

optimally prepared terrain and with strict respect for the geomechanical characteristics of the soil.

Nevertheless, the most significant consequences on the quality of the basic factors of the environment and nature can be the following:

- impact on ornithofauna,
- impact on hiropterofauna,
- increase in the noise intensity,
- impact on the characteristics of the landscape,
- shading of the objects,
- accident situations.

Analyzing the data on natural and created values at the location and project characteristics, a general assessment of the possible impacts has been made, the results of which are shown in Table 6.1.

- 1 - intensity;
- 2 - probability;
- 3 – reversible;
- 4 – lasting;

- 5 - spatial conditions (extent of influence);
- 6 - cumulative, synergistic;
- 7 – possibility of prevention, reduction or compensation

Evaluation of impact significance: + YES; – NO; ? unclear

Table 6.1. Matrix for checking the significance of the influence of the park of wind farms at the location of Kostolac on the environment

| Project characteristics | Impact characteristics | | | | | | | Explanation |
|---|---------------------------------------|---|---|---|---|---|---|--|
| Aspects of environmental protection of the project and the possibility of impact of the project on: | Possibility of significant influence? | | | | | | | Include/exclude in the environmental assessment (YES or NO) |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 1. AIR | | | | | | | | |
| 1.1 Emission | ? | + | ? | - | - | - | - | YES. Possible impacts during construction as a result of machine operation. |
| 2. WATER | | | | | | | | |
| 2.1 Surface water quality | - | - | - | - | - | - | - | NO. no influence. |
| 2.2 Groundwater quality | - | - | - | - | - | - | - | |
| 2.3 Hydrology | - | - | - | - | - | - | - | |
| 2.4 Hydrogeology | - | - | - | - | - | - | - | |
| 3. SOIL | | | | | | | | |
| 3.1 Agricultural land | - | - | - | - | - | - | - | YES. Possible influence on the landscape because the wind turbines will dominate the space. |
| 3.2 Forest land | - | - | - | - | - | - | - | |
| 3.3 Landscape / Relief | - | + | - | - | - | - | - | |
| 3.4 Erosion / soil degradation | - | - | - | - | - | - | - | |
| 3.5 Land fragmentation | - | - | - | - | - | - | - | |
| 4. CLIMATE | | | | | | | | |
| 4.1 Emission of greenhouse gases | - | - | - | - | - | - | - | NO. no influence. |
| 5. FLORA AND FAUNA | | | | | | | | |
| 5.1. Influence on ornithofauna | - | + | - | - | - | + | + | YES. Possible impacts. |

| Project characteristics | Impact characteristics | | | | | | | Explanation |
|---|---------------------------------------|---|---|---|---|---|---|--|
| Aspects of environmental protection of the project and the possibility of impact of the project on: | Possibility of significant influence? | | | | | | | Include/exclude in the environmental assessment (YES or NO) |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 5.2. Impact on hiropteroфаuna | - | + | - | - | - | + | + | |
| 6. POPULATION I HEALTH | | | | | | | | |
| 6.1 Settlement structures | - | - | - | - | - | - | - | NO. no influence. |
| 6.2. Human health | - | - | - | - | - | - | - | |
| 7. OTHER ASPECTS | | | | | | | | |
| 7.1. Waste management system | - | - | - | - | - | - | - | NO. no influence. |
| 7.2. Traffic load | - | - | - | - | - | - | - | |
| 7.3. Noise level | - | + | - | - | - | - | - | YES. Possible influences at source. |
| 7.4. Shadows flickering | - | + | - | - | - | - | - | |
| 7.5. Heat load | - | - | - | - | - | - | - | NO. no influence. |
| 7.7. Non-ionizing radiation | - | - | - | - | - | - | - | |
| 7.8. Archaeological remains | - | + | - | - | - | - | + | YES. Theoretical potential impacts while pillars foundation and underground installation |

Summarizing the characteristic of possible impacts of the planned project, the following can be noted:

a) the extent of the impact is limited in relation to intensity and spatial extent, and in the context of the current state of the environment. In the immediate vicinity of the building there are no vulnerable objects that can be exposed to the impact.

б) nature of cross-border impact: conditionally possible cross-border impact since the impact on internationally protected species of flying fauna can be considered as cross-border.

в) size and complexity of impact: the size and complexity of potential impacts (positive and negative), and given the nature of the project, is not expressed.

г) probability of impact: probability of impact can only be regarded in relation to ornithofauna and hiropteroфаuna. These effects are minimized by the optimal arrangement of wind turbines.

д) cumulative and synergetic effects can be expected as a result of the interaction of planned wind turbines within the wind farm itself.

In relation to the mentioned possible impacts of the planned project on the environment, a detailed impact assessment is based on them and analyzed through Chapter 6.2. of the Study.

Regarding the selection of the type of wind turbine to be installed, it is estimated that basically there are no significant differences between several types of this equipment in terms of environmental impact. Certain differences are related to the level of efficiency and the degree of utilization of wind potential in different operating modes, but for each of the types there is a very high level of reliability in the context of possible negative environmental impacts.

6.2. Quantitative-qualitative multicriterial assessment of the environmental impact

In order to analyze the possible impacts of certain activities and procedures during the construction and exploitation of the park of wind farms at the Kostolac site on environmental elements, from a broader list of potential impact factors (threats) that can be expected for this kind of intervention in nature, 10 possible factors are identified, which are actually individual activities on the realization of the project. Although for each of this item, it is possible to partially determine the summative, ie the average assessment of the effect (impact factor), we consider that their presentation as a whole, without partial analysis, is sufficiently purposeful and functional. For some factors, it can be said that they carry the same or similar information, so it seems justified to reduce their number. The fact is that some of them act synergistically, mutually reinforcing their actions, and therefore that matching information must be kept in the analysis. The synthetic display of the endangering factor is given over the mean values, not through the summative score that would then be scaled.

Impact factors were evaluated separately for each environmental component relevant to the scope of this study with estimates from 0 to 5 for the impact size, according to the following scale:

- 0 – no noticeable effect;
- 1 – low effect;
- 2 – tolerable effect ;
- 3 – medium high effect;
- 4 – high effect;
- 5 – very high effect (devastation).

For the importance of the impact of the scale from L to M, according to the following scale:

- L – impact limited to location;
- O – impact of importance for the municipality;
- R – impact of a regional character;
- N – influence of national character;
- M – impact of cross-border character.

For probability of impact from M to I, according to the following scale:

- M – possible impact (probability less than 50%);
- V – probable impact (probability over 50%);
- I – certain impact (probability 100%).

For the duration of the influence from P (occasional/temporary) to D (long term/permanent).

Also, the physical, biological and socio-cultural characteristics of the environment at the site are separated, and within them, a total of 16 components of the environment are defined.

The effect of the factor is assessed for the components of the environment at the site (!), and the results of the analysis are shown in the tables: 6.2 - 6.6, for all components of the environment and impact factors in the form of Leopold's matrix, and accordingly commented on in item 6.2.1.

Table 6.2. Matrix of the size of the factor influence on the components of the environment of the park of the wind farm at the location of Kostolac

| Predicted impact factors | ACTIVITIES ON THE PROJECT | | | | | | | | | | The sum of the IF values by type and bio. comp. | Average values | | | |
|---|------------------------------|---------------------------|-------------------------------|----------------------------|-----------------------|---|-------------------------------|----------------------------------|---|-----------------------------|---|----------------|---|----|-------------------|
| | Placing of the wind turbines | Foundation of the pillars | Use of construction materials | Construction of substation | Placing of the cables | Construction of internal traffic surfaces | Work of construction machines | Treatment of the waste materials | Realization of a temporary delivery point | Exploitation of the project | | | | | |
| PHYSICAL COMPONENTS | Water | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 | 0.30 |
| | Microclimate | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| | Soil | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 11 | 1.10 |
| | Erosion | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.10 |
| | Air | 1 | 1 | 0 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 0 | 11 | 1.10 |
| | Noise | 2 | 2 | 0 | 2 | 1 | 2 | 3 | 0 | 1 | 3 | 1 | 3 | 16 | 1.60 |
| | Florist diversity | 2 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 11 | 1.10 |
| | Faunistic diversity | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 10 | 1.10 |
| | Ornithofauna | 2 | 1 | 1 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 14 | 1.40 |
| | Hiropterofauna | 2 | 1 | 1 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 14 | 1.40 |
| | Barriers/corridors | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 11 | 1.10 |
| | Landscape | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 17 | 1.70 |
| | Land use | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 17 | 1.70 |
| | Economy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.10 |
| | Cultural property | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.30 |
| | Accidents | 2 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 3 | 3 | 14 | 1.40 |
| BIOLOGICAL COMPONENTS | | | | | | | | | | | | | | | |
| SOCIO-CULTURAL COMPONENTS | | | | | | | | | | | | | | | |
| Summary of IF values by environmental components | | 20 | 15 | 8 | 18 | 11 | 9 | 18 | 16 | 20 | 19 | | | | |
| Average | | 1.250 | 0.937 | 0.375 | 1.125 | 0.565 | 0.562 | 0.375 | 1.000 | 1.250 | 1.187 | | | | IF = 0.862 |

Table 6.3. Matrix of significance of the factor influence on the components of the environment of the park of the wind farm at the site Kostolac

| | Predicted impact factors | ACTIVITIES ON THE PROJECT | | | | | | | | | |
|---------------------------|--------------------------|------------------------------|---------------------------|-------------------------------|----------------------------|-----------------------|---|-------------------------------|----------------------------------|---|-----------------------------|
| | | Placing of the wind turbines | Foundation of the pillars | Use of construction materials | Construction of substation | Placing of the cables | Construction of internal traffic surfaces | Work of construction machines | Treatment of the waste materials | Realization of a temporary delivery point | Exploitation of the project |
| PHYSICAL COMPONENTS | Water | / | / | / | / | / | / | / | L | R | / |
| | Microclimate | / | / | / | / | / | / | / | / | / | / |
| | Soil | L | L | L | L | L | L | L | L | L | / |
| | Erosion | / | / | / | / | / | / | / | / | L | / |
| | Air | L | L | / | L | L | L | L | L | L | / |
| | Noise | L | L | / | L | L | L | L | / | L | L |
| | Florist diversity | L | L | / | L | L | L | L | L | L | / |
| | Faunistic diversity | L | L | L | L | L | / | L | L | L | M |
| | Ornithofauna | L | L | L | L | L | / | L | L | L | M |
| | Hiropterofauna | L | L | L | L | L | / | L | L | L | M |
| BIOLOGICAL COMPONENTS | Barriers/corridors | L | L | L | L | L | / | L | L | L | L |
| | Landscape | O | L | L | L | L | L | L | L | L | O |
| | Land use | L | L | L | L | L | L | L | L | L | L |
| | Economy | / | / | / | / | / | / | / | / | / | O |
| SOCIO-CULTURAL COMPONENTS | Cultural property | / | N | / | N | N | / | / | / | / | / |
| | Accidents | L | / | / | L | / | / | L | L | L | L |

