (Rydell et al., 2023). The flight of the western marsh harrier near the breeding site may reach the currently planned rotor height, but is not currently expected in the area. Impact and risk of collisions expected to be low, but it is necessary to comply with the technical requirements of the stations specified in the opinion, in particular regarding the visibility of the masts.



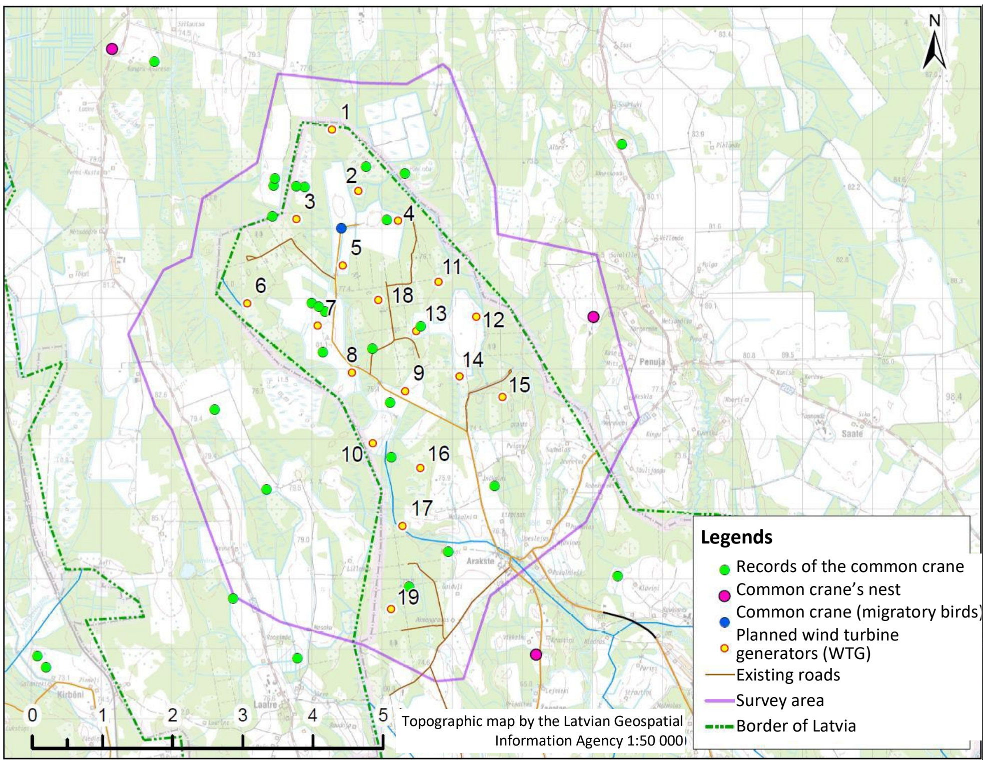
25. Figure 3.1.2. Western marsh harrier observations

7.24. **Sparrowhawk** *Accipiter nisus*

The sparrowhawk is not a specially protected species. However, it has been found in at least six locations on the periphery of the study area. One inhabited nest was found in Estonia (x:576663, y:433702), approximately 310 m away from the currently planned WTG **No.10**. The sparrowhawk can be observed near all generators throughout the year. During hunting, in bad weather, the risk of collisions with the mast is likely to be medium (both for sparrowhawk and for hunting), so it is important to take into account the stated requirements for the coloration and visibility of the mast in conditions of poor visibility.

7.25. **Common crane** *Grus grus*

The common crane is a close migrant and can be found in the wettest areas throughout the study area as early as March. In total, during nesting, the common crane has been observed in 7 to 13 places, but not in all the places where nesting has occurred. Three nests were found, all on the periphery of the study area (see Figure 26). Multiple observations suggest that the common crane probably also nests north of WTG **No. 3**, near the Urga swamp. It should be borne in mind that the common crane is found throughout the territory during nesting in different months, and this may be due to the movement of non-flying birds between different places during the season. In general, there are not many suitable places for nesting in the territory at the moment. No large migratory flocks of migratory birds have been detected. The highest number of migrants recorded is 12 birds in a single site, and one to three birds in a local open landscape. No large flocks of roosting common cranes have been found in the area (e.g. in marshes). In studies, the negative effects of wind farms have been described as minor, and cranes exhibit pronounced avoidance behaviour (Vogelschutzwarten, 2015). Both in the long and short term, the population of cranes in Latvia is increasing, and according to the last population estimate there are 2,800 to 10,000 pairs in Latvia (Ķerus et al., 2021). To reduce the risk of collisions, the technical requirements of the stations must be observed.



26. Figure 3.1.2. Cranberry observations and nests found.

7.26. **Corn crake** *Crex crex*

The corn crake is a long-distance migratory bird that inhabits farmland. Globally, the corn crake does not qualify as an endangered species but rather as a species of least concern, and its population in the world is stable. Although the population in Latvia has increased in the long term, in the short term it is experiencing a sharp decline (Auniņš et al., 2023) and is assessed as near threatened with a possible risk of extinction. The latest population estimate suggests that between 30,874 and 111,512 males nest in Latvia (Ķerus et al., 2021). In 2023, the corn crake population index continued to decline, and was only 13.9% of the population in 2005. The state of corn crake protection in Latvia is considered unfavourable, with a tendency to deteriorate (Auniņš et al., 2023).

Although during the study the corn crake was found on agricultural land only near Arakste (about 620 m from the planned WTG **No.16 a**nd 850 m from WTG **No.17**), there is still one historical observation of a songbird in July 2016 at WTG **No.7** (500 m away). During the study, it was not possible to confirm this area of the corn crake. However, it is still necessary to take into account the possibility that the corn crake may try to nest near the station in certain years, when there are suitable lawns. WTG should be planned at least 500 m away from current corn crake habitats.

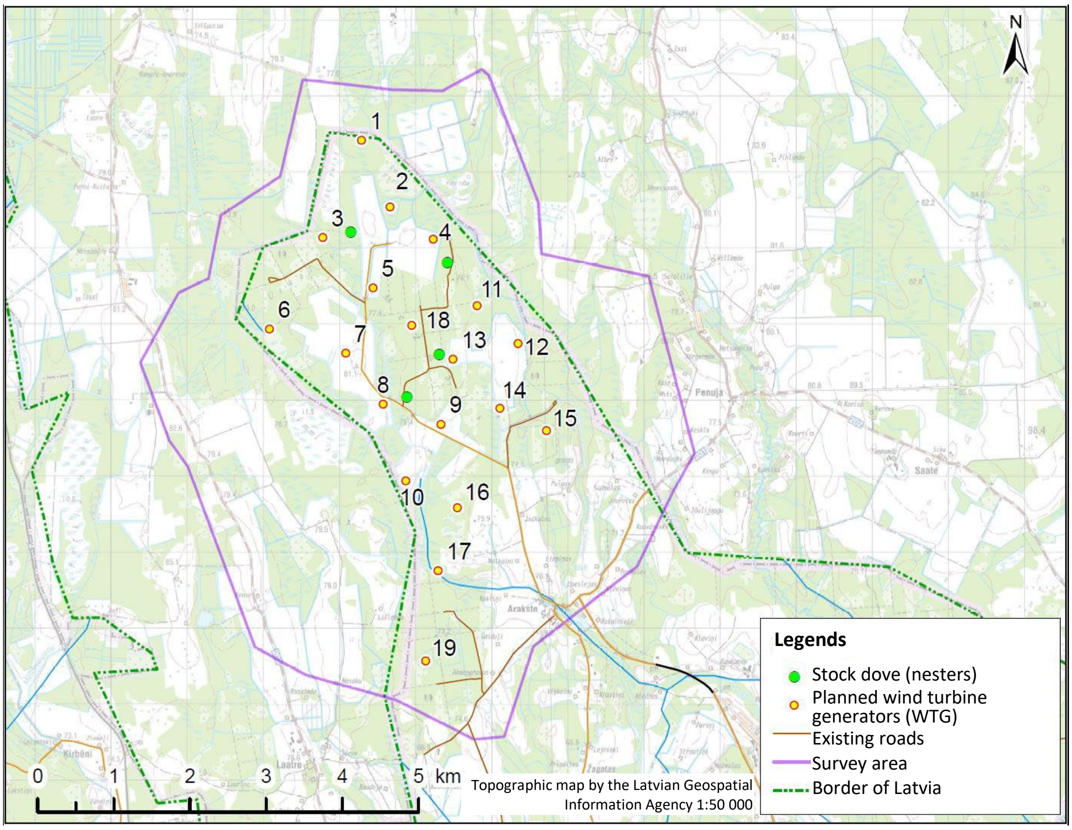
The impact generated and the risk of collisions according to the currently planned deployment of WTG during nesting is low, but is not known during migration. Theoretically, during migration, collisions can occur with the mast, so the requirements for the mast observability should be observed in poor visibility conditions.

