



Enviroprojekts



Latvijas vēja parki

Dzīvo Latvijas mežos

Summary of the Environmental Impact Assessment for the implementation of the wind power plant park “Valmiera-Valka” and its related infrastructure project in Valmiera and Valka municipalities

October 2024

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Introduction

The Environmental Impact Assessment (hereinafter - EIA) has been prepared for the proposed activity - implementation of the wind power plant (hereinafter - WPP) park "Valmiera-Valka" and its related infrastructure project in Plani parish, Valmiera municipality and Vijciema and Valka parishes, Valka municipality, initiated by Latvijas vēja parki Ltd, registration No. 40203415150, legal address: Pulkveža Brieža iela 12, Rīga, LV-1010 (JSC Latvenergo is 100% shareholder).

During the initial project feasibility phase, 93 potential WPP sites were screened. In consultation with certified experts and the Nature Conservation Agency, the number of WPP has been reduced - eliminating those with significant negative environmental impacts. This brings us to 84 WPP, which were examined in more detail as part of the EIA procedure. Sequentially, out of 84 WPP sites, up to 38 WPP have been recommended for implementation of the proposed action - WPP construction. The EIA report provides an explanation of the analysis of all the WPP locations that determine the potential for the development of this WPP park. Each potential WPP could have a rated capacity of up to 8 MW.

Decision No 5-03/9/2023 of the Environment State Bureau (hereinafter - ESB) on the application of the EIA procedure to the proposed activity of Latvijas vēja parki Ltd was adopted on 15 August 2023. The EIA Programme No 5-03/9/2023 (as amended on 10 January 2024 by No 5-02-1/4/2024) was issued on 12 September 2023.

According to EU Directive 2023/2413, the planning, construction and operation of renewable energy installations, including WPPs, their connection to the grid and the associated network and storage assets themselves are of overriding public interest and serve public health and safety, in order to promote the use of renewable energy (RE). The implementation of RE projects is a prerequisite for achieving the EU and Latvian climate goals.

According to the amendments to the Cabinet of Ministers Regulation No 350 of 19 June 2018 "Regulations on the Lease and Development Right of Public Land", Latvian Wind Parks Ltd has been established to implement the Ordinance and its overall strategic objective is "to implement strategically important wind park projects to achieve the objectives included in the Latvian National Energy and Climate Plan 2021-2030 and further progress towards climate neutrality by contributing to energy independence".

The EIA report has been prepared by Enviroprojekts Ltd, involving experts from various fields. The report provides detailed information on the proposed activity itself, the existing state of the environment, the impact on natural values in and around the proposed activity, and alternatives. In accordance with the terms of the programme issued by the ESB, the report also provides information on monitoring requirements, assessment methods, etc.

1. Description of the proposed site and justification for the choice (Chapters 1 and 3 of the EIA Report)

The intended action is the implementation of the WPP and related infrastructure project in the Plani municipality of Valmiera and the Vijciems and Valka municipalities of Valka municipality. Up to 38 WPPs are planned to be built in the WPP Park, each with a rated capacity of up to 8 MW. The total area of the study area for the construction of the WPP Park is 5387 ha.

The proposed action also includes and the EIA assessed the infrastructure related to the functioning of the WPP: construction and operation of power transmission lines, transformer substations, BESS, assembly and maintenance yards and access roads.

The installation and maintenance sites will be located in the forest areas of JSC Latvia's State Forests (hereinafter - LVM). LVM, as the manager of Latvia's strategic asset - land - is actively involved in achieving the goals set out in the Latvian National Energy and Climate Plan 2021-2030 to strengthen energy independence and economic development. In addition to the requirements for protected forest areas, LVM has identified land units under its management where it is justified to carry out WPP park surveys¹.

Based on the data of the Nature Data Management System (hereinafter - NDMS) "Ozols", there are no Natura 2000 sites and microreserves in the LVM wind park "Valmiera-Valka" study areas. The closest Sites of European Importance (Natura 2000) are the North Vidzeme Biosphere Reserve (hereinafter - NVBR) (its landscape protection zone), the nature reserve "Sedas purvs", the nature reserve "Burgas plavas" and the protected landscape area "Ziemeļgauja", as well as micro-reserves: "Bulvara riests" and "Igaunijas riests". More detailed information on the natural values of the area is provided in subsection 6.4.1 of the EIA Report. The site has a well-developed road infrastructure: the national main road A3, the regional road P24, the local roads V261 and V260, the extensive LVM road network, the roads P23, P25, V240 and V237 in the wider vicinity, as well as municipal roads.

High voltage 330 kV and 110 kV transmission lines run directly through the area of the Proposed Action, which economically justifies the construction of the WPP in close proximity to the electricity connection, also reducing the area to be deforested by shortening the new connection line.

Locating WPPs in predominantly forested areas reduces the impact of flicker, noise and landscape changes on farmsteads and inhabitants. There are 25 homesteads in the study area of the proposed wind farm.

LVM has determined that no WPP parks will be established on LVM land²:

- in towns and villages and up to 800 m around them and residential and public buildings;
- in nature conservation areas where the construction of WPP park is incompatible with the laws and regulations of the Republic of Latvia;

¹ <https://www.lvmgeo.lv/data>

² <https://www.lvm.lv/business-partners/land-purchase-and-lease/facility-parks>

- in areas where the purpose of forest land management is nature conservation and LVM has additionally established protection for preserved environmental values, as well as in forest areas important for recreation of the population, etc;
- where cultural monuments are located.

The location of the WPP study area and the 84 WPPs assessed in detail in Valmiera and Valka municipalities are presented below (Figure 1. (EIA Report 1. 1. figure)).

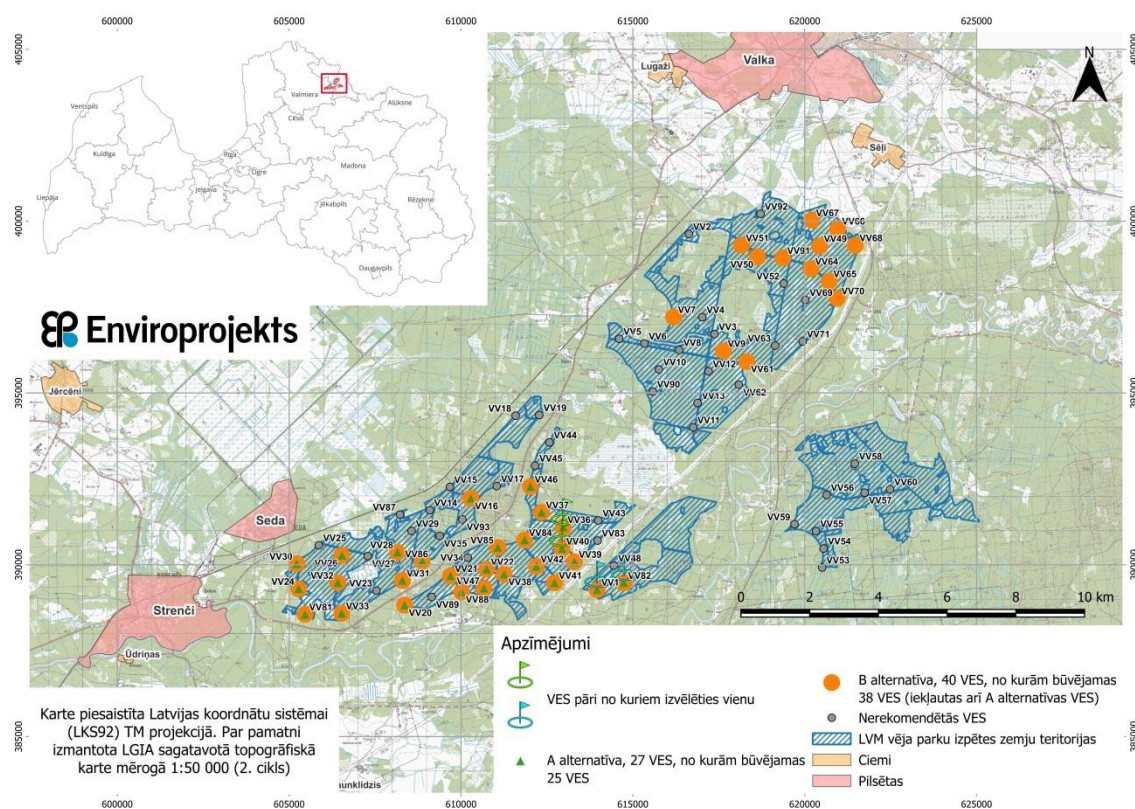


Figure 1. (EIA Report Figure 1. 1.) *The territory of the LVM wind park “Valmiera-Valka”³ and the location of the 84 WPPs studied in more detail in Valmiera and Valka*

The rationale for the location of the proposed Valmiera-Valka WPP Park was determined, inter alia, by the following factors:

- the possibility to transfer the generated electricity to the transmission infrastructure of JSC Augstsprieguma tīkls (hereinafter referred to as AST);
- restrictions, requirements and minimum distances set out in legislation and sectoral guidelines:
 - For WPPs with a capacity greater than 2 MW, the distance from the nearest planned wind power plant and wind park boundary to residential and public buildings shall be at least 800 m (FC 30. 04. 2013. not. 240), see EIA Report Figure 3.2.2;
 - The construction of WPPs is allowed outside towns and villages in the industrial area, technical area, agricultural area and forest land as defined in the spatial plans of the two municipalities concerned, provided that the distance from residential and public buildings to the nearest planned boundary of the WPP and WPP park is at least 800 metres (Law on the Procedure for the

³ Under the conditions set out at <https://www.lvmgeo.lv/data>

Construction of Facilitated Energy Supply Structures to Promote Energy Security and Independence), see EIA Report Figure 3.2.2;

- Siting of WPP is prohibited in specially protected nature territories - NATURA 2000 territories (CM 16. 03. 2010. not. No 264) and micro-reserves (Cabinet of Ministers 18. 12. 2012. not. No 940);
 - to protect bird species and other natural values from the impact of WPP, the conditions and minimum permissible distance for the siting of WPP shall be determined in accordance with the results of the EIA (MC 30. 2013. not. No 240);
 - in the visual perception zone of national protected cultural monuments, the landscape impact of WPPs and WPP park should be assessed, taking into account the specific situation and the specificity of the cultural monument (FC 30. 04. 2013. not. 240) (for a map of the cultural heritage sites in the area adjacent to the Proposed Action, see EIA Report Figure 6.5.5.);
 - WPP are not allowed in the protection zones around land-based navigational aids for national defence and military maritime surveillance aids. The maximum width of the protection zone around navigational aids for national defence on land is 15 km from the centre of the object (Law on Protection Zones);
 - if the WPP park WPP will be located up to 16 km from the navigation aid, or the beacon's outermost zone of influence, an in-depth analysis and assessment of the impact of the WPP on the operation of the beacon (Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors) is required;
 - additionally, restrictions in operational, sanitary and safety protection zones along linear and associated objects - gas pipelines, gas supply installations and structures, gas warehouses and storage facilities, electronic communications networks and radio monitoring points, electricity networks, heat networks, optical telescopes and radio telescopes, state and public use railway lines, public use roads, etc. must be taken into account.
- an assessment of the climatic conditions and wind parameters in the area to assess the efficiency of the WPP.

The planned activity is a direct result of the overall strategic objectives of Latvenergo AS and the Cabinet of Ministers' Order No 464 of 27 June 2022 establishing “Latvijas vēja parki” Ltd. to implement strategically important wind park projects. The choice of the Valmiera-Valka Wind Park site is based on the possibility of concluding a development agreement, the proximity of the transmission line and other factors listed above.

As the Estonian territory is located within 4.2 km of the nearest WPP included in the assessment, the impacts are described in terms of the aspects affecting these areas: impacts on landscape and ornithofauna.

The location of the proposed activity in relation to other WPP park's in the immediate vicinity in the north of Latvia for which EIAs have been carried out or are in various stages of preparation is presented in Figure 2 (EIA Report Figure 3.2.5). The assessment of the cumulative environmental impacts of WPP parks is based on publicly available information on these WPP parks. The closest is the Valka Wind Park, which borders the area of the Proposed Action to the north: between the Valmiera-Valka Wind Park and Valka. The other WPP park's

in northern Latvia and southern Estonia are located at distances where no cumulative environmental impacts are expected to occur. The nearest wind park in the municipality of Valga has a study area more than 15 km away from the area of the proposed activity, and between these two parks is the Valka wind park, for which the EIA is at an early stage and the initial public consultation has been completed.

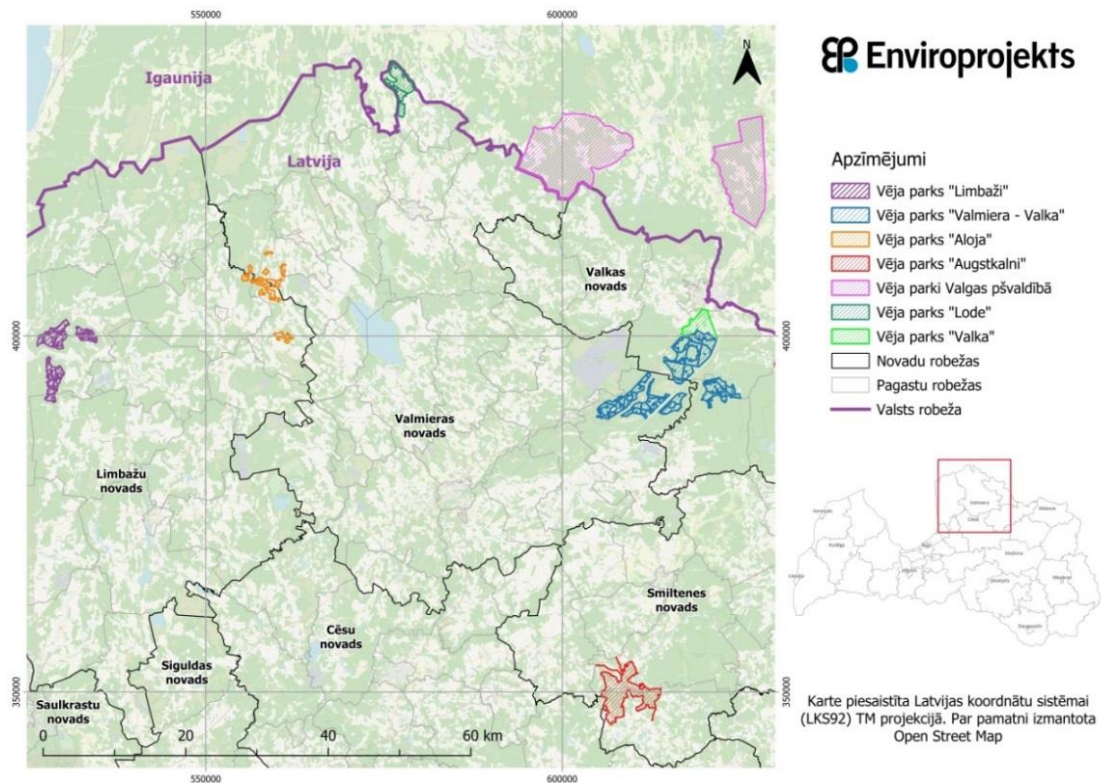


Figure 2. (EIA Report Figure 3.2.5) *Location of the proposed activity in relation to other WPP parks in the vicinity*

2. Siting of the WPP park and alternatives for the location of the WPP (Chapter 4 of the EIA report)

The construction of the WPP and related facilities will require up to 300 ha.

During the EIA, the boundaries of the areas investigated and surveyed in relation to *the area of LVM study lands* were different, determined by the environmental area assessed, e.g:

- in assessing the impact of the Proposed Action on protected habitats, the site was surveyed by visiting and/or assessing the site of the Proposed Action and the areas of potential impact: the proposed location of the WPP and the area within 350 m around it, potential access roads and the area up to 150 m along them, and potential electricity cable routes and the area up to 20 m along them;
- the ornithofauna study area covers an area of approximately 26 500 ha, covering a 3 km zone around all assessed WPP, while a 10 km zone was assessed for migratory birds;
- the landscape assessment study area is a 10 km zone around the outer boundary of the WPP park (from the edge of the WPP);
- noise and flicker have been assessed as far as the potential effects of the Proposed Action extend.

