ECOlogica URBO DOO
Крагујевац, Саве Ковачевића 3/1

PROJECT HOLDER:

IVICOM ENERGY DOO

Žagubica

UPDATED ENVIRONMENTAL IMPACT ASSESSMENT STUDY

OF THE PROJECT FOR CONSTRUCTION OF WIND FARM "KRIVAČA" ON THE TERRITORY OF THE MUNICIPALITY OF GOLUBAC (CM GOLUBAC, CM DVORIŠTE, CM KRIVAČA) AND KUČEVO (CM RAKOVA BARA, CM RADENK)

Kragujevac, August 2020.

Саве Ковачевића 3/1, 34000 Крагујевац, Тел: +381 (0) 34 337 199,
Факс: +381 (0) 34 337 237, www.ecourbo.com, e-mail:
office@ecourbo.com

UPDATED ENVIRONMENTAL IMPACT ASSESSMENT STUDY

OF THE PROJECT FOR CONSTRUCTION OF WIND FARM "KRIVAČA" ON THE TERRITORY OF THE MUNICIPALITY OF GOLUBAC (CM GOLUBAC, CM DVORIŠTE, CM KRIVAČA) AND KUČEVO (CM RAKOVA BARA, CM RADENK)

Case no: 225/20

STUDY PROCESSOR

ECOlogica URBO DOO, Kragujevac

Director:

Evica Rajić, Bachelor with Honours in Ecology

Kragujevac, August 2020.

PROJECT HOLDER	**IVICOM ENERGY DOO** **Žagubica** 2 Jug Bogdana Street by Authorization no. 78/2019 from 12.09.2019.	
STUDY PROCESSOR	**ECOlogica URBO DOO** Kragujevac 3/1 Save Kovačevića Street	
RESPONSIBLE PERSON	Evica Rajić, Bachelor with Honours in Ecology	
ELECTRONIC SIGNATURE		
WORK TEAM	Evica Rajić, Bachelor with Honours in Ecology	
	Svetlana Đoković, Bachelor with Honours in Ecology	
	Marin Rajić, Bachelor with Honours in Electrical Engineering, license no. 353 5027 03	
	Marija Babić, Master of science in Biology-ecologist	
	Sanja Andrejić, Master in Ecology	
	Zvezdana Novaković, Master in Technology	
	Nevena Janjović, Bachelor with Honours in Spatial Planning	
	Nevena Zubić, Master in Chemistry	
	Goca Damljanović, Technician-specialist	

IVICOM ENERGY d.o.o.
Ul. Jug Bogdana 2
12320 Žagubica / Srbija
Tel/Fax: +381 12 443 550

Žagubica, 12.09.2019 godine

Broj : 78/2019

ОВЛАШЋЕЊЕ

Овлашћује се **ECOlogica URBO DOO из Крагујевца**, ул. Саве Ковачевића бр. 3/1 (ПИБ: 104733275, матични број: 20222816) да у име и за потребе Носиоца Пројекта **IVICOM ENERGY DOO** из Жагубице, Ул. Југ Богданова 2, у поступку процене утицаја на животну средину, заступа Носиоца Пројекта, подноси Захтеве надлежном органу, израђује и предаје законом прописану документацију и прати поступак процене утицаја на животну средину.

Датум:
12.09.2019. године

IVICOM ENERGY DOO
Жагубица
Ул. Југ Богданова 2

Драгиша Тошић
директор

- *Consulting*
- *Engineering*
- *Project Management*

The content

In accordance with Article 19 of the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09), I enact

RESOLUTION

on the appointment of a multidisciplinary team for the preparation of an updated environmental impact assessment study of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka)

Team leader: Evica Rajić, B.Sc. in ecology

Team members: Svetlana Đoković,Bachelor with Honours in Ecology

Marin Rajić, Bachelor with Honours in Electrical Engineering

Marija Babić, Master of science in Biology-ecologist

Sanja Andrejić, Master in Ecology

Zvezdana Novaković, Master in Technology

Nevena Janjović, Bachelor with Honours in Spatial Planning

Nevena Zubić, Master in Chemistry хемичар

Goca Damljanović, Technician-specialist

They are obliged to comply with the regulations when preparing the Updated Study on Environmental Impact Assessment of the Project for construction of the wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka). technical norms, standards and rules of the profession, all in accordance with the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09), the Law on Environmental Protection ("Official Gazette of RS"), No. 135/04, 36/09, 36/09 (other law), 72/09 (other law), 43/11 (CC), 14/16, 76/18 and 95/18 (other Law)), the Rulebook on the content of the Study on Environmental Impact Assessment ("Official Gazette of RS", No. 69/05) and Decision no. 353-02-1989 / 2019-03 from 19.11.2019. Ministry of Environmental Protection, Belgrade, which determined the scope and content of the Updated Environmental Impact Assessment Study of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka).

ECOlogica URBO DOO

Director:

Kragujevac, November 2019. Evica Rajić

GENERAL DOCUMENTATION

Република Србија
Агенција за привредне регистре

Регистар привредних субјеката

БД 122381/2007
Дана, 17.09.2007 године
Београд

Агенција за привредне регистре, Регистратор који води Регистар привредних субјеката, на основу чл. 4. Закона о агенцији за привредне регистре (Службени гласник РС бр. 55/04), члана 23. и 25. Закона о регистрацији привредних субјеката (Службени гласник РС бр. 55/04, 61/05), решавајући по захтеву подносиоца регистрационе пријаве за регистрацију промене података привредног субјекта у Регистар привредних субјеката, који је поднет од стране:

Име и презиме: Евица Рајић
ЈМБГ: 2610958787413
Адреса: Димитрија Туцовића 8/3, Крагујевац, Крагујевац-град, Србија

доноси

РЕШЕЊЕ

Усваја се захтев подносиоца регистрационе пријаве, па се у Регистар привредних субјеката региструје промена података о привредном субјекту уписаном у Регистар привредних субјеката

PREDUZEĆE ZA PLANIRANJE, PROJEKTOVANJE I EKOLOGIJU ECOLOGICA URBO DOO KRAGUJEVAC, SRETE MLADENOVIĆA 2

са матичним бројем 20222816

И то следећих промена:

Промена седишта привредног друштва:

Брише се:
Адреса: Срете Младеновића 2, Крагујевац, Крагујевац-град, Србија
Уписује се:
Адреса: Саве Ковачевића 3/1, Крагујевац, Крагујевац-град, Србија

Промена пуног пословног имена:

Брише се:
PREDUZEĆE ZA PLANIRANJE, PROJEKTOVANJE I EKOLOGIJU ECOLOGICA URBO DOO KRAGUJEVAC, SRETE MLADENOVIĆA 2

Уписује се:
PREDUZEĆE ZA PLANIRANJE, PROJEKTOVANJE I EKOLOGIJU ECOLOGICA URBO DOO KRAGUJEVAC, SAVE KOVAČEVIĆA 3/1

Образложење

Подносилац регистрационе пријаве поднео је дана 12.09.2007 регистрациону пријаву за промену података о привредном субјекту уписаном у Регистар привредних субјеката као

PREDUZEĆE ZA PLANIRANJE, PROJEKTOVANJE I EKOLOGIJU ECOLOGICA URBO DOO KRAGUJEVAC, SRETE MLADENOVIĆA 2

Решавајући по захтеву подносиоца, обзиром да су испуњени законом предвиђени услови, решено је као у диспозитиву.

Висина накнаде за регистрацију у износу од 1.560,00 динара одређена је у складу са члановима 2., 3. и 4. Уредбе о висини накнаде за регистрацију и друге услуге које пружа Агенција за привредне регистре (Службени гласник РС број 109/05).

Поука о правном леку:
Против овог решења може се изјавити жалба
Министру надлежном за послове привреде РС,
у року од 8 дана од дана пријема решења,
а преко Агенције за привредне регистре.

РЕГИСТРАТОР

Младен Маглов

8000012055564

ИЗВОД О РЕГИСТРАЦИЈИ ПРИВРЕДНОГ СУБЈЕКТА

Република Србија
Агенција за привредне регистре

Пословно име привредног субјекта

Назив	ECOLOGICA URBO	Седиште	место: Крагујевац, Крагујевац-град
			улица и број: Саве Ковачевића 3/1
Правна форма	Друштво са ограниченом одговорношћу		
Бр.рег.улошка			
Трговински суд			
Матични број	20222816		
ПИБ	104733275		
Бројеви рачуна у банкама			

Пуно пословно име	PREDUZEĆE ZA PLANIRANJE, PROJEKTOVANJE I EKOLOGIJU ECOLOGICA URBO DOO KRAGUJEVAC, SAVE KOVAČEVIĆA 3/1
Скраћени назив	ECOLOGICA URBO DOO KRAGUJEVAC

Претежна делатност

7111	Архитектонска делатност

Датум оснивања: 9. новембар 2006

Време трајања привредног субјекта: Неограничено

Подаци о капиталу

Новчани

износ	датум
Уписани 500,00 EUR	
Уплаћени 250,00 EUR	9. новембар 2006

Регистрован за спољнотрговински промет: да

Регистрован за услуге у спољнотрговинском промету: да

Дана 27.04.2011. године у 10:46:59 часова

ПОДАЦИ О ОСНИВАЧИМА - ЧЛАНОВИМА ДРУШТВА

Подаци о оснивачу

Име и презиме	Евица Рајић	Адреса	место и држава: Крагујевац, Крагујевац-град, Србија улица и број: Димитрија Туцовића 8/3
ЈМБГ	2610958787413		

Подаци о капиталу

Новчани

износ	датум
Уписани 500,00 EUR	
износ	датум
Уплаћени 250,00 EUR	9. новембар 2006

	износ(%)
Сувласништво удела од	**100,00**

СКРАЋЕНО И/ИЛИ ПОСЛОВНО ИМЕ НА СТРАНОМ ЈЕЗИКУ

Скраћено пословно име привредног субјекта:

Назив	ECOLOGICA URBO DOO KRAGUJEVAC	место: Крагујевац
Облик	Друштво са ограниченом одговорношћу	

ПОДАЦИ О ЗАСТУПНИЦИМА

Заступник

Име и презиме	Евица Рајић	Адреса	место и држава: Крагујевац, Крагујевац-град, Србија улица и број: Димитрија Туцовића 8/3
ЈМБГ	2610958787413		

Функција у привредном субјекту: Директор

Овлашћења у промету:
- Овлашћења у унутрашњем промету неограничена
- Овлашћења у спољнотрговинском промету неограничена

Регистратор, Миладин Маглов

Дана 27.04.2011. године у 10:46:59 часова

ИНЖЕЊЕРСКА КОМОРА СРБИЈЕ

ЛИЦЕНЦА

ОДГОВОРНОГ ПРОЈЕКТАНТА

На основу Закона о планирању и изградњи и
Статута Инжењерске коморе Србије

УПРАВНИ ОДБОР ИНЖЕЊЕРСКЕ КОМОРЕ СРБИЈЕ
утврђује да је

Марин М. Рајић

дипломирани инжењер електротехнике

ЈМБ 1206957782419

одговорни пројектант

телекомуникационих мрежа и система

Број лиценце
353 5027 03

ИНЖЕЊЕРСКА КОМОРА СРБИЈЕ
Марин М. Рајић
дипл. инж. ел.
353 5027 03
ОДГОВОРНИ ПРОЈЕКТАНТ

У Београду,
27. новембра 2003. године

ПРЕДСЕДНИК КОМОРЕ
Милош Лазовић

Проф. др Милош Лазовић
дипл. грађ. инж.

Број: 02-12/386392
Београд, 22.07.2020. године

На основу члана 14. Статута Инжењерске коморе Србије
("СГ РС", бр. 36/19) а на лични захтев члана Коморе,
Инжењерска комора Србије издаје

П О Т В Р Д У

Којом се потврђује да је Марин М. Рајић, дипл. инж. ел.
лиценца број

353 5027 03

за

одговорног пројектанта телекомуникационих мрежа и система

на дан издавања ове потврде члан Инжењерске коморе Србије, да је измирио обавезу плаћања чланарине Комори закључно са 27.11.2020. године,
као и да му није изречена мера пред Судом части Инжењерске коморе Србије.

Председница Инжењерске коморе Србије

Марица Мијајловић, дипл. инж. арх.

TEXTUAL PART

A: Introductory remarks

At the request of the Project Holder, IVICOM ENERGY DOO from Žagubica, 2 Jug Bogdana Street, the procedure of environmental impact assessment was initiated, ie the preparation of the Updated Study on Environmental Impact Assessment of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka), and was entrusted to the company ECOlogica URBO DOO Kragujevac, 3/1 Save Kovačevića Street.

For the Project Holder, IVICOM ENERGY DOO from Žagubica, Str. Jug Bogdana 2, in 2015, the Environmental Impact Assessment Study of the Project for construction of the wind power plant "Krivača" in the municipalities of Golubac (KO Golubac, KO Dvorište, KO Krivača) and Kučevo (KO Rakova Bara, KO Radenka) was conducted. obtained consent (Decision No. 353-02-393 / 2015-16 of 29 May 2015, Ministry of Agriculture and Environmental Protection, Belgrade). The study was made on the basis of the Plan for detailed regulation of the area of the wind power plant "Krivača" in the municipalities of Golubac, Kučevo and Veliko Gradište, which defined the exact positions of 38 wind turbines.

For the needs of the construction of the wind farm "Krivača", which then consisted of a complex of 38 wind turbines:

- Location conditions were issued, no. 350-01-00098 / 2015 dated 4 February 2015, Ministry of Construction, Transport and Infrastructure;
- Notification was performed in accordance with the ESPOO Convention, No. 353-02-672 / 2013-05 of 1 July 2013;
- Consent to the Study on Environmental Impact Assessment of the project for the construction of the wind farm "Krivača", Decision no. 353-02-393 / 2015-16 dated 29 May 2015, Ministry of Agriculture and Environmental Protection was obtained;
- Decision on the construction permit for the construction of 31 wind turbines in the area of the wind farm "Krivača", no. 351-03-01919 / 2015-07 dated 24 November 2015, the territories of the municipalities of Golubac and Kučevo was issued;
  Application for works for the construction of wind turbines was made, according to the issued Decision on the construction permit, approved by the Ministry of Construction, Transport and Infrastructure, document no. 351-06-02986 / 2017-07 from 12/12/2017.

As the Project Holder, IVICOM ENERGY DOO from Žagubica, also the decision-maker on financing the Krivača Wind Farm Project, decided to change the equipment supplier, it initiated the procedure of **the first amendment to the basic planning document, the Detailed Regulation Plan for Krivača on the territory of the municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 6/13) and the Plan for detailed regulation of the wind farm "Krivača", section on the territory of the Municipality of Kučevo, "Official Gazette of the Municipality of Kučevo", No. 6/13).**

Analysis of construction rules from the current planning document (Decision on the adoption of the Plan for detailed regulation of the wind farm "Krivača" (section in the municipality of Golubac), "Official Gazette of the Municipality of Golubac", No. 6/13), Decision on the adoption of the Plan for detailed regulation of the wind farm Krivača "(section on the territory of the Municipality of Kučevo)," Official Gazette of the Municipality of Kučevo ", no. 6/13), and Location Conditions, no. 350-01-00098 / 2015-14 from 04.02.2015, the Ministry of Construction, Transport and Infrastructure), it was concluded that it is necessary to make minor corrections in terms of rules for the formation of construction plots of wind turbines (so that the foundation plots are a maximum of 25x25 m), as well as minor corrections in terms of building rules for wind turbines, with the conclusion to initiate initiatives and make decisions on the development of the first amendments to the current detailed regulation plans, with the application of a shortened procedure, pursuant to Art. 51b. Law on Planning and Construction "Official Gazette of RS", No. 72/09, 81/09, 64/10-Decision CC and 24/11 and 121/12, 42/13-Decision CC, 50/13-Decision CC, 98 / 13- decision CC, 132/14, 145/14, 83/18, 31/19 and 37/19 (other law)) and using the existing analytical and documentary basis of the valid planning document, bearing in

mind that they are already appropriate permits issued (Location conditions, Decision on construction permit, Application for works).

Based on the recommendations of the Ministry of Construction, Transport and Infrastructure, local self-government, the municipality of Golubac and the municipality of Kučevo, respecting the procedure prescribed by the Law on Planning and Construction, made the following decisions at their sessions:

- **Decision on drafting the First Amendment to the Plan for detailed regulation of the area of the wind farm "Krivača"** (in the municipality of Golubac) ("Official Gazette of the Municipality of Golubac", No. 8/2019), adopted by the Golubac, at a session held on 01.08.2019.
- **Decision on drafting the First Amendment to the Plan for detailed regulation of the area of the wind farm "Krivača**" (on the territory of the Municipality of Kučevo) ("Official Gazette of the Municipality of Kučevo", No. 10/2019), adopted by the Municipal Assembly of Golubac, at the session held on 31.07.2019.

According to Article 73 of the Rulebook on the content, manner and procedure of drafting spatial and urban planning documents, "Official Gazette of RS, no. 32/19, in the procedure of amending the planning document, the conditions of the holders of public authorizations for the part of the planning document that is being amended are being obtained. In case of changes to the above plans, the change of the planning document was done in the textual part of the plan, without changing the graphic attachments and planning solution, given that the reason for changing the plan was the need to change the rules for land parceling, ie rules for forming wind farm foundation plot. Accordingly, in accordance with the regulations on planning and construction, there is no need to obtain the conditions of holders of public authority, for this specific amendment to the plan. The local administrations of Golubac and Kučevo, through the Planning Commissions, considered this circumstance (on the need to obtain the conditions of the competent institutions) and made the decision that it is not necessary to address the competent institutions.

The bodies for environmental protection of the municipality of Golubac and the municipality of Kučevo, in the process of deciding on the development of a strategic assessment for changes to each plan individually, issued an opinion not to proceed with the preparation of the Strategic Impact Assessment aspects of the impact of changes to the planning document on the environment.

The Assembly of the Municipality of Golubac at the session held on October 15, 2019. adopted the First Amendment to the Plan for Detailed Regulation of the Wind Power Plant "Krivača" in the Municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 9/2019)

The Assembly of the Municipality of Kučevo at the session held on October 21, 2019. passed the Decision on the adoption of the First Amendment to the Plan for detailed regulation of the area of the wind farm "Krivača" in the municipality of Kučevo ("Official Gazette of the Municipality of Kučevo", No. 11/2019.)

In accordance with the above, after the adoption of amendments to each Detailed Regulation Plan, and for the purpose of amending the Building Permit for the construction of 31 wind turbines in the area of the wind farm "Krivača", no. 351-03-01919 / 2015-07 dated 24 November 2015, the territories of the municipalities of Golubac and Kučevo, a procedure was initiated to decide on the need to update the Impact Assessment Study.

With the advancement of technology in the field of wind energy, the Project Holder plans to install wind turbines with higher installed power (maximum possible power of individual wind turbines is 5.8 MW), higher column heights and larger blade diameters, compared to wind turbines originally designed and processed in Environmental Impact Assessment Study for which consent was obtained (Decision No. 353-02-393 / 2015-16 of 29 May 2015, Ministry of Agriculture and Environmental Protection).

The total installed capacity of the wind farm will not exceed 103.32 MW at the point of takeover of electricity by EMS, which is conditioned by the Energy Permit (Decision No. 312-01-00066 / 2015-04 of 17.06.2015, Ministry of Mining and energy).

As the total installed capacity of the wind farm "Krivača" of 103.32 MW would not be exceeded, it is planned to install a smaller number of wind turbines, or specifically 22 wind turbines, compared to the originally planned 38.

From the above, the Project Holder approaches the update of the Environmental Impact Assessment Study, which will include only the construction of 22 wind turbines with a total installed capacity of 103.32 MW at the point of takeover of electricity by EMS.

Conclusion: The subject of updating the Study on Environmental Impact Assessment of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka) is the construction of 22 wind turbines within wind farm ”On the territory of the municipality of Golubac and the municipality of Kučevo.

The environmental impact assessment procedure is defined by the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09), which implies a process consisting of several phases.

The impact assessment procedure for the Construction Project for the construction of the Krivača wind farm on the territory of the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka), in accordance with the Law, includes the following:

- The Project Holder submitted a Request for determining the scope and content for updating the Environmental Impact Assessment Study of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka). The request was announced on October 8, 2019. in the newspaper "Danas" and on public inspection was within the legal deadline of 15 days;
- in response to the submitted Request for determination of the scope and content for updating the Environmental Impact Assessment Study of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka) Decision no. 353-02-1989 / 2019-03 from 19.11.2019, the Ministry of Environmental Protection, which determined the scope and content of the Updated Study on Environmental Impact Assessment;
- in accordance with the obtained Decision, legislation and bylaws, an Updated Study on Environmental Impact Assessment of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvoriste, CM Krivača) and Kučevo, CM Rakova Bara, CM Radenka), which is submitted to the competent body of the relevant Ministry for further procedure.

In accordance with the Law on Environmental Impact Assessment ("Official Gazette of RS" no. 135/04 and 36/09), the Law on Environmental Protection ("Official Gazette of RS" No. 135/04, 36/09) other law), 72/09 (other law), 43/11 (CC), 14/16, 76/18 and 95/18 (other law) and the Aarhus Convention, all phases of environmental impact assessment are available and public, and the public is informed by informing through advertisements in public media, the website of the relevant Ministry, with access to the documentation submitted to the competent authority of the relevant Ministry, in accordance with the notice of public inspection, public presentation and public debate.

In accordance with the provisions of the Law on Planning and Construction ("Official Gazette of RS", No. 72/09, 81/09 (correction), 64/10 (CC), 24/11, 121/12, 42/13), 50/13 (CC), 98/13 (CC), 132/14, 145/14 and 83/18)), the environmental impact assessment procedure is carried out by the competent authority: the line ministry in charge of environmental protection, ie the updated

Environmental Impact Assessment Study is submitted to the competent authority of the relevant Ministry.

In accordance with the Law on Environmental Impact Assessment ("Official Gazette of RS" No. 135/04 and 36/09) and the Rulebook on the procedure of public insight, presentation and public debate on the study on environmental impact assessment ("Official Gazette of RS" No. 69/05), the impact assessment procedure includes:

- Public Advertising Updated Studies in the daily / local public media and the website of the relevant Ministry, which lasts 20 days.
- during the public review, the Study is available to the interested public, NGOs and individuals at all levels (international, national and local level);
- after the expiration of the period of public announcement, a public presentation of the Updated Study and a public hearing is held, where the date, time and place of the public presentation have already been defined by the Announcement;
- public presentation and public discussion of the Updated Environmental Impact Assessment Study may be attended by all interested parties, citizens, NGOs, interested public, may ask questions, give suggestions and comments, about which the competent authority keeps the Minutes;
- the team of processors of the Updated Study is obliged to present the Study in detail, to emphasize all important elements of importance for environmental protection, to answer questions in remarks;
- all objections are submitted in writing or recorded in the Minutes during the public presentation and public debate;
- the public presentation and discussion of the Updated Study requires the presence of a representative of the Project Proponent (Investor) who also participates in the discussion;
- upon completion of the public inspection, public presentation and discussion, the Updated Study is sent to the Technical Commission for evaluation;
- all remarks, suggestions and proposals, sent during the public inspection and from the public debate, are submitted to the members of the Technical Commission for evaluation of the Updated Study;
- the competent body of the relevant Ministry may submit the Updated Study also for the opinion of the institutions from which the conditions were obtained;
- The Technical Commission for the evaluation of the Updated Study submits the Report on the performed expert control of the Study;
- The processor of the Study is obliged to act according to the Report of the Technical Commission for the evaluation of the Updated Study, accept the remarks and suggestions or reject them with an explanation.

The competent body of the relevant Ministry, after the completion of the impact assessment procedure, issues a Decision on consent to the Study on Environmental Impact Assessment.

A1: The aim of the Study on Environmental Impact Assessment

The updated Environmental Impact Assessment Study is conducted in accordance with the provisions of the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09), the Law on Environmental Protection (Official Gazette RS ", No. 135/04, 36/09, 36/09 (other law), 72/09 (other law), 43/11 (CC), 14/16, 76/18 and 95/18 other law)), Rulebook on the content of the Study on Environmental Impact Assessment ("Official Gazette of RS", No. 69/05) and Decision no. 353-02-1989 / 2019-03 from 19.11.2019, in the process of obtaining consent from the competent authority of the relevant Ministry.

The aim of the Updated Environmental Impact Assessment Study is to assess the potential and significant impacts of the planned Project in accordance with the provisions of the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09) assess the potential and significant impacts of the planned Project on environmental factors, ie on the environment and social environment, define and determine measures and conditions for prevention, reduction and elimination of significant and harmful impacts and determine the monitoring regime for environmental impacts (environmental monitoring).

The modern approach to preservation and protection of the environment is based on the concept of sustainable development, ie the acceptability of projects - facilities and activities that ensure development with long-term use and preservation of natural resources, natural values and environmental capacity. The characteristic of the strategy of integrated approach to environmental protection is not partial analysis of the impact of facilities or activities on one segment of the environment, but assessment of all aspects of interaction (direct, indirect, short-term, long-term, cumulative, synergetic, local, wider spatial) on the basis of which the valorization of planned facilities and activities in a specific area is performed.

The Project Proponent wants to show that he is committed to working in accordance with national legislation, but also the best practice in the field of environmental protection, in accordance with international standards and EU Directives. Based on the above, it can be concluded that the goal of assessing the impact of the planned Project - construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka), on the environment and drafting the study presents:

- analysis and assessment of the existing situation in space and environment of the defined and determined area (determined location of the Project), based on existing spatial data, all relevant research and observations in the field, spatial planning, urban and project documentation, opinions and conditions of public authorities,
- analysis of the characteristics of the Project relevant to the impacts in space and environment and assessment of potential and significant impacts of the planned Project on the spatial situation, primarily on ornithofauna and chiroptetofauna and the environment in the Project area, immediate and wider environment,
- defining all significant impacts in space and environment, for which measures for protection and monitoring of the environment are planned, designed and implemented in order to make the Project environmentally sustainable and acceptable.

A2: Methodology for preparing the Environmental Impact Assessment Study

The basic methodological approach and content of the Study are defined by the Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09) and the Rulebook on the content of the Study on Environmental Impact Assessment ("Official Gazette" RS ", No. 69/05).

To assess the impact on the environment, the methods given in the recommendations and guidelines of the World Health Organization (WNO), the European Foundation for Chemical Engineering (EFCE), the US Environmental Protection Agency (EPA-USA) and the International Labor Organization (ILO) the following were used:

- *The Risk Assessment Guidelines, EPA Washington DC, 1986;*
- *Hazard Analysis Methods, Technical Manual for Accident Management, Washington, USA-EPA, 1989;*
- *Major Hazard Control, WHO, Geneve, 1990;*
- *Hazard Analysis Methods, Technical Guidelines for Hazard Control, International Labor Organization (ILO), Geneva,1990;*
- *Environmental Impact Assessment of Urban Development Project, Guidelines and Recommendation, WHO, 1995;*
- *Environmental Impact Assessment, McGraw-Hill International edition, Singapore, 1996.;*

- *Environmental, Health, and Safety (EHS) Guidelines, International Finance Corporation (IFC), 2007;*
- *Directive 2001/77 / EC on the promotion of electricity produced from renewable energy sources;*
  Guidelines for Environmental Impact Assessment of Wind farms, UNDP, Ministry of Environment and Physical Planning of the Republic of Serbia.

Also, the methods given in the Instruction for Environmental Impact Assessment of the wind farms developed within the Project - Capacity Building in the Western Balkans in solving environmental problems through remediation of priority sites in cooperation with the Ministry of Environment and Spatial Planning and the Program for the Development of the United Nations in Serbia.

A3: Contents of the Updated Environmental Impact Assessment Study

Based on a comprehensive analysis, assessment of possible and expected impacts, conditions of holders of public authority and institutions, prevention measures and measures to be implemented in order to minimize negative impacts, ie achieve standards and requirements prescribed by the legislation of the Republic of Serbia. The subject document, ie the Updated Impact Assessment Study, consists of the following chapters:

- Chapter A - presents Introductory remarks and acquaintance with the document and the objectives of its preparation, legal follow-up and procedures that have been implemented;
- Chapter 1.0. - presents data on the Project Holder and acquaintance with the used legal regulations, planning and technical documentation and available literature;
- Chapter 2.0. - the location where the construction of the wind farm "Krivača" is planned is described in detail;
- Chapter 3.0. - description of the Project - refers to the description of the subject activity, use of energy, raw materials, generation of waste materials, impact on environmental factors;
- Chapter 4.0. - alternatives that have been considered and are current at the time of drafting the document are presented;
- Chapter 5.0. - shows the state of environmental factors that may be exposed to the impact due to the implementation and operation of the Project;
- Chapter 6.0. - describes the possible significant impacts of the Project on environmental and social factors;
- Chapter 7.0. - shows possible right situations during the work of the Project;
- Chapter 8.0. - represents all prescribed environmental protection measures that must be complied with in order to minimize all potential negative impacts and reduce them to legally acceptable levels;
- Chapter 9.0. - ecological monitoring was presented, which is monitoring the state of the environment;
- Chapter 10.0. - non-technical data summary;
- Chapter 11.0. - presents data on technical deficiencies or lack of appropriate professional knowledge and skills or inability to obtain appropriate data;
- Chapter 12.0. - presents data on the working team that prepared the Study.

1.0. Explanation of the need for the Project in question

The technical potential for the use of renewable energy sources is great and exceeds all already available sources. Numerous factors such as climate change, increasing greenhouse gas emissions, declining fossil fuel reserves, and high energy prices have led to the encouragement and commercialization of renewable energy sources. For this reason, wind energy has recently become increasingly popular, with a significant increase from year to year, because wind energy is a competitive and economically viable energy source.

The European Union has set a binding target of 20% of total energy from wind and other renewable energy sources by 2020. In order to reach this goal, more than 1/3 of European electricity demand will have to be provided from renewable sources, with as much as 12-14% of wind energy being provided from as much as 20-14%. In Europe, the leading countries in the production of electricity from wind energy are Germany and Spain with 37,500 and 36,188 TWh, while the United Kingdom follows them with 9,259 TWh.

For the aforementioned reasons, wind energy is imposing itself in Serbia as a new branch for obtaining electricity. It is known that in Serbia there are sites with potentials suitable for the use of wind energy. Wind farms have a short construction period, seasonal peak production coincides with seasonal peak electricity consumption, and environmental disturbance is minimal compared to other energy facilities and technologies.

By ratifying the Treaty establishing the Energy Community, the Republic of Serbia has accepted, among other things, the obligation to adopt and implement a plan for the implementation of Directive 2001/77 / EC on the promotion of electricity produced from renewable energy sources.

For these reasons, the Project Holder, the company "IVICOM ENERGY" DOO from Žagubica, plans to build a wind farm "Krivača" in the municipalities of Golubac and Kučevo.

1.1. Basic information about the Project Holder

„IVICOM ENERGY“ DOO was founded in 2009 as a start-up company with the aim of researching wind potential and development of wind farm projects in the Republic of Serbia. Basic data on the Project Holder are shown in Table 1.

Table 1: *Information on the Project Holder*

Full name of the Project Holder:	**DRUŠTVO ZA INVESTICIJE I PROIZVODNJU ELEKTRIČNE ENERGIJE IVICOM ENERGY DOO, ŽAGUBICA**
Abbreviated name of the Project Holder:	**IVICOM ENERGY DOO**
Address:	Žagubica, 2 Jug Bogdana Street
Identification number:	20487224
TAX ID:	105902841
Phone / fax:	+381 12 443 550
Main activity:	3511- Electricity generation
Contact person:	Ilija Tošić, director, 063/224-678
e-mail:	ilijatosic@gmail.com
web:	www.ivicom-energy.com

1.2. Legislation used in the preparation of the Updated Study on Environmental Impact Assessment

For the preparation of the Updated Study, the following legal regulations were used and respected:

- *Law on Environmental Protection "Official Gazette of RS", No. 135/04, 36/09, 36/09 (other law), 72/09 (other law), 43/11 (CC), 14 / 16, 76/18 and 95/18 (other law));*
- *Law on Environmental Impact Assessment ("Official Gazette of RS" No. 135/04 and 36/09);*
- *Law on Planning and Construction "Official Gazette of RS", No. 72/09, 81/09, 64/10-Decision of the CC and 24/11 and 121/12, 42/13-Decision of the US, 50 / 13- CC decision, 98 / 13- CC decision, 132/14, 145/14, 83/18, 31/19 and 37/19 (other law);*
- *Law on Nature Protection ("Official Gazette of RS" No. 36/09, 88/10, 91/10, 14/16 and 95/18 (other law));*
- *Law on Efficient Use of Energy ("Official Gazette of RS", No. 25/13);*
- *Law on Air Protection ("Official Gazette of RS", No. 36/09 and 10/13);*
- *Law on Environmental Noise Protection ("Official Gazette of RS", No. 36/09 and 88/10);*
- *Law on Waters "Official Gazette of RS" No. 30/10, 93/12, 101/16 and 95/18 (other law);*
- *Law on Forests ("Official Gazette of RS", No. 30/10, 93/12, 89/15 and 95/18 (other law);*
- *Law on Land Protection ("Official Gazette of RS", No. 112/15);*
- *Law on Game and Hunting ("Official Gazette of RS", No. 18/10 and 95/18 (other law);*
- *Law on Animal Welfare ("Official Gazette of RS", No. 41/09);*
- *Law on Energy ("Official Gazette of RS", No. 145/14 and 95/18 (other law));*
- *Law on Roads ("Official Gazette of RS", No. 41/18 and 95/18 (other law));*
- *Law on Ratification of the Convention on the Conservation of European Wildlife and Natural Habitats ("Official Gazette of the RS", - International Agreements No. 102/07);*
- *Law on Ratification of the Convention on the Conservation of Migratory Species of Wild Animals ("Official Gazette of the RS" - International Agreements No. 102/07);*
- *Law on Cultural Heritage ("Official Gazette of RS" No. 71/94, 52/11 (other law) and 99/11 (other law));*
- *Law on Fire Protection "Official Gazette of RS" No. 111/09, 20/15, 87 / 18-3 (other law), 87 / 18-41 and 87 / 18-50 (other law);*
- *Law on Waste Management ("Official Gazette of RS" No. 36/09, 88/10, 14/16 and 95/18 (other law));*
- *Law on Packaging and Packaging Waste ("Official Gazette of RS", No. 36/09 and 95/18 (other law));*
- *Law on Disaster Risk Reduction and Emergency Management ("Official Gazette of RS", No. 87/18);*
- *Decree on determining the list of projects for which an impact assessment is mandatory and the List of projects for which an environmental impact assessment may be required ("Official Gazette of RS", No. 114/08);*
- *Decree on the ecological network ("Official Gazette of RS", No. 102/10);*
- *Decree on Protection Regimes (Official Gazette of RS, No. 31/12);*
- *Decree on noise indicators, limit values, methods for assessment of noise indicators, harassment and harmful effects of noise in the environment ("Official Gazette of RS" No. 75/10);*
- *Decree on the categorization of state roads, "Official Gazette RS ", nos. 105/13, 119/13 and 93/15);*
- *Decree on conditions for monitoring and air quality requirements ("Official Gazette of RS", No. 11/10, 75/10 and 63/13);*
- *Decree on limit values for the emission of pollutants into water and deadlines for their achievement ("Official Gazette of RS", No. 67/11, 48/12 and 1/16);*
- *Decree on limit values of priority and priority hazardous substances that pollute surface waters and deadlines for their achievement ("Official Gazette ", no. 24/14);*

- *Decree on Limit Values of Pollutants, Harmful and Dangerous Substances in Soil ("Official Gazette of RS", No. 30/18);*
- *Rulebook on the content of the request on the need for impact assessment and the content of the request for determining the scope and content of the study on environmental impact assessment ("Official Gazette of RS", No. 69/05);*
- *Rulebook on the National List of Environmental Indicators (Official Gazette of RS, No. 37/11);*
- *Rulebook on the content and manner of keeping the register of protected natural assets ("Official Gazette of RS", No. 81/10);*
- *Rulebook on protection of strictly protected and protected wild species of plants, animals and fungi ("Official Gazette of RS", No. 5/10, 47/11, 32/16 and 98/16);*
- *Rulebook on Compensatory Measures ("Official Gazette of RS", No. 20/10);*
- *Rulebook on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for protection of priority habitat types and on protection measures for their preservation ("Official Gazette of RS", No. 20/10);*
- *Rulebook on categories, testing and classification of waste ("Official Gazette RS ", no. 56/10);*
- *Rulebook on harmonized amounts of incentives for reuse, recycling and use of certain types of waste ("Official Gazette of RS", No. 45/18);*
- *Rulebook on the list of measures for the prevention of waste generation "Official Gazette of RS", no. 7/19);*
- *Rulebook on conditions and manner of collection, transport, storage and treatment of waste used as a secondary raw material or for energy production ("Official Gazette of RS", No. 98/10);*
- *Rulebook on the form of the document on the movement of waste and instructions for its completion ("Official Gazette of RS", No. 114/13);*
- *Rulebook on the form of the Document on the movement of hazardous waste, the form of prior notification, the manner of its submission and instructions for their completion ("Official Gazette of RS", No. 17 / 17);*
- *Rulebook on the form of daily records and annual report on waste with instructions for its completion ("Official Gazette of RS", No. 95/10 and 88/15);*
- *Rulebook on permissible noise level in the environment "Official Gazette of RS", no. 72/10);*
- *Rulebook on noise measurement methods, content and scope of noise measurement reports ("Official Gazette of RS", No. 72/10);*
- *Rulebook on the manner and conditions for measuring the quantity and testing the quality of wastewater and the content of the report on the performed measurements ("Official Gazette of RS",no. 33/16);*
- *Rulebook on technical norms for installations of hydrant fire extinguishing network ("Official Gazette of RS", No. 3/18);*
- *Rulebook on technical norms for protection of tall buildings from fire("Official Gazette of RS", No. 80/15 and 67/17).*

1.3. General, strategic, planning and project documentation used for making an Updated Study

Strategic documentation, spatial planning, urban and project documentation, conditions and opinions of holders of public authorizations, reports and relevant available literature were used in the preparation of the Updated Study:

- National Strategy for Sustainable Development ("Official Gazette of RS", No. 57/08);
- National Strategy for Sustainable Use of Natural Resources and Goods ("Official Gazette of RS", No. 33/12);
- Biodiversity Strategy of the Republic of Serbia for the period from 2011 to 2018 ("Official Gazette of RS" No. 13/11);

- Waste Management Strategy (“Official Gazette of RS”, No. 29/10);
- First amendment to the plan of detailed regulation of the area of the wind power plant "Krivača" (on the territory of the municipality of Golubac) ("Official Gazette of the Municipality of Golubac" No. 9/2019);
- Amendments to the plan of detailed regulation of the area of the wind farm “Krivača” on the territory of the municipality of Kučevo (“Official Gazette of the Municipality of Kučevo” No. 1/2019);

  Decision on determining the scope and content of the updated study on environmental impact assessment no. 353-02-1989 / 2019-03 from 19.11.2019, Ministry of Environmental Protection, Belgrade;
- Decision on approval of the Study on Environmental Impact Assessment of the construction of the wind farm "Krivača" no. 353-02-393 / 2015-16 from 29.05.2015, Ministry of Agriculture and Environmental Protection, Belgrade,

- Location conditions ROP-MSGI-33565-LOCH-2/2019, number 350-02-00545 / 2019-14 from 09.06.2020, Ministry of Construction, Transport and Infrastructure Belgrade;
- Decision 03 no. 019-4 / 5 from 18.03.2020, Institute for Nature Protection of Serbia, Belgrade;
- Conditions no. 4 / 3-09-0239 / 2019-0002, dated 4 December 2019, Directorate of Civil Aviation of the Republic of Serbia, Belgrade;
- Conditions no. 373/2 - 2019, dated November 29, 2019, Regional Institute for the Protection of Cultural Monuments Smederevo;
- Decision on Energy Permit, no. 312-01-00066 / 2015-04 dated 17 June 2015, Ministry of Mining and Energy;

- Preliminary design (PD) - 0. Main volume, number of technical documentation GSS - VEKVIDP-000 June 2020, “Global Substation Solutions” Belgrade;
- Preliminary design (PD) - 2.1. Steel structure of pillars, technical documentation number 2 / 1-132153 / 2 January 2020, IMK Institute of Materials and Structures, Faculty of Civil Engineering, University of Belgrade;
- Preliminary design (PD) - 2.2. Structural design (Wind turbine foundation project), technical documentation number 132153 June 2020, IMK Institute of Materials and Structures, Faculty of Civil Engineering, University of Belgrade;
- Preliminary design (PD) - 2.3. Plateau project for wind turbine installation, number of technical documentation GSS -VEKV-IDP-002/3, June 2020, “Global Substation Solutions” Belgrade;
- Preliminary design (PD) - 2.4. Plateau Retaining Walls Project, GSS Technical Documentation Number -VEKV-IDP-002/4, June 2020, “Global Substation Solutions” Belgrade;
- Preliminary design (PD) - 3. Project of hydrotechnical installations of retaining walls, number of technical documentation GSS -VEKV-IDP-003, June 2020, “Global Substation Solutions” Belgrade;
- Preliminary design (PD) - 4. Project of electrical installations of wind turbines, number of technical documentation GSS -VEKV-IDP-004, June 2020, "Global Substation Solutions" Belgrade;

- Preliminary design (PD) - 6. Project of mechanical installations of wind turbines, number of technical documentation GSS -VEKV-IDP-006, June 2020, "Global Substation Solutions" Belgrade;

- Location position in the environment – Google Earth;

- Atlas "Birds of Đerdap "(Bratislav Grubac, Zoran Milovanovic and Milanko Shekler 2013) and “Bats of Đerdap” (Bratislav Grubac and Zoran Milovanović 2012),
- Analysis of the impact of the planned wind farm “Krivača” on birds and bats, (Zoran Milovanović, January 2015),
- Analysis of the impact of the planned wind farm "Krivača" on birds and bats (2015-2019), Zoran Milovanović, November 2019,
- Krivaca Wind Farm, Bird Monitoring Report (2015-2016), MottMacdonald, April 2017.),
- Krivaca Wind Farm, Collision Risk Assessment Report (2015-2016), MottMacdonald, April 2017.),
- Krivaca Wind Farm, Enviromental and Social Impact Assessment Addendum, MottMacdonald, December 2017.).

2.0. Location and environment description

The Project in question is the construction of the wind farm "Krivača" which is planned in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka).

The area planned for the realization of the wind power plant "Krivača" is defined by the Plan of detailed regulation of the area of the wind power plant "Krivača" on the territory of the municipalities of Golubac, Kučevo and Veliko Gradište. The territory of the municipality of Veliko Gradište is occupied by one of the two transmission lines that are not the subject of this environmental impact assessment.

The area of the wind farm "Krivača", macro-locationally, is located in the northeastern part of central Serbia, on the territory of the Braničevo administrative district (Figure No. 1). Spatially, in the eastern part of the Braničevo district, there are the municipalities of Golubac and Kučevo, on whose territories the wind power plant "Krivača" is planned.

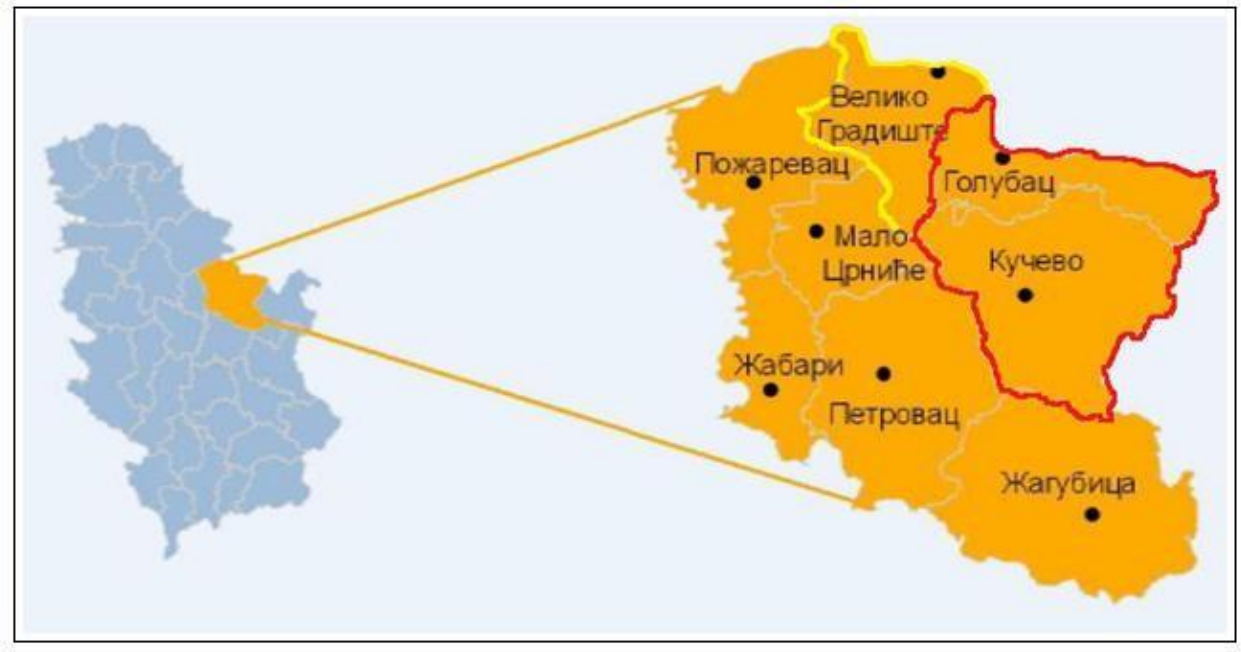


Figure no.1: *Position of Braničevo district on the map R. Serbia and the municipalities of Golubac and Kučevo*

The municipality of Golubac is located on the peripheral parts of the Pannonian Basin and covers an area of 368 km^2 and it consists of 24 settlements. Part of the settlement is located in the Peka valley, part in the hill and mountainous area, and part in the Danube coast, which runs 54 km along the northern border of the municipality. One third of the territory of the municipality of Golubac is located within the boundaries of the Đerdap National Park. The northern border of the municipality is the Danube River (also the state border with Romania). The municipality of Golubac is 130 km away from Belgrade on the main road of the state road IB Belgrade-Kladovo, which is also the most important road corridor for the municipality (Đerdap highway). River traffic on the territory of the municipality has great potential thanks to the Danube waterway, but the precondition for its more intensive development is the arrangement of the coast and ports, as well as the reactivation of the domestic river fleet.

South of the municipality of Golubac is the territory of the municipality of Kučevo (Figure no.2) with 26 settlements and an area of 721 km^2. It covers the middle and lower reaches of the Peck River. In terms of relief, the territory of the municipality of Kučevo consists of plains and hills. The plain part includes the Zviška valley and the southern part of Braničevo (part of the lower Peka), while the hill and mountainous part includes the forested areas of the Zviški mountains, North Kučaj and the northwestern slopes of the Homolje mountains. The territory of the

municipality is crossed parallel in length, the river Pek and two important roads: the state road IB Požarevac-Majdanpek-Negotin and the railway Belgrade-Požarevac-Majdanpek Zaječar.

Figure no.2: *Municipality of Golubac and Kučevo*

From the microlocation point of view, the area of the planned wind farm "Krivača" represents the area covered by the Detailed Regulation Plan, which covers an area of about 242.16 ha and is located within the municipalities:

- Golubac: CM Braničevo, CM Ponikve, CM Usije, KO Radoševac, CM Golubac, CM Sladinac, CM Vojilovo, CM Maleševo, CM Dvorište, CM Krivača and CM Snegotin, area of about 153.25 ha;
- Kucevo: CM Rakova Bara, CM Ševica, CM Turija, CM Kučevo 1, CM Popovac, CM Neresnica and CM Radenka, area of about 79.26 ha;
- Veliko Gradište: CM Kusiće, area of about 9.65 ha (for the planned transmission line).

Table no. 2: *Overview of areas covered by the Plan*

MUNICIPALITY	CADASTRAL MUNICIPALITY	SURFACE (ha)	
		CM	MUNICIPALITY
Veliko Gradište	Kusiće	9,65	9,65
Golubac	Braničevo	9,18	153,25
	Ponikve	2,82	
	Usije	6,55	
	Radoševac	8,11	
	Golubac	16,74	
	Sladinac	6,24	
	Vojilovo	2,20	
	Maleševo	5,41	
	Dvorište	29,54	
	Krivača	59,98	
	Snegotin	6,48	
Kučevo	Radenka	10,16	79,26
	Rakova Bara	32,76	

	Ševica	7,41	
	Turija	1,58	
	Kučevo 1	12,32	
	Popovac	13,40	
	Neresnica	1,63	
		TOTAL	**242,16**

The micro-location area of the planned wind farm "Krivača" is located in the southern and southeastern part of the municipality of Golubac and the northeastern part of the municipality of Kučevo, while the corridor of a 110 kV transmission line is routed from the 110 kV "Krivača" to 110/35 kV and extends over the territory of the municipalities of Veliko Gradiste and Golubac, and the corridor of the second 110 kV transmission line is traced from the 110 kV connection and distribution plant "Krivača" to the 110/35 kV substation "Neresnica" and extends over the municipalities of Golubac and Kučevo. Transmission lines are not subject to this environmental impact assessment).

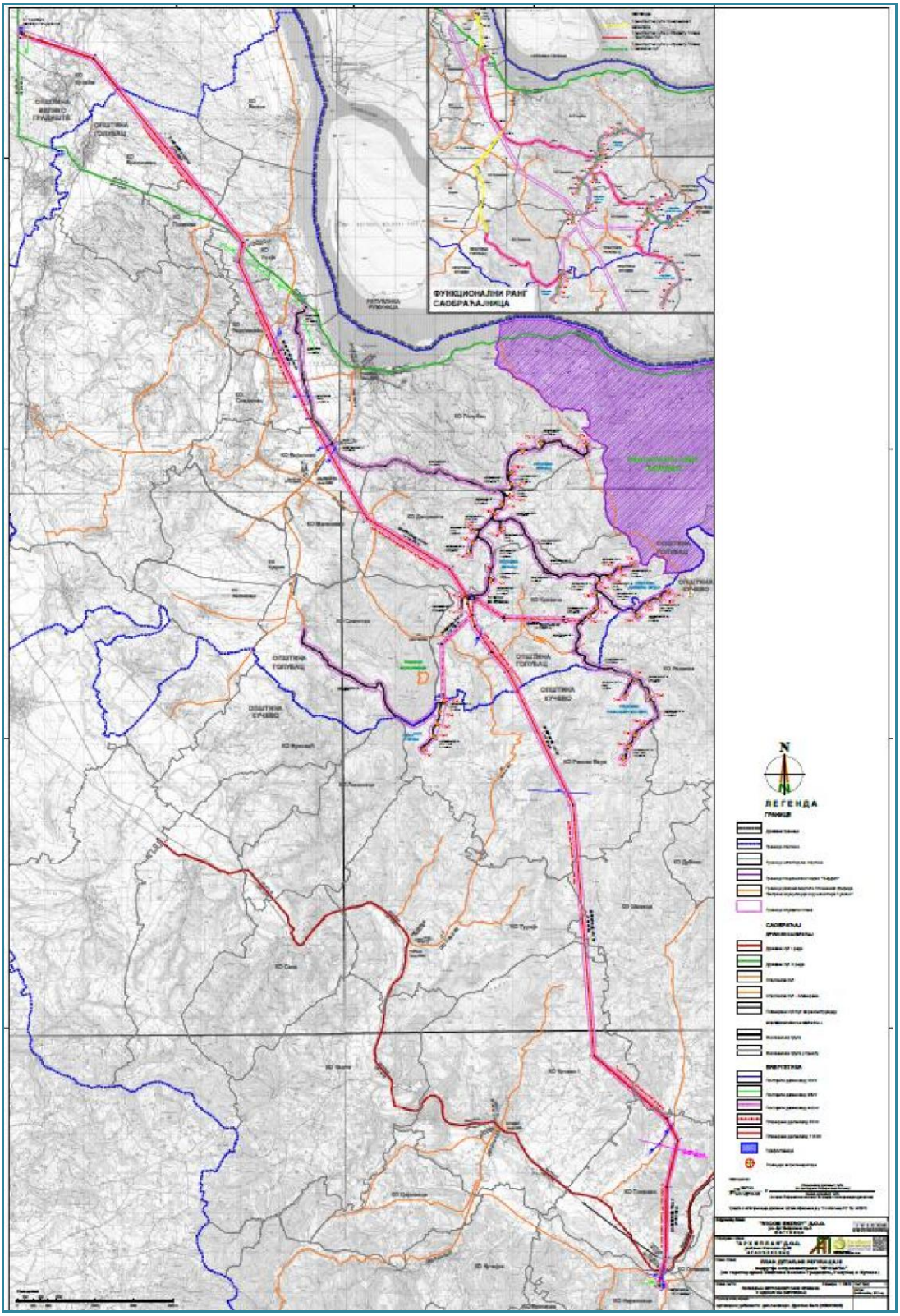


Figure no. 3: *Position of the wind farm "Krivača" in relation to the environment (Plan for detailed regulation of the area of the wind farm "Krivača" with transmission lines in the municipalities of Veliko Gradište, Golubac and Kučevo)*

The construction of the planned wind generators (T) is planned on the following cadastral parcels:

Golubac Municipality

CM Golubac: 5004/6 (T1-11), 4995/3 (T1-12), 4889/2 (T1-13), 4750/2 (T1-15),

CM Dvorište: 3638/2 (T1-4), 2082/2 (T1-5), 1930/2 (T1-6), 1636/2 (T1-8), 400/2 (T1-9), 1426/2 (T1-10).

CM Krivača: 1361/18 (T1-1), 2102/2 (T3-1), 318/2 (T3-2), 908/2 (T3-3), 266/2 (T3-4), 127/2 (T3-5), 145/2 (T3-6), 65/3 (T3-7).

Kučevo Municipality

CM Rakova Bara: 1408/2 (T2-1), 1642/2 (T2-2), 1351/2 (T2-3), 1332/2 (T2-4), 1319/2 (T2-5).

The spatial unit that includes the area of the planned wind farm "Krivača" is divided into four urban zones. The construction of the wind turbines in question is planned on construction land planned for other purposes, in urban zone 4 (UZ 4).

The construction of the next 11 wind generators is planned in the urban subzone UZ 4-1 "Venac": T1-1, T1-4, T1-5, T1-6, T1-8, T1-9, T1-10, T1-11, T1-12, T1-13 and T1-15.

The construction of the next 5 wind generators is planned in the urban subzone UZ 4-2 "Tilva": T2-1, T2-2, T2-3, T2-4 and T2-5.

The construction of the next 6 wind generators is planned in the urban subzone UZ 4-3 "Debelo Brdo": T3-1, T3-2, T3-3, T3-4, T3-5 and T3-7.

Table 3 gives the coordinates of the wind turbine poles that are included in the Detailed Regulation Plan, with separate wind turbines that will be implemented within this Project.

Table no. 3. *Coordinates of wind turbine towers*

WF „KRIVAČA“- 103,32 MW				
Positions			**Gauss-Kruger, Zone 7**	
No.	**Location**	**WTG**	**E (m)**	**N (m)**
1	**Venac**	**T1-1**	7552683	4939480
2		**T1-4**	7552897	4940872
3		**T1-5**	7552979	4941154
4		**T1-6**	7553017	4941466
5		**T1-8**	7553548	4941906
6		**T1-9**	7553739	4942137
7		**T1-10**	7553943	4942365
8		**T1-11**	7553975	4942666
9		**T1-12**	7553982	4942964
10		**T1-13**	7554263	4943513
11		**T1-15**	7555890	4943692
12	**Tilva**	**T2-1**	7551706	4935848
13		**T2-2**	7551981	4936196
14		**T2-3**	7552081	4936515

15		**T2-4**	7552135	4936830
16		**T2-5**	7552254	4937112
17	Debelo Brdo	**T3-1**	7555964	4939276
18		**T3-2**	7556166	4939493
19		**T3-3**	7556124	4939865
20		**T3-4**	7556221	4940141
21		**T3-5**	7556505	4940290
22		**T3-7**	7557127	4940606

The environment of the planned wind farm "Krivača" is a sparsely populated area with low housing densities, so no negative impacts caused by activities in populated areas are expected. Also, there are no production complexes in the area that could endanger the quality of water, air and soil, as well as increase noise levels. The immediate environment of the planned wind farm "Krivača" consists mainly of agricultural and forest land, and the analyzed area is located at a safe distance from the border of the National Park "Đerdap", which is located east of the planned wind farm.

In the area of the wind farm "Krivača", no indicators of terrain instability, landslides, landslides, erosion have been identified. The bearing capacity of the terrain is satisfactory, based on the performed geomechanical research.

From the aspect of general characteristics and features of the area, based on edificators in the area and in the surroundings, it can be stated that the location is environmentally friendly from the aspect of planning and implementation of wind farm "Krivača" with mandatory environmental protection and monitoring measures, especially those related to the protection of birds and bats.

2.1. Overview of required land areas (m^2) or the implementation of the Project

In the process of planning the wind farm "Krivača", the space was analyzed from the aspect of the necessary areas for the realization of the Project. The detailed regulation plan includes the area for the planned project - wind farm "Krivača" and the area of planned corridors of transmission lines connecting PRP "Krivača" with TS "Veliko Gradište" and PRP "Krivača" with TS "Neresnica", total area of about 242.16 ha. Within these boundaries, construction land (other purposes), ie plots for:

- foundations of wind turbine poles,
- complex of the facility in the function of maintaining the wind farm (for the needs of repair or replacement of damaged parts of the wind generator -) (CM Krivača, territory of the municipality of Golubac).

The area occupied by the plots for the foundations of wind turbine towers is a total of 1,375 ha.

Areas in the function of energy, where the change of land use is not conditioned are:

- plateau / construction site zones, within which wind turbine poles are installed; - transmission line corridors.

Within the zones / plateaus, wind turbines are installed, with the formation of construction plots for the positions of the wind turbine foundations, within the plateau / construction site zone. Plateau / construction site zones are areas where temporary (limited time) space is provided for construction, ie storage of equipment, movement of machinery, arrangement of the main crane plateau, working plateau and temporary storage of materials during excavation. Within the plateau / construction site, there is a surface for installing wind turbines. The plateau adapts to each location of the wind generator and depends on the topographic characteristics of the

terrain. The plateau is dimensioned in accordance with the technological needs of wind turbine installation, submitted by the equipment manufacturer.

Transformation of 33/10 kV WF "Krivača" will be built on the location Golo brdo on c.p. no. 1361/23 CM Krivača for which the Parceling Project was prepared (“ARHIPLAN” d.o.o. Arandjelovac, February 2015).

The 110 kV "Krivača" Switchyard (SY) will be built at the Golo brdo location on c.p. no. 1361/24 CM Krivača, for which the Parceling Project was prepared (“ARHIPLAN” d.o.o. Aranđelovac, February 2015).

Picture no. 4: *Location of the Transformation "WF Krivača" and Switchyard "Krivača" on Golo Brdo (I. Tošić, October 2019.)*

2.2. Compliance of the selected location with the spatial planning and urban documentation

The project of the wind power plant "Krivača" is harmonized with the spatial planning and urban documentation, with:

- Spatial plan of the special purpose area National Park "Đerdap" (“Official Gazette of RS”, No. 43/13 of 17 May 2013);
- Spatial Plan of the Municipality of Golubac (“Official Gazette of the Municipality of Golubac”, No. 3/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Golubac, whose provisions provide the possibility of using wind as a renewable energy source in the planned Project;
- The Spatial Plan of the Municipality of Kučevo (“Official Gazette of the Municipality of Kučevo”, No. 4/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Kučevo, also provides the possibility of using wind as a renewable energy source.

The Spatial Plan of the Municipality of Golubac and the Spatial Plan of the Municipality of Kučevo, for the realization of the wind power plant "Krivača", prescribe further elaboration of the area of the planned Project through the development of the Detailed Regulation Plan (DRP). The detailed regulation plan was made in accordance with the provisions of the spatial plans of the municipalities of Golubac and Kučevo, which are also the planning basis for the development of the DRP.

A Detailed Regulation Plan for the area of the Krivača wind farm was prepared for the area of the planned wind farm, for which the procedure of the first amendment was initiated due to the change in the rules for building wind turbines and the rules for parceling. The first amendment to the DRP was made on the basis of Decisions:

- Decision on drafting the first amendment to the Detailed Regulation Plan of the area of the wind farm "Krivača" on the territory of the municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 8/2019), made by the Municipal Assembly of Golubac, at a session held on 01.08.2019;
- Decision on the preparation of amendments to the Detailed Regulation Plan of the area of the wind farm "Krivača" on the territory of the municipality of Kučevo ("Official Gazette of the Municipality of Kučevo", No. 10/2019), made by the Municipal Assembly of Kučevo, at the session held on 30.07.2019;

These decisions, Article 11 of each Decision, define that the Report on Strategic Environmental Assessment of the Detailed Regulation Plan for Wind Farm "Krivača" in the municipalities of Golubac, Kučevo and Veliko Gradište remains in force, with the consent of the competent authority of each municipality. especially. (Decision No. 501-15 / 2013 of 04.09.2013, Municipality of Golubac, Municipal Administration, Department of Economy and Infrastructure; Decision No. 501-4 / 2013-02 of 05.07.2013, Municipality of Kučevo, Department of economy and property law affairs).

The Assembly of the Municipality of Golubac at the session held on October 15, 2019. adopted the First Amendment to the Plan for Detailed Regulation of the Wind Power Plant "Krivača" in the Municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 9/2019.)

The Assembly of the Municipality of Kucevo at the session held on October 21, 2019. made a decision on the adoption of the First Amendment to the Plan for detailed regulation of the wind farm "Krivača" in the municipality of Kučevo ("Official Gazette of the Municipality of Kučevo", No. 11/2019.) It is important to emphasize that the planned project-wind power plant "Krivača" **is outside the borders:**

- National Park "Đerdap", based on the Spatial Plan of the special purpose area of the National Park "Đerdap" ("Official Gazette of RS" No. 43/13) and
- Spatial plan of the special purpose area of the international waterway E-80 Danube (Pan-European Corridor VII), which is prepared on the basis of the Decision published in "Official Gazette" RS Gazette no. 3/10.

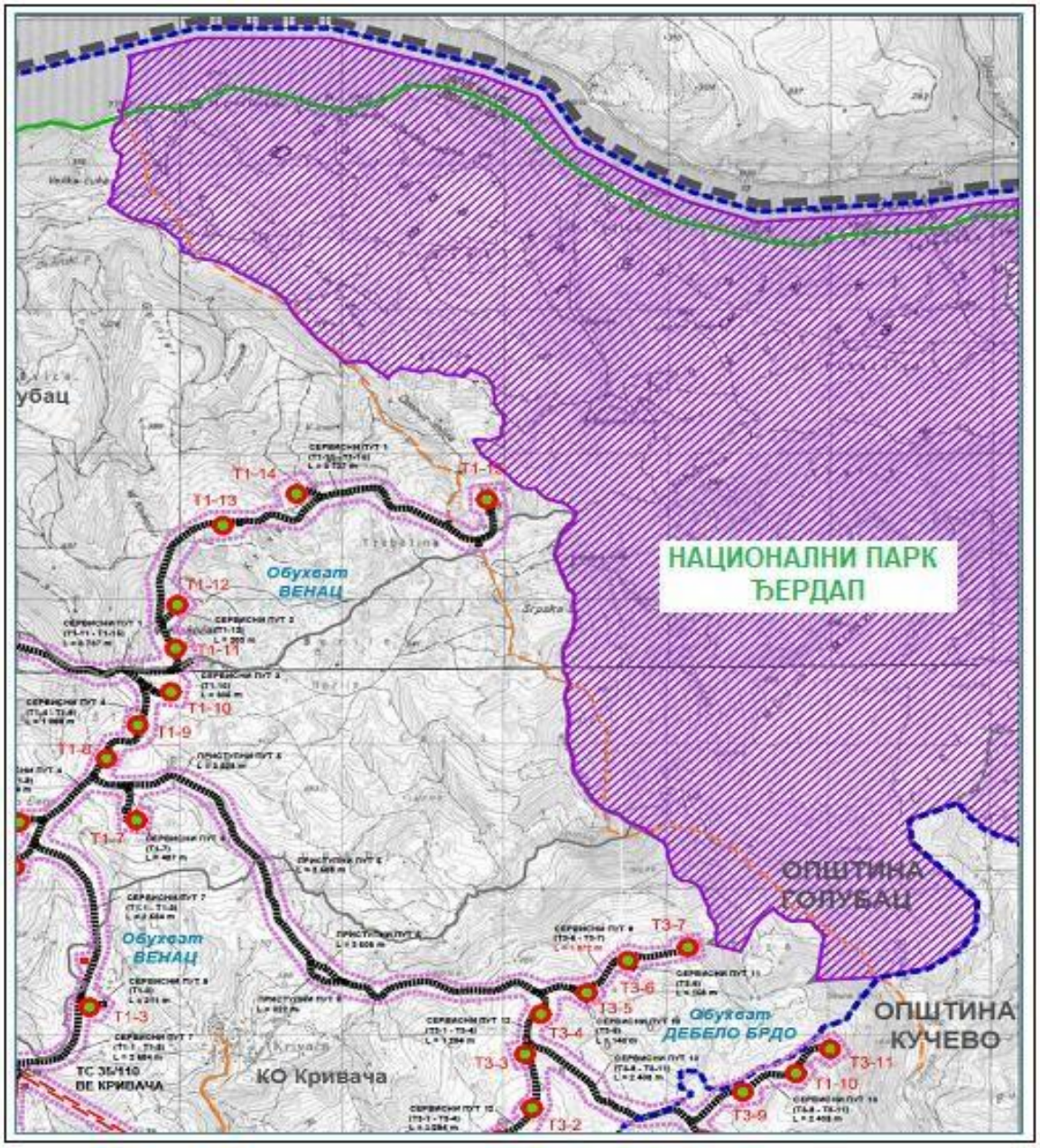


Figure no. 5: *Overview of the nearest wind turbines to the Đerdap National Park (Excerpt from the Spatial Plan of the Special Purpose Area of the Đerdap National Park) (Official Gazette of the RS No. 43/13)*

Based on the above, it can be concluded that the implementation of the planned project of the wind farm "Krivača" is fully harmonized with the current spatial planning and urban documentation, ie with the Detailed Regulation Plan and the Strategic Environmental Assessment (Strategic Impact Assessment Report).

The plan defines the conditions under which the construction of a wind generator complex is possible, respecting the existing purpose of the areas, as well as landscaping and protection of space, especially the conditions of environmental protection, natural and cultural assets.