Table 6.4. Matrix of the probability of factor impact on the components of the environment of the park of the wind farm at the location of Kostolac

| Predicted impact factors | ACTIVITIES ON THE PROJECT | | | | | | | | | |
|----------------------------------|------------------------------|---------------------------|-------------------------------|----------------------------|-----------------------|---|-------------------------------|----------------------------------|---|-----------------------------|
| | Placing of the wind turbines | Foundation of the pillars | Use of construction materials | Construction of substation | Placing of the cables | Construction of internal traffic surfaces | Work of construction machines | Treatment of the waste materials | Realization of a temporary delivery point | Exploitation of the project |
| PHYSICAL COMPONENTS | | | | | | | | | | |
| Water | / | / | / | / | / | / | / | M | M | / |
| Microclimate | / | / | / | / | / | / | / | / | / | / |
| Soil | V | I | M | I | I | I | V | M | M | / |
| Erosion | / | / | / | / | / | / | / | / | M | / |
| Air | V | V | / | V | M | V | I | M | M | / |
| Noise | I | I | / | I | M | I | I | / | M | I |
| Florist diversity | M | I | / | M | M | M | M | M | M | / |
| Faunistic diversity | M | M | M | M | M | / | M | M | M | M |
| Ornithofauna | M | M | M | M | M | / | M | M | M | I |
| Hiropterofauna | M | M | M | M | M | / | M | M | M | I |
| Barriers/corridors | M | M | M | M | M | / | M | M | M | M |
| Landscape | I | M | M | I | M | M | M | M | M | I |
| Land use | M | M | M | I | M | I | M | M | I | I |
| Economy | / | / | / | / | / | / | / | / | / | M |
| Cultural property | / | M | / | M | M | / | / | / | / | / |
| Accidents | M | / | / | M | / | / | M | M | M | M |
| SOCIO-CULTURAL COMPONENTS | | | | | | | | | | |

Table 6.5. Matrix of the duration of influence of factors on the components of the environment of the park of the wind farm at the location Kostolac

| Predicted impact factors | ACTIVITIES ON THE PROJECT | | | | | | | | | |
|---------------------------|------------------------------|---------------------------|-------------------------------|----------------------------|-----------------------|---|-------------------------------|----------------------------------|---|-----------------------------|
| | Placing of the wind turbines | Foundation of the pillars | Use of construction materials | Construction of substation | Placing of the cables | Construction of internal traffic surfaces | Work of construction machines | Treatment of the waste materials | Realization of a temporary delivery point | Exploitation of the project |
| PHYSICAL COMPONENTS | Water | / | / | / | / | / | / | P | P | / |
| | Microclimate | / | / | / | / | / | / | / | / | / |
| | Soil | P | D | P | D | P | P | P | P | / |
| | Erosion | / | / | / | / | / | / | / | P | / |
| BIOLOGICAL COMPONENTS | Air | P | P | / | P | P | P | P | P | / |
| | Noise | | P | / | P | P | P | / | P | D |
| | Florist diversity | P | P | / | P | P | P | P | P | / |
| | Faunistic diversity | P | P | P | P | P | / | P | P | D |
| | Ornithofauna | P | P | P | P | P | / | P | P | P |
| | Hiropterofauna | P | P | P | P | P | / | P | P | P |
| SOCIO-CULTURAL COMPONENTS | Barriers/corridors | P | P | P | P | P | P | P | P | D |
| | Landscape | D | P | P | D | P | D | P | P | D |
| | Land use | D | D | P | D | P | P | P | P | D |
| | Economy | / | / | / | / | / | / | / | / | D |
| | Cultural property | / | P | / | P | P | / | / | / | / |
| | Accidents | P | / | / | P | / | / | P | P | P |

Table 6.6. Matrix of summary influences of factors on the components of the environment of the park of the wind farm at the location Kostolac

| | Predicted impact factors | ACTIVITIES ON THE PROJECT | | | | | | | | | |
|---------------------------|--------------------------|------------------------------|---------------------------|-------------------------------|----------------------------|-----------------------|---|-------------------------------|----------------------------------|---|-----------------------------|
| | | Placing of the wind turbines | Foundation of the pillars | Use of construction materials | Construction of substation | Placing of the cables | Construction of internal traffic surfaces | Work of construction machines | Treatment of the waste materials | Realization of a temporary delivery point | Exploitation of the project |
| PHYSICAL COMPONENTS | Water | / | / | / | / | / | / | / | 1/L/M/P | 2/P/M/II | / |
| | Microclimate | / | / | / | / | / | / | / | / | / | / |
| | Soil | 1/L/V/P | 2/L/V/D | 1/L/M/P | 2/L/M/D | 1/L/V/P | 1/L/V/P | 1/L/V/P | 1/L/M/P | 1/L/M/P | / |
| | Erosion | / | / | / | / | / | / | / | / | 1/L/M/P | / |
| | Air | 1/L/V/P | 1/L/V/P | / | 1/L/V/P | 1/L/M/P | 2/L/V/P | 3/L/V/P | 1/L/M/P | 1/L/M/P | / |
| BIOLOGICAL COMPONENTS | Noise | 2/L/I/P | 2/L/I/P | / | 2/L/I/P | 1/L/M/P | 2/L/I/P | 3/L/I/P | / | 1/L/M/P | 3/L/V/D |
| | Florist diversity | 2/L/M/P | 2/L/I/P | / | 2/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | / |
| | Faunistic diversity | 1/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | / | 1/L/M/P | 1/L/M/P | 1/L/M/P | 2/M/M/D |
| | Ornithofauna | 2/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | / | 2/L/M/P | 2/L/M/P | 2/L/M/P | 2/M/I/P |
| | Hiropterofauna | 2/L/M/P | 1L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | / | 2/L/M/P | 2/L/M/P | 2/L/M/P | 2/M/I/P |
| SOCIO-CULTURAL COMPONENTS | Barriers/corridors | 2/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | 1/L/M/P | / | 1/L/M/P | 1/L/M/P | 1/L/M/P | 2/L/M/D |
| | Landscapes | 3/O/I/D | 1/L/M/P | 1/L/M/P | 2/L/I/D | 1/L/M/P | 1/L/M/D | 1/L/M/P | 2/L/M/P | 2/L/M/P | 3/O/I/D |
| | Land use | 2/L/M/P | 2/L/M/D | 2/L/M/P | 2/L/I/D | 1/L/M/P | 2/L/I/P | 1/L/M/P | 2/L/M/P | 2/L/M/P | 1/L/I/D |
| CULTURAL COMPONENTS | Economy | / | / | / | / | / | / | / | / | / | 1/O/M/D |
| | Cultural property | / | 1/N/M/P | / | 1/N/M/P | 1/N/M/P | / | / | / | / | / |
| | Accidents | 2/L/M/P | / | / | 2/L/M/P | / | 2/L/M/P | 2/L/M/P | 2/L/M/P | 2/L/M/P | 3/L/M/P |

6.2.1. Estimated effect of impact factors on individual components of the environment

6.2.1.1. Physical components

On the water regime and quality, the project will not have a significant impact. When using a wind farm, water is not used, so waste water is not generated. However, it is possible to pollute the waters during the implementation of the Temporary Delivery Point (TDP), which is why special attention should be paid during the realization of the TDP itself, as well as during the transshipment of the equipment. There is no impact of the project on the change of microclimatic characteristics and parameters and the stimulation of erosive processes.

When it comes to the possible impact on the soil, they are predominantly possible as a result of the foundation of the wind turbine pillars, as a result of the construction of a substation, the manipulation of construction machinery on site, and inadequate treatment of waste materials during the construction of the wind farm. The total average value of the magnitudes of the expected impacts is within the frames of a low effect (1.10), dominantly of local character, with a constant or occasional effect.

At the TDP, local erosive processes may occur if the trees and shrubs are eradicated, and this option should be avoided.

By applying one of the basic principles of the concept of sustainable development, which is the use of renewable energy sources, it is encouraging to reduce the use of fossil fuels and reduce air pollution. In addition, the use of fossil fuels for the production of electricity from several aspects affects environmental pollution, while the use of wind energy in electricity production produces multiple positive effects on the environmental quality. Each kilowatt of electricity produced from renewable sources represents a kilowatt of electricity less from non-renewable sources. This positive impact is noticeable in the wider context, which in a positive sense goes beyond the scope of the project. However, certain negative effects are possible during the construction phase of the wind farm and as a result of the realization of certain segments of the project, primarily the realization of traffic surfaces for the needs of the functioning of the complex of the wind farm and the substation complex. These effects are reflected in the air pollution caused by the manipulation of vehicles and machinery and in the form of raising dust. The overall average value of the magnitude of the expected impacts of the project on air quality is in the low-level (1.10), local character.

In modern wind generators, using the so-called "optispeed" generator has achieved the constant wind angular velocity (typically 16 rpm) in a wide range of wind speeds, and one consequence is a significant reduction in noise and vibration levels. In addition to the power and dimensions of the wind turbine, an especially important aspect of understanding the noise intensity is the spatial aspect. The noise generated by the wind generator decreases with increasing distance from the wind turbine. In order to model the noise intensity, the Rulebook on the methodology for the determination of acoustic zones ("Official Gazette of the RS" No. 72/10) was first interpreted. In this respect, the permissible levels of noise in certain areas of the settlement are prescribed. Values range from 50 dBA per day to 40 dBA per night in the holiday and recreation zone, hospitals and parks, all the way to 70.2 dBA (both day and night) in purely industrial parts of the city. When measuring the exposure of the objects (buildings, houses, etc.) in the open space, the noise level is measured at 1-2 meters in front of the facade,

or 0.5 meters in front of the open window. According to the opinion of the expert team that was involved in the preparation of the subject impact assessment study of the Kostolac wind farm project and consultations with relevant institutions and experts, the complex of the planned wind farm should be treated as zone VI - industrial zone, while the closest residential buildings should be treated as zone II - small and rural settlements. This statement was taken into account when assessing the noise intensity and its spatial dispersion in the field of project realization. A noise intensity model of the planned wind farm was modeled using the Danish "noise intensity calculator for wind turbines" (Figure 6.1).

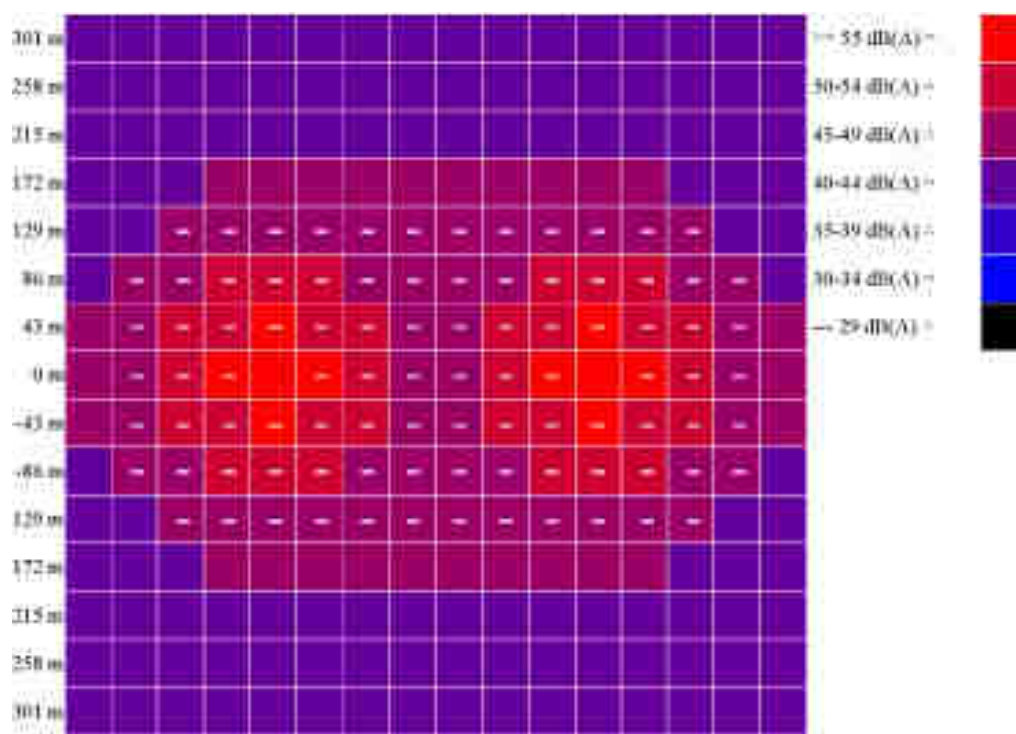


Figure 6.1. *Expected spatial dispersion of noise as a result of the operation of the wind farm*

Considering the fact that during the disposition of the wind turbine pillars, the aspect of possible noise impacts from the wind turbines was taken into account, as shown in Figure 6.1. it was found that the levels of noise from the wind turbines are significantly below the legally prescribed levels and that in this context there will be no noise increase except at the source, in the vicinity of wind turbines. In this context, the spatial disposition of the wind turbines is very favorable and there are no significant negative impacts in terms of exposure to people to increased noise intensity, since the nearest residential buildings are located at a distance of about 500 meters from the planned Kostolac wind farm, while the assessment is that the noise intensity will be reduced to within the frames of the legislation, already 300 meters away from the wind turbines. Less negative impacts on noise increase can be expected during the construction of a wind farm, primarily as a result of manipulation of construction machinery and transportation of equipment from TDP to the very location on which wind turbines will be installed. Such influences are of local character and can only occur temporarily and occasionally during the construction itself. The overall average value of the magnitude of the expected impacts of the project on the noise intensity is in the low-performance frames (1.60).