7.27. **Stock dove** *Columba oenas*

The stock dove is a nearby migratory bird that appears in places of nesting (different types of forests) in early March. Although it is possible to create micro-reserves for its protection, the stock dove in Latvia is experiencing a rapid increase in numbers (Auniņš et al., 2023), and its population is recognised as safe globally and locally, i.e. as a species of least concern. Stock dove nests in hollow trees, and much of the observations relate to clearings and young growths where such trees are preserved.

During the nesting season, the stock dove was recorded at four sites in the central and northern part of the study area (see Figure 27). When planning WTG in new nurseries, construction will have the least impact on forest bird habitats as a whole, but for the stock dove, such construction is associated with possible habitat loss, as the construction may result in the loss of hollow trees used for nesting. However, according to the current WTG plan, no nesting area for stock doves will be destroyed. The closest observations of nesting forest pigeons are 200 m from WTG **No.13**, 330 m from WTG **No.8,** 360 m from WTG **No.4** and 370 m from WTG **No.3**.

There is a risk of collisions when nesting in the immediate vicinity of WTG, however, the degree of risk is currently unknown, most likely low. The construction of the wind farm will not have a significant impact on the growing stock dove population in Latvia.



27. Figure 3.1.2. Observations of the stock dove.

7.28. European nightjar *Caprimulgus europaeus*

The European nightjar is a long-distance migratory bird that inhabits pine and mixed forests, clearings and marshes in Latvia during the breeding season, returning from wintering grounds in early May. The short- and long-term population trend of the European nightjar in Latvia is unknown, but it can be assessed locally and globally as safe, i.e. as a species of least concern*.* Between 16,500 and 31,000 males nest in Latvia (Ķerus et al., 2021).

The density of the European nightjar found during the study is low. It is found as a nesting site in two areas (clearings): 290 m from WTG **No.18** and between WTG **No.17** and **No.19** (600–700 m). There may still be some area on the periphery along the edges of the swamp that was not found during the inventory.

Pen y Cymoedd is the largest wind farm in Wales, where 76 WTGs are installed, with a rotor diameter of 101 m, the European nightjars are equipped with transmitters (2019). The nearest nightjar nest was found 58 m from the WTG, where it was successful (2 chicks). Another 4 nests were found 400 m from the mast, two of which have been successful (Traxler, 2019). It is likely that WTG in this case was not a decisive reason for the nightjar to leave the area in question, provided that nesting opportunities were still preserved. However, the situation in Latvia is not studied and can be different.

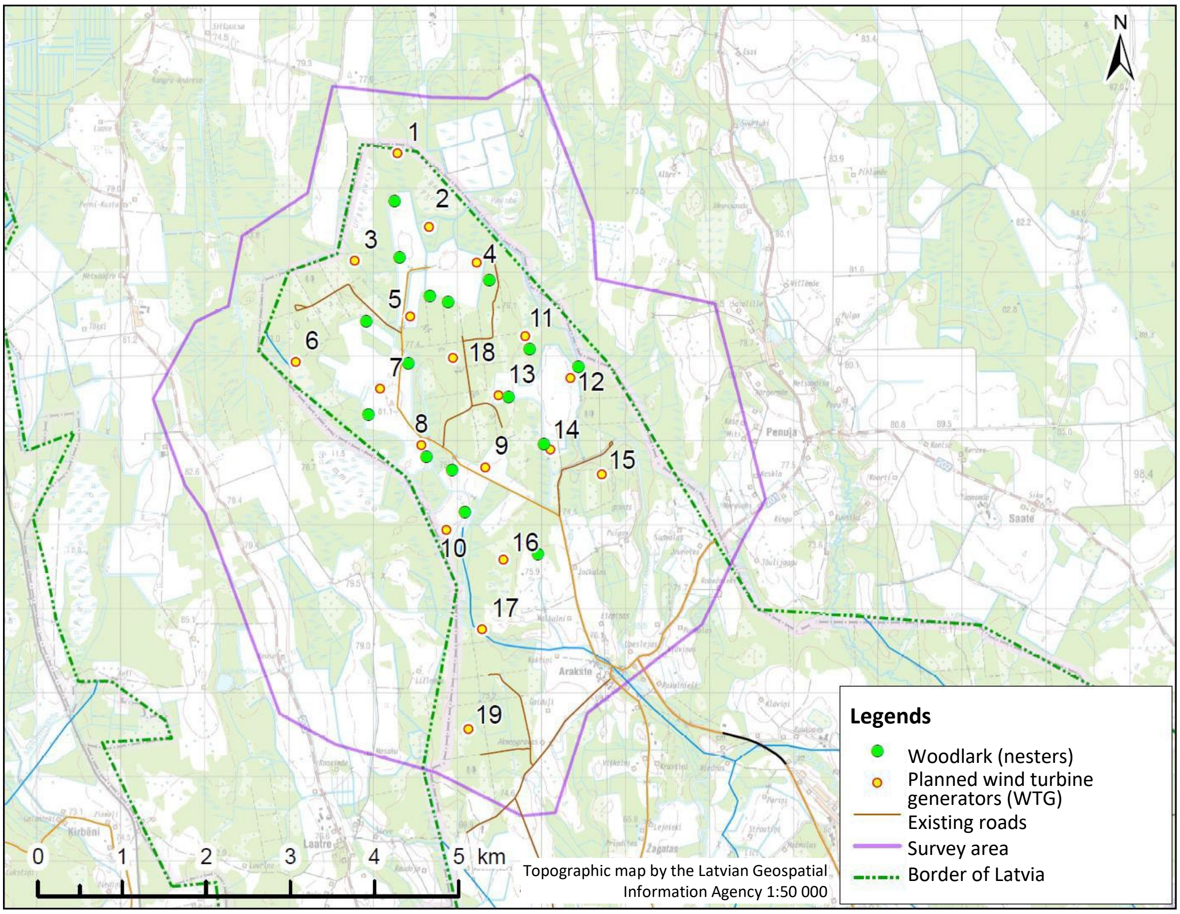
Suitable nesting habitats (swamps and their edges) are available in the area and the wind farm is unlikely to cause significant harm to nesting or available habitats of the European nightjar in the long term. The risk of collisions is thought to be low, as only isolated cases of collisions are currently known however, their corpses may also go unnoticed due to the masking coloration of the European nightjar (Rydell et al., 2017).

7.29. Woodlark *Lullula arborea*

The woodlark is a migratory bird that returns to its nesting sites in the second half of March. The woodlark population in Latvia is stable (Auniņš et al., 2023), and both globally and locally its population is assessed as an area of least concern. The population size in Latvia is between 6,497 and 30,995 pairs (Ķerus et al., 2021).

In the study area, the woodlark was found during nesting in at least 11 sites (Figure 28), mostly in the open landscape, on agricultural land and forest edges. It has been found near at least 9 or 10 planned stations (WTG **No.4, No.5, No.7, No.8, No.9, No.10, No.11, No.12, No.13, No.14**), but in other years it may be present at any of the stations, and even despite possible collisions they continue to nest near stations.

Given the high and long breeding flight, which is possible both day and night, as well as the recurrent late breeding, the risk of collisions is assessed as medium. On the other hand, the construction of the farm is not expected to significantly affect the amount of habitat available. The requirements and actions to ensure favourable conservation status described in the opinion should be taken into account, and in general it is not expected that construction of the farm will cause significant harm to the currently stable population of Latvian woodlark.