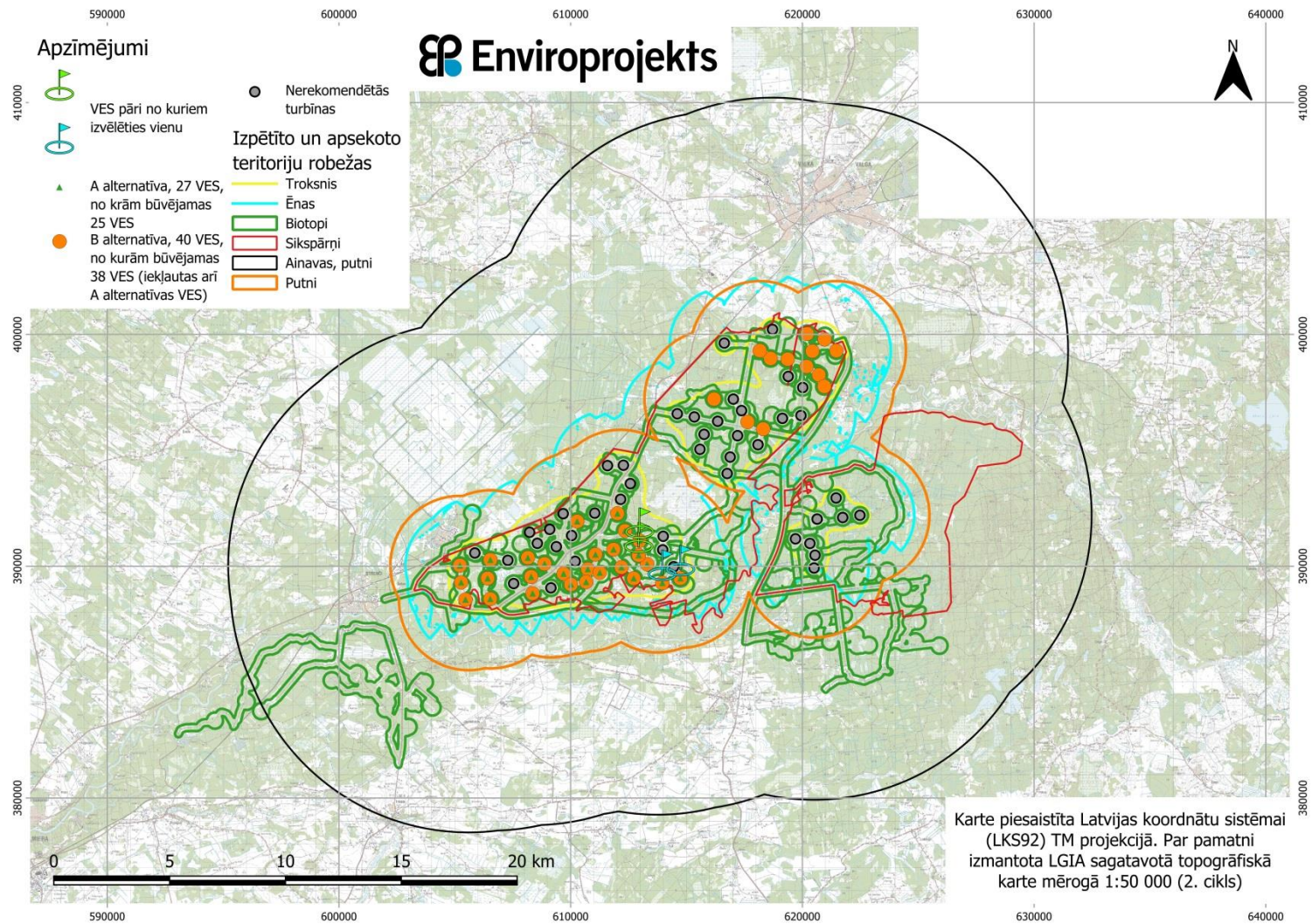


Figure 3. (EIA Report Figure 4. 1. 1.) *The boundaries of the surveyed areas in relation to the area of the JSC LVM study lands and the 84 WPP assessed*

Alternatives to the location of the proposed activity assessed in the EIA report

Of the 84 WPPs assessed, 46 were identified as having significant environmental effects (see relevant subsections in Chapter 7 of the EIA Report and summary in Chapter 8).

Overall, taking into account the recommendations of nature experts for the location and operational conditions of the WPPs, it was concluded that up to 38 WPPs could be built. Enviroprojekts Ltd together with certified nature experts recommend to abandon part of the originally planned WPP in order to mitigate the impact not only on the species occurring in the area of the Proposed Action, but also to mitigate the impact on migratory birds and the surrounding Natura 2000 sites (see Chapter 7 of the EIA Report). As a result, the feasible WPPs were grouped into two alternative locations. The assessment of alternatives and the final location of the WPPs also assesses cumulative impacts from certified expert opinions and EIA expert assessments, as well as the mitigation and exclusion of cumulative impacts on Natura 2000 sites.

For the location alternatives for the WPP, see Figure 4 (Figure 1 of the EIA Report)

Table 1 *Chronology of the Valmiera-Valka WPP Park Site Investigation*

Chronology of WPP site investigations	WPP park configuration
Initial feasibility phase	93 potential WPP sites have been investigated. 9 WPP were excluded from further investigation and 11 WPP were refined (93 - 9 = 84 WPP)
Situation at the start of 2024	84 WPP were studied in more detail in the framework of the EIA procedure - 41 WPP were identified as having significant environmental impacts and, due to the identified constraints, were excluded from the detailed study. (84 - 41 = 43 WPP). 43 WPP are being promoted for potential development
	The 43 selected WPP were grouped into two alternatives (A and B): the WPP park location options
	Alternative A: 29 WPP compact area in the SW part between Sedu, Gauja and Puksi swamp
	Alternative B: 43 WPP - 43 WPP: consisting of the compact area in the SW part (29 WPP of Alternative A) and 14 WPP in the compact area to the NE of the Puksi swamp, added to the 29 WPP planned 7 km away in the SW part of the site (identified as Alternative A). 29 + 14 = 43 WPP

Chronology of WPP site investigations	WPP park configuration
In September 2024, adjustments were made	<p><u>Nuisance</u> effects on bird species have been identified for 3 WPP (VV92, VV44, VV45), these 3 WPP have been excluded from the implementation plan.</p> <p>1 WPP (VV62) was moved to the previous location of WPP VV61 (moving this WPP does not change the WPP total in any of the alternatives).</p> <p><i>Additional clarification on the total number of WPP: one (VV92) excluded from the 14 WPP in the compact area to the N of Alternative B (13 NPPs remain); two (VV44 and VV45) excluded from the WPP in Alternative A).</i></p>
	<p><i>Hence - 2 WPP are removed from Alternative A: $29 - 2 = 27$ WPP, while all 3 WPP are removed from Alternative B (because the total number of WPP in Alternative B also includes WPP in Alternative A), i.e. $43 - 3 = 40$ WPP</i></p> <p>For the other 4 WPP (VV36, VV40, VV1, VV82), it is recommended that the choice for construction be made in favor of only two, the choice to be made at the design stage, after assessing the engineering conditions (thus - 2 more WPP are excluded from each alternative, i.e.</p> <p><u>Alternative A $27 - 2 = 25$ WPP,</u></p> <p><u>Alternative B $40 - 2 = 38$ WPP</u></p>
Result (see Figure 1)	Alternative A with 27 WPP , of which 25 WPP would be built

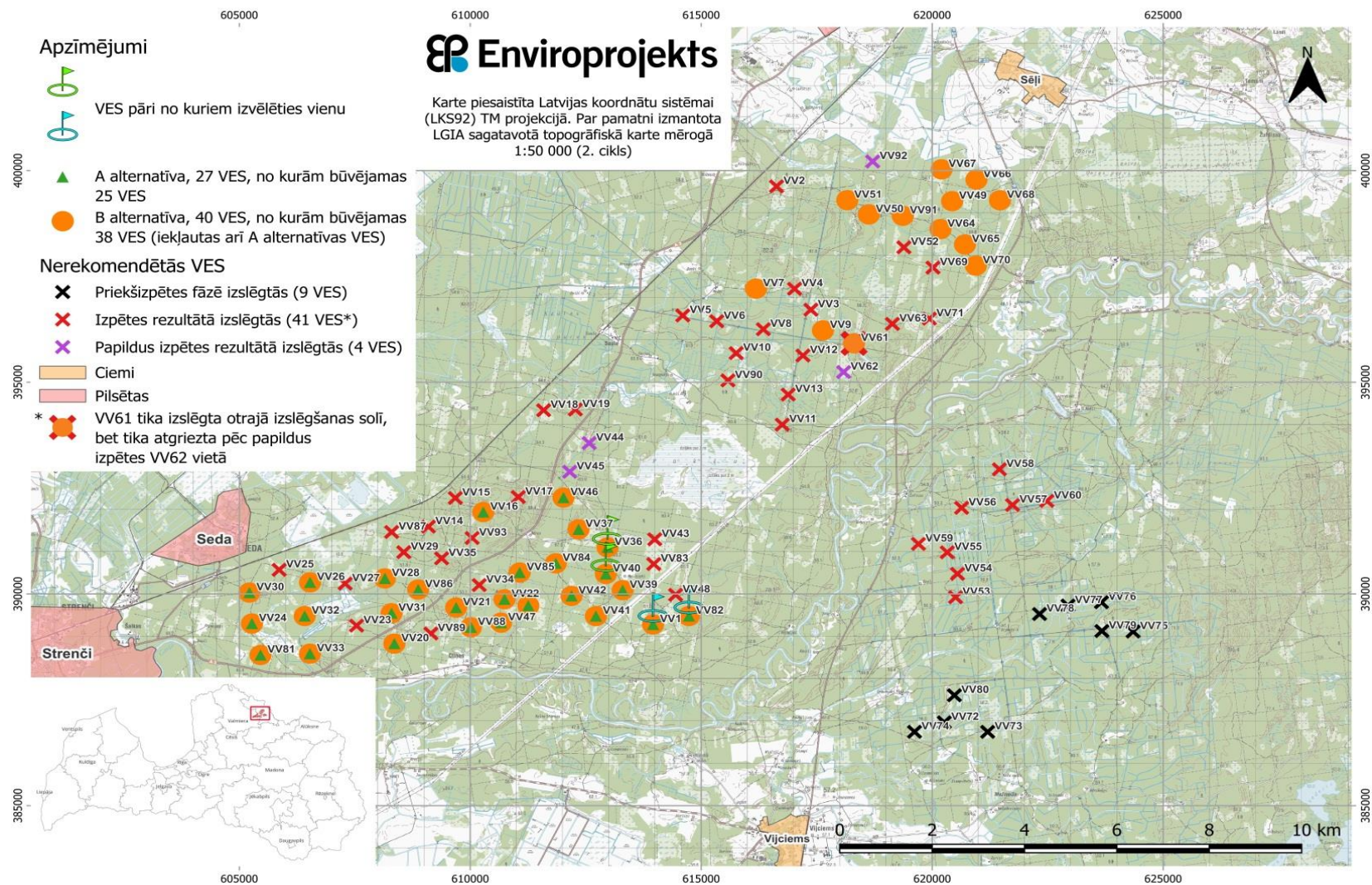


Figure 4 (Figure 1 of the EIA report). *Alternative A and B for the location of the Valmiera-Valka wind park*

3. Assessment of the existing environmental status of the site

(Chapter 6 of the EIA Report)

3.1. *Hydrogeological, hydrological and engineering geological conditions and geological structure*

The area of the proposed activity is located in the eastern part of the Baltic artesian basin. According to the LVGMC database "Boreholes" and cartographic information, groundwater aquifers associated with Quaternary sediments and rocks of the Upper Devonian, Middle Devonian and Lower Devonian sedimentary complex are distributed in and around the area of the proposed WPP (Table 6.1.1 of the EIA Report).

In general, the area has abundant underground freshwater supplies, with the right amount of water available anywhere, at different depths. The majority of the area of the proposed activity is located in the artesian water transit zone, which defines zones of medium pollution risk, and in the areas of upward flow of pressurised water, i.e. zones of low pollution risk. Small areas in Plani municipality are at high risk of pollution (pressure water recharge areas). Groundwater used for individual water supply in rural areas - homesteads - is relatively protected or moderately protected against surface pollution in most parts of the county. A small area around Strenči and the Seda river are poorly protected against surface pollution. The chemical status of all groundwater aquifers (Arukil-Gauja and Ķemeri-Pērnavas) in the area is good.

The groundwater aquifer in most of the area of the proposed activity is associated with the sandy sediments of the Baltic Ice Lake (glQ3ltvb). At most WPP sites, the water table is 0-2 m below the ground surface, with only a few sites having a water table depth of 5-25 m (Figure 6.1.1 of the EIA Report).

During the operation of the WPP park, potential impacts on hydrogeological and hydrological conditions are related to the possible drainage effect of the side ditches. No significant adverse effects on the water quality of groundwater, surface water, groundwater and water abstraction points are expected from the implementation of the Proposed Action, as there are no contaminated or potentially contaminated sites in the Proposed Action area and construction activities will be monitored during construction.

According to the Water Management Act, the territory of the Proposed Action falls within the Gauja river basin district. According to the information from the drainage cadastre of the Ministry of Agriculture and the Cabinet Regulation No 397 of 3 July 2018, the area of the Proposed Action is located in two large basin areas: The Gauja (large catchment area code 52) and the Gauja-Salaca (large catchment area code 54), which are divided into several catchment areas.

According to the "Flood risk and flood hazard maps" prepared by the LVGMC, the territory of the proposed activity is not located in flood risk areas of national importance. The nearest

flood risk area is located 1.5 km to the west of the proposed development area: Gauja floodplain near Strenči.⁴

Drainage systems

The WPP park study area is largely located in an area used for forestry, with a dense network of shared watercourses and drains⁵, providing groundwater recharge and allowing economic activities to take place in these areas. The lifetime of the drainage system network and structures is expected to be up to 50 years. During this period, the drainage network and structures must be regularly maintained, renovated and reconstructed.

Protection zones for watercourses, existing drainage and drainage facilities

The buffer zones around bogs are established to preserve biodiversity and stabilise the moisture regime in the interface (transition) zone between forests and bogs.

In the territory of the proposed activity and its surroundings, the minimum widths of the protection zones around swamps are defined in the TIANS of Valmiera and Valka municipalities⁶:

1. for areas of 10 to 100 ha, a 20.0 m strip;
2. For areas larger than 100 ha, a 50,0 m strip in forest vegetation types on dry, drained, wet mineral soils and drained peat soils, and a minimum 100,0 m strip in forest vegetation types on wet peat soils.

There are 3 swamps in and around the area of the proposed action: Seda, Taure and Puksi swamps. Information on the buffer zones of these marshes is provided in Table 6.2.2 of the EIA Report. The protection zones for surface water bodies in the vicinity of the proposed activity are summarised in Table 6.2.1 of the EIA Report.

Geological structure and engineering geological conditions

The area is well known in terms of geological exploration. A comprehensive geological and hydrological 1:200 000 scale mapping, involving extensive drilling, hydrological, geological and mineral prospecting work⁷.

According to regional tectonic zoning schemes, the territory is situated on the southern slope of the Baltic Shield in the Valmiera-Lokno salient, which sharply demarcates Southern slope of the Baltic Shield from The Latvian saddle. The Valmiera-Lokno outcrop is adjacent to the southern side Liepāja-Saldus-Rīga-Apes-Pleskava fracture zone. The Baltic Shield escarpment is characterised by an incomplete vertical geological section of the sedimentary cover and a relatively low thickness compared to other regions of Latvia. However, the age, composition, folding conditions and physical properties of the rocks in the vertical section also show three

⁴ [Flood risk and flood hazard maps \(lv\). \[floodrisk.lv\]\(http://floodrisk.lv\)](http://floodrisk.lv)

⁵ <https://www.melioracija.lv>

⁶ Strenči Municipality Spatial Plan 2012-2023. Land use and building regulations. Strenči, Strenči region. 2011. 2016; Spatial plan of Valka municipality 2016. -2027. Land use and building regulations. Valka County Council. <https://geolatvija.lv/en/geo/tapis>

⁷ Yushkevich V. , Polivko I. , Tracevski G. Report on 1:200 000 scale complex geological and hydrogeological mapping in the southern part of sheet O-35-XXI (North-Latvian mapping group), 1962. -1964. g. Geological Board, Rīga, 1964. Yushkevich V. , Polivko I. , Tracevski G. Report on 1:200 000 scale complex geological and hydrogeological mapping in the area of sheet O-35-XX (North-Latvian mapping group), 1962. -1964. g. Geological Board, Rīga, 1965.

distinctly different complexes: the lower one is crystalline bedrock, the middle one is preQuaternary sedimentary cover, and the upper one is Quaternary formations.

Engineering geological conditions and modern exodynamic processes

The engineering geological conditions of the area of the proposed operation will be assessed as a result of the engineering geological investigations to be carried out during the construction phase of the WPP. Consequently, the following description of the engineering geological conditions is based on the available general geological information at^{8 9}.

In assessing the potential hazard from hazardous geological processes, it is concluded that no hazardous modern exodynamic processes, such as karst or suffosion, landslides, slumping, gully formation, or active aeolian processes are present in the area of the Proposed Development.

Erosive or accumulative activity of the river in the area of the Proposed Action is not pronounced and mainly affects the banks of the Gauja River, which are located beyond the territory of the WPP park and do not pose geological risks to the WPP park. On the banks of the Gauja River, cutting down trees along erosion-prone banks is not desirable.

The WPP study area is not located in a seismogenic zone where earthquakes with an epicentre intensity of 6 magnitude (MSK-64 scale) have occurred or may occur in the future (Figure 7. (Figure 6.4.5 of the EIA report)).

3.2. Natural values

Special areas of conservation

There are eight Specially Protected Nature Areas (SPAs) in and around the study area, and the proposed development site is adjacent to three SPAs (see Figure 5 (Figure 6.4.1 of the EIA Report)).

The ZVBR is adjacent to and located to the north-west of the Proposed Action area; the Northern Gauja Protected Landscape Area (Natura 2000 site) is adjacent to and located to the south, east and north-east. The site of the proposed activity is completely surrounded by the micro-reserve "Bulvara riests" (Natura 2000 site).