6.2.1.2. Biological components

On the basis of conducted one-year monitoring of ornithofauna in hiropterofauna on the wider area of the planned wind farm Kostolac, fewer possible negative impacts were identified, which were minimized by preventive measures by correction of the original disposition of the wind turbine pillars resulting from the results of annual observations. On the basis of the analyzed data on the presence, directions, altitudes and flying directions of members of different bird species, as well as on the basis of the layout of wind turbines, no strong intensity was assessed at the given location for none of the influence.

Based on the foreseen layout of the wind turbines at the future Kostolac wind farm and based on the data at the observation points, it can be assumed that there should not be no significant negative impact of the construction and operation of the wind farm on the bird fauna. The wind turbines at the future wind power plant Kostolac, which according to the project are 20, according to the plan provided by the investor at the beginning of this monitoring, were located on four sub-locations in the area of the subject location. Based on the analyzed data on the presence, directions, altitudes and directions of flying members of different bird species, as well as on the basis of the layout of wind turbines, it can be assumed that the greatest impact of the construction and operation of the future wind farm Kostolac will be on the members of the largest and most frequently present species. However, due to the registered characteristics of their overflights, and most often and other target species that were flying at critical altitudes were very few, and with considerable certainty it can be estimated that the influence of wind turbines on them will be minor. On the other hand, the original arrangement of positions of wind turbines was relatively acceptable from the point of view of the influence of bird fauna, except for the wind turbines that were predicted at the westernmost part of the investigated area, around the established OP 2. In synergy with preliminary findings and recommendations for the monitoring of bats, wind generators at the location of Petka were therefore relocated. After the suggestions to the investor, in the initial phases of the works, came the current arrangement of the turbines, which is a compromise and satisfactory solution. The new situation in the area of the potential wind farm, besides meeting the requirements of preservation and protection of bird fauna, meets the criteria for protection and conservation of the fauna of the bats. Unlike bats, birds in the subject area do not have pronounced and strict flying corridors, but with minor correction in the placement of the wind turbines investor made that their new positions have a smaller effect on the area where there is a greater presence of target species, which can only increase the chances of safe passage of migratory and diurnal flying birds (and bats). No significant intensity was assessed at the subject site for no influence. Of the target species, cumulatively the greatest effect would be the storks and herons, buzzards, kestrels, and the swans, and among the other selected species of Bee-eaters, Eurasian skylark and starlings. It is important to say that the number of members of most of these species is relatively small, and that therefore there should be no significant effect on them.

On the other hand, it is necessary to emphasize the possible positive influence of the construction and operation of the wind farm and the accompanying infrastructure on certain types of birds. Maintaining the space around the base of the pillars of wind turbines in the form of grass mowing can contribute to the increase in the number of nesting breeds of species affected by high grass, as blossoms *Anthus spp.*, *Motacilla sp.* and *Alaudidae*. The total average value of the magnitude of the expected impacts of the project on the ornithofauna is in the low-performance frames (1.40).

Observed as a whole, wind farms have a certain, though not high, significance for conserving the local fauna of the bats. This exclusively refers to local populations of the species

Pipistrellus kuhlii, *Pipistrellus nathusii*, *Nyctalus noctula* (not for the migratory populations of *Pipistrellus nathusii* и *Nyctalus noctula*), for which at least some of the moderately important ecological functions exist at the sites themselves, at least occasionally and/or locally here records their high or moderate activity and relative numbers, which may be expected in the near future for *Hypsugo savii*. Based on the preliminary analysis of the conflicts, the investor was suggested, and the investor accepted that certain wind turbines should be repositioned outside the observed zones of increased risk of death, and according to the current plan, all positions of the wind generators are located at a safe distance from the most important identified corridors, so that it is believed that from the aspect of preventing/reducing the suffering of bats, maximum has been achieved by planning the layout of wind generators. Based on the overall preliminary analysis, which has been elaborated and explained in detail, it is estimated that most of the measures necessary for preventing the harmful effects of the wind farm have already been implemented by preventive planning of the positions of wind generators in the function of protecting bats and birds, and all defined positions of wind generators are suitable for construction and work with the implementation of general protection measures. The overall average value of the magnitudes of the expected impacts of the project on the hiropterofauna is in the low-performance frames (1.40). The overall average value of the magnitudes of the expected impact of the project in question on the creation of the barriers/corridors lies in the low-performance framework (1.10).

Assessment of the effect on ornithofauna and hiropterofauna was made in relation to the following indicators:

- number and species of potentially affected birds during one year and
- number and species of potentially affected bats during one year

taking into account the behavior of flying fauna in the periods of silence and the periods of optimal air flows for the operation of the wind farm and on the altitudes and flight mode of the target species covered by monitoring.

Ecological aspects of TDP are primarily seen in the adverse impact that it can produce on the present ecosystems. Depending on the selected TDP solution, the following impacts can be expected: the impact on the flora - the removal of existing coastal and other plants to ensure the smooth operation of the transshipment (primarily when it comes to using the crane, and its horizontal radius of equipment transshipment, where high plants can interfere with safe and proper functioning); impact on the fauna - due to mechanization, there will be noise, which may have an adverse effect on the presence of special species, but with the temporary nature of the chosen solution, in accordance with the Opinion of the Institute for Nature Protection (attached), it is preventing that temporary distraught fauna in time, will return to the locality that was disturbed by the transshipment and the noise that resulted from it; impact on flora and fauna - primarily concerns the possible release of toxic substances that can occur as a result of mechanization work that can be prevented by applying organizational and technical measures of protection.

6.2.1.3. Socio - Cultural Components

The total average impact factor for these components falls into the category of low effect (1.04). The reason for this is the specificity of the purpose of which the location of the planned wind farm was used, and for which purpose the surrounding area is used today,

which in the previous period led to partial or complete anthropogenic changes in the area, with all its social implications. The most significant average value of the impact factor is in relation to the overall appearance of the landscape.

Landscape characteristics represent a subjective category that is not easy to quantify. The visual impact on the environment is a subjective impression that, apart from the perception of the observer, depends on the type of landscape and the specific visual characteristics. Analyzing the target location of the planned purpose, it was concluded that the wind turbines will dominate the environment, so that it can be concluded that the existing area will significantly change by the construction of the planned wind farm. With careful planning, shaping and coloring of wind turbines, this impact can be partially reduced. The opinion of the expert team is that the planned disposition of wind turbines, although primarily based on the performed production estimation and preventive protection of flying fauna and population (noise), will not disturb the landscape features of the space, but will give it a special visual identity. On the other hand, on the wider area of the planned Kostolac wind farm, there are energy facilities/thermal power plants whose chimneys already influence the change of the landscape, which, in summary, diminishes the significance of the potential impacts of the planned wind farm on the landscape and the ambient values of the wider area. In addition, the installation of a wind turbine can have an impact on the shading and glare of the wind turbine or the so-called shadows flickering. Wind turbines are large and high objects and as such they can shine the light, or they can create a shadow in the environment. When the unit is in operation, an unpleasant flickering of the shadow can be detected at distances up to 10 diameters of the rotor. Given the configuration of the terrain, the disposition of wind turbines and existing objects in the surrounding area of the subject area, as well as the course of the Sun's movement, it can be concluded that such effects will not be expressed in a way that would present an obstacle. The total average value of the magnitudes of the expected impacts of the project on the landscape is in the low-performance frames (1.70).

Wind farms physically occupy only a few percent of the area (the surface area for the foundation of the objects) on which they are stretched, while the rest of the surface between the stand of the turbine and around the internal roads can be used for other purposes, that is, it can be used without restriction for the original purpose. In this case, it can still be used for agricultural production, and in the context of changing the purpose of land use there is no significant impact. The total average value of the magnitude of the expected impacts of the project in question on the purpose of using the land is in the low-performance framework (1.70).

In economic terms, there is a possibility of local government agreeing with the investor/contractor to pay for the compensation/fee for the implementation of a project on its territory, whereby local government can achieve some (but not large) profits. This can be achieved by paying a certain percentage of the profit to the local government budget. The total average value of the magnitude of the expected impact of the project on the local government economy is within the very low effect (0.10).

Although at the location of the planned Kostolac wind farm there are no recorded archaeological sites, although the land on this site has already been substantially in the past exposed to significant mining activities, theoretically it is possible to encounter undiscovered archaeological remains during digging and foundation of objects. In such situation it is necessary to take adequate measures in order to preserve such remainings, ie to stop the works and to inform the Institute for the Protection of Cultural Monuments. The total average value

of the magnitudes of the expected impacts of the project on cultural goods is reduced to the limits of the theoretically possible (0.30).

There is a possibility of accidents arising from the work of a wind power plant. However, equipment manufacturers predict inevitably all necessary measures to protect against accidents, and these are the following potential accidents:

- fire hazard,
- lightning strike hazard;
- ice-gathering on wind turbines blades hazard,
- wind turbines blades breaking of during severe winds.

The risk of an accident on a wind turbine is very small. Experiences from the world show that no wind turbine accidents have been reported anywhere that would cause significant ecological consequences. At the given location, there is no direct danger for residential or industrial buildings, even in the case of the most serious hazard (torn blades or other parts during the work or demolition of the entire pillar with a wind turbine). There is a danger of pillars which are positioned near existing local roads, where it is necessary to strictly apply the proposition of manufacturers of equipment related to minimizing the possibility of accidents during periods of extreme weather conditions (strong winds and ice formation on blades due to low temperatures). In order to avoid the occurrence of possible accidents, it is necessary to define adequate measures for protection and reduction of the risk of accidents and within the impact assessment, which should ensure the implementation and control of technical specifications that are prescribed by equipment manufacturers in the context of protection against accidents. The overall average value of the magnitudes of the expected impacts of the project on the possibility of implicating accidental situations is within the low-performance frames (1.40) and are of local character.

6.3. Collective effect of impact factors on environmental components

From Table 6.6. as the factors with the greatest collective impact on the components of the environment, stand out the activities in the phase of construction of a wind farm (work of construction machines, installation of wind turbines and their foundation, construction of substations and construction of TDP) and potential impacts during the exploitation of the project with possible influence to ornithofauna, hiropterofauna and increase of the noise intensity at the source.

The greatest sensitivity is shown in biological components, primarily due to possible effects on the flying fauna, but these impact values are low. Impacts are actually expressed with low intensity only on a limited space and are mostly limited in time. The average assessment of the effects of the impact factors collectively on the components of the environment is 1.22. This factor impact factor is a **low-performance frame**.

The effect of the impact factor will have a limited effect on the entire space of the site in question. Construction machinery and transport vehicles will be engaged in the construction phase. It is expected that during the operation of these machines, there will be emissions of gases in the air, as well as increased noise levels. Negative environmental effects can not be effectively prevented in this case, and preventive measures relate primarily to the regular maintenance of machines, greater efficiency of exploitation of their work and proper treatment of waste materials that may arise during the construction stage of the wind farm.