28. Figure 3.1.2. Woodlark observations.

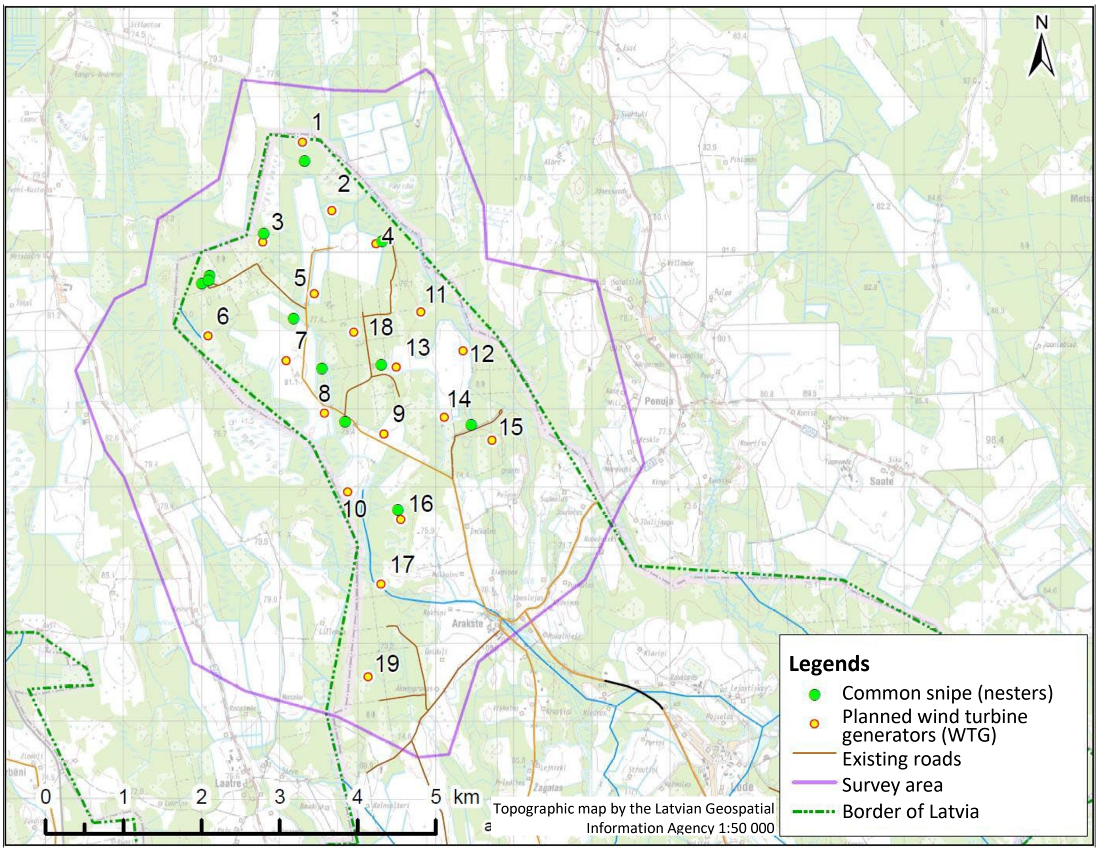
7.30. Whooper swan *Cygnus cygnus*

The whooper swan is a partial nearby migratory bird, which was found in the territory during spring migration (the first and second weeks of April) from 3 to 19 local birds, mostly near the planned WTG **No.7**. Although the nesting sites of the whooper swan can be protected by creating a micro-reserve, there are no suitable nesting sites in the territory and surroundings, nor has it been found nesting. The nearest nesting was recorded in Lode village. The resulting impact and the risk of collisions with the mast or rotor are generally low, but it is important to take into account the technical requirements for the stations as set out in the opinion.

7.31. Common snipe *Gallinago gallinago*

The common snipe is a migratory bird that arrives in the area in early April. During nesting, it is found in 10 to 11 places, mostly on the periphery of the territory next to swamps. The common snipe is not a specially protected species. However, during nesting, the species is characterised by a wide arcuate crevice flight with sharp spikes reaching the planned rotor height of the WTG. Although the possible risk of collisions is unknown at this time, it could potentially be significant. Noise from WTGs can also have an adverse effect of drowning out the mating song of the common snipe.

An English study of 18 different wind farms has concluded that the WTG affects the common snipe, generating negative effects already in the construction phase. Although there are no collisions found, however, the construction of WTG contributed to the abandonment of nesting areas, and later birds did not return to the territories. This negative effect has been observed up to 600 m from the station (Pearce-Higgins et al., 2012). At present, the nearest WTG **No.4** is planned at a distance of about 80m, WTG **No.3** of about 110 m, WTG **No.16** of 130 m, WTG **No.13** of about 200 m, WTG **No.1** of 250 m, and WTG **No.8** of about 300 m (Figure 29). The negative impact could be for 3 to 9 areas, leading to the expected dislocation of these areas. It is advisable to monitor this species and to record any changes during monitoring.



29. Figure 3.1.2. Common snipe observations.

7.32. **Eurasian woodcock** *Scolopax rusticola*

The Eurasian woodcock is a close migrant bird that returns to nesting areas in spring in the third decade of March. The Eurasian woodcock inhabit different types of forests and have been recorded 8 times in the study area.

The Eurasian woodcock is not a specially protected species, but will be adversely affected by the proposed activity. During the nesting season, the Eurasian woodcock will circle over large areas of forest at dusk, emitting a specific low-pitched rutting call that will be muffled by noise produced by WTGs (Dorka et al., 2014). The study of the negative effects on the Eurasian woodcock concludes that WTG produces a negative effect, the barrier effect, reducing the number of the woodcock flights near the turbines by 88% at distances up to 300 m. The turbines mentioned in this study had not yet been started (Langgemach et al., 2023).

The Eurasian woodcock has been found in the immediate vicinity of currently planned WTG **No.4, No.11, No.13, No.15**, **No.17, No.18**, but due to its extensive flights, it is most likely to be found throughout the territory of planned stations. As several generators have a planned spacing of around 700 m between turbines, it is likely that the Eurasian woodcock will not fly between the generators and will no longer use a part of this territory. At present, there is a lack of research on the impact of the barrier in the forest near switched on stations and stations where the mast is more than 160 m high and the blades around 80 m long. Monitoring of this species is recommended both before construction and during operation to find out exactly what kind of impact is created for this species in Latvia and in the particular wind farm. It is recommended that stations be planned as far apart as possible, leaving tunnels at least 1 km wide between them to allow the Eurasian woodcock to fly freely through the farm.

7.33. Other birds and migration

The **lesser spotted woodpecker** *Dryobates minor* has been recorded at nine sites: four sites during nesting, with one record at approximately 50 m from WTG **No.02**, and five different sites in the wind farm during autumn migration. For the **red-backed shrike** *Lanius collurio*, there was one observation in 2016, near WTG **No.5** (500 m away), however, it was not detected during the study. The **red-breasted flycatcher** *Ficedula parva* – although the presence of this species is expected, it has not been detected in the territory.

Theoretically, the presence of the **golden eagle** *Aquila chrysaetos*, the **short-toed snake eagle** *Circaetus gallicus* and the **greater spotted eagle** *Clanga clanga* is possible in the future. At the moment, such a probability is low. The activities of the monitoring section of this opinion will also be followed up on the possible occurrence of these species, and appropriate protective measures can be taken if necessary.

In October, during the migration near Arakste, two **European golden plovers** *Pluvialis apricaria* were found on agricultural land**.** No nesting of this species has been recorded in the surrounding marshes. The **northern lapwing** *Vanellus vanellus* has been found both as a nesting bird (3–4 pairs) on agricultural land near WTG **No.7, No.8, No.12** and **No.14**, and in migration by flyover area and feeding, up to 130 birds will feed near Arakste. The **common kingfisher** *Alcedo atthis* was observed in autumn at two sites along the Veserupīte. In autumn and winter, the common kingfisher may be seen in the watercourses and bodies of water closest to the wind farm that are not frozen. During the autumn migration, three

Eurasian curlews *Numenius arquata* were observed flying over the area. The **bean goose** *Anser fabalis* and the **greater white-fronted goose** *Anser albifrons* were recorded in migration low over the site. Migration of these geese has been recorded in flocks of 10 to about 200 birds in both spring and autumn. In the spring, from 7 am to 10 am, the farm was flown over by about 1,000 geese. A pronounced migration of geese is noted only on separate days. As there are no large areas where geese can feed, rest or roost, geese have only been seen flying over. No such stops have been found in the surrounding area. The intensity of migration of geese is likely similar to other places in Latvia. Geese observe wind farms and have an avoidance response, and therefore collisions are rare (Rydell et al., 2017).

Overall, the largest spring and autumn migration through the study area occurs at a low height – the height of the trees. It should be borne in mind that in poor visibility and bad weather, high-flying birds usually fly lower than normal, increasing the risk of collisions with both the mast and the blades. The most active migration takes place in the morning, when passerines pass through in a broad front. The largest migrants in numbers are the **Eurasian chaffinch** *Fringilla coelebs*, the **Eurasian siskin** *Spinus spinus*, the **parus** *Parus sp* and the **wood thrush** *Turdus sp*. Migration routes are roughly south-north. On some days in autumn, migration is high, with large numbers of birds passing through continuously. In general, the territory is outside the main narrow migration routes and there is no reason to believe that the number, flow or composition of migratory birds would differ significantly from equivalent forests in the surrounding area.

The proposed WTG layout is in a south-north direction, thus occupying as little of the migration corridor as possible. Subject to the requirements and actions set out in the opinion, the effect on migratory birds is not expected to be significant. The requirements for the observability of the mast during poor visibility, the non-use of fences and the use of recording cable lines must be observed.