The nature reserve "Purgailis upes meži" is located to the west of the site of the Proposed Action: the nearest assessed WPP VV5 is ~450 m from the nature reserve boundary.

The protected landscape area "Ziemeļgauja" crosses the study area.

The potential WPP site is adjacent to 8 micro-reserve (MR) sites.

⁸ Yushkevich V. , Polivko I. , Tracevski G. Report on 1:200 000 scale complex geological and hydrogeological mapping in the southern part of sheet O-35-XXI (North-Latvian mapping group), 1962. -1964. g. Geological Board, Riga, 1964.

⁹ Yushkevich V. , Polivko I. , Tracevski G. Report on 1:200 000 scale complex geological and hydrogeological mapping in the area of sheet O-35-XX (North-Latvian mapping group), 1962. -1964. g. Geological Board, Riga, 1965.

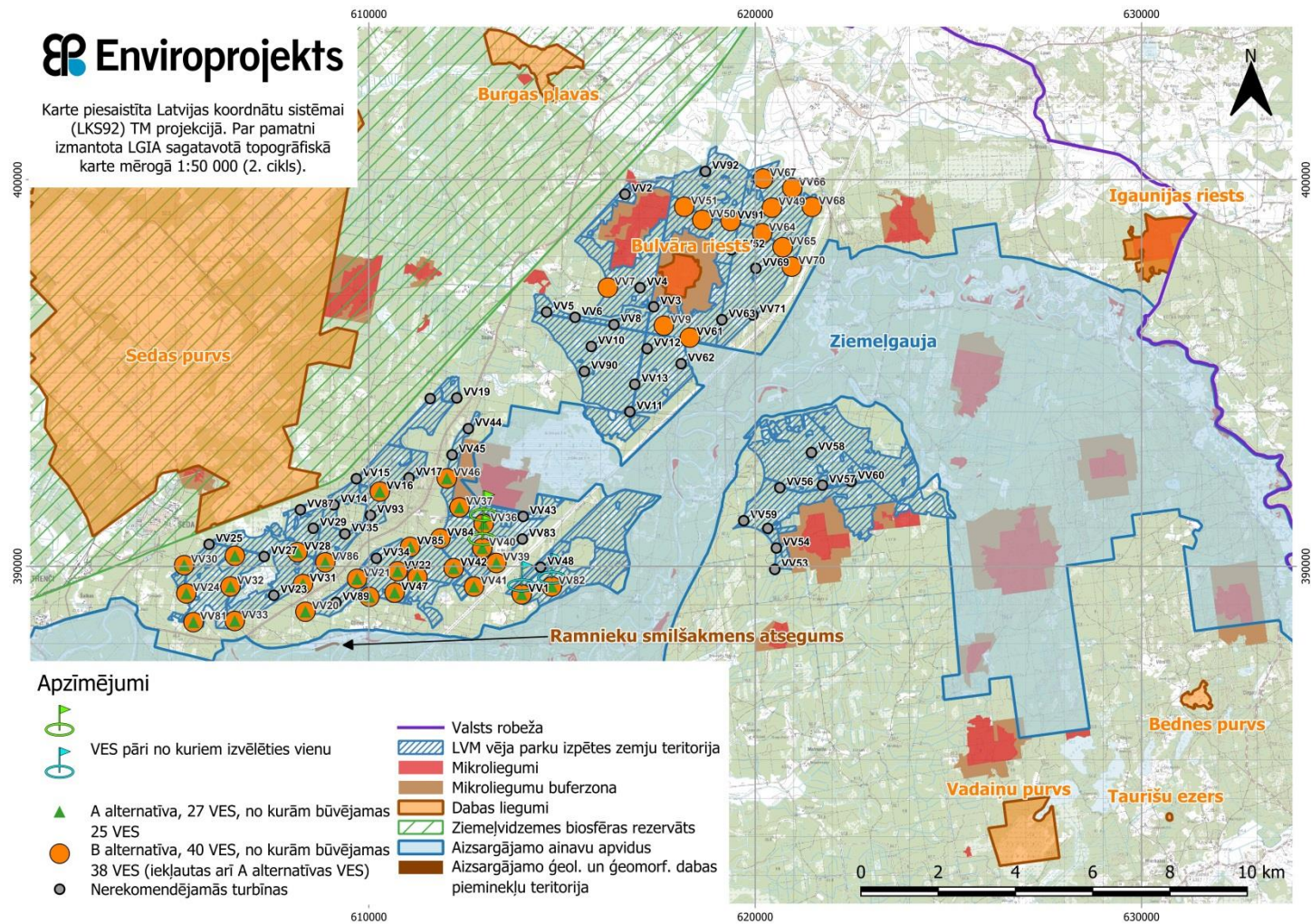


Figure 5 (EIA Report figure 6. 4. 1.). Protected natural areas in the vicinity of a potential WPP site

Characteristics of Natura 2000 sites

According to the Nature Conservation Agency (hereinafter - NCA), the following Natura 2000 sites are located in the vicinity of the planned WPP park area:

- Protected landscape area "**Ziemeļgauja**" (territory code: LV0600700), a Latvian Natura 2000 site: Type C site, established for the protection of specially protected species and habitats;
- The nature reserve "**Sedas purvs**" (area code: LV0526800), a Latvian Natura 2000 site: Type C site, established for the protection of specially protected species and habitats;
- "**Bulvāra riests**" (area code: LV0830800). Natura 2000 site: Type B site, established for the protection of specially protected species (except birds) and habitats. The area almost completely overlaps with a micro-reserve established to protect a rookery;
- "**Igaunijas riests**" (area code: LV0843500). Natura 2000 site: Type B site, established for the protection of specially protected species (except birds) and habitats. The site overlaps with a micro-reserve established for the protection of a rookery;
- Nature reserve "**Purgāiles upes meži**" (territory code: LV0542000). The site was established in 2023.
- Nature reserve "**Burgas plavas**" (area code: LV0532600). Type C site, established for the protection of specially protected species and habitats.

The location of the Natura 2000 sites in relation to the location of the Proposed Action is presented in Figure 6 (Figure 6.4.2 of the EIA Report).

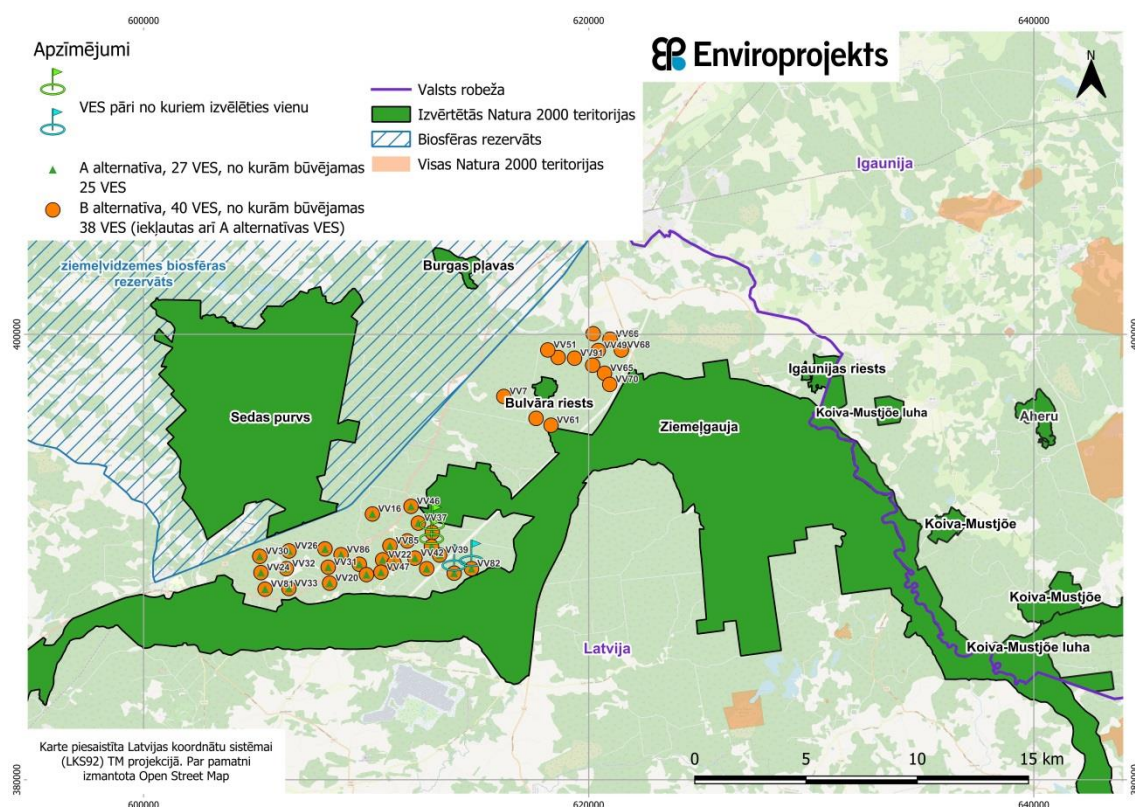


Figure 6. (Figure 6.4.2 of the EIA report) *Location of Natura 2000 sites in relation to the recommended WPP sites*

An assessment of the impact of the planned construction of the WPP, access roads, transmission lines and transformer substations on the protected natural values in the nearby Natura 2000 sites is presented in Chapter 7.9 of the EIA Report.

The northern end of the planned WPP park area is 4 km from the border of the Republic of Estonia. For a long stretch to the E of the planned WPP park area, the state border on the Latvian side is adjacent to a Natura 2000 site: the Protected Landscape Area "Ziemeļgauja" (hereafter - the "Ziemeļgauja" PLA). The border is also bordered by a Natura 2000 site on the Estonian side for a large part of this stretch: "**Koiva-Mustjõe**" (EE0080471). This is a Natura 2000 Type A site, established for the protection of specially protected bird species. It lists 4 bird species: the Common kingfisher, Northern pintail, Corn crake and Great snipe. The site completely covers the slightly smaller Natura 2000 site **Koiva-Mustjõe luha** (EE0080421), which is a type B site: established for the conservation of specially protected species other than birds and specially protected habitats. Together, the Natura 2000 sites of the two countries form a single complex of areas, the protection of which is aimed at the natural values of the Gauja and its tributary valleys. The nearest Estonian Natura 2000 sites - the R part - are located 8-9 km from the nearest WPP of the planned WPP park.

Protected habitats and species of special conservation concern

In order to assess the impact of the Proposed Action on protected habitats, the site has been surveyed and investigated by visiting and/or assessing the potential impacts of the Proposed Action.

The site supports 2 EU protected freshwater habitat types, 4 EU protected grassland habitat types, 4 EU protected bog habitat types and 8 EU protected forest habitat types (EIA Report, Chapter 6.4.2, Table 6.4.4).

The most significant threats to protected forest habitats of EU importance in the region and Latvia as a whole are the potential destruction of forest stands by clear felling or deforestation for the construction of infrastructure such as forest roads or drainage systems. Indirect negative impacts on habitat quality and the provision of full ecological functions may result from fragmentation of habitat areas, both through clearing and infrastructure construction, and from drainage caused by the construction of road-related ditches and the construction and reconstruction of drainage systems.

The 15 vascular plant, 7 moss and 5 lichen species of special conservation concern found in the area are noted in Table 6.4.5 of the EIA Report.¹⁰ The locations and areas of the species occurrences are shown on the maps (Annex 1 of the species and habitats expert report, attached as Annex 6 to the EIA report). The map and the table show the species localities only in the study area.

For the identified specially protected species (vascular plants, as well as mosses, lichens, fungi, invertebrates associated with the assessed biotopes), whose localities fall within the potential area of influence of the Proposed Action (see EIA Report 7.5. a more detailed description has been prepared (Species and Habitats Expert report, attached as Annex 6 to the EIA) in order to characterise their ecological requirements and, consequently, to assess the potential impacts of the Proposed Action.

¹⁰ Species names are used primarily according to the lists in the legislation; where the scientific name of a species has been changed, it is given in brackets.

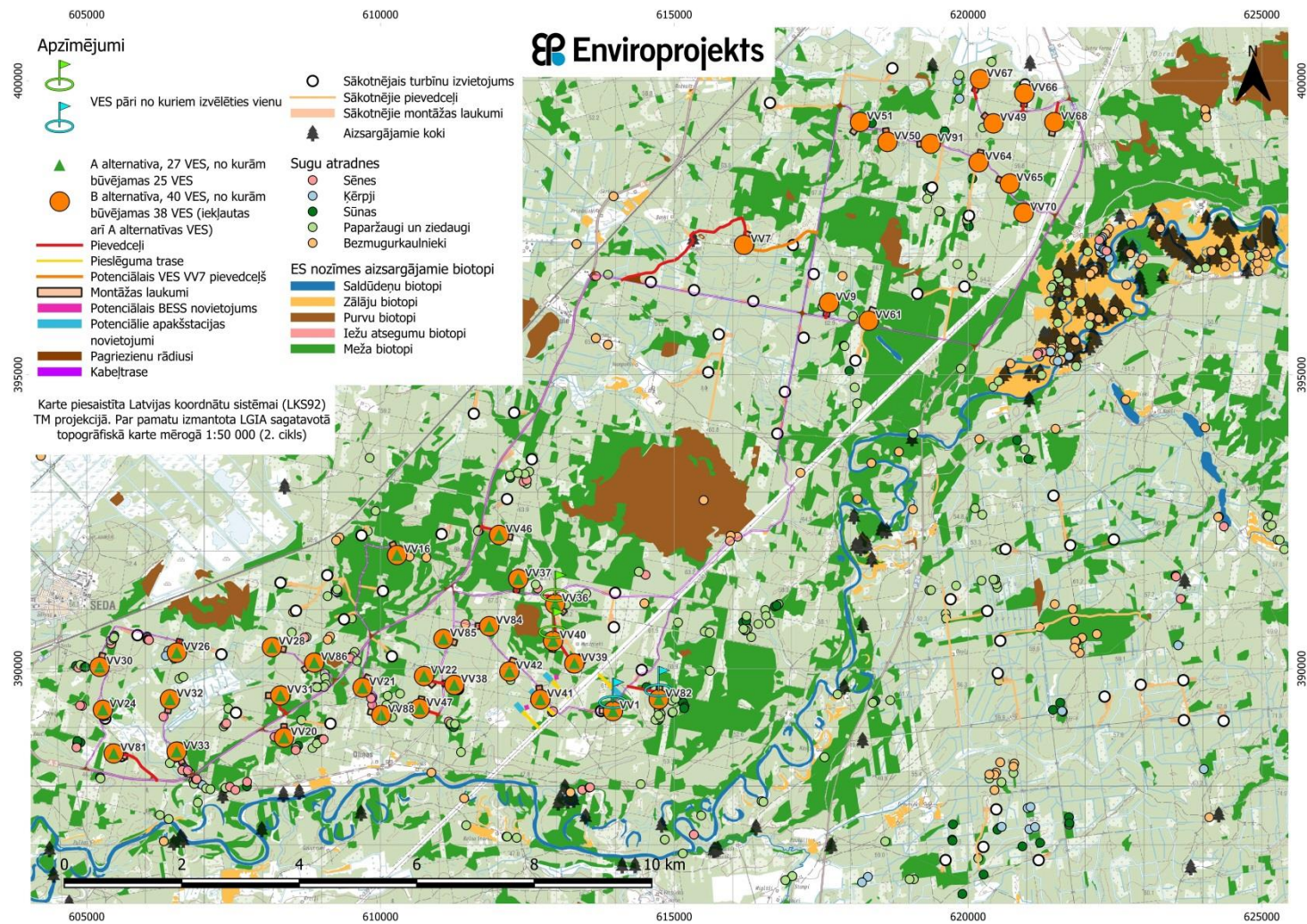


Figure 7 (Figure 6.4.5 of the EIA Report). *Natural values in and around the Valmiera-Valka wind park*

Bird species in the area

The process and methodology of the bird surveys are described in detail in the expert opinion on bird species attached to the EIA report, see Annex 6 of the EIA report.

The following bird species and species groups have been assessed within the EIA: White-tailed Eagle, Golden Eagle, Lesser Spotted Eagle, Western capercaillie, Black Stork, Eurasian goshawk, Osprey, Eurasian pygmy owl, Boreal owl, Eurasian eagle-owl, White-backed woodpecker, Hazel grouse, Black grouse, and migratory bird species.

The study of the area of the proposed activity is based on the observations of the bird expert involved in the EIA report and other observers for the period from 1 January 2022; the ornithofauna study area covers an area of 26 565 ha. in the 3 km zone around the assessed WPP, a total of 5982 observations (excluding observations recorded in the hunting monitoring programme of JSC "Latvijas Valsts meži") by a bird expert and other observers were selected and used in the analysis. in the 3 km zone around the assessed WPP, 154 bird species have been recorded at least once since 1 January 2022, of which 36 with conservation features were assessed in more detail (Table 6.4.6 of the EIA Report). The ornithofauna of the area was characterised using the expert's opinion, the opinion of NCA, LVM, the portal www.dabasdati.lv, NDMS "Ozols" and unpublished data. Detailed information on the surveys carried out in the area of the proposed WPP park and a list of bird species recorded is summarised in Annex 6 of the EIA report.