2.3. Basic, geomorphological, hydrographic, pedological and seismological characteristics of the terrain

In order to analyze the interaction of the Project with the environment, it is necessary to analyze the natural factors of the spatial unit within which the realization of the wind farm "Krivača" is planned, ie the Project in question.

Natural factors of space are defined by geomorphological, hydrographic, pedological, seismological and climatic characteristics of the terrain, as well as the characteristics of flora, fauna and landscape values. The current state of natural factors largely defines the scope and character of the impact of the Project in question on environmental media.

In the process of systematic research and previous works in the area of the wind farm "Krivača", the Study on geotechnical conditions for financing 32 wind turbines at the location of the wind farm "Krivača" (Faculty of Civil Engineering - Institute of Roads and Geotechnics, Belgrade) where the available documentation obtained on the basis of research is given in detail, and on the basis of which the presentation of geological material, morphological and hydrogeological characteristics of the exploration terrain is given.

Geomorphological features of the wider spatial unit- On the territory of the municipality of Golubac, the relief is characterized by lowland-hilly area in the extreme western part (about 30% of the territory) and mountainous in the central and eastern part of the municipality (about 70% of the territory). The lowest point in the municipality is the easternmost, at the confluence of the Pesača and the Danube, at about 69 m above sea level, and the highest on Šomrdski kamen at 804 m above sea level, in the extreme southeastern part of the municipality. Areas at altitudes of 200-400 m above sea level (45.76%) have the largest share, and at least above 800 m above sea level.

On the territory of the municipality of Kučevo, there are two types of relief: plain and hilly. The alluvium of the Peck River stretches for about 50 km, with a width of several tens of meters, up to one kilometer. The highest elevation is 242 m (Blagojev Kamen), with a steep slope to elevation 192 m (Voluja), with steep and forested valley sides further relatively low slope towards the lowest elevation of 110 m (Zelenik). From Voluje to Kučevo, the right valley side is unforested, with a gradual transition to the mountainous type, while the left is steeper and mostly forested. The largest part of the area is occupied by hilly-mountainous relief type, with a gradual transition over hilly and hilly to mountainous relief to the north and south, and a sudden transition from Brodice to the east to mountainous, densely forested and almost inaccessible terrain.

Hydrographic characteristics of the wider spatial unit – this area is characterized by large surface flows (Danube and Velika Morava), medium-sized flows (Mlave, Peka, Jasenice, Ralje) and numerous smaller streams with constant or occasional and periodic runoff, as well as the existence of large quantities spring (underground) waters in the zone of the bottom of the valleys of the mentioned rivers.

Pedological characteristics of the area – on the basis of pedological mapping, the types of land are divided according to the genetic principle with an indication of the geological basis:

- *vertisol* are separated around Ševica, Voluje, Duboka, Ključata, Radenka, north and northeast of the town of Kučevo in the Bedinac stretch, as well as between Vuković and Zelenik, and the formation is related to lake terraces;
- *cambisol* have been separated around Mišljenovac, Mustapić, Rabrovo and Mala and Velika Bresnica. The production value of this land is high depending on the type and in comparison, with other lands. It is a land of good physical properties, suitable for growing agricultural products;
- *brown acid soils* have been isolated mainly in the area of Rakova Bara, Turija, north of Kučevo, from Neresnica and Peka towards the Homolje Mountains, east of Duboka and Ključata and from Lješnica and Turija, below Blagojev Kamen. It is characterized by different production values, and they are most often under arable land, pastures and forests;
- *brown acidic leached soils* form a transition between brown soils from which pseudogleys evolve into which they evolve. They were singled out near Ceremošnja, Cerovica, on the edge of the Kučevska valley, northeast of Neresnica and in the area of

the settlement of Voluje. These lands are relatively deep, so they are used as arable land, and also for meadows and forests;

- *alluvial deposits* are formed by running water. They cover the lower and middle part of Peka, and along other watercourses, but on significantly small areas. The agricultural value of these deposits is great.

Today's relief of this terrain largely depends on the geological composition and tectonic structure of the terrain. The most prominent relief is built of limestone rocks that are undulating and rolled over the Brnjica granitoid massif, reaching altitudes between 450 and 590 m above sea level. Limestones are decomposed on the surface, broken or covered with a thin layer of Tertiary and Quaternary sediments, which caused the terrain to be quite well overgrown with vegetation (contaminated karst). Large karst forms, such as sinkholes and bays, occupy the first place in the relief of the terrain of the exploration area. The basic features of today's relief were created in the Miocene. After the retreat of the lake and the formation of the hydrographic network, a phase occurs which is characterized by intensive denudation processes, incisions of the river network and the formation of appropriate fluvial and fluviodenudation forms. The upper parts of the basins of most torrents belong to hilly areas with relatively large falls of the basin and riverbed. On the other hand, the lower streams are located in the plain zones - river valleys into which torrents flow. The most important geomorphological factor influencing the genesis of large waters is the fall of the river basin. The western and northwestern limestone rims are characterized by bays and arched sections in which Neogene material is deposited. As the valley sides in the limestones have a larger area, here the tectonic processes served only as a predisposition to the karst process. Later Neogene expansions, which go deep into the eroded limestone, are fossil bays at the bottom of which sand and fine gravel are deposited.

2.3.1. Geological structure and hydrogeological characteristics of the exploration terrain

The results of the research are given in the Study on geotechnical conditions for financing 32 wind turbines on the location of the wind farm "Krivača" (Faculty of Civil Engineering - Institute of Roads and Geotechnics, Belgrade).

2.3.1.1. Results of exploratory drilling at the positions of the wind farm "Krivača"

The research project envisages the construction of exploratory wells, and drilling was performed by machine, rotary (wire line) method with continuous coring and drilling diameter of 122.6 mm along the entire drilling profile. A total of 43 vertical wells were drilled, with individual depths of 6.00-15.80 m. The total depth of exploratory drilling was 485.20 m. Technical data on exploratory drilling at the positions of the wind farm "Krivača" are given in Table no. 4, for the positions of wind generators at the localities "Venac", "Tilva" and "Rakobarski Vis".

Table no. 4: *Technical data on exploratory drilling at the positions of wind generators at the sites "Venac", "Tilva" and "Rakobarski Vis"*

SE.NO.	MARK	COORDINATES		LEVEL (mnm)	FORECASTED DEPTH (m')	DERIVED DEPTH (m')	NPV (m)	DATE OF PERFORMANCE
		Y	X					
locality "Venac"								
1	БТ1-1	7552683.44	4939477,12	482,64	15	10,60	3,50	13.08.2014.
2	БТ1-2	7552698,30	4939775,50	501,25	15	10,50	4,20	13.08.2014.
3	БТ1-3	7553433,09	4940196,27	450,59	15	15,80	4,74	14.08.2014.
4	БТ1-4	7552891,94	4940874,18	485,82	15	15,00	4,52	14.08.2014.

5	БТ1-5	7552973,31	4941155,71	505,21	15	13,00	10,40	15.08.2014.
6	БТ1-6	7553009,50	4941469,95	514.30	15	12,90	5,55	15.08.2014.
7	БТ1-7	7553729,66	4941474,02	514.36	15	13,10	5,50	15.-16.08.2014.
8	БТ1-8	7553546.33	4941906.22	521.96	15	14,80	3,95	16.08.2014.
9	БТ1-9	7553745.02	4942140.66	522.02	15	6,50	-	16.08.2014.
10	БТ1-10	7553943,16	4942366,69	533,42	15	13,70	4,10	16.08.2014.
11	БТ1-11	7553971,79	4942669,10	549,80	15	15,10	2,90	16.08.2014.
12	БТ1-12	7553979,82	4942970,43	544,72	15	10,80	9,70	17.08.2014.
13	БТ1-13	7554264,78	4943519,68	516,31	15	12,30	7,60	17.08.2014.
14	БТ1-14	7554715,90	4943737,41	512,47	15	14,00	6,00	17.-18.08.2014.
15	БТ1-15	7555891,51	494691,67	556,61	15	14,00	-	18.08.2014.
locality "Tilva"								
16	БТ2-1	7551703,57	4935849,39	511,55	15	11,00	-	29.-30.08.2014.
17	БТ2-2	7551983,25	4936199,05	535,97	15	9,00	4,80	29.08.2014.
18	БТ2-3	7552082,42	4936521,39	555,85	15	11,00	4,20	29.08.2014.
19	БТ2-4	7552133,76	4936831,81	554,28	15	10,60	-	28.-29.08.2014.
20	БТ2-5	7552254,52	4937113,49	528,10	15	11,00	4,50	28.08.2014.
21	БТ3-1	7555967,64	4939276,43	567,85	15	10,70	-	19.08.2014.
22	БТ3-2	7556167,07	4939494,85	576,11	15	11,60	-	20.08.2014.
23	БТ3-3	7556121,69	4939868,00	534,73	15	12,60	9,20	20.08.2014.
24	БТ3-4	7556221,89	4940144,82	545,18	15	11,90	6,00	21.08.2014.
25	БТ3-5	7556504,29	4940292,61	542,94	15	10,70	-	21.08.2014.
26	БТ3-6	7556750,95	4940510,18	549,21	15	14,80	7,20	21.08.2014.
27	БТ3-7	7557130,47	4940607,14	560,72	15	10,10	-	21.08.2014.
28	БТ3-8	7557215,45	4939271,13	552,72	15	13,50	-	22.08.2014.
29	БТ3-9	7557465,17	4939606,87	570,72	15	12,00	-	22.08.2014.
30	БТ3-10	7557793,50	4939728,69	567,00	15	12,50	-	21.08.2014.
locality "Rakobarski Vis"								
31	БТ4-1	7556851,69	4935634,54	565,90	15	12,00	-	28.08.2014.
32	БТ4-2	7556993,87	4935940,00	561,53	15	10,80	7,30	28.08.2014.
33	БТ4-3	7557157,49	4936234,01	563,47	15	11,00	6,10	28.08.2014.
34	БТ4-4	7557376,94	4936490,08	554,13	15	13,20	-	28.08.2014.
35	БТ4-5	7556874,74	4937233,62	546,48	15	11,00	2,80	28.08.2014.
36	БТ4-6	7557552,81	4937212,12	577,81	15	13,10	-	28.08.2014.
37	БТ4-7	7557143,53	4937649,87	590,96	15	12,60	4,70	28.08.2014.

The area of the municipalities of Golubac, Kucevo and Veliko Gradiste, has a complex geological composition, built from the oldest to the youngest rocks and deposits. The exploration area is shown in the part of OGK papers Kučevo L 33-128 and Veliko Gradište L 34-116 (Figure no.6).

Proterozoic, as the oldest rocks stands out Proterozoic rock complex that covers the eastern part of the terrain. The shorter length of the access road PP10 to the scope of "Tilva" is projected through this unit.

Paleozoic, in the part of the terrain covered by the exploration area, according to the OGK newspaper Kučevo, the presence of an older Paleozoic (Cambrian formation) can be noticed. These rocks are affected in their surface part by decomposition processes, whereby shallow dredging and washing occur on the sloping parts of the terrain, which fills the stream valleys, if the terrain is not under forest vegetation. Landslides are possible from these rocks, which endangers the road network. The route of the access road PP10 is projected mostly over these rock masses, so during the engineering-geological mapping along the route of the access road, all processes and instability phenomena that can significantly affect the stability of the building were registered. The Late Paleozoic is represented by Lower Carboniferous formations, granite monconites and granodiorites. This unit is located in the immediate vicinity of SS "Neresnica".

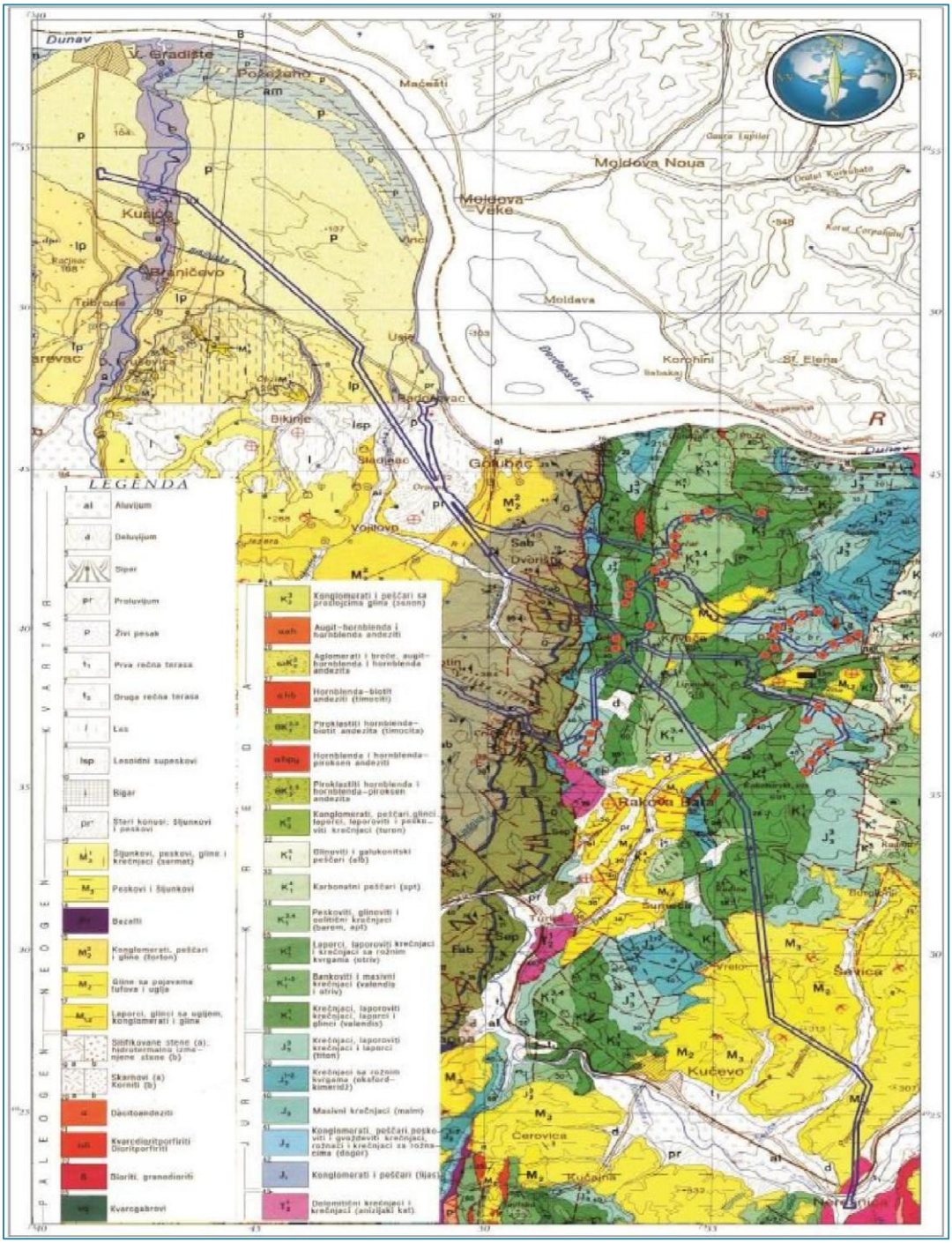


Figure no.6: *Geological map of the exploration terrain (Study on geotechnical conditions for financing wind turbines at the location of the wind farm "Krivača")*

The Mesozoic and Mesozoic formations, according to the layout of the projected buildings, belong to the Middle Triassic, Upper Jurassic and Lower Cretaceous:

- *Middle Triassic: Anisian floor (T_2^1)* - projected position of the wind turbine column on the Tilva range (T2-1) according to the geological age of the Anisian floor;
- *Upper Jurassic: Titon floor (J_3^3)* - the total thickness of the Titon floor is between 100 and 250 m. The largest number of pillars on the Tilva, Debelo brdo and Rakobarski Vis spans are positioned according to OGK (leaf Kučevo L 33-128) on these sediments;

- *Lower Cretaceous: Valendijski floor(K_1^1),* Otrivski floor(K_1^2), Baremski and part of the Aptian floor (K_1^{3+4}) - the largest number of wind turbine pillars on the Venac range, designed on Lower Cretaceous sediments, as well as wind turbines T3-1 and T3-2 belonging to the scope of Debelo brdo.

The Cenozoic is represented by Tertiary and Quaternary formations. They are spread on the entire surface of the Kučevo newspaper, but they predominate in its western part.

Neogene-Miocene-Neogene deposits within the leaves have a significant distribution, and belong to various sections of the Miocene. Depending on the complex paleogeographic and regional-tectonic conditions that prevailed in this part and on the periphery of the Carpathians, the Miocene is represented by marine, ie brackish and freshwater facies.

The lower, middle Miocene ($M_{1,2}$), probably includes isolated lake basins, relatively small areas. It is possible that during their history, some of them were in mutual communication, which influenced the reduction of their lithological differences. The sedimentary composition of these lake series is mostly monotonous. The number of members is small, and marls, clays and clays dominate among them. In most of these basins, the presence of one or more coal seams was observed, almost regularly in the marl floor, (part of the section of the access road PP-5, projected over these sediments).

Torton (M_2^2) lies over Paleozoic shales, Permian sandstones and older Miocene freshwater strata. It is represented by marine facies. The sediments of marine cake include sands, sandstones and conglomerates, and less often clays and organogenic limestones. According to the composition of sediments, tortonian deposits have accumulated in the shallow and coastal region of the Tortonian Sea, with a significant presence of coarse sediments of alluvial origin. Gravel-sand deposits have the lowest resistance to erosion processes in interlacing with clay layers, they remain weakly resistant to atmospheric effects, which makes sloping parts of the terrain conditionally stable, prone to slipping, tearing and tearing, (part of the PP-4 access road sediments).

Quaternary deposits (Q) The youngest deposits are Quaternary, developed on the banks of the Danube and Peka. The largest distribution is wood and lesoid sandstones, which have created deep valleys. Proluvial deposits also present a certain problem, which also occupy a significant space. They are subject to all forms of washing and dredging, with the deposition of the material taken to the lowest erosion base. Of the Quaternary deposits, alluvial deposits also have a significant presence, developed mainly along the course of the Peka. They are built of easily destructible gravelly-sandy material, from which this river built its wide and spacious cultivated valley (the routes of the projected access roads PP-1, PP-2 and PP-3 cross over Quaternary sediments). During the Quaternary, various genetic creations were created:

- *Sipar(s)* lie on the relatively steep and wooded sides of Crni vrh, Sokolovac and Konjarnik. They slide gravitationally down the slope and reach almost to river level. Occasional karst springs appear at the bottom of the sipar;
- *Deluvium (d)* larger batches of deluvium were observed on gentle slopes built of Neogene rocks (Peka Valley), on crystalline shales in the Kaona area and in the Rakobar Basin. Closer to the washing zone, the deluvium is built of gravelly sandstones, while in the peripheral zones, siltstone sands and loams predominate;
- *Proluvium (pr)* is represented by avalanche cones created by occasional flows at the places of their eruption on the alluvial plain of the main river. The largest number is located in the Peka Valley. The mentioned forms are made of gravel, sandstone and loam, which are characterized by poor sorting, irregular stratification and non-roundness.

Modern geological processes- engineering geological and hydrogeological mapping recorded all the characteristic processes and phenomena important for the foundation of objects and processes in the environment. The most common morphological forms of the Holocaust found

in the field are sinkholes. Mostly formed as a consequence of concentrated dissolution of carbonate rocks, at the intersection of two or more faults. A small number arose as a result of the breaking of ceilings in caverns and karst canals. Their depth varies from a few meters to a few tens of meters. The bottoms of sinkholes are usually covered with dusty clay or red clay, which is a residual residue from the dissolution of carbonate rocks, ie decalcified clay with large admixtures of iron oxides and hydroxides. The predominant shape is ellipsoidal, funnel-shaped.

Crack mass cracking based on tectonics analyzed in the Detailed Geotechnical Research Project, it can be concluded that cracks are tectonic predisposed to layer breaking in the harvesting phase. On that occasion, there was no movement along the crack plane, so those cracks cannot be called faults. These are typical cracks in wrinkles. Some of the cracks were later, through geological time, expanded by the chemical-mechanical action of water and turned into caverns. The development of cracks and caverns is very irregular in space.

2.3.2. Hydrogeological properties of the terrain

The analysis of hydrogeological characteristics of terrain and represented environments is based on data from engineering geological mapping of exploration wells, measurement of groundwater levels in exploration wells during exploration and data from existing documentation. The investigated terrain is divided into two special rock complexes, which are very different in hydrogeological terms, as follows:

- non-carbonate complex within which the compacted type is formed,
- carbonate rock complex within which the karst type was developed.

The non-carbonate rock complex, in relation to the carbonate rock masses, practically represents a barrier to the movement of karst source waters. This is also indicated by karst springs that appear at the contact between karst and non-karst.

The compacted type issued with less yield is related to the Neogene sediments of the Middle and Upper Miocene age. These sediments represent a hydrogeological complex in which layers of clay alternate, as hydrogeological insulators with layers of sand and fine gravel, as hydrogeological collectors. The layers of sand and gravel in the Upper Miocene have more pronounced collector properties. In the Lower Miocene, the reservoir layers do not have a continuous space, but wedge out laterally, so they continue at a higher or lower level, and hydrological connections between them are broken by clay layers. Neogene sediments, although they represent a hydrogeological complex, generally function as a hydrogeological insulator in relation to the Mesozoic complex on the perimeter and at the bottom.

Karst type issued, spacious karst issued complex structures and configurations, ie system issued composed of parts that differ in position, hydraulic mechanisms of chemical properties and chemical composition of water. There are numerous sinkholes on the surface, which in the higher parts of the terrain represent abysses and smaller caves or open caverns, and in the lower parts typical karst springs with large amplitudes of seasonal changes in yield and water turmoil during heavy rains and melting snow. Recharge is performed by infiltration of atmospheric sediments and infiltration of surface watercourses. Circulation takes place within cracks and fissures, and the directions of groundwater movement are a consequence of the geological structure of the terrain, the degree of karstification and local hydrogeological conditions. Drainage of karst outcrops is performed through karst springs of different yields (Figure 7).

Figure no.7: *Karst spring on the territory of the village of Krivača (D. Savić, August 2014.)*

Based on field research (August-September 2014), ie monitoring the return of groundwater levels in wells within 24 hours, different groundwater levels were measured:

- on the "*Venac*" scope, the groundwater level was measured in all exploration wells (2.90-10.40 m from the terrain surface), except in wells BT1-9 and BT1-15. Due to the highest level of groundwater in the exploration phase, a piezometric structure was installed in well BT1-11, in order to monitor changes in groundwater levels over a longer period of time. After heavy atmospheric precipitation, at the beginning of October, the groundwater level was measured again. It was noticed that the water level increased significantly in wells BT1-1 (2.80 m), BT1-3 (2.60 m) and BT1-7 (2.50 m). A sample of groundwater was taken from these wells to determine the chemistry and its aggressiveness to concrete. Based on the obtained results, special attention must be paid when performing construction works on the construction of the foundation of wind generator T1-1, because in the period of hydrological maxima and the period of intense atmospheric precipitation, groundwater inflow can be expected;
- on the scope of "*Debelo brdo*" in the largest number of wells there was no groundwater or lower levels (6.20-9.20 m) than the terrain surface were registered;
- on the scope of "*Rakobarski Vis*" in the exploration wells, the highest level of the terrain surface was found in the well BT4-5 (2.80 m), so a piezometer was installed in this well as well. In other wells, either groundwater was not registered or a level below 6.10 m from the ground surface and below was measured;
- lower levels (over 5.00 m) from the surface of the terrain have been registered on the "*Tilva*" scope, so no groundwater is expected to appear on this coverage during the construction works on the foundation of the wind generator.

The results of observations on built-in piezometers are given in Table no. 5.

Table no. 5: *Data for measuring water levels from piezometric structures*

	Designation of the hydrogeological object	Coordinates			Water level (m)		
		Y	X	$З_к$	Zero measurement m/mnm	Measurement II 10.09.2014.	Measurement III 08.10.2014.
1	БТ1-11р	7553974,09	4942659,74	549,98	4,30/545,68 19.08.2014.	8,30/541,68	6,40/543,58
2	БТ4-5р	7556878,13	4937232,26	547,23	4,70/542,53 28.08.2014.	5,60/541,63	8,10/539,13

Based on the measurement data, it can be concluded that the karst level has pronounced oscillations.

2.3.3. Geotechnical terrain profile

The construction of the terrain is of heterogeneous lithological composition. Geological environments and complexes determined by research have been separated and grouped according to lithological composition, physical and mechanical properties of environments and structural characteristics, which are covered by research up to a depth of 6.00–15.80 m. Observed from the surface of the terrain to the depth of exploration wells, the following quasi-homogeneous environments were isolated:

Humified clay, builds up the immediate surface parts of the terrain, in the entire research area. The thickness of this layer is from 0.05 m (BT2-5) to 1.00 m (BT3-6). The layer is dusty clay with brown to dark brown organic matter. Due to the large presence of organic matter, this layer has poor physical and mechanical characteristics. According to GN - 200 norms, it belongs to the II category of land, which is favorable for manual and machine excavation;

- *Dusty clay,* according to the granulometric composition, the clays are dust-sandy, with less represented gravel grains (fragments of rock mass with sharp edges, limestone and marly origin, up to 5 cm in size). It also contains uneven concretions of SaSO3, the color is dark brown to reddish brown, pseudo-cracked, mostly medium plastic (CI), rarely high plastic (CH), hard plastic to hard consistency. In the part of the research area where this layer appears, it is located directly below the humus layer, of uneven thickness in the research area, from 0.50 m - 2.40 m. It appears rarely at greater depths in the form of a layer (BT4-4 and BT4-5). According to the depth of occurrence (mostly up to 3.0 m, which is above the depth of the foundation) as well as the thickness of the layer, there is no significant influence on the geotechnical conditions of the foundation of wind turbines. According to the hydrogeological function, in the configuration of the terrain they belong to the return permeable media. When performing earthworks, they can be kept in vertical notches up to 2 m high. According to the GN - 200 categorization, these sediments belong to the II and III categories of excavations*;*
- *Debris,* weakly clayey to clayey, crumbly, limestone, heterogeneous granulations from coarse-grained to fine-grained, sandy and clayey. The color is brown to light brown. Limestone fragments have sharp edges of several to 10 cm in size, sporadically with larger fragments. In general, crumb material is located under a layer of humus or clay sediments and is a roof with limestone sediments. The thickness of this layer is variable from 1.0-4.0 m. The elevation of the foundation is located in this environment at the location of wind turbines T1-9. This medium is of integral porosity and good water permeability. According to the GN - 200 categorization, these sediments belong to the III and IV category of excavations.
- *Marl clay,* gray-yellow, medium plastic, hard kneading with angular inclusions of marl and limestone centimeter size, semi-solid. The appearance of this layer was stated in the exploration works BT1-8 in the interval (2.70-4.00 m), BT110 in the interval (2.70-

6.00 m) and BT3-6 (2.10-8.50 m)). Clays are very sensitive to changes in water content, and are prone to swelling. According to the GN - 200 categorization, these sediments belong to category III of excavations.

Marl, mostly dusty in composition, gray in color, massive in texture, with a characteristic shell-like fracture, brittle and hard, impermeable, over-consolidated. The excavations revealed their presence in the exploration well BT1-8 (4.00-6.00 m). According to GN - 200 standards it belongs to III and IV category. The environment is waterless and favorable for building supports. Work in it is performed normally, provided that the fresh wall mass does not stand for a long time exposed to the influence of moisture from the air, ie water.

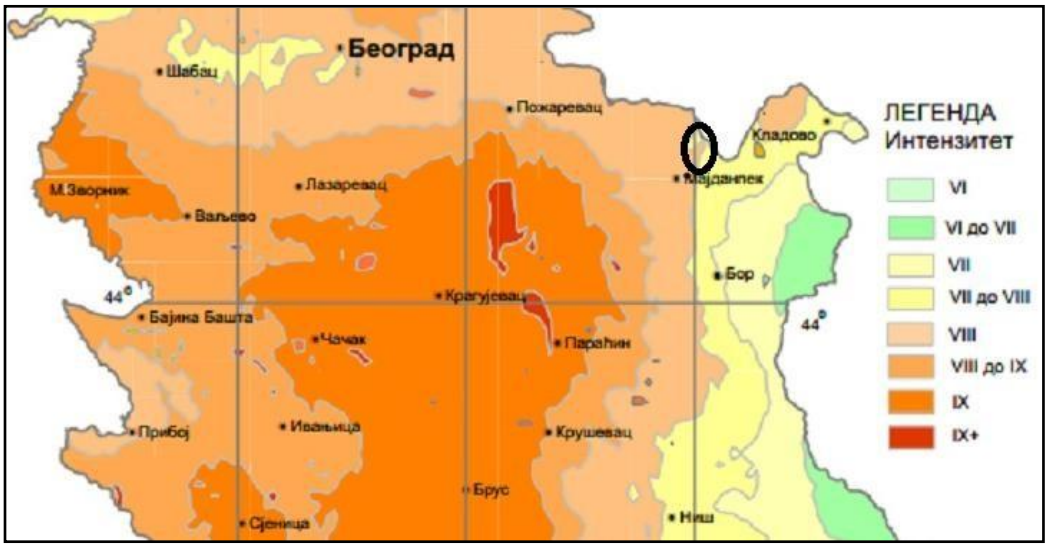
Breccia, carbonate, debit, compact. The occurrence of these sediments was noted in a small number of exploration wells. In well BT1-7 it occurs on the surface (0.90-4.50 m), while in well BT1-3 it is deeper (9.00-10.20 m). According to the GN - 200 categorization, these sediments belong to the IV and V category of excavations.

Limestone, represents the floor of Quaternary and Neogene sediments at variable depths. These are mostly compact, solid, rocky, less often marly and cavernous limestones. This is the layer in which the largest number of wind turbines is based. Depending on the age of the sediments, they can be dark gray to light gray and gray-red. They very often occur with veins of crystalline calcite that are present in the rock and indicate pronounced tectonics of the rock mass, high volume mass, according to the compressive strength belongs to solid to very solid rocks, resistant to weathering. In the surface parts they are cracked, degraded, along the cracks there are visible traces of oxidation and accumulation of Fe2O3 and Al2O3. According to GN - 200, these sediments belong to V and VI excavation categories. From the hydrogeological point of view, they locally represent a well-permeable environment.

Based on the results of field research and laboratory tests at all ranges, it can be stated that in most wind turbine positions for the foundation depth around Df = 3.0-3.50 m, turbines will be funded in a layer of broken or compact and solid limestone. Rarely, as in the position of wind turbines T1-6 (debris), T1-8 (marly clay) T1-10 (marl clay), T1-13 (debris), the contact joint will be in the layers listed in parentheses.

2.3.4. Seismic features

According to the data from the Seismic Hazard Map, Republic Seismological Institute of Serbia, macroseismic intensity on the surface of local soil probability of exceeding 5% in 50 years (return period 975 years) the observed area is in zone up to VIIVIII expressed in degrees EMS-98 (Figure 8).



Picture no.8: *Map of seismic hazard of Serbia (Source: Republic Seismological Institute of Serbia)*

2.4. Proximity to sanitary protection zones and water supply sources

The settlement of Golubac and the gravitating settlements of Usije, Radoševac, the weekend settlements of Vinci, Sladinac and Vojilovo are supplied with underground, sanitary water from the "Vinci" spring. The water is taken from 3 wells out of the planned 5 and transported to the pumping station at the source. After chlorination, the pumping station transports water with a pump with a capacity of 45 l / s and a pressure pipeline without incidental consumption to the 600 m³, reservoir "Žuti breg" in Radoševac, and from there to all the above-mentioned settlements.

The existing water supply system in Kučevo consists of springs: "Mlaka", "Odžina" and "Banja" with a total capacity of 50 l / s. The "Mlaka" spring has 4 wells with a total capacity of 40 l / s next to the pumping station. They are equipped with submersible pumps with electric motors and accompanying automation, a collection tank with a settling tank with a volume of 300 m^3. The pumping station is equipped with an automatic system for gas chlorination of water. 3 pressure VP-100 pumps with electric motors of 30 kW have been installed, the main distribution cabinets (GRO) and command-control cabinets (KKT) are located in the pumping station building, and within the pumping station there is a 10/04 kV transformer station 350 kVA. With the combined pressure-return pipeline Ø300 steel and Ø200 asbestos-cement, the excess water is delivered to the tank (I) of the height zone with a volume of 500 m^3. The tank (I) of the height zone is equipped with a substation for water supply (II) of the height zone of four pressure pumps, water is delivered by pressure PVC 61 pipeline Ø160 to the tank (II) of the height zone with a volume of 2×150 m^3. From the tank (II) of the height zone to the consumers there is a return PVC pipeline Ø90. The " Odžina " spring consists of a pumping station and two wells, one of which is in operation. The yield of this well is 10 l / s. It is equipped with a submersible pump with a 15 kW electric motor and accompanying automatics. The "Odžina" spring does not have a reservoir, it pumps water directly into the combined pressure-return pipeline. This spring is used occasionally in cases of major emergency water losses from the system and in the dry season during the year. The entire water supply system operates in synchrony, whose automation is interconnected by underground signal cables and wireless telecommunication devices between the pumping stations "Mlaka" and "Odžina" and the Reservoir (I) and (II) altitude zone. The "Banja" spring consists of two catchments and one tank with a volume of150 m^3. The yield of the source is 10 l / s. The spring is equipped with a gas system for chlorination of water and functions by natural gravity towards the city water supply network. The location of the planned wind farm is outside the sanitary protection zone of the water supply sources of the municipalities of Golubac and Kučevo.

2.5. Climatic characteristics and meteorological data for the analyzed area

Depending on the interaction of factors of geographical position, hypsometry, exposure, morphometric forms of relief and vegetation, the basic climatic characteristics are given, microclimatic specifics and available meteorological indicators for the area where the realization of the wind farm "Krivača" is planned.

Municipality of Golubac - the average annual air temperature is around 11 ° C. The coldest month is January with an average temperature of -0.57 ° C. The temperature regime is characterized by a large fluctuation of minimum and maximum temperatures. Precipitation is most intense in spring, and minimal in autumn and early winter. Parts of the municipality with higher altitude receive a higher amount of precipitation: Snegotin - 742 mm / year, Crni Tumanski vrh and watersheds between the Danube and Peka above 700 mm / year. The most significant currents are from the east, then from the northwest and west. The effect of the basket is most pronounced in spring and autumn. The specific area of the wind farm is characterized by the already mentioned, moderately continental climate, with warm and occasionally hot summers with temperatures over 35 ° C and harsh winters, intensified by cold winds. Košava, as an important factor of this Project, is the dry wind from the southeast, which can reach storm strength during the autumn and winter part of the year. With an average speed of 25-45 km / h and a maximum speed of up to 130 km / h, it can cause a drop in temperature of up to -30 ° C. Apart from the basket, the location also has a significant influence of the north

wind, which blows from the north-northwest direction throughout the year. The high summer temperatures are mitigated by the proximity of the Danube and Lake Đerdap. Therefore, the conditions for the development of climate-recreational tourism are especially favorable, which is one of the comparative advantages of the municipality of Golubac.

Table no. 6: *Climatic conditions*

Climate	**Temperate-continental**
Average annual temperature	+11°C
Lowest temperature	-27°C
Highest temperature	+40°C
Annual precipitation	663 – 756 mm/year

Municipality of Kučevo - latitude, altitude and position of the valley in the Peka basin in relation to the dominant directions of air masses, participate in shaping the general and specific climatic characteristics in the municipality of Kučevo. The area covered by the Project has the characteristics of a temperate continental climate and two climatic environments are separated. The reason for that is the Kaon gorge through which Zvižko Lake swelled and which separates Braničevo from the Zvižda, which is again closed and surrounded by mountain massifs, so the general statement is supplemented by more pronounced influences of mountain climate. In this area, the temperate continental climate is characterized by warm and occasionally hot summers, with temperatures over 35 ° and harsh winters intensified by cold winds and gusts. Due to the proximity of the Danube, the area is exposed to high humidity, so there is a problem of ice formation. The highest number of rainy days is in May and June, and the lowest in September and October. The average annual temperature is 11 ° C. For the needs of the Project - wind farm "Krivača", research-measurements and analyzes of wind energy potential were performed:

- Wind Resource and Energy Yield Assessment Wind farm Krivača, Fractal, Januar 2014;
- Assessment of the meteorological site conditions of the proposed Krivača Wind Farm in Serbia, Garrad Hassan, 01.08.2014.;
- Krivača Wind Farm – Wind Resource Assessment and Annual Energy Production Estimate, Megajoule, December 2019.

Based on measurements of wind potential at the location Golo brdo (municipality of Golubac), which were performed from 30.10.2009, as well as at the location Debelo brdo (municipality of Kučevo), which were carried out from 18.09.2009, data on wind energy potential were obtained, on the basis of which the positions of wind generators were selected and defined (installed measuring poles are 60 m high, manufactured by NRG Systems, according to Table 7.

In this area there are:

- Košava - wind from the southeast, it can reach storm strength during the autumn and winter period. With an average speed of 25-45 km / h and a peak value of 130 km / h, it can cause a drop in temperature to -30oC during the winter period. The strongest intensity is achieved between 5.00 and 10.00 in the morning;
- Severac - which blows all year round from the north-northwest direction.

There are no significant obstacles in the area that would affect the wind flow, so according to the data obtained by measurement, it can be concluded that the considered area has a high wind potential.

Table no. 7: *Positions of measuring columns /UTM WGS 84 Zone*

MC	East	North	Altitude (m)	Measurement period
Golo brdo	552257	4938715	505	30.10.2009-30.9.2012. 5.6.2014. – to date
Debelo brdo	555721	4938457	570	18.09.2012. – to date

Figure 9 shows the data on the histogram of the mean wind speed according to the Weibull distribution.

Figure no. 9: *Weibull distribution of mean wind speed*

Figure no. 10, shows the wind rose with the distribution of the average wind speed depending on the direction, while Figure no. 11, shows the wind rose with the distribution of the frequency of wind occurrence depending on the direction of wind blowing.

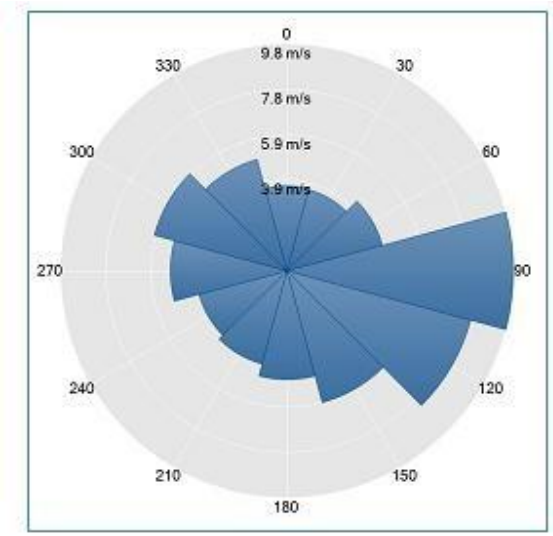


Figure no. 10: *Wind rose –distribution of mean wind speed directions*

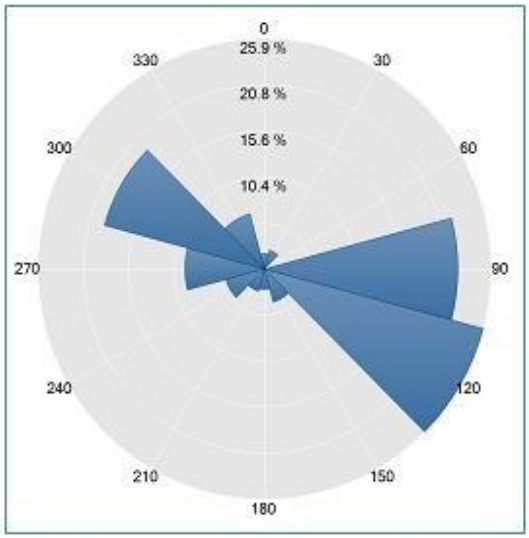


Figure no. 11: *Wind rose – frequency of average wind speed by*

2.6. Description of flora and fauna, natural assets of special value (protected), rare and endangered plant and animal species and their habitats and vegetation

Area within the scope of the Detailed Regulation Plan for the realization of the wind power plant "Krivača", according to the Conditions of the Institute for Nature Protection of Serbia 03 no. 019-4 / 5 from 18.03.2020 is not located within the protected area for which the protection procedure has been conducted or initiated. Northeast of the border of the Plan and the planned wind farm is the border of the National Park " Đerdap ", which is characterized by great wealth of wildlife, primarily due to the preservation of various habitats that provide good conditions for survival of many animal species. The following habitats are especially important in the Đerdap National Park: water, ie the Danube with tributaries, preserved forest habitats, primarily large forest complexes that are a prerequisite for the diversity of wildlife in them, meadows, gorges and canyons. In these preserved habitats, the fauna of vertebrates stands out, which includes: mammals, birds, reptiles, amphibians and fish.

2.6.1. Previous research

Research on bird fauna in the subject area was not performed before the study for the Krivača wind farm. All previous research is mainly related to the area of the Đerdap National Park and the Danube River. The first bird research in this area dates back to 1744, and was conducted by L.F. Marzilji and later E. Baldamus, in the period 1849-1851. (Matveyev, 1976). Significant research was conducted in the second half of the 19th and the beginning of the 20th century (Baldamus 1849-1851, Hodek 1877, Dombrowski 1891, Kuhn 1898,

Raiser 1898, Rašković 1904, 1905, Lintia 1907, 1917, Reiser 1939). The great Serbian ornithologist Sergej Matvejev conducted very important research in the area of " Đerdap" and neighboring areas in the period 1945-1980. A large number of data on birds from this area have been recorded in the works of modern ornithologists (Ham, 1980, Puzović and Grubač 2000, Puzović 2001, 2002, Puzović et al. 1999, 2000, 2009, Skorić 2004, Sekulić 2007, Radišić 2009, Ružić et al.2010, ...). Recent data on the research of birds in the protected area are sublimated in the atlas "Birds of Đerdap " (Bratislav Grubac, Zoran Milovanovic and Milanko Shekler 2013), and are the result of the project "Research on the status and protection of priority bird species in the National Park" Đerdap ".

Data on bats can be found in a small number of professional papers, reports and other publications (Petrov 1946, 1967, Mirić 1968, 1981, Paunović and Stamenković 1998, Ognjanović 1999, Paunović 2001), as well as the monograph " Đerdap Bats "(Bratislav Grubach and Zoran Milovanović 2012).

More detailed information on habitats and present species of birds and bats was collected during dedicated research conducted for the construction of the wind farm "Krivača" - "Analysis of the impact of the planned wind farm" Krivača "on birds and bats" (Zoran Milovanović, January 2015), as and additional periodic surveys conducted in the period 2015-2019. "Analysis of the impact of the planning of the wind farm" Krivača "on birds and bats (2015-2019)", Zoran Milovanović, November 2019).

At the request of the creditors of the Krivača Wind Farm Project, IFC, additional research on birds and bats was conducted in the period September 2015 - August 2016, and the results of this monitoring, combined with the results of previous research, are given in the following three documents:

- Krivaca Wind Farm, Bird Monitoring Report (2015-2016), MottMacdonald, April 2017.) – refers to the monitoring of stories in the subject area,
- Krivaca Wind Farm, Collision Risk Assessment Report (2015-2016), MottMacdonald, April 2017.) – refers to the assessment of the risk of collisions of animal groups with wind turbines,

- Krivaca Wind Farm, Enviromental and Social Impact Assessment Addendum, MottMacdonald, December 2017.) – includes a broader analysis of the impact of wind farms on the environment.

2.6.2. International conventions, laws and standards relating to birds

In order to assess the impact of the construction and operation of the planned wind farm "Krivača" on birds and meet European standards, this analysis is harmonized with European conventions (Bern and Bonn conventions) and directives (Birds Directive).

- *Berne Convention: Convention on the Conservation of European Wildlife and Natural Habitats (Serbia acceded on 1 May 2008);*

The Berne Convention is an international, binding legal instrument that encompasses most of the natural heritage of the European continent, and also applies to some African countries. Its goals are the preservation of wild flora and fauna and their natural habitats and the promotion of European cooperation within the area. The Convention emphasizes the need to protect endangered habitats and species, including migratory species.

- *Bonn Convention: Convention on the Conservation of Migratory Species (Serbia acceded on 1 March 2008);*

The Convention on the Conservation of Migratory Species (Bonn Convention) aims to protect terrestrial, marine and avian migratory species throughout their range. This international act, created under the auspices of the United Nations Environment Program (UNEP), deals with the protection of wild flora and fauna and their habitats at the global level.

- *Birds Directive: Directive 2009/147 / EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds;*

The aim of the directive is to ensure the long-term protection and conservation of all bird species, including migratory species that are naturally distributed in the territory of the European Union, and to regulate the management and use of birds.

2.6.3. Application of legal mechanisms in practice

In practice, there is a problem as the restrictions in Article 5 of the Birds Directive apply to all European bird species, including those that are numerous and widespread. Therefore, it is common to choose so-called target species or species of special importance in a rational way. These are species that may be considered endangered and vulnerable to a certain extent (species of European importance for protection, species from the IUCN Red List, species from Annex II of the Bern Convention) and / or may be endangered by wind turbines (Chapter 5, EU-Commission 2010).

Individual consideration of numerous and widespread species is not feasible in practice. Frequent species usually have a favorable protection status, so the possible impact of wind turbines should not lead to a disruption of their numbers (Kiel 2007).

In terms of materiality thresholds, many authors, in contrast to the Birds Directive (Kiel 2005; Luttmann 2007), only consider impacts that yield results by disturbing the population. Lana (2009) argues that the assessment of limiting intentional harassment for certain European species is not based on individual specimens, but on populations. Therefore, the impact would be determined as significant if its effects endangered a larger number of individuals in such a way that the chances of survival, rate and success of reproduction of the entire population are impaired.

In terms of applicable assessment criteria and materiality thresholds, this analysis relies on recommendations used abroad (*European Commission 2010; Lana 2009; Serbian Institute for Nature Protection 2012*).

2.6.4. Methodology of birds and bats research

For the needs of the realization of the wind power plant "Krivača", detailed research was done, ie one-year monitoring of birds and bats, which was united in the Study: "Analysis of the impact of the planned wind power plant" Krivača "on birds and bats". In the period from 2015 to 2019, periodic field visits were carried out, in order to observe birds and bats in this area.

Also, in the period September 2015 - August 2016, an additional one-year monitoring was performed at the request of the Project creditors. **Bird research methodology** - During the bird monitoring conducted during 2014 (January - December), a combination of observation (census) at a point and limited (linear) transects connecting these points was used. Point census, a standard method (BART & EARNST 2002, ROSENSTOCK et al. 2002, NICHOLS et al. 2000, HAMEL et al. 1996), in which the observer stands in a certain place and records every bird he sees or hears within certain limits, it was carried out for half an hour and at as many points as possible, in accordance with the weather and meteorological conditions.

Bird identification was performed using standard optical equipment (Swarovski SLC 8X30 binoculars, Swarovski 20-60x50 telescope).

The movement on the terrain was done mostly on foot, the vehicle was used occasionally (in order to reach the starting point from where the limited transect and census at the point was performed).

The starting point from where you moved on foot to the area of Venac and Debelo Brdo is from the outskirts of the village of Krivača (from where the village road that connects the village of Krivača and places planned for the construction of wind turbines leads). The starting point from where you moved on foot to the Rakobarski Vis area is from the access road that separates from the Krivača-Radenka road and leads to Rakobarski Vis. The starting point from where you moved on foot to the Tilva area is from the rural road that separates from the Krivača - Rakova bara road and goes in the direction of Tilva (position and description of the limited transect is given in Table 8).

During the access road to the locations provided for wind generators, shorter stops were made in the time of 10-15 minutes, at important habitats. The census at the point was performed at the places planned for the construction of wind generators (Venac, Debelo brdo, Tilva, Rakobarski Vis). The starting point for the census at the point is the first location for the wind turbine located near the access road to be reached - the end point for the census at the point is the last location for the wind turbine (Table 9). Detention in the places where the census was performed at the point, was up to 30 minutes. In some places where the census was performed at the point, where the observation covered two neighboring locations intended for wind generators, the census time at the point was 15 minutes. For bird species that were recorded by the census method in the point, in addition to the description of behavior, records were kept on the height and direction of flight. If the species was recorded in the immediate vicinity of the place for the wind generator at critical altitudes (50-150 meters), the following data were recorded: flight altitude, direction of movement. The altitude of the flight was recorded as follows: from 050 meters, from 50-150 meters, 150-200 meters, over 200 meters. When researching the limited transect method, care was taken to cover the habitats present in the study area as well as possible. The restricted transect method was used to record the birds present between the census points, as well as to record the species present from the starting point from which they moved on foot to the arrival at the location planned for the installation of the wind generator. A limited transect was also used to explore the wider subject area.

The research of the wider subject area included the following areas:

- Golubac gorge;

- Gorge Brnjička reka;
- Surroundings of the villages Maleševo, Dvorište, Krivača, Rakova Bara, Radenka.

In the Golubac gorge, research was carried out from the mouth of the Brnjica river into the Danube to Golubac. Records of the present birds of aquatic habitats were kept, as well as other birds (primarily birds of prey). The gorge of the Brnjica river was explored as follows: from the village of Brnjica to the entrance to the canyon, from the outskirts of the village of Radenka to the entrance to the canyon, from Sokolovica, located between Jelenske stene and Venac on Debelo Brdo (which is above the left side of the gorge, from where you can see most of the gorge). For efficiency and maximum use of time, field activities are planned as full-day.

Additional bird monitoring conducted in the period September 2015 - August 2016 was carried out by Dr. Stefan Skorić, senior research associate and Dr. Marko Raković, senior curator. The research applied a methodology based on the best international guidelines (Scottish Natural Heritage, 2014) and the instructions given in the manual Prakljačić et al. (2011). The bird testing methodology consists of several components;

- collision risk assessment based on bird flight activity; and
- research of numbers and distribution:
  1. a nesting bird in the project area itself;
  2. birds of prey in the wider project area and
  3. nocturnal bird species in the narrower and wider project area.

The primary purpose of the research is to obtain input data for the collision risk model (Band, 2007, Masden 2015), which predicts the mortality of birds from collisions with turbines. Vantage Point surveys (VPs) are designed to quantify the levels of flight activity of birds and their distribution across the survey area. Five favorable points (VPs) were selected and this research was conducted from them. From them, it was possible to observe all the locations planned for the construction of wind generators. A detailed description of the methodology of data collection by this method is given in the guidelines of the Scottish Natural Heritage, 2014, as well as in the above-mentioned reports related to this monitoring.

Surveys on the number and distribution of birds at the site in question are designed to record the number and distribution of birds that use the site. They allow an evaluation of the importance of the site itself planned for the construction of the wind farm and provide information that will help quantify the projected impact of the construction of the wind farm on the bird community. The research included three evenly spaced field trips along predetermined transect routes during the bird nesting season (May-June 2016). A total of six transects were made, which representatively covered the entire project area. During each transect, birds were recorded in three ranges of distances (up to 25 m, between 25 and 100 m and over 100 m) to the left and right of the observer. This research provides an estimate of the density of birds in the study area (birds per km2). The research began at least 30 minutes after dawn (sunrise) and lasted approximately 2-4 hours per transect. Transects were performed in favorable weather conditions (ie not in strong wind and rain).

Since birds of prey occupy much larger territories during the nesting season than the project area itself, research on these bird species has been undertaken in accordance with the guidelines of the Scottish Natural Heritage, 2014 and Prakljačić et al. (2011). Twice during the nesting season (March - June), a wider project area was visited to determine the number and distribution of nesting populations of birds of prey.

During the monitoring, specific researches of nocturnal bird species were performed. The nocturnal species in the project area included six species of owls (chuk, cuckoo, buljina, forest owl, long-tailed owl and small barn owl), as well as quail, blackbird and corn crake. Research on nocturnal bird species was carried out by releasing playback surveys of the mentioned species (Playback surveys) using audio equipment at 15 locations within the project area. They

were performed in October 2015 (only for owls), as well as in April and May 2016 for all species of night birds.

Bat Research Methodology- The Bat Survey conducted in 2014 was adapted to the guidelines for environmental impact assessment in Serbia, which include wind farms (Paunović et al. 2011). A tour of all available and known speleological objects in the research area was performed in order to record the presence of bats (species and numbers). The visit to most speleological objects was done during the winter period (during the hibernation period). Apart from speleological objects, a tour of all old, neglected and other houses in the narrower area (wider surroundings of the place where wind generators are planned) was performed. The method for researching bats in speleological objects consisted of a detailed examination of objects with the help of lamps. Present species, number of individuals, their behavior were recorded. Identification was performed on the basis of characteristic morphological and morphometric characteristics of the species, with the help of a manual (Dietz & Helversen 2004). A one-year monitoring of bats conducted from September 2015 to August 2016, conducted by Andrej Chonti, a graduate biologist, and Daniela Rajkov, a graduate biologist, included three methods. Two related to the activity of bats in flight (research with the help of a manual detector and with the help of automatic detectors) and one on the recording of resting places (colonies) of bats.

All bat species are protected in Europe by the EU Habitats Directive. The primary focus of the research was on species with a high and moderate risk of wind turbine collisions (Rodrigues et al. 2014) that are likely to be present in the project area:

High risk

- Common noctule (*Nyctalus noctula)*;
- Common pipistrelle (*Pipistrellus pipistrellus)*;
- Nathusius's pipistrelle (*Pipistrellus nathusii)*; and
- Soprano pipistrelle (*Pipistrellus pygmaeus)*.

Moderate risk

- Serotine bat (*Eptesicus serotinus)*; and
- European free-tailed bat (*Tadarida teniotis)*.

Bat studies using a hand-held detector are based on the transect method as recommended by the Bat Conservation Trust Guide (Hundt, 2012). The transects were performed using an off-road vehicle with a constant speed of 24 km / h. The advertising of bats (echolocation) was monitored during the entire trajectory of the transect by directing the detector at an angle of 45 degrees in the direction of movement. Bat activity was recorded using a Pettersson D240X handheld detector, and the advertisement was recorded on a dictaphone. The locations where the bats were detected were recorded using GPS. The time spent collecting data using a hand-held detector was used to calculate the bat activity index (number of contacts with bats per research hour), namely:

- One field tour every 10 days, two whole nights in September, the first half of the night in October (from September 1, 2015 to October 31, 2015);
- One field tour every 10 days (weather permitting) first half of the night (from 1 November 2015 to 15 December 2015
- One field tour every 10 days, first half of the night (from 15 February 2016 to 30 March 2016.);
- One field tour every 10 days, twice in the first half of the night and one full night in May (from March 15, 2016 to May 15, 2016.); and
- One tour every other week, all night (June 1, 2016 - July 15, 2016.).

Automatic detectors were installed in each of the four clusters of the planned Krivača wind farm. They were turned on for at least one night, during which a hand-held detector was used. They were installed in locations intended for the installation of wind turbine poles.

During the monitoring, all caves within a radius of 5 km from the planned locations of wind turbines were visited, as well as abandoned houses and barns in the nearby villages of Krivača, Rakova bara and near the location planned for the construction of a wind farm.

The research of the wider subject area included the following areas:

- Golubac gorge;
- Gorge Brnjička reka;
- Surroundings of the villages Maleševo, Dvorište, Krivača, Rakova Bara, Radenka.

In the Golubac gorge, research was carried out from the mouth of the Brnjica river into the Danube to Golubac. Records of the present birds of aquatic habitats were kept, as well as other birds (primarily birds of prey).

The gorge of the Brnjica river was explored in the following way: from the village of Brnjica to the entrance to the canyon, from the outskirts of the village of Radenka to the entrance to the canyon, from the place called Sokolovica, which is located between Jelenske stene and Venac (from where most of the gorge can be seen), from the end point on Debelo Brdo (which is above the left side of the gorge, from where you can see most of the gorge).

For efficiency and maximum use of time, field activities are planned as full-day. In order to record owls, they occasionally stayed in certain habitats at night.

Table no. 8: *Position and description of the restricted transect (OT), which moved on foot to the locations provided for wind turbines, where the census was performed at the point*

Restricted transect number	Starting position coordinates	Description of the restricted transect
RT 1	N 44 35 240 E 021 39 532	An access road that leads from the outskirts of the village of Krivača to the measuring pole on Golo Brdo
RT 2	N 44 36 332 E 021 41 339	An access road leading from the outskirts of the village of Krivača to the measuring pole on Debelo Brdo.
RT 3	N 44 36 332 E 021 41 339	An access road leading from the outskirts of the village of Krivača to Venac.
RT 4	N 44 35 166 E 021 39 768	A rural road that starts from the turnoff from the Krivača-Rakova Bara road and leads to Tilva.
RT 5	N 44 35 161 E 021 41 870	An access road that leads from the turnoff from the Krivača-Radenko road to Rakobarski Vis.

Table no. 9: *Position and description of census points (CP) - green fields of wind turbines under construction*

Census point number	Description of the census point
CP 1	Measuring column on Golo Brdo, location of wind generator No. 1 on Venac.
CP 2	Location of wind generator no. 2 on Venac.
CP 3	Location of wind generator no. 3 on Venac.
CP 4	Location of wind generator no. 4 on Venac.
CP 5	Location of wind generator no. 5 on Venac.
CP 6	Location of wind generator no. 6 on Venac.

CP 7	Location of wind generator no. 7 on Venac.
CP 8	Location of wind generator no. 8 on Venac.
CP 9	Location of wind generator no. 9 on Venac.
CP 10	Location of wind generator no.10 on Venac.
CP 11	Location of wind generator no.11 on Venac.
CP 12	Location of wind generator no.12 on Venac.
CP 13	Location of wind generator no.13 on Venac.
CP 14	Location of wind generator no.14 on Venac.
CP 15	Location of wind generator no.15 on Venac.
CP 16	Location of wind generator no.1 on Debelo brdo.
CP 17	Location of wind generator no.2 on Debelo brdo.
CP 18	Location of wind generator no.3 on Debelo brdo.
CP 19	Location of wind generator no.4 on Debelo brdo.
CP 20	Location of wind generator no.5 on Debelo brdo
CP 21	Location of wind generator no.6 on Debelo brdo
CP 22	Location of wind generator no.7 on Debelo brdo
CP 23	Location of wind generator no.8 on Debelo brdo.
CP 24	Location of wind generator no.9 on Debelo brdo
CP 25	Location of wind generator no.10 on Debelo brdo
CP 26	Location of wind generator no.11 on Debelo brdo
CP 27	Location of wind generator no.1 on Rakobarski Vis.
CP 28	Location of wind generator no.2 on Rakobarski Vis.
CP 29	Location of wind generator no.3 on Rakobarski Vis.
CP 30	Location of wind generator no.4 on Rakobarski Vis.
CP 31	Location of wind generator no.5 on Rakobarski Vis.
CP 32	Location of wind generator no.6 on Rakobarski Vis.
CP 33	Location of wind generator no.7 on Rakobarski Vis.
CP 34	Location of wind generator no.1 on Tilva.
CP 35	Location of wind generator no.2 on Tilva.
CP 36	Location of wind generator no.3 on Tilva
CP 37	Location of wind generator no.4 on Tilva
CP 38	Location of wind generator no.5 on Tilva.

Positions of favorable points from which bird activity was recorded during the monitoring conducted in 2015-2016, as well as transect routes and positions of points from which the presence and activity of nocturnal bird species were recorded are given in Figures 12 and 13.

Details on the research of nestlings by the transect method are given in Table no. 10.

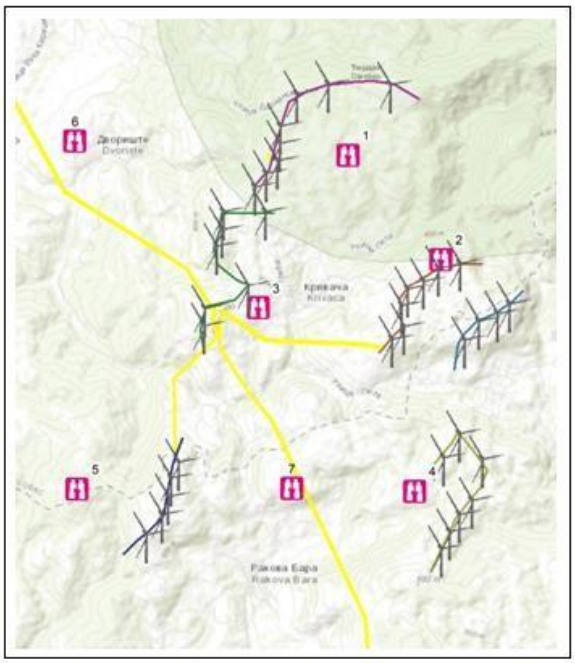


Figure no. 12: *Positions of favorable points and transect routes*

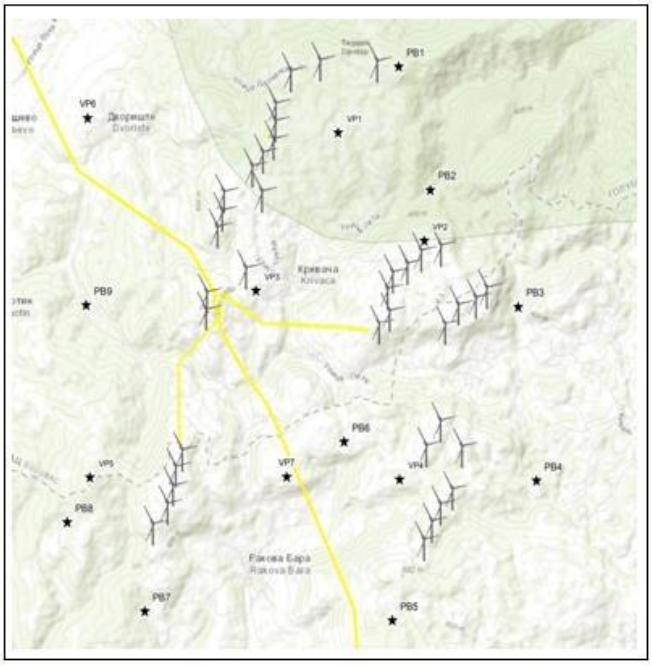


Figure no. 13 *Positions of points for studying nocturnal bird species*

Table no. 10: *Detailed data on realized transects*

Transect	Date	Time	Length (km)
1	*07/05/2016*	*3.283*	***4.00***
1	*16/05/2016*	*3.533*	***4.00***
1	*09/06/2016*	*3.467*	***4.00***
2	*07/05/2016*	*3.683*	***4.17***
2	*16/05/2016*	*3.617*	***4.17***
2	*10/06/2016*	*3.867*	***4.17***
3	*08/05/2016*	*2.517*	***2.73***
3	*15/05/2016*	*2.700*	***2.73***
3	*10/06/2016*	*2.783*	***2.73***
4	*08/05/2016*	*1.750*	***1.94***
4	*14/05/2016*	*1.867*	***1.94***

4	*08/06/2016*	*1.917*	***1.94***
5	*09/05/2016*	*2.150*	***2.36***
5	*15/05/2016*	*2.400*	***2.36***
5	*08/06/2016*	*2.483*	***2.36***
6	*09/05/2016*	*3.183*	***3.65***
6	*14/05/2016*	*2.967*	***3.65***
6	***09/06/2016***	***3.033***	***3.65***

2.6.5. Habitats

In the Study "Analysis of the impact of the planned wind farm" Krivača "on birds and bats" (*Zoran Milovanović, January 2015*), the research covered a narrower and wider area:

- the narrower area includes locations where the construction of wind turbines and their immediate surroundings is planned, and these include: Venac, Debelo brdo and Tilva;
- the wider area of research included: Golubac gorge (from Brnjica to Golubac), Brnjica river canyon (Đerdap National Park area), the surroundings of the villages of Maleševo, Dvorište, Rakova Bara, Radenka and Krivača.

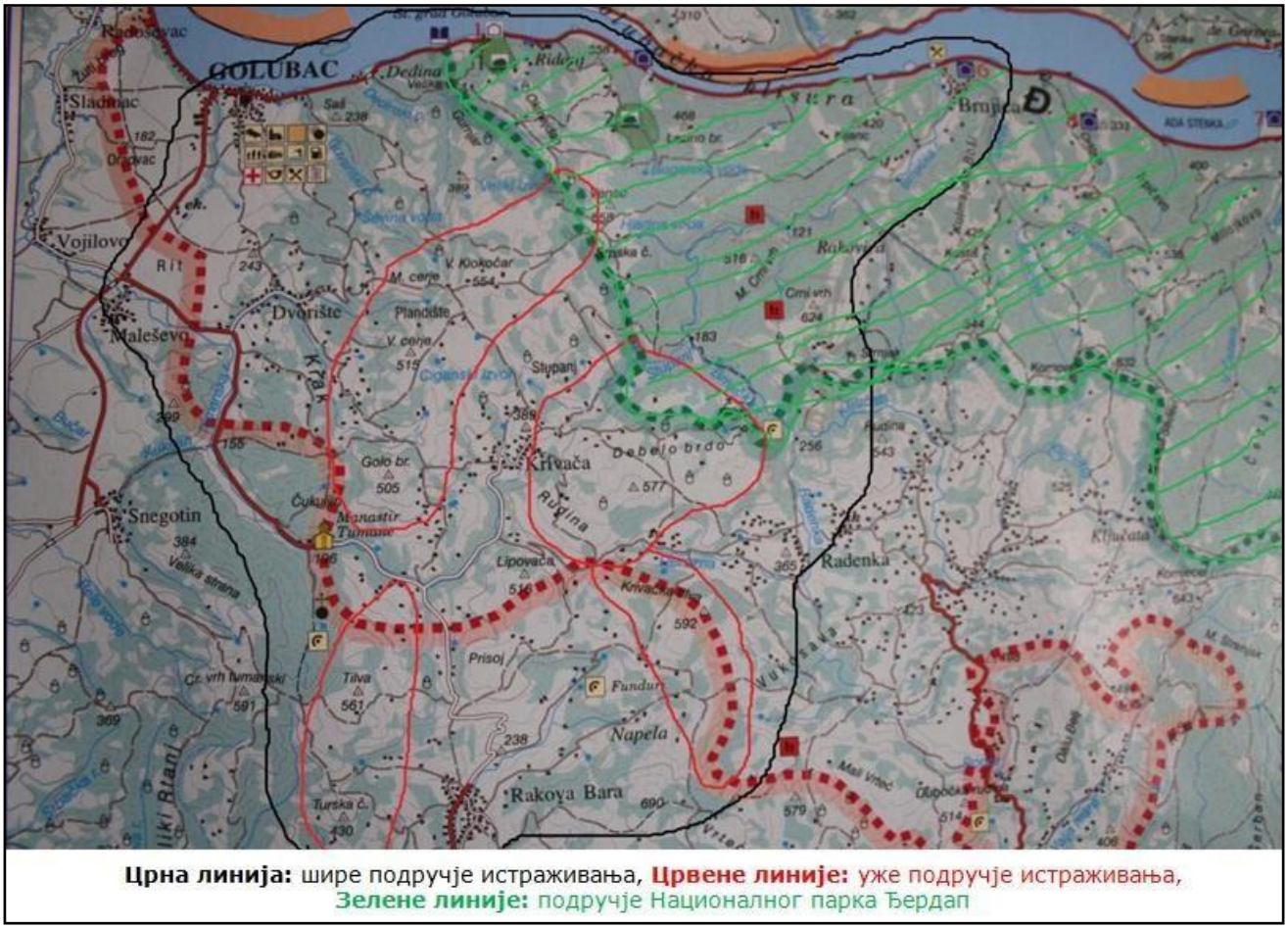


Figure no. 14: *Bird and Bat Research Area*

2.6.5.1. Habitats in the already investigated area

Venac - includes a hill that stretches not far from the border of the National Park " Đerdap ", to a place called Golo brdo. Venac stretches in a semicircle north of the village of Krivača. In the area of Venc, the construction of wind generators is planned at the following locations:

- Golo brdo,
- Veliko Cerje and
- Veliki Klokočar.