8. Other values relevant to the conservation of biodiversity and landscape of the surveyed area

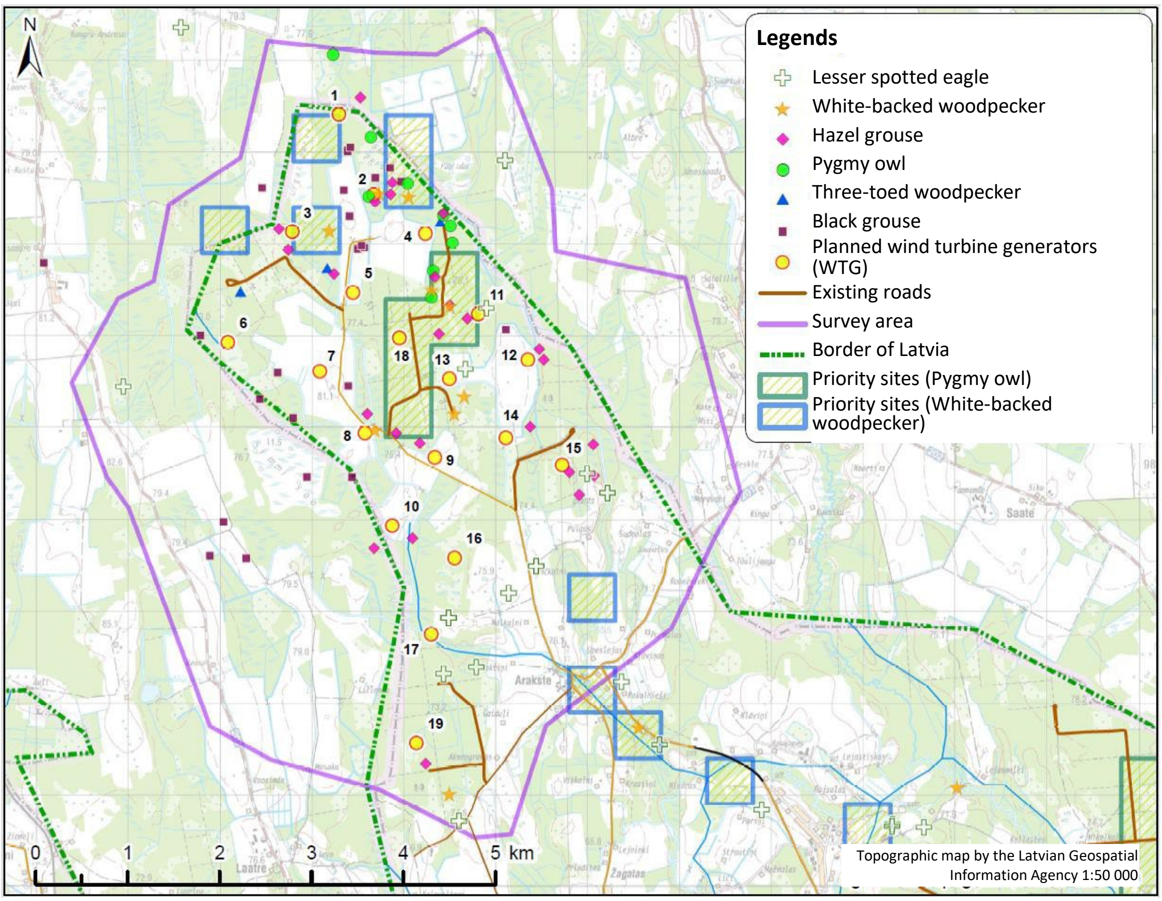
In the area, the surrounding swamps are of significant value. They should be preserved in their natural state as much as possible, without worsening their hydrological regime. Removal of overgrowth in the Bērzu and Lucas swamps is desirable.

9. Requirements and actions for ensuring the favourable conservation status of protected natural and landscape values of the studied area

By collecting the obtained bird data and analysing the scientific literature on the possible impact of planned activities, requirements have been developed regarding the location of stations, the construction of the farm and the technical characteristics of the stations. Mitigating measures, including monitoring, have been developed to mitigate potential impacts. Any changes or deviations from the requirements of this paragraph shall be reconciled by the involvement of a certified bird expert.

The priority species in the study area that require special attention are the **lesser spotted** **the eagle, the black grouse, the hazel grouse , the pygmy owl, the three-toed**

woodpecker and the white-backed woodpecker (Figure 30). It is recommended to pay increased attention to the **common buzzard**, which is currently not a particularly protected species, but the most common species of birds of prey in the planned farm area, with an unfavourable conservation status in Latvia. It is these species that need to be targeted to mitigate potential harm by preventing habitat loss through abandonment or destruction. It is important to carefully assess how noise will affect the habitat of these species.



30. Figure 3.1.2. Observations of priority species and conservation areas of the planned farm planned stations.

9.1. Location of stations

During the implementation of the wind farm, the main negative factor of impact on birds is loss of habitats of individual species and deterioration of habitat quality for several dozen years. Habitat loss can take the form of both habitat destruction and abandonment and avoidance of the territory (due to noise, light, flicker, anthropogenic load and other reasons). Habitat means both a place where a bird can breed and nest and a place where a bird can feed and rest. The location of stations and stands will mostly determine the severity of the harm caused. It is recognised that the most important action to mitigate risk is to select station locations that will cause the least severe harm to the surrounding habitats and populations of bird species.

The location of wind farm stations should be planned in a south-north direction, trying to adhere to the narrowest possible arrangement. Stands should be planned so that they are not in mature forests, but on newly developed or agricultural land, or as close as possible to them.

Particular attention should be paid to endangered species with high collision risks, specially protected, or for which micro-reserves can be established to protect their habitats (Figure 30). Planned stations should be moved away from areas where there is a high level of special protection and density of micro-reserve bird species or where priority habitats are appropriate for them. The placement of stations in areas that contribute to the fragmentation of the habitats of these species is undesirable.

Taking into account the identified sites of highly protected species and the location and number of priority areas for the protection of woodpeckers and owls, the safest and most sensitive areas described in the species descriptions have been identified in the site. For the protection of specially protected bird species, the following adjustments should be made.

The lesser spotted eagle is a particularly protected species and its inhabited nest plays a special role in the conservation of the species. The threshold for the closest distance from the nest to the wind farm established in the species protection plan is 3 km (2,765 m) or even 5 km, with the emphasis that such farms are not built in the most potentially significant hunting habitats (open and mosaic landscape). WTG **No.17** may have the greatest impact as it is currently 450 m away from a successful nest, while WTG **No.19** is planned to be approximately 810 m away from that same nest. The construction of both stations is likely to have a significant impact on this one nesting area of the lesser spotted eagle and may result in its abandonment. Possible compensatory measures would be **moving the stations aside**, and in coordination with a certified bird expert **the purchase of two quality forest land parcels** that currently have a vulnerable nest of the lesser spotted eagle, **establishing a micro-reserve** on them. Stations are recommended to move aside as far as possible, preferably at least around 1,000 m, which is especially important in the case of WTG **No.17.** The stations should be located outside the important hunting habitats of the eagle, which in the case of this nest is to the east of it, on the agricultural land around Araksti. Thus compensating for the negative impact in the ratio of 2:1, and setting the stations further away as possible, their construction would be permissible, and also the likelihood that the lesser spotted eagle will continue to nest in the area, but the risk of its collision will be considerably reduced by the use of bird detection systems that stop the operation of turbines.

WTG **No. 6** is planned 1,200 m from the nest in Estonia, next to which there is also a nest of the honey buzzard and the common buzzard. WTG **No.6** may also create an undesirable barrier effect between the feeding areas in Estonia and Latvia, which was not detected during the study. It should be noted that in the Utilitas Saarde wind farm (*Utilitase Saarde tuulepark)*, about 20 km away in Estonia, two of the farm's nine turbines are closer than 1 km (580 m and 730 m) and one turbine is 1,240 metres away from the nest of the lesser spotted eagle. If necessary, the distance of WTG **No.6** must be aligned in accordance with the requirements of Estonia. At present, the lesser spotted eagle of this nest has been found feeding near the nest, in Estonia.

If a station is being built within the area of 3,000 m from a nest of the lesser spotted eagle, the nesting eagles of this nest should be equipped with a GPS transmitter, tracking their movement paths. The nest itself should also be equipped with a camera.

Near WTG **No. 15**, it is recommended to continue research to detect the location of the nest of the lesser spotted eagle. If a nest is detected, the impact of the station and its limitations should be re-evaluated, taking into account the data obtained and the distance to the nest.