All species listed in Annex 1 of Directive 2009/147/EEC of the European Parliament and of the Council on the conservation of wild birds have been assessed by a certified bird expert during the preparation of the opinion. Other bird species have also been recorded during the site survey and during the preparation of the opinion.

2022. field work has been carried out in the study area of the Proposed Action in 2007, 2023 and 2024 to assess the impact of the Proposed Action on nesting and passage ornithofauna. 2022. during the breeding seasons of 2023 and 2023, as a result of the intensified survey of the area, the bird expert involved in the EIA proposed the establishment of 7 microreserves for specially protected bird species (some of which have already been established).

Information on the protected bird species found in the area and the bird species assessed in the context of the EIA is provided in Table 6.4.6 of the EIA Report, while the impact assessment and recommended mitigation recommendations are provided in Chapters 7.6.2 and 7.6.3 of the EIA Report.

Bat species in the area

Bat species in the study area were surveyed following the EUROBATS guidelines "On compliance with bat conservation requirements in WPP park projects"¹¹ and the Latvian adapted "Guidelines for assessing the impact of wind power plants on bats"¹². Bat species have been surveyed using the following approach:

- seven times a season, with three (May, June, July) or six (August, September) nights counted each month;

¹¹ <https://tethys.pnnl.gov/sites/default/files/publications/EUROBATS-2015.pdf>

¹² https://lvafa.vraa.gov.lv/files/materials/applications/2020/171/Vadlinijas_VES_xsparni_fin.pdf

- the timing of the surveys was chosen according to the bats' biological cycle (reproduction, migration, mating);
- bat activity was recorded at 12 fixed observation stations D1-D12 and three routes (M1-M3);
- the monitoring stations and routes have been selected to survey bat activity in habitats similar to those in which the WPP is planned to be located;
- all ultrasound detectors at the stations are located in clearings in forests (e.g. clearings).

A total of 1710 bat sound files were recorded at 12 monitoring stations in the planned area of the WPP park over 84 detector nights (21 monitoring nights, with four fixed detectors per night), with 1978 bat passes recorded (Table 6.4.7 of the EIA Report). Route records - seven 90-minute records on each of the three routes - recorded 505 bat passes per season (Table 6.4.7 of the EIA Report).

At least five reliably identified bat species have been recorded in the area of the proposed activity: the northern bat *Eptesicus nilssonii*, the rusty long-eared bat *Nyctalus noctula*, the bicoloured bat *Vespertilio murinus*, the Nathus bat *Pipistrellus nathusii* and the pygmy bat *Pipistrellus pygmaeus*, as well as at least one species of the noctule *Myotis* genus. The northern bat, the Nathus bat, the rusty bat, the double-coloured bat and the pygmy bat are species at high risk of mortality in the context of the WPP.

The results can be compared with other bat species surveys carried out in 14 other potential WPP using identical methodology. The overall bat activity recorded in this study is relatively high. This is due to the fact that forests are suitable habitats for bats, and the surveys carried out so far have mostly taken place in landscapes less suitable for bats, where forests covered only part of the area. The close proximity of several important feeding grounds should also be taken into account in this area.

Invertebrate species in the area

The assessment of the presence of protected invertebrate species in July 2024 at the potential WPP and substation construction sites in alternative A or B was carried out in accordance with the letter from NCA to Latvijas vēja parki Ltd (23.05.2024. No 1.6.1/3200/2024-N) (Annex 2 to the EIA Report).

For the assessment of the presence of invertebrate species in June/July 2024 at the potential WPP and substation construction sites under Alternative A or B, an "Opinion of certified experts in the field of species and habitat conservation - Opinion on insects in the planned WPP park Valmiera-Valka" has been prepared, which is attached as Annex 6 to the EIA Report.

The area of the proposed activity has been intensively managed for a long time, the habitats suitable for SPA invertebrate species in Alternative A or B in the area of the planned WPP and new roads were assessed only according to their suitability for the 4 identified SPA invertebrate species (great crested newt, yellow stump fly, humped newt, Schneider's minnow (Table 6.4.10 and Figure 6.4.4 of the EIA Report).

Mammals

Within the framework of the EIA, an expert on the species group "mammals" (LVMI Silava lead researcher Dr.biol. J. Ozoliņš, NCA certificate No 160) prepared an assessment of the impact of the WPP on terrestrial non-flying mammals (the opinion is attached as Annex 6 to the EIA). The opinion is based on data obtained within the framework of the monitoring of the status and damage caused to large wild mammal populations (ungulates, carnivores), which the Latvian State Forest Research Institute (LVRI) Silava has been carrying out for some species for 20 years, visiting the area in different seasons and meteorological conditions. The study area and its surroundings have been visited and mammal occurrences recorded on numerous occasions in the framework of several projects, which are listed in the expert opinion (attached as Annex 6).

With regard to the Valmiera-Valka WPP park, it is concluded that the land transport arteries - the Valmiera-Valka railway and the A3 motorway, which do not have and are not planned to have animal crossing points - as well as the dune-like elevations in the area, which are oriented NE-SW (see Figures 4.1.2. and 4.1.3. of the EIA Report) may direct animal movements in this direction.

Almost all of Latvia's terrestrial non-flying mammal species, 9 of which are specially protected, are found in the area. An overview of the species, together with their relative importance, is given in Table 6.4.11 of the EIA Report. Observations in the vicinity of the WPP park indicate that up to 10% of the Latvian brown bear population has visited the WPP "Valmiera-Valka" area and its surroundings so far¹³.

Brown bears are also a species for which little or no scientific research in Europe has looked at the impact of WPP park. Their dispersal in Latvia has been N-S, and currently the highest population densities and most successful breeding occur in northern Vidzeme. The proportion of the population of other mammals, both specially protected and economically exploited, in the area where the WPP parks are planned to be established does not exceed 1% of the total population and range of Latvia.

3.3. Landscape and heritage assessment

Landscape characteristics

The study area falls within the *Vidzeme Special Border Area*, defined as an area of natural, cultural, historical and scenic value (Figure 6.5.4 of the EIA Report). It is a concentration of natural and cultural heritage sites of international, national and regional importance, characterised by high scenic quality and biodiversity.

It is also noted that the diversity and aesthetic quality of the landscape in areas of scenic value must not be compromised, with no loss of panoramic views or obscuring of sites of cultural and historical importance.

The site also falls within a *forested area*. The following guidelines are related to sustainable landscape protection:

¹³ <https://www.silava.lv/images/Petijumi/2023-Lacu-monitoring/2023-Lacu-monitoring-Report.pdf>

- the possibility of forestry activities in ecologically and scenically valuable areas, in accordance with environmental and nature protection requirements;
- wood processing and manufacturing facilities should be located without detracting from the value of the surrounding landscape and close to existing regional infrastructure;
- when planning new industrial sites, the primary use should be for areas where no change of use from forest land to built-up area is required.

As the Gauja valley divides the study area into two parts, the territory also falls within *the area of river valleys* defined as important for tourism and recreation development.

Characteristics of cultural heritage

According to the cartographic information of the information system "Heritage",¹⁴ there are 19 monuments of cultural heritage in the study area: 13 archaeological, three architectural, one industrial, one artistic and one historical (site of a historical event) monuments; the art monument "Altar" is located indoors in the Vijciems Church. In terms of status, 6 monuments are of national importance, 9 of regional importance and 4 of local importance, see Table 6.5.2 and Figure 8 of the EIA Report. (Figure 6.5.5 of the EIA report).

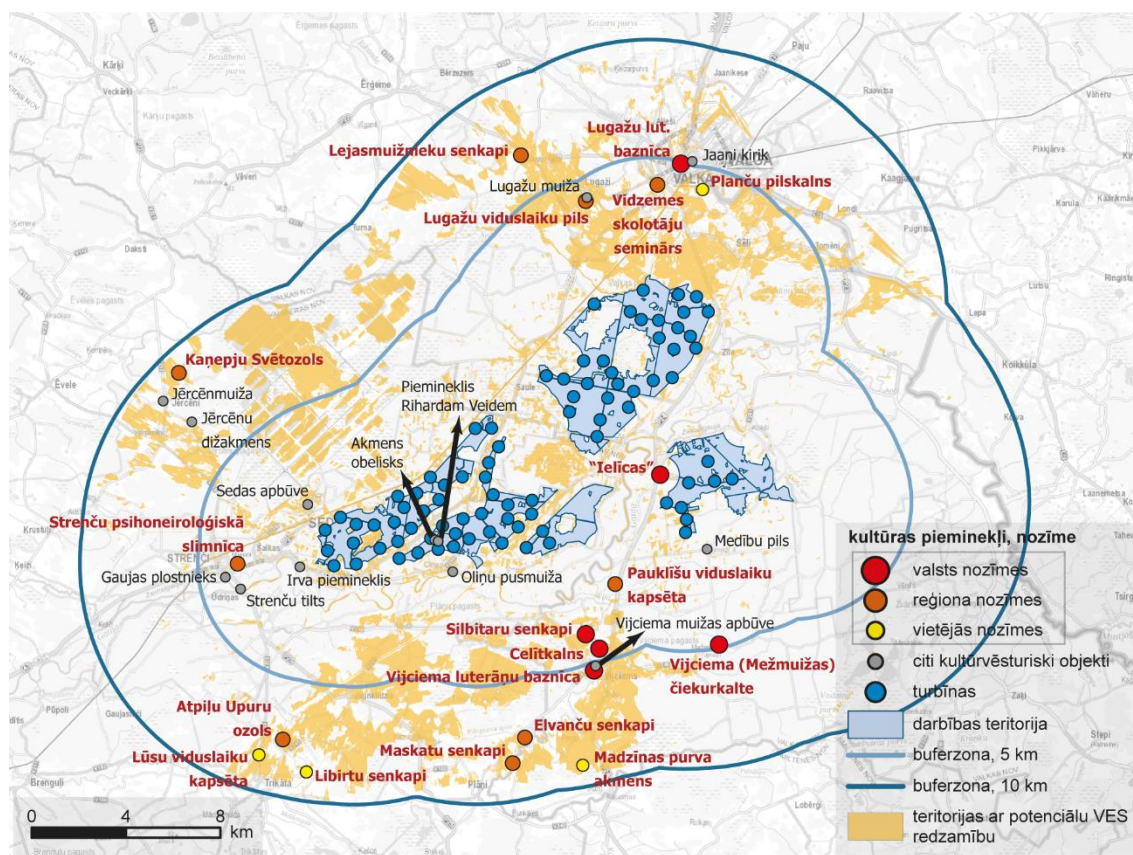


Figure 8. (Figure 6.5.5 of the EIA report) *Cultural heritage and potential WPP visibility zones in the study area*

¹⁴ <https://karte.heritage.lv/>

26 other sites or objects of cultural or historical importance have also been identified within the study area (see Table 6.5.3 of the EIA Report). Among them are 6 monuments, 9 architectural objects, 6 objects of industrial heritage, 2 objects of military heritage and an urban heritage park. 16 of these sites have been recognised as cultural and historical sites of Strenči Municipality (now part of Valmiera Municipality). The EIA includes an in-depth assessment of the objects closest to the area of the proposed activity, the existence of which has led to recommendations or which would be directly or indirectly affected by the proposed activity.

The area of the proposed action and the landscape study area has a fairly wide and varied offer of educational (non-commercial) and nature tourism. There are many point tourist attractions, and at the same time an atypical number of tourist routes of different importance (see Figure 9 (Figure 6.5.6 of the EIA Report)).

Figure 9. (EIA Report figure 6. 5. 6.) *Tourist attractions, cycle routes, hiking and water routes and orienteering areas in the study area*

Number of tourists

For most of the attractions in the Study Area, there is no specific data on the number of tourists. It is known that **the Cirgali lookout tower is visited by around 3000 visitors a year**¹⁵. The owner of Ielīcu tells us that the ethnographic farm is visited by a few thousand people.

Attractions

The nearest areas where tourist attractions are concentrated in groups are the surroundings of Strenči-Seda (the buildings of both towns, Strenči environmental objects and the nature territory of Mīlestības vērtība, Seda swamp), around Vijciems (church, buildings, Kankarīšu rock, Celītkalns, Bitarīnkalns) and Oliņi Lielais les (Olini spring, Olini half-manor, Cat pine, Stone obelisks, etc.). Further ranges are around Lugazi and Valka and around Jarcenai. The ethnographic farm "Ielīcas" and the Vijciems Hunting Lodge, where there is also an active tourism business (the guest house "Bergervilla"), are important sites of their own. For impacts on these sites, see Chapter 7.7.2 "Impacts on Cultural Heritage" of the EIA Report.

Recreational opportunities in the area of operation

Recreational opportunities include mushroom picking and other natural resource gathering, fishing, physical activity (jogging, Nordic walking, cycling, etc.), walking, sunbathing, relaxing by the water, etc.¹⁶

There are no recreation sites managed by LVM in the area of the proposed activity: these are located in the territory of the North Gauja AAC near the Gauja River. In general, LVM has not attempted to develop favourable recreational infrastructure and conditions outside the Special Protection Areas (SPAs) or in areas of economic forests in the study area.

Although there are no specific studies on recreation and tourism in the area of the Proposed Action, it should be assumed that the area, especially closer to the settlements and farmsteads, is used for recreation and not only for orienteering (described below). More detailed information on tourism and recreation opportunities and the impacts of the Proposed Action on them is provided in Chapter 7.8 "Impacts on Tourism and Recreation" of the EIA Report.

3.4. Noise assessment

There are no settlements in the WPP park area, only isolated farmsteads (for permitted development in the area, see EIA Report 2. See Annex). The nearest rural farmsteads are >800 m from the WPP. All noise-regulated areas are single detached dwellings surrounded by woodland. The situation is louder near the A3 and P24, where traffic volumes are significantly higher than on the V260. Most of the farmsteads in the WPP park are close to roads, where traffic noise causes discomfort for these houses. The overall noise in the area is mainly from natural sources, with the A3 and P24 being the loudest.

To assess the existing noise situation in the vicinity of the WPP, road traffic noise has been modelled as a single source (noise propagation map in Annex 7 of the EIA report) and compared with the noise levels in MK 07. 01. 2014. the limit values for traffic noise laid down in Regulation No 16: obtained from the EIA report 6. 7. 1. the results summarised in Table 1.

¹⁵ <https://www.daba.gov.lv/en/news/requests-for-consideration-del-slegts-cirgal-view-tower>

¹⁶ Institute for Social, Economic and Humanitarian Studies (VIA HESPI) 2022. *Monitoring of visitors to specially protected areas. Report on the survey results.*

Noise levels are very low, being relatively highest at night in Saule 4: 8 dB(A) below the night noise limit. The site is very quiet as it stands, with no existing noise sources which could significantly limit the creation of new noise sources.

3.5. *Air quality assessment in the WPP park area*

The construction equipment and vehicles required for the construction of the WPP park will cause insignificant, local, temporary and episodic air pollution, which will be localised in the construction zone, which is not located in the immediate vicinity of a residential area. The use of machinery during construction, access roads, including gravel roads, can cause air pollution from PM₁₀ and PM_{2.5} dust particles, as well as nitrogen dioxide. The concentration limit values for these substances are laid down in FC 03. 11. 2009. regulation No 1290. Air quality in the study area of the WPP park has been assessed in the light of Cabinet Decision 02. 04. 2013. 182, which requires an official statement from the LVGMC on the existing pollution levels (background concentrations of air pollutants) for the area of potential impact of the polluting activity for which air quality standards are in force.

The existing pollution levels are characterised using information provided by the LVGMC on 20 September 2024 on the concentrations of air pollutants in the potential area of influence of the activity, excluding the contribution of the polluting activity. The area of potential effect for the determination of background concentrations is the area around the location of the polluting activity at a distance equivalent to the 20 highest emission source heights, but not less than 2000 m.

Table 2 (EIA Report Table 6. 8. 2.) *Annual mean background concentrations (µg/m³) in the study area of the proposed activity*

Viela	Annual mean concentration (µg/m ³)
PM ₁₀	13. 55
PM _{2.5}	7. 00
Carbon monoxide (CO)	305. 53
Nitrogen dioxide (NO ₂)	4. 33

The concentrations of pollutants in the vicinity of the proposed activity area are low and do not even approach the limit values for pollutants specified in the Cabinet of Ministers Regulations, as shown in the figures included in the EIA Report (EIA Report Figures no. 6.8.1.-6.8.4). The annual mean concentrations for nitrogen dioxide, PM₁₀ and PM_{2.5} are below even the lower pollution assessment threshold (65% of the limit value or 26 µg/m³ for nitrogen oxides, 50% of the annual limit value or 20 µg/m³ and 10 µg/m³ for PM₁₀ and PM_{2.5}, respectively). The existing air quality in the area of the Proposed Action is good and there is no need to develop measures to improve air quality, with the highest concentrations of air pollutants in the vicinity of major settlements (Strenči, Valka) and roads.