Nevertheless, if the negative effect of these and other factors is considered as a whole, it should be emphasized that qualitative and quantitative losses in the living world will nevertheless be negligible both spatially and timelily very limited, practically at the very location. Negative effects will not significantly affect the surrounding area, while some of their effects will only be revealed during the construction of objects. The survival of none species nor significant, sensitive or rare ecosystems and other natural values will be questioned, or will have no significant consequences for the living world and the basic environmental factors.

At the stage of exploitation of the facility, and with the correct and consistently implemented recommended and prescribed protection measures, significant physical and biotic components of the environment are not expected to be significantly endangered.

6.3.1. Summary of the possible impacts

Quality of air, water, soil, noise and vibration, heat and radiation - Using renewable energy sources positively affects air quality. This positive impact is noticeable in a wider context and beyond the scope of the project. However, certain negative effects are possible during the construction phase of the wind farm and as a result of the realization of certain segments of the project, primarily the realization of traffic surfaces for the needs of the functioning of the complex of the wind farm and the substation complex. These effects are reflected in the air pollution caused by the manipulation of vehicles and machinery and in the form of raising dust. On the regime and quality of surface waters, the given project can have an impact during the realization and functioning of the TDP. When using a wind farm, water is not used, so waste water is not generated. Certain negative impacts can occur in the construction phase and in case of accidental situations and oil leakage into groundwater, but the likelihood is at the level of theoretical assumptions. When it comes to the possible impact on the soil, they are predominantly possible as a result of foundation of wind turbine pillars, manipulation of construction machinery on site, and inadequate treatment of waste materials during the construction of a wind farm. In relation to the noise and vibration generation, based on the spatial noise dispersion and the values obtained from noise modeling, noise levels from wind turbines were found to be significantly below the legally prescribed levels. In this context, the spatial disposition of wind turbines is very favorable and does not have significant negative impacts in terms of exposure to people with increased noise intensity and vibrations. The wind farm project does not produce thermal pollution, and in the context of radiation, there are electric and magnetic fields in the substation as a type of non-ionizing radiation. Since there are no residential facilities near the substation, such impacts are not considered significant because there is no exposure of the population to these influences.

Health of the population - Due to the specificity of the site in terms of the vicinity to the settlement and the nature of the technological process in the wind farm, there are no effects on the health of the population. During the construction of the wind farm, possible impacts related to possible injuries at work are possible. Theoretical possibilities for endangering the health and life of the population exist only in the event of accidents, in cases where, at the time of eventual accidents (eg tearing up/fracture of blades), the people find themselves at the site.

Meteorological parameters - There is no impact of the project on the change of microclimatic characteristics and parameters.

Ornithofauna and hiropterofauna - It can be assumed that the greatest impact of the construction and operation of the future Kostolac wind farm will be on the members of the most numerous and most frequently present species. However, due to the registered characteristics of their overflights, most often and other target species that were flying at critical altitudes were very few, and with considerable certainty it can be estimated that the influence of wind turbines on them will be minor. Of the target species, cumulatively the greatest effect would be the storks and herons, buzzards, kestrels, and the swans, and among the other selected species of Bee-eaters, Eurasian skylark and starlings. It is important to say that the number of members of most of these species is relatively small, and that therefore there should be no significant effect on them. On the other hand, it is necessary to emphasize the possible positive influence of the construction and operation of the wind farm and the accompanying infrastructure on certain types of birds. Thus, the construction of a transmission line in terms of compulsory complementary infrastructure can have a significant effect on the nesting populations of those bird species that favor transmission lines for nesting. As it has already been established, many species are gladly nesting on the transmission lines, such as *Passer* spp., *Sturnus vulgaris*, *Corvus corax*, *Corvus cornix*, *Pica pica*. The ravens nests are usually used by predators such as *Falco tinnunculus*, *Buteo buteo*, *Falco subbuteo*, *Falco cherrug*, and very rarely by *Aquila heliaca*. Maintaining the space around the base of the pillars of wind turbines in the form of grass mowing can contribute to the increase in the number of nesting breeds of species affected by high grass, such as *Anthus* spp., *Motacilla* sp. and *Alaudidae*. As far as the bats are concerned, wind farms have a certain, though not high, significance for conserving the local fauna of the bats. This exclusively refers to local populations of the species *Pipistrellus kuhlii*, *Pipistrellus nathusii*, *Nyctalus noctula* (not for the migratory populations of *Pipistrellus nathusii* и *Nyctalus noctula*), for which at least some of the moderately important ecological functions exist at the sites themselves, at least occasionally and/or locally here records their high or moderate activity and relative numbers, which may be expected in the near future for *Hypsugo savii*. Based on the preliminary analysis of the conflicts, the investor was suggested, and the investor accepted that certain wind turbines should be repositioned outside the observed zones of increased risk of death, and according to the current plan, all positions of the wind generators are located at a safe distance from the most important identified corridors, so that it is believed that from the aspect of preventing/reducing the suffering of bats, maximum has been achieved by planning the layout of wind generators. Based on the overall preliminary analysis, which has been elaborated and explained in detail, it is estimated that most of the measures necessary for preventing the harmful effects of the wind farm have already been implemented by preventive planning of the positions of wind generators in the function of protecting bats and birds, and all defined positions of wind generators are suitable for construction and work with the implementation of general protection measures.

Population, concentration and migration of the population - There is no impact of the project of the subject wind farm on the population, concentration and migration of the population.

Purpose and use of surfaces – Wind farms physically occupy only a few percent of the area (the surface area for the foundation of the objects) on which they are stretched, while the rest of the surface between the stand of the turbine and around the internal roads can be used for other purposes, that is, it can be used without restriction for the original purpose. In this case,

it can still be used for agricultural production, and in the context of changing the purpose of land use there is no significant impact.

Utility infrastructure - The project will have no impact on the existing communal infrastructure, and the planned internal communal infrastructure will be carried out in accordance with the valid regulations and conditions of the relevant institutions obtained in the regular procedure for the needs of the project.

Natural assets of special values and cultural heritage - The smallest distance of the wind farm from the SNR Deliblatska pescara (which is also an important bird area - IBA) is about 4 km (southwestern border), i.e. about 7 km (Deliblatska pescara itself). During construction work, heavy machinery and vehicles will not jeopardize the Deliblatska pescara. The distance of the project site from the protected area is large enough that there is no possibility of disturbance or loss of protected habitats in the named area during the construction of the wind farm. According to the data from higher level plans and plans of the surrounding areas, which are related to the subject area, there are no objects that have the character of the cultural heritage, except for the site of Rukumija - a bronze age archaeological site and a monastery, which is considered not to be under impact of the Project.

Landscape characteristics of the area - Analyzing the target location of the planned purpose, it was concluded that the wind turbines will dominate the environment, so it can be concluded that the existing landscape will significantly be changed by the construction of the planned wind farm. With careful planning, design and color of wind turbine columns, this impact can be partially reduced. The opinion of the expert team is that the planned disposition of the wind turbines will not disturb the landscape features of the space, but will give it a special visual identity. On the other hand, on the wider area of the planned Kostolac wind farm, there are energy facilities/thermal power plants whose chimneys already influence the change of land, which, in summary, diminishes the significance of the potential impacts of the planned wind farm on the landscape and the ambient values of the wider area. In addition, the installation of a wind turbine can have an impact on the shading and glare of the wind turbine or the so-called shadows flickering. Wind turbines are large and high objects and as such they can shine the light, or they can create a shadow in the environment. When the unit is in operation, an unpleasant flickering of the shadow can be detected at distances up to 10 diameters of the rotor. Given the configuration of the terrain, the disposition of wind turbines and existing objects in the surrounding area of the subject area, as well as the course of the Sun's movement, it can be concluded that such effects will not be expressed in a way that would present an obstacle.

6.4. Cross-border impacts

As a signatory to the ESPOO Convention (Law on the Confirmation of the Environmental Impact Assessment in a Transboundary Context, "Official Gazette of the RS - International Agreements", No. 102/2007) and the Kyoto Protocol (Law on the ratification of the Kyoto Protocol to the United Nations Framework Convention on Change (Official Gazette of the RS, No. 88/2007 and 38/2009), as well as international agreements related to the conservation of migratory species (Law on the Confirmation of the Convention on the Conservation of Migratory Species of Wild Animals, "Official Gazette of the RS - International Treaties ", No. 102/2007); The Republic of Serbia has undertaken to notify other countries of projects that may have a cross-border impact.

Under the terms of the ESPOO Convention on Impact Assessment, cross-border impact is defined as: "Any impact, not only of a global nature, within an area of jurisdiction on the one hand, caused by the activity of physical origin, in whole or in part, in an area under the jurisdiction of the other party".

An additional argument for the cross-border cooperation between the Kostolac wind farm project is contained in the Decision II/14 of the Republic of Serbia of February 2016 on the Amendments on Environmental Impact Assessment in the Transboundary Context (ESPOO), which in the point 22. defines the procedure for "large installations for the use of wind power for the purpose of producing electricity (the so-called "wind farms")".

Of all the dominant influences that the wind farm can imply in some area (impact on flying fauna, increasing noise intensity, visual impacts and shadows flickering) in the case of the Kostolac wind farm, and in the context of possible cross-border impacts on neighboring Romania whose border is at about 15 km northeast of the most eastern position of the wind turbine of the Kostolac wind farm, one can speak of:

1. Visual impact (visibility of the wind farm from the territory of Romania) and
2. Impact on a flying fauna with the status of internationally protected species.

When we speak about visual impact, item 6.2.1.3. of the Study elaborated visual impacts and it was concluded that the wind farm Kostolac will dominate the area that is in the immediate vicinity of the wind farm due to the height of the wind turbines. However, in a transboundary context, this impact is completely relativized with regard to the distance of the location from the nearest settlements in Romania (18km - Socol, 20km - Campia, 22km - Parneaura), especially in view of the topography of the terrain. Namely, between the location of the Kostolac wind farm and Romania, on the territory of the Republic of Serbia, there are locations: Lipar, Dos, Dolovi, Veliko Brdo, where altitudes range from 230m to 324m (Figure 6.2).



Figure 6.1. Topography of the terrain on the space between wind farm Kostolac and Romania

Bearing in mind the height of the 180-meter wind turbine with the vertical position of the blade, the topography at the site of the Kostolac wind farm (70 meters above sea level), as well as the altitudes of the locality: Lipar, Dos, Dolovi, Veliko Brdo, located on the area between the location of the wind farm and the territory of Romania and its closest settlements, it is evident that the visual impact is considered negligible because either it will not be noticeable or it will not exist at all (depending on the location of observation).

When the second possible cross-border impact is analyzed, the impact on the flying fauna, as mentioned earlier, at about 15 km northeast of the easternmost positions of the wind turbine of the Kostolac wind farm is the state border with Romania. Also, from this closest point on the state border along the Danube River in neighboring Romania, is the *Porcile de Fier* National Park. This very spacious (115,655 ha) protected area represents a unique natural entity with protected or predicted for protection areas in Serbia located in the vicinity of the wind farm's location - Labudovo okno, ie Donje Podunavlje, and further downstream with the National Park Đerdap. These protected areas, both in Serbia and Romania, have undoubted importance for the conservation of bird fauna, which has led to the release of several important and internationally important bird areas (IBAs) and internationally protected Ramsar areas in this area. And the entire Danube valley is a very important European migration corridor, both for birds and bats, which is why its stream with the coastal belt is protected by law as an ecological corridor of international importance and part of the ecological network of Serbia.