WTG **No. 2** is planned on forest land, where the greatest diversity of priority species of this area is found in the immediate vicinity – the hazel grouse, the pygmy owl, the white-backed woodpecker and the black grouse, as well as priority protection areas of the white-backed woodpecker(Figure 32). The station should be moved as close as possible to agricultural land and away from mature forest. From 1 March to 1 July, it is advisable to keep the station turned off in the mornings (for one and a half hours before sunrise, up to five hours after sunrise) and in the evenings (two hours before sunset, up to one and a half hours after sunset). An exception may be in times when there is high ambient background noise due to wind and rain, such as wind speeds exceeding 5 m/s.

WTG **No.18** is planned right in the middle of a larger forest clump, which is a priority protected area forthe pygmy owl. The pygmy owl in this area has been found both in April and in July – with successfully delivered nestlings. Thus, WTG **No.18** is located in a priority protected habitat of a populated area of the pygmy owl, which will be divided when the station is built. To prevent this negative impact, it is advisable to move the station at least 300 m away, for example, to a young forest in the SW direction, as close as possible to the edge of the forest.

WTG **No.11** is located very close to the priority protected area of the pygmy owl. To minimise the negative impact, it is advisable to move the station as close as possible to the edge of the forest (in the new growth) eastwards.

The location of WTG **No.1** and **No.3** should be planned in such a way that the stations are located as far as possible from adult forest and the priority protected area ofthe white-backed woodpecker. The area of WTG **No.3** is inhabited by white-backed woodpeckers, therefore, to ensure favourable conservation status of the species, it is essential not to destroy suitable habitats for the species.

In addition to the adjustments to be made, the following conditions must be taken into account:

9.1.1. WTG and the associated infrastructure (including substation) should be built as **close as possible to the existing road network** to reduce the construction of new roads and wide turns, and thus reduce the fragmentation of forest species habitats.

9.1.2. To reduce the impact on the bird populations present in the area (habitat losses as a result of deforestation), **turbines should be planned in plots where there is younger forest** (up to 40 years old). Turbines should be planned as far away as possible from old forests and habitats of specially protected species, such as the pygmy owl, the hazel grouse and the white-backed woodpecker.

9.1.3. To reduce the risks of collisions, it is recommended to position the stations **as linearly as possible in a north-south direction** to minimise the trap situation for a bird flying through the farm, where there is no safe and wide passage path.

9.1.4. WTG should be planned **as far as possible** (the preferred minimum distance of about 2,000 m) **from the known honey buzzard nest**, as in the case of WTG **No.6** (Figure 22). The construction of the WTG closer than **1,000 m from the nests of the common buzzard found in the area** will increase the risk of collisions and the likelihood that the birds will leave the area in question. All large nests (over 50 cm in diameter) with a group of trees around them are salvageable.

9.1.5. It is necessary to observe the **approximately 1 km wide** (500 m on both sides from the middle of the river) **protection zone along Krūmiņupīte**, where stations should not be built. It is essential that there is no deterioration of the availability of access to the surrounding rivers (feeding places) as a result of the operation of the farm (e.g. for black stork), number of watercourses (as a result of drainage), quality of feed found (e.g. as a result of pollution, rectification or hydrology change).

9.1.6. **The construction of WTG in places that would significantly alter the hydrological regime of the area,** for example by draining large areas (digging ditches), or in surrounding swamps **should be avoided.** During construction, it is important not to reduce the biological value of the swamp, and it is desirable to increase this value precisely by promoting the swamp regeneration.

9.2. Wind farm construction requirements

9.2.1. To reduce the likelihood of death of birds, for electrical transmission, for communication and other needs**, underground cable lines must be used in the territory of the farm along existing roads** (including the connection of the substation to the 330 kV power transmission line). If the construction of new roads and cable tracks is required, it should be planned outside the priority squares for the protection of woodpeckers and owls, avoiding felling trees as far as possible and preserving bird habitats.

9.2.2. **It is significant not to degrade the priority protected areas identified in the woodpecker and owl protection plan**. It also includes the preservation of the hydrology and suitable habitats of these areas.

9.2.3. If deforestation work is required for the construction of a wind farm, **they must be carried out outside the nesting time of birds, i.e. from 1 August to 1 March.**

9.2.4. In clearings and new groves (adjacent to stations), **both ecological and hollow trees should be preserved as much as possible**. They are important habitats and feeding places for birds. If any such tree is nevertheless cut down, it is preferable not to cut it, but to keep it as fallen deadwood in the immediate vicinity.

9.2.5. It is preferable not to use fencing around stations. However, if a fence is necessary (also in the case of a substation), it should be as low as possible and wicker fences, which can be more difficult for birds to notice, should be avoided. In the case of wicker fences, to give birds better visibility, the upper wire between each vertical post should be marked at least once, for example, with a reflective metal plate. It is desirable that the fence is marked with an orange mesh. A study in Scotland concluded that a wicker fence labelled with orange mesh reduced collisions of the western capercaillie by 64% and of the black grouse by 91% (Baines et al., 2003).

9.2.6. Upon completion of the wind farm operation, **the territory should be recultivated.**

9.3. No.17 e. Technical requirements of the stations

To minimise the harm caused, both passive and active measures should be implemented during the operation of the entire farm.

9.3.1. **Noise reduction technology** that would cause as little disturbance as possible to the bird species living in the area should be chosen for the stations. It should be the choice of sound-absorbing materials, blades with as low noise level as possible or other noise-suppressing technologies, such as noise control systems, which automatically adjust turbine performance if necessary. The goal is to reduce noise levels at certain times or respond to changes in weather, wind speed, noise prediction patterns, or other factors. It is advisable to stop the WTG rotor when there is no wind and at low wind speed (when the wind potential is small) and to gradually resume the operation at the moment when the ambient background noise exceeds 35 dB, reaching the highest speed when the ambient background noise is 60 dB. This recommendation is especially expedient in the morning and evening hours, during the nesting of birds, in the period from 15 February to 15 July at WTG **No.2, No.4, No.5, No.7, No.8, No.11** and **No.18**. Morning hours are at least an hour before and four to five hours after sunrise, and evening hours are at least three hours before and two hours after sunset. A more detailed impact assessment and recommendations should be made after preparing the WTG noise model.

9.3.2. **The mast must be smooth and tubular so that birds cannot** sit on it. It is desirable that the end of the mast is maximally not suitable for birds to be used as a seating position (especially for birds of large size). If necessary, **it is possible to cover the end of the mast with bird spikes** (at least 17–20 cm in length) specially designed for birds of prey. The mast must be safe, tested in practice, minimising the risks of its breaking, which can lead to significant negative consequences in the surrounding bird habitats.

9.3.3. Particular attention in the farm infrastructure should be given to **fire safety** to exclude the risk of fires, which can have significant negative consequences for the surrounding bird habitats. Turbines, for example, must be equipped with wear or vibration sensors that report in good time about possible wear in bearings or the generator, faults in the electrical system, etc., to ensure that all components are in good working condition. Possible risk of fire caused by a lightning strike must be prevented.

9.3.4. Masts pose collision risks to birds, and the risk with a mast is expected to be higher than with blades. There is a greater risk during migration, especially in autumn, in adverse meteorological conditions and poor visibility, such as fog and high winds. The risk is significantly reduced if the mast is of a contrasting colour and does not merge with the surrounding environment during fog, is noticeable. Such a preventive measure reduced the number of dead willow ptarmigans found at the mast by 48% (Stokke et al., 2020). Therefore, **dark colouring should be used for the lower 45 m of the mast**, for example, in the colour of the surrounding trees and the environment. This will reduce the number of potential collisions, e.g. for the black grouse, the hazel grouse (Coppes, 2019), as well as various migratory and other bird species.

9.3.5. Both moving and non-moving blades that are difficult to spot during migration present an increased risk of collisions. Blades in the planned farm are designed higher (at the height of 80–250 m) than in the studies mentioned, however, it is advisable to find a **way to increase the contrast of at least one blade** (especially at the tip of the blades). At lower height stations, such preventive measures reduced the number of birds killed by more than 70%, especially by reducing the mortality of birds of prey (May et al., 2020).

9.3.6. Stations must be equipped with **technology that can, if necessary, cause the blades to rotate at a slower speed or to stop completely** at times when the wind potential is low or, for example, during active bird migration, when there is a threat of collisions (adverse meteorological conditions, fog, etc.). A study in Spain found that the effectiveness of implementing such a system reduces the risk of death for soaring birds (storks and birds of prey) by 61.7%, and for the Eurasian griffon vulture *Gyps fulvus* by 92.8% (Ferrer et al., 2022). Solutions should be chosen that use the most effective collision mitigation technologies and software at the moment.