4. Significant environmental effects of the proposed activity and its possible alternatives (Chapter 7 of the EIA Report)

The accelerated development of renewable energy projects should be supported by EU Member States, in cooperation with local and regional authorities, in identifying and defining land, surface, underground and marine or inland water areas required for the installation of renewable energy plants and related infrastructure to ensure the achievement of the 2030 renewable energy target and to support the achievement of the climate neutrality target by 2050 at the latest under Regulation (EU) 2021/1119.

4.1. Deforested areas

The exact size of the total deforested area will be determined during the construction phase. The EIA has assessed the maximum possible area estimates.

The approximate area to be deforested if the recommended alternative A is implemented will be 91.5 ha, of which approximately 60% will be young stands, 18% middle-aged stands and 12% mature stands (see calculations in Table 3 (EIA Report Table 7. 1. 1). 0.75% of deforested area is currently clear-cut.

However, if the recommended alternative B is implemented, the deforested area will be 144.96 ha, of which approximately 55% will be young stands, 21% middle-aged stands and 14% mature stands (see calculations in Table 4 (Table 7.1.2 of the EIA Report)). 2% of deforested area is currently clear-cut.

Table 3 (Table 7.1.1 of the EIA Report) *Total deforested area under Alternative A*

Alternative A							TOTAL (ha)
	New yield (ha)	Middle- aged stand (ha)	Briestaudze (ha)	Adult stand (ha)	Overgrown stand (ha)	Deforestation (ha)	
Total	50,19	15,05	11,12	7,19	0,54	2,04	86,13
%	58,27	17,47	12,91	8,35	0,63	2,37	

Table 4 (Table 7.1.2 of the EIA Report) *Total deforested area under alternative B*

Alternative B							TOTAL (ha)
	New yield (ha)	Middle- aged stand (ha)	Briestaudze (ha)	Adult stand (ha)	Overgrown stand (ha)	Deforestation (ha)	
Total	73,17	23,31	18,20	8,89	0,6	3,78	127,95
%	57,19	18,22	14,22	6,95	0,47	2,95	

According to the Central Statistical Office, in 2024 there will be 3607 thousand ha of forest land in Latvia,¹⁷ , so the area deforested by Latvijas vēja parki Ltd for the WPP park "Valmiera-Valka" during the construction of the WPP park in alternative A will be approximately 0.0025%, while in alternative B approximately 0.004% of the total forest area in Latvia. The impact is assessed as not significant.

4.2. Noise and vibration levels

Assessment and significance of changes in noise levels

The planned area of the WPP park is large (approximately 100 km² for Alternative B and 60 km² for Alternative A) and covers the municipalities of Valka and Plāni. There are approximately 15 farmsteads in the WPP park area.

An overview of the noise propagation forecast is attached in Annex 7 of the EIA Report.

The results of the noise calculations indicate that no potential problems with exceedances of the noise limit values are expected:

1. As it stands, the noise level (traffic noise only) is fully compliant with FC 07. 01. 2014. regulation No 16: traffic noise limit values are not exceeded (and low traffic noise does not even reach the noise limit values for industrial sites).
2. The existing situation (traffic noise), in one homestead area, measuring point 1, does not meet the WHO guideline¹⁸ for road traffic noise of a daily_{LDV} value < 53 dBA (see Table 7.2.2 of the EIA report).
3. Calculation of the noise level at night with 27 WPPs (Option A): compliance with the permissible noise level in the homestead areas at all times of the day (see Table 7.2.3 of the EIA report) in accordance with the provisions of the Cabinet of Ministers of the Republic of Latvia 7.2.2. 01. 2014 Regulation No 16.
4. Calculation of night-time noise levels from 40 WPPs (Option B): the permissible noise levels in the homestead areas are met at all times of the day (see Table 7.2.4 of the EIA report) in accordance with Cabinet of Ministers 7. 01. 2014 Regulation No 16.
5. In some homestead areas (Option A, measuring points 1, 4, 6, 8, Option B, measuring points 1, 4, 6, 8, 13) the WHO guidelines¹⁹ for WPP noise recommend a daily_{LDV} value < 45 dBA.

To comply with the daily_{ADI} values recommended in the WHO guidelines:

Option A for VPPs VV88, VV85, VV84, VV47, VV46, VV37, VV21, VV16, mitigation measures to be implemented: select WPP models whose noise emissions comply with WHO recommendations, install WPPs with the lowest possible noise emissions or aerodynamically improved wings.

Option B for VV88, VV85, VV84, VV66, VV47, VV46, VV37, VV21, VV16 VPPs, mitigation measures to be implemented: select WPP models whose noise emissions comply with WHO recommendations, install WPPs with the lowest possible noise emissions or aerodynamically improved wings.

¹⁷https://data.stat.gov.lv/pxweb/lv/OSP_PUB/START_NOZ_MEMEP/MEM010/table/tableViewLayout1/

¹⁸ Compendium of WHO and other UN guidance on health and environment, 2022 update

¹⁹ Compendium of WHO and other UN guidance on health and environment, 2022 update

Assessment and significance of low-frequency noise

There are no laws and regulations in Latvia that set limit values for low-frequency noise. For the assessment of low-frequency noise in this EIA, the Danish limit values and the procedure for setting them for WPP development projects have been used as a basis. The cumulative low-frequency (0-160 Hz) noise level from WPP in residential buildings must not exceed 20 dB at wind speeds of 6 m/s and 8 m/s. The predicted low-frequency noise of the WPPs has been calculated for all 84 WPPs initially evaluated at the same time, fully covering the two alternatives evaluated in more detail, using the WindPro software with up-to-date data from WPP manufacturers on the latest models for which low-frequency noise measurements have been made²⁰: see Annex 7 of the EIA Report. The results obtained do not exceed the Danish limit values (see Figure 7.2.2 of the EIA report).

Extensive national epidemiological studies on the public health effects of low-frequency noise from WPP have been carried out in Denmark, analysing the effects of WPP noise on cardiovascular disease, pregnancy and diabetes. The results of the studies have been published in 2018^{at21, 22,23,24}. These studies, which analysed public health aspects in the vicinity of all Danish WPPs (up to 40 WPP heights) where ~615 000 people lived during the reporting period, were carried out in a total area of ~650 000. The original hypotheses that noise from WPPs, including low frequencies, would have a negative impact on public health have not been confirmed. The authors note that some observations suggest that potentially higher relative risk factors could be observed in areas where the ambient noise level from the WPP is above 42 dB(A) and the indoor low-frequency noise level is above 15 dB(A).

The low-frequency outdoor noise modelled in this EIA does not reach even the lowest indoor level in any of the nearby developments mentioned in all these studies: 15 dB(A).

Assessment and significance of changes in vibration levels

During operation, the imbalance and friction of the rotating parts cause vibrations that are undesirable not only from an environmental point of view, but above all for the operation of the WPP itself, so they are kept to a minimum in the design of the WPP. The main sources of vibration in a WPP are the generator, gearbox and bearing systems. The vibration of these rotating parts can also cause the nacelle and tower to vibrate. At high wind speeds, the level of vibration can be increased by imbalances in the WPP parts due to wind pressure and turbulent flows.

Short-term effects may arise from vibrations caused by construction machinery during construction.

The level of vibration caused by WPPs and their impact on nearby areas in Latvia are not limited by regulatory limits. Until 30 June 2010, vibration limit values were laid down in Cabinet Regulation No 341. After 30 June 2010, when the Regulation expired, no new laws and regulations laying down vibration limit values have been issued. These regulations set lower vibration limits for operating theatres and wards in medical and rehabilitation facilities (night period), where the weighted vibration acceleration

²⁰ WindPRO 3. 6. 366 by EMD International A/S, Enviroprojekts Ltd licence (client) No 8797.

²¹ A. H. Poulsen et al., Long-term exposure to wind turbine noise and redemption of antihypertensive medication: A nationwide cohort study. *Environment International* 121 (Pt. 1), September 2018

²² A. H. Poulsen et al. , Pregnancy exposure to wind turbine noise and adverse birth outcomes : A nationwide cohort study, *Environment International* 167, September 2018

²³ A. H. Poulsen et al. , Long-term exposure to wind turbine noise at night and risk for diabetes: A nationwide cohort study, *Environmental Research* 165, April 2018

²⁴ A. H. Poulsen et al. , Short-term nighttime wind turbine noise and cardiovascular events: A nationwide casecrossover study from Denmark, *Environment international* 114, March 2018

could not exceed 0.028m/s^2 . In living areas, the weighted vibration acceleration must not have exceeded 0.04m/s^2 at night and 0.07m/s^2 during the day.

A comparison of the results of the measurements of vibration from WPPs with the vibration limits in force in Latvia until 30 June 2010 shows that the vibration levels in the immediate vicinity of WPPs are higher than the former limits, but at a distance of 300 m from the WPP, the vibration levels are significantly lower than the lower limit value for operating theatres and wards in medical and rehabilitation institutions (at night). Although no studies have been carried out on the vibration levels of the WPPs assessed in this EIA, given that the limit values for the mechanical parts of the WPPs are set independently of the capacity of the WPP, there is no reason to believe that the vibration levels of the proposed WPPs will approach the limit values that were in force in Latvia at the time and will cause any perceptible discomfort outside the former WPP protection zones. Therefore, the proposed operation, which does not foresee any WPP within 800 m of any human dwelling, cannot by a large margin cause vibration that would disturb people.

4.3. Flicker

Effects of the flicker effect

The flickering effect is caused by the movement of the rotor wings as they periodically block out the sun and create moving shadows on the ground, on the surface of objects and on the person, who may experience subjective discomfort from this rhythmic alternation of sun and shadow. However, the only objective adverse effect on human health found in the literature is that for epileptics, lighting changes of 3-60 Hz can cause seizures. Modern high-power wind rotors, however, produce much slower flicker: typically in the range of 0.2-1 Hz.

There are no laws and regulations in Latvia that set out how the flicker effect should be assessed and limited. Similarly, in other EU countries, flicker exposure targets are set in guidelines rather than in legislation, due to the fact that flicker is recognised and defined as a nuisance, but there is no scientific evidence of its effects on public health.

Effects of the Flashing Shadow

In the Valmiera-Valka WPP project, the overall shadow duration target of 10 hours per year is not exceeded in any of the houses (see worksheets "Shadow times with distance attenuation" in Annex 8 of the EIA report). The maximum annual shadow duration for all alternatives is 2 h 16 min, or less than a quarter of the target: the house "Birches" from WPP VV85. There is no difference between alternatives A and B because the source of the shadow in both cases is the same WPP VV85, nor between A' and B' because the heights of these WPPs do not differ (and even if they differed by 25 m, the shadow duration would differ by a few minutes, which would make no difference).

In addition, it should be noted that the methodology with a shadow intensity factor depending on the distance of the house to the shadow casting WPP was applied in this EIA from the very beginning, when a fleet of 84 WPPs was provisionally assessed, which also resulted in small shadow duration overruns that would require mitigation measures (stopping some WPPs during sunny periods) to be applied. At the current stage, when there are two alternatives with significantly fewer WPP and the ones that cast the longest shadows from closer distances are among those screened out, no shadow duration approaches the target value even without such a factor (see Fig. The longest shadow is 4 h 46 min in

alternative B' on the house "Liepkalni" at a distance of 1246 m from WPP VV92 - a very weak shadow close to the invisibility limit.

4.4. Impact on air quality

During the construction of the WPP, construction equipment and vehicles will cause insignificant local, temporary and episodic air pollution, which will be localised in the construction zone, which is not located in the immediate vicinity of a residential area.

During the construction process, the following have been identified as temporary air pollutants:

- Dust. This pollutant is caused by construction activities such as excavation, drilling and the movement of machinery. These activities can produce dust particles of different sizes, from coarse to fine.
- Diesel exhaust gases from heavy machinery and equipment powered by diesel engines. The main pollutants emitted by diesel-powered machinery are nitrogen oxides, PM, including PM₁₀ and PM_{2.5}.

The overall level of risk of impacts is low according to the IAQM guidelines used²⁵. The construction process of the WPP, including the movement of vehicles involved in the construction process, will have a negligible impact on the health, property and ecosystem of the population. Localised dust abatement measures (e.g. road dusting for nearby farmsteads) should be considered during the construction process.

Overall, the air pollution from the construction process is assessed as insignificant, with negligible environmental damage and a more significant consequential benefit from the constructed renewable energy facility, which will not cause air pollution in future operation.

4.5. Impact on natural values

Habitats and vascular plant species

The factors identified as threatening nature values in relation to protected plant species, protected freshwater, grassland, marsh and forest habitats are the direct destruction of protected habitats as a result of the construction of the WPP and associated infrastructure, the fragmentation of habitat areas by power plant assembly/operation sites and access roads, and the potential drainage impacts that may arise from ditching around assembly sites and access roads where necessary for drainage.

Measures to avoid and minimise potential impacts on nature values have already been identified in this EIA by assessing the initial location of the WPP and infrastructure and providing planners with information on the identified nature values, possible alternative locations for the WPP and associated infrastructure, as well as explaining the basic principles for planning the location of the WPP to avoid impacts on nature values. Compared to the original layout, the length of access roads to be newly constructed has been significantly reduced, the number of NPSs has been reduced and at least some WPPs are planned as far away as possible from habitats that need to be kept undisturbed. In the case of the recommended WPP locations for Alternatives A and B, the number of WPP has been further reduced by removing the left bank of the Gauja and by specifying the location of infrastructure facilities in relation to habitats and species habitats. The assessment identifies the impacts that are still identifiable

²⁵ <https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf>

as adverse to nature values and makes recommendations for mitigation, see Table 7.6.3 of the EIA Report.

Potential direct impacts on protected habitats and species assemblages in the SPA are fully avoidable, see Table 7.6.3 of the EIA Report.

The potential direct impacts on Natura 2000 sites will be limited to Alternative B and the following protected habitats of EU importance may be affected (additional information with pictures showing the location of the affected habitats is provided in Chapter 7.9 of the EIA Report):

- 6270* Fennoscandian lowland species-rich dry to mesic grasslands, 0.12 ha (LPA "Ziemeļgauja", cable route along "Pukšu purvs");
- 91D0* Bog woodland, 0.1 ha (LPA "Ziemeļgauja", cable route along the section of "Pukšu purvs");
- 9010* Western taiga, 0.046 ha, (LPA "Ziemeļgauja", cable route along "Pukšu purvs");
- 91T0 Central European lichen scots pine forests, 0.03 ha (LPA "Ziemeļgauja", cable route along "Pukšu purvs");
- 9010* Western taiga, 0.12 ha ("Bulvāra riets" gar Bulvāra road).

Impacts on protected habitats in Natura 2000 sites are entirely avoidable, as the maximum impact was assessed during the EIA, with cable routes on both sides of the road and considering the possibility of a cable route along Gailīši Road crossing the LPA "Ziemeļgauja". To exclude impacts, it is possible to locate the cable routes on the opposite side of the road from the habitats and species sites, along the side of the road where no habitats of EU importance are affected, and the cable connection to the substation can be located along the A6 road, connecting to the substation via the connection that would be made if the Group A alternative WPP connection were to be constructed (see Chapter 11, Figure 11.2).

Potential effects of dewatering in the SPNA include:

- 9080* Coniferous forests 0.3 ha ("Purgaile River forests");
- 91E0* Alluvial forests 1.5 ha ("Purgaile River forests").

Impacts on protected habitats and species sites in the SPNA can be fully avoided by choosing to lay the cables on the road side, on the other side of the SPNA NR "Purgailes upes meži" during the design phase of the roads and cable routes, see Table 7.6.1.

Impacts on habitats of EU importance outside SPNAs that cannot be avoided by the Proposed Action if 27 WPPs are constructed under Alternative A affect three protected habitats of EU importance and under Alternative B (if 40 WPPs are constructed) five protected habitats of EU importance outside SPNAs, see Table 7.6.2. The largest areas of habitat directly affected are 91T0 Central European lichen scots pine forests, including the areas. Calculations of habitats likely to be affected by the cable routes have been made for the cable routes on both sides of the roads. The construction of the infrastructure will only be on one side of the road and the area of direct impact, at least on part of the roads, will be smaller than estimated in the assessment.

The proposed action affects the following protected species outside the SPNA:

- The most affected species will be the *Lycopodium annotinum* and *Lycopodium clavatum*: During the implementation of the proposed action, individuals of the species will be destroyed. The populations of these species are stable and widely distributed in Latvia, therefore the complete or partial destruction of local localities in the area of the Proposed Action will not have a significant negative impact on the population of the species in Latvia. The information contained in the report to the European Commission on the conservation status of habitats and species of EU importance in Latvia²⁶ for the period 2013-2018 confirms that the population status of the species is considered to be stable. The report indicates that *Lycopodium spp.* species occur in at least 7120 localities in Latvia (currently there are data on a much larger number of localities). The status of the populations of the species of the quail class is assessed as stable and the future conservation outlook (conservation status) is assessed as favourable.
- In places, the proposed action will affect the habitat of the *Dactylorhiza spp.*, especially the *Dactylorhiza baltica*. The species is often found along roadsides and ditches as it successfully colonises open ground in these areas; the impact of disturbance to the understorey is expected to be short-lived and the population will recover, particularly if other individuals of the species remain in the vicinity. The proposed activity will result in the destruction of approximately 2 *Platanthera bifolia* sites: this will not have a negative impact on the population of the species, as it is relatively common in suitable habitats, such as those adjacent to the area of influence of the proposed activity.
- The proposed activity could have a negative impact on the habitats of species associated with protected habitat 9010* Western Taiga and will be destroyed or fragmented (see above for the area of habitat 9010* potentially affected). The proposed activity may adversely affect the hydrological regime in habitats of species associated with habitat 91D0* Bog Woodland (see above on 91D0*).
- Throughout the WPP park, dryland habitats support associated vascular plant species (Sand pink *Dianthus arenarius*, fastigate gypsophila *Gypsophila fastigiata*, Eastern and pasqueflower meadow pasqueflower *P. patens* and *Pulsatilla pratensis*, *Silene chlorantha*). The installation of the cable routes may affect the vegetation of these species, but in the long term the impact of disturbance to the understorey is positive, whereas the destruction of individuals of very rare species may have a negative impact and completely destroy the micropopulation, hence the significant conditions in Table 7.6.3 of the EIA report.