Planned locations are located on private plots (meadows, pastures). Individual trees and shrubs are present in meadows, mornings and pastures. From the border of the National Park "Đerdap" along Venac to Golo brdo, there is a rural (dirt) road that separates in several places and leads to the village of Krivača.

Meadows and arable land are surrounded by forest (sometimes forest fragments). The rural roads that cross this area are used occasionally and occasionally by the locals and the local population. On the stretch from the border of the National Park "Đerdap" along Venac to Golo brdo, there are five houses (individual households), in which the locals stay occasionally. An overview of the Venac habitat can be seen in Figures 15 and 16..

Figure no. 15: *Habitat "Venac" - meadows, pastures, rural roads, forest fragments, individual households, Stupanjksa river*

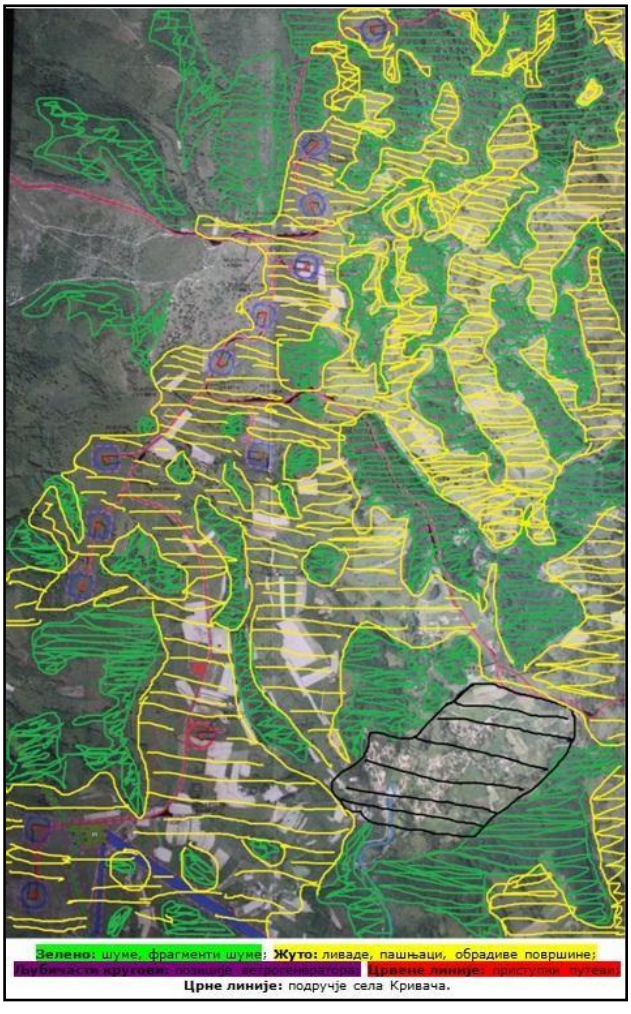


Figure no. 16: *Habitats on "Venac" – schematic overview*

Debelo brdo - stretches from the border of the National Park "Đerdap" (gorge of the Brnjica river) and descends to the macadam road that leads and connects the village of Krivača and the village of Radenka. Rakobarska tilva rises on the other side of the road. It is located southeast of the village of Krivača. Habitats on Debelo brdo consist of: meadows, pastures and arable land, rough grazing along rural roads, forests (mostly beech Fagus sp. And oak Quercus sp.)**,** Figure no. 17 and 18.

Figure no. 17: *Habitat "Debelo brdo" - meadows, pastures and arable land, mornings along rural roads*

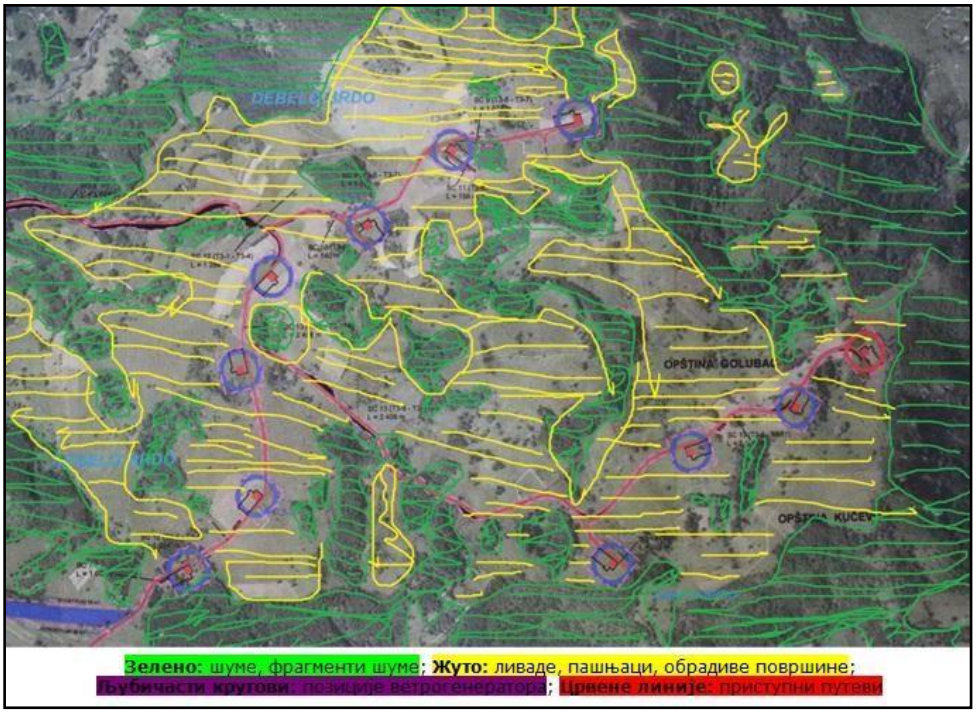


Figure no. 18: *Habitats on "Debelo Brdo" – schematic overview*

Tilva - Tilva hill stretches northwest of the village of Rakova bara. The locations are on meadows, mornings, where there are individual trees, and which are surrounded by bushes and woods. Tilva habitats include: meadows, pastures, rough grazing, mixed forests (beech Fagus sp., Oak Quercus sp. and hornbeam Carpinus sp.) and arable land.

Figure no. 19: *Habitat "Tilva" - meadows, pastures, rough grazing, mixed forests and arable land*

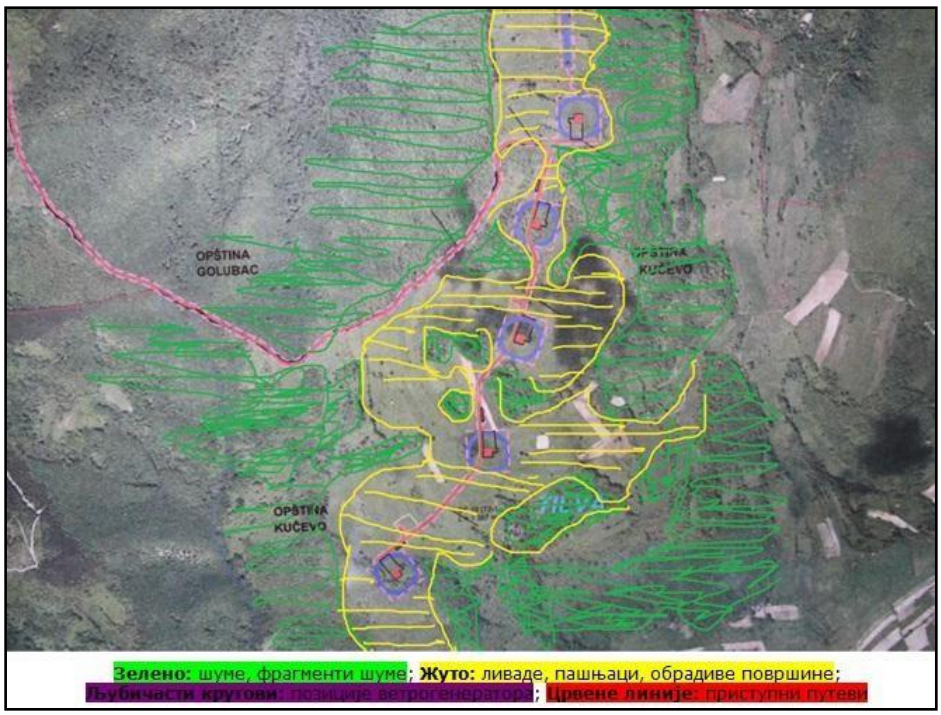


Figure no. 20: *Tilva habitats – schematic overview*

2.6.5.2. Habitats in a wider research area

The area of research in the Golubac gorge included the area from the mouth of the Brnjica river to Golubac. The habitat consists of: the course of the Danube, the coast, the fortification of the town of Golubac, the cliffs of Veliki Košar near the town of Golubac.

Figure no. 21: *Danube near town of Golubac*

Figure no. 22: *Veliki Košar cliffs near town of Golubac*

Figure no. 23: *Golubac Gorge area - schematic (red hatch)*

The gorge of the Brnjica river - since the area where the construction of the wind farm "Krivača" is planned is near the gorge of the Brnjica river, the habitats of the Brnjica river are important for life activity in the life activity below which they are. The gorge of the Brnjica river belongs to the area of the National Park " Đerdap". The area of the National Park "Đerdap" is

an internationally important area for birds - IBA area (Puzović et al. 2009). The Brnjica river flows into the Danube near the village of Brnjice.

The border of the Đerdap National Park stretches along the highest part of the left side of the gorge. It is an integral valley. In the first widest part of the Brnjica gorge, from the village of Brnjica to the mouth of the river Mala Rakovica, there are black alder (Alnetum glutinosae) forests and the content of black alder and poplar (Populetinos-Alene). On the right bank of the river, there is a forest of malt and Hungarian oak (Kuercetum frainetto-cerris) in the lower part, and silver linden and beech (Tilio tomentosae-Fagetum submontanum) in the upper part. On the left bank of the river is a forest of linden and beech, which extends all the way to the top of Sokolovica. From the stream Mala Rakovica upwards is a mosaic of relict communities in the gorge and canyon of Brnjica, on limestones with species: linden, downy oak, South European flowering ash, hornbeam, lilac, smoketree ,the mahaleb cherry the Montpellier maple and others. There are communities: in the bays of beech and linden, on the wider sides of lily of the valley and cera with lilac (*Quercetum cerris-virgilianae syringetosum),* hornbeam and lilac *(Siringo-Carpinetum orientalis)*, on maple and ash with lilac (Aceri-Fraxinetum syringetosum), on the steep sides there are lilac bushes (*Siringetum-i).*

The Brnjica gorge is a habitat, among others, of several species of birds that are rare and endangered. Among them are: golden eagle (Aquila chrisaetos) and peregrine falcon (Falco peregrinus*)*.

Figure no. 24: *View of the gorge of the Brnjica river*

Figure no. 25: *Brnjica river*

Figure no. 26: *Gorge of the Brnjica River - red hatch and the area of the National Park " Đerdap" - green line*

Rakobarski Venac - is located near the village of Rakova bara. At the foot of Rakobarski Venac on the west side is the Funduri cave. Rural roads lead to Rakobarski Venac from the direction of the village of Rakova bara, and from the road that connects the villages of Krivača and Radenka. Habitats of Rakobarski venac consist of: meadows, pastures, rough grazing, forests (beech, oak, hornbeam) and arable land. At the foot of Rakobrski Venac in the wide surroundings of the village of Rakova bara, there are rural households (where locals occasionally stay during the year).

Figure no. 27: *The area at the foot of Rakobarski Venac, the road that connects the village of Krivača and Rakova Bara*

Figure no. 28: *Habitats on "Rakobarski Venac"*

2.6.6. Bird research January 2014 / December 2014.

Basic data on birds and bats at the location "Krivača" were obtained through fieldwork during 12 months, in the period January 2014 - December 2014. Planning of field work (time, method of research) is significantly facilitated by knowledge of the wider subject area that was researched in the period 2010-2011 by the author (Grubač, B., Milovanović, Z., Šekler, M. 2013.) Also, it is certainly easier to get acquainted in detail with the researched area on the basis of available literature: Spatial plan of the municipalities of Golubac and Kučevo, Plan of detailed regulation of the wind farm "Krivača" and other national and international documentation and data.

Table no. 11: *Dynamics of field activities in the period January 2014 - December 2014*

Month	Days of the month	Number of days	Number of hours
January	18,19	2	16
February	15,16	2	16
March	9,22,23	3	30
April	12,13,20	3	30
May	10,11,24,25	4	48
June	14,15,21,22	4	48
July	12,13,19,20	4	48
August	16,17,23,24	4	48
September	13,14,21	3	30

October	11,12,19	3	30
November	16,23,29	3	24
December	13,14,21,28	4	32
Total days		**39**	**400**

2.6.7. Sampling and processing

The beginning of the Study of the impact of the wind farm on birds, included preparation in the form of collecting and analyzing all the necessary information (map of the area, map of bird distribution, map of bird migration). The data collection technique for the Study was adapted to the number, position and size of the wind turbines. As the rotational zone of the turbine can be from 29 m to 200 m above the ground, everything was taken into account: both high-flying and low-flying bird species.

2.6.8. Results of bird research

In the researched area, in the period from January 2014 to December 2014, a total of 107 bird species were recorded. A total of 64 bird species were recorded in the narrower area of research (Venac, Debelo brdo Tilva). Out of the stated total number of recorded bird species, 66 species were marked as sensitive - target species.

In Table no. 12, a list of birds recorded in the study area, their nesting status and international and national conservation status is given.

Table no. 12: *List of bird species recorded in the study area, their nesting status, national and international conservation status*

Ord. no.	Species name	Nesting status	Protection in Serbia	International protection
1.	Little grebe *Tachybaptus ruficollis*	GS **	ZVS-1	Be-II
2.	Great crested grebe *Podiceps cristatus*	GS	ZVS-1	Be -III
3.	Great cormorant *Phalacrocorax carbo*	GS	L	Be -III
4.	Pygmy cormorant *Phalacrocorax pygmeus*	GS **	ZVS-1	Be-II, Bo-II, DP-I, SPEC-1, g-IUCNrl NI/A2c,A3c
5.	Little egret *Egretta garzetta*	GSel	ZVS-1	Be-II, DP-I
6.	Great egret *Casmerodius albus*	Z (L, mGS)	ZVS-1	Be-II -II, Bo-II, DP-I
7.	Grey heron *Ardea cinerea*	GS	L	Be-III
8.	White stork *Ciconia ciconia*	GSel	ZVS-1	Be-II, Bo-II, DP-I, SPEC-2
9.	Mute swan *Cygnus olor*	GS	ZVS-2	Be-III, Bo-II, DP-II/2, SPEC-e
10.	Greater white-fronted goose *Anser albifrons*	Z	L	Be-III, Bo-II, DP-2/B
11.	Mallard *Anas platyrhynchos*	GS	L	Be-III, Bo-II, DP-II/1,III/1
12.	Common pochard *Aythya ferina*	GS	L	Be-III, Bo-II, DP-2/1, 3/2, SPEC-2
13.	Tufted duck *Aythya fuligula*	GS, Z	ZVS-1	Be-III, Bo-II, DP-2/1, 3/2, SPEC-3

14.	Common goldeneye *Bucephala clangula*	Z	ZVS-1	Be-III, Bo-II, DP-2/2
15.	Red-breasted merganser *Mergus serrator*	Z	ZVS-1	Be-III, Bo-II, DP-2/2
16.	Hen harrier *Circus cyaneus*	Z	ZVS-1	Be-II, Bo-II, DP-1 SPEC-3
17.	European honey buzzard *Pernis apivorus*	GSel	ZVS-1	Be-II, Bo-II, DP-1, C-2, SPEC-e
18.	White-tailed eagle *Haliaeetus albicilla*	GS	ZVS-1	Be-II, Bo-II, DP-1, C-1, SPEC-1, g-IUCN rl NT
19.	Short-toed snake eagle *Circaetus gallicus*	GSel	ZVS-1	Be-II, Bo-II, DP-1, C-2, SPEC-3
20.	Northern goshawk *Accipiter gentilis*	GS	L	Be-II, Bo-II, C-II
21.	Eurasian sparrowhawk *Accipiter nisus*	GS	ZVS-1	Be-II, Bo-II, C-II
22.	Common buzzard *Buteo buteo*	GS	ZVS-1	Be-II, Bo-II, DP-I, C-II
23.	Rough-legged buzzard *Buteo lagopus*	Z	ZVS-1	Be-II, Bo-II, C-2
24.	Golden eagle *Aquila chrysaetos*	GS	ZVS-1	Be-II, Bo-II, DP-1, C-2, SPEC-3
25.	Booted eagle *Hieraaetus pennatus*	vGSel	ZVS-1	Be-II, Bo-II, DP-1, C-2, SPEC-3
26.	Common kestrel *Falco tinnunculus*	GS	ZVS-1	Be-II, Bo-II, C-II, SPEC-3
27.	Eurasian hobby *Falco subbuteo*	GSel	ZVS-1	Be-II, Bo-II, C-II
28.	Peregrine falcon *Falco peregrinus*	GS	ZVS-1	Be-II, Bo-II, DP-1, C-1
29.	Grey partridge *Perdix perdix*	GS	L	Be-III, DP-II/1,III/1 SPEC-3, e-IUCn rl VU
30.	Common quail *Coturnix coturnix*	GSel	L	Be-III, Bo-II, DP-II/2, SPEC-3
31.	Ring-necked Pheasant *Phasianus colchicus*	Int. (GS)	L	Be-III, DP-II/1, 3/1
32.	Corn crake *Crex crex*	GSel	ZVS-1	Be-II, Bo-II, DP-1, SPEC-1, g-IUCN rl NT
33.	Eurasian coot *Fulica atra*	GS	L	Be-III, DP-2/1, 3/2
34.	Eurasian woodcock *Scolopax rusticola*	G-S/Sel	ZVS-1*** (****L)	Be-III, Bo-II, DP-2/1, 3/2, SPEC-3
35.	Common sandpiper *Actitis hypoleucos*	P(mGSel)	ZVS-1	Be-II, Bo-II, SPEC-3
36.	Black-headed gull *Larus ridibundus*	S (L)	ZVS-2	Be-III, DP-2/2, SPEC-e
37.	Caspian gull *Larus cachinnans*	L (S)	ZVS-2	DP-2/2, SPEC-e
38.	Common tern *Sterna hirundo*	GSel	ZVS-1	Be-II, Bo-II, DP-1

39.	Rock dove *Columba livia*	GS	ZVS-1 (L)	Be-III, DP-2
40.	Common wood pigeon *Columba palumbus*	GS /Sel	L	DP-II/1,III/1, SPEC-e
41.	Eurasian collared dove *Streptopelia decaocto*	GS	L	Be-III, DP-2/2
42.	European turtle dove *Streptopelia turtur*	GSel	L	Be-III, Bo-II, DP-II/2,SPEC-3
43.	Common cuckoo *Cuculus canorus*	GSel	ZVS-1	Be-III
44.	Eurasian scops owl *Otus scops*	GSel	ZVS-1	Be-II, C-2,SPEC-2
45.	Eurasian eagle-owl *Bubo bubo*	GS	ZVS-1	Be-II, DP-1, C-2, SPEC-3
46.	Little owl *Athene noctua*	GS	ZVS-1	Be-II, C-2, SPEC-3
47.	Tawny owl *Strix aluco*	GS	ZVS-1	Be-II, C-2, SPEC-e
48.	Ural owl *Strix uralensis*	GS	ZVS-1	Be-II, DP-1, C-2
49.	Long-eared owl *Asio otus*	GS	ZVS-1	Be-II, C-2
50.	European nightjar *Caprimulgus europaeus*	GSel	ZVS-1	Be-II, DP-1, SPEC-2
51.	Alpine swift *Tachimarptis melba*	GSel	ZVS-1	Be-II
52.	Common kingfisher *Alcedo atthis*	GS	ZVS-1	Be-II, DP-1, SPEC-3
53.	European bee-eater *Merops apiaster*	GSel	ZVS-1	Be-II, Bo-II, SPEC-3
54.	Eurasian hoopoe *Upupa epops*	GSel	ZVS-1	Be-II, SPEC-3
55.	Black woodpecker *Dryocopus martius*	GS	ZVS-1	Be-II, DP-1
56.	Grey-headed woodpecker *Picus canus*	GS	ZVS-1	Be-II, DP-1, SPEC-3
57.	European green woodpecker *Picus viridis*	GS	ZVS-1	Be-II,SPEC-2
58.	Great spotted woodpecker *Dendrocopos major*	GS	ZVS-1	Be-II
59.	Syrian woodpecker *Dendrocopos syriacus*	GS	ZVS-1	Be-II, DP-1, SPEC -e
60.	Middle spotted woodpecker *Dendrocopos medius*	GS	ZVS-1	Be-II, DP-1, SPEC –e
61.	White-backed woodpecker *Dendrocopos leucotos*	GS	ZVS-1	Be-II, DP-1
62.	Lesser spotted	GS	ZVS-1	Be-II

	woodpecker *Dendrocopos minor*			
63.	Crested lark *Galerida cristata*	GS	ZVS-1	SPEC-3
64.	Woodlark *Lullula arborea*	GS	ZVS-1	Be-III, DP-1, SPEC-2
65.	Eurasian skylark *Alauda arvensis*	GS	ZVS-1	Be-II, DP-2/2, SPEC-3
66.	Barn swallow *Hirundo rustica*	GSel	ZVS-1	Be-II, SPEC-3
67.	Common house martin *Delichon urbica*	GSel	ZVS-1	Be-II, SPEC-3
68.	Tree pipit *Anthus trivialis*	GSel	ZVS-1	Be-II
69.	Grey wagtail *Motacilla cinerea*	GS	ZVS-1	Be-II
70.	White wagtail *Motacilla alba*	GS	ZVS-1	Be-II
71.	White-throated dipper *Cinclus cinclus*	GS	ZVS-1	Be-II
72.	Eurasian wren *Troglodytes troglodytes*	GS	ZVS-1	Be-II, Bo-II
73.	European robin *Erithacus rubecula*	GS	ZVS-1	Be-II, Bo-II, SPEC-e
74.	Common nightingale *Luscinia megarhynchos*	GSel	ZVS-1	Be-II, Bo-II, SPEC-e
75.	Black redstart *Phoenicurus ochruros*	GS	ZVS-1	Be-II, Bo-II
76.	Whinchat *Saxicola rubetra*	vP (mGSel)	ZVS-1	Be-II, Bo-II, SPEC-e
77.	Common blackbird *Turdus merula*	GS	ZVS-1	Be-III, Bo-II, DP-2/2, SPEC-e
78.	Fieldfare *Turdus pilaris*	Z	ZVS-1	Be-III, Bo-II, DP-2/2, SPEC-eW
79.	Song thrush *Turdus philomelos*	GSel	ZVS-1	Be-III, Bo-II, DP-II/2, SPEC-e
80.	Mistle thrush *Turdus viscivorus*	GS	ZVS-1	Be-III, Bo-II, DP-2/2, SPEC-e
81.	Icterine warbler *Hippolais icterina*	GS	ZVS-1	Be-II, Bo-II, SPEC-e
82.	Common whitethroat *Sylvia communis*	GSel	ZVS-1	Be-II, Bo-II, SPEC-e
83.	Eurasian blackcap *Sylvia atricapilla*	GSel	ZVS-1	Be-II, Bo-II, SPEC-e
84.	Common chiffchaff *Phylloscopus collybita*	GSel	ZVS-1	Be-II, Bo-II
85.	Long-tailed tit *Aegithalos caudatus*	GS	ZVS-1	Be-II
86.	Marsh tit	GS	ZVS-1	Be-II, SPEC-3
	Parus palustris		ZVS-1	
87.	Great tit *Parus major*	GS	ZVS-1	Be-II
88.	Eurasian blue tit *Parus caeruleus*	GS	ZVS-1	Be-II, SPEC-e
89.	Eurasian nuthatch	GS	ZVS-1	Be-II

	Sitta europaea			
90.	Red-backed shrike *Lanius collurio*	GSel	ZVS-1	Be-II, DP-I, SPEC-3
91.	Great grey shrike *Lanius excubitor*	Z	ZVS-1	Be-II, SPEC-3
92.	Eurasian jay *Garrulus glandarius*	GS	L	DP-II/2
93.	Eurasian magpie *Pica pica*	GS	ZVS-2	DP-II/2
94.	Western jackdaw *Corvus monedula*	GS	ZVS-2	DP-II/2, SPEC-e
95.	Hooded crow *Corvus cornix*	GS	ZVS-2	-
96.	Common raven *Corvus corax*	GS	ZVS-2	Be-III
97.	Common starling *Sturnus vulgaris*	GS	ZVS-2	DP-2/B, SPEC-3
98.	House sparrow *Passer domesticus*	GS	ZVS-2	SPEC-3
99.	Eurasian tree sparrow *Passer montanus*	GS	ZVS-2	Be-III, SPEC-3
100.	Common chaffinch *Fringilla coelebs*	GS	ZVS-1	Be-III, SPEC-e
101.	European goldfinch *Carduelis carduelis*	GS	ZVS-1	Be-II
102.	Eurasian bullfinch *Pyrrhula pyrrhula*	GS	ZVS-1	-
103.	Hawfinch *Coccothraustes coccothraustes*	GS	ZVS-1	-
104.	Yellowhammer *Emberiza citrinella*	GS	ZVS-1	Be-II, SPEC-e
105.	Rock bunting *Emberiza cia*	GS	ZVS-1	Be-II, SPEC-3
106.	Cirl bunting *Emberiza cirlus*	GS	ZVS-1	Be-II, SPEC-e
107.	Corn bunting *Miliaria calandra*	GS	ZVS-1	Be-III, SPEC-2

Legend:

Nesting status: S - Sedentary bird resident; SG - resident-nesting; GSel - nesting-migratory; L - wanderer; P - species in migration or passage and Z - wintering. Along with the migratory status (S; SG; L and P) there are lowercase letters: d - proven migratory status of the species; c - probable and m - possible migratory status of the species.

Protection in Serbia: ZVS-1 and ZVS-2 - a species protected by the Rulebook on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi; under code 1 refers to strictly and code 2 to a protected species in Serbia (Official Gazette of the Republic of Serbia No. 5/2010); **** - a species that is protected in areas up to 500 m above sea level; L-species whose status and protection regime is regulated by the Law on Wildlife and Hunting of Serbia.

International protection: Be - a species protected by the Berne Convention - with an appropriate appendix (Annex II - a strictly protected species; III - a protected species that is hunted or exploited in any way); Bo - a species protected by the Bonn Convention with the corresponding appendix (II-); S - species protected by the Washington Convention with an appropriate appendix; SPEC - 1 - globally endangered species; SPEC - 2 - a species whose conservation status is unfavorable in Europe and its main populations are in Europe; SPEC-3 - species whose conservation status is unfavorable in Europe, but its main populations are outside Europe; SPECs - a species whose conservation status is favorable in Europe and its main populations are in Europe; SOE - European Commission Birds Directive 2009/147; Annex I - Annex 1 (strictly protected species); Annex II - Annex 2 (protected species).

Figure no. 29: *Common buzzard (Buteo buteo) one of the most common bird species* ***Figure no. 30:*** *Common raven (Corvus corax) a species that is constantly present in the area*

2.6.9. Number, distribution and time of appearance of birds

For the purpose of insight into the number of recorded species in the subject area, the estimation of the nesting population in Serbia and the direction of the nesting population trend is presented (Puzović et al. 2003), as well as the presence in the investigated area. Bird species recorded in the narrower area of research are marked with a dark font (Table 13).

Table no. 13: *Overview of bird species recorded in the research area, estimation of the nesting population in Serbia (estimation of the number of pairs), direction of the nesting population trend (increase, decrease, fluctuation, stability), presence in the research area*

Marked in bold: bird species recorded in the already researched area (Venac, Debelo brdo, Rakobarski Vis, Tilva)

Ord.no	Species name	Estimation of nesting population in Serbia	The trend direction of the nesting population	Presence in the research area (period / habitat / frequency / number)
1.	*Tachybaptus ruficollis*	4.500-7.000	Stability	November-February / Danube from Brnjica to Golubac / regularly, few (individual individuals, several individuals).
2.	*Podiceps cristatus*	1.300-2.100	Increase	October-February / Danube from Brnjica to Golubac / regularly, few (individual units, 2-4 units).
3.	*Phalacrocorax carbo*	1.000-1.200	Increase	November-February / Danube from Brnjice to Golubac / regularly, several individuals, smaller flocks..
4.	*Phalacrocorax pygmeus*	350-500	Increase	November-February / Danube from Brnjica to Golubac / regularly,

				individual individuals, several individuals.
5.	*Egretta garzetta*	650-850	Increase	July-August / Danube from Brnjice to Golubac town / irregular, few (individual units).
6.	*Casmerodius albus*	200-300	Increase	August-March / Danube from Brnjice toGolubac town / irregular, few (individual units).
7.	*Ardea cinerea*	2.100-2.400	Increase	November-March / Danube from Brnjica to Golubac town / occasionally, few (individual units).
8.	***Ciconia ciconia***	1.100-1.250	Stability	**March-August / Golubac, regular nesting / Krivača area, occasionally-migration, food / regular on nesting (1 pair), on migration regularly (max. 20 individuals).**
9.	*Cygnus olor*	50-60	Increase	November-March / Danube near Brnjica / regularly (max. 8 individuals).
10.	***Anser albifrons***			**December-January / Krivača area / overflight (max. 80 units).**
11.	***Anas platyrhynchos***	**70.000-90.000**	**Decrease**	**Throughout the year / Danube from Brnjice to Golubac, area Rakobarski Vis / On the Danube fly-smaller groups, families, in winter smaller flocks / Regular, in the wider area of Krivača in winter in flight (max. 50 individuals).**
12.	*Aythya ferina*	750-1.000	Increase	November-March / Danube from Brnjica to Golubac / regular, smaller flocks (max. 50 individuals).
13.	*Aythya fuligula*	30-50	Stability	November-March / Danube from Brnjica to Golubac town / regular, smaller flocks (max. 60 individuals).
14.	*Bucephala clangula*			November-February / Danube near Golubac town / regularly, few (max. 20 individuals).
15.	*Mergus serrator*			December-February / Danube near Brnjica / regularly, few.
16.	***Circus cyaneus***			**December-January / fields and rough grazing near the villages of Maleševo and Rakova Bara / regularly, few (individual units).**
17.	***Pernis apivorus***	**550-700**	**Increase**	**June-August / Brnjica river gorge / regular, few (2 individuals).**
18.	*Haliaeetus*	52-58	Increase	Throughout the year / Golubac

	albicilla			gorge / occasionally (1 individual, two birds-pair).
19.	***Circaetus gallicus***	**75-90**	**Stability**	**April-July / Brnjica river gorge, Golubac gorge / occasionally (individual units).**
20.	***Accipiter gentilis***	**1.400-1.800**	**Stability**	**Throughout the year / Gorge of the river Brnjica, the outskirts of the village Rakova Bara, Krivača, Radenka / regular (few, individual).**
21.	***Accipiter nisus***	**700-900**	**Stability**	**Throughout the year / Gorge of the river Brnjica, the outskirts of the villages Rakova Bara, Debelo brdo, Venac, Krivača, Maleševo / regularly (few, individual individuals, pair).**
22.	***Buteo buteo***	**2.600-3.400**	**Stability**	**Throughout the year / in the narrower and wider research area (Brnjica river gorge, Venac, Debelo brdo, Rakobarski vis, Tilva, the outskirts of the villages of Krivača, Brnjica, Rakova Bara, Maleševo, Radenka) / regularly (individual individuals, several individuals in circulation - max. 4 individuals).**
23.	***Buteo lagopus***			**December-February / Field in the vicinity of Maleševo, Venac / occasionally (individual units).**
24.	***Aquila chrysaetos***	**65-77**	**Stability**	**Throughout the year / Golubačka gorge, Brnjica river gorge / occasionally (one specimen, 2 individuals - pair).**
25.	*Hieraaetus pennatus*	8-10	Decrease	May-July / Brnjica River Gorge / occasionally (1 individual).
26.	***Falco tinnunculus***	**3.400-4.000**	**Stability**	**Throughout the year / Brnjica River Gorge, Golubac Gorge, the outskirts of the villages Maleševo, Krivača, Rakova Bara, meadows on Venac and Debelo Brdo / regularly, ordinary single individuals - two individuals-pair).**
27.	***Falco subbuteo***	**420-570**	**Stability**	**July-October / surroundings of the village Dvorište, Rakova Bara / occasionally (1-2 individuals).**
28.	***Falco peregrinus***	**65-80**	**Stability**	**April-August / Brnjica river gorge / regularly (1-2 individuals, pair).**

29.	***Perdix perdix***	**25.000-45.000**	**Decrease**	**Throughout the year / field, mornings on the outskirts of the village** **Maleševa, field and mornings around the village of Rakova Bara,** **meadows, bushes and shrubs on Rakobarski vis, Venac,** **Debelo Brdo, Tilvi / occasionally (max. 10 individuals).**
30.	***Coturnix coturnix***	**8.000-12.000**	**Decrease**	**May-September / Fields around Golubac, Maleševo, Yards,** **Rakove Bare, Krivače, Radenke, Rakobarski Vis / occasionally (1-2, several individuals).**
31.	*Phasianus colchicus*	190.000- 230.000	Fluctuation	Throughout the year / fields around Maleševo, Dvorište, Rakove Bare / occasionally (individual units).
32.	***Crex crex***	**700-1.200**	**Decrease**	**May-August / meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilva / occasionally (individual pairs).**
33.	*Fulica atra*	5.000-7.000	Increase	November-March / Danube from Brnjice to Golubac / regularly, smaller flocks.
34.	***Scolopax rusticola***	**500-800**	**Fluctuation**	**October-February / Around Maleševo, Krivače, Rakove bare / occasionally, few (individual specimens).**
35.	*Actitis hypoleucos*	500-800	Decrease	June-August / Golubac gorge / occasionally, few (individual specimens, 2 individuals).
36.	*Larus ridibundus*	2.500-3.700	Increase	Throughout the year / Danube from Brnjica to Golubac / regular, smaller flocks (max. 40 individuals).
37.	*Larus cachinnans*			Throughout the year / Danube from Brnjica to Golubac / regular (smaller flocks).
38.	*Sterna hirundo*	150-200	Fluctuation	May-July / Danube near Golubac town / irregular (individual units).
39.	*Columba livia*	500-1.000	Decrease	Throughout the year / Golubačka gorge / regularly (max. 20 individuals).
40.	***Columba palumbus***	**60.000-80.000**	**Increase**	**During the nesting season /** **The gorge of the river Brnjica, around the village of Krivača, Rakova Bara,** **Maleševo, Radenka / regular**

				(individuals, pairs, small groups).
41.	***Streptopelia decaocto***	**100.000-300.000**	**Increase**	**Throughout the year / surroundings of Krivača, Rakova Bara, Radenka, Maleševo / regular (individuals, couples).**
42.	***Streptopelia turtur***	**50.000-100.000**	**Decrease**	**During the nesting season / surroundings of the villages Maleševo, Dvorište, Krivača, Rakova Bara / regular (individuals, pairs).**
43.	***Cuculus canorus***	**16.000-22.000**	**Stability**	**May-August / Surroundings of the village of Krivača, Rakova Bara / regular (individual units).**
44.	***Otus scops***	**8.500-11.500**	**Stability**	**May-August / Surroundings of Krivača village, Dvorište / occasionally (individual units).**
45.	***Bubo bubo***	**250-400**	**Decrease**	**Throughout the year / gorge of the river Brnjica / occasionally (1 individual, pair).**
46.	*Athene noctua*	8.500-13.000	Stability	Throughout the year / around the villages Dvorište, Maleševo, Rakova Bara / occasionally (individual units).
47.	***Strix aluco***	**9.500-12.000**	**Stability**	**Throughout the year / gorge of the river Brnjica, surroundings of Rakova bara, wider surroundings of the village Krivača, Venac / occasionally (individual units, 2-3 units).**
48.	***Strix uralensis***	**70-100**	**Stability**	**Throughout the year / Beech forest on Venac / occasionally (1 individual).**
49.	*Asio otus*	9.000-13.000	Increase	Throughout the year / around the village of Maleševo, Dvorište / occasionally (individual units).
50.	***Caprimulgus europaeus***	**3.000-5.000**	**Stability**	**May-October / Venac, near the road Golubac-Meleševo, forest road on Rakobarski vis / irregular (individual units).**
51.	*Tachimarptis melba*	60-100	Stability	In the nesting season / Golubačka klisura-Veliki Košar / regular (max. About 150 individuals)
52.	*Alcedo atthis*	1.200-1.800	Stability	Throughout the year / Danube Danube near Golubac town, gorge of the river Brnjica, Tumanska river, Rakobarska river / occasionally (individual units, 2 units).
53.	*Merops apiaster*	2.600-3.600	Decrease	In the nesting season / In the fields between Golubac and the village of Maleševo / occasionally (max. 10 individuals), it nests in light sections

				near the village of Radoševac.
54.	***Upupa epops***	**8.000-11.000**	**Increase**	**April-August / periphery of the villages Maleševo, Venac, Debelo brdo, Rakova Bara / occasionally (individual units).**
55.	***Dryocopus martius***	**1.400-1.900**	**Increase**	**Throughout the year / gorge of the river Brnjice, Beech forest on Rakobarski Vis, on Venac / occasionally (individuals).**
56.	***Picus canus***	**2.200-2.900**	**Stability**	**Throughout the year / Venac, Debelo brdo / occasionally (individual units).**
57.	***Picus viridis***	**8.000-11.000**	**Decrease**	**Throughout the year / Golo brdo, Venac, Debelo brdo, Rakobarski vis / occasionally (individual).**
58.	***Dendrocopos major***	**140.000-210.000**	**Stability**	**Throughout the year / Venac, near the Tumane Monastery, between Golo brdo and the village of Krivača, Debelo brdo, Rakobarski Vis, Tilva / regular (individual, pair).**
59.	***Dendrocopos syriacus***	**23.000-30.000**	**Increase**	**Throughout the year / periphery of the village Dvorište, Krivača, Rakova Bara. / occasionally (individuals).**
60.	***Dendrocopos medius***	**4.500-7.500**	**Decrease**	**Throughout the year / Periphery of the village Radenka, nearby Tumane Monastery, the outskirts of the village of Rakova Bara. / occasionally (individuals).**
61.	***Dendrocopos leucotos***	**400-700**	**Stability**	**Током целе године / букова шума на Венцу / повремено (1 јединка).**
62.	*Dendrocopos minor*	3.000-4.500	Stability	Throughout the year / periphery of the village of Krivača, Rakova Bara, near the Tumane Monastery / occasionally (individual units).
63.	***Galerida cristata***	**38.000-52.000**	**Decrease**	**Throughout the year / Venac, Debelo brdo, surroundings of the village Maleševo, Krivača, Dvorište, Rakova Bara / occasionally (individuals, pair).**
64.	***Lullula arborea***	**8.500-12.000**	**Decrease**	**Throughout the year / Venac, Debelo brdo, Rakobarski Vis, surroundings of the village Rakova Bara. / regularly (individuals, pairs, several**

				individuals).
65.	***Alauda arvensis***	**300.000-400.000**	**Decrease**	**Throughout the year / On the meadows near the place called Prisoj below Rakobarski Vis, Rakobarski Vis, Venac, Debelo brdo, Golo brdo, Tilva / regular (one, two and several individuals)**
66.	*Hirundo rustica*	200.000-350.000	Decrease	In the nesting season / in the villages: Maleševo, Krivača, Rakova Bara / regularly (smaller flocks, families).
67.	*Delichon urbica*	130.000-200.000	Stability	During the nesting season / Brnjica village, Dvorište, Rakova Bara / regularly (more pairs, smaller flocks).
68.	***Anthus trivialis***	**25.000-35.000**	**Decrease**	**During the nesting season / Venac, Rakobarski Vis, Tilva, Debelo brdo / regularly (individual individuals, several individuals, family).**
69.	*Motacilla cinerea*	5.000-8.000	Stability	Throughout the year / Stupanjska river, Rakobarska river, Tumanska river, Brnjička river / occasionally (one, two individuals).
70.	*Motacilla alba*	25.000-40.000	Stability	Throughout the year / Golubac gorge, along the road from the village of Brnjica to the entrance to the canyon of the Brnjica river, along the Brnjica river near the village of Radenka / occasionally (individual individuals, pair).
71.	*Cinclus cinclus*	2.200-3.000	Stability	Throughout the year / Golubac gorge, Brnjicka river, Rakobarska river. irregular (single individuals, pair).
72.	***Troglodytes troglodytes***	**75.000-110.000**	**Stability**	**Throughout the year / Rakobarski Vis, Venac, Stupanjska river, periphery of the village Krivača, Maleševo. / Occasionally (individuals).**
73.	***Erithacus rubecula***	**550.000-750.000**	**Stability**	**Throughout the year / gorge of the river Brnjica, around the monastery Tumane, Venac, Rakobarski Vis, Tilva, Debelo brdo / irregular (single individuals, several individuals).**
74.	*Luscinia megarhynchos*	120.000-200.000	Decrease	During the nesting season / surroundings of the villages

				Dvorište, Rakova Bara, Krivača. irregular (single individuals).
75.	*Phoenicurus ochruros*	30.000-50.000	Increase	Throughout the year / surroundings of the village Brnjica, Golubac gorge / irregular (individuals, pair).
76.	*Saxicola rubetra*	5.500-7.000	Decrease	During the nesting season / periphery of the village Dvorište, Rakova Bara. irregular (single individuals, pair).
77.	***Turdus merula***	**450.000-700.000**	**Stability**	**Throughout the year / Rakobarski Vis, Tilva, Debelo brdo, gorge of the river Brnjice, periphery of the village Maleševa, surroundings of the village Krivača, Golubac gorge Venac, Golo brdo / regularly (individual units).**
78.	***Turdus pilaris***	**0-10**	**Increase**	**During the winter / Debelo brdo, near the village of Rakova Bara, near the village of Maleševo / regularly (individual individuals, several individuals).**
79.	***Turdus philomelos***	**200.000-350.000**	**Stability**	**During the nesting season / surroundings of the village of Krivača, Rakova Bara, the gorge of the river Brnjica. irregular (individual individuals).**
80.	***Turdus viscivorus***	**25.000-40.000**	**Fluctuation**	**Throughout the year / Rakobarski Vis, Tilva Venac, Debelo brdo, near the village of Krivača, Golo brdo / occasionally (single individuals, several individuals).**
81.	*Hippolais icterina*	1.000-1.500	Decrease	During the nesting period / around the village of Maleševo / occasionally (individual individuals).
82.	***Sylvia communis***	**30.000-45.000**	**Stability**	**During the nesting period / surroundings of the village Krivača, Dvorište / occasionally (individual individuals).**
83.	***Sylvia atricapilla***	**900.000-1.200.000**	**Increase**	**During the nesting period / surroundings of the Tumane monastery, surroundings of the village of Krivača, Rakobarski Vis, surroundings of the village of Rakova Bara, gorge of the Brnjica river / occasionally (individual individuals).**
84.	***Phylloscopus***	**400.000-**	**Stability**	**During the nesting period / Venac,**

	collybita	**650.000**		**Rakobarski Vis, Tilva, surroundings of the village Krivača, gorge of the Brnjica river / occasionally (individual individuals).**
85.	***Aegithalos caudatus***	**35.000-45.000**	**Stability**	**Throughout the year / Venac, Rakobarski vis, Debelo brdo, Tilva / occasionally (single individuals, several individuals).**
86.	***Parus palustris***	**50.000-75.000**	**Stability**	**Throughout the year / Rakobarski vis, Tilva, Debelo brdo, Venac / occasionally (individuals, several individuals).**
87.	***Parus major***	**700.000-1.000.000**	**Stability**	**Throughout the year / near the village of Radenke, around the village of Brnjica, the gorge of the river Brnjica, around the Monastery of Tumane, Venac, Debelo brdo, Golo brdo, Rakobarski Vis, Tilva, in the village and on the outskirts of the village Krivača. Rakova Bara / regularly (individuals, pairs, multiple individuals).**
88.	***Parus caeruleus***	**220.000-360.000**	**Stability**	**Throughout the year / Venac, Debelo brdo, Rakobarski Vis, Tilva, the outskirts of the village Rakova Bara, Krivača, Dvorište, Radenka, gorge of the Brnjica river / regularly (individuals, pairs, several individuals).**
89.	***Sitta europaea***	**300.000-400.000**	**Stability**	**Throughout the year / at the Tuman Monastery, Rakobarski Vis, Venac, Debelo brdo / regular (individual, two individuals).**
90.	***Lanius collurio***	**55.000-85.000**	**Decrease**	**During the nesting season / periphery of the village Brnjica, next to the road Golubac-Maleševo, periphery of the village Radenka, gorge of the Brnjica river, periphery of the village Rakova pond, periphery of Krivača village / regular (individual, pair, several).**
91.	***Lanius excubitor***			**During the winter / Periphery of the village Maleševo, Debelo brdo, Periphery of the village Rakova Bara / regularly (individual**

				units).
92.	***Garrulus glandarius***	**150.000-250.000**	**Stability**	**Throughout the year / gorge of the river Brnjica, Tilva, Venac, Golubac gorge, Rakobarski vis, Debelo brdo, surroundings of the village Krivača, Rakova Bara, Radenka / regularly (individual units, max. 4 units).**
93.	*Pica pica*	100.000-150.000	Increase	Throughout the year / surroundings of the villages Maleševo, Dvorište, Radenka / occasionally (individual units).
94.	*Corvus monedula*	100.000-150.000	Decrease	Throughout the year / Golubac gorge-nests on the cliffs of Veliki Košar, around the village of Maleševo / regularly (several individuals, pairs, small flocks).
95.	***Corvus cornix***	**130.000-200.000**	**Increase**	**Throughout the year / Fields between Golubac and Maleševo, Golubac gorge, Rakobarski vis, Debelo brdo, surroundings of Krivača village / regular (pairs, small flocks).**
96.	***Corvus corax***	**900-1.200**	**Increase**	**Throughout the year / Golubac gorge, gorge of Brnjica river, Venac, Debelo brdo, Golog brdo, Rakobarski Vis, Tilva / regular (single individuals, several individuals, smaller flocks).**
97.	***Sturnus vulgaris***	**300.000-600.000**	**Fluctuation**	**Throughout the year / around the villages of Maleševo, Dvorište, Rakova Bara, Krivača / occasionally (several individuals, smaller flocks).**
98.	*Passer domesticus*	1.000.000-2.000.000	Stability	Throughout the year / in the village of Brnjica, in the village of Krivača, in the village of Rakova Bara, Dvorište / regularly (families, small flocks).
99.	*Passer montanus*	300.000-450.000	Stability	Throughout the year / outskirts of the village of Rakova Bara, Dvorište, outskirts of the village of Krivača / regularly (families, small flocks).
100.	***Fringilla coelebs***	**1.250.000-1.600.000**	**Stability**	**Throughout the year / gorge of the river Brnjica, around the village Krivača, Venac, Golo brdo, Rakobarski vis, Debelo brdo / regular (single individuals, several individuals, smaller flocks).**
101.	***Carduelis***	**170.000-**	**Stability**	**Throughout the year / Venac,**

	carduelis	**250.000**		**surroundings of the villages Brnjica, Krivača, Rakova Bara, gorge of the Brnjica river, Rakobarski vis, Debelo brdo, Tilva / occasionally (two or several individuals, max. 10).**
102.	***Pyrrhula pyrrhula***	**3.000-4.500**	**Stability**	**Throughout the year / forests: on Venac, Debelo brdo, Rakobarski vis / occasionally (individual units).**
103.	***Coccothraustes coccothraustes***	**10.000-15.000**	**Fluctuation**	**Throughout the year / forests on Venac, Rakobarski Vis, the outskirts of the village Maleševo, the outskirts of the village Krivača / occasionally (individual units).**
104.	***Emberiza citrinella***	**45.000-60.000**	**Stability**	**Throughout the year / Debelo brdo, Venac, Rakobarski Vis, Tilva, surroundings of the village Dvorište, Krivača, Rakova Bara / occasionally (single individuals, several individuals).**
105.	*Emberiza cia*	2.000-3.500	Stability	Throughout the year / Golubac gorge / occasionally (1-2 individuals).
106.	*Emberiza cirlus*	9.000-14.000	Increase	Throughout the year / around the village of Dvorište, around the village of Radenka / occasionally (individual units).
107.	*Miliaria calandra*	20.000-30.000	Decrease	Throughout the year / along the Tumanska river between Maleševo and the Tumane monastery, around the village of Dvorište / occasionally (1-2 individuals).

Figure no. 31: *Great Magpie (Lanius excubitor) present in winter in the narrower and wider area*

2.6.10. Target species

Based on the results of one-year research of birds in the subject area, it was concluded that there are species that may be significantly endangered by the construction of a wind farm. These are sensitive species or species of birds of special importance for protection in Europe.

Bird species recorded in the already researched area (Table No. 13 - dark font) were singled out as sensitive-target species.

Also, as significantly endangered - target species, all recorded species in the already researched area (near the locations for wind turbines) are included, as well as those species that are not on the endangered list based on international criteria, but are due to presence in the narrower area and manner use of space subject to the influence of wind generators (primarily predators).

Assessment of the level of endangerment of the target species was done on the basis of:

- Conservation statuses defined by Birdlife International (SPEC 1, SPEC 2, SPEC 3);
- Status defined by the EU Birds Directive (2009/147 / EC, Annex 1);
- European guidelines for the development of wind energy use (EC 2010, Annex II);
- Presences in the narrower area.

Based on the above criteria for assessing the level of endangerment of the target species in the subject area, the endangerment is divided into:

- Low endangerment;
- Moderate endangerment;
- High endangerment.

In the researched area during January-December 2014, 66 species of birds were recorded (Table no. 14), which are considered to be significantly endangered.

Table no. 14: *Overview of target species, presence in the narrower area, level of endangerment*

Se.no.	Species name	Presence in a narrower area, level of threat
1.	White stork *Ciconia ciconia*	During the spring migration (March), a flock of 20 individuals in high flight at a height of about 300 meters above the place called. Ruđine (between Debelo brdo and Rakobarski vis), from the direction of the village of Radenka in the direction of the village of Maleševo. During the migration in August, a flock of 20 individuals in high flight at a height of about 300 meters, above the periphery of the village Krivača (between Tilva and Golo brdo), the direction of flight from the village of Maleševo in the direction of the village Radenka. During the nesting season, one pair is regularly present in Golubac (nesting) and its surroundings. Two birds were recorded in July near the Tumanska river near the village of Krivača. At the end of March, 2 individuals in a field next to the Krivača-Rakova bara road. Given that the International Protection Status is DP-1, SPEC-2, and a species that is sensitive to wind farms (EC 2010, Annex II) - the threat is moderate.
2.	Greater white-fronted goose *Anser albifrons*	In winter (January), a flock of about 80 individuals in a high flight (about 300 m) above the place called Ruđina (between Debelo brdo and Rakobarski vis), the direction of flight is from the village of Radenka in the direction of the village Maleševo. Given that the species is present in a narrower area in flight, and is sensitive to wind farms (EC 2010, Annex II) - the threat is moderate.
3.	Mallard *Anas platyrhynchos*	In winter (December) in flight over the periphery of the village Krivača (between Tilva and Golo brdo) from the direction of the village Radenka in the direction of the village Maleševo at a height of about 300 meters (flock of about 50 individuals). Due to the presence in the narrower area - the threat is moderate.
4.	Hen harrier *Circus cyaneus*	It was recorded in winter on the outskirts of the village of Maleševo in December (1 unit), and on the outskirts of the village of Rakova Bara in January (1 unit). The international protection status of the species is: SPEC-3, DP-1, the species is sensitive to wind farms (EC 2010, Annex II). Considering the international protection, as well as the way of flying (it was observed in low flight above the ground) - the threat is moderate.
5.	European honey buzzard *Pernis apivorus*	It was recorded in the gorge of the Brnjica river (2 individuals). The type is DP-1. Due to the way of flight, as well as the relative proximity of the wind farm in relation to the used space, the species is sensitive to wind farms - barrier effect (EC 2010, Annex II) - the threat is moderate.
6.	White-tailed eagle *Haliaeetus albicilla*	It was recorded in the Golubac gorge throughout the year - occasionally (1-2 individuals). The direction of flight is above the Danube upstream towards Golubac or downstream towards Brnjica and Dobra. In the vicinity of the village of Ponikve, 1 pair regularly nests. The species is DP-1, SPEC-1, it is sensitive to wind farms (EC 2010, Annex II), regardless of the fact that it is not recorded in the narrower area - the threat is moderate.
7.	Short-toed snake eagle *Circaetus gallicus*	Recorded in the Gorge of the Brnjica River (1 individual occasionally during the nesting season). The species is DP-1, SPEC-3, it is sensitive to wind farms (EC 2010, Annex II), it is present in the Brnjica River, it is considered that the threat is moderate.

8.	Northern goshawk *Accipiter gentilis*	It is recorded throughout the year in a narrower area (and near the place where the wind turbines are located). The species is sensitive to wind farms - barrier effect (EC 2010, Annex II), Due to the presence in the narrower area, the threat is considered moderate.
9.	Eurasian sparrowhawk *Accipiter nisus*	It is recorded throughout the year in the narrower area. The species is sensitive to wind farms (EC 2010, Annex II), due to the presence in the narrower area, the way of flying, it is considered that the threat is low.
10.	**Common buzzard *Buteo buteo***	It is present throughout the year in the narrower and wider area. One of the most common birds of prey in the narrower area (single individuals, 2, several, often circling and at critical altitudes, 100-150 m) The species is sensitive to wind farms (EC 2010, Annex II). Due to the regular presence, the way of flying, the threat is considered high.
11.	Rough-legged buzzard *Buteo lagopus*	It was recorded in winter (December-January) in the vicinity of the village of Maleševo in January (1 unit), and on Venac in December (1 unit). The species is sensitive to wind farms (EC 2010, Annex II), due to its presence in a narrower area, the threat is considered to be moderate.

12.	**Golden eagle *Aquila chrysaetos***	It is recorded in the Golubac gorge throughout the year (1-2 individuals), it is occasionally present on Venac and above the Brnjica river (1 unit in circulation was recorded). The species is DP-1, SPEC-3, sensitive to wind farms (EC 2010, Annex II), Due to the occasional presence in the narrower area, small numbers in the wider area, as well as the way of using hunting space, the threat is considered high.
13.	Booted eagle *Hieraaetus pennatus*	It was recorded in the gorge of the Brnjica river (1 individual occasionally during the nesting season). The type is DP-1, SPEC-3. Based on the presence in the vicinity of the narrower area, the threat is considered to be moderate.
14.	Common kestrel *Falco tinnunculus*	It is present in the narrower area throughout the year. The species is SPEC-3, it is sensitive to wind farms (EC 2010, Annex II). Due to the constant presence in the narrower area, and based on foreign experiences regarding sensitivity to wind farms, the threat is considered moderate.
15.	Eurasian hobby *Falco subbuteo*	It was recorded on the outskirts of the villages of Dvorište and Rakova Bara. The species is sensitive to wind farms (EC 2010, Annex II), the threat is considered low.
16.	Peregrine falcon *Falco peregrinus*	It was recorded in the gorge of the Brnjica river (1-2 individuals, pair). The species is DP-1, it is sensitive to wind farms (EC 2010 Annex II). Since it is present in the immediate vicinity of Debelo brdo (cliffs near the

		Gaura Mare cave, which are at the foot of Debelo brdo, the threat is considered to be moderate.
17.	Grey partridge *Perdix perdix*	It is present throughout the year in the narrower and wider area. The species is SPEC-3. Due to the constant presence and manner of using the space, the threat is considered to be moderate.
18.	Common quail *Coturnix coturnix*	It is present during the nesting season in the narrower and wider area (on the meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilvi, couples, families). The species is SPEC-3. Due to the way of life (in the habitats near which wind generators are planned), the threat is considered to be moderate.
19.	Corn crake *Crex crex*	Recorded on meadows on Venac, Debelo Brdo, Rakobarski Vis, Tilvi in the nesting season (1 individual - pairs). The species is DP-1, SPEC-1, sensitive to wind farms (EC 2010, Annex II). Due to the presence of meadows in the immediate vicinity of wind turbines and the way the space is used - the threat is moderate.
20.	Eurasian woodcock *Scolopax rusticola*	It is present on the outskirts of the villages of Meleševo, Krivača, Rakova Bara. The species is SPEC-3. Due to the way the space is used, the threat is considered low.
21.	Common wood pigeon *Columba palumbus*	It is present in the vicinity of the village of Krivača, Rakova Bara. Based on the way the space is used, the risk is low.
22.	Eurasian collared dove *Streptopelia decaocto*	It is present in the vicinity and periphery of the village of Krivača, Rakova bara. The threat is low.
23.	European turtle dove *Streptopelia turtur*	It is present in the vicinity of the villages of Rakova Bara and Krivača. The species is SPEC-3. Due to the way the space is used, as well as its international significance, the threat is low.
24.	Common cuckoo *Cuculus canorus*	It was recorded during the nesting season in the wider area of the village of Rakova Bara, Krivača (individual). The species is sensitive to wind farms (EC 2010, Annex II). The threat is low.
25.	Eurasian scops owl *Otus scops*	Recorded in the vicinity of the village Dvorište, Krivača. The species is SPEC-2. The threat is low.
26.	Eurasian eagle-owl *Bubo bubo*	It was recorded in the gorge of the Brnjica river. The type is DP-1, SPEC-3. Due to the way the space is used, the way it flies and the proximity of the wind turbine on Debelo Brdo, the risk is low.

27.	Tawny owl *Strix aluco*	Recorded on Venac, in the vicinity of Krivača, Rakove Bare, in the gorge of the Brnjica river (individual individuals, 2-3 individuals). The threat is low.
28.	Ural owl *Strix uralensis*	It was recorded in a beech forest on Venac (1 specimen). The type is DP-1. The threat is low.
29.	European nightjar *Caprimulgus europaeus*	Recorded on Venac, Rakobarski Vis (individual specimens). The type is DP-1, SPEC-2. The threat is low.
30.	Eurasian hoopoe *Upupa epops*	Recorded on Venac, Debelo Brdo, around Rakove Bare (individual units). The species is SPEC-3. The threat is low.
31.	Black woodpecker *Dryocopus martius*	It was recorded in the gorge of the Brnjica river, on Venac, Rakobarski Vis (individuals). The type is DP-1. The threat is low.
32.	Grey-headed woodpecker *Picus canus*	Recorded on Venac and Debelo Brdo (individual individuals, 2 individuals). The type is DP-1, SPEC-3. The threat is low.
33.	European green woodpecker *Picus viridis*	It was recorded on Venac, Debelo Brdo, Rakobarski Vis and Tilva (12 individuals). The species is SPEC-2. The threat is low.
34.	Great spotted woodpecker *Dendrocopos major*	It was recorded on Venac, Debelo Brdo, Rakobarski Vis, Tilva (individuals, 2 individuals). The threat is low.
35.	Syrian woodpecker *Dendrocopos syriacus*	Recorded in the vicinity of the villages Dvorište, Krivača, Rakova Bara (individual units). The type is DP-1. The threat is low.
36.	Middle spotted woodpecker *Dendrocopos medius*	Recorded on the outskirts of the village Radenka, Rakova Bara. The type is DP-1. The threat is low.
37.	White-backed woodpecker *Dendrocopos leucotos*	Recorded in a beech forest on Venac (1 individual). The type is DP-1. The threat is low.
38.	Crested lark *Galerida cristata*	Recorded on Venac, Rakobarski Vis, around the villages Dvoriste, Krivača, Rakova bara. The type is DP-3.

		The threat is low.
39.	Woodlark *Lullula arborea*	Recorded not in Venac, Debelo Brdo, Rakobarski Vis. The type is DP-1, SPEC-2. The threat is low.
40.	Eurasian skylark *Alauda arvensis*	It was recorded on Venac, Golo brdo, Debelo Brdo, Rakobarski Vis, Tilva (1-2 and several individuals). The species is SPEC-3. The species is sensitive to wind turbines (Pearce-Higgins et al, 2009), due to the way it uses space, uses habitats near wind turbines and flies vertically upwards (up to a height of 50-70 meters) during mating, the threat is moderate.
41.	Tree pipit *Anthus trivialis*	Recorded during the nesting season on meadows on Venac, Debelo Brdo, Rakobarski Vis, Tilva (1,2 and several individuals). The threat is low.
42.	Царић *Eurasian wren*	Recorded in the forest on Venac, Stupanjska reka, Rakobarski Vis, around the village of Krivača (individual). The threat is low.
43.	European robin *Erithacus rubecula*	Recorded on Venac, Rakobarski Vis, Tilvi, Debelo Brdo (several individuals). The threat is low.
44.	Коc *Common blackbird*	Recorded on Venac, Debelo Brdo, Golo Brdo, Rakobarski Vis, Tilvi throughout the year (individual units). The threat is low

45.	Fieldfare *Turdus pilaris*	It was recorded in winter on Debelo brdo, on the outskirts of the village of Maleševo, Rakova Bara (1-few individuals). The threat is low.
46.	Song thrush *Turdus philomelos*	Recorded in the vicinity of the villages of Krivača and Rakova Bar. The threat is low.
47.	Mistle thrush *Turdus viscivorus*	Recorded on Venac, Debelo Brdo, Golo Brdo, Rakobarski Vis, Tilvi. The threat is low.
48.	Common whitethroat *Sylvia communis*	Recorded in the wider area of the village of Krivača (individual individuals). The threat is low.
49.	Eurasian blackcap *Sylvia atricapilla*	Recorded on Rakobarski Vis, around the villages of Krivača and Rakova Bara. The threat is low.
50.	Common chiffchaff *Phylloscopus collybita*	Recorded on Venac, Rakobarski Vis, Tilvi. The threat is low.

51.	Long-tailed tit *Aegithalos caudatus*	Recorded on Venac, Debelo Brdo, Rakobarski Vis, Tilvi. The threat is low.
52.	Marsh tit *Parus palustris*	It was recorded on Venac, Rakobarski Vis, Debelo Brdo, Tilva. The species is SPEC-3. The threat is low.
53.	Great tit *Parus major*	It is present throughout the year in the narrower and wider area - Venac, Debelo Brdo, Rakobarski Vis, Tilva, the outskirts of the village Krivača, Rakova Bara (1-2 and more individuals). The threat is low.
54.	Eurasian blue tit *Parus caeruleus*	Recorded on Venac, Debelo Brdo, Rakobarski Vis, Tilva, the outskirts of the village of Krivača, Rakova bara, Maleševo. The threat is low.
55.	Eurasian nuthatch *Sitta europaea*	Recorded on Venac, Rakobarski Vis, Debelo brdo. The threat is low.
56.	Red-backed shrike *Lanius collurio*	Recorded on the outskirts of the villages Radenka, Rakova Bara, Krivača. The type is DP-1, SPEC-3. The threat is low.
57.	Great grey shrike *Lanius excubitor*	It was recorded in the winter on the outskirts of the village Maleševo (1 unit), on Debelo Brdo (1 unit), on mzv. Prisoj located below Rakobarski Vis (1 individual). The species is SPEC-3. The threat is low.
58.	Eurasian jay *Garrulus glandarius*	Recorded on Venac, Tilva, Debelo Brdo, Rakobarski Vis (1-2 or several individuals). The threat is low.
59.	Hooded crow *Corvus cornix*	Recorded on Rakobarski vis, Debelo Brdo, near the village of Krivača. The threat is low.
60.	Common raven *Corvus corax*	Recorded throughout the year in the area of Venac, Debelo Brdo, Rakobarski Vis, Tilva. Considering that it is regularly present throughout the year in the entire narrower area, and that the height of the flight or circle of 50-100 meters above the place for wind generators is recorded, the threat is moderate.
61.	Common starling *Sturnus vulgaris*	Recorded in the vicinity of the village of Rakova Bara, Krivača (1-2 or more individuals). The species is SPEC-3. The threat is low.
62.	Common chaffinch *Fringilla coelebs*	Recorded in the vicinity of the village of Krivača, on Venac, Debelo Brdo, Rakobarski Vis, Tilva (1-2 or several individuals). The threat is low.
63.	European goldfinch	Recorded on Venac, Debelo Brdo, Rakobarski Vis, Tilvi, around the village of Krivača, Rakova Bara. The threat is low.

	Carduelis carduelis	
64.	Eurasian bullfinch *Pyrrhula pyrrhula*	Recorded on Venac, Debelo Brdo, Rakobarski Vis. The threat is low.
65.	Hawfinch *Coccothraustes coccothraustes*	Recorded on Venac, Rakobarski Vis, near the village of Krivača. The threat is low.
66.	Yellowhammer *Emberiza citrinella*	Recorded on Venac, Debelo brdo, Rakobarski Vis, Tilvi, around the village of Krivača. The threat is low.