9.3.7. The farm must be **equipped with automated bird detection and identification systems** (e.g. cameras) capable of identifying large bird species, and if necessary momentarily reducing the rotor speed or stopping it completely. The number of detection systems must be such that they cover the entire area of the wind farm or a radius of at least 1 km around the masts of all generators. They should have bird identification and not bird deterrent devices. The system must be able to react if necessary (control the speed of the rotor or stop it completely), recognising birds that are close by, depending on their size and quantity. The installation of a system that reacts by detecting only specific species is also possible. If the system is able to recognise species, then it should recognise the lesser spotted eagle, the hen hawk, the gull, the sea eagle, the golden eagle, the osprey, the black stork, the white stork and the common buzzard. It is recommended that the system be able to recognise as many bird species as possible, as the recorded data can be used for monitoring purposes. The system is also useful in migration, in the protection of birds traveling through the farm, since it can react if necessary, for example by detecting swans, cranes, geese and other species. The mechanism of action of the stations, if the system detects a species in the vicinity, must be coordinated with a certified bird expert, and appropriate adjustments must be made during the operation of the farm.

9.4. Mitigating measures

The implementation of the above measures will significantly reduce the harm caused. However, it will not be possible to completely eliminate the effects caused, and some species will avoid the farm, leave the territory or their flight trajectories will be limited. Additional mitigation measures are therefore necessary to ensure, as far as possible, the favourable conservation status of the site.

9.4.1. In and around the territory of the priority protection sites for owls and woodpeckers and around observation sites for these species (with nesting signs), **species-appropriate cages must be placed** and monitored. For the pygmy owl (at least 10 pcs), for the Ural owl (at least 7 pcs). Within the same species, cages should be placed at equal distances from the WTG to ensure comparability between groups of different distances. Cages can also be put near stations at possible locations where the particular species were found prior to the construction of the farm. Cages are deployable before the intended operations in the construction sites where they will be located in the long term (where no logging will be carried out during monitoring). To ensure the effectiveness of this measure and the scientific usability of the data, a certified bird expert should be involved in the placement of cages and in locating sites.

9.4.2. It is recommended to maintain crops sown in arable land near the stations to reduce the interest of birds of prey in this area as a feeding place.

9.4.3. It is desirable to agree with the land manager on the clearing of overgrowth in the Bērzu swamp (see Figure 4), and if possible, also in the Lucas swamp. This will provide wider nesting areas for the black grouse (its protection situation in Latvia is unfavourable) and compensate for the affected nesting areas near the wind power plants. Restoration of the swamp is also a priority, because Bērzu swamp is the habitat of the specially protected biotope "Degraded high marshes in which natural regeneration is possible or is taking place" (7120), and the Lucas swamp is the habitat of the specially protected biotope "Active high marshes" (7110*).

9.4.4. It is advisable to have discussions with forest owners so that, for example, near WTG **No. 2** and **No. 3** (preferably also elsewhere) a grown forest can be preserved during the operation of the farm without logging in these forest plots(Figure 33).

9.4.5. Since the long-term population ofthe pygmy owl in Latvia is decreasing, and the hazel grouse population is severely endangered, it is advisable to preserve forests with little impact of economic activities and sufficiently large habitats with adult and overgrown forest stands in the nesting areas of these species. Including species in priority protected areas.

9.5. Monitoring

Monitoring should be initiated prior to the construction phase of the planned activities, continuing to gather and supplement the information obtained during this opinion. The purpose of monitoring shall be to obtain qualitative data to monitor and identify any impacts on bird populations, and where appropriate to implement mitigation measures. As the construction of the wind farm will change the habitats and habits of surrounding birds, future bird monitoring will help to identify situations where the impacts are different from those predicted in the opinion.

Monitoring and research is an essential element of responsible renewable energy development, which can be assessed as the implementation of a compensatory measure. This helps to ensure that wind farms are built and operated in such a way that they pose as little threat to bird populations as possible.

Monitoring should be structured and scientific to obtain accurate and reliable data on how the wind farm affects bird populations, especially those that are currently not sufficiently studied in the context of wind farms. **The results of the monitoring should be publicly available** so that they can be used in the construction of other wind farms and help to better identify the risks of harms. Publication of the results in an internationally cited scientific journal in English would make the results accessible to a wider readership and help improve understanding of the impacts on birds.

Substantial data analysis can be done remotely using bird detection systems. It is also desirable **to install cameras near the masts of the stations, which keep track of the blades and are able to detect flying objects.** Such cameras accumulate information about the presence of species and cases of collisions. Based on the information obtained by a certified bird expert work should be done on the development of a mechanism for different scenarios of actions for the stations. This mechanism should be inspected annually for the first three years and every three years thereafter. The mechanism of the scenarios involves an automated operation of the station (reducing or stopping the speed of the blades) depending on the real-time information of bird detection systems, such as the presence of a particular species (the common buzzard, the lesser spotted eagle, the white-tailed eagle, etc.) close to the station or the approach (migration) of a large number of birds at rotor height, etc.

9.5.1. Large birds

Monitoring of all known large bird nests in trees (the common buzzard, the lesser spotted eagle, the European honey buzzard, etc.) located up to 5 km from the constructed wind stations should be carried out annually to judge the occupancy of the nest and obtain information on nesting success and the number of fledglings.

Monitoring should first be carried out in the spring, when the birds begin to nest, but in those nests that have been busy in the spring, also at the time of hatching. If it is unclear during the time of hatching about the population of the nest, it should be reached with the aim to find out when approximately the nest was abandoned. **Monitoring of individual nests can be carried out remotely by installing a nest surveillance camera**. Such a solution may help link the nest camera observations to observations of bird detection systems at WTG.

9.5.2. Owl cages

Every year, for at least ten consecutive years, monitoring of the nesting success of owl cages should be carried out for all cages installed less than 2 km from the wind station.

Such monitoring will help to find out the extent to which wind farms are negatively affecting owl populations.

9.5.3. Sampling plot of daytime and nocturnal birds of prey

To keep track of the changes of day and night birds of prey and find out the distances of species territories from the stations, it is advisable to establish a day and night plot for birds of prey.

Monitoring should be carried out according to the methodology for monitoring birds of prey (including nest search) (Avotiņš jun., 2020).

The selection of the plot should be carried so as to cover the largest possible area of the wind farm, adding additional inventory points if necessary. The purpose of this plot is not to obtain indicators of population change that are representative of the whole country, but of the particular farm and the immediate surrounding area.

Monitoring should be carried out during at least two years before the construction of the farm and eight years after commissioning of the farm.

9.5.4. Migration and general monitoring

Migration and general farm survey monitoring should be carried out at least twice in the spring. During monitoring, changes in presence of the black grouse nests and woodpeckers should be registered primarily, but all other species should be noted in order to keep track of their changes as well, such as the common snipe and the Eurasian woodcock. During the surveys, the operation of the stations and the response of the automation systems should be evaluated.

9.5.5. Transmitters

The possibility of **equipping large birds with transmitters** near the territory should be evaluated before the construction phase of the farm. This will allow to follow the habits of birds before the construction of the farm and their changes during when the wind farm is in operation, with a better understanding of the impacts generated.

Black grouses, lesser spotted eagles, European honey buzzards or other large birds can be equipped with transmitters. It is essential to equip the lesser spotted eagle with a transmitter if a station is built closer than 2,000 m from the bird's nest. This will help in determining whether and how the wind farm affects the lesser spotted eagle.

9.5.6. **Additional monitoring**

If other significant impacts, sensitive species or areas are identified during the monitoring, additional research is needed the appropriate protection measures should be ensured.

10. Conclusions on the impact of the planned activity or measure on the status and biological value of the species and habitats found and the adjacent area and the conditions for the activity or measurement

When developing wind farms in forest areas compared to agricultural lands or industrial areas, it is essential to take into account the greater potential risks and a higher probability of harm to birds. Forest areas are usually less affected, they have a greater diversity and concentration of bird species compared to agricultural land.

To reduce the potential risk of harm in forest areas, priority should be given in the planning of wind farms to areas that are already degraded, intensively managed and have low ecological value. In contrast, places near which there are large areas of protected areas, a mosaic landscape with various structural elements, bodies of water and watercourses, will have a higher bird species diversity, and consequently the greater the harm that will result. All species that inhabit the vicinity of the wind farm can be affected. Particularly sensitive to the construction of wind farms and activities in the forest territories are herbivorous birds, day and night birds of prey, as well as species whose habitats are destroyed or degraded in the process of habitat development. In addition to possible collisions, disturbances during the operation of the farm can lead to a change in the behaviour patterns of birds, species can be forced out of the territory and abandon it. If these species no longer have suitable or free areas nearby (most specially protected species are very demanding on the habitat), this can contribute to a decline in the population of the species. Research suggests that locally, forest species are more sensitive to changes in forest quality than the presence of wind farms (Rehling et al., 2023).