In order to mitigate potential impacts on habitats and vascular plant species, the species and habitat expert has made recommendations that can be taken into account, where possible, in the construction of the proposed wind farm. The habitat expert's opinion assessed the worst case scenario of cable routes on both sides of the road, but based on the expert opinion, the impacts can be almost completely avoided during the design of the WPP, as the cable routes will only be built on one side of the road and in some cases it is possible to place the cables under the road surface, thus further reducing the impacts on species, habitats and reducing the deforested areas.

Effects on birds

²⁶ <https://cdr.eionet.europa.eu/Converters/en/eu/art17/>

To improve transparency, the list of species analysed in detail has been divided into two groups: **Species to be excluded** and **Species to be assessed**. **Exclusionary** species are those whose presence means an area of generally fixed size around the species' location, where the recommendation not to deploy WPP is valid. For some species, there are even two areas: where the recommendation not to build WPPs is valid (this was taken into account in the earlier stages of the project when most of the originally planned 93 turbines were excluded), and where the need for and feasibility of mitigation measures should be assessed but WPPs can be built (current alternatives A and B, assessed in detail and reflected in the EIA report). **Species to be assessed** are²⁷, for which the construction of a WPP in the vicinity of a site (mostly in a fixed size area around the site) should be assessed in combination with mitigation measures, but the recommendation not to build a WPP only applies in certain cases, e.g. in areas with concentrations of multiple sites of species **to be assessed**. The analysis for each species indicates the reasons for including the species in one group or the other.

Exclusion

White-tailed eagle *Haliaeetus albicilla*

There are no distinct concentrations of observations that would warrant the designation of areas where it is recommended that WPP should not be installed. The expert assesses the threat to the population of sea eagles from the proposed WPP park as low.

Golden eagle *Aquila chrysaetos*

In May 2023, the known nest was surveyed and signs that the platform was occupied by golden eagles were observed and "adequate protection" was established. A 3 km protection zone should be applied to the Puksi bog along the perimeter. It is recommended that no WPP be installed within a 3 km radius around the platform.

Lesser Spotted Eagle *Clanga pomarina*

In the study area, 23 records of Lesser Spotted Eagles have been recorded since 1 January 2022, 18 of them in the open landscape zone between the N part of the study area and the town of Valka (Figure 7.6.3 of the EIA Report), where there are no plans to locate a WPP park. Therefore, the bird expert concludes that the planned wind park potentially threatens the population of Lesser Spotted Eagles only in the N part of the study area (outside the boundaries of the Valmiera-Valka WPP Park). In order to reduce the threat of the wind park to the nesting pair of Lesser Spotted Eagles found by the expert, the expert recommends to abandon the WPP located closer to the forest edge, which is partially taken into account.

Western capercaillie *Tetrao urogallus*

8 rookeries were found in the study area. During the site investigation, several times the location of the WPP was adjusted according to the bird expert's recommendations by relocating the WPP outside Western capercaillie microreserves and 1 km protection zones around the known LVM rookeries. The final expert opinion recommended additional adjustments to the location of the WPP, creating a WPP-free zone to protect Sink 1 (Figure 7.6.4 of the EIA Report), which was found in 2023, as well as recommending the suspension of the 62. planning of the WPP until the potential sink identified in the vicinity of the WPP is located.

²⁷ Common Pochard *Glaucidium passerinum*, Shoveler *Aegolius funereus*, Buzzard *Bubo bubo*, Barn Owl *Strix uralensis*, White-backed Woodpecker *Dendrocopos leucotos* and Three-toed Woodpecker *Picoides tridactylus*

Due to the increased risk of anthropogenic disturbance when a wind farm is developed in a forest massif, the expert recommends that, in cooperation with the forest manager (LVM), increased attention should be paid to the management of nesting sites.

Black Stork *Ciconia nigra*

In the bird expert opinion, the Black Stork was considered to be a species that would be excluded from the WPP due to its avoidance behaviour. There have been 8 records of black storks in the study area since 1 January 2022 (Figure 7.6.5 of the EIA Report). In accordance with current practice in Latvia and guidance in the literature, a WPP-free zone of 3 km radius around the nest should be planned. Overall, the bird expert estimates that 2-3 pairs of black storks nest in the vicinity of the study area in the long term. All currently recommended WPP are located outside the 3 km zones around known recently occupied nests and outside the 1 km zones around the most likely feeding sites of the Black Stork.

According to M. Strazda's opinion on black storks in the area of the WPP, 3-4 pairs of black storks have nested in the study area of the Proposed Action. Knowing that the stork population in Latvia has been declining in general, 1-2 pairs could be living here at present, of which one permanently occupied nest is known for certain. If a nest can be found in this area, this nesting site qualifies as a long-term site of importance for the conservation of the population, where the construction of WPP (~3 km) in the area between the nest and the main feeding grounds should be avoided. In undisturbed nesting areas, movements between nests do not exceed 100 m.

A 100 m wide zone should be maintained along the tributaries of the Seda and the Gauja rivers Purgaili, Stakļupīte and Kokšu. When planning the location of WPP along the old rivers of the Gauja, a WPP-free zone of at least 500 m shall be maintained. A 1 km buffer zone should also be left around small forest streams, where it is recommended that the installation of WPP should be avoided (Figure 7.6.6 of the EIA report).

Eurasian goshawk *Accipiter gentilis*

3 Eurasian goshawk nests were recorded in the study area (Figure 7.6.7 of the EIA Report). The bird Expert recommends that WPP 52, 69 and 71 should not be installed as a precaution.

Osprey *Pandion haliaetus*

4 osprey nests were found in the study area (Figure 7.6.8 of the EIA Report). The bird expert recommends refusing WPP 54 installation in connection with a plausible but so far undiscovered nest.

Risk of collisions

A number of the originally planned WPPs was located in very high collision risk areas close to the nests of large, specially protected species of soaring birds. In a species-by-species analysis, it is recommended to phase them out. Some WPP have been recommended to be abandoned in order to reduce the impact of other impact components, but this has undoubtedly also reduced the risk of collisions of raptor species with WPP in the proposed wind park. The final siting of the WPP with Alternatives A and B has also undoubtedly reduced the risk of collisions of raptor species with the WPP in the planned wind farm. According to the expert's recommendations, cameras should be installed on the wind turbines that can stop the operation of the WPP to almost completely eliminate the possibility of collisions with birds, including soaring birds.

Noise pollution

Priority Areas of Conservation Concern for owl species have been modelled in the area of the proposed wind park.²⁸ Some of the Priority Areas identified in the Conservation Plan for Eurasian pygmy owl *Glaucidium passerinum*, Boreal owl *Aegolius funereus*, Tawny owl *Strix aluco*, Ural owl *Strix uralensis*, Long-eared owl *Asio otus* and Eurasian eagle-owl *Bubo bubo* also contain these owl species, and the Plan recommends limiting additional noise pollution from the WPP in these areas choosing the quietest possible wind turbine model. Due to the lack of studies on the effects of noise from WPPs on Ural owl *Strix uralensis*, pre-construction monitoring.

Taking into account the Latvian Owl Conservation Plan, where the noise threshold is set at 35 dB, and based on various studies on natural noise in forest environments, where 30-40 dB is considered typical background noise, it can be concluded that a level of 40 dB, consistent with natural conditions, is unlikely to be harmful to owls. It can therefore be assumed that noise levels up to 40 dB will not have a significant impact on the owls' lifestyle and hunting efficiency. If it is possible to keep the WPP operating in this range at night, this does not affect the owls' ability to hunt.

Visual disturbance

Recommendations from other researchers, mostly based on judgements about the overall effect of WPP siting on bird distribution, have been taken into account when recommending adjustments to WPP siting. It is recommended to abandon a number of WPPs, creating broad corridors within the previously visually continuous "walls" of WPPs, which cross both the spring and autumn migration direction of common birds in the NE-SW direction, and the low flyway in the vicinity of Luksti meadows. Maintain a fairly dense group of WPP in Part D of the planned wind park, an area where large areas of habitat are concentrated with little suitable nesting habitat for specially protected bird species. This solution was chosen as a compromise to avoid installing WPPs elsewhere: in ornithologically more valuable areas of the territory. To reduce this nuisance component even further, the alternative would be not to install the WPP, as there is no other way to reduce its visual impact.

Barrier effect

In the study area, during both spring and autumn migration periods, the main direction of migration across the territory is NE-SW, similar to other parts of Latvia. This is the main direction perpendicular to which continuous rows of WPPs should be avoided, creating a barrier effect. Looking at the remaining WPP configuration, it can be seen that there is a dense group of WPP in the NE-SW direction with the widest part along 16-82. The WPP line, forming a 5 km wide "barrier". Consequently, 2 NW-SE direction lines are formed in the N part of the park: between 7. and 60. WPP (3 km), and between 51 and 70. WPP (3,2 km).

Additional assessment of EIA location alternatives

When assessing the impact of location alternatives A and B on ornithological values in the area of the proposed wind park, the two alternatives do not differ significantly.

²⁸ Avotiņš jun. A. 2019. Conservation plan for the Barn Owl *Glaucidium passerinum*, the Short-eared Owl *Aegolius funereus*, the Barn Owl *Strix aluco*, the Barn Owl *Strix uralensis*, the Long-eared Owl *Asio otus* and the Barn Owl *Bubo bubo*. Latvian Ornithological Society, Riga.

The ZA part of Alternative B, which is the divergent part between Alternatives A and B, is located in poor habitats: a region that is not crossed by regular local overflights of migratory species, and is located in the sequentially dominant direction of spring and autumn migrations of birds. The difference between the predicted impacts on ornithofauna of the two proposed alternatives is expected to be similar: The WPP group of Alternative B ZA does not pose a significant additional risk. In terms of the potential threat to ornithofauna, the two proposed siting alternatives are similar.

Summary of recommended mitigation measures

- it is recommended to abandon WPP: VV2, VV3, VV4, VV5, VV6, VV8, VV10, VV11, VV12, VV13, VV14, VV15, VV18, VV19, VV23, VV25, VV27, VV29, VV35, VV43, VV44, VV45, VV52, VV54, VV62, VV69, VV71, VV83, VV87, VV90, VV92, VV93*²⁹;
- it is recommended to install WPP shutdown camera systems for all WPP;
- assess the current proposals in line with the results of the pre-construction monitoring:
 - Stop WPP around sunrise and sunset during the Black Stork breeding season if the effectiveness of WPP camera systems is reduced at dusk;
 - WPP: VV26, VV30, VV31, VV33, VV81, VV86 and VV89 are also recommended to be stopped around sunrise in spring and autumn if the effectiveness of WPP camera systems is reduced at dusk;
 - it is recommended to limit additional noise pollution from the WPP during the entire lifetime of the wind park, in accordance with the results of pre-construction monitoring (regarding the impact of noise from the WPP on owls);
- deforestation for the wind park is recommended outside the bird breeding season;
- it is recommended that infrastructure is planned as far as possible outside habitats of importance for birds and as far as possible constructed outside the bird breeding season;
- it is recommended to plan wind park construction processes, which are associated with increased noise and light pollution emissions, outside the bird nesting season and, if possible, during the daytime;
- it is recommended to maintain feedback to the mitigation measures of the wind farm, with the possibility to adjust them based on the results of the monitoring;
- it is recommended to monitor nesting birds and the remains of birds killed by collisions with WPP in the context of the proposed wind park, based on the methodology used in the original study;
- etc. recommendations, the implementation of which is beyond the influence of the proponent of the proposed activity - are reflected in Chapter 7.6.3 of the EIA Report.

Effects on bats

The overall bat activity in the study area is considered high compared to 14 other wind park sites where similar surveys were carried out. The highest bat activity is recorded in July and August. Bats have been recorded almost throughout the night, with high activity from the first to the ninth hour after sunset.

The highest risk of bat mortality in the planned wind park area is observed in July-August. Bat activity in the study area is high almost throughout the night, so it is not possible to distinguish night-time hours

²⁹ * The recommendation has already been taken into account during the EIA process.

when bat mortality risks are lower, except for the last 2-3 morning hours in late autumn (from 10 pm after sunset in the second half of September, October and November).

The establishment of a wind park in the area "Valmiera-Valka" is allowed subject to the following restrictions and conditions:

- automatic shutdown or non-operation of the WPP from 1 May to 30 September during the night period from sunset to sunrise, if:
 1. the wind speed at the rotor height of the WPP is 6 m/s or less,
 - 2) rainfall does not exceed 1 mm/h,
 - 3) air temperature above 6 °C.
- Monitoring of bats is ensured in the first and second year after the start of operation of the WPP. The monitoring methodology is designed according to the site specifics and carried out by a NCA-certified bat expert with experience in processing ultrasound recordings. A description of the monitoring is given in Chapter 12 of the EIA report.

Depending on the results of the monitoring, which would or would not confirm increased bat activity and/or mortality at the constructed WPPs, the **WPP operating restrictions could be reviewed** after the first and second years of post-construction monitoring - **lifted, relaxed or tightened**, in particular: the period when WPP operating restrictions are required could be extended or reduced, or the wind speed threshold at which WPP operation is allowed could be changed.

Invertebrates

In order to conserve specially protected species and other important species, the proposed action will:

1. WPP (VV7, VV16, VV20, VV22, VV27, VV31, VV32, VV34, VV36, VV38, VV43, VV45, VV46, VV48, VV70, VV82, VV85, VV88, VV91, VV93) and substation (ST1, ST2, ST3, ST4) locations, where adult or new emergences of Flatheaded pine borer are found, it is necessary to remove all fallen trees, snags, stems from the construction site and relocate them to the nearest coppice or woodland, preferably. The insect larvae in the dead wood can then complete their development. They may also be able to continue breeding. Dead wood that does not decompose when moved should be removed.
2. Where the new access road to be constructed passes through a stand of fallen or standing ecological trees, these trees shall be relocated outside the development area.
3. Recommendation throughout the study area, if there has been a forest fire, pine trees that have been burnt but are still alive should be preserved.
4. Recommendation throughout the study area that if the stand to be felled contains pine saplings with black trunks (presence of the fungus *Aurobasidion* sp.), the trees should be moved outside the managed stand.

The main protection measures for SPA species are the removal of dead wood (fallen trees, stumps, snags) from the development area. This allows the larvae in the wood to complete their development. The population sizes of the species found in the area of the proposed activity, the Flatheaded pine borer

and the *Laphria gibbosa*, have not been assessed in Latvia. Given the relatively wide distribution of species in the area of the Proposed Action and in Latvia as a whole, the establishment of the WPP Park will not affect the populations of the species.

Preserving burnt forest stands without clearing them is important. *Boros schneideri* and *Stephanopachys linearis* have not been recorded in the WPP area. It is not possible to judge the impact of the Proposed Action on these species in Latvia as a whole.

Effects on mammals

The construction of the WPP will not significantly alter the status of nationally protected species. Local and wider indirect and cumulative impacts on wild mammals are expected (up to 10 km away from the study area of the Proposed Action), the consequences and spatial limits of which are currently unknown and unpredictable.

Continuity of green corridors in a transboundary context will not be affected: the construction of the WPP is not planned in the Gauja valley, which is an important corridor for the movement of game, including large carnivores.

Additional expert recommendations that are beyond the influence of the proponent, including measures to mitigate impacts on mammals, are presented in Chapter 7.6.8 of the EIA Report.

4.6. Impact on the landscape

Impact on the landscape

There is no prominent topography in the study area that would affect the visibility of the WPP. The dominant landscape is woodland, with only a few relatively large areas of open countryside. The WPP will be visible from these open areas, but the presence of cleared areas (clearings, roads, stiges, overhead power lines) will be the most important factor for visibility. The rest of the Landscape Study Area, meanwhile, is much more diverse.

Forest landscape

Inland dune masses are a characteristic and important element of the landscape in this area. To avoid the loss of value of the dune massifs, the dune topography must be preserved:

- do not place WPP on (behind) dune ridges;
- not to significantly alter the dune topography, including by ensuring the continuity of dune ridges, in the construction of access roads, cable trenching, installation and construction of WPPs;
- make access roads to WPP parallel to the dunes, not perpendicular.

These aspects are most relevant for WPP VV20, VV31, VV37, VV61, which are located in close proximity to dune ridges, but other dunes could also be affected by construction.