High endangerment was assessed in 2 species: *Buteo buteo* and *Aquila chrysaetos.*

Moderate endangerment was assessed in 17 species: *Ciconia ciconia, Anser albifrons, Anas platyrhynchos, Circus cyaneus, Pernis apivorus, Haliaeetus albicilla, Circaetus gallicus, Accipiter gentilis, Buteo lagopus, Hieraaetus pennatus, Falco tinnunculus, Falco peregrinus, Perdix perdix, Coturnix coturnix, Crex crex, Alauda arvensis, Corvus corax.*

Low endangerment was assessed in 47 species: *Falco subbuteo, Scolopax rusticola, Columba palumbus, Streptopelia decaocto, Streptopelia turtur, Cuculus canorus, Otus scops, Bubo bubo, Strix aluco, Strix uralensis, Caprimulgus eoropaeus, Upupa epops, Dryocopus martius, Picus canus, Picus viridis, Dendocopos major, Dendocopos syriacus, Dendocopos medius, Dendrocopos leucotos, Galerida cristata, Lullula arborea, Anthus trivialis, Troglodytes troglodytes, Erithacus rubecula, Turdus merula, Turdus pilaris, Turdus philomelos,Turdus viscivorus, Sylvia communis, Sylvia atricapilla, Phyloscopus collybita, Aegithalos caudatus, Parus palustris, Parus major, Parus caeruleus, Sitta europaea, Lanius collurio, Lanius excubitor, Garrulus glandarius, Corvus cornix, Sturnus vulgaris, Fringilla coelebs, Carduelis carduelis, Pyrrhula pyrrhula, Coccothraustes coccothraustes, Emberiza citrinella.*

Table no. 15: *Overview of endangered species' levels*

Endangerment Level	Number of target species
low	47
moderate	17
high	2

Based on the results of the research in the period January-December 2014, as well as on the basis of foreign experience, 19 target species were selected, with the aim of monitoring in the period 2015-2019. Thus, in the period from 2015 to 2019, occasional surveys of **target species** were performed, and the results of these surveys are shown in Table no. 16.

Table no. 16: *Overview of target species, presence in the subject area, level of endangerment in the period from 2015 to 2019*

Ser.no	Species name	Presence in the subject area, level of threat
		2015.

1.	White stork *Ciconia ciconia*	During the spring migration (second half of March), a flock (14) of individuals in high flight at a height of over 200 meters above the place called Rudjina (between Debelo brdo and Rakobarski vis), from the direction of the village Radenka in the direction of the village Malesevo. During the migration in the second half of August, a flock (18) of individuals in high flight at an altitude of over 200 meters, above the outskirts of the village Krivača (between Tilva and Golo brdo), the direction of flight from the village Maleševo in the direction of Radenka. During the nesting season, one pair is regularly present in the vicinity of the village of Maleševo. During the summer months, individual specimens or two specimens are regularly present along the Tumanska River near the village of Krivača. During the spring migration, several individuals (6) were recorded in the fields next to the Krivača-Rakova bara road.
		2016.
		In the second half of March, a regular flock (10) of individuals in high flight at a height of 150-200 meters above the village of Krivača, from the direction of the village of Radenka in the direction of the village of Maleševo. In the second half of August, a flock (16) of individuals in high flight at an altitude of over 200 meters, above the outskirts of the village of Krivača (between Tilva and Golo brdo), the direction of flight from the village of Maleševo in the direction of Radenka. During the nesting season, one pair was recorded on the outskirts of the village of Vojilovo. During the summer months, individual specimens or two specimens are regularly present along the Tumanska River. During the spring migration, 4 individuals were recorded on the outskirts of the village of Rakova bara.
		2017.
		During the spring migration (March 22), a flock of 23 individuals in high flight at a height of over 200 meters above the place called. Ruđine, from the direction of the village of Radenka in the direction of the village of Maleševo. During the migration in the second half of August (August 24), a flock of 19 individuals in high flight at an altitude of over 200 meters, above the outskirts of the village Krivača (between Tilva and Golo brdo), the direction of flight from the village Maleševo towards the village Radenka. During the nesting season, one pair is regularly present in the vicinity of the village of Vojilovo. During the summer months, individual individuals or two specimens are regularly present along the Tumanska River (between the villages of Krivača and Maleševo).
		2018.
		At the time of the migration (March 23), a flock of 16 individuals in high flight at an altitude of over 200 meters between Debelo brdo and Rakobarski vis, from the direction of the village of Radenka in the direction of the village of Malesevo. During the migration in the second half of August, a flock of 26 individuals in high flight at an altitude of over 200 meters, above the outskirts of the village Krivača, the direction of flight from the direction of the village Maleševo in the direction of the village Radenka. During the nesting season, one pair is regularly present in the vicinity of the village of Maleševo. During the summer months, individual specimens or two specimens are regularly present along the Tumanska River near the village of Krivača.
		2019.
		During the spring migration (March 24), a flock of 26 individuals flew in a high flight at a height of over 200 meters between Debelo brdo and Rakobarski vis, from the direction of the village of Radenka in the direction of the village of Malesevo. During the migration in the second half of August, a flock of 20 individuals in high flight at an altitude of over 200 meters, above the outskirts of the village Krivača, the direction of flight from the direction of the village Maleševo in the direction of the village Radenka. During the nesting season, one pair is regularly present in the vicinity of the village of Vojilovo. During the summer months, individual specimens or two specimens are regularly present along the Tumanska River near the village of Krivača.

	Угроженост	International protection status DP-1, SPEC-2, a species that is sensitive to wind farms (EC 2010, Annex I), the level of threat is moderate.
		2015.
2.	Greater white-fronted goose *Anser albifrons*	In the winter months (December), flocks (12 and 62 individuals) were recorded in high flight (above 200 m) above the place called Ruđine (between Debelo brdo and Rakobarski vis), the direction of flight is from the village of Radenka in the direction of the village of Maleševo.
		2016.
		In the winter months (December), flocks (18 and 47 individuals) were recorded in a high flight (above 200 m) between Debelo brdo and Rakobarski vis, the direction of flight is from the village of Radenka in the direction of the village of Maleševo.
		2017.
		In December, flocks (26 and 36 individuals) were recorded in high flight (above 200 m) above the outskirts of the village of Krivača, the direction of flight in the direction of the village of Maleševo.
		2018.
		In December, a flock (52 individuals) was recorded in a high flight (above 200 m) above the outskirts of the village of Krivača, the direction of flight in the direction of the village of Maleševo.
		2019.
		In December, a flock (85 individuals) was recorded in a high flight (above 200 m) between the village of Krivača and the village of Maleševo, the direction of flight in the direction of the village of Maleševo.
	Endangerment	Given that the species is present in a narrower area in flight, and is sensitive to wind farms (EC 2010, Annex II), the level of endangerment is moderate.
		2015.
3.	Mallard *Anas platyrhynchos*	In December, in a flight over the outskirts of the village of Krivača (between Tilva and Golo brdo) from the direction of the village of Radenka in the direction of the village of Maleševo at a height of over 200 meters (flock of 48 individuals).
		2016.
		In December, in a flight over the Tumanska river from the direction of the village of Radenka in the direction of the village of Maleševo at an altitude of over 200 meters (flock of 64 individuals).
		2017.
		In December, in a flight over the outskirts of the village of Krivača, from the direction of the village of Radenka in the direction of the village of Maleševo at an altitude of over 200 meters (flock of 58 individuals).
		2018.
		In December, in a flight over the Tumane monastery, from the direction of the village of Radenka in the direction of the village of Malesevo at a height of over 200 meters (a flock of 66 individuals).
		2019.

		In December, in a flight over the outskirts of the village of Krivača, from the direction of the village of Radenka in the direction of the village of Maleševo at a height of over 200 meters (flock of 72 individuals).
	Endangerment	Due to the presence in the narrower area, the level of endangerment is moderate.
		2015.
4.	Hen harrier *Circus cyaneus*	Individual individuals were recorded in winter (December) on the outskirts of the village of Maleševo, and on the outskirts of the village of Rakova Bara.
		2016.
		Individual individuals were recorded in winter (December) on the outskirts of the village of Krivača, and between the villages of Krivača and Rakobarski vis.
		2017.
		Individual units were recorded in winter (December) between the villages of Krivača and Rakobarski vis.
		2018.
		Individual individuals in winter (December) on the outskirts of the village of Rakova Bara were recorded.
		2019.
		Individual individuals in winter (December) on the outskirts of the villages of Krivača and Maleševo were recorded.
	Endangerment	The international protection status of the species is: SPEC-3, DP-1, the species is sensitive to wind farms (EC 2010, Annex II). Considering the international protection, as well as the way of flying (it was observed in low flight above the ground), the level of endangerment is moderate.
		2015.
5.	European honey buzzard *Pernis apivorus*	It was recorded in the gorge of the Brnjica river (1-2 individuals), on the outskirts of the village of Rakova bara (1 individual).
		2016.
		It was recorded in the gorge of the Brnjica river (1 individual), on the outskirts of the village of Rakova bara (1 individual), on the outskirts of the village of Krivača (1 individual).
		2017.
		Recorded on the outskirts of the village of Radenka (1 individual), in the forest between Rakobarski vis and the outskirts of the village of Krivača (1 individual).
		2018.
		Recorded in the forest on Venac (1 individual), in the forest between Rakobarski vis and the outskirts of the village of Krivača (1 individual).
		2019.
		Recorded in the forest on the outskirts of the village Krivača, (1 individual), in the forest on Rakobarski vis (1 individual).
	Endangerment	International protection status: the species is DP-1. Due to the way of flight, as well as the relative proximity of the wind farm in relation to the used space, the species is sensitive to wind farms - barrier effect (EC 2010, Annex II), the

		level of threat is moderate.
		2015.
6.	White-tailed eagle *Haliaeetus albicilla*	It is recorded in the Golubac gorge occasionally throughout the year - (1-2 individuals).
		2016.
		It was recorded in the Golubac gorge (on the stretch from the Golubac town to the village of Brnjica) occasionally throughout the year - (1-2 individuals). It is more present in the winter months.
		2017.
		It was recorded in the Golubac gorge (and the stretch from the Golubac town to the village of Brnjica) occasionally throughout the year (1-2 individuals).
		2018.
		It is recorded in the Golubac gorge (on the stretch from the Golubac town to the village of Brnjica) occasionally throughout the year (1-2 individuals).
		2019.
		It is recorded in the Golubac gorge (on the stretch from the Golubac town to the village of Brnjica) occasionally throughout the year (1-2 individuals).
	Endangerment	The species is DP-1, SPEC-1, it is sensitive to wind farms (EC 2010, Annex II), regardless of the fact that it is not recorded in the narrower area, the level of endangerment is moderate.
		2015.
7.	Short-toed snake eagle *Circaetus gallicus*	Recorded in the gorge of the Brnjica river (1 individual occasionally during the nesting season).
		2016.
		Recorded on the outskirts of the village Radenka (towards Rakobarski vis 1 individual occasionally during the nesting season).
		2017.
		Recorded in the gorge of the Brnjica river (1 individual occasionally during the nesting season).
		2018.
		Recorded in the gorge of the Brnjica river, on Venac (1 individual occasionally during the nesting season).
		2019.
		Recorded on the outskirts of the village Krivača (between the village and Venca 1 individual occasionally during the nesting season).
	Endangerment	The species is DP-1, SPEC-3, it is sensitive to wind farms (EC 2010, Annex II), the level of endangerment is moderate.
		2015.
8.	Northern goshawk *Accipiter*	It was recorded throughout the year in the narrower and wider area (periphery of the villages of Krivača, Maleševo, Rakova bara).
		2016.

	gentilis	It was recorded throughout the year in the narrower and wider area (Venac, the outskirts of the village of Krivača, Tilva, the outskirts of the village of Rakova bara).
		2017.
		It was recorded throughout the year in the narrower and wider area (the outskirts of the village of Radenka, the outskirts of the village of Krivača, Tilva, the outskirts of the village of Rakova bara).
		2018.
		It was recorded throughout the year in the narrower and wider area (the periphery of the village of Radenka, Venac, Golo brdo, the periphery of the village of Krivača, Tilva, the periphery of the village of Rakova bara).
		2019.
		It was recorded throughout the year in the narrower and wider area (Rakobarski vis, the outskirts of the village of Radenka, Venac, Debelo brdo, the outskirts of the village of Krivača, Tilva, the outskirts of the village of Rakova bara).
	Endangerment	The species is sensitive to wind farms - barrier effect (EC 2010, Annex II), Due to the presence in the narrower area, the level of endangerment is moderate.

		2015.
9.	Common buzzard *Buteo buteo*	It is present throughout the year in the narrower and wider area. One of the most common birds of prey in the narrower area (single individuals, 2, several, often in circulation and at critical altitudes, 100-150 m)
		2016.
		It is present throughout the year in the narrower and wider area. It was recorded on Venac, Tilva, Rakobarski vis, on the outskirts of the village of Krivača, Rakova bara (individual individuals, 2 individuals, 3-6 individuals were recorded).
		2017.
		It is recorded throughout the year in the narrower and wider area. It was recorded in the gorge of the Brnjica river, Venac, Tilva, Rakobarski vis, on the outskirts of the village Krivača, Rakova bara, (individual individuals were recorded, 2, several, often in a circle and at critical heights, 100-150 m)
		2018.
		It is recorded throughout the year in the narrower and wider area. It was recorded in the gorge of the Brnjica river, Venac, Tilva, Rakobarski vis, on the outskirts of the village of Krivača, Rakova bara (individual individuals, 2 individuals, 3-7 individuals were recorded).
		2019.
		It is recorded throughout the year in the narrower and wider area. Recorded on Debelo brdo, Venac, Tilva, Rakobarski vis, on the outskirts of the village of Krivača, Rakova bara (individual individuals, 2 individuals, several individuals were recorded).
	Endangerment	The species is sensitive to wind farms (EC 2010, Annex II), Due to the regular presence in the narrower area, flight methods, the level of endangerment is high.
		2015.
10.	Rough-legged	Individual individuals were recorded in winter (December) in the vicinity of the village of

	buzzard *Buteo lagopus*	Maleševo, and on Venac.
		2016.
		Individual individuals in winter (January-December) were recorded in the forest on the outskirts of the village of Krivača, on the outskirts of the village of Maleševo.
		2017.
		Individuals were recorded on the outskirts of the village of Maleševo in winter (January-December).
		2018.
		Individuals were recorded in the winter (December) between the village of Maleševo and the Tumane Monastery.
		2019.
		Individuals were recorded in winter (December) near the Tumanska river near the village of Maleševo.
	Endangerment	The species is sensitive to wind farms (EC 2010, Annex II), due to occasional presence in the narrower area (winter only), the level of endangerment is moderate.
		2015.
11.	Golden eagle *Aquila chrysaetos*	It is recorded in the Golubac gorge throughout the year (1-2 individuals), it is occasionally present on Venac and above the Brnjica river (occasionally 1 individual in circulation). It is regularly present in the Danube gorge in the area around the quarry and the so-called Jelenske rock.
		2016.
		It is recorded in the Golubac gorge throughout the year (1-2 individuals), it is occasionally present on the Venac and the gorge of the Brnjica river (occasionally 1 individual in circulation). It is regularly present in the Danube gorge in the area around the quarry and the so-called Deer walls. During the nesting season, two individuals were observed above the Danube near Jelenski steni. Based on observations, it is believed to have nested on the Romanian side of the Danube gorge (across from Jelenske rocks).
		2017.
		It is recorded in the Golubac gorge throughout the year (1-2 individuals), occasionally present in the gorge of the Brnjica river (occasionally 1 individual in circulation). It is regularly present in the Danube gorge in the area around the quarry and the so-called Jelenske rocks.
		2018.
		It is regularly present in the Golubac gorge throughout the year (on the stretch from Golubac town to the village of Brnjica, 1-2 units), it is occasionally present in the gorge of the Brnjica river (occasionally 1 individual in circulation).

		2019.
		Throughout the year, it is present in the Golubac gorge (on the stretch from the Golubac town to the village of Brnjica, 1-2 units), it is occasionally present in the gorge of the Brnjica river (occasionally 1 unit in circulation).
	Endangerment	The species is DP-1, SPEC-3, sensitive to wind farms (EC 2010, Annex II), Due to the occasional presence in the narrower area, small numbers in the wider area, as

		well as the way of using hunting space, the level of endangerment is high.
		2015.
12.	Common kestrel *Falco tinnunculus*	It is present in the narrower and wider area throughout the year. It was recorded: on Venac, Rakobarski vis, Tilva, Debelo brdo, on the outskirts of the village of Krivača, Rakova bara, Radenka. Individual or 2 individuals were recorded.
		2016.
		It is present in the narrower and wider area throughout the year. It was recorded: in the gorge of the Brnjica river, on Venac, Rakobarski vis, Tilva, Debelo brdo, on the outskirts of the village of Krivača, Rakova bara, Radenka, around the Tumane monastery. Individual or 2 individuals were recorded.
		2017.
		It is present in the narrower and wider area throughout the year. It was recorded: in the gorge of the Brnjica river, on Venac, Rakobarski vis, Tilva, Debelo brdo, on the outskirts of the village of Krivača, Rakova bara, Radenka, around the village of Maleševo. Individual or 2 individuals were recorded.
		2018.
		It is present in the narrower and wider area throughout the year. It was recorded: on Venac, on Rakobarski vis, on Tilva, on Debelo brdo, on the outskirts of the village of Krivača, Rakova bara, Radenka, around the village of Maleševo. Individual or 2 individuals were recorded.
		2019.
		It is present in the narrower and wider area throughout the year. It was recorded: in the gorge of the Brnjica river, on Venac, on Rakobarski vis, on Tilva, on Debelo brdo, on the outskirts of the village of Krivača, Rakova bara, Radenka, around the village of Maleševo. Individual or 2 individuals were recorded.
	Endangerment	The species is SPEC-3, it is sensitive to wind farms (EC 2010, Annex II). Due to the constant presence in the narrower and wider area, and based on foreign experiences regarding sensitivity to wind farms, the level of threat is moderate.
		2015.
13.	Peregrine falcon *Falco peregrinus*	It was recorded in the gorge of the Brnjica river (1-2 individuals, pair).
		2016.
		It was recorded in the gorge of the Brnjica river (1-2 individuals). It was recorded near the Gaura Mare cave, as well as on the Sokolovica cliff (individual specimens).
		2017.
		It was recorded in the gorge of the Brnjica river (individual specimens on the cliffs near the Gaura Mare cave and on the outskirts of the village of Radenka).
		2018.
		It was recorded in the gorge of the Brnjica river (individual specimens, 2 individuals).
		2019.
		It was recorded in the gorge of the Brnjica river (1 individual on the outskirts of the village of Radenka).

	Endangerment	Since it is present in the immediate vicinity of Debelo brdo, in the gorge of the river Brnjica (cliffs near the cave Gaura Mare, which are at the foot of Debelo brdo), as well as on the cliffs above the Brnjica river on the so-called Sokolovica, the level of threat is moderate.
		2015.
14.	Grey partridge *Perdix perdix*	It is present throughout the year in the narrower and wider area (on the meadows on Venac, Tilva, Rakobarski vis, Debelo brdo, on the outskirts of the village Krivača), individual specimens, pairs, several individuals-families).
		2016.
		It is present throughout the year in the narrower and wider area (meadows on Venac, Tilva, Rakobarski vis, Debelo brdo, outskirts of Krivača village, outskirts of Malevača village, outskirts of Maleševo village, outskirts of Radenka village, outskirts of Rakova bara village), individual specimens, pairs, several individuals 3 -8).
		2017.

		It is present throughout the year in the narrower and wider area (on meadows on Venac, Tilva, Rakobarski vis, Debelo brdo, outskirts of Krivača village, outskirts of Malevača village, outskirts of Maleševo village, outskirts of Radenka village, outskirts of Rakova bara village), individual specimens, pairs, several individuals 4 -7).
		2018.
		It is present throughout the year in the narrower and wider area (on the meadows on Venac, Tilva, Rakobarski vis, Debelo brdo, on the outskirts of the village Krivača), individual specimens, pairs, several individuals-families).
		2019.
		It is present throughout the year in the narrower and wider area (on meadows on Venac, Tilva, Rakobarski vis, Debelo brdo, outskirts of Krivača village, outskirts of Malevača village, outskirts of Maleševo village, outskirts of Radenka village, outskirts of Rakova bara village), individual specimens, couples, families).
	Endangerment	The species is SPEC-3. Due to the constant presence in the narrower area and the way the space is used, the level of endangerment is moderate.
		2015.
15.	Common quail *Coturnix coturnix*	It is present during the nesting season in the narrower and wider area (on the meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilvi, couples, families).
		2016.
		It was recorded during the nesting season in the narrower and wider area (on the outskirts of the villages of Krivača, Rakova bara, on the meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilviparovi, families).
		2017.
		It was recorded during the nesting season in the narrower and wider area (on the outskirts of the villages Maleševo, Krivača, Rakova bara, on the meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilvi-pairs, families).
		2018.

		In the nesting season, it is present in the narrower and wider area (on the outskirts of the villages Maleševo, Krivača, Rakova bara, on the meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilviparovi, families).
		2019.
		It was recorded during the nesting season in the narrower and wider area (on the outskirts of the villages of Krivača, Rakova bara, on the meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilvi - individual specimens, pairs, families).
	Endangerment	The species is SPEC-3. Due to the way of life (in the habitats near which wind generators are planned), the level of endangerment is moderate.
		2015.
16.	Corn crake *Crex crex*	Recorded on meadows on Venac, Rakobarski Vis, Tilvi in the nesting season (1 individual - pairs).
		2016.
		Recorded on meadows on the outskirts of the village Krivača, Debelo brdo, Rakobarski Vis, Tilvi in the nesting season (1 individual - pairs).
		2017.
		Recorded on meadows on the outskirts of the village of Krivača, Debelo brdo, on the outskirts of the village of Rakova bara, Tilvi in the nesting season (1 individual - pairs).
		2018.
		Recorded on meadows on the outskirts of the village of Krivača, on the outskirts of the village of Rakova bara, on Tilva in the nesting season (1 individual - pairs).
		2019.
		Recorded on meadows on Rakobarski vis, on the outskirts of the village of Krivača, on the outskirts of the village of Rakova bara, on Tilva in the nesting season (1 individual - pairs).
	Endangerment	The species is DP-1, SPEC-1, sensitive to wind farms (EC 2010, Annex II). Due to the presence of meadows in the immediate vicinity of wind turbines, and the way the space is used, the level of endangerment is moderate.
		2015.
17.	Eurasian skylark *Alauda arvensis*	It was recorded on meadows on Venac, Golo brdo, Debelo Brdo, Rakobarski Vis, Tilvi (individual specimens, several individuals, families).
		2016.

		It was recorded on meadows on the outskirts of the villages of Krivača, Rakova bara, on Venac, Golo brdo, Debelo Brdo, Rakobarski Vis, Tilva (individual specimens, several individuals, families).
		2017.
		It was recorded on meadows on the outskirts of the villages Maleševo, Radenka, Krivača, Rakova bara, on Venac, Golo brdo, Debelo brdo, Rakobarski Vis, Tilvi (individual specimens, several individuals, families).
		2018.

		It was recorded on meadows on the outskirts of the villages Maleševo, Radenka, Krivača, Rakova bara, on Venac, Golo brdo, Debelo brdo, Rakobarski Vis, Tilvi (individual specimens, several individuals, families).
		2019.
		It was recorded on meadows on the outskirts of the villages Maleševo, Radenka, Krivača, Rakova bara, on Venac, Golo brdo, Debelo brdo, Rakobarski Vis, Tilvi (individual specimens, several individuals, families).
	Endangerment	The species is SPEC-3. The species is sensitive to wind turbines due to the way it is used, uses habitats near wind turbines and at the time of mating it flies vertically upwards (up to a height of 50-70 meters), the level of endangerment is moderate.
		2015.
18.	Red-backed shrike *Lanius collurio*	It is regularly present during the breeding season in the narrower and wider area. It was recorded on meadows on Venac, Debelo Brdo, Tilva, Rakobarski Vis, on the outskirts of the villages of Radenka, Rakova Bara, Krivača. Mostly individual specimens were recorded.
		2016.
		It is regularly present during the breeding season in the narrower and wider area. It was recorded on meadows on the outskirts of the village of Krivača, on Venac, Debelo Brdo, Tilva, Rakobarski Vis, on the outskirts of the villages of Radenka, Rakova Bara, Maleševo. Mostly individual specimens were recorded.
		2017.
		It is regularly present during the breeding season in the narrower and wider area. It was recorded on meadows on the outskirts of the village of Krivača, on Venac, Debelo Brdo, Tilva, Rakobarski Vis, on the outskirts of the villages of Radenka, Rakova Bara, Maleševo. Mostly individual specimens were recorded.
		2018.
		It is regularly present during the breeding season in the narrower and wider area. It was recorded along the field roads on the bush, on the meadows on the outskirts of the village of Krivača, on Venac, Debelo Brdo, Tilva, Rakobarski Vis, on the outskirts of the villages of Radenka, Rakova Bara, Maleševo. Mostly individual specimens were recorded.
		2019.
		It is regularly present during the breeding season in the narrower and wider area. It was recorded along the field roads on the bush, on the meadows on the outskirts of the village of Krivača, on Venac, Debelo Brdo, Tilva, Rakobarski Vis, on the outskirts of the villages of Radenka, Rakova Bara, Maleševo. Mostly individual specimens were recorded.
	Endangerment	The type is DP-1, SPEC-3. The level of threat is moderate.
		2015.
19.	Common raven *Corvus*	Recorded throughout the year in the area of Venac, Debelo Brdo, Rakobarski Vis, Tilva (individual specimens, pairs, 3-6 specimens).

	corax	**2016.**
		Recorded throughout the year on the outskirts of the village of Krivača, on the outskirts of the monastery Tumane, in the area of Venac, Debelo Brdo, Rakobarski Vis, Tilva (individual specimens, pairs, 3-8 specimens).
		2017.
		It is present throughout the year on the outskirts of the village of Krivača, on the outskirts of the Tumane monastery, in the area of Venac, Debelo Brdo, Rakobarski Vis, Tilva (individual specimens, pairs, several specimens).
		2018.
		It is present throughout the year in the gorge of the Brnjica river, on the outskirts of the village of Krivača, on the outskirts of the Tumane monastery, in the area of Venac, Debelo Brdo, Rakobarski Vis, Tilva (individual specimens, pairs, several specimens).
		2019.
		It is present throughout the year in the gorge of the Brnjica river, on the outskirts of the villages of Rakova bara, Krivača, on the outskirts of the Tumane monastery, in the area of Venac, Debelo Brdo, Rakobarski Vis, Tilva (individual specimens, pairs, several specimens).
	Endangerment	Considering that it is regularly present throughout the year in the narrower and wider area, and that the height of the flight or circle of 50-100 meters above the area planned for wind generators is recorded, the level of threat is moderate.

Collision risk on line structures - transmission lines (not the subject of this Impact Assessment Study), north of the wind generator cluster, has been assessed for the following bird species:

- White stork *(Ciconia ciconia)*
- Greater white-fronted goose *(Anser albifrons)*
- White-tailed eagle *(Haliaeetus albicilla)*
- Common buzzard (*Buteo buteo)*
- *Hen harrier (Circus cyaneus)*

2.6.11. Migration routes, daily and seasonal migrations, gathering places of target bird species

Based on the research, it was concluded that migration corridors for migratory species, occasional flights of individual specimens during the year, as well as flights of flocks of birds during the winter pass over the already researched area.

The white stork (*Ciconia ciconia*), during the spring migration, was recorded on March 23 in a high flight (flight altitude about 300 meters) above a place called Ruđina (between Debelo brdo and Rakobarski Vis), from the direction of Radenka village towards Maleševo village. It was also recorded on August 23 in a high flight (flight altitude about 300 meters) above the outskirts of the village of Krivača (between Tilva and Golo Brdo), from the direction of the village of Maleševo in the direction of the village of Radenka. At the end of March, it was recorded in a field next to the Krivača-Rakova bara road (2 individuals). During the summer (July), two white storks were recorded along the Tumanska River near the village of Krivača.

Greater white-fronted goose (*Anser albifrons*) was recorded in January in a high flight, a flock of about 80 individuals at a height of about 300 meters from the direction of the village Radenka in the direction of the village Maleševo, above a place called Ruđina (between Debelo Brdo and Rakobarski Vis).

Mallard (*Anas platyrchynchos*), a flock of 50 individuals was recorded in December in a high flight at a height of about 300 meters above the outskirts of the village Krivača (between Tilva and Golo Brdo) from the direction of the village Radenka in the direction of the village Maleševo.

Birds of prey recorded in the narrower area occasionally fly over (in high or low flight) or circle over habitats in the narrower area (meadows, mornings, pastures) in search of food. This applies to the species: Golden eagle (*Aquila chrysaetos*), Common buzzard (*Buteo buteo*), Northern goshawk (*Accipiter gentilis*), Eurasian sparrowhawk (*Accipiter nisus*), Common kestrel (*Falco tinnunculus*).

In the period of late autumn-winter, resident birds (primarily songbirds) gather mostly in smaller flocks in habitats that are in the wider vicinity of the village of Krivača, Rakova Bara. They are most present in habitats near individual houses (households), arable land and orchards.

During the winter months, species that are winter guests are present in the narrower area. These are the following species: Great grey shrike (*Lanius excubito*r) (1 specimen on Debelo Brdo in December, 1 specimen on the outskirts of the village of Rakova Bara in December), Buteo lagopus (1 specimen on the Wreath in December), Hen harrier (Circus cyaneus) (1 individual on the outskirts of the village of Rakova Bara in January).

In the narrower area there are springs, watercourses, which birds use as watering places. The most important are: the Biger spring on the slopes of Venca, the Stupanjska river and the Rakobarska river. In the area of Venca there is a spring called Biger, which is used as a watering place for domestic cattle, and the present species of birds.

The Stupanjska River flows between Venac and Debelo Brdo, which is a habitat and watering place for the birds present.

At the foot of Rakobarski Vis, near the Funduri cave, the Rakobarska river springs and flows through the village of Rakova bara.

2.6.12. Bird species targeted to monitor wind farm impacts

During the one-year research of birds in the subject area and the wider environment in the period January - December 2014, 107 species of birds were recorded. 66 species of birds have been recorded in the narrower area (wider surroundings of locations intended for wind generators). National and international protection status is given for all recorded species.

An estimate of nesting pairs in Serbia, an estimate of the number of nesting pairs and the study of some bird species in the wider area of Đerdap in the period 2010-2011 is also given.

Of the total number of recorded species, 66 bird species were singled out as significant-target species. For the target species, based on their protection status, presence in the narrower area, sensitivity to wind farms, endangerment assessment is given.

Special attention is paid to the analysis of species that are most sensitive to wind turbines (species present in locations intended for wind turbines, predators and species that fly over the subject area during migration or in search of food, as well as species not endangered by collisions with wind turbines from habitat destruction and fragmentation). These are the following species of birds:

- golden eagle *(Aquila chrysaetos),*
- white stork (*Ciconia ciconia),*
- greater white-fronted goose (*Anser albifrons),*
- common buzzard (*Buteo buteo),*
- common kestrel (*Falco tinnunculus),*
- Eurasian skylark (*Alauda arvensis),*
- hen harrier *(Circus cyaneus)*
- common quail *(Coturnix coturnix),*
- corn crake *(Crex crex).*

All these types can be considered as targets for monitoring the impact of wind farms in phases during and after construction. **Golden eagle** (*Aquila chrysaetos*) - is one of the largest birds of prey (Fig. 32). Golden eagle belongs to the group of birds that are passive pilots, whose flight depends on the thermal, so due to their maneuverability and behavior during the flight, the vulnerability to collision was assessed as very high. (ORNIS CONSULT 1999). Sitting birds of prey on wind turbines contribute to high mortality rates (ORLOFF & FLANNERY 1992). DESCRIPTION: body length 75-88 cm, wingspan 204-220 cm, feathers of adults monochromatic, dark brown, head and nape are golden brown young are stamens with large white parts at the base of the tail and on the wings. It lives in different places, mostly in mountain massifs without dense vegetation. The lifespan of a golden eagle can be up to 50 years. It feeds on rabbits, mice, marmots, martens, foxes and turtles, but often with carrion. It can eat other birds. During the winter, they have problems finding food, so they can eat carrion to feed themselves.

They have very good eyesight and can spot prey from great distances. They have 8 times more visual acuity than humans. The claws are used to kill and carry prey, and the beak only for eating. They usually have a division of labor during the hunt - one golden eagle chases and leads prey to another waiting in ambush.

Golden eagles usually stay with the same partner for the rest of their lives. They build several nests throughout their territory and use them for several years. The nests consist of twigs, and are filled with grass from above when used. Older nests can be up to two meters in diameter and 1 meter in height, as eagles repair them every time they lack something and thus increase them over time through use. If the nest is placed on a tree, the branches can sometimes loosen under the weight so that the nest collapses. Various other small wild animals, which are so small that they are usually not interested in this large predator, can use their nests as shelter. Those who could actually eat them are just an interesting prey for the bald eagle and that is why they avoid their active nests. According to research, it is considered to occasionally nest in Romania on the left bank of the Danube. Based on previous research, in the wider area of Đerdap the number is 3-4 pairs.

MIGRATORY STATUS: very rare nesting bird - resident of the national park and the wider area of Đerdap.

STATE OF THE SPECIES: It was recorded in the Golubac gorge throughout the year (1-2 individuals), it is occasionally present on Venac and above the Brnjica river (1 individual in circulation was recorded).

NATIONAL PROTECTION STATUS: Strictly protected species in Serbia.

INTERNATIONAL STATUS OF PROTECTION: Strictly protected species under the Birds Directive of the European Commission; a species whose conservation status is unfavorable in Europe, but its main populations are outside Europe (SPEC-3) ¸Strictly protected species by the Berne Convention and protected by the Bonn Convention. The species is sensitive to wind farms (EC 2010, Annex II). Due to the occasional presence in the narrower area, small numbers in the wider area, as well as the way of using hunting space, the threat is considered high.

Since the study area is also an area where certain species nest and feed, habitat change would be an appropriate measure to reduce the impact. Several authors (JOHNSON et al. 2007; STERNER et al. 2007; MAMMEN et al. 2009) recommend the following habitat changes to reduce the impact.

The aim of these measures is to reduce the attractiveness of the wind farm area for birds of prey (where the golden eagle belongs), and especially this applies to the locations of wind turbines:

- avoid natural or artificial seating;
- agricultural fields in the wind farm area should not be mowed or mowed before mid-July;
- avoid facilities inside the wind farm that attract birds (eg landfills);

- the bases of the columns must be made in such a way that they are unattractive to the birds of prey that feed there and must be as small as possible.

The installation of wind turbines with tubular poles and the avoidance of other structures that are suitable for sitting are measures to reduce the activity of birds of prey in the area, and thus to reduce the risk of collision.

Figure no. 32: *Golden eagle (Aquila chrysaetos)*

White stork *(Ciconia ciconia)* - is a large wetland bird with long red legs and a flat, pointed red beak (Picture no. 33).

DESCRIPTION: Body length 100-115 cm, wingspan 155-165 cm. The head, neck and body are white while part of the wing is black, which is well visible when flying. The stork is very rarely announced, but that is why its clapping with its beak is very recognizable and it sounds like hitting a stick with a stick. As he chatted, he twisted his long neck back.

Storks are easily observed while standing on the nest. Nests can sometimes be very large, and they are placed on: roofs and chimneys of houses, poles along the streets, and less often on tall trees. We can often observe them feeding, when they visit meadows, ponds and swamps on high legs. He usually lives near people.

MIGRATORY STATUS: Nesting bird - a migrant from the wider area of Đerdap.

NATIONAL PROTECTION STATUS: Strictly protected species in Serbia.

INTERNATIONAL STATUS OF PROTECTION: Strictly protected species under the Birds Directive of the European Commission; a species whose conservation status is unfavorable in Europe, but its main populations are in Europe (SPEC-2), a species strictly protected by the Berne and Bonn Conventions.

Figure no. 33: *White stork (Ciconia ciconia)*

Greater white-fronted goose *(Anser albifrons)* – is a bird of the plover family (Figure no. 34).

DESCRIPTION: Body length is 65-78 cm, wingspan 130-165 cm. The body is brownish gray with striped stripes on the abdomen and white feathers around the beak and under the buttocks. They have light orange legs.

MIGRATORY STATUS: Winterer of the Đerdap area. NATIONAL STATUS OF PROTECTION: Protected species by the Law on Wildlife and Hunting ("Official Gazette of RS" No. 18/10).

INTERNATIONAL STATUS OF PROTECTION: Protected species under the European Commission's Birds Directive (WP-2); protected species by the Berne and Bonn Conventions.

Figure no. 34: *Greater white-fronted goose (Anser albifrons)*

Common Buzzard *(Buteo buteo)* – predator (Fig.35).

DESCRIPTION: Common Buzzard is an eagle that reaches a body length of 51-57 cm, and a wingspan of 113-128 cm. The body color of the feathers varies from dark brown to light brown. Common Buzzard builds nests high on trees in forests, plains, mountains and rocks. It builds its nest mainly in conifers at a height of 6 to 30 meters. They build them with dry tree branches, roots and twigs. Inside, there are green leaves from the trees they found in the area.

MIGRATORY STATUS: frequent nesting-resident of the Đerdap area.

NATIONAL PROTECTION STATUS: Strictly protected species in Serbia.

INTERNATIONAL STATUS OF PROTECTION: Strictly protected species by the Berne and protected species by the Bonn Convention.

Figure no. 35: *Common Buzzard (Buteo buteo)*

Common Kestrel *(Falco tinnunculus)* – is a diurnal predator from the falcon family and genus (Figure no. 36).

DESCRIPTION: The length of the body is 32-35 cm, and the wingspan is 71-80 cm. It has a long tail, the color of the wings and back is reddish-brown, while the belly is lighter in color. This species is very widespread, so that its range includes almost the whole of Eurasia and Africa. This falcon inhabits steppe landscapes, forest edges. The kestrel feeds on small rodents, field mice and voles, and if it does not have them, it will hunt small birds such as sparrows, tentacles or woodpeckers. It hunts in a characteristic way by hovering in the air watching the prey on the ground and then abruptly descends to a lower altitude, where it stops again, to observe the prey once more and then launch the final attack and finally catch it. The female Kestrel lays five to six eggs, and only she lays on them while the male hunts and brings food. If something happens to the females, there is no hope for the chicks either, because only she knows how to feed them properly with small pieces of prey.

MIGRATORY STATUS: Relatively frequent nesting-resident of the Đerdap area.

NATIONAL PROTECTION STATUS: Strictly protected species in Serbia.

INTERNATIONAL STATUS OF PROTECTION: a species whose conservation status is unfavorable in Europe, but its main populations are outside Europe (SPEC-3); strictly protected species by the Berne and protected species by the Bonn Convention.

Figure no. 36: *Common Kestrel (Falco tinnunculus)*

Eurasian skylark *(Alauda arvensis)* - a small bird from the order of sparrows (Fig. 37). The species is sensitive to wind turbines, due to the way it is used, it uses habitats near wind turbines and at the time of mating it flies vertically upwards (up to a height of 50-70 meters), the threat is moderate.

DESCRIPTION: The size of this bird is about 16-18 cm. This bird is gray-brown in color and has stripes on the upper parts and chest, but it also has a pure white belly. Males usually have larger wings than females.

MIGRATORY STATUS: Nesting-resident of the Đerdap area.

NATIONAL PROTECTION STATUS: Strictly protected species in Serbia.

INTERNATIONAL STATUS OF PROTECTION: a species whose conservation status is unfavorable in Europe, but its main populations are outside Europe (SPEC-3); strictly protected species by the Berne and protected species by the Bonn Convention.

Figure no. 37: *Eurasian skylark (Alauda arvensis)*

Hen Harrier (*Circus cyaneus*) is a species of bird of prey of the order of hawks. It resembles other hawks, and owls are surrounded by small feathers because of their eyes (Figure no. 38). It does not nest in Serbia, and can be seen during winter, late autumn and early spring. Hen Harriers hunt prey by searching the terrain in low, swinging flight, and for that reason it belongs to the species that are sensitive to wind farms.

DESCRIPTION: Hen Harrier is 41 to 52 cm long, with a wing span of 97 to 122 cm. The wings are long and narrow, and the legs are long. Males and females differ markedly in their appearance, so much so that for centuries they were considered separate species. The male is gray-blue with a white label, weighs about 350 g, and the female is brown with stripes and spots and a white tail and weighs about 530 g.

MIGRATORY STATUS: a passer-by in the Đerdap area.

NATIONAL PROTECTION STATUS: Strictly protected species in Serbia.

INTERNATIONAL STATUS OF PROTECTION: a species whose conservation status is unfavorable in Europe, but its main populations are outside Europe (SPEC-3); Strictly protected species under the Birds Directive (WP-1); the species is sensitive to wind farms (EC 2010, Annex II).

Figure no. 38: *Hen Harrier (Circus cyaneus)*

Common quail *(Coturnix coturnix)* - The common quail is a species of bird from the pheasant family, with numerous subspecies (Fig. 39). The smallest is from the order of coca. Its most common habitats are wheat fields and plains with meadows. The negative impact of wind farms is the destruction and fragmentation of habitats.

DESCRIPTION: body length 16-18 cm, wingspan 23-35 cm, back dark brown, belly and chest brown yellow, color adapted to the habitat. The eyes are reddish brown and the beak is dark brown. Her legs are yellow-pink, while her neck is brown. It feeds on seeds, leaf and flower buds and blackberries, and the young feed mainly on insects, until they become independent. The lifespan of a quail is estimated at 10 years. It is a migratory bird, and often dies during migration. They spend winters in Africa. Its natural enemies are beasts and birds of prey. It is difficult to see this bird, because it walks more than it flies and hides in the greenery. The quail's cry can be heard at a distance of about half a kilometer.

STATE OF THE SPECIES: It is present in the nesting season in the narrower and wider area (on the meadows on Venac, Debelo Brdo, Rakobarski Vis and Tilvi - couples, families).

MIGRATORY STATUS: Less nesting - resident of the Đerdap area.

NATIONAL STATUS OF PROTECTION: Protected species by the Law on Wildlife and Hunting ("Official Gazette of RS" No. 18/10). Due to the way of life (in the habitats near which wind generators are planned), the threat is considered to be moderate.

INTERNATIONAL STATUS OF PROTECTION: Protected species under the European Commission's Birds Directive (WP-2); a species whose conservation status is unfavorable in Europe, but its main populations are outside Europe (SPEC-3), protected species by the Berne and Bonn Conventions.

Quails do not usually inhabit a certain area, but appear evenly within the same field. Therefore, it can be assumed that the probability of inhabiting improved or newly formed habitats will be high, if they are formed at a sufficient distance from the wind generator (250 m).

All measures leading to an increase in agriculture are acceptable to increase the quality of quail habitats. This especially refers to the restoration of fragmented networks composed of smaller arable land as well as the absence of pesticide application. The formation of large strips of fallow land within arable fields or the formation of wide edges of fields rich in flowering species increases the availability of food and can fulfill a connecting role between different habitat structures such as the fields used.

The proposed measures will also serve as compensation for habitat damage near the wind farm.

As agricultural land is most often close to the research area, it is very likely that the quail in the vicinity will find a sufficient suitable habitat, in which the specific requirements of the species are met. Therefore, no disturbance of the local quail population is expected (in the sense of Article 5 of the Birds Directive and Article 6 of the Bern Convention). However, taking into account that a total of 38 wind turbines are planned to be installed, it is recommended to compensate for the destruction and reduced habitat quality in the proposed wind farm with appropriate measures at a distance of at least 250 m from the proposed wind turbines. All measures leading to an increase in agriculture are acceptable to increase the quality of quail habitats. The proposed measures will also serve as compensation for the disturbance and resulting disturbance of quail nesting and feeding habitats.

Appropriate compensatory measures for quail:

- Compensatory measure: Formation of strips rich in plants on the edges of fields and along field roads. It consists of forming strips rich in plants on the edges of the field and along field roads with a width of at least 5 cm, without the use of pesticides and artificial fertilizers, without mowing until August 1.

- Compensatory measure: Leaving cereal stubble on arable land. It consists of leaving the stubble of cereals in arable fields by February at the latest, the length of the stubble must be at least 20 cm, without the use of pesticides.

If the recommended measures for quails are taken into account, it is expected that the construction and operation of the proposed wind farm "Krivača" will not lead to:

- capturing or killing individuals during construction and operation;
- significant disturbance and destruction of nesting and resting habitats;
- harmful harassment.

Figure no. 39: *Common quail (Coturnix coturnix)*

Corn crake *(Crex crex)* – a species belonging to the barn hen family (Fig. 40).

DESCRIPTION: Their body is small (body length 27-33 cm, wing span 46-53 cm). The color of the feathers is grayish-yellow, the back with dark longitudinal stripes, on the sides of a rusty red stripe, so they are easily camouflaged into plants. They are not easily noticeable, but their specific way of advertising betrays them in nature. They nest in fields and in low vegetation, so they are very endangered. Beak short, sharp, yellowish like legs.

In Serbia, the farmer has lost a large part of its natural habitat by expanding arable land and using automation. They often suffer from agricultural machines, or do not have an adequate place to make nests. Great chemicals for these small birds are also strong chemicals used to destroy weeds and pests. Its somewhat irritating way of advertising, after which it got its name, is actually a love song! Corn crake males of the take tactical positions on which they build nests and then tirelessly call on females. It is especially interesting that the corn crake is a very fast animal that is almost impossible to catch.

SPECIES STATUS: Recorded on meadows on Venac, Debelo Brdo, Rakobarski Vis, Tilvi in the nesting season (1 individual - pairs). In the wider area of Đerdap, the number of couples is 50-70. Due to the presence of meadows in the immediate vicinity of wind turbines, and the way the space is used, the threat is moderate.

MIGRATORY STATUS: Rare nesting bird - migrant of Đerdap area.

NATIONAL PROTECTION STATUS: Strictly protected species in Serbia.

INTERNATIONAL STATUS OF PROTECTION: Strictly protected species under the Birds Directive of the European Commission; globally endangered (SPEC-1); strictly protected species by the Berne and protected species by the Bonn Convention. It is sensitive to wind farms (EC 2010, Annex II).

Figure no. 40: *Corn crake (Crex crex)*

Corn crake mostly lives on land, so the risk of collision with wind turbines is very low. Collisions of individual specimens cannot be completely ruled out in the planned wind farm, but they are considered unlikely.

Occasional harassment may occur if the time of installation of planned wind turbines or supporting infrastructure coincides with the nesting period. It is not considered that the influences related to the installation of wind generators can lead to the disruption of the status of the local population.

According to modern knowledge, the avoidant behavior of corn crakes can be attributed to the sound stimuli of wind farms. It is assumed that the rotors of the wind generator produce an aerodynamic sound that mixes and overlaps with the corn crake's voice, and because of that, the birds stop voting. As a result, the birds do not settle in the area near the wind farm because the communication between the individuals is disturbed. The operation of a wind farm can therefore lead to a reduction in habitat quality and even habitat loss.

Given that a similar habitat is found in the entire research area, it is very likely that the farmer will find enough suitable habitat in the area, in which the requirements of the species are met. Therefore, no disturbance of the local flea population is expected (in the sense of Article 5 of the Birds Directive and Article 6 of the Berne Convention).

Bird monitoring conducted from September 2015 to August 2016 provided insight into the use of the project area by the garden (target species) that are particularly vulnerable to collisions with wind turbines, as well as the number of nesting species. Based on the summer activity, the annual risk of collision with turbines was estimated for the target species. The initial collision risk assessment was made for turbines whose height was 180.3 m (117 m column height and propeller diameter 126 m), and an additional assessment was made because according to the amended project, the turbine height is 179.9 m column, and the diameter of the propeller 149.1 m) and reduced the number of turbines per cluster. The results are shown in Table no. 17 and 18.

Table no. 17: *Estimated annual risk of bird collisions with windmills for the original type of wind turbine*

Species (season)	No avoidance	90&	95%	99%
Hen harrier (winter)	0.43	0.043	0.021	0.004
Peregrine falcon (nesting)	0.21	0.021	0.010	0.002

European honey buzzard (nesting)	1.71	0.1708	0.0854	0.0171
Eurasian sparrowhawk (throughout the year)	0.03	0.0030	0.0015	0.0003
Northern goshawk (throughout the year)	1.42	0.1424	0.0712	0.0142
Western marsh harrier (passer)	1.22	0.1224	0.0612	0.0122
Montagu's harrier (passer)	0.26	0.0262	0.0131	0.0026
Long-legged buzzard (winter)	0.15	0.0151	0.0076	0.0015
Common buzzard (throughout the year)	54.50	5.4504	2.7252	0.5450
Common kestrel(passer)	1.13	0.1130	0.0565	0.0113
Merlin (winter)	0.01	0.0013	0.0007	0.0001
Eurasian hobby (passer)	0.03	0.0033	0.0016	0.0003

Table no. 18: *Estimated annual risk of collision of birds with windmills for another type of turbines*

Species (season)	**No avoidance**	**90&**	**95%**	**99%**
Hen harrier	0,31	0,031	0,015	0,003
Peregrine falcon	0,18	0,018	0,009	0,002
European honey buzzard	1,71	0,1708	0,0854	0,0171
Eurasian sparrowhawk	0,05	0,0050	0,0025	0,0005
Northern goshawk	1,48	0,1482	0,741	0,0148
Western marsh harrier	1,57	0,1575	0,0787	0,0157
Montagu's harrier	0,30	0,0324	0,0162	0,0032
Long-legged buzzard	0,15	0,0151	0,0076	0,0015
Common buzzard	50,04	5,0041	2,5020	0,5004
Common kestrel	1,34	0,1347	0,0673	0,0135
Merlin	0,01	0,0013	0,0007	0,0001
Eurasian hobby	0,03	0,0033	0,0016	0,0003

Raven	2,73	0,2735	0,1367	0,0273

During the one-year research of birds in the area of the wind farm "Krivača", a total of five primarily target bird species were observed (species that are the highest priority for protection and that suffer from collisions with wind turbines). Those are:

- *Anser albifrons*
- *Ciconia nigra*
- *Circus cyaneus*
- *Milvus migrans*
- *Falco peregrinus*

Most of the target bird species were observed on Venac, followed by Debelo brdo and Tilva. Only one primary target species has been recorded on Tilva, and that is *Circus Cuaneus*. Only two of the five primary target species were recorded in the 50 (30) - 180 m window, namely *Circus Cuaneus and Falco Peregrinus*. For these two species, the risk of collision with wind turbines was calculated for all localities together (Tables 17 and 18). If we calculate the lowest collision avoidance rates with in-flight wind turbines (Scottish Natural Heritage (SNH), 2016), the calculated probability of death for these two species is very small. At an avoidance rate of 95%: one *Circus Cuaneus* would die every 47.6 years for the original turbine type and number of windmills, and at 66.7 years for a changed turbine type and reduced windmill number. For the gray falcon (*Falco Peregrinus*), the estimated mortality is even more favorable, one unit every 100 years for the first type and 111.1 years for the second type of turbine. In the area of the wind farm "Krivača", another 13 secondary target species were recorded (Table 3), two of which were not observed in the collision risk window (50 (30) - 180 m), but in the window of 180 m and more. These are *Phalacrocorah carbo* and *Anser fabalis*. The two species that have the highest probability of suffering, counting the avoidance rate of 95%, are the mouse: three birds per year for the first type of turbine and the number of windmills and 5 individuals every 2 years for the second type and number of windmills; and raven 1 individual every seven years for the first and 1 individual every 8 years for the second type of wind turbine. (Tables 17 and 18).

A total of 51 bird species (excluding predators) (Table 19) were registered during the nesting period in the area provided for the construction of the wind farm. Species richness was highest in the Venac cluster (Transect 1, n = 33; Transect 2, n = 40), and lowest in the Tilva cluster (Transect 5, n = 23). The Tilva and Rakobarski Vis transects have the smallest share of small forest areas compared to the transects within the Venac and Debelo Brdo clusters. The Debelo Brdo cluster (Transect 4) had the most uniform habitat, with approximately equal representation of shrubs, small forests and meadows. The Rakobarski Vis cluster (Transect 6) had the largest share of meadows in relation to all other transects (Figure 6). The Debelo Brdo cluster (Transect 4) had the largest number of species (n = 29). This will probably be the result of a mosaic of habitats. The Rakobarski Vis cluster (Transect 6) supported the smallest number of species (n = 6), which is probably the result of the dominance of one type of habitat (meadow) in this area. Of the species important for protection during this research, only one species was recorded that is endangered at the European level and whose populations have negative trends in Serbia as well (BirdLife International, 2015). It is the turtle dove (*Streptopelia turtur*), which was recorded in all six transects. The recorded number in the project area is not significant at the national level, where it is estimated that the population is from 39,000 to 53,000 pairs (BirdLife International, 2015). All other recorded species are common, widespread and a possible reduction in numbers due to the construction of a wind farm would have almost no impact on the populations of these species at the national level.

Table no. 19: *The number of nesting birds in the area of the Krivača wind farm*

Species	Transect						Number of pairs / km transect
	1	2	3	4	5	6	
Coturnix coturnix	0.00	0.00	0.27	0.00	0.00	0.28	0.09
Phasianus colchicus	0.44	0.13	0.29	0.00	0.75	0.00	0.27
Perdix perdix	0.00	0.00	0.00	0.85	0.00	0.00	0.14
Columba palumbus	0.00	0.33	0.40	1.45	0.55	0.00	0.46
Streptopelia turtur	0.37	0.33	0.29	1.61	0.39	0.36	0.56
Cuculus canorus	0.36	0.26	0.85	0.88	0.35	0.00	0.45
Accipiter nisus	0.00	0.13	0.14	0.00	0.00	0.00	0.04
Accipiter gentilis	0.07	0.00	0.00	0.00	0.20	0.00	0.04
Buteo buteo	0.37	0.39	0.43	1.18	1.05	0.27	0.61

Species	Transect						Number of pairs / km transect
	1	2	3	4	5	6	
Upupa epops	0.00	0.13	0.00	0.00	0.00	0.00	0.02
Jynx torquilla	0.00	0.20	0.00	0.00	0.18	0.00	0.06
Picus canus	0.00	0.00	0.00	0.00	0.00	0.09	0.01
Picus viridis	0.15	0.19	0.00	0.28	0.00	0.09	0.12
Dendrocopos medius	0.36	0.33	0.00	0.00	0.00	0.00	0.11
Dendrocopos syriacus	0.00	0.00	0.00	0.00	0.00	0.26	0.04
Dendrocopos major	0.59	0.27	0.29	1.13	0.35	0.18	0.47
Falco tinnunculus	0.29	0.19	0.15	0.00	0.55	0.18	0.23
Oriolus oriolus	0.45	0.26	0.43	1.18	0.00	0.00	0.39
Lanius collurio	2.09	1.80	4.61	6.18	6.48	1.81	3.83
Garrulus glandarius	0.66	0.39	0.28	2.01	0.79	0.18	0.72
Pica pica	0.76	0.40	0.71	0.85	0.00	0.00	0.45
Corvus corax	0.08	0.00	0.00	0.00	0.00	0.00	0.01
Corvus corone/cornix	0.38	0.07	0.43	0.59	1.38	0.00	0.47
Poecile lugubris	0.00	0.00	0.42	0.85	0.00	0.00	0.21
Parus palustris	0.00	0.00	1.11	1.44	0.00	0.18	0.45
Parus caeruleus	0.85	1.04	1.33	2.46	1.30	0.55	1.26
Parus major	0.94	0.66	0.94	2.65	0.99	0.44	1.10
Lullula arborea	0.35	0.33	0.00	1.14	0.00	0.00	0.30
Alauda arvensis	0.46	0.52	1.39	1.99	2.25	2.09	1.45
Phylloscopus collybita	0.37	0.26	0.00	0.86	0.00	0.00	0.25
Aegithalos caudatus	0.52	0.78	1.34	1.73	0.79	0.37	0.92

Sylvia atricapilla	*0.59*	*0.13*	*0.43*	*0.57*	*0.55*	*0.00*	*0.38*
Sylvia nisoria	*0.22*	*0.33*	*0.68*	*0.57*	*0.39*	*0.09*	*0.38*
Sylvia curruca	*0.00*	*0.13*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*
Sylvia communis	*0.50*	*0.45*	*0.93*	*2.45*	*1.91*	*1.19*	*1.24*
Certhia familiaris	*0.00*	*0.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.05*
Sitta europaea	*0.00*	*0.25*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*
Troglodytes troglodytes	*0.22*	*0.19*	*0.00*	*0.00*	*0.00*	*0.00*	*0.07*
Sturnus vulgaris	*0.00*	*0.00*	*0.42*	*1.14*	*0.00*	*0.00*	*0.26*
Turdus viscivorus	*0.30*	*0.40*	*0.00*	*0.00*	*0.00*	*0.00*	*0.12*
Turdus philomelos	*0.37*	*0.33*	*0.00*	*0.00*	*0.00*	*0.26*	*0.16*
Turdus merula	*0.85*	*0.78*	*1.53*	*2.18*	*2.42*	*0.54*	*1.38*
Erithacus rubecula	*0.38*	*0.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.12*
Luscinia megarhynchos	*0.82*	*0.46*	*0.57*	*1.91*	*0.94*	*0.74*	*0.91*
Phoenicurus phoenicurus	*0.00*	*0.13*	*0.00*	*0.00*	*0.00*	*0.00*	*0.02*
Saxicola rubetra	*0.00*	*0.00*	*0.28*	*0.00*	*0.00*	*0.37*	*0.11*
Saxicola rubicola	*0.00*	*0.26*	*0.00*	*0.00*	*0.00*	*0.00*	*0.04*
Anthus trivialis	*0.15*	*0.26*	*0.55*	*0.29*	*0.59*	*0.26*	*0.35*
Fringilla coelebs	*0.97*	*0.99*	*0.69*	*0.57*	*0.94*	*0.71*	*0.81*
Coccothraustes	*0.53*	*0.51*	*1.02*	coccothraustes	*0.00*	*2.36*	*0.86*	*0.88*
Carduelis carduelis	*0.22*	*0.20*	*0.42*	*0.00*	*0.00*	*0.00*	*0.14*

Species	Transect						Number of pairs / km transect
	1	*2*	*3*	*4*	*5*	*6*	
Emberiza calandra	*0.44*	*0.33*	*0.83*	*2.52*	*0.92*	*0.52*	*0.93*
Emberiza hortulana	*0.00*	*0.00*	*0.70*	*1.15*	*0.00*	*0.18*	*0.34*
Emberiza cirlus	*0.00*	*0.00*	*0.28*	*0.00*	*0.00*	*0.00*	*0.05*
Emberiza citronella	*0.37*	*0.59*	*0.99*	*1.99*	*1.18*	*0.43*	*0.92*

Six species of birds active at night were registered in the subject area of the Krivača wind farm.

Table no. 20: *Number of territorial males / pairs of nocturnal species on the clusters of the Krivača wind farm*

Species	Trend in Serbia	Population of Serbia (pairs)	Venac	Debelo brdo	Rakobarski Vis	Tilva	Total
Common quail *Coturnix coturnix*	*-/-*	*24,000- 34,000*	*2*	*2*	*3*	*3*	*10*
Eurasian scops owl *Otus scops*	*+/+*	*26,000- 41,000*	*1*	*1*	*0*	*0*	*2*
Tawny owl *Strix aluco*	*0/0*	*18,500- 23,500*	*1*	*2*	*2*	*1*	*6*

Ural owl *Strix uralensis*	+/+	*450-650*	*2*	*1*	*0*	*1*	*4*
Long-eared owl *Asio otus*	+/+	*17,700- 25,200*	*1*	*1*	*2*	*0*	*4*
European nightjar *Caprimulgus europaeus*	*0/0*	*3,600- 5,100*	*1*	*1*	*1*	*2*	*5*

The birds were observed in relatively low density with little variation between test points. Eurasian scops owl (*Otus scops*) and the ural owl (Strix uralensis) were absent from the survey points in and around Rakobarski Vis. A maximum of four ural owl territories have been recorded, representing 0.9% of the national population, so this species should be monitored during project development.

Seven species of birds of prey were registered during the examination of these species done between February and May 2016. No pairs of white-tailed eagle and bald eagle have been found within a 6km radius around the turbine cluster, but their territories at a greater distance from the wind farm are known.

Four species of predators were observed during the examination of nesting birds. Common species of predators such as muskrats and kestrel have been recorded in all clusters, and the Common buzzard is the most numerous predator recorded.

Table no. 21: *Number of birds of prey (territory / pairs) within a radius of 2 km around the wind farm*

Species	European Red list	Trend in Serbia	Population in Serbia	North	East	South	West
The European honey buzzard	*LC*	*+/+*	*650-820*	*0*	*0*	*1*	*1*
Eurasian sparrowhawk	*LC*	*+/+*	*1,450-1,700*	*0*	*0*	*1*	*1*
Northern goshawk	*LC*	*-/-*	*900-1,150*	*1*	*0*	*1*	*0*
Common buzzard	*LC*	*+/+*	*3,800-4,700*	*2*	*1*	*2*	*2*
Common kestrel	*LC*	*0/0*	*4,000-5,000*	*3*	*0*	*3*	*2*

2.6.13. Bat Research January 2014 / December 2014.

The research of bats in the subject area included, above all, all available and known speleological objects. The following speleological objects are present in the research area:

- Ivan's cave, located in the immediate vicinity of the Stupanjska river at the foot of Debelo Brdo, in the area of the Đerdap National Park, in the gorge of the Brnjica river (Figure no. 44),
- Funduri Cave, located near the source of the Rakobar River at the foot of Rakobarski Vis (Figure no. 42);
- Gaura Mare Cave, located in the gorge of the river Brnjica at the foot of Debelo Brdo (Figure no. 41).

Figure no. 41: *Gaura Mare Cave*

Figure no. 42: *Funduri Cave*

In addition to speleological objects, the research area included old, neglected as well as other houses in the research area (Venac, Debelo brdo, Rakobarski Vis, Tilva), in order to determine the presence of bats in them, which may be potential shelters (Figure no. 43).

Figure no. 43: *Old and neglected house on Venac*

Figure no. 44: *Ivan's cave*

2.6.14. The results of bat research

During the monitoring conducted in 2014, four species of bats were recorded in speleological objects in the investigated area: Greater horseshoe bat *(Rhinolophus ferrumequinum)*, Mediterranean horseshoe bat *(Rhinolophus euryale)*, common bent-wing bat *(Miniopterus schreibersii)* и Soprano pipistrelle *(Pipistrellus pygmaeus)*.

An inspection of old, abandoned houses in the subject area did not reveal the presence of bats in them.

Figure no. 45: *Greater horseshoe bat (Rhinolophus ferrumequinum) in hibernation in Ivan's cave*

Figure no. 46: *Common bent-wing bat Дугокрили љиљак (Miniopterus schreibersii)*

In Table no. 22, a list of bats recorded in the study area in the period from 2014 to 2019 is given.

Table no. 22: *Overview of speleological objects included in the research of bats, date of research, present species*

Se. no.	Species name	Presence in the subject area, level of endangerment
1.	Greater horseshoe bat *Rhynolophus ferrumequinum*	**2014.**
		- Gaura Mare Cave: 1 individual - Funduri Cave: 1 individual - Ivan's Cave: No bats were found. The feces of bats were found on the floor of the cave. According to a survey of the residents of the village of Krivače, bats are present during the summer.
		2015.
		- Gaura Mare Cave: 4 individuals - Funduri Cave: 2 individuals - Ivan's Cave: 1 individual
		2016.
		- Gaura Mare Cave: 8 individuals - Funduri Cave: 3 individuals - Ivan's Cave: 4 individuals
		2017.
		- Gaura Mare Cave: 6 individuals - Funduri Cave: 2 individuals - Ivan's Cave: 6 individuals
		2018.
		- Gaura Mare Cave: 8 individuals - Funduri Cave: 4 individuals - Ivan's Cave: 8 individuals
		2019.
		- Gaura Mare Cave: 6 individuals - Funduri Cave: 6 individuals - Ivan's Cave: 4 individuals
	Endangerment	A species that is not sensitive to wind farms. The international IUCN status of the species is "almost endangered", the population is considered to be declining, in Serbia it is the status of "least concern". In Europe, the population is declining, while in Serbia it is stable. The assessment of the level of vulnerability is low.
2.	Mediterranean horseshoe bat *Rhynolophus euryale*	**2014.**
		- Gaura Mare Cave: 12 individuals - Funduri Cave: this species has not been found - Ivan's Cave: No bats were found. The feces of bats were found on the floor of the cave. According to a survey of the residents of the village of Krivače, bats are present during the summer.
		2015.
		- Gaura Mare Cave: 10 individuals - Funduri Cave: 2 individuals - Ivan's Cave: 6 individuals
		2016.
		- Gaura Mare Cave: 12 individuals - Funduri Cave: 4 individuals - Ivan's Cave: 8 individuals
		2017.
		- Gaura Mare Cave: 10 individuals - Funduri Cave: 6 individuals - Ivan's Cave: 10 individuals.
		2018.

		- Gaura Mare Cave: 14 individuals - Funduri Cave: 8 individuals - Ivan's Cave: 8 individuals
		2019.
		- Gaura Mare Cave: 12 individuals - Funduri Cave: 4 individuals - Ivan's Cave: 4 individuals
	Endangerment	A species that is not sensitive to wind farms. The international IUCN status of the species is "almost endangered". Status in Serbia is defined as "least concern". The assessment of the level of vulnerability is low.
3.	Common bent-wing bat *Miniopterus schreibersii*	**2014.**
		- Gaura Mare Cave: 1 individual - Funduri Cave: no specimen of this species has been found - Ivan's Cave: not a single specimen of this species has been found
		2015.
		- Gaura Mare Cave: 2 individuals - Funduri Cave: no presence was ascertained - Ivan's Cave: 1 individual
		2016.
		- Gaura Mare Cave: 4 individuals - Funduri Cave: 1 individual - Ivan's Cave: 1 individual
		2017.
		- Gaura Mare Cave: 1 individual - Funduri Cave: 1 individual - Ivan's cave: no presence was ascertained
		2018.
		- Gaura Mare Cave: 2 individuals - Funduri Cave: 2 individuals - Ivan's Cave: 1 individual
		2019.
		- Gaura Mare Cave: 4 individuals - Funduri Cave: no presence was ascertained - Ivan's Cave: 1 individual
	Endangerment	A species that is not sensitive to wind farms. The population in Serbia is stable. Status in Serbia is defined as "least concern". International IUCN status is "almost endangered". The assessment of the level of vulnerability is low.
4.	Soprano pipistrelle *Pipistrellus pygmaeus*	**2014.**
		This species has not been recorded in field research.
		2015.
		One specimen was recorded in the roof of a house in the village of Rakova bara
		2016.
		One specimen was recorded in the roof of the house in the village of Radenka, one specimen in the roof of the house in the village of Krivača.
		2017.
		One specimen was recorded in the roof of the house in the village of Rakova bara and the village of Krivača.
		2018.
		One specimen was recorded in the roof of the house in the village of Krivača and the village of Rakova bara.
		2019.
		One specimen was recorded in the roof of a house in the village of Rakova bara.
	Endangerment	The species is moderately sensitive to wind farms. The international IUCN status of the species is the "least concern". In Serbia, the population trend is considered stable. The assessment of the level of vulnerability is low.