However, despite the close proximity of such important bird habitat (or perhaps because the ecological conditions for many bird species and bats in these protected zones are incomparably more favorable than in the zone of the wind farm's location), the monitoring of the activities of flying fauna (November 2014 - November 2015) found that the number/activity of migratory bird populations (members of the *Anseridae*, *Ardeidae*, *Falconidae*, *Accipitridae*, *Gruidae* and others) and the bats (*Pipistrellus nathusii* and *Nyctalus noctula*) were small/low in the zone of the Kostolac wind farm location, even negligible, so the risk of their suffering is estimated to be small or negligible. By applying the principles of preventive planning in the function of protecting bats and birds, this low risk is further reduced, since all implemented measures for the prevention and reduction of adverse impacts (undertaken by a slightly higher risk identified for some local population of sedentary species) have a positive impact and to migratory populations. In this context, possible transboundary impacts in relation to internationally protected species of ornithofauna and hiropterofauna are maximally minimized by the optimal spatial distribution of wind turbines, based on detailed observations of flying fauna.

Other possible cross-border impacts have not been identified even at the theoretical level.

7. ENVIRONMENTAL IMPACT ASSESSMENT IN CASE OF ACCIDENTS

There is a possibility of accidents arising from the work of a wind power plant. However, equipment manufacturers predict inevitably all necessary measures to protect against accidents, and these are the following potential accidents:

- fire hazard,
- lightning strike hazard;
- ice-gathering on wind turbines blades hazard,
- wind turbines blades breaking of during severe winds.

The risk of an accident on a wind turbine is very small. Experiences from the world show that no wind turbine accidents have been reported anywhere that would cause significant ecological consequences.

At the given location there is no direct danger to the objects, even in the case of the most serious hazard (torn blades or other parts during the work or demolition of the entire pillar with a wind turbine). However, special attention should be paid to the way that VG15, VG16 and VG 17 operate in the period of extreme climatic events (extreme wind blows and eventual icing on the blades) and in case of the realization of a new municipal public road that should pass near these positions.

It is of particular importance that the site and work organization are professionally done in order to minimize possible consequences at that stage. This implies the organization of continuous control in the procurement of construction materials and the execution of construction works. The investor is obliged to provide exclusively approved construction materials and equipment from an authorized supplier, and through professional supervision performs regular quality control of the materials that are being installed.

Particular attention must be paid to the transshipment (TDP), transport and temporary storage of building materials and equipment, so that at that stage of the works due to weather conditions or other circumstances, construction materials and equipment would not lose some of their properties and quality and not to jeopardize the quality of the basic environmental factors.

In the construction and exploitation phase of the building, the investor is obliged to take all the necessary fire protection measures and to process them in detail in the appropriate fire-fighting department. Also, all employees, both in the construction phase and in the stage of exploitation of the facility, must be adequately trained and equipped for timely and efficient reaction in such situations.

Regarding the possibility of a lightning strike in the wind turbine, it exists, but manufacturers in their technical specifications inevitably predict the placement of lightning rods on the tips of the wind turbines, thus eliminating this possibility. The manufacturer of the equipment in its specifications also defines the wind speeds in which the automatic shutdown of the system occurs which prevents the possibility of damage.

Dangerous substances could be used in the regular operation of the wind farm are (1) hydraulic oils and lubricants, anti-freeze and other chemicals for cleaning and maintenance of wind turbines (necessary for operation) and (2) transformer oil in the substation.

The use of hazardous substances necessary for the operation of wind turbines are defined by the regulations of the manufacturer which is, as a rule, certified according to the ISO 14001: 2004 standard.

The replacement of the oil contained in the lubrication devices and lubricating systems in the type of wind turbine projected by the project will be carried out periodically, as part of the regular preventive maintenance of the plant.

All listed possible accidents are extremely rare and for the prevention of possible impact measures are implemented during the design of the plant, exploitation of the facility, the monitoring of the condition of the equipment and the operational maintenance in accordance with the regulations and standards.

7.1. Earthquake risk exposure of the project

Since earthquakes, as a specific natural phenomenon, always carry as a basic feature of their destructive effect the spread in a spatial - regional continuum (and beyond any possibility of people to influence it), this review will refer to the seismicity of the territory where the location of the construction of the Kostolac wind farm and the wider environment to which it belongs.

For a detailed analysis of the local soil response to seismic activity, a detailed Seismic micro-regulation of the terrain at the scope of the Project has been done to define project seismic parameters in accordance with the positive regulations of Serbia and Eurocode 8-1. The analyzes were carried out with the aim of defining the parameters of the horizontal elastic spectrum of the local soil response, the corresponding time histories of acceleration and deformable soil properties compatible with the seismic effect on the four microlocation WF Kostolac: Drmno, Klenovnik, Ćirikovac and Petka.

For the location of the facilities of the wind farm in Kostolac – *locality Drmno* the categorization has determined that the soil conforms to soft soil according to Serbian standard and according to EN 1998-1 soil type D. The type of spectrum is I based on magnitude of the competent earthquake.

The liquefaction resistance of the local soil is defined using the results of geomechanical investigations, mainly CPT tests. CPT field tests in their essence, represent a continual representation of the change of soil properties along the depth of the geotechnical profile. Altogether 7 CPT tests were performed at Drmno site. By analyzing the data of all 7 CPT experiments, the index of the liquefaction potential values was very low, so its occurrences at the location of the wind farm Kostolac site for location Drmno is low. Analysis of the conditions for the occurrence of liquefaction at the site of wind farm Kostolac-locality Drmno showed that there is no potential for the occurrence of liquefaction. The results of an independent analysis of laboratory and CPT tests are consistent with the existence of conditions for the initiation of liquefaction and, according to the probability of events and the index of the liquefaction potential, the danger is defined as "unlikely".

For the location of the facilities of the wind farm in Kostolac – *locality Klenovnik* the categorization has determined that the soil conforms to soft soil according to Serbian standard

and according to EN 1998-1 soil type D. The type of spectrum is I based on magnitude of the competent earthquake.

Altogether 6 CPT tests were performed at Klenovnik site. By analyzing the data of all 6 CPT experiments, the index of the liquefaction potential values was very low, so its occurrences at the location of the wind farm Kostolac site for location Klenovnik is low. Analysis of the conditions for the occurrence of liquefaction at the site of wind farm Kostolac-locality Klenovnik showed that there is no potential for the occurrence of liquefaction. The results of an independent analysis of laboratory and CPT tests are consistent with the existence of conditions for the initiation of liquefaction and, according to the probability of events and the index of the liquefaction potential, the danger is defined as "unlikely".

For the location of the facilities of the wind farm in Kostolac – *locality Ćirikovac* the categorization has determined that the soil conforms to soft soil according to Serbian standard and according to EN 1998-1 soil type C. The type of spectrum is I based on magnitude of the competent earthquake.

A total of 4 CPT tests were performed at the Ćirikovac site. By analyzing the data of all 4 CPT experiment in 3 cases of very low value of the index of the liquefaction potential were obtained and the high potential at the WG 11 location, and the risk of its occurrence at the location of wind farm Kostolac, the Ćirikovac locality is generally low. The results of an independent analysis of laboratory and CPT test data are inconsistent. One of the reasons is the assumption that the level of groundwater is on the surface of the terrain and the other cause of this certainly lies in the sampling method, continuous and discrete. Analysis of the conditions for the occurrence of liquefaction at the site of wind farm Kostolac- the Ćirikovac locality showed that there is a potential for the occurrence of liquefaction in the existence of conditions for the initiation of liquefaction, and the danger is defined as "very likely" according to the probability of events and the index of the liquefaction potential. Analysis of the liquefaction potential for the location of the wind turbine at the location of Ćirikovac has shown that there is a high probability of ~ 13% for the occurrence of liquefaction. The analysis shows that the last 8 meters to the surface of the terrain are the key to the occurrence of liquefaction, and by the appropriate method of foundation the expected effects of liquefaction on vertical subsidence can be significantly reduced.

For the location of the facilities of the wind farm in Kostolac – *locality Petka* the categorization has determined that the soil conforms to soft soil according to Serbian standard and according to EN 1998-1 soil type D. The type of spectrum is I based on magnitude of the competent earthquake.

Altogether 3 CPT tests were performed at Petka site. By analyzing the data of all 3 CPT experiments, the index of the liquefaction potential values was very low, so its occurrences at the location of the wind farm Kostolac site for location Petka is low. The results of an independent analysis of laboratory and CPT test data are inconsistent. Cause of this certainly lies in the sampling method, continuous and discrete. Analysis of the conditions for the occurrence of liquefaction at the site of wind farm Kostolac- the Petka locality showed that there is a potential for the occurrence of liquefaction in the existence of conditions for the initiation of liquefaction, and the danger is defined as "very likely" according to the probability of events and the index of the liquefaction potential. Analysis of the liquefaction potential for the location of the wind turbine 9 at the location of Petka has shown that there is a high probability of ~ 19% for the occurrence of liquefaction. The analysis shows that the last 4 meters to the surface of the terrain are the key to the occurrence of liquefaction, and by

the appropriate method of foundation the expected effects of liquefaction on vertical subsidence can be significantly reduced.

The control calculation benchmark for all four micro-locations showed that the proposed parameters of the specific spectrum for the location Kostolac containing the expected spectral acceleration as for distant as well as maximum local earthquakes.

The intensity of seismic hazard in the subject area is in the 7 °MCS zone, and a more detailed analysis of the seismic characteristics of the location of the planned wind farm Kostolac is elaborated in point 2.2.5. of the Study, and all construction works and materials should be aligned with the values obtained in the analysis of the local soil response to the seismic effect done within the detailed Seismic micro-landscaping of the terrain at the boundary of the Project.

8. ENVIRONMENTAL PROTECTION MEASURES

In designing, constructing and exploiting of the Kostolac wind farm, it is necessary, in addition to the measures included in the Preliminary Design and defined by the equipment specification of the manufacturer, to apply the appropriate environmental protection measures that are listed below.

8.1. Measures during the construction

- during the construction of the planned facilities and the accompanying infrastructure, it is obligatory to respect all the acquired conditions of the competent institutions and the measures that have been incorporated on the basis of them in the Project in question;
- the base of the pillars of each wind generator should be built and secured in a concrete deposit and in such a way that mammals that live underground cannot dig beneath them, and which are the potential prey of the birds
- the land around the concrete foundation of the pillars and the land on which the cables are installed must be repaired after the completion of the works and returned to the previous purpose;
- all installations must be earthed and properly insulated to prevent, or minimize, the harm to wild species;
- the accompanying facilities (substations, distribution boxes, etc.) must be constructed as to prevent the settlement of birds and bats;
- the disposal of agricultural and all other forms of organic waste in the area of the wind farm is prohibited;
- the wind farm should be equipped/organized so as to ensure continuous monitoring of the migration of birds and bats over the territory it occupies;
- the construction of buildings, the execution of works, or the carrying out of the technological process, can be carried out provided that no permanent damage, pollution or other degradation of the environment is caused;
- during the execution of construction works, in order to protect the health and life of people, all occupational safety measures prescribed for the intended type of work must be carried out;
- organize the site in such a way as to prevent any penetration of harmful substances into water, air and soil;
- for the needs of the personnel involved in the construction it is necessary to provide portable chemical toilets and their regular maintenance and discharge by an authorized legal entity;
- настали грађевински, комунални и остали отпад мора се отпремити са локације на за то предвиђену локацију у складу са важећим прописима, што треба дефинисати у Пројекту за извођење; the generated construction, municipal and other waste must be dispatched from the location to the designated location in accordance with the applicable regulations, which should be defined in the Detailed design;
- the movement of mechanization and vehicles during construction should be limited to the design areas of roads and access roads;
- from all surfaces where oily or other liquids that can be pollutants may occur, provide a closed collecting and discharging system;