Gauja landscape

The proposed activity will not directly affect the Northern Gauja AAP and will not result in visual impacts in most areas, although there will be visual impacts in some areas. Therefore, a height limit of 250 m should be set for WPP VV71, VV69, VV65, VV49 and VV68.

Bridges are important viewpoints of the Gauja Valley: Anņu, Spicrāmja and Strenči Bridge. From the Spitscrae Bridge, the location of WPP VV11 is planned to the west (2.4 km) and will be clearly visible. VV11 is not recommended to preserve the scenic view.

At the highest vantage point above the mouth of the Vija River in the Gauja River, several WPP would be visible towards the NW. VV39 and VV1, which are not recommended, would be very visible. The partially visible VV48, VV82, VV83, VV36 should have a height limit of 250 m.

Seda townscape

The proposed development will accommodate four WPPs, however, in order not to adversely affect the attractiveness of the existing landscape, VV25, VV24, VV30 are not recommended and the maximum overall structure height of VV80 should be reduced to 250 m. Retain uncut tree belt (in state forest with cadastral designation: 94760010055) at least 100 m around the city in the direction of the Proposed Action.

Strenči town centre landscape

The visibility model indicates that the highest visibility would be along the railway, in the Strenči Centre Park area, in the courtyards between Rīgas, Pulkveža Brieža and Gaujas streets. The WPP will also be visible from the central buffer zone near the market square, which is the closest point. The nearest WPP (VV24) would be 4.4 km away but would not be visible. The upper part of VV81 and the wings above (4.5 km) and the wings of VV33 (just behind VV81, 5.6 km away) would be visible. The impact on this view from the market area can be considered to be medium. However, this view is not valuable in itself.

Oliņi Big Forest

The cultural and historical values identified and theoretically to be rediscovered in the area should be preserved, and the routes should not be altered to the maximum extent possible. For example, do not turn a natural carriageway into a wide "typical LVM road" with gravel and ditches along it.

Landscape of the Seda swamp

Two viewing (birdwatching) towers have been created to review it, but the WPP would not be visible from the towers. However, the view will be from the causeways in the marsh area. For example, at least 21 WPP will be clearly visible from the road to the lookout tower closest to Seda (see Annex 9. See Annex 10 to the Landscape Expert's Report).

Open farmland (arable) landscapes

Although no open countryside is actually present in the immediate vicinity of the Proposed Action, the proposed WPP will be most directly visible from these relatively distant areas. On the NE side, the distant vistas of the Ergeme hills would potentially offer views of several dozen WPP. Although the Spatial plan of Valka municipality does not define scenic road sections and the most valuable viewpoints, a high

scenic value articulated relief landscape with the Strenči-Cirgaliai forest massif in the background is visible from several locations (see Annex 9): See Annex 12 to the Landscape Expert's Report).

The closest to these road sections are VV92, VV67, VV66, which are located up to 820 m away, and on the very edge of the forest (up to 80 m away from the forest edge). If it is assumed that the height of the forest is on average 25 m, the entire wind park will have a strong and dominant effect on these views. VV92, VV67 and VV66 are not recommended.

To the R of the study area of the Proposed Action is the Ēvele Cultural Landscape, which consists of a landscape of cultural, historical and aesthetic value. The WPP will be at least 4.9 km to the SE of it, but will be visible. One of the most important cultural sites is the Cannabis Oak: both views of and from the oak will be affected by distant WPP. However, WPPs will be characterised as subdominant objects.

On the other side of the area of the Proposed Action is the Vijciems open landscape space, from which the WPP would be clearly visible (see Annex 9: See Annex 13 to the Landscape Expert's Opinion).

Impact on cultural heritage

Overall, the expected impact on cultural monuments in the study area is assessed as medium. The expert has recommended that WPPs VV59, VV66, VV92, VV67, VV53, VV25, VV24 and VV30 be abandoned and that WPPs VV56, VV47, VV24, VV54 and VV80 be set at a maximum height of 250 m. The expert also recommends:

- Preserve the forest (no logging) in the existing state forest (cad. designations: 94920010035, 94920010038) in a strip at least 70 m wide around the farmstead (land unit with the cad. number 94920010025), which according to the forest transparency model (developed by Estonian researchers) should limit the view to other WPP. During the installation of WPP and related works, assess the impact of machinery movement on the building structures, do not provide for its movement along the LVM road "Road of the Inlets".
- To preserve the cadastral units of the forest hospital (cad. app. 94170010085) on the eastern side or in the adjacent Latvian State Forest (Cad. app. 94170013127) in a 100 m strip to the west of the site, adjacent to the hospital complex.
- Preserve the forest in the area of the ancient burial site.
- Preserve the existing forest on the north-west-north slope of the mound.
- As it is not possible to ensure the invisibility of VV21, it should be moved further away from Monument Road (possible location coordinates: 57.635288, 25.837657 or 57.635615, 25.837217). Preserve the semi-circular forest around the obelisk within a radius of 100 m on the obelisk side of Monument Road. On the other side of the road, plant Norway spruce covering the base of the WPP, preferably in two parallel rows. When planting rows, use planting material at least 1.5 metres high. To protect the monument during construction works and machinery movements, and to maintain or renew the information board about it.
- To clarify the actual location of the monument to the Crown Prince of Prussia in nature. With this in mind, try to uncover and protect the site during construction work and machinery movement. Inform museum professionals.

- To preserve the monument to Rihards Veide during construction works and during the movement of machinery, and to maintain or renew the information board about it. Preserve the forest in a 100 m zone around it.
- Preserve the existing forest strip of at least 70 m on the other side of the road from Oliņi semi manor house (Mežmuižas).
- Although the forest has already been cleared on the other side of the road, preserve the uncut forest strip along it opposite the Captain Anton Irv Monument.
- Retain the currently unlogged forest strip (Block 290, Section 5) to the N of the Hunting Lodge, 70 m wide.
- Retain uncut tree belt (in state forest with cadastral designation: 94760010055) at least 100 m around the town of Seda in the direction of the proposed development.

4.7. Impacts on Natura 2000 sites in the vicinity of the WPP Park

As mentioned in Chapter 6.4.1 of the EIA Report and summarised in Table 7.9.1, there are 5 SPNAs in the vicinity of the proposed wind park that are included in the single European network of SPNAs Natura 2000 (see EIA Report Figure 6. 4. 2.):

- Nature Reserve “Sedas purvs”. The nearest WPPs are planned within 0.9 km of the nature reserve boundary.
- Nature Reserve “Burgas plavas”. The nearest WPPs are planned within 4 km of the nature reserve boundary.
- Protected Landscape Area “Ziemeļgauja”. The nearest WPPs are planned within 0.3 km of the protected landscape area boundary.
- Micro-reserve “Bulvara riests”. The nearest WPPs are planned within 0.8 km of the micro-reserve boundary.
- Micro-reserve “Igaunijas riests”. The nearest WPPs are planned within 8 km of the micro-reserve boundary.

On 21 November 2007, the Cabinet of Ministers approved the “Regulations on Nature Reserves” and established a new nature reserve: “Purgailes upes meži”. The nearest WPP VV7 is planned 1.3 km to the east of the nature reserve. This assessment includes an assessment of the impacts of the five Natura 2000 sites as identified in the Programme No 5-03/9/2023 issued by the NRW on 12 September 2023.

Overall, based on the expert assessment of habitats, vascular plant species, invertebrates, the proposed activity does not pose a threat to the conservation objectives of the protected areas in terms of ensuring a favourable level of protection for protected habitats of EU importance or to the integrity of the protected areas, either locally or regionally.

No significant adverse impacts on Natura 2000 sites have been identified that would result in any of the alternatives for the location of the WPP-Park not being realisable.

In relation to the assessment of impacts on bird species, it should be noted that although the proposed activity is planned outside Natura 2000 sites, it is surrounded by Natura 2000 sites, which are also sites of importance for birds: nature reserve “Sedas purvs” and PLA “Ziemeļgauja”.

For some species, the potential impacts of the proposed WPP cannot be separated into Natura 2000 sites and non Natura 2000 sites due to the ecology of these bird species and the ecological integrity of the sites with adjacent areas, while for the remaining species, no significant impacts of the proposed WPP on breeding populations of these species in the two large Natura 2000 sites – “Sedas purvs” and “Ziemeļgauja” - can be identified for any of the species. The already minor impacts will be reduced by the recommended mitigation measures for the WPP park (see Chapter 7.6.3 of the EIA Report and summary in Annex 12 of the EIA Report).

Summarising the assessment of impacts on Natura 2000 sites, the EIA assessment concludes that 46 of the 84 WPP assessed are not recommended. Measures to mitigate the impact of WPP have been taken during the construction of the WPP park, e.g. corridors to reduce the “barrier effect” have been created to allow migratory species to fly, camera systems have been designed for WPP to identify birds and periodically stop turbines to reduce the risk of collisions, etc. c. no specific mitigation measures have been identified as necessary at this stage in accordance with the Cabinet of Ministers Regulation No 300 of 19 April 2011 “Procedure for assessing the impact on a specially protected nature area of European importance (Natura 2000)”. A summary of the mitigation measures for the WPP included in the recommended alternative EIAs for the design, construction and operation phases of the WPP is attached as Annex 12 to the EIA Report (due to its size, electronic: MsExcel file).

5. Transboundary assessment (Chapter 9 of the EIA report)

In the context of transboundary impacts, the Republic of Estonia has been identified as the country likely to be affected by the proposed action.

5.1. Transboundary impact assessment for landscape, tourism and recreation

As part of the Estonian territory (part of Valga county and the whole of Valga city) falls within the landscape study area, the transboundary impacts of the proposed activity on the landscapes, tourism and recreation of this part of Estonia have been assessed. Estonian territory is located within 4.2 km of the nearest assessed WPP.

When assessing the locations of the WPPs, the closest WPPs to the area of the Proposed Action are located in the Koiva-Mustjegi Karulas AEP 9.1 km away on the right bank of the Gauja River (VV70)). The Karulas-Pikjerva AEP is located 15.7 km from the nearest WPP (VV68). The boundary of Karula National Park is 20 km from the nearest WPP (VV68).

For the planned operation in the nearest Estonian open areas, e.g. between Londi and Lepa in Valga municipality, the WPP would be visible at a distance of 5.5 km at most.

Lookout towers are important viewpoints. The closest one to the proposed operation is at Tsirgumäe: Tellingumäe vaatetorn (Tellingumäe lookout tower), 25 km from VV68. It offers a wide panoramic view of the Mustjegi River and the territory of Latvia (towards the Cirkali dune massif). If this and other WPPs are also visible in clear weather, they should be considered as background objects.

Taking into account the distance of the Proposed Action from the territory of Estonia, the transboundary impact is assessed as negligible in the context of the aspects to be assessed.

5.2. Impact assessment on birds

Impacts on the Republic of Estonia have been assessed in a similar level of detail as for adjacent areas in Latvia. The impacts in Latvia are considered in two zones - 3 and 10 km around the recommended final wind park configuration. The 3 km zone around the wind park does not affect the territory of the Republic of Estonia, whereas the 10 km zone affects 5355 ha (6.2% of the entire 10 km zone) of the territory of the Republic of Estonia (see Figure 12 (Figure 9.1 of the EIA Report)).

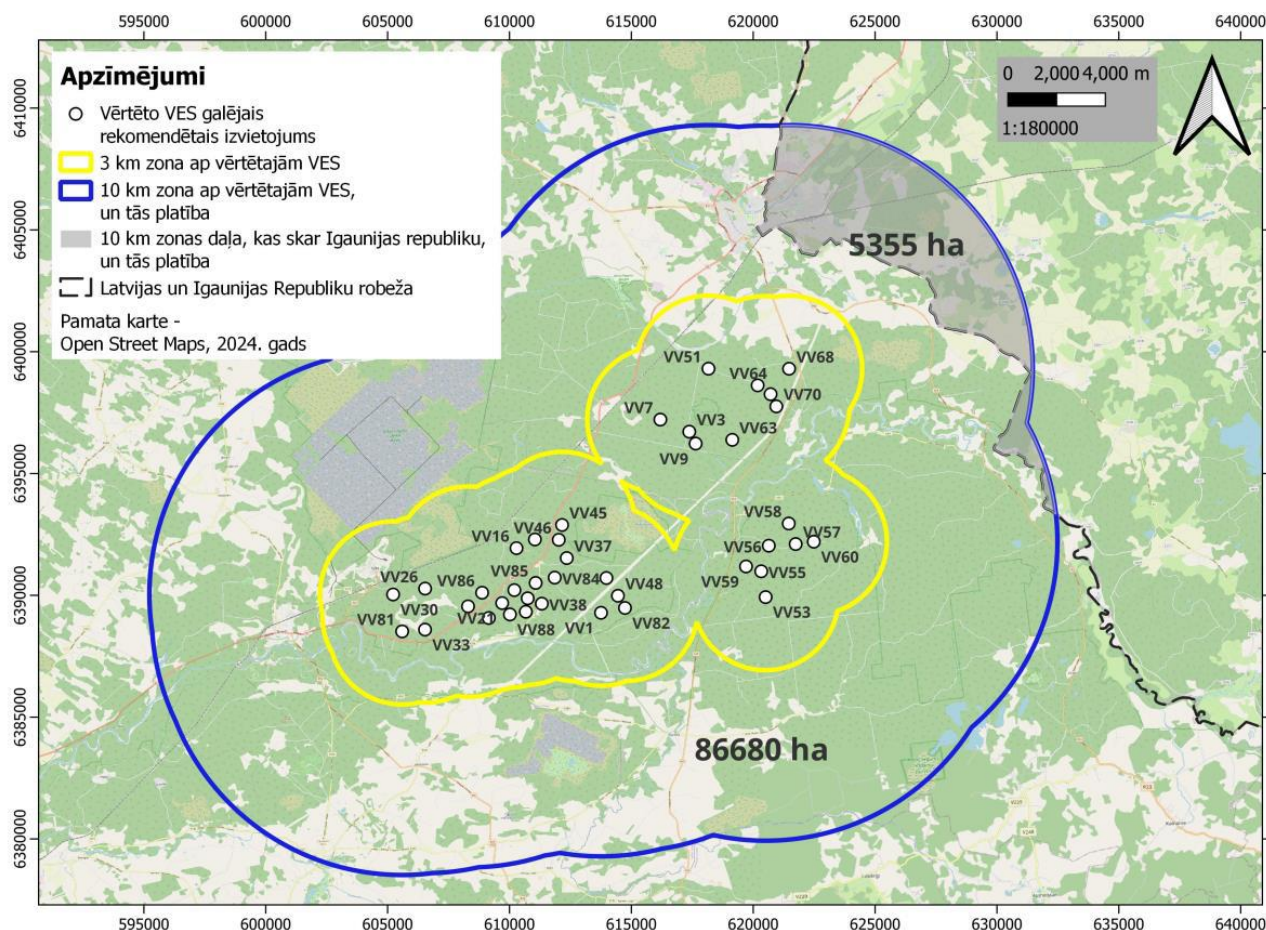


Figure 12 (Figure 9.1 of the EIA Report) *The planned 10 km area of the Valka-Valmiera WPP park covers the territory of the Republic of Estonia*

The transboundary impact analysis uses bird observation data publicly available in the open access databases elurikkus.ee and plutof.ut.ee. Combining the observation data available from both sources, 7,927 bird observations have been recorded in the Estonian part of the 10 km area of influence of the planned WPP park since 1 January 2022.

In a 10 km zone, including the territory of the Republic of Estonia, the expected impact of the planned WPP park on migratory waterbird species in flocks: cranes, swans and geese has been assessed. These species are characterised by regular movements between feeding and roosting sites, and it is therefore recommended to avoid the installation of dense WPP groups along flyways. The planned configuration of the WPP park is recommended to avoid dense groups of WPP in the local flyways of cranes, swans and geese. Concentrations of these species groups have been observed in open landscapes near the N part of the planned WPP park, but their local flyways do not cross the territory of the planned WPP park. Transboundary effects on the crane/swan/goose species group within the territory of the Republic of Estonia are assessed as negligible. It is likely that there will be no direct impacts at all if the WPP is built.

Migration of ducks, herons, sparrows, storks, birds of prey, day and night birds of prey and other migratory species in the territory of Latvia mostly follows the SW direction in autumn and the NE

direction in spring, following the so-called. The East Atlantic Flyway³⁰, more specifically its White-Baltic Sea branch.

Outside areas of concentrations of migratory bird flows caused by natural barriers, migratory bird species fly over land in a broad front, evenly covering the entire land area. The planned WPP park is located at the border of Latvia's NE. Thus, in spring, the WPP park will have minimal impact on migratory birds nesting in Latvia, but a greater impact on birds migrating through Latvia to the Republic of Estonia and areas to the NNE of it. Some species, especially those that are visually sensitive to the “barrier effect” created by the wind park, will avoid it, others will ignore it or not see it during daylight hours. The shape of the planned WPP park is longitudinally elongated in the NE-SW direction, which coincides with the main direction of bird migration in the territory of Latvia. From the perspective of the bird migration route, they are therefore largely spaced behind each other and do not form a wide barrier perpendicular to the migration route, blocking it.

In autumn, a similar picture is expected: the planned WPP park in the SW direction will meet migratory birds at the very border of Latvia, will affect the populations of N-S migratory bird species in the Republic of Estonia, with minimal impact on the populations of migratory birds breeding in the territory of Latvia.