During the one-year monitoring of bats conducted from September 2015 to August 2016, the presence of four species was registered by working with manual and automatic detectors for

bats: *Miniopterus schreibersi*, *Pipistrellus pipistrellus*, *Nyctalus leisleri*, *Barbastella barbastellus*. The activity of bats registered by detectors (manual and automatic) shows that the activity in the project area is low, and that the area is not particularly important for bats.

The presence of one species of bats - the great horseshoe bat Rhinolophus ferrumequinum - was registered in the speleological objects that were visited (Ivan's Cave and Guara Mare). The presence of bats during the hibernation period was not registered in Ivan's cave, while the presence of three individuals of this species was recorded in Guara Mare cave. This finding indicates that this speleological object is not significant for bat hibernation.

2.6.15. Protected species of bats and sensitivity to wind farms

The species of bats recorded in the study area are protected by international conventions:

- as strictly protected species in Annex 2 of the Berne Convention;
- are in Annex 2 of the Bonn Convention on the Conservation of Migratory Species of Wild Animals.

This means that they are considered migratory species that are the subject of international agreements for their conservation and management of their populations. All species recorded in the study area are strictly protected under the Law on Nature Protection ("Official Gazette of RS", No. 36/09, 88/10, 91/10, 14/16 and 95/18 (other law)).

Greater horseshoe bat *(Rhinolophus ferrumequinum)* - a species that is not sensitive to wind farms. The international IUCN status of the species is "almost endangered", the population is considered to be declining, in Serbia it has the status of "least concern". In Europe, the population is declining, while in Serbia it is stable. The endangerment for this species is considered low.

Common bent-wing bat *(Miniopterus schreibersii)* - a species that is not sensitive to wind farms. The population in Serbia is stable. Status in Serbia is defined as "least concern". International IUCN status is "almost endangered". The endangerment for this species is considered low.

Soprano pipistrelle *(Pipistrellus pygmaeus)* - the species is moderately sensitive to wind farms. The international IUCN status of the species is the "least concern". In Serbia, the population trend is considered stable. The endangerment for this species is considered low.

Common pipistrelle (*Pipistrellus pipistrellus)* – A species of mostly forest habitat. Small activity in the subject area. The species is on the Red List of the International Union for Conservation of Nature (category LC - "least endangered“).

Lesser noctule (*Nyctalus leisleri*) - This species is not endangered, and is listed as a last resort because it is widespread. International IUCN status is "least endangered".

Western barbastelle (*Barbastella barbastellus*) - This species is at lower risk of extinction, and according to international IUCN status is "almost endangered" by the taxon.

Figure no. 47: *Soprano pipistrelle (Pipistrellus pygmaeus)*

Based on foreign experience, it is considered that the mentioned species of bats, which are present in the subject area of the wind farm, will not be significantly negatively affected. This will certainly depend on the application of measures that prevent, reduce and eliminate any significant harmful effects of wind turbines on the bat population present in the area in question.

2.7. Landscape appearance and landscape characteristics

Landscape and landscape characteristics of space are an important element for understanding the current state of natural and acquired conditions and their mutual relations, since they unite all positive and emerging negative influences and consequences from the aspect of visual perception, which enables easy and quick identification of problems in space. Landscape and landscape characteristics synergistically outline all phenomena and interactions of spatial and social factors. When assessing landscape-landscape values of space, it should be borne in mind that they are largely based on subjective perception and evaluation. The assessment of landscape-landscape values of space can be performed by breaking it down into physical and abstract characteristics.

Physical characteristics can include natural characteristics (terrain morphology, vegetation condition, existing water surfaces) and created ones (construction, arrangement). Abstract characteristics represent the subjective experience of the observed space (specificity of form, diversity, compactness, harmony, aesthetic experience).

In the area of the planned wind farm "Krivača" and the locations planned for the installation of wind generators, there are arable land, meadows, pastures, surrounded by smaller or larger fragments and forest complexes. In the immediate vicinity of the locations provided for wind turbines, there is already a developed road network - rural roads that locals use during the year to perform agricultural work and other activities. Considering that there are already roads in the area of Venac, Debelo brdo, Rakobarski vis and Tilva, so that no significant changes in the structure of the landscape are expected with the reconstruction of the existing and possible construction of new access roads. The character of the landscape in the area of the planned wind farm is very specific:

- prominent locations "Venac", "Tilva", "Debelo brdo";
- construction areas at the foot of hills and hills and plains connected by rural and state roads;

The identification of characteristic landscape elements was used in order to analyze the spatial and temporal dynamics of landscapes in the subject area, in order to ensure efficient management of the same. A wide range of landscape values, such as natural landscapes induced by physical and geographical characteristics: Tilva, Venac, Rakobarski venac, Debelo and Golo brdo, landscapes whose main characteristic is determined by the composition and distribution of plant communities and have different degrees of balance (preserved forest communities letters), cultural landscape (rural Braničevo, Ponikve, Usije, Radoševac, Golubac, Sladinac, Vojilovo, Maleševo, Dvorište, Krivača and Snegotin, Rakova bara, Ševica, Turija, Popovac, Neresnica and Radenka) and urban landscape, Golubac, Kučevo Veliko Gradište), are exposed to growing human pressure and exhibit accelerated dynamics of characteristic landscape elements. The following photographs show the landscape represented in the analyzed area.

The planned project, in accordance with the characteristics of the location, represents an acceptable purpose and will be part of the overall landscape and landscape of the spatial unit to which it belongs.

Figure no. 48: *Debelo brdo*

Figure no. 49: *Golo brdo*

Figure no. 50: *Overview of landscapes in the research area*

2.7.1. Land use in the area of importance for the Project

The area where the construction of the wind farm "Krivača" is planned has the following characteristics:

- *on the territory of the municipality of Golubac (area 368 km²), the relief is characterized by lowland-hilly area in the extreme western part (about 30% of the territory) and mountainous in the central and eastern part of the municipality (about 70% of the territory); agricultural areas cover about 15,100 ha (about 41% of the municipality's territory), and forest areas cover about 17,400 ha (about 47.4% of the municipality's territory);*

- *on the territory of the municipality of Kučevo (721 km²), there is a plain part with low hills and hilly-mountainous relief; agricultural areas occupy about 34,550 ha about 47%) and about 34,820 ha forest (about 48%);*

According to the Spatial Plan of the Republic of Serbia 2010-2020, Figure 51 shows the use of land on the territory of the municipalities in whose territories the Krivača Wind Farm Project is planned.

The analyzed area is characterized by a mosaic shift of intensively cultivated agricultural land, abandoned plots with visible succession processes, meadows, pastures, mornings, forest fragments, forest complexes of deciduous and coniferous stands.

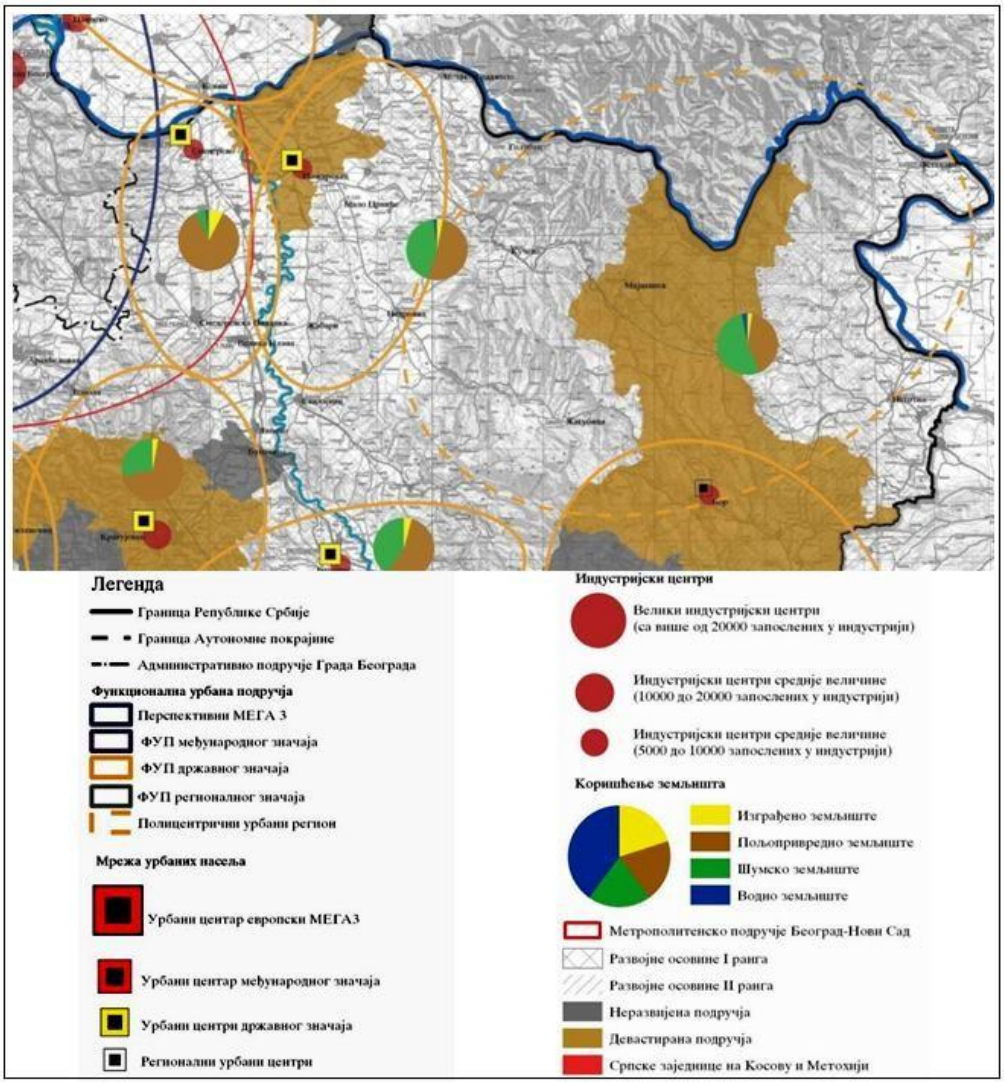


Figure no. 51: *Spatial plan of the Republic of Serbia 2010-2020 - Referral map no.1, Land use and functional urban areas model 2012*

2.7.2 Landscape character assessment

The appearance of the landscape in the area of the planned Project fits into the context of the wider area, in terms of proportion, topography, visual balance and texture. The subject area is characterized by mosaic in changing agricultural and forest type areas: arable land, meadows, pastures, shrubs, shrubs and hedges, individual trees and groups, prohibitions, forest fragments and forest complexes of pure and mixed deciduous and coniferous vegetation. The analyzed area is intersected by state roads, rural and forest uncategorized roads. In the field of research, the following are represented: highly preserved (natural) forest and meadow ecosystems, areas close to natural ecosystems, areas with semi-natural habitats, plots of

abandoned agricultural land in succession processes and intensively cultivated agricultural areas.

East of the planned wind farm zone is the area of the Đerdap National Park, which is a unique natural, cultural, historical and archaeological phenomenon, with over 50 types of forest communities, 35 of which are relict with six developmental vegetation series. Represents areas with international protection status:

- Internationally Important Bird Areas - IBA (Important Bird Areas), established under the Birdlife International program under the name - Đerdap;
- Internationally important plant areas - IPA areas (Important Plant Areas), established under the Plantlife International-PlantEuropa program under the name: Đerdap and Kladovo-Radujevac;
- Selected areas for butterflies - PBA areas (Prime Butterfly Areas) under the program Butterfly Conservation Europe, established under the name Đerdap;
- EMERALD area identified / established under the name "Đerdap National Park" as part of the network of areas (Emerald Network of Areas of Special Conservation Interest-AsCI) important from the point of view of implementing the Convention on Conservation of European Wildlife and Natural Habitats (Bern Convention) in Serbia ;
- IBA and EMERALD areas are the backbone of the European ecological network NATURA 2000 through which the implementation of key EU acts in the field of nature protection - Habitats Directive (Council Directive92 / 43 / EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) - on the basis of which the so-called Special Areas of Conservation (SAcS) and the Birds Directive (Council Directive 79/409 / EEC of 2 April 1979 on the conservation of wild birds) - on the basis of which the so-called Special Protection Areas (SPAs);
- Carpathian region - Đerdap National Park, which is currently the only area of application of the Framework Convention for the Protection and Sustainable Development of the Carpathians in Serbia;
- Biosphere Reserve - Đerdap National Park as one of the 8 areas in Serbia planned for the establishment of a biosphere reserve under the UNESCO program "Man and the Biosphere" (MaB);
- World Heritage Site - Đerdap National Park as an area on the preliminary list of assets proposed by the Republic of Serbia for inclusion in the UNESCO World Heritage List under the Convention on the Protection of World Cultural and Natural Heritage);

The area in the immediate and, in part, the wider environment of the planned wind farm area is relatively sparsely populated. In the wider environment there are settlements Krivača, Dvorište, Golubac, Snegotin, Krivača, Radenka and Rakova Bara, which differ greatly in size, population, population density, level of equipment and size of the construction area. Each settlement has a specific view in space. The settlements are mostly primary villages, except for Golubac, which is the municipal center. They are economically underdeveloped and in the primary rural settlements agriculture is the dominant activity. Part of the local municipal roads is asphalted, and other Atar and forest roads are unpaved, gravelly or dirt. The intensity of traffic on these roads is low.

2.7.3. Settlements of importance for the Project in question

The area where the realization of the wind power plant "Krivača" is planned is spread over the territory of three municipalities:

- Golubac (Braničevo, Ponikve, Usije, Radoševac, Golubac, Sladinac, Vojilovo, Maleševo, Dvorište, Krivača and Snegotin), with an area of about 153.25 ha;
- Kučevo (Rakova Bara, Ševica, Turija, Kučevo 1, Popovac, Neresnica and Radenka), with an area of about 79.26 ha;
- Veliko Gradište (Kusiće), area of about 9.65 ha. The route of one of the two transmission lines is planned in the municipality of Veliko Gradište, but they are not the subject of this Study on Environmental Impact Assessment.

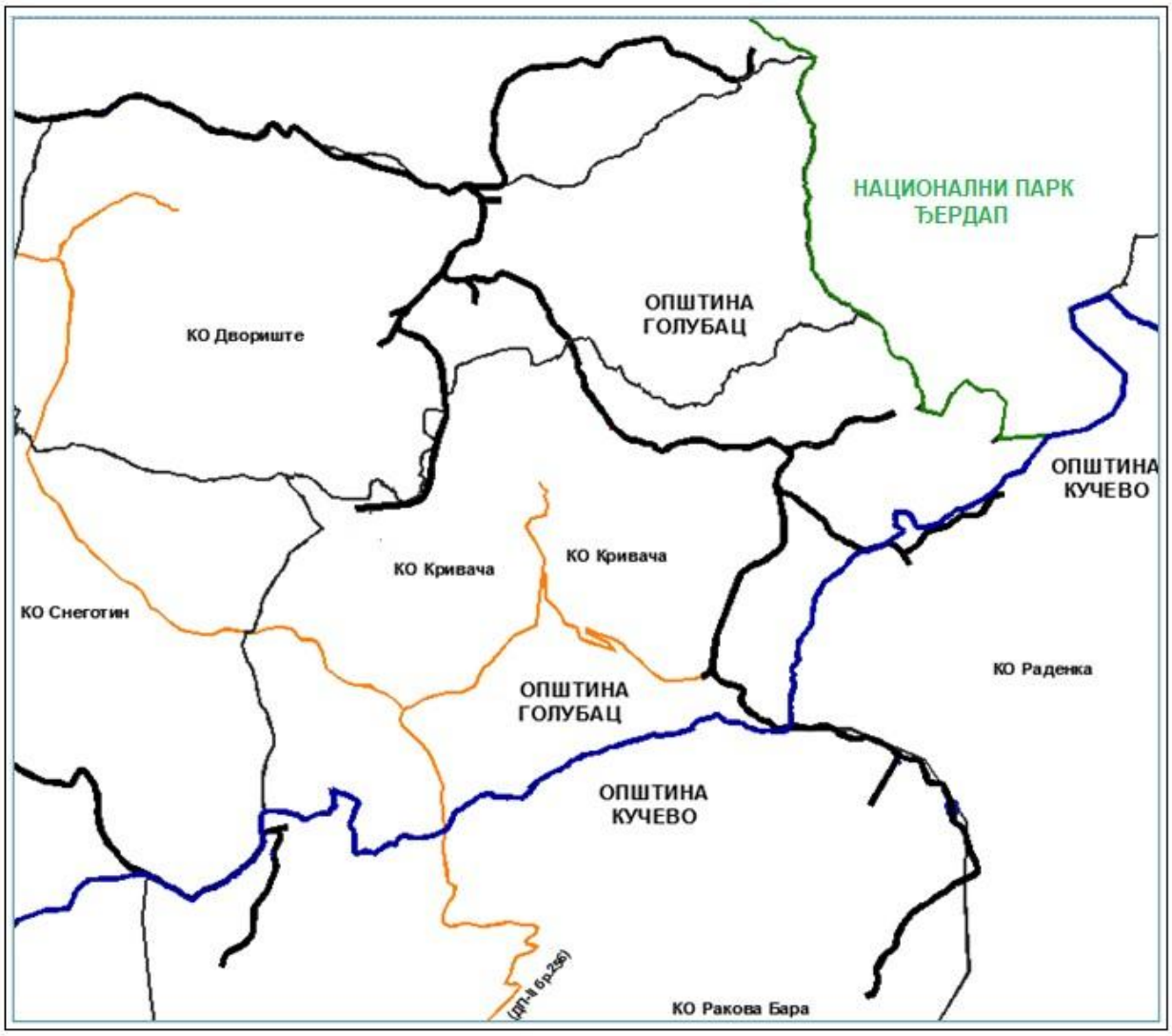


Figure no. 52: *Municipalities of Golubac and Kučevo with settlements*

Through the area of the municipality of Golubac (settlements: Braničevo, Ponikve, Usije, Radoševac, Sladinac, Vojilovo, Maleševo, Dvorište and Krivača), a corridor of 110 kV transmission line was laid from PRP "Krivača" to SS110 / 35 kV "Veliko Gradište". On the territory of the municipality of Veliko Gradište, through the CM Kusiće, about 3.0 km long, a 110 kV transmission line was laid, from the 110/35 kV substation "Veliko Gradište" to the border with the municipality of Golubac. The corridor of the transmission line with the protection belt (2x15.00 m), which starts from the 110/35 kV substation "Veliko Gradiste", passes about 500 m north of the construction area of Kusiće, crosses the river Pek and then enters the municipality of Golubac. On the territory of the municipality of Golubac, through CM Braničevo, CM Ponikve, CM Usije, CM Radoševac, CM Sladinac, CM Vojilovo, CM Maleševo, CM Dvorište and CM Krivača, a transmission line, about 16.4 km long, was laid. The corridor of the transmission line with the protection belt (2x15.00 m) passes outside the construction areas of the settlement, in CM Usije it intersects with the corridor of the state road IB row number 34 (at the station around km 113 + 949). In the settlement of Radoševac, it passes the existing location of the cemetery on the west side and joins the CM Krivača in the 110 kV SY "Krivača".

The planned 110 kV transmission line, routed from SY "Krivača" to substation 110/35 kV "Neresnica", extends over the municipalities of Golubac (CM Krivača) and Kučevo (CM Rakova Bara, CM Ševica, CM Turija, CM Kučevo I, CM Popovac and CM Neresnica). On the territory of the municipality of Golubac, through the KO Krivača, about 2.8 km long, a transmission line was laid from the SY "Krivača" to the border with the municipality of Kučevo. The corridor of the transmission line with the protection belt (2x15.00 m) passes outside the construction areas of

the settlement, intersects with the Krivačka river and then enters the territory of the municipality of Kučevo. On the territory of the municipality of Kučevo, through CM Rakova Bara, CM Ševica, CM Turija, CM Kučevo I, CM Popovac and CM Neresnica, a transmission line about 16.6 km long was laid, and the corridor of the transmission line with a protection belt (2x15.00 m) passes outside the construction settlement areas. From the border with the municipality of Golubac, the transmission line is routed in the southeast direction, over the hill Prisoj, passes about 1.2 km northwest in relation to the settlement Rakova Bara, climbs the hill Zapod, and then breaks in the south direction. After passing the hill Rudina, the route is on a relatively flat terrain. The transmission line bypasses the town of Kučevo on the northeast side, intersects with the river Ševica and the municipal road Kučevo - Ševica. Further, the route is directed to the south, intersects with the 400 kV transmission line number 401/2 "Drmno-Đerdap 1", intersects with the state road IB row number 33 (at the station km 342 + 094) and enters the 110/35 kV substation " Neresnica".

Therefore, based on the planned routes of the transmission line, it can be concluded that the corridors of the transmission line are outside the construction area of the settlements in the municipalities of Golubac, Veliko Gradište and Kučevo.

In the vicinity of the wind farm there are construction areas of the settlement, as follows:

- the settlement of Krivača is closest to the subzone "Venac", ie about 700 m east of the nearest wind generator, and about 1 km east of the Transformation "WF Krivača" and SY "Krivača";
- the settlement Dvorište is 2250 m northwest of the nearest wind generator,
- the municipal center-settlement Golubac is 4600 m northwest of the nearest wind turbine,
- the settlement of Snegotin is 4080 m southwest of the nearest wind turbine,
- the settlement of Rakova Bara is about 1.5 km southeast of the nearest wind generator of the subzone "Tilva";
- Krivača and Radenka settlements are the closest settlements to the "Debelo brdo" subzone. The position of the nearest wind turbine is located about 1.5 km from the settlement of Krivača, or about 4.0 km from the settlement of Radenka;

Rakova Bara is the closest settlement to the "Rakobarski Vis" subzone, and the position of the nearest wind generator is about 3.0 km away in relation to the settlement of Rakova Bara.

2.7.6. Road and other infrastructure

Road infrastructure Within the scope of the planned wind farm "Krivača", in accordance with the Reference System of the State Road Network of the Republic of Serbia (PE "Roads of Serbia", November 2017) and the Decree on the categorization of state roads "Official Gazette of RS", no. 105/13, 119/19 and 93/15), there are:

- state road IB row number 34;
- state road IB row number 33;
- state road IIA row number 163.

The scope of the planned wind farms includes:

- corridors of uncategorized / access roads (existing / reconstructed / planned), which belong to urban zone 1, on the territories of the municipalities of Golubac and Kučevo;

  corridors of service roads, on the territories of the municipalities of Golubac and Kučevo, on the sections of which the installation of traffic signals, information and warning signs is envisaged, in order to determine the course of the special traffic regime;

According to the functional range, the road network includes:

uncategorized / access roads, which belong to the category of construction land for public purposes, which provide access to the wind farm area and between certain

groups of wind generators and use mainly existing routes, which are being reconstructed, total length of about 20,917 km;

- service roads, which belong to the category of construction land for public purposes, which connect individual locations of wind turbines within the urban subzones "Venac", "Tilva" and "Debelo brdo", with a total length of about 19,967 km;
- internal roads (belonging to the category of construction land for other purposes) which are connected to service roads and are located within the construction site / plateau.

The road network (access and service) is dimensioned in accordance with the requirements of oversized transport and serves for the delivery of equipment, the need for installation and maintenance of the wind farm during operation. The project documentation envisages:

- minimum pavement width of 6,0 m;
- minimum width of free profile H = 7.0 m, W = 7.0 m;
- minimum width of the road (regulation belt) of 10.0-11.0 m, which is further expanded in some places and curves.

The network of uncategorized / access roads is supported by a network of service roads, which connect the locations of individual wind turbines.

Railway traffic- In the territory of the municipality of Kucevo, the route of the planned 110 kV transmission line intersects with the route of the railway Mala Krsna - Bor - Rasputnica 2 - (Vražogrnac), at a station about km 153 + 243 of the line, which is located in the tunnel ”Neresnica”.

Water supply - On the territory of the municipality of Golubac, settlements that have a primary and secondary network, managed by KJP "Golubac" are Usije, Radoševac, Sladinac, Golubac and Vojilovo. In the settlement of Radoševac, on the stretch from the state road IB row number 34 to Žuti breg, a pressure line of the water supply network of PVC pipes Ø250 was built, which must be adequately protected to prevent damage when passing heavy trucks, especially is laid in low-bearing soil. Outside the boundaries of this Plan, in the settlement of Radoševac, planned transport, temporary roads with built return primary and secondary lines intersect, so it is necessary to take all necessary actions on temporary routes, in order to avoid damage and delays in water distribution. In order to ensure adequate protection and functioning of the pressure pipeline, within CM Radoševac (Golubac municipality), the intersection of the existing water supply network, with the section of uncategorized road that is being reconstructed, must be adequately secured, in accordance with technical regulations.

Water supply of the Transformation Complex 33 / 110kV "WF Krivača" and SY 110kV "Krivača", since there are no conditions for connection to the existing water supply network, will be provided by building its own well / or setting up a tank at the location.

There are no existing or planned water supply installations on the territory of the municipality of Kučevo, within the limits of importance for the planned project. The water supply of the SS "Neresnica" complex is solved from its own well.

Collection, drainage and treatment of wastewater - Drainage of wastewater from the complex within the scope of the Project, will be provided by the construction of watertight septic tanks and / or WWTP of smaller capacity. In addition to the watertight pit, an oil separator and an oil pit will be built within the substations.

Collection and drainage of atmospheric water - From all potentially oiled asphalted (concreted) surfaces, it is planned to conduct atmospheric water in the separator-precipitator of oil and grease for purification, and only after treatment to enter the final recipient. The quality of treated wastewater will be controlled and must be in accordance with the applicable legislation (Decree on limit values for emissions of pollutants into water and deadlines for their achievement ("Official Gazette of RS", No. 67/11, 48/12 and 1 Conditionally clean atmospheric water, from the roofs of buildings and other landscaped areas, will be drained to the surrounding land.

Mineral water- On the territory of the municipality of Kučevo, the factory "Mineral water" was built in the settlement of Neresnica, and the route of supply water, from the source to the factory / bottling plant, intersects with the corridor of the planned 110 kV transmission line. The crossing must be performed without any endangerment of the supply pipeline, ie without performing any works in the protection zone of this pipeline, which is 2x2.50 m.

Electricity - in the area of the planned wind farm, there are no special conditions, except that, in the municipality of Kucevo, the planned 110 kV transmission line routed from the wind farm to 110/35 kV TS "Neresnica" intersects with the 400 kV transmission line number 401/2 Drmno-Đerdap 1 ", and the intersection will be resolved in accordance with the regulations. The planned wind power plant "Krivača" will be connected to the transmission network of the Republic of Serbia via two planned 110 kV transmission lines, which are traced:

- from the Transformation “WF Krivača” to the 110/35 kV substation “Veliko Gradište” and
- from the Transformation “WF Krivača” to the 110/35 kV substation “Neresnica”.

The arrangement of the space along the transmission line is determined on the basis of technical requirements (construction and operation) of the transmission line, location conditions, protection of the immediate environment and, in particular, environmental protection. Preliminary requirements are provided by the choice of route, without the need for prior removal or relocation of existing facilities or relocation of existing infrastructure and co-infrastructure facilities, painting of agricultural plantations or disruption of activities of the local population. Along the route of the transmission line, they form a protective and construction belt, which are: protection belt, total width 30.0 m (2x15.0 m) and construction belt, total width 8.0 m (2x4.0 m).

Note: In the Study in question, only basic data on transmission lines traced from SY "Krivača" to SS "Veliko Gradište" and from SY "Krivača" to SS "Neresnica" are given, because these transmission lines are subject to special environmental impact assessment procedures, which have been implemented and for which Consents have been obtained.

- Consent to the Study on Environmental Impact Assessment of the project - 110 kV transmission line corridor routed from PRP "Krivača" to 110/35 kV substation "Veliko

  Gradište ”on the territory of the municipalities of Golubac (CM Braničevo, CM Ponikve, CM Usije, CM Radoševac, CM Sladinac, CM Vojilovo, CM Maleševo, CM Dvorište, CM Krivača) and Veliko Gradište (CM Kusiće) - Decision no. 353-02-485 / 2016-16 of 13.17.2016, Ministry of Agriculture and Environmental Protection;

- Consent to the Study on Environmental Impact Assessment of the project - 110 kV transmission line corridor routed from SY "Krivača" to substation 110/35 kV "Neresnica" in the municipalities of Golubac (CM Krivača) and Kučevo (CM Rakova bara, CM Ševica, CM Turija, CM Kučevo 1, CM Popovac, CM Neresnica) - Decision no. 353-02-486 / 2016-16 from 13.17.2016, Ministry of Agriculture and Environmental Protection.

110/35 kV substation "Veliko Gradište" - In the 110/35 kV transformer station "Veliko Gradište" it is planned to equip one transmission line field in the 110 kV plant, in order to connect the 110 kV transmission line from the direction of PRP 110 kV "Krivača". Necessary secondary equipment should be installed in the existing command building.

Substation 110 / 35kV "Neresnica" - In the transformer station 110/35 kV "Neresnica" it is planned to equip the reserve OHL field number E05 in the 110 kV plant to connect the 110 kV transmission line, from the direction of SY 110 kV "Krivača". Necessary secondary equipment should be installed in the existing command building.

Transformation of 33/110 kV "Krivača" within the area of the wind farm and 110 kV connection plant "Krivača" - on the territory of the municipality of Golubac, at the location Golo brdo, the construction of two facilities is planned:

- Transformation of "WF Krivača" in which energy will be collected from wind turbines at a medium voltage level of 33 kV and raised to a high voltage level of 110 kV and

- 110 kV connection and distribution plant "Krivača", which will be owned by the transmission system operator of the Republic of Serbia (Joint Stock Company "Electric Network of Serbia"), through which the produced energy will be placed in the transmission system. SY "Krivača" is planned to contain a 110 kV high voltage plant, protection system, electricity metering system, local control system, connection to the telecommunications system, own consumption and the command building of the connection plant.

Remote control is planned in both facilities.

35 kV transmission lines and cables within the area of the wind power plant - from wind generator groups to the Transformation of the Krivača WF, the construction of overhead or underground (several shorter sections) 35 kV lines is planned. The routes of 35 kV lines, to a large extent, follow the routes of road infrastructure, and due to the terrain configuration, the routes of these lines outside the road infrastructure corridor, overhead (with corridor of 2x15.0 m) and underground (with corridor 2x1.0 m) lines are planned.

In the wind power plant "Krivača", a center for supervision and management of all wind generators is planned according to optical cables (working and backup), which are laid in parallel together with medium voltage power cables (35 kV). The condition for the control center defined in this way to be continuously in operation should be implemented through the selection of reserves for all equipment in the center, which means: working and backup computer system and uninterrupted working and backup power supply in the control center.

2.8. Protected natural assets

Special note: According to the Decision of the Institute for Nature Protection of Serbia 03 no. 019-4 / 5 dated 18 March 2020, the subject area of the wind farm "Krivača" is not located within the protected area for which the protection procedure has been conducted or initiated. In the same Decision, it is stated that a part of the area planned for the installation of wind generators is within the ecologically important area "Đerdap", ecological network of the Republic of Serbia, ie areas of national and international importance for birds (IBA "Đerdap" RS034IBA). Also, it is stated that the subject area is located near the western border of the National Park " Đerdap" and the Danube River - an ecological corridor of international importance within the ecological network of the Republic of Serbia, in accordance with the Decree on the ecological network. No.102 / 10).

In the Decision of the Institute for Nature Protection of Serbia 03 no. 019-4 / 5 from 18.03.2020. year, the boundaries of the ecologically significant area, ecological network are not stated (there is no cadastrally described boundaries, which is a condition for the analysis of potential collisions).

It is especially emphasized that during the adoption of the Decision on the development of the Plan for detailed regulation of the area of the wind farm "Krivača" ("Official Gazette of the Municipality of Golubac", No. 3/2011), adopted by the Municipal Assembly of Golubac, at the session held on 15.07.2011. (No. 30-1) and the Decision on the development of the Plan for detailed regulation of the area of the wind farm "Krivača" ("Official Gazette of the Municipality of Kucevo", No. 10/2011), adopted by the Municipal Assembly of Kucevo, at a session held on 08.07.2011. year (number I-06-1-73 / 2011), and in defining the scope of these planning documents, the cadastral border is described, taking into account the conditions of nature protection and protected areas.

Also, for the preparation of these plans, the Institute for Nature Protection of Serbia issued the conditions (Decision on the conditions of nature protection, 03 number: 020-169 / 2 from 14.08.2012), and approval of the plans, while still in the planning This phase defines a border that does not collide with the ecologically important area "Đerdap", ecological network, or area of national and international importance for birds (IBA "Đerdap" RS034IBA), but it was stated that there are no protected natural assets in the area and that The future wind farm is located **right next to the border of** the National Park "Đerdap" and the ecologically important area

"Đerdap" as part of the ecological network of Serbia (Decree on the ecological network, "Official Gazette of RS", No. 102/10), and **not in the scope**.

The basic planning setting for the wind farm "Krivača" is to be located outside the borders of:

- National Park "Đerdap", based on the Spatial Plan of the special purpose area of the National Park "Đerdap" ("Official Gazette of RS" No. 43/13) and
- Spatial plan of the special purpose area of the international waterway E-80 Danube (Pan-European Corridor VII), which is prepared on the basis of the Decision published in "Official Gazette". RS Gazette ”no. 3/10.

If a natural asset of geological-paleontological or mineralogical-petrographic origin is encountered during the works, and which is presumed to have the status of a natural monument, the contractor is obliged to inform the competent Ministry of Environmental Protection and apply all measures. so that the natural good would not be damaged until the arrival of an authorized person (Article 99 of the Law on Nature Protection "Official Gazette of RS", No. 36/09, 88/10, 91/10 (correction), 14/16 and 95 / 18 (other law)).

2.9. Overview of immovable cultural property

Based on Decision no. 373/2 - 2019 from 29.11.2020. year of the Regional Institute for the Protection of Cultural Monuments, Smederevo, in the area planned for the realization of the wind farm "Krivača" there are no recorded immovable cultural property, but prescribed conditions that must be implemented in project documentation and represent obligations to the Project Holder and contractors.

In accordance with Article 109 of the Law on Cultural Heritage ("Official Gazette of RS", No. 71/94, 52/11 (other law) and 99/11 (other law)), the obligation of the contractor is that if he encounters to the archeological site or archeological objects, immediately stop the works and inform the competent Institute and to take measures so that the find is not damaged, destroyed and preserved at the place and in the position in which it was discovered. Based on the established facts, protection measures must be taken, which include mandatory field inspection (archaeological reconnaissance) in the entire subject area and provide mandatory archaeological supervision of all earthworks during the construction of wind turbines and installation routes at each location with possible archaeological content to be determined after reconnaissance. within the subject area, and in case of finding archaeological remains, inform the competent Institute and ensure the presence of experts in the field, in accordance with applicable Legal provisions.

2.10. Purpose of areas within the scope of the planned Project

The main purpose of the areas in the current state within the analyzed area is: agricultural and arable agricultural land (fields, orchards, meadows, pastures), forest land and forests, water land, construction land in construction areas of settlements and individual buildings and road construction land and others infrastructure.

The main purpose of the area within the planned Project is construction and other land in the function of energy. Construction land includes built-up areas and areas intended for construction and is divided, in accordance with the land use regime, into construction land for public and other purposes.

Table no. 23: *Basic purpose of the land*

s.n.	Basic Purpose	Veliko Gradište Municipality		Golubac Municipality		Kučevo Municipality	
		Surface (ha)	Percentage of participation (%)	Surface (ha)	Percentage of participation (%)	Surface (ha)	Percentage of participation (%)

1	Construction land	0,65	0,27	45,94	18,97	10,71	4,42
2	Other land in the function of energy	9,00	3,72	107,31	44,31	68,55	28,31
Total (Plan area)		**9,65**	**3,99**	**153,25**	**63,28**	**79,26**	**32,73**

Construction land for public purposes includes areas whose use or construction is of general (public) interest:

- land in urban zone 1, which includes corridors of uncategorized roads (planned and existing ones that are being reconstructed), on the territories of the municipalities of Golubac and Kučevo;
- service road corridors, which connect to public / uncategorized roads,
- complexes of 110/35 kV substations "Veliko Gradiste" and "Neresnica";
- complex of 110/35 kV substation "Krivača";
- 110kV and 35kV transmission line poles.

Construction land for other purposes includes:

- plots for the foundations of wind turbine tower;
- complex of the facility which is in the function of maintaining the wind power plant (for the needs of repair or replacement of damaged parts of the wind generator) (CM Krivača, territory of the municipality of Golubac).

Areas that are in the function of energy (where there is no change of land use) are:

- plateau / construction site zones, within which wind turbine poles are installed;
- transmission line corridors.

Within the zone / plateau, wind generators are installed, with the formation of construction plots for wind generator foundation positions, within the plateau / construction site zone, while changing the land use of individual cadastral plots, where wind generator poles are installed, without forming a construction plot for foundations. Plateau / construction site zones are areas where temporary / temporary space is provided with construction, ie storage of equipment, movement of machinery, arrangement of the plateau for the main crane, working plateau and temporary disposal of materials during excavation. Within the plateau / construction site, there is a surface for installing wind turbines. The plateau adapts to each location of the wind generator and depends on the topographic characteristics of the terrain.

2.11. Population and construction of the location, demographic characteristics in the immediate and wider environment

Planned Project - wind farm "Krivača" is located on the territory of municipalities:

- Golubac (Braničevo, Ponikve, Usije, Radoševac, Golubac, Sladinac, Vojilovo, Maleševo, Dvorište, Krivača and Snegotin), with an area of about 153.25 ha;
- Kučevo (Rakova Bara, Ševica, Turija, Kučevo 1, Popovac, Neresnica and Radenka), with an area of about 79.26 ha;
- Veliko Gradište (Kusiće), area of about 9.65 ha.

Demographic characteristics of the municipalities of Golubac and Kučevo, as a general indicator of population in the wider environment of the complex, can be presented based on the results of the Census (Bulletin, Republic Bureau of Statistics, Belgrade, 2011).

Based on the results of the census in the Braničevo district, as a wider spatial unit of importance for the planned project, 180,480 inhabitants live.

Table no. 24: *Census of Population in the Republic of Serbia, 2011 (Bulletin, Republic Statistical Office, Belgrade, 2011)*

Name of the district	Municipality / City	Name of the settlement	Population
Braničevo district	Golubac	Braničevo	799
		Ponikve	72
		Usije	305
		Radoševac	277
		Municipality center Golubac	1655
		Sladinac	169
		Vojilovo	247
		Maleševo	226
		Dvorište	240
		Krivača	357
		Snegotin	158
	Kučevo	Rakova Bara	406
		Ševica	671
		Turija	471
		Municipality center Kučevo	3950
		Neresnica	1946
		Radenka	606
	Veliko Gradište	Municipality center Veliko Gradište	5868
		Kusiće	664

During the selection of the area for the realization of the planned Project, WF "Krivača", special attention was paid to the analysis of settlements, their position and population density of the spatial unit. At the location where the realization of the wind power plant is planned, there are no residential buildings, industrial and production facilities and plants. The nearest settlements, ie rural housing zones to the locations of the planned wind generators are Krivača, Dvorište, Golubac, Snegotin and Rakova Bara. Each settlement has a specific view in space. The settlements are mostly primary villages, except for Golubac, which is the municipal center. They are economically underdeveloped and in the primary rural settlements' agriculture is the dominant activity.

The realization of the planned Project - wind farm "Krivača" will not cause demographic changes, ie no significant changes are expected in the demographic structure of the area. The wind farm does not condition the displacement or immigration of the population. Works on construction (installation) of wind turbines, construction of Transformation of WF "Krivača" and PRP "Krivača" with accompanying facilities, on realization of accompanying infrastructure (reconstruction of existing, construction of new and temporary road infrastructure), construction

of transmission lines and cable lines, as well as other accompanying works are temporally but also spatially limited.

During the realization of the wind power plant, an increased concentration of people is expected at the locations where the works are being performed and at the locations of temporary accommodation. Regular work of the Project will not cause an increase in the concentration of population in locations relevant to the Project. An occasional increase is expected in the process of regular maintenance and control of the Project. In case of permanent termination of the Project, in the process of dismantling, removal of dismantled elements from the sites and the process of reclamation of degraded sites, temporarily, while these activities last, it is expected to increase the presence of contractors. When performing the planned works on the realization of the Project, it is possible to engage the local population, in accordance with the required level of expertise and training.

From the aspect of the impact on the demographic characteristics of the settlements in the immediate vicinity of wind turbines, planned transmission lines, road and other infrastructure, the planned Project is sustainable and environmentally friendly.

2.12. Proximity to important roads and connection to public roads

The main communication connections are the asphalt road "Đerdap highway" along the Danube and the asphalt road parallel to it through the Peka valley, as well as the railway connecting Zaječar-Bor-Majdanpek-Kučevo-Belgrade. In addition to these, there are good roads with macadam surface: Kučevo-Petrovac, Kučevo-Golubac and other roads of local importance.

Access to certain positions of wind turbines of WF "Krivača" will be enabled by construction of new access roads, but also by reconstruction of existing roads using the existing traffic network, all in accordance with the Detailed Regulation Plan of wind farm "Krivača" in Golubac and Kučevo.

2.13. Socio - economic characteristics

2.13.1. Area of impact

Socio-economic impacts can be primary, secondary and tertiary. In the case of the planned construction of the wind farm "Krivača", the primary impact would be the impact on the nearest settlements: Krivača, Dvorište, Golubac, Snegotin and Rakova Bara. The area of secondary impact, primarily refers to economic impacts and supporting infrastructure and has a broader effect, ie regional significance. In this case, it covers the areas of the municipalities of Golubac and Kučevo, as well as the municipality of Veliko Gradište due to the planned route of the transmission line. The area of tertiary impact has an even broader effect and refers to the national level, ie the impact of the planned wind farm from the aspect of the development of the Republic of Serbia.

2.13.2. Local context

The planned wind farm "Krivača" is mostly located on the territory of the municipality of Golubac (CM Golubac, CM Dvorište, CM Krivača), and to a lesser extent on the territory of the municipality of Kučevo (CM Rakova Bara, CM Radenka). The following construction areas of the settlement are located in the vicinity of the wind farm:

- The nearest settlement in subzone 4-1 "Venac" is Krivača in the municipality of Golubac. The Krivača substation is located about 1.0 km west of the settlement, and the position of the nearest wind turbine is about 700 m away from the Krivača settlement;
- The nearest settlement of subzone 4-2 "Tilva" is Rakova Bara in the municipality of Kucevo. The position of the nearest wind turbine is about 1.5 km away in relation to the settlement of Rakova Bara;
- The nearest settlements in subzone 4-3 "Debelo Brdo" are Krivača in the municipality of Golubac and Radenka in the municipality of Kučevo. The position of the nearest wind

turbine is located at about 1.5 km from the settlement of Krivača, or about 4.0 km from the settlement of Radenka;

Also, the corridors of road and other public utility infrastructure (reconstruction, planning and temporary routes) represent primary and secondary impacts in the municipalities of Golubac and Kučevo:

- planned transport route starting from the port "Usije", through the banks of the Danube and a new route of temporary character (until inclusion in the uncategorized road at the exit from the east of the construction area of Radoševac, the route uses the route of the existing uncategorized road leading through Žuti breg) and leads to the locations "Venac" and "Debelo Brdo"),
- transport of the route leading along the section of the municipal road, on the territory of the municipality of Golubac (section of the state road II order number 108a) from the station around km 36 + 081 to the intersection with the municipal road to Snegotin and through the construction area of this settlement. which partly follows the planned route, and partly follows the route of the existing uncategorized road and leads to the location "Tilva",
- uncategorized access roads to the wind farm area and between individual groups of wind generators, using mainly existing routes that are being reconstructed,
- service roads that connect the locations of wind generators within the urban subzones "Venac", "Tilva" and "Debelo Brdo",
- internal roads that connect to the service roads and are located within the construction site / plateau of each wind generator;

The access and service road network must be dimensioned in accordance with the requirements of oversized transport and fire protection conditions because it serves for the delivery of equipment, the need for installation and maintenance of the wind farm during operation. Considering the planned interventions, the minimum width of the road is 6.0 m, the minimum width of the free profile H = 7.0 m, W = 7.0 m and the minimum width of the road (regulation zone) of 10.0-11.0 m, are expected primary and secondary impacts on settlements and parts of settlements through which they pass and touch, on landscape and landscape, parts of habitats, flora and fauna. and with a probability of recurrence (wind farm maintenance and other interventions).

3.0. Project description

The subject of updating the Study on Environmental Impact Assessment of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka) is the construction of 22 wind turbines within the wind farm complex "Krivača" on the territory of the municipality of Golubac and the municipality of Kučevo.

Since 2009, the holder of the Project "IVICOM ENERGY" DOO has been measuring the wind potential at the locations Golo brdo and Debelo brdo, based on which it was determined that there is a wind energy potential that can be technically used. Based on the measurement results, the Project Holder made a decision on the construction of the wind farm "Krivača", which is intended for the production of electricity with the help of wind power.

With the advancement of wind energy technology, the Project Holder plans to install wind turbines of **higher installed capacity** (maximum possible power of individual wind turbines is 5.8 MW), **higher column heights and larger blade diameters**, compared to wind turbines originally planned and processed in the Study on environmental impact assessment for which consent has been obtained (Decision No. 353-02-393 / 2015-16 of 29 May 2015, Ministry of Agriculture and Environmental Protection).

The total installed capacity of the wind farm will not exceed **103.32 MW** at the point of takeover of electricity by EMS, which is conditioned by the **Energy Permit (Decision No. 312-01-00066 / 2015-04 from 17.06.2015, Ministry of Mining and energy).**

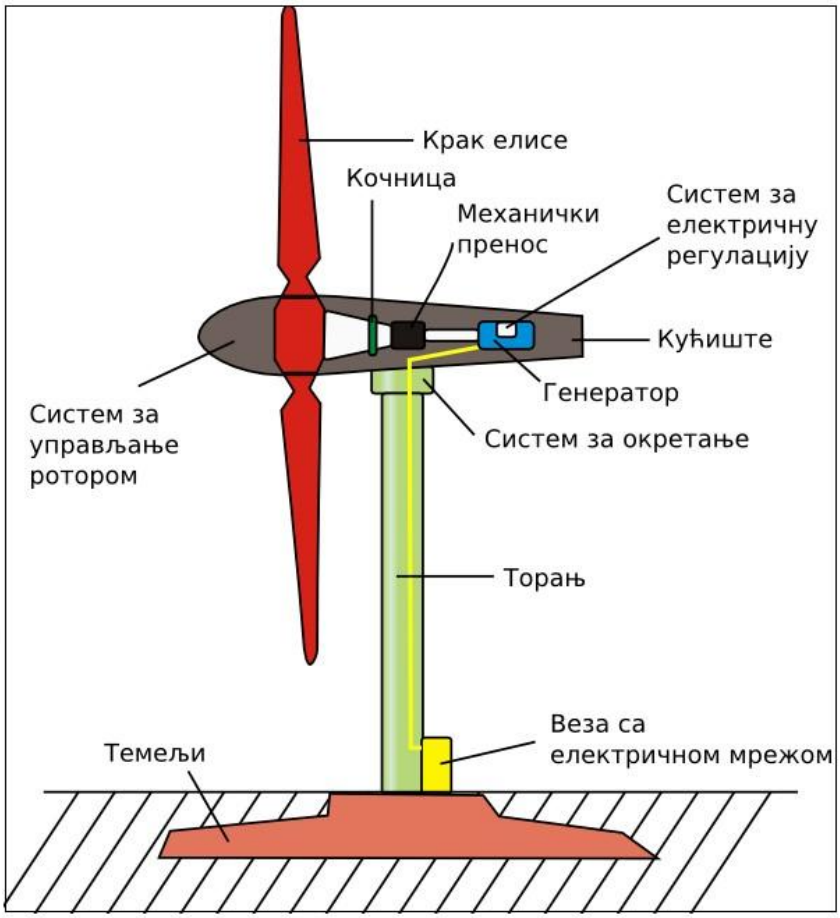


Figure no. 53: *Schematic diagram of a wind turbine (WT)*

The produced energy will be delivered to the 110 kV transmission network of nominal voltage level through facilities at the location of the wind farm, as follows:

- Transformations 33 / 110kV "WF Krivača" (not the subject of this project),

- 110 kV "Krivača" connection and distribution plant (CDP) (not the subject of this project) and) and
- construction of two new 110 kV transmission lines (not the subject of this project), the construction of which is planned for the needs of the Wind Power Plant "Krivača", which would connect the CDP 110 kV "Krivača" with transformer stations "Neresnica" (not the subject of this project), and "Veliko Gradiste" (not the subject of this project). This ensures the safe placement of energy produced from the wind farm in the Serbian power grid.

In accordance with the document "Analysis of optimal conditions for connecting the Krivača WF facility to the transmission system" issued by the PE "Electric Network of Serbia" (No. IV-21-02-97, 31.05.2012), the value of the approved capacity of the Facility is, ie Under = 103.32 MW.

The subject project includes the construction of::

- 22 wind turbines according to table no.25;
- Wind turbine foundations;
- Main and auxiliary plateaus and with retaining walls.

Table no. 25: *Coordinates of wind turbine poles - 22 positions*

WIND FARM KRIVAČA - 103,32 MW				
wind turbine positions (Gauss-Kruger coordinate system, Zone 7)				
Location	**wind turbines**	**E (m)**	**N (m)**	**pieces.**
Venac	T1-1	7552683	4939480	**11**
	T1-4	7552897	4940872	
	T1-5	7552979	4941154	
	T1-6	7553017	4941466	
	T1-8	7553548	4941906	
	T1-9	7553739	4942137	
	T1-10	7553943	4942365	
	T1-11	7553975	4942666	
	T1-12	7553982	4942964	
	T1-13	7554263	4943513	
	T1-15	7555890	4943692	
Tilva	T2-1	7551706	4935848	**5**
	T2-2	7551981	4936196	
	T2-3	7552081	4936515	
	T2-4	7552135	4936830	
	T2-5	7552254	4937112	
Debelo Brdo	T3-1	7555964	4939276	**6**
	T3-2	7556166	4939493	
	T3-3	7556124	4939865	
	T3-4	7556221	4940141	
	T3-5	7556505	4940290	
	T3-7	7557127	4940606	

3.1. Description of the main characteristics of the wind farm "Krivača"

It is planned to install 22 wind generators of nominal power up to 5.8 MW within the WF "Krivača".

The wind turbine (WT) will be equipped with a three-bladed propeller with a maximum diameter of 155 m, and the maximum total height of the wind turbine will be up to 205 m.

The Project Holder will select a specific type of wind turbine with the associated configuration, whereby the power of the wind power plant at the place of delivery to the electricity network will not be transferred, ie. at the connection point of 103.32 MW, and the number of installed wind turbines will be in accordance with the valid planning documentation.

The WT gondola, with all its associated equipment, is mounted on the WT pole. A tubular steel pillar is provided for carrying the gondola.

Wind turbines are delivered as a prefabricated product with factory documentation.

The wind generator (wind turbine) has the possibility of complete regulation of the gondola position for the purpose of maximum use of wind power (active wind direction control system).

The power of the wind turbine is controlled by a system for turning the blades (pitch), which involves independent control of each of the three blades. The gondola control system (so-called yaw system) has the role of rotating the gondola. With the help of these two control systems, the possibility is provided that the wind turbine makes the best possible use of the available wind potential.

The basic characteristics of the wind turbine are shown in Table 26.

Table no. 26: *Basic characteristics of wind turbines*

characteristic	feature
Potential type of wind turbine	**Nordex N149/4,8 MW** (The specific manufacturer will be defined in the Execution Project phase)
Assigned WT power	max. 5,8 MW
Propeller blade system	Rotor with three blades and horizontal shaft
Rotor diameter	max. 155 m
Height to the top of the blade	max. 205 m

WT braking is aerodynamic and is performed by turning each of the three blades. Additionally, a disc brake is available on the axle side on the higher gears side. The mechanical brake is used only in the case of a complete stop of the WT and in the case of pressing the "All Stop" button.

Figure no. 54: *Wind turbine parts (WT)*

Each wind turbine is equipped with two high-precision anemometers, mounted on top of the gondola, with built-in heaters that minimize the impact of snow and ice. The mentioned anemometers are redundant, one is working, the other is spare and they give the controller and the control system information about the direction and speed of the wind.

The Project Holder has not yet selected a specific type of wind turbine to be installed, but it is most likely that a Nordex N149 / 4.8 MW wind turbine will be selected, or some similar characteristics.

Nordex N149/4.0-4.5 wind turbine (WT) is a variable speed turbine, with a rotor diameter of 149 m and a rated power between 4000 kW and 4500 kW (for a specific project of 4800 kW), which can be adjusted depending on the location. The wind turbine is designed for class S in accordance with IEC61400 1 or wind zone S in accordance with DIBt 2012 and is available in 50 Hz and 60 Hz variants.

Nordex N149/4.0-4.5 turbine consists of the following main components:

- Rotor, with rotor hub, three blades and blade rotation system;
- Gondola with drive assembly, generator, gondola rotation system, medium voltage transformer and converter;
- Tubular or hybrid pole with MV plant.

Description of wind turbine components

Wind turbine column- conical steel column has a cylindrical profile. The pillar is a cantilever system, clamped in a circular AB foundation. It consists of four prefabricated pieces (MK1-MK4), of different dimensions. The dimensions of the column, ie the length, diameter and mass of the elements have been optimized with regard to transport and assembly on the construction site. Parts of the steel column are produced in the workshop and as a prefabricated product are brought to the construction site and interconnected with high-quality screws via flanges made at the ends of each segment of the column. Each component of the pillar is equipped with appropriate mounting brackets, ladders and lighting, so installation work as well as maintenance inside the wind turbine can take place regardless of weather conditions. A protective fence is provided at the place where the opening for the service platform is located. All floor surfaces are non-slip, made of ribbed, tear sheet metal. A screw connection of the wind turbine column segments is provided. No welding is planned on the construction site. The basic material of the pillar shell is made of steel. Corrosion protection is guaranteed by the surface coating system according to ISO 12944. The service lift, vertical ladders with fall protection system, as well as work and rest platforms inside the pole, provide protection from the weather when climbing to the gondola.

The foundation structure of all pillars depends on the soil conditions at the specific location.

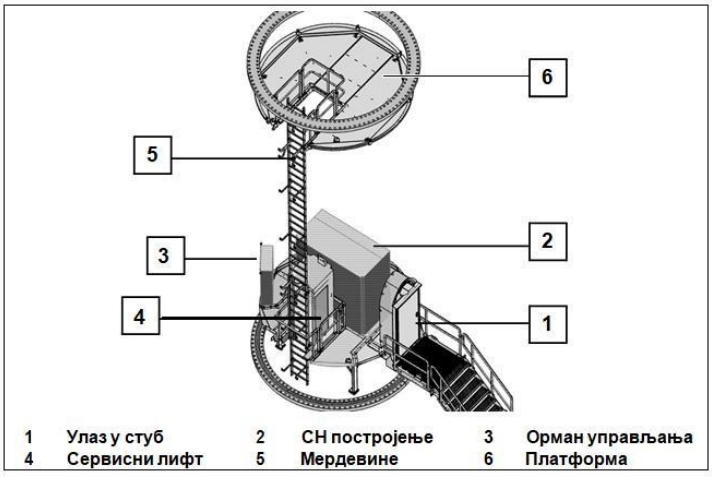


Figure no. 55: Overview of the lower section of the tubular steel column (column plates not shown)

Gondola and hub- Supporting structure- The gondola, ie the drive part, is the part of the wind generator that is located at the very top of the pillar. It consists of a housing to which a slow-moving shaft with a bearing, a generator, a transformer and a motor drive for turning the gondola are attached, as the basic parts that are located inside the gondola.

The supporting structure of the gondola consists of an upper and a lower frame which are connected by screws via flanges. The welded construction of the generator stand is located at the rear of the lower frame. The unit is closed on all sides (except at the point of connection with the pole and the rotor).

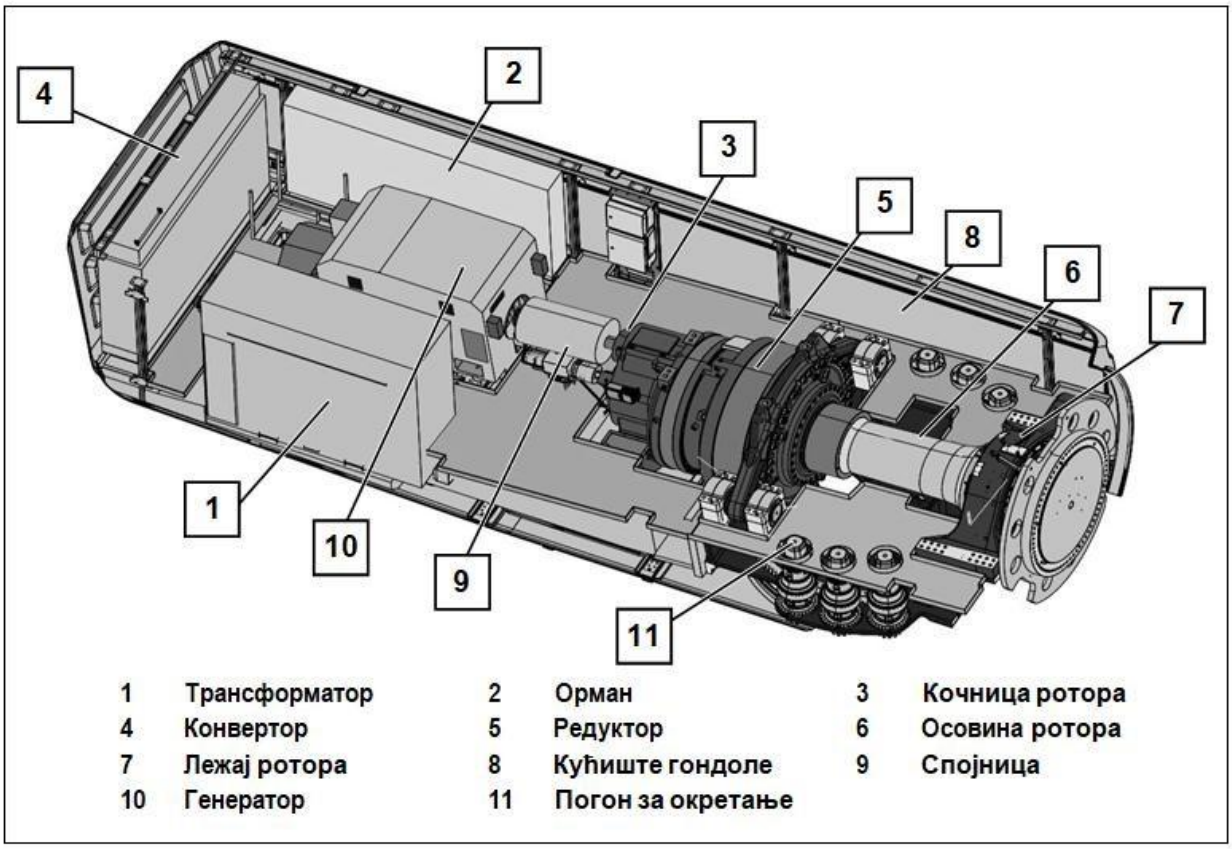


Figure no. 56: *Schematic view of the gondola*

The interior of the gondola is spacious and allows easy access to all parts inside the gondola as well as the blade carrier space. In addition to easy access to these parts, the design of the platform inside the gondola is performed in such a way as to provide a connection to the service platform located in the pillar.

The rotor bearings are housed in the upper frame, the gearbox is housed in the lower frame, while the generator is housed on a special stand.

Gondola Swivel System- The gondola swivel bearing is designed as a bearing with 4 points of contact and a toothed outer rim. The bearing is located between the gondola and the pole so that it allows the gondola to rotate around the axis of the pole, thus placing the rotor in the most favorable position in relation to the wind. Four motors with a multi-stage planetary gearbox and a brake are installed on the supporting structure of the gondola, which are paired with the circumferential gearing of the main bearing. Through this bearing or system, loads are transferred directly from the gondola to the pole. The main gondola support is installed on the bearing. The gondola rotation drive is controlled by a unit from the gondola itself. The engine brake is inactive during the turn of the gondola.

The gondola swivel drive system is also equipped with an additional hydraulic disc brake. The brake disc is bolted to the pole while the brake calipers are attached to the supporting structure of the gondola. When the gondola rotates the jaws are not fully open thus dampening transverse movements. In this way, the gearing of the swivel system is preserved.

All gears are equipped with a lubrication system which significantly extends the service interval. The system also includes a lubricant collector that prevents uncontrolled lubricant leakage.

The dominant wind direction indicators are located at the top of the gondola and constantly send data to the control unit which compares the wind direction with the current rotor position. If necessary, the control unit activates the swivel system by directing the rotor in the optimal direction.

The gondola switch and sensor are located in a pole just below the gondola that monitors the relative rotation of the gondola relative to the pole to protect the power lines from excessive torsion. If the gondola is turned for the maximum allowed turn (from zero position) the switch switches off the turning system, and the gondola turns to zero position.

Power and control cables are located inside the gondola pole at the top to the bottom. Although they are attached to the wall of the pillar, they have enough freedom to rotate several times around the axis together with the gondola. The wind turbine is equipped with an automatic cable unwinding system when they reach the limit position. After the gondola has turned 3 times in the same direction, the wind generator will use the next period of low wind to stop and turn in the other direction, ie unwind the cables. If the wind speed does not decrease after a while, the wind generator stops working, unwinds the cables, and starts working again.

The gondola control board consists of several plastic parts reinforced with plastic fibers (GRP). The control board contains lighting and numerous openings that enable regular inspections and maintenance, as well as an exit in case of evacuation. The gondola also has an opening with a transparent cover on the front of the roof. The hub and rotor can be reached through this cover. Also, through that cover, with the appropriate equipment, you can get to the weather station, and to the position lights at the back of the gondola. The cover in the middle of the gondola is intended for access to the appropriate jack holders when lifting and installing the gondola.

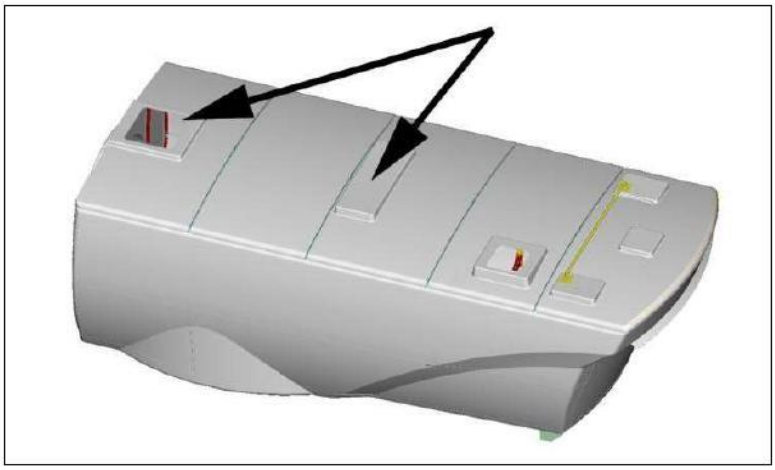


Figure no. 57: *Gondola control board*

Tools and spare parts can be delivered to the gondola through an opening in the rear lower part of the gondola via a crane located in the gondola. This crane is intended for operation during maintenance and repair of wind turbines and has access to the entire length of the gondola. The small hand-operated chain hoist is intended for manipulating parts inside the gondola. Ventilation of the gondola is done through fans located in the control board.

With the help of an integrated crane in the gondola you can work on:

- Transmission assembly (quick shaft, cover, radiator, lubrication system…),
- Parts of the frame, brackets, insulation and parts of the gearbox bearing base,
- Parts of the collector system,
- High speed swivel brakes and joints,
- Parts of the carrier, insulation and parts of the generator,
- Parts of the gondola rotation and braking system,
- Other various smaller components.

The openings in the gondola formwork are also provided for evacuation in case of fire and the like.

Braking system- The wind generator rotor is stopped by an aerodynamic brake, ie a blade rotation system that rotates the blades in a matter of seconds, using the wind to stop the rotor. In this way, the rotor speed is reduced without further loading the elements during power. For effective braking, it is enough to turn only one rotor blade, so that separate turning systems additionally contribute to the safety of the entire wind generator.

Even when the wind generator is out of operation, the rotor is not blocked but rotates slowly without load at idle. In this way, the loads on the rotor and other parts are lower than when the rotor was blocked and at rest.

The rotor is blocked only for the purpose of maintaining or replacing and repairing a part of the wind generator and if the emergency stop button is pressed. For this purpose, an additional brake is activated, but only when the rotor has slowed down sufficiently. The rotor lock is only used when the rotor is completely stopped.

In the event of an emergency stop, all three blades rotate via their own separate swivel system which provides additional power in the event of a mains disconnection.

With this concept of wind generator braking, the requirements for safe braking are more than met.

The blade rotation drive consists of a DC electric motor with an associated gear transmission. The blade is rotated so that the electric motor attached to the hub via gears is connected to the main bearing of the blade which has internal gearing.

Figure no. 58: *Hub*

The total range of rotation of the blade is -9.5 ° to 90 ° while in normal operation it is 40º. During idling (when the wind generator does not produce electricity) the blades are rotated 90º.

The rotor speed is controlled by the rotor speed system in accordance with the available wind energy and the torque load on the rotor. If the rotor produces less than the rated power, the rotation of the rotor blade is 0º. As the wind energy increases, so do the blades rotate, letting in more wind. If the rated power is reached, and the wind energy continues to increase, the blades rotate additionally, thus adjusting the rotor power to the required generator power.

To prevent accidents at high winds, the blades rotate to the end position, acting as an aerodynamic brake, reducing the speed of the rotor. Aerodynamic braking is possible by turning

two blades. The blade rotation systems are independent for each blade, so they are equipped with an independent battery power system in case of mains failure.

Main bearing and its housing - Turbine rotor with forged shaft located on a double-row tapered roller bearing (fixed bearing) and a cylindrical roller bearing. Both bearings are located in the upper half of the gondola support structure. Their housings are made of ductile iron. The tapered bearing takes over the axial and radial force components on the shaft or generator while the cylindrical bearing transmits the other force component generated by the rotation of the rotor. The bearings are lubricated with grease specially developed for large bearings, which extends their service life.

The transmission converts wind energy from low speed and high torque on the input side to high speed and low torque on the output side. The generator shaft and the gearbox are connected via a special flange that allows separate transport and installation of these components. It is made of cast iron.

The gearbox is a multi-stage planetary gearbox that is mounted on the underside of the supporting structure of the gondola. Special elastomeric damping elements have been developed for this application and are installed between the gearbox and the load-bearing structure, thus reducing vibration and noise.