- all surfaces damaged during the execution of the works must be repaired after the works have been completed;
- in the event of damage and spill of motor oil and fuel, the damages must be repaired and the polluted land evacuated and deposited under the conditions of the competent utility service;
- removed humus or soil of similar characteristics (if any) should be separately deposited, protected from the pollution and after the completion of the works use it for the purpose of horticultural arrangement of devastated surfaces;
- for workers involved in construction for sanitary purposes and for the storage of parts and equipment, organize mobile container facilities that should be removed from the site after the works have been completed;
- during the realization of the project achieve noise protection by good site organization and using machinery that does not create great noise;
- the construction of facilities shall be carried out in accordance with the applicable technical norms for construction, with the application of technologies that meet the prescribed environmental standards;
- in the event that in the course of earthworks, a natural good that is geologically-palaeontological or mineralogical-petrographic origin is found, which is presumed to have the status of a natural monument in accordance with Article 99 of the Law on Nature Protection (Official Gazette of the RS No. 36/09, 88/10 and 91/10), the contractor is obliged to inform the Ministry of Environmental Protection within eight days and take all measures so that the natural good could not be damaged until the arrival of the authorized person;
- in the event that in the course of earthworks the archaeological site or material remains of culture is found, the contractor is obliged to immediately suspend it and notify the competent institution for the protection of cultural monuments, and to ensure that, by the arrival of the expert team, the damage or destruction of the findings in accordance with Article 109 paragraph 1 of the Law on Cultural Property (Official Gazette of the RS, No. 71/94, 52/2011 - other laws and 99/2011 – the second law);
- the foundation of the wind turbine must be carried out in accordance with the requirements of the manufacturer of the equipment, and special attention should be paid to the joint of the bearing pillar and foundation;
- collecting surface water flow from the surfaces on which the works are carried out through temporarily constructed drainage channels and precipitates in order to prevent direct entry into the natural recipient (soil), especially during the precipitation period;
- atmospheric wastewater generated by flowing from the manipulative surfaces of the site may potentially contain suspended matter and petroleum products. Provide the controlled acceptance of potentially contaminated atmospheric waters and their treatment in a precipitates or a separator of fats and oils to ensure that the quality of purified water meets the criteria prescribed for discharge into a particular recipient and removal by an authorized person;
- blades of the wind turbine should be marked for observation by day, alternating with red and white colours, so that the field at the top of the blade is red. In total, there should be two red fields. The height of the field must be 6 meters (Rules on airports "Official Gazette of RS", number 23/12);
- mark the pillar of the carriers of each wind generator as an obstacle for flying, for spotting at night and in conditions of reduced visibility by placing a flash lamp with white light, medium intensity "type A", for marking obstacles in air traffic at the top of the pillar (Airport Rules "Official Gazette of RS", No. 23/12 and 60/12).

- the holder of the right to dispose of the facility is obliged to submit a technical report on the determination of the coordinates in the WGS-84 coordinate system, as well as the absolute and immediately after the construction of the facility, to the Directorate of Civil Aviation of the Republic of Serbia and the Air Traffic Control Agency of Serbia and Montenegro, the relative height of the objects, for the purpose of publishing them in an integrated airborne informational package;
- windgenerators must be equipped with devices for protection against lightning strikes (lightning rods);
- take measures that will prevent the creation of ice on the blades of the wind turbine in the period when its it is possible;
- construct the facilities in accordance with the Law on Fire Protection (Official Gazette of RS, No. 111/09) and other related legal and sub-legal acts in accordance with the conditions of the Ministry of Internal Affairs - Emergency Situations Sector;
- provide an access route for fire-fighting vehicles in accordance with the provisions of the Rules on technical standards for access roads;
- the implementation project foresee the way of constructing and using a TDP that will not adversely affect the quality of water, the coastal plant and animal world and the emergence of erosive processes by Detailed design;
- the implementation project foresee the way of constructing and using of the docking bay that will not adversely affect the quality of water, the costal and water plant and animal world and the emergence of erosive processes by Detailed design;
- the transshipment of the equipment at the TDP shall not be carried out between the half of March to the end of June and from the beginning of October to the end of November, during the migration and nesting cycle of birds;
- at the sites of temporary disturbance of vegetation, the eradication of trees and shrubs is not permitted, in order to prevent soil erosion and allow faster spontaneous renewal of vegetation;
- during the construction phase, monitor the implementation of the defined protection measures for this phase of project implementation;
- all facilities must be built in accordance with the applicable legal and by-law acts regulating the specific area.

8.2. Protection of substation complex measures

- by technical solution, prevent the release of transformer oil into water and soil. The collecting pit, pipelines, collecting channels must be waterproof and protected from the hazard spillage and penetration into the underground aquifers;
- use a special system of oil pits, separators and absorbent wells of atmospheric waters. The system must be closed and oil from the separator should be transported to the tanks for further processing;
- transformers to be installed outdoors and provide reinforced concrete foundations, separated from other buildings. Directly between concrete (base walls) and its sides to build concrete tanks for receiving any oil;
- any oil spilled must be collected in the lowest part where there is a manhole from which, through the oil sewer pipe (which must be resistant to high temperature), it is taken to the oil pit;
- the oil pit should be constructed so that it ensures the separation of oil from water and the removal of clean water into an absorbent well;

- the oil pit must be waterproof and have sufficient capacity to receive the total amount of oil from the transformer, including the total amount of atmospheric water and firefighting water entering the oil pit through the transformer tank;
- dispose of the concentrative material for transformer oil in accordance with the regulations, entrust to the company with accreditation for the manipulation, transport and permanent disposal of hazardous waste;
- the grounding system of the medium voltage plant, as a lightning protection system, should in all cases be aligned with the grounding system and the lightning protection system of the connection distribution system;
- fire wall is realized between two transformers (transformers tanks), from reinforced concrete in the width of the tanks, ie the foundation of the transformer and height according to the foreseen size;
- build a sanitary facility and a waterproof septic tank at the substation facility, which will be discharged by the competent public utility company;
- in the zone of the substation, near the collecting pit, envisage the production of an appropriate number of piezometers for monitoring the level and quality of groundwater, according to the hydrogeological characteristics of the soil.

8.3. Measures during the operation

- regularly maintain all equipment and devices, especially mechanical parts of the turbine (lubrication, cleaning, etc.). In the event of regular maintenance of the plant and possible installations of new equipment and devices, care must be taken not to come of disposal of waste oils and lubricants on the ground, and if this occurs, immediately repair the damage;
- in case of any failure that can significantly increase the noise level, it is necessary to limit or discontinue operation and to repair the damage;
- limit or interrupt the operation of the wind generator in the period of strong winds in accordance with the technical characteristics prescribed by the manufacturer of the equipment;
- when installing new equipment, one of the essential parameters should be the acquisition of noise data, as well as the purchase of small-scale equipment in accordance with the requirements of the EU Directive of reducing the emitted sound power (Directive 2000/14 / EU on the noise emission of equipment used in the open air area). Upon commissioning, measurements should be made of the influence of noise arising in the area as a result of the operation of new equipment;
- equip the wind farm with equipment for monitoring birds and bats; provided equipment should be according to Rule book for special technical solutions providing secure and uninterrupted communication of wild life (Republic of Serbia Official Gazette No. 72/10 from October 2010);
- the obligation of the investor is the implementation of post-structural monitoring of the situation and possible endangerment of ornithofauna and hiropterofoana with appropriate equipment whose technical characteristics and precision of the measurement would be determined in accordance with the first observations immediately after the construction and at the very beginning of the exploitation phase and which will be immediately installed;
- the results of post-construction monitoring must be submitted on an annual basis to the Institute for Nature Protection of Serbia. The report should contain photographs of

- possibly dead birds, the exact location and time of finding, the distance from the wind turbine and weather conditions;
- depending on the results of post-structural monitoring, if necessary, and in cooperation with the Institute for Nature Conservation of Serbia, plan compensatory measures:
 - the establishment of new or revitalization of existing sites where species that may be damaged are living,
 - measures of active protection of species, such as setting up nesting platforms and money compensations;
 - if it is noticed that birds in large numbers and regularly are gathering in certain locations in the vicinity of wind turbines, or that they are attracted to certain objects (different pillars, trees, wild dumps, etc.), it is necessary, with prior consultations with the Institute for Nature Conservation, to remove objects from the location of the wind farm or apply technical and organizational measures to prevent the retention and gathering of birds;
 - possible dead animals, primarily mammals and birds, is necessary to regularly remove from the location of the wind farm;
 - it is necessary to periodically measure the noise intensity at the location and near the closest residential buildings;

8.4. Waste management measures

- provide the necessary space, the necessary conditions and equipment for collection, classification and temporary storage of waste materials in accordance with the Law on Waste Management ("Official Gazette of RS", No. 36/2009, 88/2010) and other regulations regulating the treatment with different types of waste;
- collect hazardous waste (waste oil), store it safely in closed containers in a specially designated place in accordance with the Regulations on the manner of storage, packaging and labeling of hazardous waste (Official Gazette of RS, No. 92/2010). Collected waste oil is handed over to the authorized organization with which the contract is concluded and which has a valid permit for hazardous waste management (storage, treatment, disposal);
- collected solid waste (secondary raw materials) is classified and disposed of in separate containers. The secondary raw material is handed over to the authorized organization with which the contract is concluded and which has a valid permit (storage, treatment, disposal);
- it is not allowed to dispose of waste materials on the uncovered and non-concreted space in the wind farm;
- the landfill of the land surplus that occurs during the execution of construction works shall be provided from the washing and dismantling and, at the latest after the completion of the works, evacuate from the site and deposited in the place and under the conditions of the competent utility service;
- all specified waste management measures should be precisely defined in the Detailed design.

8.5. Accident protection measures

- before the start of the operation of the wind farm, develop an Action Plan in the accident situations that should contain (1) the scheme of the response to the accident,

- (2) the training program, (3) the control program, (4) other instructions and notices. This Plan will determine which activities are to be undertaken in cases of accidents, which external institutions are notified and how the consequences are corrected;
- force for the implementation of the Plan should include (1) workers in charge of managing the operation of the wind farm at the moment of the accident, (2) other workers who are not in the shift, (3) the competent fire department;
 - regularly conduct adequate training of employees that should include and identify disruptions in the operation of wind turbines (unusual sounds from pillars, gondolas or blades) and how to act in such cases;
 - during periods of strong wind (usually for wind speeds greater than 25 m/s) wind turbines are automatically stopped and maintained in braked state (due to possible damage to equipment and devices);
 - establish a comprehensive program of preventive maintenance and monitoring of key parts of the wind turbine to reduce the risk of the occurrence of failures and potential accidents;
 - regularly maintain electrical components and rotating parts in the gondola and thus reduce the risk of temperature rise or spasms (and fires) in the gondola;
 - in exceptional cases that can occur (fracture of the blade, fall of the wind turbine) completely remove the generated waste and safely dispose of it. Perform rehabilitation of damaged land and compensation for (eventual) damage done;
 - install an automatic fire detection system that will ensure the shutdown of the electricity transmission system as soon as possible;
 - the fire scenario on wind generators is a general-type risk and is subject to separate fire protection analyzes by authorized institutions. The fire protection report is a separate part of the project documentation and determines the method of response in case of fire and appropriate protection measures;
 - the zone immediately around the wind generator must be a zone where smoking is prohibited and accordingly marked;
 - in the case of spillage of dangerous substance, collect the used sorbent and deposit according to the Rulebook on the manner of storage, packaging and labeling of hazardous waste (Official Gazette of RS, number 92/2010);
 - in case of degradation of soil and water, it is necessary to make remediation or otherwise rehabilitate the degraded environment in accordance with the rehabilitation and remediation project.

8.6. Measures for preventing and mitigating the impact during the closure of the wind farm

The planned life cycle of the wind farm is about 25 years. After this period, the turbine could be replaced or the closure and removal of the plant. Protective measures during the period of closing and removal of the wind farm contain the same or similar requirements as protection measures during the performance of works and the installation of wind turbines. In that sense, the measures mentioned in the case of construction concerning the protection from noise, traffic management, protection of habitats, flora and fauna, protection of land and groundwater, protection against air pollution, can also be applied in case of closing and removal of the wind farm.