The development of wind farms on forest lands is possible if a high-quality inventory of the site is carried out, the habitats of specially protected species are preserved, the available scientific information and species protection plans are studied, and specific construction requirements are ensured.

The information provided in the opinion will enable the competent authorities to adopt a balanced decision to permit or not to permit the construction of a planned wind farm or part thereof and to lay down the conditions for carrying out the operation. The opinion mainly assessed the impact of wind farms on a local scale, but it should be taken into account that the overall harm caused by wind farms adds up. Therefore, both in the environmental impact assessment and for the responsible institutions, when deciding on the construction of a wind farm and individual turbines, it is important not only to take into account the opinions of other certified experts and socio-economic assessment, but also to assess the impact of the wind farm on the planned infrastructure of Latvian wind farms as a whole, including the proximity of other wind farms. How bird populations in general are affected should be assessed, taking into account the total sum of the impacts of all wind farms. It is important that this effect does not become excessive for any of the species. Latvia needs to preserve large areas and wide tracks that are free from wind farms and other types of harm. It is impossible to completely avoid the harm that wind farms causes to birds, but it can be significantly mitigated or made insignificant.

Implementation of the initial full-scale wind farm plan in the area studied in the opinion (Figure 1) will have harm certain specially protected bird species, such as the lesser spotted eagle, the honey buzzard, the black woodpecker, the hazel grouse, the black grouse, and maybe also woodpeckers. Wind recommendations and conditions are provided to mitigate the impact of the location of power plants, where the cumulative harm to birds will be least severe. While developing such a wind farm, some of the negative effects will continue to be felt by birds (see the descriptions of species), but the site corresponds to a potential wind farm site and is generally not characterised as highly sensitive from the viewpoint of birds. It is located away from the main migratory routes of birds and their resting places, does not include and does not have in its immediate vicinity core areas of specially protected bird species that are important for the maintenance of the population. However, it is important to take into account the conditions for minimising harm.

Since the harm to forest birds caused by wind turbines of this size and height has not yet been sufficiently studied, it is important to take additional precautions and bird monitoring before construction and during operation of the wind farm. Monitoring will provide valuable data on the local situation and help in making informed decisions further on. To minimise the potential impact in the study territory and its vicinity, the opinion provides mitigation and monitoring conditions regarding the location, construction and technical requirements. If necessary, the existing protection measures should be adapted and additional measures taken.

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Bird species expert, Andris Dekants.
Email address: adekants@gmail.com

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Annex

1. Table

Numbers of survey of the area and information related to the survey. The temperature and wind information corresponds to the starting time of the survey.

Survey No.	Date	Time	Temperature	Wind
1.	02.04.2023	00:15 - 02:10	0°	5 m/s
2.	02.04.2023	06:45 - 08:50	-1°	6 m/s
3.	07.04.2023	08:20 - 16:10	13°	3 m/s
4.	07.04.2023	17:30 - 22:00	14°	1 m/s
5.	08.04.2023	06:30 - 12:00	3°	2 m/s
6.	08.04.2023	13:00 - 19:00	16°	2 m/s
7.	17.04.2023	19:10 - 20:40	9°	**2 m/s**
8.	18.04.2023	06:00 - 20:50	10°	3 m/s
9.	19.04.2023	06:00 - 10:30	3°	5 m/s
10.	06.05.2023	19:00 - 21:30	9°	5 m/s
11.	07.05.2023	06:00 - 21:05	10°	5 m/s
12.	08.05.2023	06:00 - 19:00	12°	3 m/s
13.	18.05.2023	13:40 - 17:00	14°	5 m/s
14	14.06.2023	21:00 - 22:00	15°	**2 m/s**
15.	15.06.2023	06:00 - 21:00	26°	**2 m/s**
16.	21.06.2023	22:00 - 23:00	20°	**2 m/s**
17.	22.06.2023	07:00 - 11:00	17°	4 m/s
18.	17.07.2023	21:50 - 23:40	19°	3 m/s
19.	18.07.2023	05:30 - 09:40	14°	3 m/s
20.	25.08.2023	05:50 - 12:50	12°	**2 m/s**
21.	11.09.2023	19:00 - 20:00	20°	**3 m/s**
22.	12.09.2023	07:00 - 14:45	23°	**3 m/s**
23.	08.10.2023	14:00 - 16:40	5°	8 m/s
24.	26.10.2023	15:45 - 18:45	-1°	6 m/s
25.	27.10.2023	07:50 - 15:20	-1°	4 m/s
26.	01.04.2024	06:30 - 14:45	19°	**3 m/s**

2. Table

Preliminary locations of 19 WTG and their coordinates in the LKS-92 system.

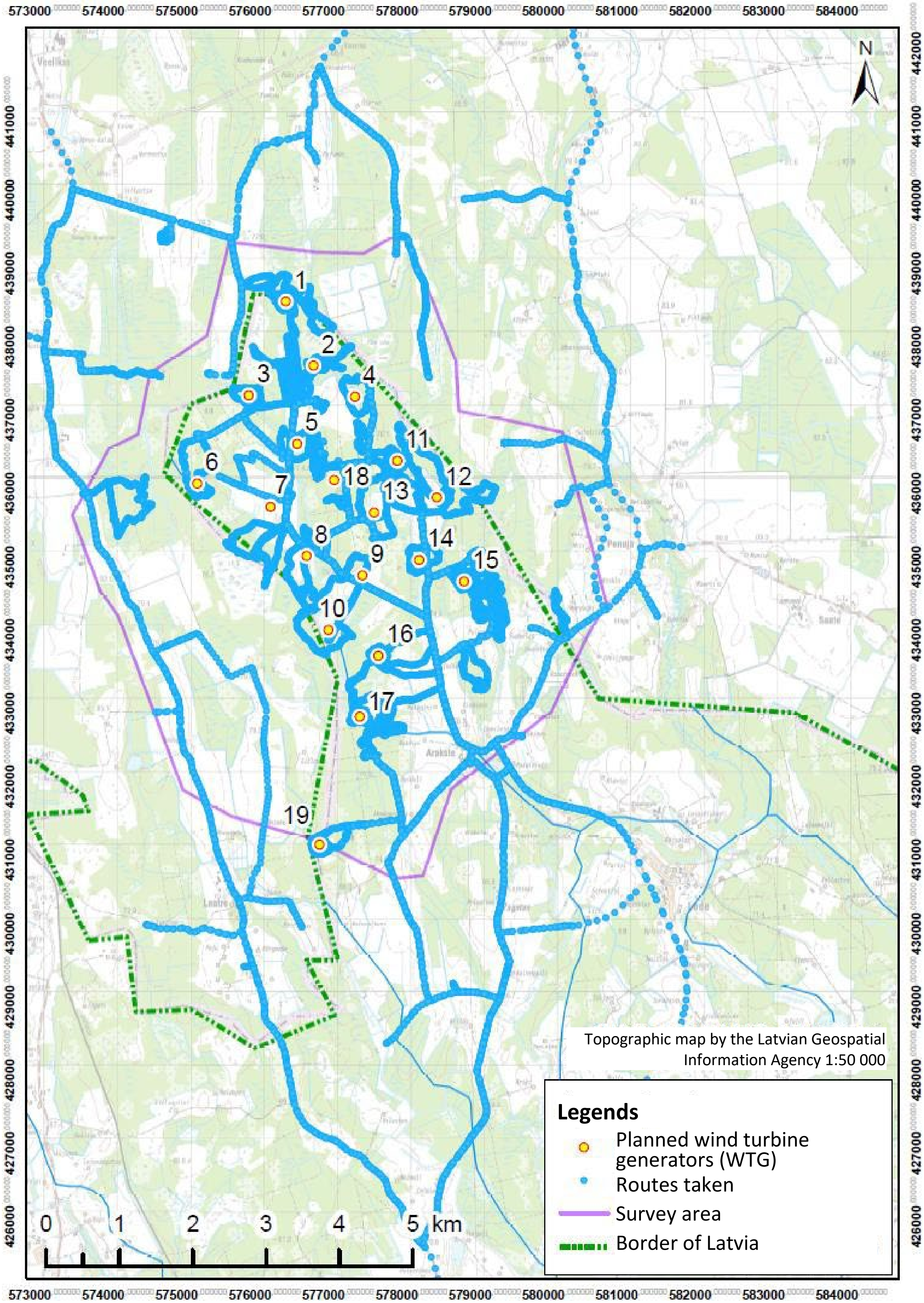
No.	X	Y
1	576293	438413
2	576670	437536
3	575786	437134
4	577236	437113
5	576446	436472
6	575085	435930
7	576086	435613
8	576576	434942
9	577338	434676
10	576873	433934
11	577812	436238
12	578352	435739
13	577496	435533
14	578111	434888
15	578723	434594
16	577553	433581
17	577300	432752
18	576953	435978
19	577136	431566