The gearbox is equipped with two independent lubrication systems: mechanical and electrical. The mechanical pump is connected to the shaft drive via a special transmission, thus ensuring lubrication even in the event of idling of the wind turbine. The oil is cooled in a special oil cooler. The bearings are lubricated through oil pipelines that have nozzles at the ends to ensure the required oil pressure in the bearing. Before reaching the bearing, the oil passes through a filter, thus ensuring the required purity of the oil in accordance with ISO 4406. The gearbox is equipped with sensors that monitor the main parameters of the gearbox:

- Oil temperature
- Oil level
- Oil pressure
- Oil difference in oil filters
- Temperature of bearings and gears
- Температура лежајева и зупчаника

Braking system - In normal wind operation mode, the generator brakes by turning two rotor blades. This braking system is the main braking system and is called the aerodynamic brake. The blade rotation system is powered from the mains via a rectifier (as well as the power regulation system). Electricity for the braking system is provided during the necessary shutdown through three separate battery systems whose capacities are constantly monitored and regulated through the control system. An additional brake in the form of a hydraulic disc brake is installed on the shaft, which rotates at high speed. This brake is used as an additional brake, as an emergency brake, and as a brake during maintenance or repair.

During normal braking, braking by turning the rotor blades is sufficient. If the wind turbine needs to be completely stopped, e.g. in the event of a breakdown or during maintenance, the hydraulic brake is also activated when the rotor speed is sufficiently reduced.

The hydraulic reservoir provides sufficient pressure to close the hydraulic brake for a longer period in the event of a mains failure.

Nordex turbines are equipped with extensive equipment and resources, which enable personal and safety of the turbine, as well as continuous operation. The entire turbine is designed in accordance with the Machinery Directive 2006/42 / EC and is certified according to IEC 61400.

If certain parameters are exceeded, which concern the safety of the wind generator, WT will immediately stop working and go into a safe state. Depending on the cause of the shutdown, different braking programs are activated. In case of external causes, such as excessive wind speed or operating temperature not reached, the turbine brakes slightly by adjusting the rotor blades.

The rotor lock must be switched on during certain installations and maintenance. For example, it is strictly forbidden to enter the rotor hub before the rotor lock is activated. The rotor lock consists of a disk with holes located on the rotor shaft at the shaft-hub connection, and a bolt located on the upper part of the bearing frame above the front main bearing. The bolt is moved by means of a hydraulic cylinder which is driven by a hand pump.

The blocking bolt enters the hole in the disc, which prevents the rotor from rotating. Maintenance work that requires the rotor to be blocked can only be reported when the wind speed is less than allowed to block the rotor. If the wind speed increases unexpectedly, all work must be stopped immediately and the rotor must be unlocked.

Coupling - The gearbox and the generator are connected to the carrier via elastic elements which can lead to radial and axial displacement of these elements. That is why the gearbox and the generator are connected via a clutch that simultaneously transmits torque.

Control system - Sensors constantly record the operating parameters of all parts of the wind turbine, and input data such as wind direction and speed, and send them to the control unit which will adjust the mode according to the collected data (blade rotation, turned to wind…).

When the wind has a speed suitable for operation, the wind turbine is automatically put into operation. After the rotor reaches the minimum speed required for operation, the generator begins to send electricity to the network.

During partial load operation, the speed and angle of rotation of the blade are constantly adjusted to changes in wind dynamics. The gondola rotation system starts before the wind speed reaches the required value. The wind direction sensor constantly determines the wind direction, so if the angle between the rotor and the wind is too large, the system turns on and turns the gondola in the wind direction.

Rotor consists of a blade carrier (rotor hub) and a blade. A hydraulically controlled blade rotation system (-9 ° to 90 °) is attached to the bracket to increase the efficiency of the wind generator. Each blade can rotate independently around its own axis.

Rotor hub consists of a base element with a support system and a spinner. The base element consists of a rigid cast structure, on which rotary bearings and rotor blades are mounted. The rotor hub is covered with a spinner, which allows direct entry from the gondola into the hub.

In addition to blade rotation, the system is able to "lock" the blades in the event of an emergency stop. The blade holder is designed in a way that allows easy access to the inside of the blade from the gondola. The rotor blades are made of high-quality glass fibers and carbon fiber reinforced plastic. Optionally, the blades can be equipped with serrations, in order to improve the noise level. The serrations consist of light gray glass fiber laminates, which are multi-serrated, between 0.3 and 0.7 m long, which are attached to the rear edge of the blades. The blades can also be painted with red and white fields (RAL 3020) for better visibility in daytime conditions.

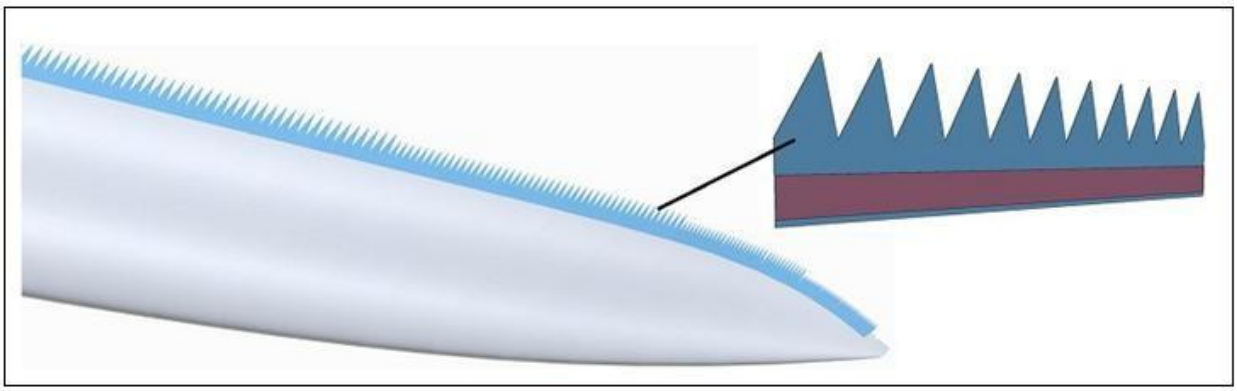


Figure no. 59: *Serrations on the rear edge of the rotor blade*

The aerodynamic profile has been specially developed for this type of wind turbine so that it achieves the optimal power output for the currently possible input.

The blades are protected from lightning by a protection system that contains three grounding grips per blade.

The construction of the rotor blades has a great influence on the degree of efficiency and noise emission of wind turbines. The blade of the wind turbine is made of plastic (epoxy resin) reinforced with glass fibers (GFRP). Its shape and profile have been developed in accordance with the following requirements:

- high degree of use;
- long service life;
- low noise emission;
- small loads;
- as little spent material as possible.

The rotor blades are specially designed to work with variable speed and variable blade rotation, which makes them resistant to air turbulence. They are coated with a special protective layer that protects them from adverse environmental influences such as chemical compounds and solar radiation.

Each individual rotor blade is equipped with an independent blade rotation system. The rotating system is used to adjust the angle of rotation of the rotor blades, which defines the control system. For each individual rotor blade, the rotary system consists of an electromechanical drive with a three-phase motor, a planetary gearbox and a drive gear, as well as a control unit with a frequency converter and auxiliary power supply. Power supply and signal transmission are realized through a sliding ring in the gondola.

The plain in which the surface of the rotor is located is inclined in relation to the axis of the column for ssa 6º, in order to prevent the interaction, ie turbulence caused by the flow of the blades when passing by the column. The minimum service life of the rotor blade is 20 years. The blades rotate clockwise, seen from the front of the wind turbine.

Service platform is used to transport staff and tools to the gondola premises for maintenance and regular inspections. The platform can also be operated from the outside, without persons inside, e.g. for transport of equipment parts. The platform is lifted by a steel rope over a set of ropes, and is equipped with safety systems that prevent the elevator from falling or speeding faster than allowed. Special steel ropes installed on the side of the platform serve to guide the elevator in a straight line. The platform is also equipped with a system for manual lowering in case of power failure or failure of the drive system.

Marking of wind turbines - Wind turbines, due to their height, dominate the environment and as such represent a potential obstacle for aircraft, so they must be properly marked with adequate lamps for marking obstacles in aviation. The method of marking WT will be defined by the requirements contained in the decision of the Directorate of Civil Aviation of the Republic of Serbia, and in accordance with the requirements, the marking of wind turbines will be resolved. The following are envisaged:

- System of lamps for marking obstacles in aviation
- Marking the blades with contrasting colors (red / gray)

Anti-corrosion protection consists of multiple primers and topcoats. The interior finish meets the general requirements for industrial assemblies and maintenance work.
Anti-corrosion protection of equipment and parts is performed in accordance with the specifications and standardized procedures of the manufacturer of basic equipment of wind turbines.
The foundation of the wind turbine - The foundation structure is monolithic, designed as a single octagonal or circular foundation with a diameter of up to 25 m. The depth of burying the foundation is approximately 3.5 m.

When laying the foundation, it is necessary to pay special attention to the installation of anchor baskets. The anchor basket ensures safe transmission of forces from the steel column to the reinforced concrete foundation.
The process of installing the anchor baskets should be performed according to the instructions of the turbine manufacturer, with expert supervision. The anchor basket is supplied by the turbine manufacturer and consists of high-quality screws placed in two rows and a template for securing the position of the screws. Load-bearing reinforced concrete and concrete foundation elements are made of concrete of minimum strength class C30 / 37 and / or C35 / 45, and are reinforced with B500B quality steel. The use of low heat hydration cement is envisaged. The protective layer of reinforcement is 5 cm. The foundation must be made on a layer of supporting concrete of minimum strength class C12 / 15, 10 cm thick.

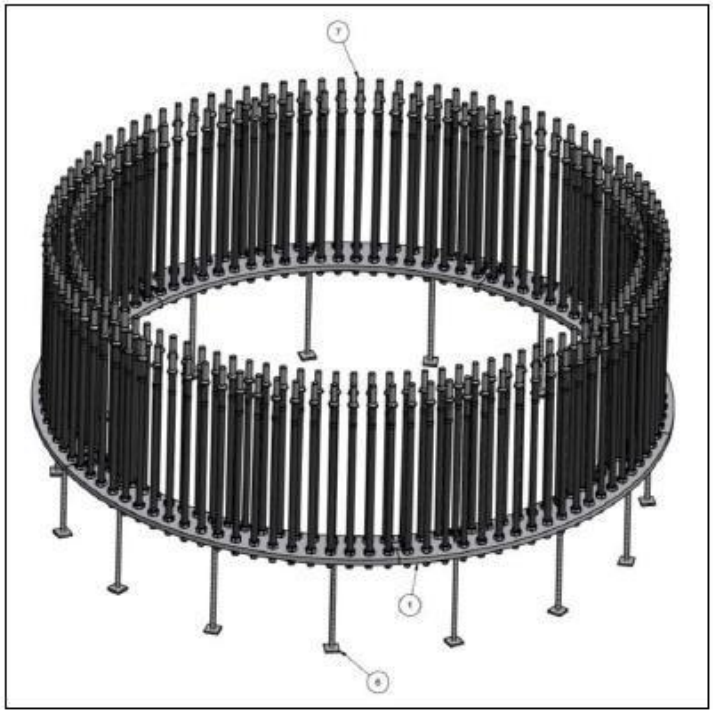


Figure no. 60: *Anchor basket*

Plateau for wind turbine installation

For the needs of wind turbine installation, plateaus are used which serve as a temporary surface for accommodation and installation of main and auxiliary cranes and parts of wind turbines, and they are designed in accordance with wind turbine manufacturers' recommendations, requirements from geotechnical study and experiences from other wind farm projects. All plateaus are height and position adjusted in such a way that access to the public road is enabled, without interfering with other users, while satisfying the clear heights and widths prescribed according to the picture below.

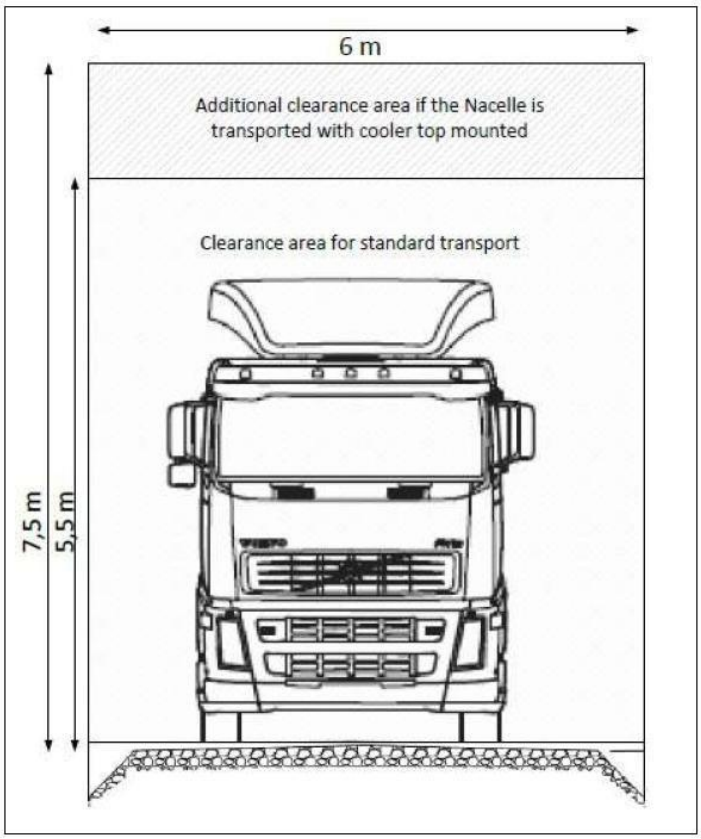


Figure no. 61: *Free profile*

The plateau is dimensioned in accordance with the technological needs of wind turbine installation, submitted by the equipment manufacturer, and which include the following main works:

- defining the shape and position of the plateau, as well as the leveling plan of the plateau
- formation of plateaus by earthworks
- installation of bearing layers of gravel plateau
- defining the location of machines (cranes - main and auxiliary) during installation
- delivery and storage of wind turbine parts
- defining an auxiliary plateau for the space for mounting blades and rotors, as well as other parts of wind turbines

The plateau adapts to each location of the wind turbine and depends on the topographic characteristics of the terrain, and the intended method of installation. According to their function, we divide plateaus into "main" plateaus and "auxiliary" plateaus. The main plateaus will be used to accommodate the main crane and install wind turbines. Auxiliary plateaus are mainly used to accommodate auxiliary cranes, shovels and other equipment.

The equipment on the plateau must be located and organized in such a way as to cause minimal delays during the installation of parts of the wind turbine. Cable trenches for medium voltage cables crossing the plateau should be protected with a layer of lean concrete, if necessary (not the subject of this project).

On the parts of the plateau where the supplier of the equipment planned the accommodation of the main and auxiliary cranes, it is necessary to satisfy the conditions of soil bearing capacity, ie. achieve the compressibility modulus value by using a gravel finish.

The main plateau, the auxiliary plateau and the internal road are used as temporary surfaces for the needs of the construction site and the installation of wind generators. After the installation of the wind generator as the final layer of the main plateau, auxiliary plateau and the

internal road of the plateau, the use of humus 15 cm thick and autochthonous vegetation is planned in accordance with the location conditions.

The final layer of gravel is retained on the part of the plateau where the foundation is located (25x25 m).

The slope of the final layer of the plateau in any direction must not exceed 1%.

Access / service roads were processed as a separate project, after which the Investor obtained a building permit from the local self-government of the Municipality of Golubac and the Municipality of Kučevo.

Auxiliary systems

The generator bearing, swivel bearing reducer, vane, rotor shaft and rotary drive bearing reducer are equipped with an automatic lubrication system. Automatic lubrication of the swivel bearing housing can be offered as an option. The reducer, generator, cooling circuit and all relevant distribution cabinets are equipped with heaters.

An electric chain hoist is installed in the gondola, and is used to lift tools, components and other working material from the ground to the gondola. Others, a movable ceiling crane is used to transfer material to the gondola.

Various accessory options are available for wind turbines.

Cooling system

The reducer, generator, converter and transformer are cooled via a connected air / water heat exchanger. The pump transfers the mixture through a heat exchanger. At start-up, the slightly heated reducer oil is returned directly to the reducer via thermal bypass and is directed to the panel heat exchanger after the operating temperature is reached.

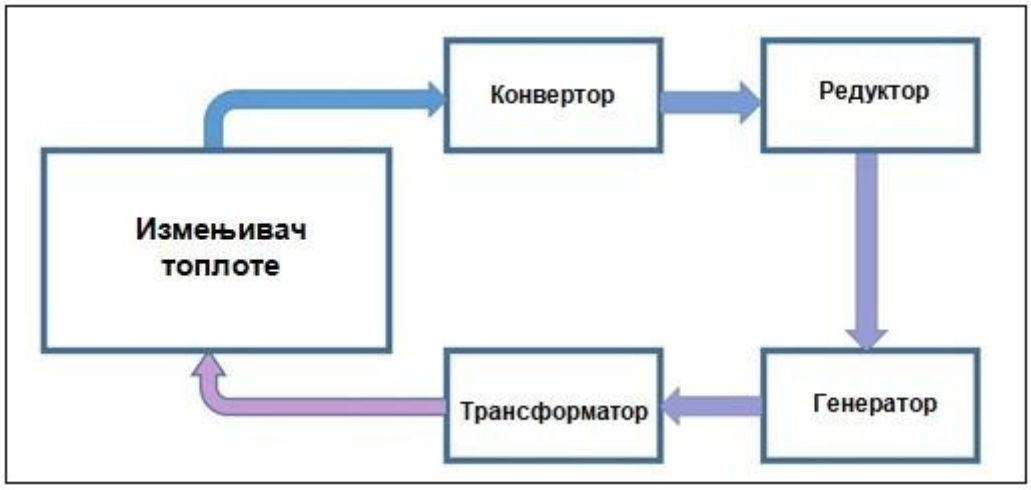


Figure no. 62: *Cooling diagram of the main components in the gondola*

Heat exchange takes place via two passive coolers on the roof of the gondola (Figure 63).

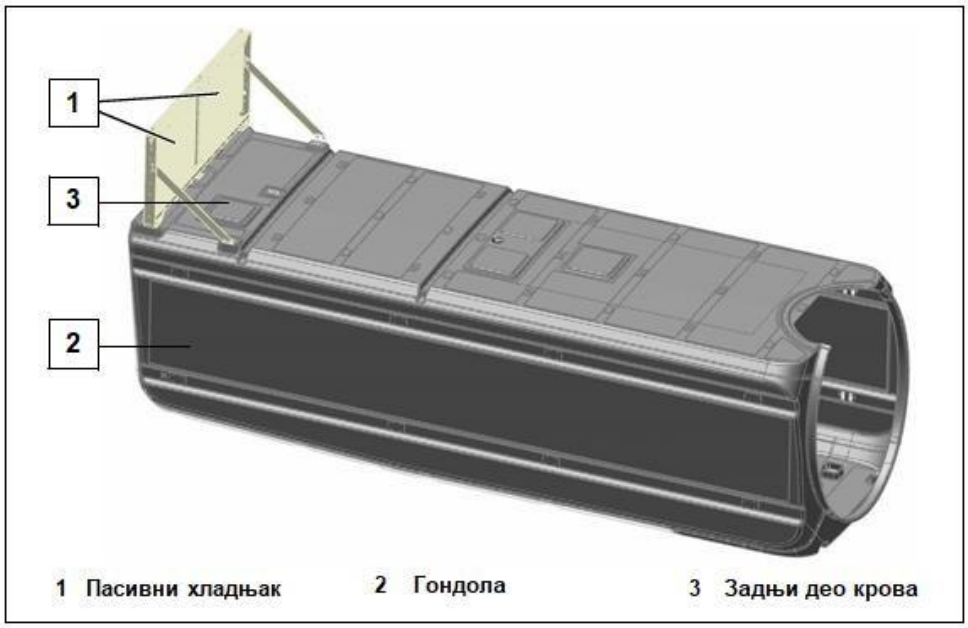


Figure no. 63: *Passive coolers in the frame on the roof of the gondola*

Electrical components

Generator is a 6-pole double-powered induction machine. An air / water heat exchanger is mounted on the generator. The cooling water is cooled again, together with the cooling water of the other main components, in a passive cooler on the roof of the gondola.

Medium voltage components are used to connect the VT to the medium voltage network of the wind farm or the network of the local system operator. The base of the pole contains a **medium voltage (MV) plant**. It consists of a transformer field with a switch and at least one cable ring field (as a basic solution) to a maximum of three cable ring fields as an additional option (depending on the wind farm configuration). The transformer field consists of a vacuum switch and a disconnector with a grounding knife (three-position switches). The cable ring field contains a three-position switch. The complete MV plant is mounted on a supporting frame. Further characteristics of the MV plant are:

- Routine testing of each plant in accordance with IEC 62271-200;
- Type tested, SF6 isolated;
- Indoor mounting system (min. IP2X);
- SF6 container: metal shielded, partitioned (min. IP65), regardless of the influence of the external environment;
- Three-position trap positions "On-Off-Grounded";
- Terminal strip for secondary tests;
- Low level of maintenance requirements, in accordance with class E2 (IEC 62271-100).

System protection of MV plants is achieved by the following elements:

- The release of overpressure is enabled by the pressure absorption channel, in case of an arc;
- Improved personal safety and protection of the system in case of arc occurrence, according to the type test in accordance with IEC 62271-200;
- Protection device, powered by converter current and appropriately set, as overcurrent protection relay (independent current protection);
- Achieved inter-blockades at the plant, in order to prevent incorrect manipulations, optional padlock locking;
- Protection against corrosion of the plant by hot-dip galvanizing and control painted surfaces.

The transformer and converter are located in the gondola. The transformer is specified in accordance with IEC 60076-16 and meets the requirements of the eco-design requirements of 548/2014 / EC. The steel components of the transformer are dimensioned for corrosion protection class C3 (H). Additional protection measures:

- Grounded housing (dry transformer) or earthed vessel (ester transformer);
- Overtemperature protection with temperature sensor and relay;
- Hermetic protection (against leakage) and overpressure protection for ester transformer.

Types of low voltage networks

The 660 / 690V low voltage network, as the IT network configuration and the three-phase AC network, are isolated to the ground and represent the primary low-voltage energy part of the wind turbine. The elements of electrical devices for operation and measurement are earthed directly or via separate protective cables for equipotential bonding. As a further protection measure for the protection of people and turbines in the 660 / 690V IT network, a central insulation monitor was installed.

Low voltage network 400 / 230V has a directly grounded neutral point on power supply transformers, such as TN and three-phase system. PE equipment grounding conductor and neutral conductor are available separately. Enclosures of electrical equipment and consumers are directly connected to the neutral points of mains transformers by means of equipment grounding conductors, including protective equipotential bonding connections. The 400 / 230V network is an auxiliary system for powering the wind turbine.

General principles of lightning protection installation of wind generators - wind turbines are very robust elements, of significant dimensions which in most cases can be treated as lonely very high objects. As such, they are very often exposed to direct atmospheric discharges into certain elements of the wind generator: blades, gondola or pole. Lightning protection installation and earthing system of wind generators are very closely connected in physical and functional sense and represent a unique system of protection of wind generators.

The analysis of the wind turbine model by the rolling sphere method, defined in the standard IEC 61400-24: "Wind turbine Generator System - Part 24: Lightning Protection", identified the most critical points in terms of atmospheric discharge:

- Wind turbine propeller tips;
- Meteorological station at the back of the gondola.

External lightning protection installation means protection of prominent parts of wind turbines that are subject to direct atmospheric discharge. It consists of a receiving system whose role is to conduct a discharge current into the earthing system via the smallest possible impedance.

The general principle of lightning installation of wind turbines is shown in Figure no. 64.

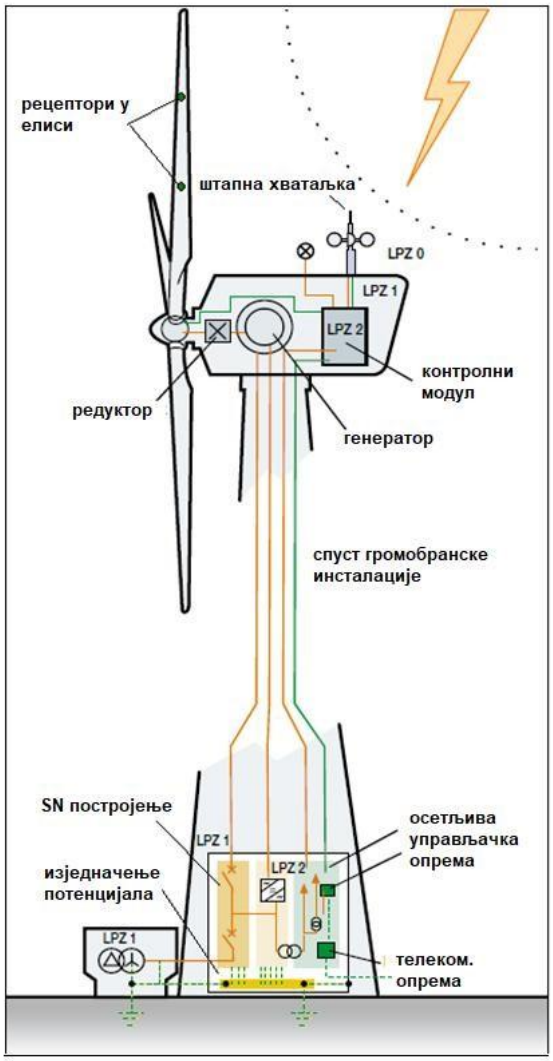


Figure no.64: *General principle of lightning installation of wind turbines*

In order to determine how effectively the component should be protected from atmospheric discharge, it is convenient to classify the wind turbine by zones, LPZ *(lightning protection zones),* describing the conditions to which the components are exposed.

Lightning protection zones (LPZ) include the following units.

Protection zone 0 (LPZ 0) includes exposed elements of wind turbines: rotor blades, rotor hub, gondola dividers, gondola structures, outer part of the pillar.

- **Protection zone 1 (LPZ 1)** includes elements inside the nacelle and wind turbine pillars that are not directly exposed to atmospheric discharge currents, but partially;
- **Protection zone 2 (LPZ 2)** includes elements for which it is necessary to carry out additional shielding in order to reduce the impact of induced electromagnetic fields. These include converters, converters, sensitive electronic and telecommunications equipment**.**

After atmospheric discharge into the wind generator, the propeller receiving system conducts the discharge current to the rotor hub which is dimensioned to withstand current up to 200 kA. From the rotor hub, current is transmitted via elastic bridges and grounded cables to the wind turbine pillar housing. The steel column housing is connected to the column base via grounded cables and equipotential bonding strips. Equipotential bonding is carried out in the gondola and at the foot of the stairs. The following is connected to the equipotential bonding rail and the earthing system: block transformer, main cabinet, low voltage distribution and medium voltage

switch as well as converter and generator box. From the steel column and the potential equalization rail, the discharge current is further discharged into the earthing system of the wind generator. In addition to purposefully installed protection elements, the regulation defines the requirements that all equipment must meet, ie all elements of external lightning protection, including gondola and pole, must be designed to withstand and safely conduct atmospheric discharge current into the grounding system.

The classification of protection zones of wind turbines against atmospheric discharge is shown in Figure 65.

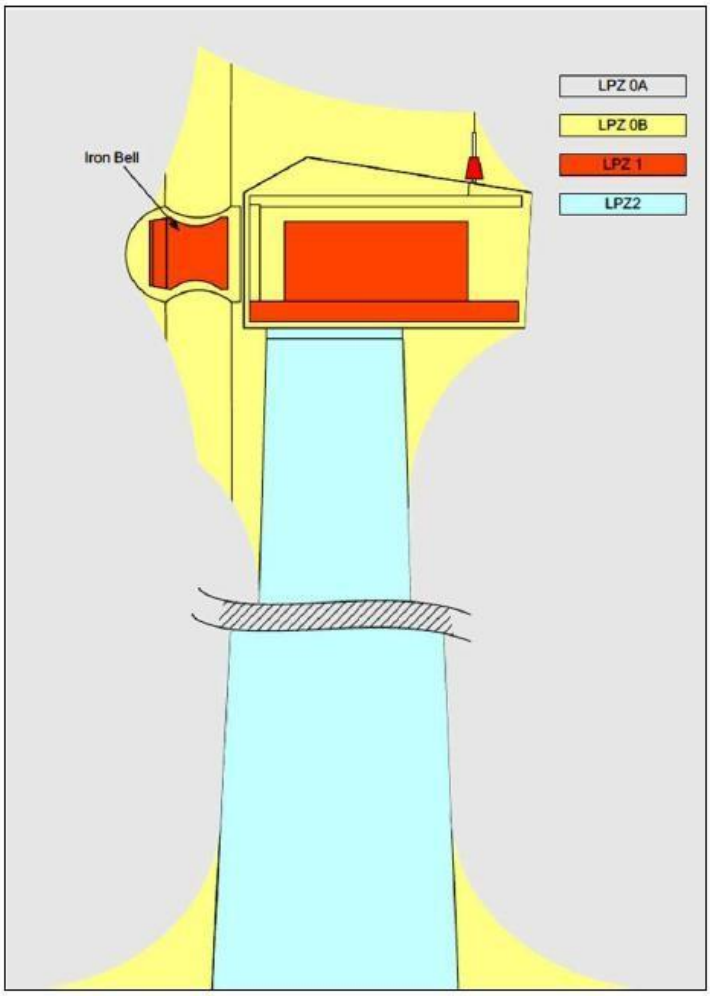


Figure no. 65: *Classification of wind turbine protection zones*

Wind turbine grounding system - is an integral part of the earthing system of the entire wind farm. The earthing system of the wind farm is realized as a complex earthing conductor, consisting of individual earthing conductors of wind turbines connected by a copper rope (interconnective earthing conductor) into one common combined earthing conductor. The earthing system of each individual wind generator is realized as a combined earthing device which includes:

- Working (drive) grounding
- Protective grounding
- Lightning protection grounding

The unified function of the earthing system is realized through the main potential for equalization of potentials located in the room at the foot of the pole, mounted on the support (chassis) of the MV plant. All earthing system subsystems:

- Working and protective grounding of high voltage installations;
- Working and protective grounding of low voltage installations;

- Grounding of the installation for protection against atmospheric discharge;
- Basic grounding of wind turbines (Cu rope 50 mm^2);
- Interconnection grounding switch, made of copper rope 50 mm^2 that connects the earthing of adjacent wind turbines.

The basic scheme of the earthing system of an individual wind generator is shown in the following figure.

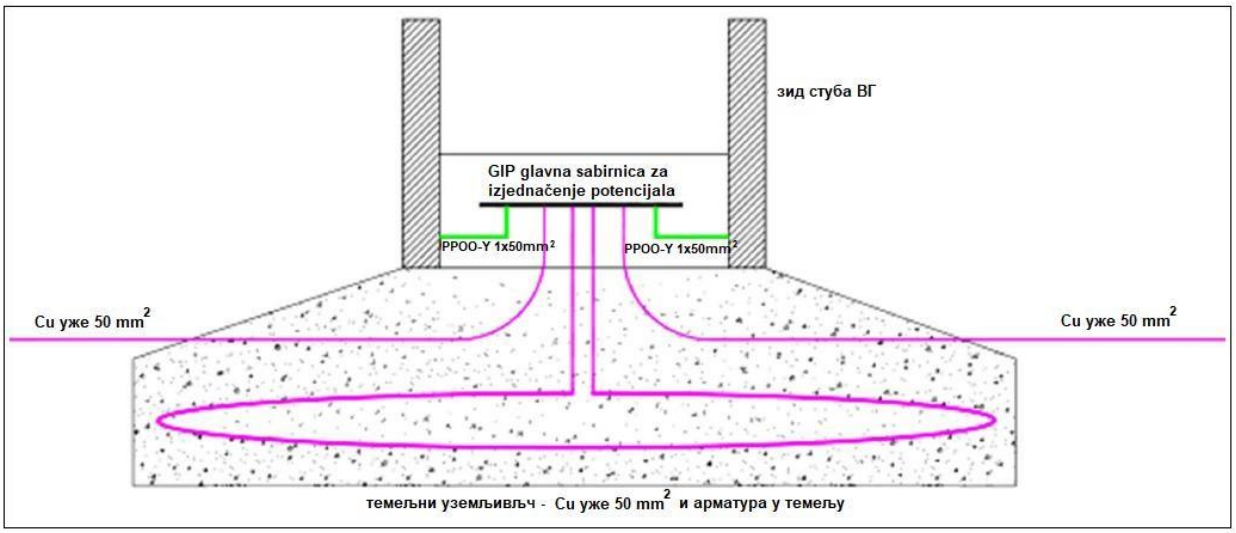


Figure no. 66: *Schematic diagram of the grounding system of an individual wind turbine*

Interconnection grounding is when all wind turbines inside the wind farm "Krivača" are interconnected in the earthing system via a copper rope with a cross section of 50 mm2 which is laid along the route of MV cables above the cable bed, which achieves the effect of protecting MV cables from induced atmospheric overvoltage. All wind turbines and the transformer plant are interconnected in one integrated earthing system, consisting of the basic earthing conductors of the wind turbine and the transformer plant and the horizontal earthing strips that connect them. In this way, a quasi-plate earthing switch was formed on the entire wind farm complex, which will be of great importance when considering the values of step voltage and contact.

Transformation of 33/110 kV "WF Krivača" and Connection-distribution plant 110kV "Krivača"

The produced energy will be delivered to the 110 kV transmission network of nominal voltage level through the following facilities that will be built:

- Transformation 33 / 110kV “WF Krivača”;
- 110 kV "Krivača" connection and distribution plant,
- construction of two new 110 kV transmission lines, the construction of which is planned as part of the investment of the Wind Power Plant "Krivača", which would connect the 110 kV "Krivača" Connection and Distribution Plant with SS 110/35 kV "Neresnica" (in the municipality of Kučevo) and SS 110 / 35 kV "Veliko Gradiste". The routes of the 110 kV transmission line PRP 110 kV "Krivača" - TS "Neresnica" and the transmission line PRP 110 kV "Krivača" - TS "Veliko Gradište" are approximately equal in length and amount to about 19.4 km. (As mentioned earlier, transmission lines are not subject to this environmental impact assessment, a special procedure has been conducted for them).

110 kV connection and distribution plant of WF "Krivača" - the basic elements of the 110 kV connection and distribution plant "Krivača" are an external 110 kV plant and a command and control building. The 110 kV switchyard is performed in the open with appliances and safety gaps for outdoor installation. The plant of the indicated voltage of 110 kV is with a single system of busbars made of pipes with two transmission lines, two transformers and one

connecting field. The busbars are made of aluminum alloy pipes of the required cross-section, which are placed on supporting insulators. The busbars are designed in such a way that free space is provided for the reserve transmission line field. The entire plateau that includes the 110 kV "Krivača" PRP facility will be fenced with a metal fence, while an internal fence is planned to separate the plateau of the 110 kV "Krivača" PRP facility and the 33/110 kV "VE Krivača" transformation facility. From the service road of the wind power plant "Krivača" there is a branch of the macadam / asphalt road to the entrance to the transformer station. Within the complex of the plant, 5 m wide service roads are planned for the needs of equipment installation and in the vicinity of the command and control building, while 4 m wide roads are planned for the rest of the plant.

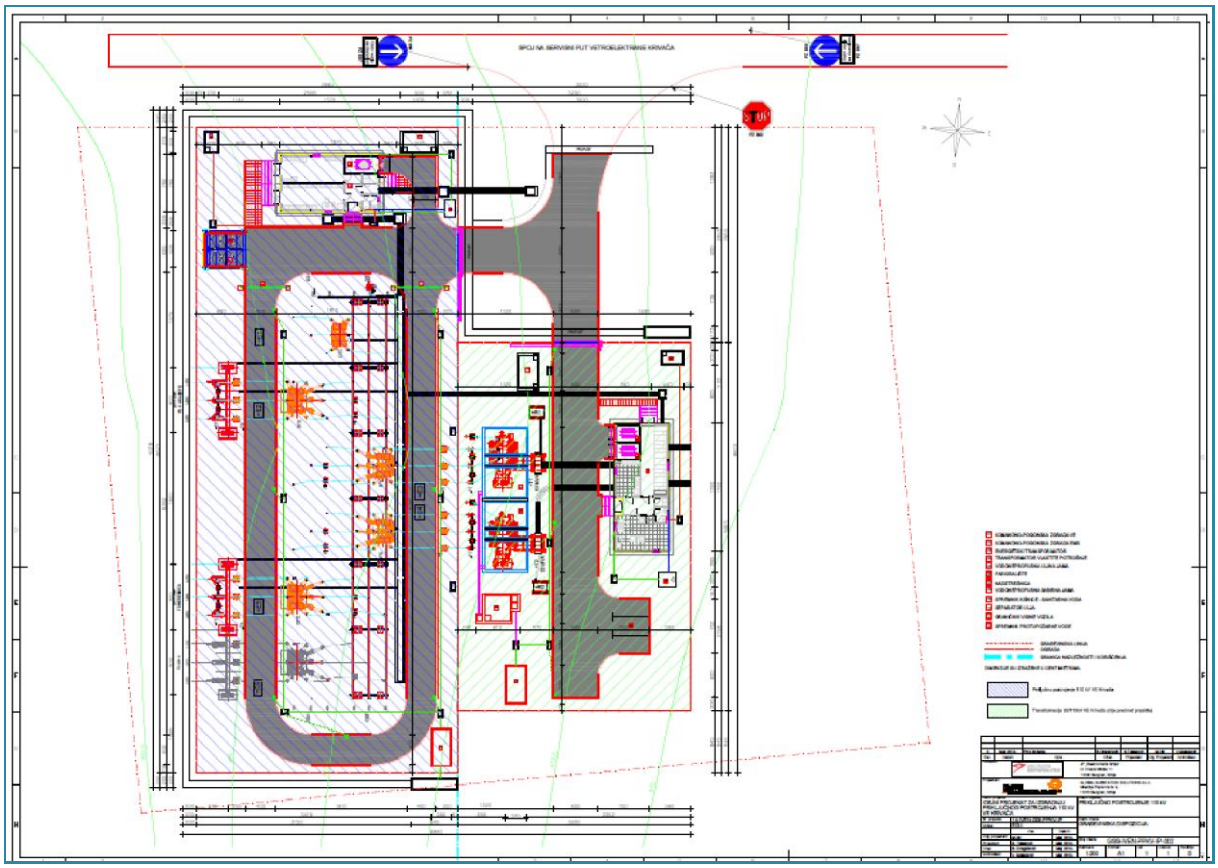


Figure no. 67: *Complex of SS 110/33 kV "Krivača" (Conceptual Design)*

Transformation of 33/110 kV "WF Krivača"- is planned with remote control, at the location of Golo Brdo, where energy will be collected from wind turbines at a medium voltage level of 33 kV and raised to a high voltage level of 110 kV. Within the enclosed space of the 33/110 kV Transformation Plant "VE Krivača" on the outer plateau, the installation of two 110/33 kV transmission power transformers is planned, while the 33 kV plant is planned within the command-and-control building. Transformers are protected from overvoltage by surge arresters which also represent the delimitation elements between the 110 kV "Krivača" PRP facility and the 33/110 kV "VE Krivača" Transformation facility. A branch of the macadam / asphalt road to the entrance to the substation is being built from the service road of the Krivača Wind Power Plant. The width of the road inside the TS, at the place where the command-and-control building is located, will be 6 m. Situational drawing of the 33/110 kV Transformation "WF Krivača" is shown in Figure no. 67 and is given in the Annex to the study.

35 kV transmission lines and cables within the area of the wind power plant - from wind generator groups to the transformation of "WF Krivača", the construction of overhead and underground (several shorter sections) 35 kV lines is planned. The routes of 35 kV lines, to a large extent, follow the routes of road infrastructure, and due to the terrain configuration, the routes of these lines outside the road infrastructure corridor, overhead (with corridor of 2x15.0

m) and underground (with corridor 2x1.0 m) lines are planned. The arrangement of the space along the transmission line is determined on the basis of technical requirements (construction and operation) of the transmission line, location conditions, protection of the immediate environment and, in particular, environmental protection.

Wind turbine poles and associated plateaus (where the wind turbine poles are located) - including the cable network for connecting the wind farm to the transformer station and service roads, belong to urban zone 4 (according to DRP):

- wind turbines T1-1 to T1-15 are located in subzone 4-1 "Venac"
- wind turbines T2-1 to T2-5 are located in subzone 4-2 "Tilva"
- wind turbines T3-1 to T3-7 are located in subzone 4-3 "Debelo Brdo"

Complete approximate technical data of the turbine (wind generator) are given in Table no. 27.

Table no. 27: *Technical data*

Design	
Design temperature	Standard: -20°C to +45°C CCV: -40°C to +45°C
Operating temperature range	1) -20°C to +40°C
Operating temperature range (CCV)	1) -30°C to +40°C
Stopping	Standard: -20°C, restart at -18°C CCV: -30°C, restart at -28°C
Maximum height above sea level	2000 m[1)]
Certificate	In accordance with IEC 61400-1 and DIBt2012
Type	Rotor with three blades and horizontal shaft Wind turbine with wind
Output control	Active adjustment of each blade individually
Nominal power	Variable 4000 - 4500kW[1)]
Nominal power starting from wind speed of (air density of 1,225 kg / m3)	Approximately 11.5 m/s
Rotor speed operating range	6.4 rpm to12.3 rpm to
Nominal speed	11.0 mın
Wind speed to start the turbine	3 m/s
Wind speed to stop the turbine	26 m/s[2)]
Restart wind speed	25.5 m/s[2)]
Estimated lifespan	At least 20 years

Columns	**TS105**	**TS125-01**	**TCS164 NV05**	**TCS164 NV06**
Height	105 m	125 m	164 m	164 m
wind class	DIBt S / IEC S	DIBt S / IEC S	DIBt S / IEC S	DIBt S / IEC S
number of column sections	4	6	2 steel sections 1 concrete part	

Rotor	
rotor diameter	149.1 m
gripping surface	17460 m^2
Rated power / area	257.7 W/m^2
Angle of inclination of the rotor shaft	5°
Blade angle	3.5°
Rotor blade	
Material	fiberglass and carbon fiber reinforced plastic
Total length	72.40 m
Rotor shaft / rotor bearing	
Type	Forged hollow shaft
Material	42 $CrMo_4$ or 34$CrNiMo_6$
Bearing type	Spherical roller bearing
Lubrication	Regular application of lubricating grease
Mechanical brake	
Type	disc brake with active actuation
Location	on a high-speed axle
Number of brake cylinders	1
Brake pad material	organic tile material
Reducer	
Type	Multistage planetary gearbox + gear
Gear ratio	50Hz:i = 113.5 60Hz:i = 136.2
Lubrication	Forced lubrication
Amount of oil including cooling circuit	Max. 650 l
Oil type	WT 320
Max. oil temperature	Approximately 77°C
Oil change	change as needed
Electrical installations (690VAC) - turbines with power up to 4800 kW	
Nominal power of P_{nG}	To 4800kW*
Nominal voltage	3xAC 690V±10% (in accordance with the applicable network regulations)
Nominal current during maximum injection of reactive power I_{nG} at S_{nG}	4571 A

Nominal apparent power of S_{nG} at P_{nG}	5463 kVA
Power factor at P_{nG}	1.00 as a predefined setting 0.8785 incited (inductive) to 0.8785 overwhelmed (capacitive) is possible
Frequency	50 Hz и 60 Hz

1) Nominal power is achieved in defined temperature ranges depending on the power factor. N149 / 4.0-4.5 can operate up to 4800 kW.
2) Depending on the project, the wind speed to stop the turbine can be reduced, in order to preserve structural stability.
*) All values are maximum values. Values may vary depending on rated voltage, rated apparent power and active WT power.

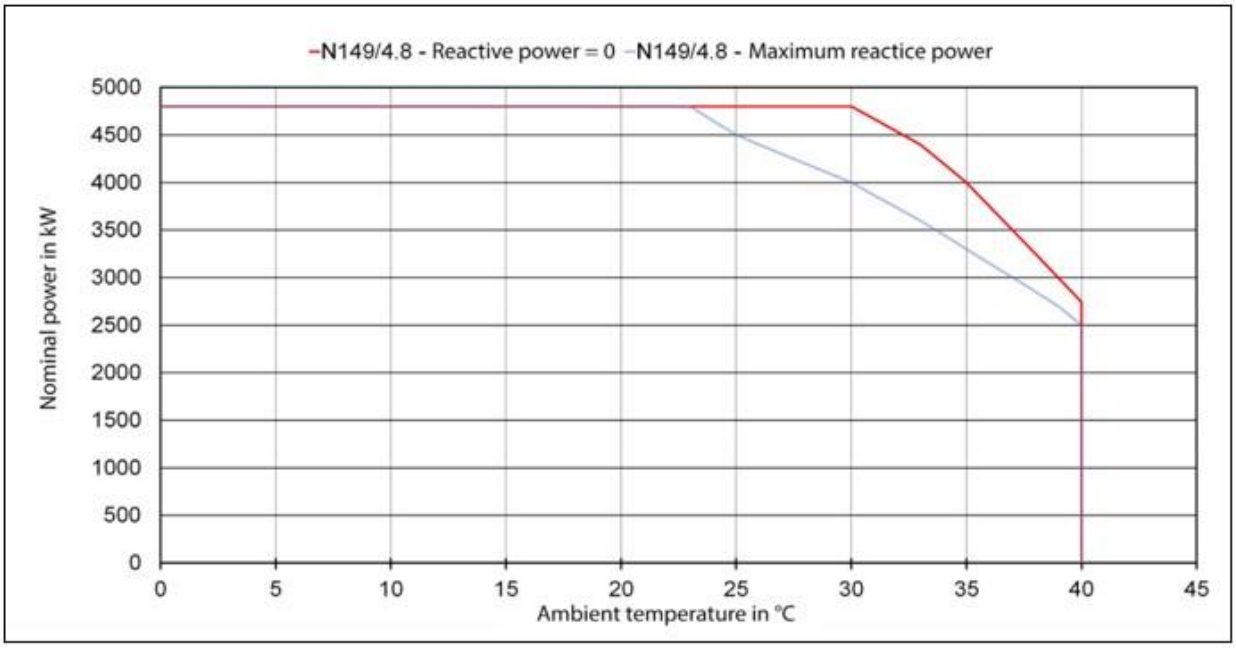


Figure no. 69: *Power adjustment for wind turbines power up to 4800 kW*

3.2. Description of previous works on the Project

Activities that preceded the idea of implementing the planned wind farm "Krivača" were measurements of wind potential in this area and detailed research, ie one-year monitoring of birds and bats, which was combined in the Study "Analysis of the impact of the planned wind farm" Krivača "on birds and bats" , (Zoran Milovanović, January 2015), as well as an additional one-year monitoring of birds and bats, conducted from September 2015 to August 2016 (MottMacdonald, April 2017).

Based on the above tests, it was determined that there is a wind energy potential that can be technically used for the construction of a wind farm. The monitoring of birds and bats in the analyzed area determined the presence of 66 species of birds and 7 species of bats. A detailed study has established that by applying protection and compensatory measures, the planned wind farm will not have significant negative impacts on birds and bats.

Previous activities for the implementation of the Wind Turbine Project "Krivača" include:

- measurement of wind potential:
  - Wind Resource and Energy Yield Assessment Wind farm Krivača, Fractal, Januar 2014;
  - Assessment of the meteorological site conditions of the proposed krivaca wind farm in serbia, Garrad Hassan, 2014;

- Krivača Wind Farm – Wind Resource Assessment and Annual Energy Production Estimate, Megajoule, December 2019.

- monitoring of ornithofauna and chyropterofauna:
  - Analysis of the impact of the planned wind farm "Krivača" on birds and bats, (Zoran Milovanović, January 2015.)
    Analysis of the impact of planning the Krivača wind farm on birds and bats (2015-2019), Zoran Milovanović, November 2019.
  - Krivaca Wind Farm, Bird Monitoring Report (2015-2016), MottMacdonald, April 2017.),
  - Krivaca Wind Farm, Collision Risk Assessment Report (2015-2016), MottMacdonald, April 2017.),
  - Krivaca Wind Farm, Enviromental and Social Impact Assessment Addendum, MottMacdonald, December 2017.).
    (last three documents based on additional research and observations)
- surveying the terrain and making geodetic bases;
- For the area of the planned wind farm, the Plan of detailed regulation of the area of the wind farm "Krivača" was made, for which the procedure of the first amendment was initiated due to the change in the rules of wind generator construction and parceling rules. The first amendment to the PDR was made on the basis of Decisions:

- Decision on drafting the first amendment to the Plan for detailed regulation of the area of the wind farm "Krivača" (on the territory of the municipality of Golubac) ("Official Gazette of the Municipality of Golubac", No. 8/2019), made by the Municipal Assembly of Golubac, at a session held on 01.08.2019;
- Decision on drafting an amendment to the Plan for detailed regulation of the area of the wind farm "Krivača" on the territory of the municipality of Kučevo ("Official Gazette of the Municipality of Kučevo", No. 10/2019), made by the Municipal Assembly of Kučevo, at the session held on 31.07.2019;

These decisions, Article 11 of each Decision, define that the Report on Strategic Environmental Assessment of the Plan for Detailed Regulation of the Wind Power Plant "Krivača" in the municipalities of Golubac, Kučevo and Veliko Gradište remains in force, with the consent of the competent authority of each municipality (Decision No. 501-15 / 2013 of 04.09.2013, Municipality of Golubac, Municipal Administration, Department of Economy and Infrastructure; Decision No. 501-4 / 2013-02 of 05.07.2013, Municipality of Kučevo, Department of economy and property law affairs).

- Assembly of the Municipality of Golubac at the session held on October 15, 2019. adopted the First Amendment to the Detailed Regulation Plan of the Wind Farm "Krivača" in the Municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 9/2019.)

- Assembly of the Municipality of Kučevo at the session held on October 21, 2019. passed the Decision on the adoption of the First Amendment to the Detailed Regulation Plan of the area of the wind farm "Krivača" in the municipality of Kučevo ("Official Gazette of the Municipality of Kučevo", No. 11/2019.)

- preparation of the Geotechnical Study:

  - Study on geotechnical conditions for financing wind turbines at the location of the wind farm "Krivača", Faculty of Civil Engineering in Belgrade - ISG);

- obtaining Location Conditions;
- preparation of the Feasibility Study of the WF “Krivača”;
- development of the Conceptual Design („Global Substation Solutions“ d.o.o.):
  - Construction project;

- Steel construction of columns,
- Plateau project for wind turbine installation,
- Plateau retaining walls project,
- Project of hydraulic installations of retaining walls,
- Project of electrical installations of wind turbines,
- Project of mechanical installations of wind turbines.

Preparatory works for the construction of the wind farm "Krivača" and the accompanying functional infrastructure include:

- preparation of the terrain for the construction of road infrastructure (transport routes and other road network) and other accompanying infrastructure;
- preparation of the terrain for the installation of wind generators and transmission network (110 kV transmission line "Krivača" - TS "Neresnica" and transmission line 110 kV "Krivača" - TS "Veliko Gradište"
- Preparatory works for the construction of the Transformation "WF Krivača" and PRP "Krivača".

- obtaining a building permit;
- application of works on the construction of facilities within the WF "Krivača".

3.2.1. Construction of wind farm "Krivača"

The main activities in the construction phase of the wind farm "Krivača" are:

- preparation and clearing of the terrain;
- leveling the terrain;
- construction of infrastructure in the function of the Project;
- formation of a temporary concrete base;
- formation of plateaus by earthworks;
- installation of the final layer of the plateau - gravel;
- construction of the foundation and foundation structure of the wind turbine column;
- delivery and storage of wind turbine parts;
- placement of machines (cranes - main and auxiliary) during installation;
- space for mounting blades and rotors;
- manipulative space during installation works;
- installation and assembly of equipment;
- construction of auxiliary facilities;
- connection to the electric transmission network;
- commissioning.

Realization and execution of the Project will include several specialized manufacturers of equipment and supporting materials and contractors who will work in parallel on the construction, installation and assembly of parts of the wind farm. Since the design and production of wind turbines is limited to specialized manufacturers, equipment and devices will be manufactured off-site at the wind farm and delivered by specialized vehicles.

Preparation for construction includes: preparatory works, elaboration of construction site organization and construction site organization, preparation of storage spaces, temporary workshop and pre-assembly spaces, preparation of construction sites and construction site electrical installations, construction cranes and mechanization.

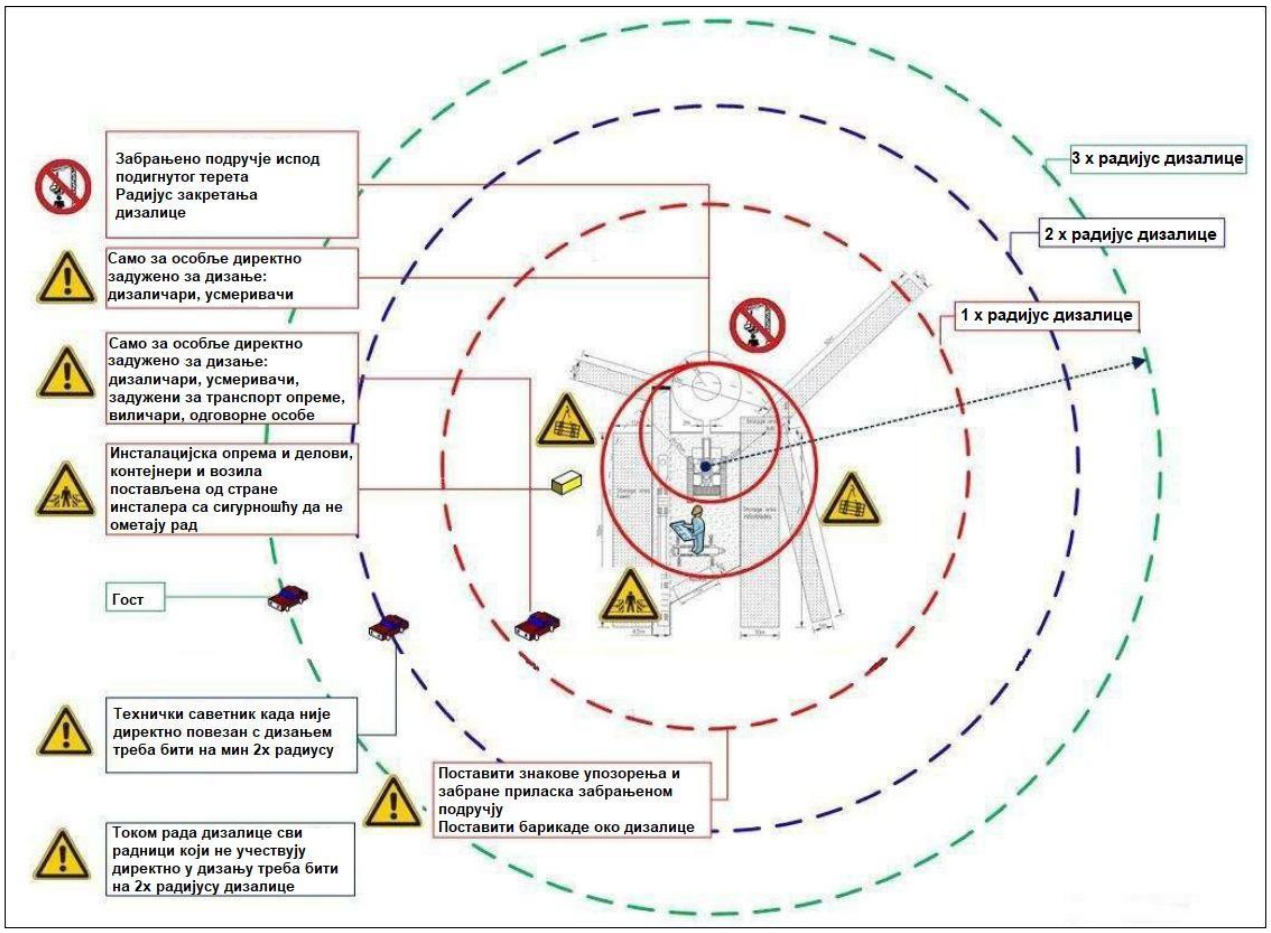


Figure no. 70: *Working area of the crane on the plateau for the installation of wind turbines*

Plateaus are constructed on the location of wind turbines in accordance with the technological needs of wind turbine installation, submitted by the equipment manufacturer, in accordance with the topographic characteristics of the terrain. The equipment on the plateau must be located and organized in such a way as to cause minimal delays during the installation of wind turbine parts. On the parts of the plateau where the supplier of equipment has planned the placement of the main and auxiliary cranes, it is necessary to satisfy the conditions of bearing capacity of the soil, ie to achieve the value of compressibility modulus using the final layer of gravel. The slope of the plateau in any direction must not exceed 1%. Cable ducts that cross the plateau, if necessary, are protected by a layer of lean concrete. The plateaus are rectangular (or triangular in shape).

The basic construction is octagonal in shape. The concrete class for which the foundations are made is S30 / 37. The foundations are located within the boundaries of the scope in accordance with the Project of parceling / re-parceling, dimensions 25x25 m.

Figure no. 71: *Derived foundation construction*

The load-bearing steel structure, the main load-bearing structure of the wind turbine, is a steel column of circular cross-section, variable in height. The pillar is a cantilever system, clamped in a circular AB foundation. It consists of several prefabricated pieces, of different dimensions. Anchoring of columns for AB foundation is realized by means of anchor plate and anchor screws. The anchor plate is symmetrically placed in relation to the axis of the cylindrical mantle of the column. After placing the first mounting piece in the design position, the anchor block is filled with a high-strength grout (C90 / 105).

Figure no. 72: *Lifting a column segment*

Figure no. 73: *Installation of the gondola*

The connection between the pole and the gondola is realized by means of a specially designed and machined flange 200 mm thick and prestressed high-quality screws. An opening for the entrance to the pillar is provided on the first mounting piece. Due to stress concentrations and changes in boundary conditions regarding the protrusion of the cylindrical shell, in addition to the increased thickness of the cylinder shell (85 mm), longitudinal and transverse stiffening along the perimeter of the opening is planned in this zone. Given the dimensions of the cross section of the column (ratio of diameter / thickness of the mantle wall) it must be treated as a cylindrical shell. Considering the type and importance of the object, as well as the dynamic nature of the load and the exposure of the structure to external temperatures, steels with

improved properties in terms of material fatigue and brittle fracture are adopted as the basic material. Different steel qualities are adopted for the cylindrical shell mantle, depending on the thickness of the sheet metal.

Figure no. 74: *Lifting the wind turbine*

Pre-installation works for the rotor (blade carrier and blades) include: preparation of the connection to the blade carrier, pre-assembly of the blades, connection of the blade rotation system, Figure no. 73.
After pre-assembly of the generator (stator and rotor) on the ground, it is lifted and mounted in the drive part using a crane and connected with screws, Figure no. 74.
On the ground, the hub is pre-assembled together with the blades, so it is lifted and mounted on the drive part of the wind generator (Picture no. 75.)

Mechanical installation works:

- for the column include: preparation of the foundation plate and screws, assembly of the segments of the pillar;
- for the gondola, include: preparation of the connection to the pole, installation of the gondola;
- for the rotor include: preparation of the connection on the gondola, installation of the rotor.

Painting works include: repairing paint in potentially damaged places.

Other obligatory works include: final adjustments and tests, cold tests, heat tests, test drive, test operation of the plant, marking of equipment, installation of prohibition signs, hazards and warnings, installation of mobile firefighting equipment, maintenance of cleanliness, rehabilitation of construction sites, preparation of construction documentation condition, elaboration of proof of quality, preparation of instructions for handling and maintenance.

Figure no. 75: *Installation of the assembled hub and blade on the wind turbine pole*

3.2.2. Transport of construction materials and equipment

Transport of construction materials and equipment to the location of the subject Project in the phase of realization, ie construction implies delivery of:

- wind generator elements (poles, propellers, turbines ...);
- equipment for construction works on the site (cranes, mobile concrete bases ...);
- construction material (cement, sand, reinforcement, small stone and ...).

In the Project planning process, the following were considered:

- transport routes, for the needs of unloading and delivery of wind generators in the phase of wind farm construction;
- ransport routes, in the service / maintenance phase of the wind farm.

In the phase of drafting the Detailed Regulation Plan, the route from the port of Constanta in Romania was considered: parts of the wind turbine will be transported along the Danube, in accordance with the wind farm construction schedule, to the port of "Usije" (Golubac municipality), where they will be temporarily stored. The transport route that starts from the port

of "Usije", through the Danube area, Radoševac, then goes along the corridor of the state road IB row number 34 and a new route to the uncategorized road at the exit from the east of the construction area Radoševac, total length of about 2,879 km and is of a temporary nature. The transport route leading along the section of the municipal road, on the territory of the municipality of Golubac, from the station around km 36 + 081 to the intersection with the municipal road to the settlement Snegotin and through the construction area of this settlement, about 5,489 km long, is temporary.

On the territory of the municipality of Golubac, the transport route uses the route of the existing uncategorized road, which leads through the location of Žuti breg, east of the settlements of Radoševac and Sladinac to the intersection with the municipal road, from where it divides into two main directions. The first transport route leads to the subzones at the locations "Venac" and "Debelo Brdo". The second transport route follows the route of the municipal road to the intersection with the municipal road that leads to the settlement of Snegotin, through the settlement of Snegotin, about 5,489 km long. Below is the transport route, which partly follows the newly planned route, and partly follows the route of the existing uncategorized road and leads to the subzone at the location "Tilva".

During the development phase of the Project, the following three variants of unloading and storage of wind turbine parts for the needs of wind farm construction were considered (obligation of the equipment supplier, including risk assessment of the planned transport):

- unloading and storage in Smederevo, then transport by road to Golubac (Figure no. 76);
- unloading and storage in Zadar, then transport by road to Golubac (Figure no. 77);
- unloading and storage in the settlement of Usije, then transport by road to Golubac (Figure no. 78).

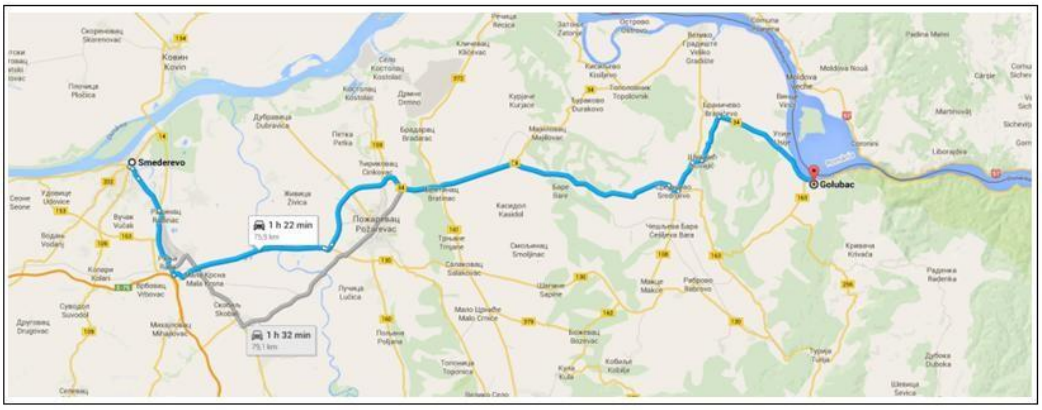


Figure no. 76: *Transport route Smederevo - Golubac*

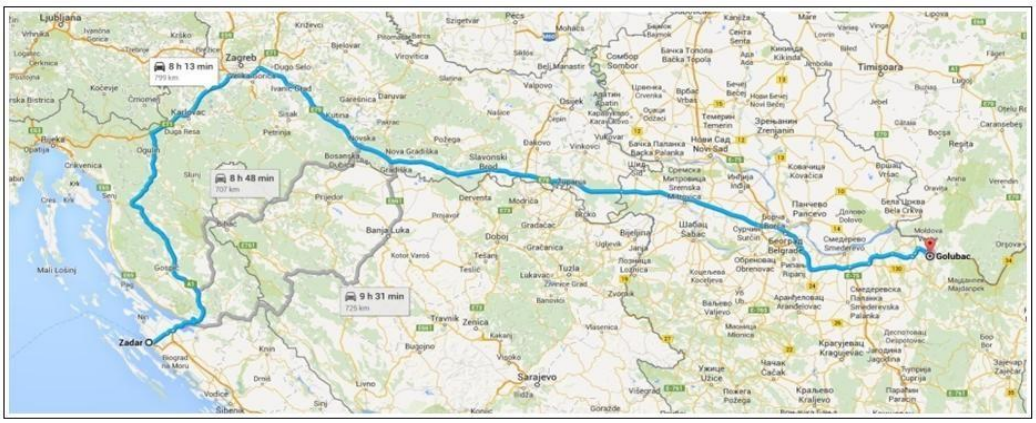


Figure no. 77: *Transport route Zadar - Golubac*

Based on all the analyzes, the third variant was chosen - unloading and storage in the settlement of Usije, where the unloading and temporary storage of wind generator parts will take place. That is, wind turbines are brought to Romania to the port of Constanta, where they are temporarily unloaded and stored. In accordance with the construction schedule, parts of the wind generator are transported to the port of "Usije" (Golubac municipality), where they will be temporarily stored.

Figure no. 78: *Selected transport route for unloading and storing wind turbines - port of Usije*

The transport route from the port "Usije" takes place on the road Vinci-Usije, after which it intersects with the state road Braničevo-Golubac (state road IB row number 34), then continues through the settlement Radoševac. The Vinci-Usije road, just before the intersection with the state road (state road IB row number 34), needs to be raised and harmonized with the level of the road (state road IB row number 34) at the exit from the east side of the construction area Radoševac, which is of a temporary nature. The road continues through the location of Žuti breg, which is located east and above the settlement of Sladinac, until it intersects with the state road IIB row number 376 Golubac-Maleševo. The transport route is divided from this point into two directions:

- the first transport route is according to the groups of wind generators located at the locations "Golo brdo-Venac" and "Debelo brdo";
- the second transport route follows the route of the municipal road to the intersection with the municipal road leading to the settlement of Snegotin. Below is the transport route, which partly follows the newly planned route, and partly follows the route of the existing uncategorized road and leads to the subzone at the location "Tilva".

The obligation of the Project Holder is to obtain special permits for extraordinary (oversized) transport on public state roads during the selection and determination of the transport route in accordance with the Law on Roads "Official Gazette of RS", No. 41/18 and 95/18(other law)).

Also, if intervention is needed in the state road corridor to change the geometry and load-bearing capacity of the municipal road to the state road (connection of access road 3 in the

area of KO Radoševac, where the planned service road intersects with the municipal road and through it to the port of Usije connection to the state road IB row number 34, the obligation of the Project Proponent is to obtain traffic and technical conditions, in accordance with the Law on Roads.