Of the range of birds migrating through the planned WPP to Estonia and beyond, the most threatening in the expert's view are nocturnal migrants and small-medium sized birds. Thanks to the promising results of WPP camera systems, the threat to the most critical group of species - large soaring birds - has been significantly reduced. The fact that these birds may have to slightly change their migration route due to the “barrier effect” of the WPP park is not considered to be a significant negative factor. Most importantly, however, the risk of collisions for this group of species has been significantly reduced, so no significant negative impacts on migratory large soaring bird species breeding in the Republic of Estonia and areas to the NE of Estonia are expected. A VES-free zone of at least 1 km around the most likely feeding sites of Black Storks is also maintained, further reducing the threat to migrating Black Storks.

Taking into account the literature available on the impact of WPP park's on migratory species and mainly emphasising the fact that the proposed WPP park is located outside the concentration of bird migratory flows, i.e. “bottle neck” sites, the expert does not expect any migratory bird species passing through the area of the proposed wind park to be significantly adversely affected by the wind park.

5.3. Overview of transboundary impacts of the Ministry of Climate of the Republic of Estonia

An overview of the transboundary impacts of the Ministry of Climate of the Republic of Estonia and how they have been taken into account in the preparation of the EIA for the Valmiera-Valka WPP is presented in Table 5 (Table 9.1 of the EIA Report).

³⁰ BirdLife International 2010, Busse 2001, Busse et. busse 2001. 2014

Table 5 (Table 9.1 of the EIA Report) *Overview of transboundary impacts of the Ministry of Climate of the Republic of Estonia*

No.	Aspects of transboundary impacts to be taken into account in the EIA by the Ministry of Climate of the Republic of Estonia	Posted by	Notes
1.	A WPP park is planned for Estonia. The cumulative visual impact of WPP parks should be assessed. Planning documents related to planned WPP parks in Estonia should be taken into account.	Ministry of Regional Affairs and Agriculture	The landscape assessment takes into account information on planned WPP parks in Estonia. Cumulative visual impacts across borders are assessed as negligible.
2.	The proposed action may affect: - movement of game, - noise pollution, - the local population, - grid stability.	Ministry of Economic Affairs and Communications of the Republic of Estonia	<p>Large mammals have high intelligence and good mobility. Their response and speed of adaptation to the WPP parks is currently unpredictable. Studies on the impact of WPP parks on terrestrial wild mammal and domestic animal species have concluded that the results of studies on these species should not be extrapolated from one site to another.</p> <p>The expert recommends that the controlling national authorities should require the developers of the North Latvian and Estonian border wind parks (Figure 3.2.5 of the EIA report) to jointly undertake specialised monitoring of wild mammals in cooperation with the controlling national authorities and scientific institutions.</p> <p>The indirect and cumulative impacts of the WPP on wild mammals are expected to occur up to a distance of approximately 10 km from the study area of the Proposed Action.</p> <p>A mammal expert opinion on the assessment of the impact of the WPP on terrestrial non-flying mammals has been received as part of the EIA (attached as Annex 6).</p> <p>The noise assessment is presented in Chapter 7.2. No transboundary</p>

No.	Aspects of transboundary impacts to be taken into account in the EIA by the Ministry of Climate of the Republic of Estonia	Posted by	Notes
			<p>effects have been identified. The local population in the Republic of Estonia is not expected to be affected.</p> <p>The stability of the electricity grid in the Republic of Estonia is not expected to be affected.</p>
3.	<p>The WPP park is 1.5 km from the Natura 2000 Important Bird Area KOIVA-Mustjoe. The site is also designated as a landscape conservation area. Black Stork breeding in the area is also possible. Attention should also be paid to goose migration and the nesting sites of black grouse.</p> <p>Bats are also present in the area and impacts on bat species are also assessable.</p> <p>Attention should also be paid to the continuity of green corridors, as the Gauja River is an important corridor for the movement of game. Including large predators.</p> <p>Given that significant drainage works are planned, the impact of these works on water quality and fish populations in the Gauja needs to be assessed.</p> <p>Cumulative impacts to be assessed and mitigation measures and monitoring to be planned if necessary.</p> <p>If it is found that the impact goes beyond what was originally planned, the environmental impact in Estonia must be assessed further.</p> <p>there are several protected areas within a 20 km radius: Karula National Park, Karula Bird Sanctuary and Karula Natural Area.</p>	Estonian Environmental Administration	<p>An assessment of the impacts on Natura 2000 sites and birds in the Republic of Estonia is presented in Chapter 9. The nearest WPP from KOIVA-Mustjoe is located 9.1 km away on the right bank of the Gauja River (VV70).</p> <p>The assessment of bats is presented in Section 7.6.3. The Gauja valley will not be crossed under the recommended alternatives (A or B) for the Proposed Action.</p> <p>The continuity of green corridors in a cross-border context will not be affected: The construction of the WPP is not planned in the Gauja Valley, which is an important movement corridor for game, including large carnivores.</p> <p>A mammal expert opinion on the assessment of the impact of the WPP on terrestrial non-flying mammals has been received as part of the EIA (attached as Annex 4).</p> <p>Water quality and fish populations in the Gauja will not be affected. Mitigation measures and monitoring are foreseen.</p> <p>The environmental impacts in Estonia are not expected to exceed those described in Chapters 10.1 and 10.2.</p> <p>Nature experts have assessed that no impacts are expected on the Karula National Park, the Karula Important Bird Area and the Karula</p>

No.	Aspects of transboundary impacts to be taken into account in the EIA by the Ministry of Climate of the Republic of Estonia	Posted by	Notes
			Natural Area.
4.	It has been observed that the noise generated by WPP is more disturbing than the same level of noise generated by road noise and airport noise. According to Estonian noise limits, noise should preferably not exceed 50 dB during the day (7:00-23:00) and 40 dB at night (23:00-7:00), which cannot be exceeded in residential areas.	Estonian Health Board	The lowest noise limit values assessed are 45 dB at night, 50 dB in the evening and 55 dB during the day, in accordance with the requirements of the Cabinet Regulations. The noise assessment is presented in Chapter 7.2. No transboundary effects have been identified.
5.	It is noted that the Koiva-Mustjoe N2000 site is marked on the map, but that most of it is also the Koiva-Mustjoe Grassland Natural Area.	Estonian Fund for Nature	The maps have been updated to https://natura2000.eea.europa.eu/
6.	Impact assessment on N2000 sites must be included. The continuity of the Gauja River migration corridor must be ensured. The EIA should assess this. At the same time, the Estonian side informs that another WPP park is planned about 4 km from the town of Valka and 9 km from the planned WPP park. Estonia will inform Latvia by another letter.	Municipality of Valga	The impact on N2000 is assessed in Chapter 7.9. Information on the Valga WPP Park has been obtained and taken into account in the EIA. The Gauja valley will not be crossed under the recommended alternatives (A or B) for the Proposed Action.
7.	The transboundary assessment must include protected areas within a 10km buffer zone around the proposed activity. Impacts on the N2000 sites Koiva-Mustjoe and Aheru need to be assessed. At the same time, please explain the meaning of the 3 km, 10 km and 20 km zones of influence included in the attached map.	Ministry of Climate	The impact on Natura 2000 has been assessed. the 3 km, 10 km and 20 km zones of influence were initially drawn as the boundaries of the study and survey areas, which were refined during the EIA process according to the area assessed.

In addition, the "Convention on the Transboundary Effects of Industrial Accidents" has been in force since 27.09.2004 and provides for transnational cooperation in the field of industrial accidents. The quantity and hazardousness of chemical substances at the site of the Proposed Operation do not reach the threshold values specified in this Convention, therefore the provisions of this Regulation are not applicable to the construction of the Valmiera - Valka WPP Park and its related infrastructure.

6. Socio-economic benefits (Chapter 14 of the EIA report)

The construction and operation of the proposed WPPs may have both positive and negative socio-economic impacts in the area of the Proposed Action and in the national context. Positive impacts include investment in the economy, an increase in directly related and indirectly related jobs, financial benefits from land leases to property owners on whose land the WPP will be built, increased energy supply on the market, reduced carbon dioxide emissions, contribution to national energy policy objectives. There may be negative impacts on tourism and recreational resources and property values for some residents. As the socio-economic impacts of WPPs have not been widely studied in Latvia, the information in this report is largely based on the results of studies in other countries.

Attracting investment is an important factor influencing the development of the economy, and the construction of a WPP should be evaluated in the same way as any other investment that contributes to economic growth in terms of attracting investment. It is expected that several dozens (the exact number to be implemented is not known before and after the completion of this EIA) The total cost of constructing the WPPs could be in the order of several tens of millions of EUR, which is a significant investment project.

In the context of employment, the WPP construction proposal is linked to the creation of jobs during both construction and operation. Demand for additional labour will be related to the construction and operation of the WPP itself, as well as to indirectly related activities such as mining for road construction, cement and concrete production, and transport.

In terms of qualitative socio-economic damages, the negative impacts on properties in the vicinity of the WPP development areas are likely to be medium-term (three to five years after the WPP starts operation) and not significant in the long term.

On the other hand, the quantifiable socio-economic benefits and losses for all alternatives show a significant overall net present value and an internal rate of return well above the socio-economic discount rate of 5% used in the calculations, which means that the long-term socio-economic benefits offset the short-term negative impacts (losses), including the short-term negative impacts of the project. In terms of GHG emissions. In terms of socio-economic returns to the development of the WPP, both alternatives show positive results: Alternative B has a higher net present value (NPV) than Alternative A by a factor of 1.5, while the internal rate of return is slightly higher for Alternative A (see Annex 11).

7. Comparison of the alternatives envisaged and justification of the chosen alternative

As part of the EIA for the proposed action, the alternatives for the location of the WPP park have been assessed and the technological alternatives have been evaluated: height alternatives, three different heights of the WPP.

All the alternatives evaluated would achieve the objective of the Proposed Action: to install new WPPs with a nominal capacity of 8 MW each.

A summary, taking into account the assessments of the ornithologist, species and habitat expert, landscape expert, bat expert and hydrologist, and the physical impact assessment for all 84 WPP sites assessed in the EIA is provided in Table 8.1 of the EIA Report. For all WPPs, undesirable effects have been identified which can be avoided or reduced by conditions or constraints in the design documentation, during the construction phase or during operation (for conditions and constraints for recommended WPPs, see Annex 12 of the EIA Report).

Impacts assessing the existing situation in the area of the proposed action and the situation expected under the alternative to be implemented: Species and habitats, Bats, Birds, Invertebrates, Mammals, Landscape, Cultural history, Tourism and recreation, Natura 2000, Noise, Low frequencies, Flicker, Air, Hydrology, Environmental hazards and emergencies, Vibration, Climate, Communication systems.

The impacts of the development scenarios have been given a conditional numerical characterisation, summarised in Table 8.3 of the EIA Report.

Overall, the assessment of the EIA Report 8.4. the comparison and analysis of the WPP location and height alternatives presented in Table 2.1 does not reveal any circumstances that would prevent the implementation of the planned WPP park location A or B or the technical alternative. The location and technical implementation of all alternatives is feasible.

Alternative B is primarily recommended because of the advantage of this WPP park in its proximity to the 330 kV high voltage line (less deforested area for the construction of new AST lines) and its proximity to large electricity consumers. As the construction of new substations near high-voltage lines has its own technological limitations, it is most efficient, economically feasible and safe to build generating capacity (WPP).

8. Further conditions for environmental monitoring of the proposed action

The EIA assesses the potential impacts of the proposed WPPs. Impacts such as flicker effects, noise pollution, safety risks, impacts on habitats and specially protected plant species and the hydrological regime of the site can be predicted with a high degree of accuracy by assessing the scale of the Proposed Action and using calculation methods. Unfortunately, it is not practicable to assess the precise impacts of the proposed WPP on ornithofauna and bat populations, so the impacts of the proposed WPP on these animal groups should continue to be assessed through monitoring and, if necessary, the introduction of additional mitigation measures not identified in this report.

Bird monitoring

In order to be able to judge the effectiveness of the recommended mitigation measures for the planned wind park and to be able to adjust them if necessary, the bird expert recommends monitoring of nesting birds **before and during the operation and construction of the wind park**.

Pre-construction monitoring should result in a choice between the two scenarios VV1, VV82/VV42, VV36: the expert recommends to abandon VV1 and VV82, unless there are some technological reasons that it would be better to abandon VV42 and VV36.

It is also recommended that at least one year of **ambient noise measurements** be carried out **before the WPP park** is put into **operation**, so that they can be compared with measurements during the lifetime of the WPP park.

Install WPP suspension cameras in accordance with the results of the pre-construction monitoring, assessing the current proposals:

- (1) Suspension of WPP around sunrise/sunset to protect soaring birds (1 April to 1 October),
- (2) Suspension of the WPP for the protection of migratory birds in flocks (from 15 February to 15 May and from 1 September to 15 November),
- (3) If the pre-construction monitoring confirms that WPPs VV16 and VV46 have a “flickering” effect on the Western capercaillie rookeries, the turbine operation should be adjusted between 1 April and 15 May between sunrise and 4 hours after sunrise to prevent this,
- (4) For WPP VV20, 21, 24, 26, 28, 30, 31, 32, 33, 81, 88: if a Black Stork nest is found during the pre-construction period, solutions for WPPs construction will be sought and agreed with a certified expert and the NCA,
- (5) Comply with owl protection measures (noise restrictions) by choosing the quietest possible WPP model and solution, to be refined during pre-construction monitoring.

It is recommended to search for the remains of birds killed in collisions in the vicinity of WPPs after they have been commissioned.

For the monitoring of nesting birds, the “Methodology for the investigation of the Wind Park and the preparation of an Expert Report” used in the initial study of the site shall be used as a basis.³¹

It is important to carry out Natura 2000 monitoring of bird species in the two Natura 2000 sites adjacent to the site to enable a qualitative assessment of the potential impact of the proposed WPP park on them.

Other records are to be kept in accordance with the methodology. The data obtained will be comparable with each other, including with those already obtained during the initial site investigation. The surveys regularly identify neighbourhoods that need increased attention. In case of new ornithological values identified, possible WPP park construction and, if necessary, operational changes shall be assessed.

Breeding bird monitoring should be carried out annually until the planned WPP park is operational and for the first five years of operation. 7. in the 9th and 11th year of operation, and every third year thereafter. However, this may be refined according to the results of the monitoring.

It is recommended that the search for the remains of birds killed in the collisions should be organised using the methodology used by Lithuanian colleagues.³²

Given that scientific studies^{33, 34, 35, 36} on the effects of noise from WPP on Ural owls (*Strix uralensis*) are controversial, in many countries (Finland, Poland, etc.) have no restrictions on noise impact and the approved Owl Conservation Plan states that “...noise pollution levels should be below 35 dB anywhere in the micro-reserve area (including the boundary) for the frequency range 0.1 to 20 kHz”, pre-construction monitoring of this species should be undertaken.

Bat monitoring

The bat monitoring methodology includes:

- 1) acoustic monitoring with ultrasonic detectors,
- 2) listing of dead bats under selected WPP.

Acoustic monitoring, recommendations: monitoring to be carried out by installing automatic ultrasonic detectors in the 15 WPP nacelles to record bat activity from at least 1 May to 30 September. Automatic detectors should aim to cover the entire WPP park area as evenly as possible. In addition to acoustic monitoring, monitoring of dead bats should be developed and carried out by selecting for dead bat counts WPP at which acoustic monitoring would also be carried out and/or WPP that are suspected during the work to cause increased bat mortality.

³¹ Ueland, D. , Miller, K. 2022. Methodology for the Wind Farm Study and the Expert Report.

³² Morkūnas J. 2023. Best Practices for Bird Monitoring in Wind Farm Development in Lithuania: Guidelines.

³³ Pijanowski, B.C., et al. (2011) - Soundscape ecology: The science of sound in the landscape. BioScience, 61(3), 203-216. <https://doi.org/10.1525/bio.2011.61.3.6>.

³⁴ Rheindt, F.E. (2003) - The impact of roads on birds: Does song frequency play a role in determining susceptibility to noise pollution? Journal of Applied Ecology, 40(5), 744-753. <https://doi.org/10.1046/j.1365-2664.2003.00856.x>.

³⁵ Deichmann, J. L., et al. (2017) - Sensitivity of tropical bats to anthropogenic noise. Biological Conservation, 207, 9-15. <https://doi.org/10.1016/j.biocon.2017.05.012>.

³⁶ Foote, A. D., et al. (2004) - Noise pollution and marine mammal populations: Conservation biology implications for large cetaceans. Conservation Biology, 18(2), 373-375. <https://doi.org/10.1111/j.1523-1739.2004.00573.x>.

During the design of the WPP, in agreement with a certified bat expert, other solutions can be used to mitigate the impact on bats, such as smart monitoring systems equipped with ultrasonic sensors and artificial intelligence technologies that detect the presence of bats in real time before shutting down the turbines.

To facilitate the search for dead bats, a vegetation-free ground surface should be established around the base of the WPP, where possible, or grass should be cut regularly during the monitoring period, within a radius of at least 50 m. In forests, no special clearing is required to create such a strip.