Before the removal of the plant begins, it will be necessary to make a General project for closing and removing of the facilities that will include a detailed plan for the rehabilitation of

the area of former wind farm. As part of the general project, it will be necessary to formally establish a list of protective measures and requirements that need to be met, based on possible specific conditions that may arise at that time. The mentioned project will need to be harmonized with the Conditions of the competent institutions. The project with a recovery plan should be accepted by the competent environmental authority as well as all other stakeholders (including the financial institutions that participate in the project financing).

It is necessary to implement several general measures (principles) of protection which are necessary to be applied in the phase of termination of the project, which are:

- before removing the wind farm and clearing the site, re-execute an ecological location analysis to determine whether special measures and activities are required, depending on the identified species and their habitats;
- during the works, form the central warehouse, by surface and structure, as well as the warehouse during the execution of the works;
- production units and objects are to be removed and shipped from the location. All materials and parts of equipment suitable for reuse are recycled and renewed;
- degrade the concrete foundation to a depth of 1 meter. All waste material should be removed from the site and disposed of in accordance with the regulations governing the treatment of waste;
- rehabilitate the land and restore it to the state as before the existence of a wind farm;
- after the installation is terminated, the production units will be removed and shipped from the site, and all materials and parts of the equipment suitable for reuse will be recycled and renewed.

It is forbidden to:

- discharge or spill the waste oils into or onto land, surface and groundwater and sewage;
- disposal of waste oils and uncontrolled release of residues from the processing of waste oils;
- any kind of waste oil treatment that pollutes the air in concentrations above the prescribed limit values;
- discharge of purified oily wastewater into an absorbent well, and discharging the transformer oil into atmospheric or any other sewerage, into groundwater, as well as on surrounding land.

The producer of waste oil, depending on the quantity of waste oil it produces annually, is obliged to provide a receiving place until delivering for the treatment to the person for whom the permit is issued. Owners of waste oils other than waste oil producers are obliged to hand over waste oil to the person who collects and treats it. The person who collects, stores and treats waste oils must have permission for keeping and keep records of waste oils and the amount that has been collected, stored or treated, and the final disposal of residues after treatment.

9. ENVIRONMENTAL IMPACT MONITORING PROGRAM

In order to realize the defined protection measures, it is necessary to control the implementation of planned, urban and project solutions in all phases of project realization (in the construction phase, exploitation and after the completion of exploitation). Controls should be conducted by relevant institutions for each individual project area.

According to the Law on Environmental Protection, the level of noise in the environment is controlled by the systematic noise measurement provided by the municipality. Noise measurements are performed by authorized professional organizations in accordance with the Law on Environmental Noise Protection (Official Gazette of RS, No. 36/09 and 88/10) and the relevant by-laws.

During the construction period of the wind farm, and especially after the commissioning of the wind farm, it is necessary to actively monitor the state and impact of the facility and its work on the elements of bird and bats fauna in the period of at least one year. In that sense, it is necessary to provide a field works of the object concerned and the surrounding belt for the collection of data and possibly killed specimens of birds and bats. Monitoring must include recording of the number and determination of the types of dead or wounded birds and bats resulting from the operation of the wind farm. In this context, it is necessary to observe in particular the space within a radius of 100 meters from each individual wind generator every 7 days (in the period from February 1 to May 1 and from August 1 to December 1), that is, every 14 days in other periods of the year. Monitoring must be carried out by a professional nature protection institution, and if necessary, other competent institutions may also be included in the monitoring report submitted to the Institute for Nature Conservation of Serbia.

In the event that in the course of the monitoring, injured specimens are found of species that are protected as natural rarities according to the Rulebook on the designation and protection of strictly protected and protected wild species of plants, animals and fungi (Official Gazette RS, No. 5/10 and 47/11), the investor must finance their transport and disposal at the appropriate Wildlife Refuge.

The further procedure would consist of the identification of these specimens, dissection and natural processing, and their preservation and storage in terms of evidence, but also for other professional and scientific purposes. For these purposes, the support and assistance of the Institute for Nature Protection of Serbia and the Natural History Museum in Belgrade could be provided, which are competent for their work with their capacities and expertise, as well as legal provisions.

In the event that the monitoring establishes possible facts about the impact of the facility and its functioning on the investigated natural values, it would be the duty and obligation of the monitoring entities to inform the initiators and project implementers, as well as the competent institutions about the situation. In that sense, timely measures would be taken to eliminate and prevent possible widespread consequences.

10. CONCLUSION

The Ministry of Agriculture and Environmental Protection of the Republic of Serbia, within its competencies and in accordance with the provisions of the Law on Environmental Impact Assessment (Official Gazette of the RS, No. 135/04 and 36/09), and upon the request of the project holder PE "Elektroprivreda Srbije", adopted a Decision determining the need for development and determining the scope and content of the Environmental impact assessment study of project of construction of wind farm on the locality of Kostolac (Decision No: 353-02-01621 / 2016-16, from 13.09 .2016).

For the needs of the Study, the project holder of the PE "EPS" conducted the public procurement procedure - JN/1000/0162/2016, after which the work was awarded to the company NETINVEST d.o.o. from Belgrade (Service Provider) and company EKO PLAN from Belgrade (member of the group), who gathered a multidisciplinary team for the development of the subject Study, which is usually a part of the documentation necessary in the process of obtaining approval for the construction and preparation of the remaining documentation.

Special attention in the preparation of the Study was devoted to the analysis of the state of the environment at the location where the construction of the Kostolac wind farm and its surroundings is planned. By the nature of the functioning, the wind farm can imply certain negative environmental impacts, both in the construction phase (temporary effects) and at the stage of its exploitation. The most dominant negative effects are possible in relation to the flying fauna, ie on ornithofauna and hiropterofauna. In this context, in the analysis of the situation, for the purpose of preventive protection of flying fauna, one-year monitoring of ornithofauna and hiroftofauna was done. On the basis of observations, the final spatial disposition of wind turbines was carried out, ie the displacement of certain pillars from the original locations, to locations where the possibility of endangering the flying fauna was minimized, and the results of performed observations were incorporated in the Study on Environmental Impact Assessment.

After analyzing the state of the environment and analyzing the technical documentation, a multi-criteria evaluation of the possible impacts of the planned Kostolac wind farm on environmental components was carried out using the "Leopold's matrix". For evaluation purposes, from a broader list of potential impact factors (threats) that can be expected for this kind of intervention in nature, 10 possible factors were identified as a result of project implementation activities. Impact factors were assessed separately for each component of the environment relevant to the scope of this Study, in relation to the magnitude of the impact, the importance of impact, the probability of impact, and the duration of the impact. Also, the physical, biological and socio-cultural characteristics of the environment at the site are separated, and within them a total of 16 components of the environment were defined.

Summarizing the impacts of the planned projects on the environment, it was found that they are acceptable and that they will be minimized using 89 taxatively stated protective measures defined in the Study and the appropriate environmental monitoring program at the site in question.

In summary, the realization of the planned project involves the use of renewable energy, using clean technology for its exploitation. In the concrete case, it can be concluded that negative impacts of limited intensity and spatial extent have been identified and that adequate protection measures for their prevention or minimization are foreseen.

By planing the micro-locations of individual wind turbines based on the results of annual observations of ornithofauna and hyropterofauna, the principle of preventive protection has been achieved and optimal wind turbine positions have been achieved, ie the maximum in terms of protection of flying fauna.

Having in mind:

- the characteristics of the planned project and the state of the environment at the site,
- results of one-year monitoring of ornithofauna and hiropterofauna
- results of multi-criteria evaluation of planned activities on the environment and
- defined environmental protection measures and environmental monitoring program,

it is concluded that the project of the Kostolac wind farm, in the wider context, will have certain positive impacts on the quality of the environment, and that the smaller identified possible negative impacts will not burden the capacity of the area, especially with the application of defined protection measures that will be implemented at all stages of the project (during the construction, exploitation and after the end of use of the wind farm). It can be concluded from the above reasons that it does not represent a significant environmental pollutant, that its implementation is in the function of realization of the basic principles of sustainable development and that it is in accordance with the national policy in the field of application of renewable energy sources and the appropriate legilization in the field of nature and environment protection. Bearing all in mind, we consider that the Project in question is fully acceptable from the point of view of possible environmental impacts.