3. Table

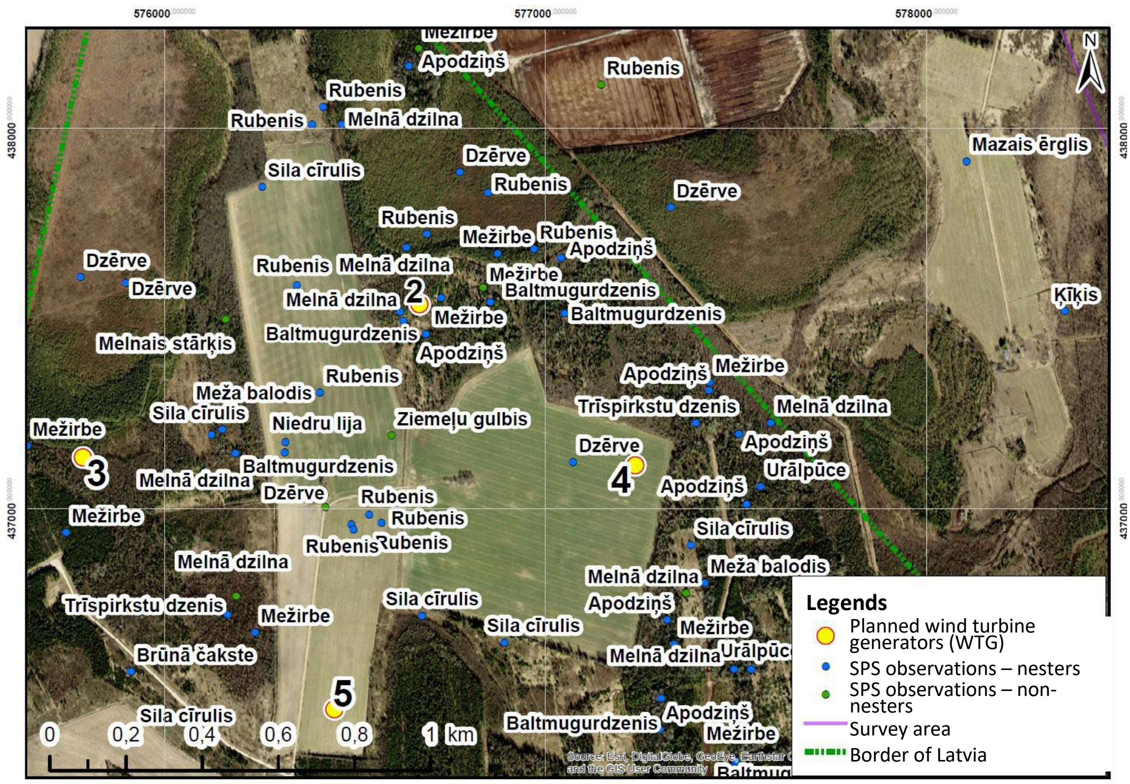
Number of specially protected and micro-reserve bird species in the study area and periphery since 2013. See Figure 1 for spatial arrangement.

No.	Species	Micro-reserve species	Nesters observations	Non-nesters observations	Observations in total
1	Whooper swan	Yes	1	4	5
2	Hazel grouse		26	2	28
3	Black grouse		26	3	29
4	Western capercaillie	Yes	4	1	5
5	Grey partridge		2		2
6	Black stork	Yes		1	1
7	White stork		13	1	14
8	European honey buzzard		1	1	2
9	White-tailed eagle	Yes		2	2
10	Western marsh harrier		2	3	5
11	Hen harrier			1	1
12	Eurasian goshawk	Yes	2		2
13	Common buzzard*		27	4	31
14	Lesser spotted eagle	Yes	12	3	15
15	Corn crake		4		4
16	Common crane		16	6	22
17	European golden plover			1	1
18	Eurasian curlew			1	1
19	Stock dove	Yes	4	1	5
20	Pygmy owl	Yes	9		9
21	Ural owl		4		4
22	European nightjar		2		2
23	Wryneck		2		2
24	Grey-headed woodpecker		5	1	6

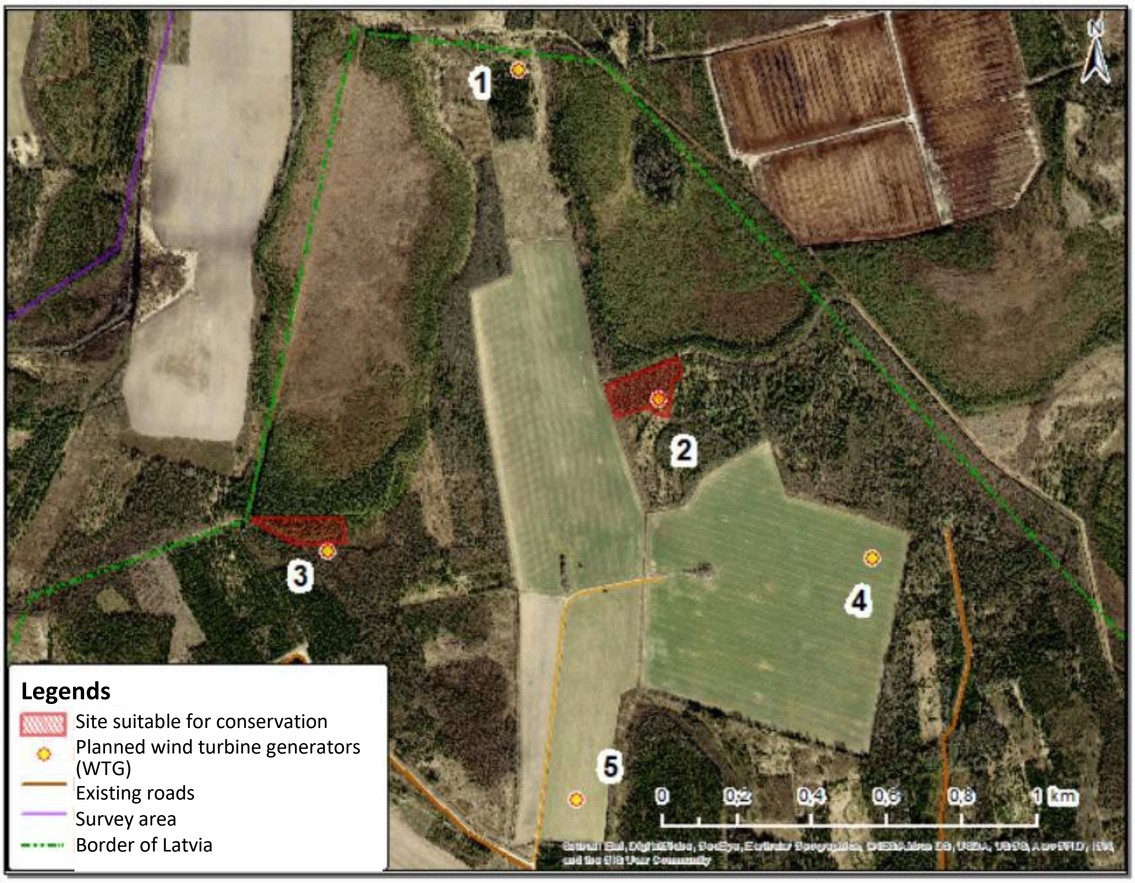
No.	Species	Micro-reserve species	Observations of nesters	Observations of non-nesters	Observations in total
25	Black woodpecker		30	6	36
26	Middle spotted woodpecker	Yes	3		3
27	White-backed woodpecker	Yes	11		11
28	Three-toed woodpecker	Yes	3		3
29	Woodlark		13		13
30	Red-breasted flycatcher		1		1
31	Red-backed shrike		2		2



31. Figure 3.1.2. For the purposes of this opinion, the routes taken in the study area and the theoretical possible arrangement of WTG.



32. Figure 3.1.2. Card scheme 1:10,000 with specified coordinates (LKS-92) and found specially protected species near WTG **No.2, No.3, No.4** and **No.5**.



33. Figure 3.1.2. Recommended plots to reduce the impact, in which mature forest should be retained during the period of operation of the wind farm.