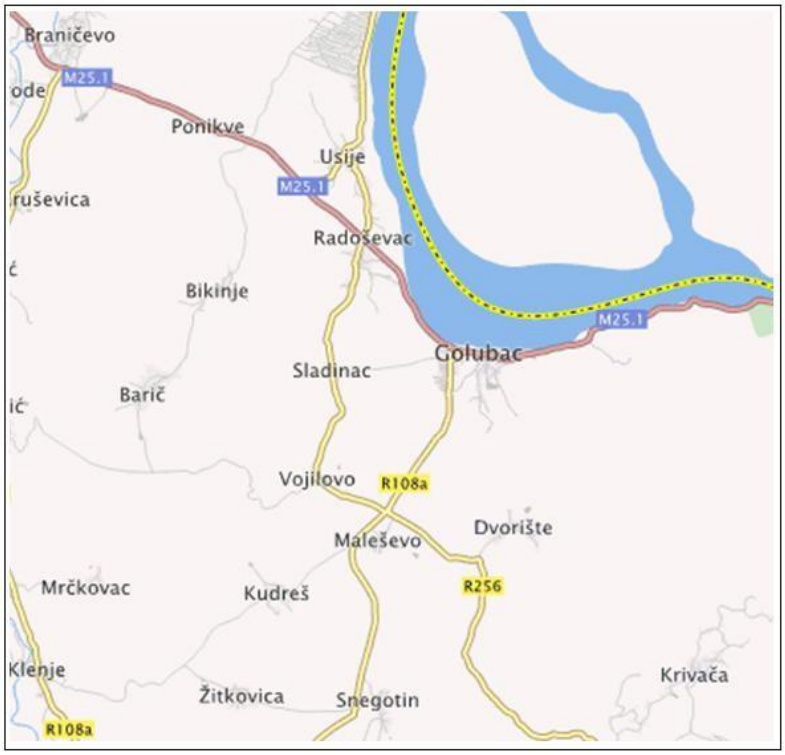


Figure no. 79: *Transport route Usije - Golubac*

When transporting parts of wind turbines, according to the project documentation, it is necessary to provide a free profile with a favorable radius of curvature and longitudinal slope. The free profile consists of traffic profile, protective heights and widths. We must not encroach on the free profile of the surrounding terrain, traffic signs, fences, etc.

Apart from traffic connections, access roads are also used as an infrastructure corridor for laying power and optical cables.

The road construction must meet the following conditions:

- All static and dynamic loads should be transferred to the lower structure without harmful placental deformations;
- Retain the required quality for the anticipated loads in the planned period;
- The geometric shapes of the upper surface of the curtain must ensure efficient transverse and longitudinal drainage of the running surface;

The transverse slope of access and service roads is 2-3%.

Table 28: *Planning road lengths*

DESCRIPTION	LENGTH (m)
New roads	41466,00
Existing roads	7777,00
TOTAL (m)	49243,00

Composition and dimensions of the pavement structure for all roads:

- bearing layer of mechanically compacted stone material, MNS 0-31,5mm 10 cm

- bearing layer of mechanically compacted stone material, MNS 0-63mm 20 cm
- total road construction 30 cm

The transport of wind turbine parts is shown in the following figure.

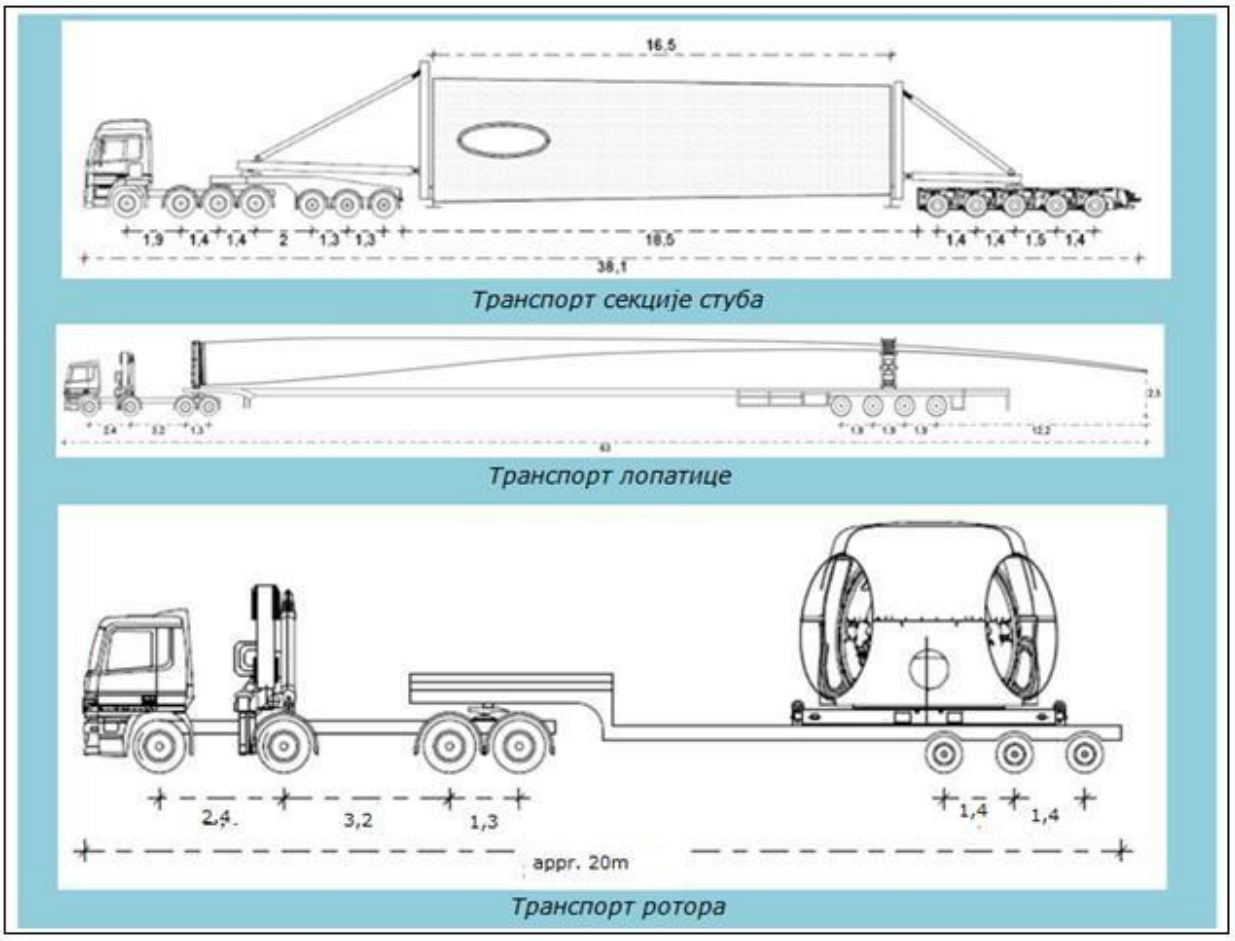


Figure no. 80: *Transport of wind turbine parts*

3.3. Project work technology

3.3.1. Electricity generation

The technological process of production and distribution of electricity using wind power can be presented as follows:

- propellers (blades) rotate with the help of wind power;
- rotation of the wind turbine blades causes the rotor to rotate, which converts wind energy (kinetic) into electrical energy;
- the transformer inside the wind generator raises the voltage for further transmission by underground cables to the Transformation of the wind farm complex;
- in the Transformation facility, the voltage is increased to correspond to the voltage of the national transmission network;
- electricity is transmitted to the grid and distributed to customers.

In conditions when the wind speed is constantly higher than 3 m / s, the rotation of the wind generator blades begins (clockwise). The rotation of the blades leads to the rotation of the rotor and the creation of kinetic energy which is converted into electrical energy through multipliers and generators. The minimum operating wind speed is 3 m / s and at this speed the wind generator starts producing electricity, with a power of about 20 kW. At a wind speed of 6 m / s, the wind generator generates electricity of about 600 kW. A wind speed of 12 m / s represents

the nominal operating speed at which the wind generator reaches its nominal power of about 3000 kW. The maximum operating wind speed is 25 m / s, at which the wind turbine automatically stops and stays locked. At higher wind speeds, the wind turbine will remain locked for safety reasons (primarily due to damage to equipment and devices). The largest amount of electricity produced will be placed in the electricity transmission system. A smaller amount will be used for the internal consumption of the facilities on the site, for the needs of the wind generators themselves to start the hydraulic system for braking the turbine rotor (in cases when the wind speed is constantly higher than 25 m / s). The electricity produced in the generator is distributed to the transformer located in the wind turbine pole and then to the underground, collecting electricity network of voltage level 35 kV to the Transformation facility.

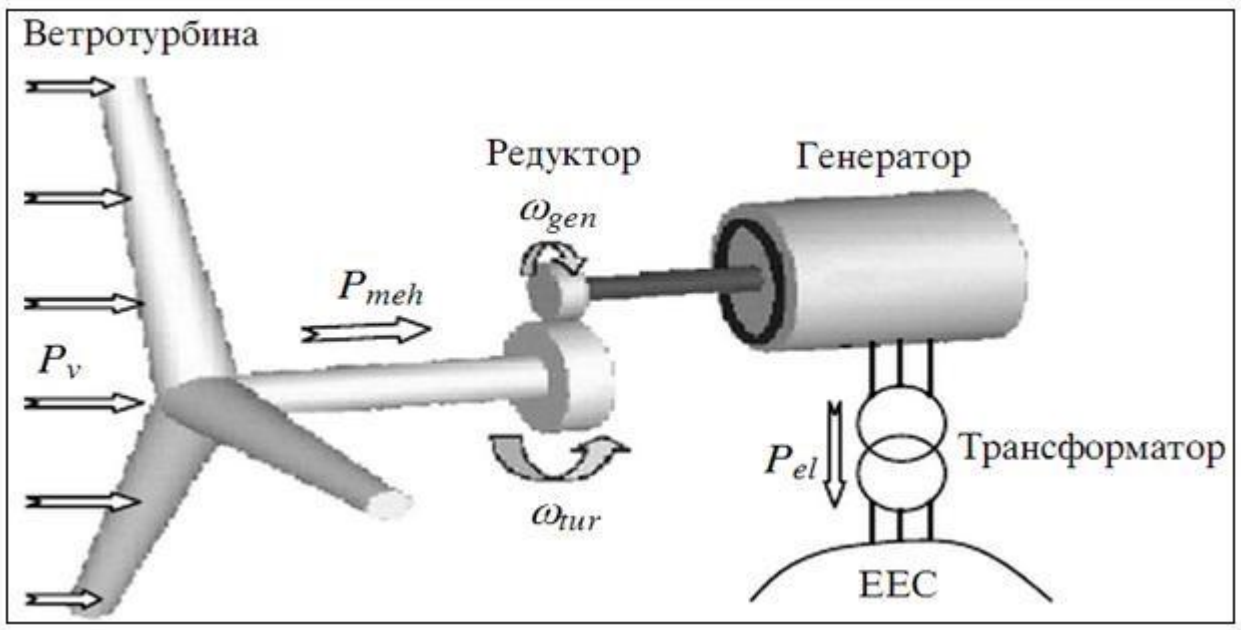


Figure no. 81: *Schematic diagram of wind turbine operation*

3.3.2. Operational management of wind farm operation

Remote control and supervision is planned for the WF "Krivača", which will be performed from the command room, located in the administrative building of the complex, through the central management and supervision system.

The central control and monitoring system of the wind farm is connected to the control systems of all wind generators through a network of optical cables. Each wind turbine will be equipped with a control system to monitor key operating parameters, monitor climatic conditions and send data to the control center. The administrative building, which is in the function of maintaining the wind farm, is planned in the sub-zone "Venac", where the Transformation "WF Krivača" is located. The administrative building is planned on an area of 0.42 ha, and TS 110 / 35kV "Krivača" with the accompanying areas on an area of 1.19 ha. The infrastructure of the administrative building will be separated from the infrastructure of the transformer station.

3.3.3. Maintenance of wind turbines

The maintenance of the wind farm will be performed by the contractors, in accordance with the recommendations of the equipment manufacturer and the technical requirements of the Project Holder.

Wind farm maintenance includes preventive and corrective maintenance. Preventive and corrective maintenance are regular activities during the operation of the wind farm. Preventive maintenance includes:

- inspection of turbines in order to identify areas where rust, corrosion or deterioration has occurred;
- checking propellers and all other moving parts to detect potential defects or fatigue of the material;
- inspection of equipment containing oil to prevent leaks;
- identification of equipment damage;
- oil quality control with which the mechanisms of moving parts and devices (rotor, multiplier, generator) are lubricated;
- replacement of oil that is not of appropriate quality;
- inspection of all parts and mechanisms whose improper operation may lead to noise emission that is higher than the level provided by the project documentation.

Corrective maintenance includes:

- replacement of defective or damaged equipment and parts that cannot be repaired. Maintenance includes the following measures: cleaning, servicing, painting, repairs, replacement of building parts.

The Project Holder will determine the personnel for the operation and maintenance of the plant. Key personnel for the handling and maintenance of equipment and individual technological units must be present during the preliminary tests and trial operation. In addition to conducting the trial work, the responsible persons are obliged to prepare a training program in advance, with a record of the training performed, which is conducted in parallel with the trial work.

3.3.4. Associated facilities and infrastructure

Within the complex of the wind farm "Krivača", the Transformation 33 / 110kV 110 / 35kV "VE Krivača" is planned with the accompanying areas, administrative building, transmission lines, internal roads, green areas, certain water management and telecommunications infrastructure.

The 35 kV medium voltage cable network will connect wind turbines to the Transformation and will consist of overhead and underground power lines to which each individual wind turbine is connected to the Transformation. Cables and transmission lines are, as a rule, the shortest route from the wind generator to the transformer station, most conveniently in the corridors of the Atar roads.

The internal electricity network for the own consumption of facilities within the Transformation is an underground network of voltage levels up to 1 kV which will be connected to the distribution network via a 33 / 0.4 kV transformer within the transformer plant.

Telecommunication cable network for facilities within the Transformation complex is planned for the use of standard telecommunication connections, but also for the management of systems within the complex. In the wind power plant "Krivača", a center is planned for the supervision and management of all wind generators by optical cables (working and spare), which are laid in parallel with medium voltage power cables (35 kV). The condition for the control center defined in this way to be in continuous operation should be implemented through the selection of a hot reserve for all equipment in the center, which means:

- working and backup computer system and
- uninterrupted operation and backup power supply in the control center.

The control center defined in this way is subordinated in terms of management to the competent control center - AD "Elektromreža Srbije". In that sense, it is necessary to provide during the construction of the 110 kV transmission line PRP "Krivača" - TS "Neresnica" and PRP "Krivača" - TS "Veliko Gradište", as well as the 35 kV transmission line, delivery and installation of steel ropes with at least 24 optical fibers in the core of the same (OPGW), as well as the laying of optical cables in the corridors of 35 kV cables. Further communication, with optical cables or other communication systems, in terms of supervision and management

from the mentioned substations to the control center - AD "Elektromreža Srbije", must also be provided.

Connection to the facilities of the distribution network - The planned Wind Power Plant "Krivača" will be connected to the facilities of the Operator of the Distribution Network "EPS Distribucija", over two 110 kV transmission lines, which are traced:

- from PRP 110 kV "Krivača" to the substation 110/35 kV "Veliko Gradište" and
- from PRP 110 kV "Krivača" to the substation 110/35 kV "Neresnica".

Transmission lines are not subject to this environmental impact assessment.

3.3.5. Traffic on location and surroundings

The traffic infrastructure within the planned WF "Krivača" is represented by:

- transport routes, for the purpose of unloading and delivery of wind generators in the phase of construction of the wind power plant;
- transport routes, in the phase of servicing / maintenance of the wind farm;
- corridors of uncategorized / access roads (existing / reconstructed / planned), which belong to urban zone 1, on the territories of the municipalities of Golubac and Kučevo;
- Corridors of service roads, on the territories of the municipalities of Golubac and Kučevo, on the sections of which it is planned to install traffic signals, information and warning signs, in order to determine the development of a special traffic regime.

У граници обухвата Пројекта, у складу са Референтним системом мреже државних путева Републике Србије (ЈП "Путеви Србије", новембар 2017.год.) и Уредбом о категоризацији државних путева („Сл. гласник РС”, бр. 105/13, 119/19 и 93/15), налазе се:

- state road IB row number 34;
- state road IB row number 33;
- state road IIA row no. 163.

Within Chapter 3.2.2. transport of equipment and construction materials, the requirements of the subject Project in terms of traffic infrastructure are described. The impact on the traffic infrastructure will be reflected mainly during the implementation phase of the Project, ie during the transport of oversized wind turbine equipment. It is assumed that the equipment will be delivered by ship, ie to the port of Constanta in Romania, and parts of the wind generator will be transported from it along the Danube, in accordance with the wind farm construction schedule, to the port of "Usije" (Golubac municipality), where they will be temporarily stored. The transport route continues on the road Vinci - Usije, after which it intersects with the state road IB row number 34, then continues through the settlement Radoševac. The road continues until it intersects with the state road IIB row number 376 Golubac-Maleševo. The transport route is divided from this point into two directions:

- The first transport route is according to the groups of wind generators located at the locations "Golo brdo", "Venac" and "Debelo brdo".

- the second transport route follows the route of the municipal road (state road IIB row number 376), to the intersection with the municipal road leading to the settlement of Snegotin; Below is the transport route, which partly follows the newly planned route, and partly follows the route of the existing uncategorized road and leads to the subzone at the location "Tilva".

Access roads will provide access to the wind farm area and between certain groups of wind turbines and use mostly existing routes, which are being reconstructed, while service roads, which belong to the category of construction land for public purposes, connect individual wind turbine locations within urban subzones "Venac" Tilva ”and“ Debelo Brdo ”. There are also internal roads, which belong to the category of construction land for other purposes, which are connected to the service roads and are located within the construction site / plateau.

3.4. Display of the type and amount of required energy, water, raw materials, required material for the subject technology

The realization of the planned project, ie the construction of the wind power plant "Krivača" on the territory of the municipalities of Golubac and Kučevo, does not require special use of natural renewable and non-renewable (difficult to renew) resources.

The regular work of the Project will use the potential of wind to obtain electricity, so that regular work does not lead to the consumption of resources and energy. The main goal of the wind turbine is to convert the kinetic energy of the wind into mechanical energy, and then into the next transformation into electrical energy, so the most important parameter is the amount of useful wind energy in the area.

Realization of the wind power plant implies temporary and permanent occupation of the land, for: formation of a plateau with earthworks, which will be dimensioned in accordance with the technological needs of the installation of wind generators; construction of the foundations of wind turbine poles, storage of wind turbine surface parts; mechanized parking lots; rotor blade mounting space; manipulative space for installation work; transformer station, administrative building and accompanying facilities; road infrastructure. During the realization of the Project, mechanization will be hired to perform construction works, which will use petroleum products as fuel. Based on the analysis of site characteristics and the characteristics of the planned Project, analysis of the projected scope of works, their local character and limited duration, it was estimated that the use and consumption of fuels does not significantly affect the consumption of petroleum products as non-renewable resources.

The project will contribute to the improvement of electricity supply and the reduction of losses in the electricity network in the subject area, and from the aspect of energy consumption it is a positive aspect.

Based on the above, it can be concluded that the planned Project does not have extremely significant requirements for the use and consumption of natural resources and energy, and from that aspect is environmentally friendly and energy sustainable. All planned works, while respecting the measures and conditions of the holder of public authorizations and measures and conditions of environmental and social protection, are environmentally and economically acceptable and do not represent a factor endangering the environment and health of the local population.

3.5. Display of type and quantity of air pollutants, wastewater, liquid waste materials, solid waste, noise and vibration emissions

In the process of environmental impact assessment, it is necessary to consider all aspects of the impact of the Project in question. Special attention must be paid to the generation of waste both in the phase of realization and in the phase of its exploitation, ie regular operation of the wind farm.

The greatest impact on the environment can be expected during the implementation of the Project, when the environment suffers from negative impacts of local and time-limited nature. The presence of mechanization, construction waste and disorder of the location in the realization phase is a form of visual degradation. However, given the planned scope and duration of works, number of means of work, these negative impacts will not cause significant and lasting consequences for the environment - all negative impacts cease upon completion of works without the likelihood of recurrence, and landscape significantly improves visual qualities.

3.5.1. Emissions in the air

Emissions into the air can be expected in the phase of construction of wind power plants and supporting infrastructure (access roads) as a result of the work of engaged machinery and the increased number of vehicles at the location and routes of road infrastructure. Since modern vehicles and machines will be used, with engines that have a very high degree of oxidation during fuel combustion, the amount of harmful substances released by fuel combustion into the

atmosphere cannot lead to a significant increase in pollutant concentrations at the location and environment. The intensity and spatial dispersion of pollutants will be limited in time and space - to the subject location and the route of the road network and will cease upon completion of works. In this regard, no ELV overruns are expected during and during the execution of works on the implementation of the planned Project.

Regular work of the Project, ie the use of wind energy in the production of electricity does not lead to emissions into the air.

3.5.2. Wastewater generation

During the regular activities of the wind farm, wastewater will be generated, as follows:

- *sanitary-fecal wastewater* - since no sewerage network has been built in the area, sanitary wastewater from the facilities will be conducted through the internal sewerage system to a watertight septic tank or a lower-capacity WWTP*;*
- *Sanitary and fecal* wastewater that will be generated on the construction site in the phase of project implementation, must be solved by installing mobile toilets (cabins). The company that rents these toilets will be obliged to empty them. So, water from the toilet cubicles will not be released into the environment*.*
- *potentially oily wastewater* from the manipulative surfaces of the Transformation Complex "WF Krivača" and PRP and surface washing water will be discharged through an internal sewerage network, through gutters and canals, to the grease and oil separator, after which the treated water will be poured into the final recipient (road ditch, surrounding area). Oil pits have been designed for both facilities to collect potentially leaked transformer oil and oily water. Oil pits must have an oil separator*.*
- *atmospheric water* from the roofs of buildings and manipulative plateaus of wind turbines will be channeled by peripheral open drainage channels and will infiltrate the surrounding land.

For the planned Project, the conditions of wastewater and waste management are defined, through the conditions of the competent public utility companies as holders of public authorizations. With strict observance of the same, as well as legal regulations and projected measures, conditions are created for control and management, ie prevention of environmental pollution. With the realized and realized measures, it can be concluded that the planned Project is environmentally friendly for the location and the subject zone..

3.5.3. Waste generation

Waste management at the site of the planned Project must be established and monitored at all stages of implementation, regular operation as well as in case of accidents. During the realization and operation of the planned wind farm, different categories and types of solid waste will be generated. An overview of the types of non-hazardous and hazardous waste that can be found at the location of the international passenger port is shown in Table 29.

Table no. 29: *Name and designations of waste based on the Waste Catalog available at the wind farm site*

Index number	Name of waste
13	**Wastes from oils and residues of liquid fuels (excluding edible oils and those of Chapters 05, 12 and 19)**
13 01	waste hydraulic oils
13 02	waste motor oils, transmission oils and lubricants
15	**Packaging waste, absorbents, wipes, filter materials and protective fabrics, unless otherwise specified**

15 01	packaging (including specially collected packaging in municipal waste)
15 01 01	paper and cardboard packaging
15 01 02	plastic wrapping
15 01 10*	packaging that contains residues of hazardous substances or is contaminated with hazardous substances
15 02	absorbents, filter materials, wipes and protective clothing
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wipes, protective clothing, contaminated with hazardous substances
15 02 03	absorbents, filter materials, wipes and protective clothing other than those mentioned in 15 02 02
17	**Construction and demolition wastes (including excavated earth from contaminated sites)**
17 01	concrete, brick, tile and ceramics
17 01 01	concrete
17 04	metals (including their alloys)
17 04 05	iron and steel
17 04 10*	cables containing oil, coal tar and other hazardous substances
17 04 11	cables other than those mentioned in 17 04 10
17 05	soil (including soil excavated from contaminated location), stone and excavation
17 05 04	soil and stone other than those mentioned in 17 05 03
17 09	other construction and demolition wastes
20	**Municipal wastes (household wastes and similar commercial and industrial wastes), including separately collected fractions**
20 01	separately collected fractions (except 15 01)
20 03	other municipal waste

Based on the Waste Catalog (Rulebook on categories, testing and classification of waste, "Official Gazette of RS", No. 56/10)

* - hazardous waste label

3.5.4. Noise and vibration emission

In the regular operation of the wind generator, noise is emitted from two sources: aerodynamic (due to the movement of the propeller through the air) and mechanical (due to the operation of mechanical elements in the housing - generators, multipliers).

Aerodynamic noise is a function of several interdependent factors, including propeller design, rotational speed, wind speed, and turbulence of incoming air that can produce specific sound. Mechanical noise from wind farms is tonal in nature.

Advances in technology and design have led to a reduction in the noise emitted. Aerodynamic improvements that are combined with each other to make wind farms quieter include switching from lattice to tubular poles, variable speed operation, and switching to three-legged models. Improvements in multiplier design and the use of anti-vibration techniques result in a significant reduction in mechanical noise.

With modern wind turbines, the use of "optispeed" generators has achieved a constant angular velocity of the wind turbine (typically 16 rpm) in a wide range of wind speeds, so one of the consequences is a significant reduction in noise and vibration levels. The volume emitted by the wind generator at a wind speed of 10 m / s is between 105-106 dBA. In addition to the power and dimensions of the wind generator, a particularly important aspect of considering the intensity of noise is the spatial aspect. The noise caused by the wind turbine decreases with increasing distance from the wind turbine. The Project Proponent, during the determination of the number and disposition of wind turbines, performed preliminary noise modeling. The model found that noise levels from wind turbines are significantly below the legally prescribed levels. For that reason, the planned disposition of the wind generator is very favorable.

During the construction phase of the wind farm, increased noise levels can be expected due to the operation of construction equipment and heavy machinery. The intensity and spatial dispersion of noise will be limited to the subject location, the network of road corridors, but it is also limited in time.

3.5.5. Emission of electromagnetic radiation, light and heat

Like all electrical equipment - wind generators and accompanying equipment (substation) and power facilities emit electromagnetic radiation, as a type of non-ionizing radiation. There are no domestic regulations that define the permissible intensities of the electric and magnetic fields to which people can be exposed for a long time. Therefore, they are accepted as authoritative criteria of the World Health Organization (permissible electric field strength is 5 kWeff / m, and permissible magnetic field strength is 100 μT). In the area of the planned Project and near the substation, there are no residential buildings, ie receptors that could be affected by electric and magnetic fields.

Heat and light emissions are not characteristic of the planned Project.

3.6. Presentation of the technology of treatment of all types of waste materials that will be generated in the subject Project

Waste and waste materials will not be treated at the wind farm site, but all types of waste materials and waste will be temporarily stored, according to the conditions of the competent public utility company, and evacuated from the site or through operators with appropriate waste management permits. obligatory accompanying documentation - Document on waste movement.

Construction waste - in the phase of realization of the wind power plant, construction waste will be generated in the form of surplus land from excavation and construction debris, which must be treated in accordance with legal regulations and conditions of the competent utility company. The generated construction waste must be evacuated from the location, according to the conditions of the competent utility company, ie the authorized operator who has a waste management permit, and in accordance with the Decision of the local self-government body on determining the location for construction waste disposal. Most of the excavated material will be used, so it is not expected that large amounts of surplus land will be generated as a result of earthworks and construction works. Materials that are installed, such as concrete, are produced at another location and delivered in the required quantity.

Municipal waste - waste generated by employees on the construction site will be collected in containers and emptied according to the established dynamics, through an authorized utility company.

Recyclable waste - which can be recycled (PET packaging, paper, cardboard) will be collected on site and then handed over with the records to the competent PUC or the operator who has a permit for waste management, for further action.

Waste (sludge) from cleaning the separator-precipitator of grease and oil, which will be generated occasionally on site, is hazardous waste. The treatment of this type of waste must be in accordance with the provisions of the Rulebook on the manner of storage, packaging and labeling of hazardous waste ("Official Gazette of RS" No. 92/10). The obligation of the Project Proponent is to entrust the cleaning to an authorized operator who has a Hazardous Waste Management License, and who will also take over the generated hazardous waste, which is in accordance with the Law on Waste Management ("Official Gazette of RS", No. 36/09). 88/10, 14/16 and 95/18 (other law)), with the obligatory completed Document on the movement of hazardous waste.

Hazardous waste - may occur due to maintenance of wind turbines, and represents oils, oily cloths, parts of electronic and electrical equipment ... All waste generated on that occasion must be adequately stored until handed over to authorized operators who have a permit to manage hazardous waste for further treatment. Waste machine and hydraulic oils must be collected separately in watertight containers with original lids during repair and maintenance. It is considered that the operation of the components of one wind turbine requires an amount of about 450 liters of hydraulic oil. The oil in the components is changed every four years.

3.7. Presentation of the environmental impact of the adopted operation technology of the “Krivača“ wind farm

When assessing the possible significant impacts of the Project on the environment, it is necessary to identify and evaluate all short-term, local and reversible impacts, but also potentially long-term, irreversible, cumulative impacts on the environment and population health. Also, it is obligatory to assess possible synergetic impacts, long-term, as well as impacts with the probability of recurrence.

The greatest impact and pressure on the environment can be expected during the implementation of the Project, ie during the execution of preparatory and construction works, when the environment suffers negative impacts of local and time-limited nature. The works on the site require the engagement of mechanization, the work of which causes the emission of atmospheric pollutants, impulse noise and vibrations, dust and the generation of construction waste. In the case of forced labor, these types of pollution and environmental impact may, in the short term, lead to exceeding the limit values. The presence of mechanization, construction waste and untidy location in the phase of realization and execution of construction works, cause visual degradation of space, limited to the visible from the immediate environment. However, given the planned scope and duration of works, the number of means of work, these negative impacts will not cause significant and lasting consequences for the environment. All negative influences of the mentioned type and character cease after the completion of works, without the possibility of recurrence, and the landscape and urban-architectural solution of the complex significantly improves the visual qualities of the location, ie the associated ambient whole.

Air emissions can occur only in the implementation phase of the Project. Wind farms are not emitters of air pollution.

During regular operation, wind turbines make noise. The noise caused by the wind turbine decreases with increasing distance from the wind turbine. The Project Proponent, during the determination of the number and disposition of wind turbines, performed preliminary noise modeling. The model found that noise levels from wind turbines are significantly below the legally prescribed levels. For that reason, the planned disposition of the wind generator is very favorable and will not affect the state of the environment in the immediate and wider environment.

Accident situations, smaller in size and scale, are possible on the site during the previous works on arranging the location and during the implementation of the Project, accompanying contents and infrastructure, in case of hazardous spillage or accidental leakage of petroleum products from engaged mechanization and means of work. Such an accident requires urgent suspension of works, remediation and treatment of such generated waste (which has the character of hazardous waste) according to the provisions of the Ordinance on the manner of storage, packaging and labeling of hazardous waste ("Official Gazette of RS", No. 92/10). to the authorized operator who has a License for hazardous waste management for further action, along with the Document on the movement of hazardous waste. On the construction site, during the execution of works on the marked area, a container with sorbent (sand, zeolite) and a marked container (impermeable with a lid) must be placed to act in case of the specified accident.

In order to prevent, prevent, reduce, eliminate and minimize possible significant impacts on the environment, especially on birds, bats and environmental media (land, air, surface and groundwater), this Study prescribes measures to protect and monitor the environment environments, which must be planned and implemented in all phases of implementation and regular work of the Project, as well as in case of an emergency situation at the location or termination of the Project.

Realization of the Project of the wind farm "Krivača" will take place in compliance with the conditions and consent of the holder of public authorizations, according to the project documentation and in compliance with norms and standards of the subject activity, legal regulations, mandatory supervision and implementation of projected protection measures. and a small impact on the environment.

3.8. Activities in case of termination of the Project

It is assumed that the working life of a wind farm is about 30 years. After that period, the Project Holder is obliged to assess whether the wind farm can still be used or must be removed or only to replace individual turbines. Removal involves dismantling the complete installed equipment.

It is necessary to envisage the removal or other type of use of the substation TS "Krivača" 35/10 kV power facilities.

The Project Holder undertakes, after the expiration of the expected life of each wind turbine or wind farm in its entirety, ie the cessation of their use, to dismantle all wind turbines. The advantage of wind farms is that after their removal there are practically no traces of space use. Of course, if there is a need to continue the production of electricity from wind energy, new permits will be obtained. Also, if it proves cost-effective to replace the existing wind turbines with new ones after a certain time, the necessary permits will be obtained. In the event of a breakdown of one or more wind turbines, they will be replaced or completely removed as soon as possible, and in the meantime, all necessary safety and environmental measures will be taken.

Prior to the removal of the wind farm, the Project Proponent is obliged to obtain a permit for the removal of facilities, all in accordance with the Law on Planning and Construction ("Official Gazette of RS", No. 72/09, 81/09, 64/10-US Decision and 24/11 and 121/12, 42/13-decision CC, 50/13-decision CC, 98/13-decision CC, 132/14, 145/14, 83/18, 31/19 and 37/19 ((other law)).For obtaining a permit, the Project Holder is obliged to prepare and submit the Main Project for the removal of the facility, as well as the necessary conditions and consents of the competent institutions in the field of environmental protection and nature protection. issue an approval for the removal of the facility and supervise the implementation of this project when the dismantling and removal of equipment and installations begins. Time required to remove the plant It is between 1.5 and 2 years old, and in addition to dismantling the equipment, it also includes the rehabilitation of the land that was used during the work. Works on the removal of equipment and infrastructure will be performed by engaged contractors. For the planned works, it is necessary to form a central warehouse, as well as during the execution of works.

The project of removing the wind power plant needs to include all parameters and environmental protection measures that would minimize possible negative impacts on environmental media during the dismantling of the installed equipment. An accredited company needs to be hired to remove the equipment and infrastructure. The greatest impact on the environment can be expected when removing the concrete foundations of wind turbines.

Excavation of concrete foundations should be at least 1 m deep, because it is believed that this will be enough for further uninterrupted continuation of agricultural activities. It is necessary that the entire land that was occupied be revitalized and recultivated and returned to its original purpose.

When dismantling and removing the wind farm, pay special attention to the collection of machine oils that are removed from the disassembled assemblies and thermal insulation oils from the transformer. All oils must be collected separately in airtight packaging. When unloading and disassembling assemblies and equipment, technically provide a way to collect oil so that it does not spill on the ground. It is necessary to record all collected quantities of oil. Evacuate oils immediately from the site by handing them over to an authorized operator who holds a Hazardous Waste Management Permit.

All waste generated in the process of dismantling facilities must be adequately removed from the site in accordance with the provisions of the Law on Waste Management "Official Gazette of RS" No. 36/09, 88/10, 14/16 and 95/18 (other law)).

4.0. Alternatives considered by the Project Holder

The possibility of alternative solutions in the choice of location, construction and facilities are the basic postulates in the function of environmental protection. Also, during the analysis of conditions and determination of environmental protection measures through impact assessment, all potential limitations and possible conflicts in the space brought by the Project and location as well as mutual relations of the Project and the state of the environment before the Project construction were considered.

4.1. Alternatives about site selection

Alternatives in the choice of location for the construction of the wind farm "Krivača" were considered through the preparation of higher order documentation:

- Spatial Plan of the Municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 3/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Golubac, whose provisions provide the possibility of using wind as a renewable energy source in the planned project;
- The Spatial Plan of the Municipality of Kučevo ("Official Gazette of the Municipality of Kučevo", No. 4/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Kučevo, also provides the possibility of using wind as a renewable energy source;
- The first amendment to the Detailed Regulation Plan of the area of the wind farm "Krivača" in the municipality of Golubac,
- First amendment to the Detailed Regulation Plan of the area of the wind farm "Krivača" in the municipality of Kučevo.

At the very beginning, research was performed - measurements and analyzes of wind energy potential in this area in order to determine the possibility of realization of the wind farm:

- Wind Resource and Energy Yield Assessment Wind farm Krivača, Fractal, Januar 2014;
- Assessment of the meteorological site conditions of the proposed Krivača wind farm in Serbia, Garrad Hassan, 01.08.2014.;
- Krivača Wind Farm – Wind Resource Assessment and Annual Energy Production Estimate, Megajoule, December 2019.

Based on measurements of wind potential at the location Golo brdo (municipality of Golubac), which were performed from 30.10.2009, as well as at the location Debelo brdo (municipality of Kučevo), which were carried out from 18.09.2009, data on wind energy potential were obtained, based on which the positions of wind generators were selected and defined.

At the beginning of the planning process, the Project Leader had alternative options in terms of wind farm configuration and spatial layout of wind turbines. That is, according to the original Preliminary Design, it is planned to install 41 wind turbines with a certain spatial layout and total installed capacity of 96.4 MW, amendments to the Detailed Regulation Plans planned 38 positions of wind turbines, while the current Preliminary Design plans to install 22 wind turbines. The positions of wind turbines have not been changed, in the window on the positions foreseen by the Amendments to the detailed regulation plans, but only the number of wind turbines has been reduced.

The basic criteria for choosing the location where the "Krivača" wind farm will be realized were:

- wind potential,
- availability of space,
- possibility of access to each unit of wind turbine and
- as little impact on the environment as possible.

The spatial unit - the location of the wind farm in the municipalities of Golubac and Kucevo, was assessed as very favorable for the construction of the wind farm, in addition to favorable directions, speed and constancy of wind and due to the nature of the land and favorable existing infrastructure. When choosing the location for the construction of the wind farm "Krivača", given the above criteria, the Project Holder, the company "IVICOM ENERGY" DOO from Žagubica, decided on the location and for the following reasons:

- wind characteristics in the subject area are favorable from the aspect of realization and regular work of the Project,
- the spatial capacity of the subject location is satisfactory for the safe performance of the subject activity,
- the subject area is at a significant distance from residential buildings and zones of higher housing density,
- there are no protected natural and cultural assets within the boundaries of the subject area,
- in the immediate vicinity there are no sources of water supply, terrains and areas for sports and recreation, tourist and excursion points and areas, public and other facilities and contents that could be endangered by the work of the Project,
- production of electricity from wind energy is suitable for energy supply of isolated, scattered remote settlements in remote villages and for direct connection to the electricity system,
- wind turbines can encourage the economic development of local communities,
- the area for the construction of the wind farm is planned on the basis of valid development documents, which were adopted at the assemblies of local governments (Spatial plan of the municipality of Golubac, Spatial plan of the municipality of Kučevo),

Based on the assessment of the current situation, the relationship between the Project and the environment, characteristics and capacity of the wind farm, spatial characteristics, it can be concluded that the choice of plant location is environmentally, economically and spatially justified, sustainable and acceptable, in strict compliance with , projected environmental protection measures and environmental monitoring measures, as well as the principles of sustainable development.

4.2. Alternative in the choice of production process and technology

Considering that this is a project whose main activity is obtaining electricity, the Project Holder decided to cross the renewable source, ie wind. Recently, the technical potential for the use of renewable energy sources is great and exceeds all already available sources. There are many factors for the commercialization of renewable energy sources in recent years, and some of them are climate change, increasing greenhouse gas emissions, declining fossil fuel reserves, and high fuel prices.

When the construction of the wind generator is finished, no pollutants or harmful gases are produced. Although wind turbines are very tall, they do not take up much space. This means that the land around the wind turbine can still be used. This is especially important for agricultural land, where land cultivation continues unhindered.

Wind energy is used by the wind passing through the blades of the wind turbine and rotating the base. The base is connected to a multiplier and a generator, which converts mechanical energy into electrical energy. The minimum wind speed that can cause electricity production is 3 m / s, and at this speed energy of about 20 kW is generated. At higher wind speeds, higher power energy is generated. The maximum operating wind speed is a speed of 25 m / s with an approach that the wind turbine automatically stops and keeps locked. At higher wind speeds, the wind turbine will remain locked for safety reasons (primarily due to damage to equipment and devices). The speed for switching on the wind generator again is 20 m / s.

The largest amount of electricity produced will be placed in the electricity transmission system. A certain amount of energy will be used for internal consumption of facilities at the site and for

the needs of wind turbines, in order to start the hydraulic system for braking the turbine rotor (in the case when the wind speed is higher than 25 m s).

4.3. Alternatives regarding working methods

The wind farm is a very simple process in terms of working methods. In this case, the entire process is automated, with remote monitoring, so there were no other alternatives.

4.4. Alternative site plans and project designs

The operation of the Project is planned on the basis of activities that are adapted to the physical conditions at the site and in accordance with the planning and project documentation, and such conditioned operation does not allow alternative solutions. The Project Holder has prepared a detailed regulation plan which has the basic goal of determining the rules of arrangement and construction, ie creating a planning basis for issuing appropriate permits for the construction of all necessary facilities of the wind farm "Krivača", in accordance with location conditions, existing and planned development interests of local communities. holder of public authority. It is also necessary to define the conditions under which it is possible to build a wind farm, taking into account the existing purpose of the area, as well as landscaping and protection in the immediate vicinity of these facilities, depending on the type of facility, and then pay special attention to environmental, natural and cultural assets.

The Project Holder, IVICOM ENERGY DOO from Žagubica, initiated the procedure of the first amendment to the basic planning document, the Plan of detailed regulation of the area of the wind farm "Krivača", sections on the territory of Golubac (Official Gazette of Golubac, No. 6/13) and the Plan detailed regulations of the area of the wind power plant "Krivača", section on the territory of the municipality of Kučevo, "Official Gazette of the Municipality of Kučevo", No. 6/13). The reason for that was the changes in the rules of construction of wind generators and the rules of parcelling.

The project of the wind farm "Krivača" is harmonized with the spatial planning and urban documentation:

- The Spatial Plan of the Municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 3/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Golubac, provides the possibility of using wind as a renewable energy source in the planned project;
- The Spatial Plan of the Municipality of Kučevo ("Official Gazette of the Municipality of Kučevo ", No. 4/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Kučevo, also gives the possibility of using wind as a renewable energy source;

The project documentation, ie the Conceptual Design with drafts for the subject Project was prepared by the company *Global Substation Solutions d.o.o.*, Belgrade.

4.5. Alternatives around the type and choice of wind turbine type

The Project Holder considered the following types of wind turbines:

Vestas V150/4,0 (4,2) MW

The technical characteristics are as follows:

- nominal power..... 4 – 4,2 MW
- number of propellers..... 3
- Rotor diameter.....150 m
- Height of the column (from the ground to the axle) .....105 m
- total height (from the ground to the top of the propeller) .....182 m

Nordex N149/4,8MW

The technical characteristics are as follows:

- nominal power.....4,8 MW
- number of propellers.....3
- Rotor diameter.....149 m
- Height of the column (from the ground to the axle).....105 m
- total height (from the ground to the top of the propeller).....179,5 m

Siemens Gamesa SG6.0-155

The technical characteristics are as follows:

- nominal power..... 5,8 MW
- number of propellers.....3
- Rotor diameter.....155 m
- Height of the column (from the ground to the axle).....122,5 m
- total height (from the ground to the top of the propeller).....200 m

The Project Holder, in this phase of the Project implementation, in addition to the listed alternative solutions when choosing the type of wind turbine, still decided on **Nordex N149 / 4.8MW**. Given that the implementation of the Project is still in various preparatory phases that are subject to change, the Project Holder retains the possibility of choosing another type of wind turbine with the corresponding configuration in the main design phase, not exceeding the total wind power of 103.32 MW installed power per wind turbine of 5.8 MW.

4.6. Functioning and cessation of functioning

All decisions on the functioning and termination of the Project in question are within the competence of the Project Holder and its founder.

In case of termination of work, the obligation of the Project Proponent is to arrange the location in accordance with the new planning basis and conditions of the competent institutions and holders of public authority. He is obliged to remove all installed equipment and devices, waste and waste materials from the location and to bring the location in question to a satisfactory condition in accordance with legal regulations.

4.7. Production volume

The subject of the environmental impact assessment is the project of the wind power plant "Krivača" in the municipalities of Golubac and Kučevo and is not subject to analysis and valorization in terms of possible alternatives regarding the volume of production.

4.8. Pollution control

In accordance with the characteristics of the Project, its position, control of all potential pollution is defined by applicable legislation and the content of the Impact Assessment Study is mandatory, ie pollution control measures, pollution prevention measures and measures to protect water, air, soil, noise protection, vibration, measures and action in case of an accident and the same is defined by the Study, without alternatives.

4.9. Waste disposal management

Management of waste that may occur at the Project site (municipal, recyclable, non-hazardous, hazardous) is prescribed by the Study, in accordance with the Law on Waste Management ("Official Gazette of RS", No. 36/09, 88/10 14/16 and 95/18 (other law)) and bylaws and alternative solutions are not allowed.

4.10. Alternatives around arranging access and traffic routes

In the project development phase, three variants of unloading and storage of wind generator parts for the needs of the construction of the wind farm "Krivača" were considered (Chapter 3.2.2.).

A variant has been chosen where the unloading and temporary storage of parts of the wind generator will be performed in the settlement of Usije. Wind turbines are brought to Romania to the port of Constanta, where they are temporarily unloaded and stored. In accordance with the construction schedule, parts of the wind turbine are transported along the Danube to the port of "Usije" (Golubac municipality), where they will be temporarily stored. Further, the transport route will be performed in two directions through the corridor of the state road IB row number 34 and through the sections of the state road IIA row number 163. The location of the wind farm itself will be accessible via the mentioned state roads.

4.11. Training course

Training of persons to work at a wind farm is strictly prescribed by law and is not subject to consideration of possible alternative solutions.

4.12. Monitoring

The specificity of the Project allows for alternative solutions in the monitoring process, but Chapter 9.0 defines environmental monitoring in accordance with the relevant legislation, and alternative solutions have not been taken into account.

4.13. Contingency plans

Contingency plans, in accordance with their competencies, are defined by the Law on Disaster Risk Reduction and Emergency Management ("Official Gazette of RS", No. 87/18). The Study prescribes the procedure in case of an environmental accident.

5.0. Overview of the state of the environment

An assessment of the state of the environment can be given on the basis of existing data on the state of the environmental medium at the location in question, the spatial unit and the zone to which it belongs. In case of non-existence of the database on the state of the environment, the assessment of the condition includes the analysis of all relevant factors on the basis of which the assessment can be given: natural characteristics of the location and spatial unit to which it belongs and created conditions on the location and environment. Also, as an important element in the assessment of the situation, especially in the absence of a database, is a detailed observation in the field and identification of sources of environmental pollution.

5.1. Population

The location of the planned wind farm "Krivača" is located in the municipality:

- Golubac (Braničevo, Ponikve, Usije, Radoševac, Golubac, Sladinac, Vojilovo, Maleševo, Dvorište, Krivača and Snegotin);
- Kucevo (Rakova Bara, Sevica, Turija, Kucevo 1, Popovac, Neresnica and Radenka);
- Veliko Gradište (Kusiće).

There are no residential buildings at the location where the realization of the wind power plant is planned. The nearest settlements, ie rural housing zones to the locations of the planned wind generators are Krivača, Dvorište, Golubac, Snegotin and Rakova Bara. Each settlement has a specific view in space. The settlements are mostly primary villages, except for Golubac, which is the municipal center. They are economically underdeveloped and in the primary rural settlements' agriculture is the dominant activity.

The realization of the planned Project - wind farm "Krivača" will not cause demographic changes, ie no significant changes are expected in the demographic structure of the area. The wind farm does not condition the displacement or immigration of the population. Works on construction (installation) of wind turbines, construction of accompanying facilities, on realization of accompanying infrastructure (reconstruction of existing, construction of new and temporary road infrastructure), construction of transmission line and cable network and other accompanying works are limited in time and space.

Realization and regular work of the Project will not cause changes in the purpose of the space in terms of demolition of residential buildings and displacement of the population. According to its function, the Project will not cause immigration or any permanent migratory movements of the local population, ie the realization of the Project has no impact on demographic trends and demographic changes of the wider spatial unit.

Also, no special influences and changes in the traditional values and habits of the local population are expected. On the other hand, the entire infrastructure will be significantly improved through further planned development.

5.2. State of flora and fauna

In the area of the planned wind farm "Krivača" and the locations planned for the installation of wind generators, there are arable land, meadows, pastures, surrounded by smaller or larger fragments and forest complexes. Typical animal species are represented in these habitats. As it is about wind power plants, special attention must be paid to the impact on ornithofauna and chiropterofauna.

5.2.1. Bird fauna

As detailed in Chapter 2.6. for the purposes of the Impact Assessment Study, extensive surveys of bird fauna in the study area were conducted in the period from January to December 2014, and occasionally in the period from 2015 to 2019. For the purposes of the research, it was necessary to determine which bird species are of special interest for the research area.

Target species are defined as species of special importance for protection, or as species that may be significantly endangered by wind turbines.

A total of 107 bird species were recorded in the study area. A total of 66 bird species have been recorded in the narrower area of research (Venac, Debelo Brdo, Tilva). Of the stated total number of recorded bird species, 66 species were marked as sensitive (target species). National and international protection status is given for all recorded species.

An estimate of nesting pairs in Serbia, an estimate of the number of nesting pairs and the study of some bird species in the wider area of Đerdap in the period 2010-2011 is also given. In Table no. 12. (Chapter 2.6.8) gives a list of birds recorded in the study area, their nesting statuses and international and national conservation statuses.

Of the total number of recorded species, 66 bird species were singled out as significant (target species). For the target species, based on their protection status, presence in the narrower area, sensitivity to wind farms, endangerment assessment is given.

Special attention is paid to the analysis of species that are most sensitive to wind turbines (species present in locations intended for wind turbines, predators and species that fly over the subject area during migration or in search of food, as well as species not endangered by collisions with wind turbines from habitat destruction and fragmentation). These are the following bird species:

- golden eagle *(Aquila chrysaetos),*
- white stork (*Ciconia ciconia),*
- greater white-fronted goose (*Anser albifrons),*
- common buzzard (*Buteo buteo),*
- common kestrel (*Falco tinnunculus),*
- Eurasian skylark (*Alauda arvensis),*
- hen harrier *(Circus cyaneus)*
- common quail *(Coturnix coturnix),*
- corn crake *(Crex crex).*

All these types can be considered as targets for monitoring the impact of wind farms in phases during and after construction.

5.2.2. Bat fauna

All species recorded in the study area are strictly protected under the Law on Nature Protection ("Official Gazette of RS", No. 36/09, 88/10, 91/10, 14/16 and 95/18 (other law)), ie the basis of the Rulebook on the Proclamation and Protection of Strictly Protected and Protected Wild Species of Plants, Animals and Fungi (Official Gazette of the RS, No. 5/10, 47/11, 32/16 and 98/16).

Three species of bats have been recorded in speleological objects in the investigated area: Greater horseshoe bat *(Rhinolophus ferrumequinum)*, Mediterranean horseshoe bat *(Rhinolophus euryale)*, Common bent-wing bat *(Miniopterus schreibersii)*.

The research of bats in speleological objects in the wider area of Đerdap in the period 2010-2011 (Grubač, Milovanović, Šekler, 2012), in the subject area, in addition to the listed species, recorded the Soprano pipistrelle *(Pipistrellus pygmaeus)* species.

The species of bats recorded in the study area are protected by international conventions:

- As strictly protected species in Annex 2 of the Berne Convention;
- They are in Annex 2 of the Bonn Convention on the Conservation of Migratory Species of Wild Animals.

This means that they are considered migratory species that are the subject of international agreements for their conservation and management of their populations.

5.3. State of land, water and air

5.3.1. Land state

Based on the basic geological map (BGM), it was concluded that in the planning area are mostly layered and bank limestones and massive and bank limestones. The terrain of the location is stable. There is no data on soil pollution, but based on insights into the field and environment, it can be concluded that there is no historical pollution at the site and that there are no special requirements for testing and quality control / soil pollution.

Soil quality tests have not been performed, as the Planned Project does not affect soil quality (no wastewater and waste production). The location of the Project is agricultural land that is mainly cultivated and forest land. Unprofessional and excessive use of mineral fertilizers and pesticides may result in a slightly higher concentration of soil pollutants, but exceeding the remediation values is unlikely.

The settlement of Krivača is not equipped with a sewage network, which indicates the existence of point pollution of the land with sanitary-fecal wastewater. Rural settlements are not included in the system of organized waste collection, so household waste is disposed of in wild landfills, mostly along hedges, in the morning by the roads.

In the process of environmental impact assessment, potential changes in the topology of the terrain, changes in the purpose and use of land were analyzed. Therefore, it is important to point out that at the subject location, and having in mind the planned Project, the preparation of the terrain for the wind farm facility will not significantly affect the change in the appearance of the terrain.

5.3.2. State of surface and groundwater

In the observed area, the dominant watercourse is the Danube River, as a navigable river of international importance, followed by the Pek River, the Tumanska River and several smaller tributaries. The implementation of planning solutions will not have an impact on the quality of surface watercourses given their distance and the characteristics of the Project and planned facilities.

Groundwater can be endangered in the construction phase in case of accidents (spillage and leakage of petroleum products) and in case of non-compliance with technological and communal discipline during the use of wind farms (leakage of transformer oil, sanitary-fecal wastewater).

The Study on geotechnical conditions for financing 32 wind turbines at the location of the Krivača wind farm (Faculty of Civil Engineering - Institute of Roads and Geotechnics, Belgrade) contains data after measuring groundwater levels in October 2014. Due to the high level of groundwater, water samples were taken from wells BT1-1, BT1-3, and BT1-7 to determine the aggressiveness of groundwater to concrete. The samples were analyzed in the hydrochemical laboratory of the Institute of Hydrogeology, Faculty of Mining and Geology in Belgrade.

Chemical analysis of the water sample from the exploration wells BT1-1, BT1-3 and BT1-7 showed that the tested samples are not aggressive to concrete. Reports on test results are given in Annex II - Laboratory Tests.

5.3.3. Air condition

The air quality in the observed area is not burdened with pollutants due to the absence of major pollutants, openness and ventilation of the space. The only source of pollutants and dust is traffic on local macadam roads that cross the area. Due to the low frequency of traffic, this impact is negligible.

The operation of the wind farm does not lead to emissions of pollutants into the atmosphere. Potential emissions may occur during the execution of works as a consequence of the operation of machinery.

5.4. Existing noise level

The impact of noise should be assessed in accordance with the nature and character of noise-sensitive locations as well as in accordance with legal acts in this area. In the case of a wind farm, a noise-sensitive location is considered to be any inhabited facility, hostel, health facility or church, and may include areas of particular scenic landscape or recreational area. The prescribed noise limits should also apply to areas used for recreation or activities for which a quiet environment is highly desirable. The prescribed noise limits should be applied to locations in the wider wind farm environment and should take into account turbine noise and background noise.

The Decree on Noise Indicators, Limit Values and Methods for Assessing Noise Indicators, Disturbance and Harmful Effects of Noise in the Environment (Official Gazette of the RS, No. 75/2010) prescribes environmental noise indicators, limit values, methods for assessing indicators noise, harassment and harmful effects of noise on human health. According to the mentioned Decree, the permitted noise level by purpose zones is given in Table No. 30.

Table no. 30: *Acoustic zoning of JUS space U J6.205. - Decree on noise indicators, limit values, methods for assessing noise indicators, harassment and harmful effects of noise in the environment*

Zone	Use of the space	Maximum permitted level of external noise in dB(A)	
		Day	At night
1.	Areas for rest and recreation, hospital zones and convalescent homes, cultural and historical sites, large parks	50	40
2.	Tourist areas, small and rural settlements, camps and school zones	50	45
3.	Purely residential areas	55	45
4.	Business - residential areas, commercial - residential areas and playgrounds	60	50
5.	City center, craft, trade, administrative zone with residents, zones along highways, main city roads	65	55
6.	Industrial, storage and service areas and transport terminals without residential buildings	At the border of this zone, the noise must not exceed the permitted levels in the zone in which it borders	

Zones in the direction of the wind (downwind) are most endangered by increased noise levels. At higher wind speeds, wind noise generally has the effect of masking wind farm noise. Good acoustic design and carefully considered turbine location prevents a significant increase in ambient noise levels in sensitive locations nearby.

Increased noise levels are mostly felt in areas that are in the direction of the dominant wind. Noise emission is directly dependent on wind speed and distance from the noise source. Noise emissions increase with the strength of the wind, which increases the background noise - the critical wind speed in terms of noise perception is 8 m / s. The sound power of modern wind turbines at a wind speed of 8 m / s is 98-102 dB.

With modern solutions in the selected reference example of the wind generator, good sound insulation of the gondola has been designed, which significantly alleviates mechanical noise, as well as the existence of serrations. The serrations consist of light gray glass fiber laminates, which are multi-serrated, between 0.3 and 0.7 m long, which are attached to the rear edge of the blades. There is still aerodynamic noise, which is created by turning the propellers, where, depending on the speed of the propeller tip, noise occurs in a wide range of sound waves. This is characterized by low frequency tones, with a frequency below 200 Hz, which can be unpleasant.

Wind turbines will be equipped with a blade rotation control system, which constantly monitors the angles of the rotor blades, so that the angle of the blades is always adjusted to the weather conditions, thus reducing noise levels during wind turbine operation.

Once the project is built and put into operation, it is necessary to perform noise monitoring, which will include measuring noise levels at wind turbine locations and in settlements.

5.5. Climatic factors in the analyzed area

The climate in the analyzed area is temperate-continental. Four seasons are expressed. Winters are harsh and summers are warm. A detailed overview of meteorological parameters and climatic characteristics is given in the Study, Chapter 2.5.

5.6. Buildings, immovable cultural property, archeological sites and ambient units

In the area of the wind power plant "Krivača", according to the conditions of the competent Institute, there are no protected cultural assets, archeological sites and ambient units.

However, the routes of the transmission line PRP "Krivača" - TS "Veliko Gradište" and PRP "Krivača" TS "Neresnica" pass through the territories known as archeological sites, as well as parts of the area that represents a potential archaeological site. The transmission line routes are the subject of a special environmental impact assessment procedure, which have been implemented and for which approvals have been obtained:

- Approval of the Study on Environmental Impact Assessment of the project - 110 kV transmission line corridor routed from PRP "Krivača" to 110/35 kV substation "Veliko Gradište" in the municipality of Golubac (CM Braničevo, CM Ponikve, CM Usije, CM Radoševac, CM Sladinac, CM Vojilovo, CM Maleševo, CM Dvorište, CM Krivača) and Veliko Gradište (CM Kusiće) - Decision no. 353-02-485 / 2016-16 of 13.17.2016, Ministry of Agriculture and Environmental Protection;

- Approval of the Study on Environmental Impact Assessment of the project - 110 kV transmission line corridor routed from PRP "Krivača" to substation 110/35 kV "Neresnica" in the municipality of Golubac (CM Krivača) Kučevo (CM Rakova bara, CM Ševica, CM Turija , CM Kučevo 1, CM Popovac, CM Neresnica) - Decision no. 353-02-486 / 2016-16 from 13.17.2016, Ministry of Agriculture and Environmental Protection.

5.7. Landscape characteristics

In the subject area where the realization of WF "Krivača" is planned, there are arable lands, meadows, pastures, surrounded by smaller or larger fragments and forest complexes. In the immediate vicinity of the locations provided for wind turbines, there is already a developed road network - rural roads that locals use during the year to perform agricultural work and other activities.

Therefore, the realization of the planned Project, in accordance with the project documentation, will be part of a wider landscape unit, landscaped in accordance with the conditions for the purpose.

5.8. Interrelationships of environmental factors

All short-term, local and reversible impacts must be analyzed and evaluated when assessing possible impacts. Also, it is obligatory to assess possible cumulative, synergetic impacts, long-term, irreversible, as well as impacts with the probability of recurrence.

Short-term, local impacts are expected in the area of the site during the works (preparatory to the site, construction of wind turbines and supporting infrastructure) and works on functional units (installation of wind turbines) and the occurrence of noise and impulse noise and vibration, emissions into the air (atmospheric pollutants), generating waste and wastewater.

During regular activities and operation of the wind farm, one of the biggest impacts is reflected in the impact on ornithofauna and chiropterofauna.

The operation of the wind turbine also emits noise. Advances in technology and design have led to a reduction in the noise emitted. In general, noise will not be a significant problem when the distance between the nearest wind farm and a facility is more than 500 meters, as is the case here.

Wind farms can have an impact on the surrounding population by casting shadows on residential buildings when the sun is low in the sky. This effect is known as shadow blinking (shadow effect) and is created when the propeller casts a shadow on the windows of houses, and the rotation of the propeller leads to the alternating formation and disappearance of the shadow. This effect is short-lived and occurs only in certain combined circumstances, when the sun shines and is at a low angle (at dawn or dusk) and the wind farm is located exactly between the sun and the object on which it casts a shadow and has enough wind to trigger propellers. For the above reason, it is very important to choose a location for the construction of wind farms. The "Krivača" wind power plant in question is located at a safe and sufficient distance from residential settlements and residential buildings, so that there will be no disturbing shadow effect on the surrounding population.

Electromagnetic heat, light and emanation of odors are not characteristic of the subject activity.

Based on the above, it can be concluded that the state of environmental factors is expected to be within the limits of environmental acceptability, and the implementation and regular work of the Project, while respecting and implementing measures to prevent, prevent, eliminate and minimize potential negative impacts, will not endanger and disruption of the capacity of the environment at the location and spatial unit to which the wind farm belongs.

6.0. Description of possible significant impacts of the Project on the environment and human health

Based on the previously presented analysis of the characteristics of the location and environment, identification of pollution sources, assessment of the existing state of the environment, characteristics and specifics of the Project, possible negative impacts on the environment can be predicted and assessed. Possible changes and impacts on the environment, ie its endangerment by the Project in question - wind farms, need to be considered from several aspects:

- possible and expected significant impacts during the implementation of the Project;
- possible and expected significant impacts during the regular operation of the Project;
- potential impacts in the event of an accident at the Project site;
- impact in the event of termination of the Project.

The use of wind energy has little impact on the environment compared to the much more serious effects of conventional electricity generation that affect climate change and disturb the natural balance. Wind energy does not create harmful emissions or hazardous waste, does not deplete natural resources, is not a cause of environmental damage due to the use of resources, transport or waste management.

Wind turbines (wind turbines) occupy less than 1% of the land area. Once they are built and put into operation, existing activities, such as agriculture, or grazing livestock, can continue to run smoothly around them. Impacts on the natural habitats of birds and other flora and fauna depend on the specifics of the site itself. Also, wind farms can have an impact on the surrounding population, so it is necessary to avoid placing them near settlements.

This chapter will describe the impacts on individual environmental factors that may be affected by the implementation and regular operation of the WF "Krivača". Impact assessments were performed in accordance with the legislation of the Republic of Serbia in the field of environmental protection and other laws and bylaws, which are listed within Chapter 1.2.

The Impact Assessment Study considers possible impacts and changes in the environment by the Project in question - activities and activities at the location and environment. Along with the records of deficiencies in the environmental protection system, measures are proposed to be implemented in order to minimize negative impacts, ie to reach the standards and requirements prescribed by the legislation of the Republic of Serbia, Directive 2001/77 / EC on the promotion of electricity from renewable energy sources. assessment of the impact of wind farms on the environment (UNDP, Ministry of Environment and Spatial Planning of the Republic of Serbia).

6.1. Possible harmful effects on the environment during the arrangement of the location, preparatory works, works on the construction of facilities and accompanying content

The greatest impact on the environment can be expected during the implementation of the Project, when the environment suffers negative impacts of a limited nature, spatially and temporally. During the realization of the wind farm, ie during the installation of oversized parts of the wind generator, there may be some impact on environmental factors, so it is necessary to adhere to environmental protection measures to minimize possible negative impacts and reduce the legal limits. The impact of the construction of wind farms on habitats will directly depend on rationality and precaution during technical works on laying the foundations for wind generators, ancillary facilities, adjustment of roads and transport lines.

Negative impacts, however, are the inevitability of any anthropogenic activity and construction in space. Negative impacts on the quality of the environment are most pronounced in the phase of realization of planning solutions, ie earthworks and construction works. These negative

impacts are reflected in the occupation of areas under productive land and the disturbance of habitats in locations planned for the construction of plateaus and the installation of wind turbines and on the routes of roads and transmission lines. Earthworks and construction works negatively affect the air quality due to the emission from the process of combustion of motor fuel of the engaged mechanization and dust due to the manipulation of soil and construction materials. The Project Holder is obliged to collect and remove construction waste from the site in an organized manner in accordance with the conditions of the competent utility company. All the mentioned influences are local and limited in time, with no probability of recurrence after the completion of the works.

The impacts of the area of WF "Krivača" were analyzed on the relation: sources of impact - impacts - effects and consequences.

The sources of impact, which belong to the subject Project, on the quality of the environment can be different and are shown in the following table.

Table no. 31: *Possible sources of impact taken into account when assessing environmental impact*

Serial number	Sources of impact
1.	Installation of 22 wind turbines, total power 103, 32 MW.
2.	Construction of new and reconstruction of existing roads and internal - service roads. Estimated length of all roads 49,243.00 m
3.	Formation of 22 plateaus measuring 25m x 25m, for locating wind turbines, facilities in the function of maintaining the wind farm, open plateaus for storing equipment and parking equipment
4.	Construction of a well or installation of a reservoir for the needs of water supply
5.	Construction of watertight septic tanks or mini wastewater treatment plants; Construction of a watertight oil pit.

As this phase envisages the realization of 22 pillars of wind generators, the impact on the land will be greatly reduced, compared to the original idea when the realization of 38 pillars was planned.

6.1.1. Impact on habitats, flora and fauna

6.1.1.1. Impact on protected areas of nature

Area within the scope of the Detailed Regulation Plan for the realization of the wind power plant "Krivača", according to the Conditions of the Institute for Nature Protection of Serbia 03 no. 019-4/5 from 18.03.2020. is not located within the protected area for which the protection procedure has been conducted or initiated. Based on the Spatial Plan of the Đerdap National Park area, which was adopted in May 2013, there is no so-called "buffer" zone, which existed in the previous spatial plan. The distance of the last pillar - the border of the park "Đerdap", is: on Venac-212 m, on Debelo Brdo-147 m. Đerdap National Park is characterized by a great wealth of wildlife, primarily due to the preservation of various habitats that provide good conditions for the survival of a large number of animal species. The following habitats are especially important in the Đerdap National Park: water, ie the Danube with tributaries, preserved forest habitats, primarily large forest complexes that are a prerequisite for the diversity of wildlife in them, meadows, gorges and canyons. In these preserved habitats, the fauna of vertebrates stands out, which includes: mammals, birds, reptiles, amphibians and fish. During the construction works, heavy machinery and vehicles will not pass through the Đerdap National Park.

The distance of the project location from the protected area is large enough that there is no possibility of disturbance or loss of protected habitats during the construction of the wind farm.

6.1.1.2. Impact on habitats

The impact on the natural heritage in the subject and wider area (habitats and sensitive bird species) is possible in the phase of construction and regular operation of the wind farm. Impacts can be temporary or permanent.