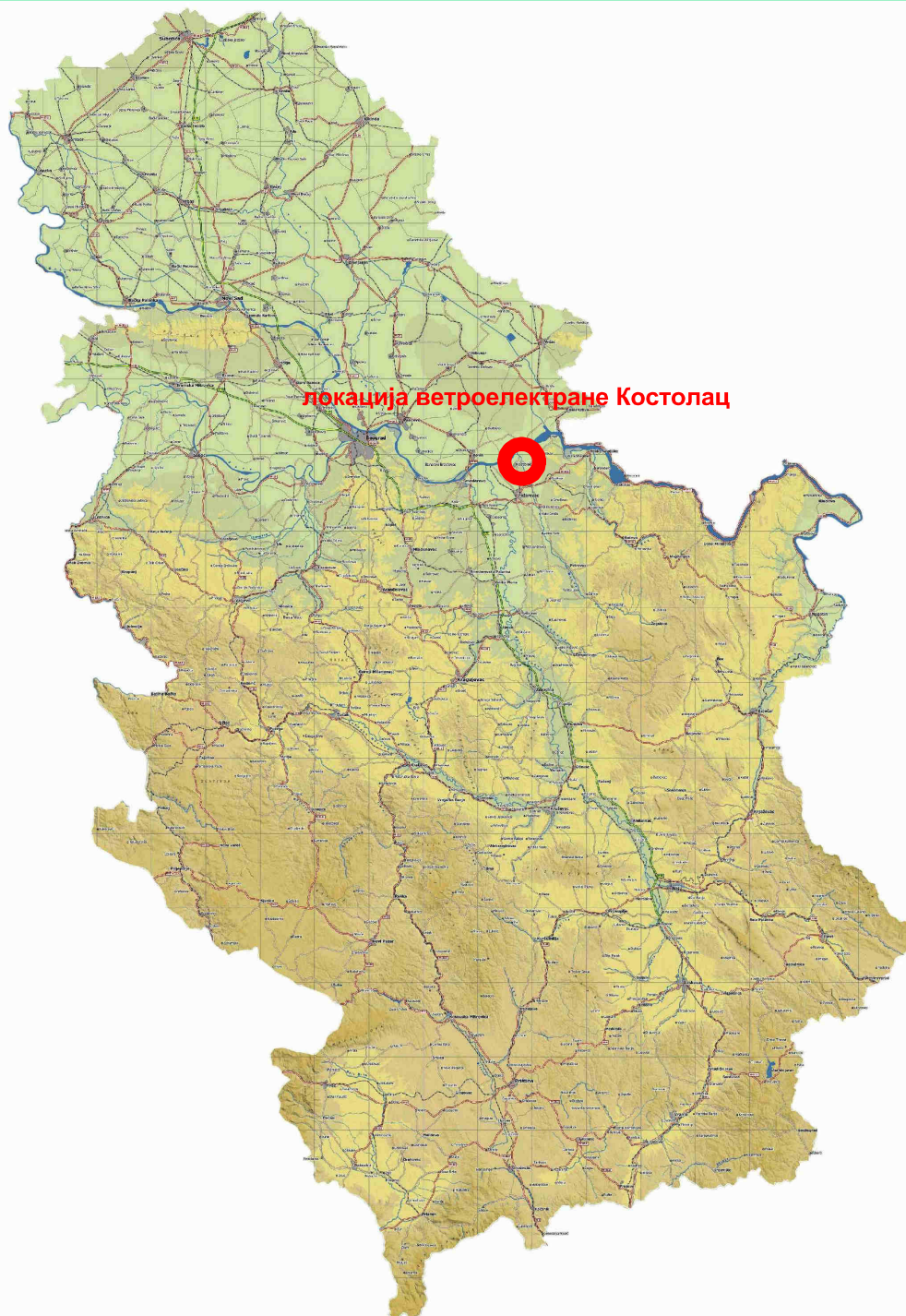
LEGAL REGULATIONS USED IN THE STUDY


- Law on Environmental Protection ("Official Gazette of RS", No. 135/04, 36/09 and 72/09 - 43/11 - Constitutional Court and 14/2016);
- Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09);
- Law on Nature Protection ("Official Gazette of the Republic of Serbia", No. 36/09 and 88/10 and corrections 91/10 and 14/2016);
- Law on Air Protection ("Official Gazette of RS", No. 36/09 and 10/13);
- Law on Protection against Noise in the Environment ("Official Gazette of RS", No. 36/09 and 88/10);
- Law on Waste Management ("Official Gazette of RS", No. 36/09, 88/10 and 14/16);
- Law on Fire Protection ("Official Gazette of RS", No. 111/09);
- Law on Cultural Heritage ("Official Gazette of the Republic of Serbia", number 71/1994);
- Law on Energy ("Official Gazette of the Republic of Serbia", No. 145/14);
- Law on waters ("Official Gazette of RS", No. 30/10, 93/12 and 101/16);
- Law on Protection against Non-Ionizing Radiation ("Official Gazette of RS", No. 36/09);
- Law on Planning and Construction ("Official Gazette of RS", No. 72/09, 81/09 - correction, 64/10-US, 24/11, 121/12, 42/13-US, 50/13-US, 98/13-US, 132/14 and 145/14);
- Energy Development Strategy of the Republic of Serbia until 2025 with projections until 2030 ("Official Gazette of RS", No. 101/15);
- Decree on placing under control of the use and trade of wild flora and fauna ("Official Gazette of RS", No. 31/05, 45/05 - correction, 22/07, 38/08, 9/10 and 69/11);
- Rulebook on the compensation price list for determining the amount of compensation for damage caused by unauthorized activities in relation to strictly protected and protected wild species ("Official Gazette of RS", No. 37/10);
- Rulebook on special technical and technological solutions that enable unhindered and safe communication of wild animals ("Official Gazette of RS" No. 72/10);
- Rulebook on the conditions to be met by shelters for the management of protected wild animals ("Official Gazette of RS" No. 76/10);
- Rulebook on compensatory measures ("Official Gazette of RS No. 20/2010");
- Decree on requirements for monitoring and requirements for air quality ("Official Gazette of RS" No. 11/10, 75/10 and 63/13)
- Regulation on Limit Values of Emissions of Pollutants in the Air ("Official Gazette of RS" No. 71/10)
- Regulation on Noise Indicators, Limit Values, Methods for Evaluating Indicators of Noise, Disturbance and Harmful Effects of Noise in the Environment ("Official Gazette of RS", No. 75/10);
- Rulebook on the methodology for determining acoustic zones ("Official Gazette of RS", No. 72/10);
- Rulebook on the manner of storage, packaging and labeling of hazardous waste ("Official Gazette of RS", No. 92/2010);
- Rulebook on the content of the study on the environmental impact assessment ("Official Gazette of the Republic of Serbia", No. 69/05);
- Decree on Classification of Facilities, Activities and Land in Fire Categories ("Official Gazette of RS", No. 76/10);

- Amendments to the Rulebook on Technical Norms for the Construction of Structures in Seismic Areas (Official Gazette of SFRY, No. 59/90);
- Rulebook on sources of non-ionizing radiation of special interest, types of sources, manner and period of their examination ("Official Gazette of the Republic of Serbia", No. 104/09);
- Rulebook on the limits of exposure to non-ionizing radiation ("Official Gazette of the Republic of Serbia", No. 104/09);
- Decree on determining the list of projects for which the impact assessment is mandatory and the List of projects for which an environmental impact assessment can be requested ("Official Gazette of the Republic of Serbia", No. 114/08);
- Rulebook on permitted quantities of hazardous and harmful substances in soil and methods for their examination ("Official Gazette of RS", No. 23/94);
- Law on the Confirmation of the Environmental Impact Assessment Concentration in a Transboundary Context, ("Official Gazette of the Republic of Serbia - International Agreements", No. 102/2007);
- Law on the Confirmation of the Kyoto Protocol to the United Nations Framework Convention on Climate Change ("Official Gazette of the Republic of Serbia", No. 88/2007 and 38/2009);
- Law on the Confirmation of the Convention on the Conservation of Migratory Species of Wild Animals, ("Official Gazette of the Republic of Serbia - International Agreements", No. 102/2007).

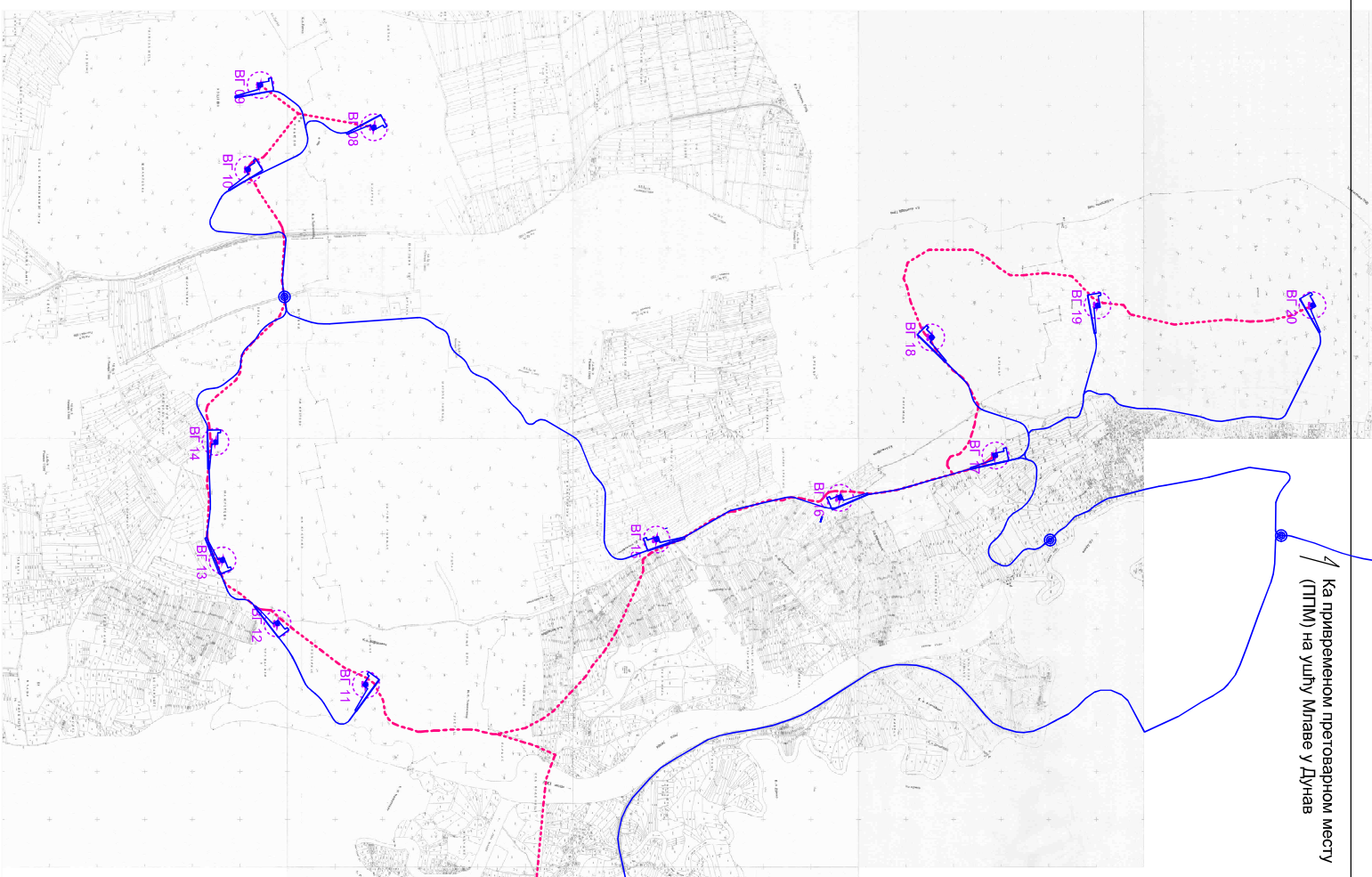
GRAPHICAL ANNEXES

(macro and microlocation)








| | | | |
|-----------------------|---|---------------|--|
| Назив предузетника: |  netinvest Нетинвест д.о.о., Трг Николе Пашића 1, Београд | | |
| Евиденциони број: | PR/EPS-PUZS/16 | | |
| Назив инвеститора: | ЈП "Електропривреда Србије", Царице Милице 2, Београд | | |
| Назив објекта: | Парк ветроелектрана инсталисане снаге 66MW | | |
| Ознака документације: | Студија процене утицаја на животну средину | | |
| Ознака дела пројекта: | Графичка документација | | |
| Назив цртежа: | Макролокација - локација ветроелектране | | |
| Размера: | 1:2500000 | | |
| Број цртежа: | 1 | | |
| Датум израде: | Август 2018. | | |
| Цртеж израдили: | Име и презиме: | Број лиценце: | |
| Одговорни пројектант: | Филип Каначки, д.и.а. - мастер | 200 1514 15 | |
| Пројектант сарадник: | Зоран Бутулија, д.и.е. | 351 N716 14 | |
| Пројектант сарадник: | Владислав Николић, д.и.г. | 310 G621 08 | |
| Пројектант сарадник: | | | |

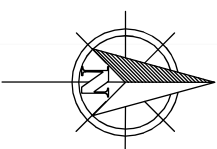
4 Ка привременом претворном месту (ПТМ) на ушћу Млаве у Дунав




ЛЕГЕНДА:

-  Ветроагрегати
-  Зона трафо-станице
-  Траса приступних путева и саобраћајница
-  Тачке прикључења на јавне саобраћајнице
-  Траса унутрашње кабловске мреже (УКМ) 35kV

СЕВЕР







| | | |
|-----------------------|--|---------------|
| Назив предузетника: |  Netinvest Нетинвест д.о.о., Трг Николе Пашића 1, Београд | |
| Евиденциони број: | PRERS-RUZSI/16 | |
| Назив инвеститора: | ЈП "Електропривреда Србије", Царске Млинице 2, Београд | |
| Назив објекта: | Парк ветроелектрана инсталсане снаге 66MW | |
| Ознака документације: | Студија процене утицаја на животну средину | |
| Ознака дела пројекта: | Графичка документација | |
| Назив цртежа: | Микролокација | |
| Размера: | 1:25.000 | |
| Број цртежа: | 2 | |
| Датум израде: | Август 2018. | |
| Цртеж израдили: | Име и презиме: | |
| Одговорни пројектант: | Филип Каначки, д.и.а. - мастер | Број лиценце: |
| Пројектант сарадник: | Зоран Бугулија, д.и.е. | 351 N7/6 14 |
| Пројектант сарадник: | Владислав Николић, д.и.г. | 310 G621 08 |
| Пројектант сарадник: | | |

ANNEX I

(Excerpt from one-year monitoring of ornithofauna and hiropteroфаuna - graphic attachments)

Прилог 2. Мапе прелета циљних врста птица

Легенда

| | |
|---|--|
|  | директан лет |
|  | лов |
|  | кружење |
|  | стајање/слетање |
| 1.14 | лет на висини испод 50 или изнад 200 m |
| 1.14 | критичан лет на висини од 50 до 200 m |