During the construction phase of the wind generator, habitat reduction will inevitably occur, primarily through the expansion of existing and construction of new access roads. These are mostly habitats: meadows, rough grazings. These habitats primarily use the following target bird species: Common quail Coturnix coturnix and the Corn crake Crex crex. These bird species will certainly be affected by the expansion of existing and construction of new access roads. This refers to the habitat they use for their life activities. Given that similar habitats exist in the narrower and wider area, no major negative impact on birds is expected during the construction of wind turbines.

Also, habitats in this area are under constant human influence. These impacts are primarily constant or occasional harassment of birds present in the area. The harassment is a consequence of the activities of the locals on arable land, meadows and forests (which are privately owned). The type of bird harassment is certainly the activities of hunters in the subject area. In accordance with the above, the increased activity by humans during the construction and operation of wind turbines will not significantly affect the birds present in the area.

6.1.1.3. Impact on terrestrial mammals and reptiles

Although the existing habitats at the site are not of high quality, the possibility that certain species of mammals belonging to legally protected species are present cannot be ruled out. The regulations of the Republic of Serbia prohibit the capture or destruction of these animals or the undertaking of any actions that may endanger protected species and their habitats.

If the grassland along the roads is degraded during the works, it can affect the mammals present. For this reason, it is necessary that the construction works be performed in a way that does not pose a risk of endangering and destroying legally protected animals.

The present fauna of reptiles is typical for agricultural habitats and has negligible ecological value. During construction, the peripheral grasslands and ruderal habitats commonly inhabited by reptiles could be lost or degraded. Eventual losses will be offset by the emergence of new peripheral grassland habitats to be formed along the new access roads. Therefore, the impact on reptiles is considered temporary, unlikely and insignificant.

6.1.1.4. Impact on bat fauna

Four species of bats have been recorded in speleological objects in the study area: Greater horseshoe bat *(Rhinolophus ferrumequinum)*, Mediterranean horseshoe bat *(Rhinolophus euryale)*, Common bent-wing bat *(Miniopterus schreibersii)* and Soprano pipistrelle (*Pipistrellus pygmaeus)*.

Execution of construction works can affect bats in case of damage or endangerment of their schools (heavy mechanization) or disturbance of active bats (construction works). The influence of noise originating from the engaged mechanization is mainly related to the analysis of hunting activity and orientation.

Due to the distance of the shelter from the nearest zone of construction works, it is unlikely that bats will be disturbed in their shelters.

Certain parts of the subject area have a medium to high value as hunting territories. In these parts, bats that go hunting or flying will be able to feel the effects of noise, vibration and lighting. Certain species, such as Greater horseshoe bat (*Rhinolophus ferrumequinum*), are known to actively avoid lighted areas.

Based on a comprehensive analysis, it can be assumed that construction activities will be performed simultaneously in a limited number of locations and that the works will mostly be performed during the day when the bats are not active. Therefore, the influence of noise, lighting and vibration will be limited only to certain zones of the subject area. This will allow the bats to continue searching for food and fly over most of the site where construction is not in progress. These impacts will be temporary and not considered significant.

6.1.1.5. Impact on bird fauna

The realization of the wind power plant "Krivača" implies the presence of heavy machinery and a large number of people on the site, earthworks, concrete and installation works, which results in noise, exhaust emissions and dust. Due to these phenomena, it is expected that a number of songbirds nesting in this area will be expelled and will, in order to move away from construction sites and other sources of disturbance, put pressure on the rest of the population and increase competition for resources. food, shelter, etc.). This somewhat reduces the vitality and productivity of the population, but it is expected that this phenomenon will be transient due to the limited duration of work and without a significant impact on changes in the overall size of the population.

Bright lights are known to attract and disorient birds, disrupting flight paths. One of the aspects they could show is that the migration of birds is disturbed near high-intensity light installations. When performing construction work at night, there may be a negative impact on the bird fauna, so care must be taken to keep night work to a minimum and to use appropriate light bulbs for site lighting to minimize the negative impact. .

The consequences of temporary disturbance of predators during the works will be mitigated by the fact that endangered individuals will use the same habitats in the vicinity. These are well-moving species that can actively avoid contact with machinery. Construction work could lead to harassment of individuals in search during the reproductive period, during migration. Due to the presence of alternative habitats, construction works are not expected to have a negative impact on the success of pairs during reproduction and on the survival rate of individuals of species registered in this area.

6.1.2. Impact on landscape appearance

6.1.2.1. Methodology

The methodology for assessing the impact on the appearance of the landscape is based on the consideration of all significant visual as well as cumulative impacts. The existing appearance of the landscape in the analyzed area and its sensitivity to the wind farm were taken into account.

The impact on the appearance of the landscape can be direct and indirect, but also the overall, general impact. It is necessary to identify visual receptors and their sensitivity, and of course to determine measures for their mitigation.

6.1.2.2. Spatial scope of assessment

The subject area is determined by visiting the location where possible receptors and zones that may be exposed to the greatest impact are considered.

6.1.2.3. Impact on landscape appearance during construction

In order to provide the necessary areas for the realization of the wind farm, ie for the installation of wind generators, installation of underground cables and other necessary works, it will be necessary to remove part of the vegetation that will affect the appearance of the landscape. This impact is temporary and transient. Due to the fact that the foundations of wind turbines will occupy small areas, the impact on vegetation and surface land will occur in only a small and limited area.

The presence of a large number of construction machines, excavations for foundations, excess earth and construction material will have a far greater impact on the appearance of the landscape, which will cause the visual degradation of the landscape. This influence is also temporary and ends after the realization of the project.

6.1.2.4. Impact on the character of the landscape

During the construction phase of the wind farm, the character of the landscape may change due to the increase in "urbanization" that accompanies construction works (movement of cranes for wind turbines, trucks, other construction machines, increased presence of people ...) in a quiet rural area. Given that these changes will occur only over a short period of time, the overall impact will be moderately negative.

6.1.2.5. Impact on land use

The works on the realization of the wind power plant and the accompanying infrastructure will have the greatest impact on the surface layer of the land due to digging the foundations of the wind generator, construction of access roads, storage of excavation materials for laying underground cables for electricity transmission.

These impacts are temporary and cease upon completion of the works. It should be noted that the wind farm construction project involves the occupation of a small area of land given that the foundations are small and that the area under the wind turbine can be used for agricultural production.

Figure no. 82: *Debelo Brdo - landscape appearance without and with wind turbines*

6*.1.2.6. Visual impact on protected areas*

Even in the phase of site selection and Preliminary design, designers must take into account the potential visual impact of the wind farm on the present protected areas. The location where the realization of the wind power plant "Krivača" is planned in its current state is an undeveloped area where there are meadows and arable land surrounded by smaller or larger fragments of forest, as well as rural settlements in the municipalities of Golubac and Kučevo. Also, the future wind farm is located at a safe distance from the border of the " Đerdap " National Park.

Having this in mind, it can be said that performing works on the location of the wind power plant will not lead to a visual impact on this protected area. The Đerdap gorge will not be directly affected by the construction activities that will take place in the project implementation phase.

6.1.3. Impact on traffic and transport routes

For the needs of realization and work of the wind power plant "Krivača", it is necessary to build access and service roads for access to the wind power plant and each individual wind generator. A total of 30,896 m of access roads and 18,499 m of service roads need to be built.

The greatest impact on traffic and transport routes by the Project in question will certainly occur in the implementation phase of the Project, due to the transport of slow vehicles with large parts of wind turbines. Also, due to the delivery of construction materials to the location, the traffic on this part of the road will be increased.

The most significant impact of transport is the movement of vehicles for the transport of oversized parts. With their low speed, conveyors significantly slow down traffic and lead to congestion. Due to their large dimensions, it is difficult to overtake and pass them. Routes that have the necessary turning radii must be selected, and when driving, intensive care must be taken of parked vehicles and traffic infrastructure facilities that may be inadvertently damaged. The specified transport must be performed under escort. Most of the parts that are installed in wind generators, despite their large dimensions, are light in weight, so no negative impact on the condition of the road surface is expected. The delivery of construction materials is done by transport mechanization with a carrying capacity of up to 20 t. During the duration of the works, the traffic of heavy transport machinery will be intensified, which will also cause a slowdown in the traffic on the specified section of the road.

Upon completion of the works, the negative impact on the flow of traffic ceases. The project is being implemented in phases, so that the negative impact is broken down into three shorter phases. Also, it is planned that the transport will not be done during rush hour.

6.1.3.1. Impact on the Port of Usije

From the port of Constanta in Romania, parts of the wind turbine will be transported along the Danube, in accordance with the schedule for the construction of the wind farm, to the port of "Usije" (Golubac municipality), where they will be temporarily stored. It is not expected that the presence of mobile cranes could interfere with normal activities in the port of "Usje".

6.1.3.2. Impact on the state road network

Impacts on the state road network could occur during the passage of trucks with parts of wind turbines. The biggest impact would be on the roads through the settlements. The impact is short-lived and ends after the transport is completed. Transport activities for construction purposes will not have a significant impact on regular traffic on the state road network, provided that the "rush hour" period is avoided.

6.1.3.3. Impact on local roads

Local roads could be affected to some extent by traffic disruptions, but in general, traffic disruptions are not expected to be significant as long as adequate management of this activity is ensured. The estimated impact is of low importance with the possibility of becoming moderately significant if appropriate management plans are not implemented or followed.

6.1.3.4. Impact on project location

Project locations are fragmented plots intersected by atar roads. Accumulation of mechanization on plots can lead to a negative impact, which is reflected in the destruction of the surface cover, which is especially important if it is agricultural arable land. It will undoubtedly cause damage to crops and compaction of agricultural land.

6.1.4. Impact on noise level

6.1.4.1. Construction activities

The biggest impact on the noise level will be the origin of the construction works that will be performed on the site. At the planned location, the "zero state" will be measured before the start of construction, but it is assumed that it does not exceed the allowed values for purely residential areas, given that there are no significant noise sources and that it is a rural environment.

6.1.4.2. Movement of construction machinery

A large amount of construction material will be delivered to the location, and the construction of only one wind generator requires about a dozen truck tours in order to deliver all the necessary material and parts of the wind turbine. Also, the traffic on the location will increase the noise level.

The noise level will be increased along the roads that will deliver equipment and construction materials due to increased freight traffic. Facilities located along these roads will be endangered.

All works on the implementation of the Project, ie wind farms are limited in time and after the completion of these works, some impacts will be reduced or completely eliminated.

6.1.5. Other impacts during construction

6.1.5.1. Impact on soil and groundwater

There should be no negative impact on land and groundwater during the construction phase of the wind farm.

The only impact during the operation of the project on the land may occur due to the accident at the location related to the spillage of oil or fuel from motor vehicles. With the exception of the engagement of mechanization in the implementation phase, during regular operation there is a very small number of vehicles on the site, so the probability of fluid leakage from the vehicle as an accident is very small. The quantities of harmful substances that would be released in that way cannot lead to significant negative consequences for environmental factors. The removal of the contaminated layer of soil can be easily and simply reported - and the resulting hazardous waste is immediately handed over to an authorized operator for further treatment.

Groundwater can also be endangered only in the construction phase in case of accidents (spillage and leakage of petroleum products) and in case of non-compliance with technological and communal discipline during the use of wind farms (leakage of transformer oil, sanitary-fecal wastewater).

6.1.5.2. Impact on surface waters

The operation of the Krivača wind farm does not cause the production of wastewater, gases, solid waste and hazardous waste, so it will not have any impact on surface waters, as well as on aquatic bionts.

6.1.5.3. Impact on cultural assets and archaeological finds

Based on Decision no. 373/2 - 2019 from 29.11.2020. year of the Regional Institute for the Protection of Cultural Monuments, Smederevo, in the area planned for the realization of the wind farm "Krivača" no recorded immovable cultural property, but prescribed conditions that must be implemented in project documentation and represent obligations to the Project Holder and contractors.

In accordance with Article 109 of the Law on Cultural Heritage ("Official Gazette of RS", No. 71/94, 52/11 (other law) and 99/11 (other law)), the obligation of the contractor is that if he encounters to the archeological site or archeological objects, immediately stop the works and inform the competent Institute and to take measures so that the find is not damaged, destroyed and preserved at the place and position in which it was discovered. Based on the established facts, protection measures must be taken, which include mandatory field inspection (archaeological reconnaissance) in the entire subject area and provide mandatory archaeological supervision of all earthworks during the construction of wind turbines and installation routes at each location with possible archaeological content to be determined after reconnaissance. within the subject area, and in case of encountering archaeological remains, inform the competent Institute and ensure the presence of experts in the field, in accordance with applicable legal provisions.

6.1.5.4. Impact on air quality

Impacts on air quality at this stage can be identified as impacts arising from the operation of construction machinery and occur in the form of dust emissions, emissions from vehicle exhaust. These impacts are local, short-lived and cease upon completion of works. There will be no significant consequences for the environment and the population in the area.

6.2. Possible adverse effects on the environment during the regular operation of the Project

Considering the basic characteristics of the planned Project and its purpose, it can be concluded that no significant impact and impacts of special importance on the environment are expected. The project is of general interest and represents an important factor for the production of electricity from wind energy, it is suitable for the supply of energy to isolated, scattered remote settlements in remote villages and for direct connection to the electricity system.

The environmental impacts identified during this phase are as follows.

- Impact on habitats, flora and fauna
- Impact on the appearance of the landscape
- Impact on increasing noise levels
- Impact on public health, safety and disruption

Other, less significant impacts are the following:

- Influence of electric and magnetic fields
- Electromagnetic interference
- Impact on traffic and roads
- Impact on land and groundwater
- Impact on surface waters.

This chapter will analyze the above impacts and assess their significance.

6.2.1. Impact on habitats, flora and fauna

6.2.1.1. Impact on habitats

Potential consequences for protected bird species and bats sensitive to wind impacts are habitat changes and reductions. Habitats in the Krivača area, which may be affected by wind farms, include meadows and pastures where wind turbines will be installed.

The main potential impacts on habitats that may result from the reduction or loss of diversity of birds and bats may be due to:

- Direct loss of habitat due to infrastructure construction (foundations for wind turbines, ancillary facilities, roads);
- Habitat fragmentation and enhanced negative edge effect (impact of peripheral habitats).

Protected areas of nature

The area of the wind farm "Krivača", according to the Conditions of the Institute for Nature Protection of Serbia 03 no. 019-4 / 5 from 18.03.2020. is not located within the protected area for which the protection procedure has been conducted or initiated. The distance of the last pillar - the border of the park "Đerdap", is: on Venac-212 m, on Debelo Brdo-147 m. The Đerdap National Park is characterized by the great wealth of the animal world and is characterized by the great wealth of the animal world, primarily due to the preservation of various habitats that provide good conditions for the survival of a large number of animal species.

The distance of the project location from the protected area is large enough that there is no possibility of disturbance or loss of protected habitats during the construction of the wind farm.

6.2.1.2 Impact on bats

Wind farms have the greatest impact on birds and bats. For that reason, a good examination is needed before the realization of the project in order to implement possible protection measures and reduce the negative impact to a minimum.

Potential impacts that wind farms can have on bats are:

- Harassment during the regular operation phase leading to temporary or permanent removal from the site or its surroundings;
- Collision mortality;
- Obstacles to movement, which depends on the type of bats and the season;
- Due to barotrauma, ie damage to the tissues of organs that contain air, due to rapid or excessive pressure changes;
- Direct loss or degradation of habitats, especially in wetlands. It has been recorded that bats are killed due to collisions with wind turbine blades. Bats produce sound signals below 20 kHz, but also high-frequency ultrasonic signals, which are not audible to the human ear. They emit ultrasonic signals and receive back the echo of those sounds, so they can perceive the environment and orient themselves.

Risk of direct collision

Collisions with wind turbines are primarily related to migratory birds and large birds that sail, such as birds of prey. In such cases, birds and bats may run into the blades or poles of wind turbines, be sucked in by turbines, or be knocked to the ground by turbulence. It is believed that the most significant cause of death of bats is a collision with the blades and due to the creation of a vortex during rotation.

Risk of barotrauma

Since bats are much easier to detect moving objects with echolocation, compared to stationary ones, their relatively high mortality rate due to the operation of wind turbines is confusing. There are different explanations for this. The decompression hypothesis assumes that bats suffer from barotrauma, which is caused by a rapid decrease in air pressure near the wind turbine blades. Barotrauma means damage to the tissues of those organs that contain air, due to rapid or excessive changes in pressure.

Pulmonary barotrauma is damage to the lungs due to the expansion of air in them, which is not consistent with exhalation (exhalation). In addition, cases of internal bleeding of the middle ear have been recorded.

Studies show that in 90% of cases, the death of bats is caused by internal bleeding that accompanies barotrauma, and that only in 50% of cases, direct contact with wind turbine blades was recorded. Some other studies show an even higher percentage of deaths due to barotrauma: as much as 100%, while external physical injuries (which occur due to contact with wind turbine blades) were recorded in 46% of cases.

The reason for the smaller number of cases of birds suffering from the consequences of barotrauma lies in the unique anatomy of their respiratory system. Namely, the lungs of birds are more resistant to the influence of barotrauma in relation to the lungs of mammals..

(*Source: Baerwald, E.F., D Amours, G.H., Klug, B. J., Barclau, R.M.R. (2008). Barotrauma is a significant cause of bat fatalities at wind turbines. Curent Biology 16: 695-696. (http://ac.elscdn.com/S0960982208007513/1-s2.0-S0960982208007513-main.pdf?_tid=24be4c6a-534c11e3-bc5f 00000aab0f02&acdnat=1385107405_0e88752be309e575b588c77c7fe2d8b9))*

Greater horseshoe bat *(Rhinolophus ferrumequinum)*

A species that is not sensitive to wind farms. The international IUCN status of the species is "almost endangered", the population is considered to be declining, in Serbia it has the status of "least concern". In Europe, the population is declining, while in Serbia it is stable. The endangerment for this species is considered low.

Mediterranean horseshoe bat *(Rhinolophus euryale)*

A species that is not sensitive to wind turbines. The international IUCN status of the species is "almost endangered". Status in Serbia is defined as "least concern". The endangerment for this species is considered low.

Common bent-wing bat *(Miniopterus schreibersii)*

A species that is not sensitive to wind farms. The population in Serbia is stable. Status in Serbia is defined as "least concern". International IUCN status is "almost endangered". The endangerment for this species is considered low.

Soprano pipistrelle *(Pipistrellus pygmaeus)*

The species is moderately sensitive to wind farms. The international IUCN status of the species is the "least concern". In Serbia, the population trend is considered stable. The endangerment for this species is considered low.

Based on foreign experience, it is considered that the mentioned types of bats, which are present in the subject area, will not be significantly affected by wind farms. This will certainly depend on the application of measures that prevent, reduce and eliminate any significant harmful effects of wind turbines on the bat population present in the subject area.

6.2.1.3. Impact on bird fauna

Based on the results of one-year research of birds in the subject area during 2014, as well as subsequent occasional research during 2015-2019, it was concluded that there are species that may be significantly endangered by the construction of wind farm "Krivača". These are sensitive species or species of birds of special importance for protection in Europe.

Harassment and habitat loss

There are several reasons for birds to collide with wind turbines and due to good visibility, and the basic one is that they are not able to notice the rotation of the propellers. There are two hypotheses offered for explanation, applicable mainly to predators. The first relates to the assumption that the bird's eye is unable to see fast enough.

The second hypothesis starts from the assumption of the inability of birds to divide attention between hunting on the ground and observing obstacles on the horizon. Given the fact that

predators have two yellow spots (foveae) in their eye, one for the front sight and the other for the downward view, this second hypothesis should be ruled out. However, some observations indicate that sometimes birds do not use both yellow spots at the same time, because they are so focused on looking for prey on the ground, that they fail to notice objects in front of them such as wind turbines and power lines, which leads to collisions.

Most bird collisions with wind turbines are individual birds and very few cases of multiple bird losses have been reported, even in bad weather.

Although there is not always a direct correlation between the density of birds and the number of losses due to collisions, in principle there is a higher probability of collisions where the number of birds present is higher, ie where the frequency of bird movements is higher.

The bird species that have been recorded in the already researched area have been singled out as sensitive - target species.

Also, as significantly endangered - target species, all recorded species in the already researched area (near the locations for wind turbines) are included, as well as those species that are not on the endangered list based on international criteria, but are due to presence in the narrower area and manner use of space subject to the influence of wind generators (primarily predators).

Based on the above criteria for assessing the level of endangerment of the target species in the subject area, the endangerment is divided into:

- Low risk,
- Moderate risk,
- High risk.

In the study area, 66 bird species were recorded (Table 14; Chapter 2.6.10), which are considered significantly endangered.

High endangerment was assessed in 2 species: Buteo buteo and Aquila chrysaetos.

Based on the results of the research in the period January-December 2014, as well as on the basis of foreign experience, 19 target species were selected, with the aim of monitoring in the period 2015 to 2019.

These include the following target bird species:

Ciconia ciconia, Anser albifrons, Anas platyrhynchos, Circus cyaneus, Pernis apivorus, Haliaeetus albicilla, Circaetus gallicus, Accipiter gentilis, Buteo buteo, Buteo lagopus, Aquila chrysaetos, Falco tinnunculus, Falco peregrinus, Perdix perdix, Coturnix coturnix, Crex crex, Alauda arvensis, Lanius collurio, Corvus corax.

Other bird species

Some studies have shown that birds use less habitat with wind farms than those without such structures, or even abandon them altogether. Some birds may continue to use areas with wind farms, but be more anxious and timid otherwise.

Such stressful situations can lead to poorer nesting success, which can cause a local population decline. However, some species of birds can continue to use the habitat unhindered, without any change, as before the construction of the windmill, they can misjudge the speed of the rotor or they cannot detect the blades moving at high speed.

6.2.1.4. Other species of fauna (excluding birds and bats)

Impact on increased numbers of insects and fur pests

The potential impacts of wind farms extend beyond direct consequences for bird and bat populations and can disrupt important environmental processes. Many species whose populations can be affected by wind turbines are predators from the top of the trophic pyramid

and play an important role in maintaining ecological processes (eg birds of prey and insectivorous bats). This is especially important because wind turbines are located in meadows, pastures and arable land (see Figures 15 and 16, Venac habitat; 17 and 18 Debelo brdo habitat; 19 and 20 Tilva habitat), where pests can overpopulate.

Also, birds of prey are the main predators of fur pests, especially mice and rabbits, and local reduction of the population of predators will enable an increase in the population of these pests. Birds of prey also feed on many species of other birds and thus prevent their overpopulation. Some species in case of overpopulation can negatively affect agricultural production, damage infrastructure and can become a nuisance to the local population.

Bats feed on large amounts of insects during one day. Their diet also includes many insects that are considered agricultural pests. Reduction or local extinction (extinction) of bats will result in a dramatic increase in the number of harmful insects that feed on crops, as well as in the consequent increased use of insecticides to prevent economic losses.

In connection with the above, the impact of wind farm construction on soil pollution is possible due to the increased use of insecticides and rodenticides to combat the overpopulation of insect and rodent populations at the base of wind turbines.

(Source: Sharp, A. (2010). Briefing note on the effects of wind farms on bird and bat populations. Government of South Australia, Department of Environment and Heritage (http://www.nynrm.sa.gov.au/Portals/7/pdf/DENR/Briefing%20Note%20%20Effects%20of%20Wind%20Farms.pdf))

6.2.2. Impacts on landscape appearance

In this chapter, an analysis of the type and significance of the expected changes in the character of the landscape and the visual impression that will occur as a result of the operation of the wind farm. The impact on the appearance of the landscape depends on the land use of the planned Project and the topographic characteristics of the area, as well as on the position of the receptor and its sensitivity. Receptor sensitivity is an important issue in assessing the significance of the impact on landscape appearance. Sensitivity depends on the type of receptor and the type of view that the receptor has. For example, populated areas are highly sensitive receptors.

6.2.2.1. Impact on the appearance of the landscape during the operation of the wind farm

The realization of the wind power plant "Krivača" will not condition the change of the purpose of large areas of agricultural and forest land into construction, and therefore no significant changes in the structure and participation of the areas of represented crops are expected. In the area of the planned wind farm, no special and significant landscape types have been identified and singled out, from the aspect of preserving especially valuable stands of vegetation and geological heritage. But, the realization of the WF "Krivača" will condition the introduction of artificial elements, physically and visually, in the existing appearance of the landscape. With the realization of the planned wind farm and all expected changes in space with the construction of wind turbines, access roads and accompanying facilities, the interested public, local population in the municipalities of Golubac and Kucevo, and especially residents of Krivača, Rakova Bara, Radenko and municipal centers Golubac and Kucevo, are get acquainted at the earliest stage of Project planning. The assessment of possible impacts in space and environment was presented to the interested public in the process of strategic environmental impact assessment of the Plan for detailed regulation of the area of the wind farm "Krivača". In the process of public insight and public discussion of the Strategic Impact Assessment of the Detailed Regulation Plan, the participation of all stakeholders (individuals, associations, NGOs, population of the covered settlements) was provided, where the expected changes in the area of importance for stakeholders were presented.

The report on the strategic impact assessment of the Plan for detailed regulation of the area of the wind farm "Krivača" was made especially for the area of the municipality of Golubac and the area of the municipality of Kučevo, as well as for the area of the municipality of Veliko Gradište (due to the planned transmission line). In the process of public discussion, the interested population was acquainted with, above all, the physical and visual changes in space and landscape in their immediate and wider environment.

Changes in the space of the planned Project, physical and visual, are a fact and represent significant changes that can cause both positive and negative effects. Specific geomorphological characteristics of the terrain, mosaic structure of the represented cultures and the choice of the configuration of the planned Project will affect the reduction of visibility and mitigation of negative visual effects.

Impact on land use

The Transformation "WF Krivača", PRP "Krivača", as well as transmission lines (which are not the subject of this Study, but are part of the future complex of the wind power plant "Krivača") will be built within the wind farm complex. Within the complex, internal roads, green areas, certain water management, electric power and telecommunication infrastructure are planned.

The realization of the wind power plant implies the occupation of land for:

- Formation of a plateau with earthworks that will be dimensioned in accordance with the technological needs of the installation of wind turbines;
- Construction of the foundation of wind turbine poles, circular foundation;
- Storage of wind turbine parts;
- Parking lots for mechanization;
- Space for mounting rotor blades;
- Manipulative space for installation work.

The land on which the construction of the wind power plant is planned implies the occupation of a small area of land, so no significant negative impacts on land use are expected.

Impact on protected areas

The area of the wind farm "Krivača", according to the Conditions of the Institute for Nature Protection of Serbia 03 no. 019-4 / 5 from 18.03.2020. is not located within the protected area for which the protection procedure has been conducted or initiated. The distance of the last pillar - the border of the park "Đerdap", is: on Venac - 212 m, on Debelo Brdo - 147 m. The national practice " Đerdap " is characterized by the great wealth of the animal world, primarily due to the preservation of various habitats that provide good conditions for the survival of a large number of animal species.

The distance of the project location from the protected area is large enough that there is no possibility of disturbance or loss of protected habitats during the operation of the wind farm.

6.2.2.2. Potential visual impact on protected areas

There are no protected areas in the area of the planned Project, but the Đerdap National Park is located in the wider area. The visibility of the planned Project in the area of the National Park represents potential visual impacts during the regular operation phase. Morphological characteristics of the terrain and vegetation characteristics are a factor in mitigating and limiting the visibility of the Project from the National Park zone.

6.2.2.3. Cumulative impact on landscape appearance

Cumulative impact on the appearance of landscapes and receptors can be expected due to additional changes that could occur as a result of the construction of new wind farms in areas around the site. Although the projected effects of other projects individually may not be

significant cumulatively, they may create an unacceptable level of negative impacts on the appearance of landscapes and receptors.

6.2.3. Impact on noise increase

6.2.3.1. Methodology

During the regular operation of WF "Krivača", there will be noise emission made by wind generators due to the movement of propellers through the air and due to the operation of mechanical elements inside the gondola (generator, multiplier and other components).

It is considered that the volume emitted by the wind generator at a speed of 10 m / s is about 105-106 dBA, depending on the manufacturer. Newer generations of wind turbines have a built-in so-called. "Optispeed" generator which achieves constancy of angular velocity in a wide range of wind speeds.

6.2.3.2. Assessment of the impact on the existing noise level

At low wind speeds, the noise caused by the operation of the wind turbine has the lowest values. As the wind speed increases, the noise level rises to a certain value, and then it becomes constant and does not depend on the wind speed. According to the studies that have been done, at a wind speed of 10 m / s, the noise level will not exceed the allowed values.

Wind turbines do not operate at a speed lower than the wind speed called the "cut in speed" (the minimum wind speed below which the wind farm does not produce usable energy, ie the speed at which the energy system is turned on) and is usually about 3 m / s.

Larger and variable speed wind farms emit lower noise levels at cut in speeds than smaller constant speed wind farms. Noise spreads in some directions more than in others, with zones in the wind direction (downwind) usually having the highest predicted noise levels. At higher wind speeds, wind noise generally has the effect of masking wind farm noise.

The Decree on Noise Indicators, Limit Values, Methods for Assessing Noise Indicators, Disturbance and Harmful Effects of Noise in the Living Environment ("Official Gazette of RS" No. 75/10) the permitted noise levels in the environment in which a person resides are prescribed for open space:

- clean residential area, for day and evening / night. 55/45 dB (A),
- city center, craft, trade, administrative zone with apartments, zone along highways, highways and city roads, for day and evening / night. 65/55 dB(A).

Areas near the wind farm where the existing noise level is less than allowed, a maximum increase of 5dB (A) above the existing noise is considered acceptable in providing protection to the surrounding population.

Good acoustic design and carefully considered turbine locating will prevent a significant increase in ambient noise levels in sensitive locations nearby. Sound generation from modern wind farms can be regulated, thus alleviating noise problems, although some energy is lost from production. An appropriate balance must be struck between energy production and the impact of noise.

6.2.4. Other possible impacts

6.2.4.1. Electrical and magnetic radiation

Alternating current creates electric and magnetic fields that are collectively called "electromagnetic fields". Electric fields create voltage and they are amplified in proportion to the increase in voltage. Magnetic fields are the result of the flow of electric current and their power increases in proportion to the increase in current. Power transmission lines are the most well-

known sources of electromagnetic fields, but all other electrical equipment has the ability to create an electromagnetic field.

Sources of electromagnetic radiation associated with the proposed wind farm project are overhead transmission lines, wind turbines themselves as well as transformers.

The electromagnetic field has the highest intensity when its source is in the immediate vicinity of the receptor, and the field intensity decreases per square foot with increasing distance from the source. Only receptors that have been exposed to high-intensity electromagnetic fields for a long time could be endangered. Such a receptor could be, for example, a residential building located in the immediate vicinity of a high voltage source.

6.2.4.2. Electromagnetic interference

Impact on air traffic and radio communications

Wind farms can be a nuisance to air traffic and radio communication systems in cases where wind farms are located extremely close to the airport. WF "Krivača" is not located near any airport. Due to the distance between the planned wind farm and the nearest potential receptors, it can be concluded that the Krivača WF will not have an impact on air traffic and radio communication systems.

Impact on television and telecommunication systems

Wind farms can interfere with communication systems that use electromagnetic waves such as television, radio and the like. Interference can also be caused by the shadow effect or by reflection. Conditions no. 205592/2 dated 18 July 2011 years issued by "Telekom Srbija" which the Project Holder must adhere to. It is considered that the wind farm in question will not have an impact on telecommunication systems. The wind farm will not have an impact on mobile phones, communications, satellite and television receptions as well as aircraft radars. The effect on households using conventional antennas is difficult to predict due to the nature of the transmission direction and the type of individual antennas used.

6.2.4.3. Impact on traffic and roads

The main impact on traffic and roads is during the construction phase, in this regard, access to agricultural plots is not expected to be prevented during this phase. During this phase, it is expected that access to the site using vehicles will be done for control purposes once or twice a week. Each machine requires servicing and thus the presence of a certain number of employees in a certain time interval. Unplanned maintenance may require additional presence for limited periods during the operation of the wind farm. Respecting the rules of arrangement and construction, the assumption is that during this phase, built access roads and internal roads will be used, and in accordance with that, appropriate management measures will be applied so that the impact on traffic and roads will be negligible.

6.2.4.4. Impact on surface waters

No discharges into surface water bodies or wastewater collection systems are foreseen during the operation of the wind farm. Adequate handling of hazardous substances has not identified possible ways for these substances to reach water receptors. Discharge of hazardous substances is only possible in the event of an accident, with an emphasis on preventive protection measures as well as regular technical inspections. The amount of hazardous substances that could lead to the impact on surface waters is not significant, so there is very little possibility of them reaching the receptors. Applying all the proposed measures to prevent and limit negative impacts, it can be concluded that during this phase there will be no impact on surface water bodies.

6.2.4.5. Impact on soil and groundwater

No releases of oil, chemicals or hazardous substances are planned during the operation of the wind farm. Potential negative impacts that may occur on the land can occur only in the case of accidents where hazardous substances may be released. Groundwater pollution can occur due to the penetration of hazardous substances into the soil. By ensuring regular maintenance during the operation of the wind farm, as well as by ensuring that vehicles use access roads that are well maintained, the effect of the operation of the wind farm on land and groundwater will be negligible.

It is envisaged that potentially pollutants (fuel, oils, chemicals or liquid waste) will be stored in designated, separate areas, with secondary reception equipment and protective measures in place to prevent any accidental leakage during storage. Also, appropriate working procedures will be prescribed to reduce the risk of accidents during delivery and delivery of materials to the warehouse as well as during maintenance.

6.2.4.6. Shadow flicker effect

In addition to the impact caused by noise emissions, wind farms can have an impact on the surrounding population by casting shadows on residential buildings when the sun is low in the sky. This effect is known as shadow blinking (shadow effect) and is created when the propeller casts a shadow on the windows of houses, ie the space where people live, and the rotation of the propeller leads to alternating formation and disappearance of the shadow. The shadow effect depends on the size of the rotor.

The correct choice of micro-location influenced the nearest populated place of Krivača to be 800 m away from the nearest wind generator, therefore this type of disturbance is not considered an issue of importance for the Project in question.

This effect is short-lived and occurs only in certain combined circumstances, when the sun shines and is at a low angle (at dawn or dusk) and the wind farm is located exactly between the sun and the object on which it casts a shadow and has enough wind to trigger propellers, so that it is not considered as a significant impact for the project in question.

The distance from the settlement, ie the residential zone is large enough so that there will be no visual disturbance with rotating shadows (shadow effect) which is created when the wind turbine propeller casts a shadow on the windows of nearby houses or areas where people live outdoors (parks, playgrounds, picnic areas). etc.).

6.3. Negative influences on climatic characteristics

Taking into account the characteristics of the subject of environmental impact assessment, ie the implementation and regular work of the Project - wind farm "Krivača", the assessment is that there is no likelihood of significant negative impacts on climate characteristics in the wider area, ie in the region.

6.4. Negative impacts on the environment in case of natural disasters

Based on the analysis of spatial - positional characteristics of the location, immediate and wider environment, as well as on the basis of available data from higher order documentation, project documentation, conditions of public authority holders analyzed at the level of planning document and technical documentation, it was concluded that characteristic devastating natural disasters that would cause significant negative consequences in space and the environment.

This area is not characterized by destructive winds. According to the data from the Map of Seismic Hazard, Republic Seismological Institute of Serbia, macroseismic intensity on the surface of local soil probability of exceeding 5% in 50 years (return period 975 years), the observed area is in zone up to VII-VIII expressed in degrees EMS-98.

Based on the presented facts, it can be concluded that the probability of natural disasters on the site is low and that negative environmental impacts are practically excluded from this aspect.

6.5. Possible adverse effects on the environment after the termination of the Project

The project of closing the plant needs to include all parameters and measures of environmental protection that would affect the minimization of possible negative impacts on environmental media during the dismantling of the installed equipment. An accredited company needs to be hired to remove the equipment and infrastructure. The greatest impact on the environment could be expected when removing the concrete foundations of wind turbines.

The wind farm in question can have significant impacts on the environment and the closure, which are very similar in scope and type to the impacts that occur during the implementation of the wind farm. In fact, construction work on the dismantling and removal of wind turbines and installed equipment are the main causes of possible impacts. Possible impacts that may occur are:

- Impact on the existing noise level
- Impact on traffic and roads
- Impact on public health, safety and disruption.

In addition to the above, it is necessary to consider the following impacts:

- Impact on flora, fauna and habitats
- Impact on the appearance of the landscape.

6.5.1. Impact on noise increase

Works on removal of equipment and dismantling of infrastructure

Work on removing equipment and dismantling the infrastructure will lead to increased noise levels, but the noise should not exceed the limit values. A significant increase in noise levels could be expected during the breaking of the concrete foundation plateaus of wind turbines, during which noise could be heard at a distance of up to 1.5 km.

Similar to the assembly and disassembly of wind turbines, it will cause a larger number of truck tours, which could lead to an increased noise level due to the increased volume of traffic at the location.

These influences during this phase are inevitable and cannot be avoided. The only possibility of prevention refers to the regular maintenance of vehicles and construction machinery, in order to prevent the occurrence of higher noise levels.

Traffic during wind farm removal

An appropriate number of truck tours will be organized during the dismantling of wind turbines. Depending on the transport routes, noise levels may increase due to vehicle movement.

In the process of preparing this Study, the following were considered:

- transport routes, for the purpose of unloading and delivery of wind generators in the phase of construction of the wind power plant;
- transport routes, in the service / maintenance phase of the wind farm.

6.5.2. Impact on traffic and transport routes

Similar to construction work, the dismantling of each wind turbine will require a significant number of truck tours. Depending on the roads on which the vehicles will travel to the project location, there could be an increase in noise levels due to the increased volume of traffic. After complete dismantling, this influence ceases.

6.5.3. Other impacts due to the closure of the Project

6.5.*3.1. Impacts on habitats*, flora and fauna

The dismantling works are similar to the influences that occur during the construction phase. The dismantling of the wind farm implies the presence of heavy machinery and a large number of people on the site and installation work, which results in noise, exhaust emissions and dust. Due to these phenomena, it is expected that a number of songbirds nesting in this area will be expelled and will, in order to move away from construction sites and other sources of disturbance, put pressure on the rest of the population and increase competition for resources. food, shelter, etc.). This somewhat reduces the vitality and productivity of the population, but it is expected that this phenomenon will be transient due to the limited duration of work and without a significant impact on changes in the overall size of the population. No potentially greater impacts are expected than those during the construction phase.

6.5.3.2. Impact on landscape appearance

Primary impacts in the phase of dismantling the wind farm, ie closing the subject Project may disturb the appearance of the subject location due to the movement of heavy machinery and vehicles, larger amounts of waste deposited at the location. These impacts are also limited and stop after the completion of works and complete dismantling of wind turbines and accompanying infrastructure.

More serious impacts can occur only if wind turbines with accompanying equipment and facilities are left on the site without control and left to the ravages of time. For that reason, the Project Holder has the obligation to restore the location after the cessation of work.

It should be noted that the average service life of a wind turbine is 30 years. After this period, unused wind turbines must be removed, which will cause minor short-term impacts in terms of land use and revitalization and restoration before construction.

6.6. Socio-economic impacts of the Project

The socio-economic impacts that will result from the construction and operation (and subsequent removal) of the wind farm are as follows:

- impact on land use,
- impact on increasing employment opportunities,
- impact on the way of earning a living,
- impact on public health and safety and
- impact on infrastructure.

6.6.1. Socio-economic impacts during construction

Wind farms physically occupy only a few percent of the area (areas intended for the foundation of buildings) on which they stretch, while the rest of the area between the turbine base and around internal roads can be used for other purposes, ie it can be used for its original purpose. In this case, it can still be used for agricultural production, so in the context of changing the purpose of land use, there are no significant impacts. The total average value of the magnitude of the expected impacts of the Project in question on the purpose of land use is within low efficiency.

The area on which the realization of the wind power plant is planned is about 242.16 ha. The location of the planned wind farm is located in a hilly and mountainous area and occupies agricultural land. During the construction phase, the area of available arable land will be reduced, of which several hectares will only be temporarily occupied during construction. Due to the increase in traffic frequency and the improvement of access roads, access to arable land will be temporarily difficult.

During the construction phase, the need for employment of the local population (construction workers, wind turbine installation experts, etc.) can be expected. Local employers can be hired

to provide materials for roads such as crushed stone and the like, as well as to procure equipment that will be needed during the construction phase (mechanization, spare parts for mechanization, etc.). Biodiversity as a central component of the ecosystem plays an important role. Every species that lives within an ecosystem creates streams of energy and materials.

All activities during construction affect the land and can be divided into four phases:

- Soil transformation
- Occupying land
- Restoration
- Leaving the land

Occupation or occupation of land can be defined as maintaining an area in a certain condition for a certain period. Transformation is the conversion of agricultural land from one state to another, for example from its original state, to an altered state or from an altered state to another altered state. Often the transformation follows the occupation, or the occupation takes place in a space that was previously transformed. Land use reflects damage to ecosystems due to the effects of occupation and land transformation. Taking into account the purpose of the land (agricultural land), the expected negative impacts will be reflected in the loss of land for growing crops, so these impacts will include owners of plots to pass through during the construction phase (use of machinery, soil vibration).

As a result of the construction of the WF "Krivača", the road infrastructure will be improved, primarily due to the improvement and expansion of the access roads. Negative impact on the infrastructure could occur in the case of damage to road surfaces during the traffic of heavy goods vehicles. Increasing the frequency of traffic (due to the delivery of materials and equipment to the location and travel of employees) could lead to a temporary reduction in the quality of life.

6.6.2. Impacts during operation

During the operation of the wind farm, due to the occupation of plots, the area of available arable land will be reduced. The operation of the plant will create an opportunity for direct employment of the local population. In addition to direct employment, the operation of the wind farm will also indirectly affect employment due to the need to procure materials and the consumption of wind farm employees within the local community.

The operation of the wind farm will enable an increase in the revenues of the municipalities of Golubac and Kučevo and local communities, due to the participation in the realized profit. The Krivača wind farm can contribute to the development of tourism. As a result of the construction of the wind farm, the road infrastructure will be improved, primarily due to the maintenance of access roads needed for access to wind generators for maintenance.

6.6.3. Impacts after cessation of work

Upon completion of the dismantling of equipment and removal of the wind farm, arable land will become available for agricultural activities. Works on removing the wind farm, disposing of materials and returning the land to its original function will affect the emergence of new direct and indirect employment opportunities. These employment opportunities will be partially available to the local workforce.

Conclusion: By reducing the number of turbines, from the originally planned 38 to 22 that will be realized by this Project, it is considered that all possible negative impacts will significantly measures be reduced.

7.0. Environmental impact assessment in case of an accident

An accident is an unexpected or unforeseen event that can endanger the population, employees, the environment or lead to material damage. Accident risk assessment at the Project site can be performed based on the identification of potential hazards and hazardous situations, assessment of the probability of occurrence and analysis of the consequences of the accident.

In addition to identification, risk assessment requires an analysis of the consequences, which aims to predict the extent of possible effects of the accident, the magnitude of the damage and the extent of the response to the accident.

The first phase of vulnerability analysis is the identification of all vulnerable objects on the site and in its surroundings. Vulnerable objects are all accident-sensitive and vulnerable objects and everything that can be affected by the uncontrolled release of harmful substances (people, material goods).

7.1. Hazardous materials at the Project site

Depending on the amount and manner of treatment, or depending on its hazardous properties, any chemical used at the site and each type of waste can lead to accidents, if it is not treated according to prescribed procedures, if there are breakdowns in the installations, devices, or natural disasters occur. In the chemical sense, there are differences in the levels of danger, ie not all substances are equally toxic, ie harmful to human health, ecosystems and the environment. The riskiest substances are those that are difficult to store, ie which, due to malfunctions in storage areas or installations, easily enter the working and living environment, which is characteristic of gaseous and liquid substances. Solids are much easier to control and store, ie they have significantly less requirements in this regard.

The subject technology represents the production of electricity using wind energy. Wind is a clean, sustainable source of energy and does not create pollution. The subject technology uses only the potential of wind, so the project in question is not characterized by the production of technological wastewater that has the properties of hazardous substances that could lead to a potential accident.

Hydraulic oils and lubricants for lubrication and maintenance of wind generators and transformer oil will be used within the planned wind farm "Krivača" from hazardous substances. It is considered that the operation of the components of one wind turbine requires an amount of about 450 liters of oil. The oil in the components is changed every four years.

7.2. Identification of accident hazards

Based on the characteristics of the wind farm "Krivača", planned technical solutions for prevention and environmental protection, possible right situations have been identified:

- leakage of petroleum products from engaged machinery and vehicles,
- ice formation on propellers,
- tearing or breaking of the blade,
- wind turbine fall,
- lightning strike and fire.

Leakage of petroleum products from engaged machinery and vehicles

During the implementation of the planned Project, preparation and arrangement of the location, construction of wind turbine foundations, traffic infrastructure and accompanying facilities, in case of accidental spillage or accidental leakage of petroleum products and other fluids from engaged construction and other machinery, potential soil and groundwater pollution may occur. The resulting waste has the characteristics of hazardous waste, requires urgent suspension of works, rehabilitation of the terrain. Dispose of such waste in accordance with the Rulebook on the manner of storage, packaging and labeling of hazardous waste ("Official Gazette of RS",

No. 92/10). An important fact is that, if an accident occurs, the amount of spilled petroleum products is small (maximum volume of one tank), so the potential consequences will be small and local.

An accident of this type is also possible in the phase of regular work at the Project site, ie spillage / spillage of oil derivatives from the vehicles of workers who visit wind turbines during their maintenance. A leak of petroleum products is an unlikely accident. In case of such an event, it is necessary to immediately start remediation of the terrain, and thus pack the generated waste in impermeable barrels (containers) with lids and act in accordance with the provisions of the Law on Waste Management "Official Gazette of RS" No. 36/09, 88/10, 14 / 16 and 95/18 (other law)) and the Rulebook on the manner of storage, packaging and marking of hazardous waste ("Official Gazette of RS", No. 92/10). The waste generated in this way is stored at the location in accordance with the provisions of the said Rulebook until it is handed over to the Operator who holds a Hazardous Waste Management License, with mandatory records on hazardous waste collection (Hazardous Waste Movement Document). By applying preventive protection measures, using the correct mechanization, the risk of accidents - leakage or spillage of petroleum products and potential contamination of land, groundwater and surface water is reduced to a minimum.

Ice formation on propellers

This potential right-wing situation can be assessed as unlikely for the following reasons:

- The location of the wind farm in question is not in a climate zone with extremely cold winters and low temperatures that would cause the formation of ice on the blades. Even in the case of ice formation on wind turbine blades, there would be no long delay;
- Newer generations of wind turbines are equipped with anti-vibration sensors that detect all imbalances caused by icing of the propellers and prevent the wind generator from starting while the ice from the propellers is removed;
- The nearest residential buildings are more than 800 m away from the nearest wind turbine, so it is unlikely that people will be injured by broken ice or parts of the propeller. Also, people who tour the wind turbines and maintain them with proper equipment will be protected and will pay special attention to the existence of ice on the wind turbine blades.

Tearing or breaking of the blade

Accident with very low probability of occurrence. It can occur due to extreme weather conditions, ie very strong wind that can cause the propeller to hit the pole and break or tear the propeller. The occurrence of this accident is unlikely because even in the design phase and before choosing the location for the construction of the wind farm, wind power testing is performed, so in this case it was determined that there will be no wind power at the planned site. stability. Even less likely is the scenario that due to the breaking or tearing of the propeller at that moment, one of the people will be found near the wind generator and that there will be a serious injury.

Wind turbine fall

An accident with a minimum probability of occurrence that would be caused only in extreme conditions (wind speed) that would lead to a failure of the brake or multiplier, which would allow uncontrolled rotation of the blades and tearing of the air brakes on the top of the blades. Also in the event of an earthquake, the mentioned accident may occur, but since the location in question is not in the zone of devastating earthquakes, it is considered that this situation will not occur.

Lightning strike and fire

In the event of a lightning strike, a fire or burst propeller may result. For this reason, it is necessary that each unit of the wind farm be equipped with lightning protection and grounding. In case of fire in the wind turbine gondola, it is necessary to allow complete combustion of the

wind generator with the establishment of a safety zone by the fire service, in order to prevent secondary fires in the vicinity. The occurrence of fires on wind turbines is extremely rare.

A fire at a substation is a more serious problem than a fire at a wind turbine. During the construction of the substation, the project documentation planned a fire protection system.

As already pointed out, a transformer station can have a significant impact on the environment only in the event of an accident. Such cases are unlikely to occur, they are local in nature and in the process of design, construction and maintenance, all measures are taken to prevent accident situations. Possible accidents at the SS location are:

- transformer oil spill,
- fire on the transformer,
- spraying of AKU battery cells

At the substation, except for the transformer, all other equipment is with SF6 gas content or low oil content, so it can be considered that the main possible source of fire may be a fault in one of the transformers. The occurrence of fire on the transformer is practically prevented by the use of sensitive protective and automatic devices in order to quickly and safely turn off the part of the plant where the fault occurred. The application of all fire protection measures practically excludes fires that can endanger the environment and the health of the employees in the substation, as well as the local population and space users.

A fire wall is being built between the transformers to prevent the transmission of fire. Inside the transformer box, a drain tub of the transformer and foundations on which the rails for slipway and support of the transformer are placed are provided. An oil sewer leads from the catchment to the oil pit.

Within the scope of the Project, the use of open flames is prohibited and it is mandatory to comply with applicable fire protection regulations when performing soldering and welding works in temporary places. All persons participating in the execution of works are obliged to respect the prescribed protection measures from the Law on Safety and Health at Work as valid Regulations and Instructions of the PE EMS.

With the strict application of technical and technological measures of prevention and protection and accident management measures, the probability of accidents at the location of WF "Krivača" will be minimized and reduced to the limits of environmental acceptability.

8.0. Environmental protection measures

In order to prevent all significant negative impacts and consequences for the environment, life and health of the local population, natural and cultural values of the environment, prevention of conflicts in space, cumulative and synergistic negative effects during implementation, regular work, in case of accident or permanent closure. The project, the Study prescribes measures for prevention, elimination, prevention, minimization and reduction in the legal framework and environmental acceptability, of all significant negative impacts on the environment and users of space.

Environmental protection measures include technical measures and solutions, ie organizational measures that define actions in the control, maintenance and prevention of significant negative impacts and consequences for the population and the environment. Technical and organizational measures to meet and minimize potential environmental pollution, ie prevent negative impact on human health, aquatic ecosystems and the quality of the environment in the environment, during the preparatory and construction works, during the regular operation of the Project, in case of accidental pollution, or in case of termination of the Project.

Based on the project documentation, the conditions of the holder of public authorizations, based on the assessed environmental characteristics of the subject zone, potentially significant impacts were determined and endangered environmental media were defined.

After obtaining the consent of the Study on Impact Assessment by the competent body of the relevant Ministry, the measures prescribed by the Study become binding in the development of the project for execution and for the Project Holder. Every environmental protection measure must be in accordance with the applicable legislation of the Republic of Serbia.

8.1. Measures provided by law and other regulations, norms and standards and deadlines for their implementation

General environmental protection measures include a synthesis of all measures that must be applied as acquired obligations from valid planning and urban planning documents. Due to the rational management of the environment, it is necessary to ensure compliance with legal regulations regarding the limit values of certain environmental impacts.

1. The Project Holder is obliged to comply with and implement measures, which are directly related to environmental protection or are indirectly related to the preparation of project documentation (Preliminary design, Preliminary design, Main design and Detailed design) and regular work environmental protection, prescribed by the following laws and bylaws:

- *Law on Environmental Protection, "Official Gazette of RS", No. 135/04, 36/09, 36/09 (other law),72/09 (other law), 43/11 (CC), 14 / 16, 76/18 and 95/18 (other law));*
- *Law on Environmental Impact Assessment ("Official Gazette of RS" No. 135/04 and 36/09);*
- *Law on Planning and Construction "Official Gazette of RS", No. 72/09, 81/09, 64/10-Decision of the CC and 24/11 and 121/12, 42/13-Decision of the CC, 50 / 13- CC decision, 98 / 13- CC decision, 132/14, 145/14, 83/18, 31/19 and 37/19 (other law));*
- *Law on Nature Protection ("Official Gazette of RS" No. 36/09, 88/10, 91/10, 14/16 and 95/18 (other law));*
- *Law on Efficient Use of Energy ("Official Gazette of RS", No. 25/13);*
- *Law on Air Protection ("Official Gazette of RS", No. 36/09 and 10/13);*
- *Law on Environmental Noise Protection ("Official Gazette of RS", No. 36/09 and 88/10);*
- *Law on Waters "Official Gazette of RS" No. 30/10, 93/12, 101/16 and 95/18 (other law));*
- *Law on Forests ("Official Gazette of RS", No. 30/10, 93/12, 89/15 and 95/18 (other law));*
- *Law on Land Protection ("Official Gazette of RS", No. 112/15);*
- *Law on Game and Hunting ("Official Gazette of RS", No. 18/10 and 95/18 (other law));*
- *Law on Animal Welfare ("Official Gazette of RS", No. 41/09);*
- *Law on Energy ("Official Gazette of RS", No. 145/14 and 95/18 (other law));*

- *Law on Roads ("Official Gazette of RS", No. 41/18 and 95/18 (other law));*
- *Law on Ratification of the Convention on the Conservation of European Wildlife and Natural Habitats ("Official Gazette of the RS", - International Agreements No. 102/07);*
- *Law on Ratification of the Convention on the Conservation of Migratory Species of Wild Animals ("Official Gazette of the RS" - International Agreements No. 102/07);*
- *Law on Cultural Heritage ("Official Gazette of RS" No. 71/94, 52/11 (other law) and 99/11 (other law));*
- *Law on Fire Protection "Official Gazette of RS" No. 111/09, 20/15, 87 / 18-3 (other law), 87 / 18-41 and 87 / 18-50 (other law));*
- *Law on Waste Management "Official Gazette of RS" No. 36/09, 88/10, 14/16 and 95/18 (other*
- *law));*
- *Law on Packaging and Packaging Waste "Official Gazette of RS", No. 36/09 and 95/18 (other law));*
- *Law on Disaster Risk Reduction and Emergency Management ("Official Gazette of RS", No. 87/18);*
- *Decree on determining the list of projects for which an impact assessment is mandatory and the List of projects for which an environmental impact assessment may be required ("Official Gazette of RS", No. 114/08);*
- *Decree on the ecological network ("Official Gazette of RS", No. 102/10);*
- *Decree on Protection Regimes ("Official Gazette of RS", No. 31/12);*
- *Decree on noise indicators, limit values, methods for assessment of noise indicators, harassment and harmful effects of noise in the environment ("Official Gazette of RS" No. 75/10);*
- *Decree on the categorization of state roads, ("Official Gazette of RS", nos. 105/13, 119/13 and 93/15);*
- *Decree on conditions for monitoring and air quality requirements ("Official Gazette of RS", No. 11/10, 75/10 and 63/13);*
- *Decree on limit values for the emission of pollutants into water and deadlines for their achievement ("Official Gazette of RS", No. 67/11, 48/12 and 1/16);*
- *Decree on limit values of priority and priority hazardous substances that pollute surface waters and deadlines for their achievement ("Official Gazette of RS", No. 24/14);*
- *Decree on Limit Values of Pollutants, Harmful and Dangerous Substances in Soil ("Official Gazette of RS", No. 30/18);*
- *Rulebook on the content of the request on the need for impact assessment and the content of the request for determining the scope and content of the study on environmental impact assessment ("Official Gazette of RS", No. 69/05);*
- *Rulebook on the National List of Environmental Indicators (Official Gazette of RS, No. 37/11);*
- *Rulebook on the content and manner of keeping the register of protected natural assets ("Official Gazette of RS", No. 81/10);*
- *Rulebook on protection of strictly protected and protected wild species of plants, animals and fungi ("Official Gazette of RS", No. 5/10, 47/11, 32/16 and 98/16);*
- *Rulebook on Compensatory Measures ("Official Gazette of RS", No. 20/10);*
- *Rulebook on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for protection of priority habitat types and on protection measures for their preservation ("Official Gazette of RS", No. 20/10);*
- *Rulebook on categories, testing and classification of waste ("Official Gazette RS ", no. 56/10);*
- *Rulebook on harmonized amounts of incentives for reuse, recycling and use of certain types of waste ("Official Gazette of RS", No. 45/18);*
- *Rulebook on the list of measures for the prevention of waste generation "Official Gazette of RS", no. 7/19);*

- *Rulebook on conditions and manner of collection, transport, storage and treatment of waste used as a secondary raw material or for energy production ("Official Gazette of RS", No. 98/10);*
- *Rulebook on the form of the document on the movement of waste and instructions for its completion ("Official Gazette of RS", No. 114/13);*
- *Rulebook on the form of the Document on the movement of hazardous waste, the form of prior notification, the manner of its submission and instructions for their completion ("Official Gazette of RS", No. 17/17);*
- *Rulebook on the form of daily records and annual report on waste with instructions for its completion ("Official Gazette of RS", No. 95/10 and 88/15);*
- *Rulebook on permissible noise level in the environment ("Official Gazette of RS", No. 72/10);*
- *Rulebook on noise measurement methods, content and scope of noise measurement reports ("Official Gazette of RS", No. 72/10);*
- *Rulebook on the manner and conditions for measuring the quantity and testing the quality of wastewater and the content of the report on the performed measurements ("Official Gazette of RS", No. 33/16);*
- *Rulebook on technical norms for installations of hydrant fire extinguishing network ("Official Gazette of RS", No. 3/18);*
- *Rulebook on technical norms for protection of high buildings from fire ("Official Gazette of RS", No. 80/15 and 67/17).*

8.2. Measures during the arrangement of locations and supporting infrastructure at the location of WF "Krivača"

8.2.1. Measures for the protection of flora, fauna and habitat protection measures

The construction works will be affected by the loss of arable land and marginal (grassy, shrubby) habitats, as well as the disturbance of the fauna of mammals and reptiles. In order to mitigate this impact, the following measures are proposed:

2. After obtaining the construction permit, and before the start of works on the construction of the wind farm "Krivača", the Project Holder is obliged to prepare a study on the arrangement of the construction site (in accordance with the Rulebook on the content of the study on the arrangement of the construction site, "Official Gazette of RS", no. 121/12 and 102/15), which will include measures of prevention and precaution in relation to the fauna of birds, mammals and reptiles and other protection measures during construction works. In this way, responsibilities and deadlines for the implementation of all planned and each individual measure are directly determined.
3. The Project Holder is obliged to apply prevention measures so that earthworks and vegetation clearing are limited to as small an area as possible in order to prevent unnecessary habitat degradation.
4. Prevention and precautionary measures in relation to habitat protection should include gradual (phased) removal of vegetation during works. This gradual approach of clearing the terrain, with the presence of mechanization and people on the site, leaves the possibility for the present species of mammals and reptiles to spontaneously migrate from the construction zone. The Project Proponent is obliged to ensure that the movement of construction machinery and workers on site is restricted within predetermined and marked corridors, in order to reduce the risk of habitat destruction, disturbance of existing species or killing.
5. The presence of people and construction works can lead to disturbance of birds during the breeding season, due to clearing of vegetation, as well as to the loss of breeding habitats. In order to mitigate these impacts, it is necessary to remove vegetation and interventions at locations, plan and carry it out, out of the breeding season, thus preventing potential destruction of nests, eggs or young.

6. Project Holder is obliged to ensure that the central storage, areas with equipment and machinery as well as access roads are located so as to avoid forest and all other sensitive habitats.
7. Project Holder is obliged to organize a meeting with the contractors before the start of the works where he will inform them about the protected bird species in the subject area and where he will establish a procedure for informing and acting in case they are encountered during the works.
8. In order to prevent potential destruction of nests, eggs or young, the Project Holder shall ensure that vegetation removal is carried out outside the breeding season (February to August). When this is not possible, the Project Holder is obliged to organize a field inspection before starting the works in order to identify the nest. In case the nest is discovered, a protection zone will be determined and marked, within which it is not allowed to perform any work, until it is determined that the nest is no longer used.
9. Special attention should be paid to the species present in the subject area and belonging to the group of birds that are passive pilots, whose flight depends on thermal, so that due to maneuverability and behavior during flight, vulnerability to collision was assessed as very high. It is a golden eagle (Aquila chrysaetos). As the area where these species nest and feed is analyzed, a set of measures was recommended that would lead to habitat relocation. The aim of these measures is to reduce the attractiveness of the wind farm area for birds of prey (where the golden eagle belongs), and especially this applies to the locations of wind turbines:
    - avoid natural or artificial seating;
    - agricultural fields in the wind farm area should not be mowed or mowed before mid-July;
    - avoid facilities inside the wind farm that attract birds (eg landfills);
    - the bases of the pillars must be made in such a way that they are unattractive to birds of prey that feed there;
    - installation of wind turbines with tubular columns and avoiding other structures that are suitable for sitting, are measures to reduce the activity of birds of prey in the area, and thus to reduce the risk of collision.
10. In order to compensate for the loss of common quail breeding habitat *(Citurnix coturnix),* appropriate compensatory measures for quail are recommended:

Compensatory measure: Formation of strips rich in plants at the edges of fields and along field roads. It consists of forming strips rich in plants on the edges of the field and along field roads with a width of at least 5 cm, without the use of pesticides and artificial fertilizers, without mowing until August 1.

Compensatory measure: Leaving grains stubble on arable land. It consists of leaving the stubble of grains in arable fields by February at the latest, the length of the stubble must be at least 20 cm, without the use of pesticides.

11. During the construction of the wind farm, apply some of the modern systems for monitoring intimidation and deterrence of birds, due to the expected accumulation of negative impacts on the fauna of birds and bats (Rulebook on special technical and technological solutions that enable smooth and secure communication of wild animals Official Gazette RS no. 72/2010)).
12. Noise, vibration and light that will occur during construction will be a nuisance to bats that hunt, fly over or have shelters in the Project area. In order to eliminate or mitigate the impact on bats during the works, it is necessary to suspend works or reduce the intensity of works in the period from dusk to dawn in the period of the most intensive activities of bats (April to October); During this period, limit artificial lighting only to the zones of current works, and direct the spotlight towards the zones in which the works

are performed; It is recommended to cover the reflectors with protective covers that prevent light scattering outside the work zone.

13. During the execution of works on the construction of wind power plants, supporting infrastructure and facilities, visual changes in space will be created (visual influences for observation from settlements, state and local roads). In order to mitigate visual impacts due to the introduction of artificial elements in the landscape (due to the presence of mechanization during construction works), it is necessary to reduce vegetation to a minimum through preparatory works, ie remove only what is necessary for construction works. Vegetation (especially high vegetation) should be protected by placing protectors or protective fences in the immediate work zone of the engaged mechanization. After the completion of works, restore the working zones formed on arable land, meadows and pastures to their original condition.
14. It is necessary to enable the final choice of locations for the installation of individual wind turbines to be harmonized with the results of flora and fauna research. That is, to enable possible relocations of individual pillars or reduce the number of wind turbines in order to protect biodiversity. This primarily refers to wind generators that are planned at locations along the gorge of the Brnjica River (Debelo brdo coverage)).
15. For greening or recultivation of areas degraded by works, use only indigenous plant species. The use of allergenic species (poplar, etc.) for landscaping is not allowed.
16. Intervention is acceptable with the aim of accelerating natural recovery, ie burying and sprinkling humus on degraded areas, leveling the terrain and planting indigenous vegetation.

8.2.2. Measures in the field of traffic and road infrastructure

17. In order to ensure unhindered and safe traffic on the routes of state and local road infrastructure, protect the safety and health of the population and the environment, mitigate the impact of increased traffic load of heavy goods vehicles at the local, municipal and regional level, the Project Holder is obliged to transport management in all phases of the Project implementation.
18. The Project Holder is obliged to develop a Traffic Management Plan for public and local roads, in accordance with the traffic and technical conditions of road infrastructure managers (PE "Roads of Serbia"; PE "Directorate for Construction of Veliko Gradiste"; PE "Directorate for Construction Municipality of Golubac"; PE "Directorate for Construction and Development of Settlements of the Municipality of "Kučevo“).
19. The traffic management plan on public roads should define the movement of heavy goods vehicles, the number of tours in both directions and the most acceptable transport routes to the locations of planned wind turbines; define roads that connect zones with works and zones with parts and equipment; speed limits and prevention of dust emissions from roads; for transport, use only the roads that are defined in the planning and project documentation for access to the subject zone and locations.

8.2.3. Noise protection measures during construction

20. In order to reduce the impact of noise during construction works and activities on construction site locations, it is necessary to determine access roads for construction machinery in such a way as to avoid zones with sensitive receptors.
21. During the execution of works, it is necessary that construction vehicles use only designated roads to access the site.
22. The obligation of the Project Holder is to ensure that the workers engaged on the construction site are aware of the requirement that noise and interference from construction works be kept to a minimum.

23. Define the working hours of the construction site for regular construction activities. Work that directly affects the emission of noise in the environment should be performed during the day, at defined working hours.
24. Plan works in such a way that the need for works outside the defined working hours is minimized.
25. During construction works, use regularly maintained equipment and machinery that does not generate elevated noise levels. Equipment and vehicles that are not in use should be switched off (switch off the engine).
26. Use protective equipment to prevent or reduce noise emissions. Equip construction workers for noise protection in accordance with regulations defining safety and protection at work.

8.2.4. Measures for the protection of cultural property and cultural monuments

In accordance with the Law on Cultural Heritage ("Official Gazette of RS", No. 71/94, 52/11, 52/11 (other law) and 99/11 (other law)), Regional Institute for the Protection of Cultural Monuments Smederevo, has determined the conditions that the Project Holder is obliged to fulfill during the execution of construction works:

27. Project Holder is obliged to inform the Regional Institute for the Protection of Cultural Monuments Smederevo in writing at least fifteen days in advance about the start of earthworks.
28. Project Holder and the Contractor are obliged to provide all the necessary conditions for archaeological supervision during the execution of all earthworks on the construction of wind turbines and ancillary facilities, which will be regulated by a special contract.
29. If archeological finds are found during the works, the contractor is obliged to immediately and without delay terminate the works and inform the competent Institute for the Protection of Cultural Monuments and to take measures to ensure that the find is not destroyed or damaged and preserved in place and position. to whom it was revealed.
30. Project Holder is obliged to provide funds for research, protection, storage, publication and exhibition of goods that enjoy prior protection, which is discovered during the execution of works, which will be regulated by a special contract.
31. Project Holder and the Contractor are obliged to prevent the destruction of potential surface archaeological finds in the wider area of the planned works, caused by the construction of access roads or facilities, as well as the operation of heavy machinery.

8.2.5. Protection measures according to the conditions of the Institute for Nature Protection

In accordance with the provisions of the Law on Nature Protection ("Official Gazette of RS" No. 36/09, 88/10 and 91/10 (correction), 14/16 and 95/18 (other law)) and the conditions of the Institute for Nature Protection nature of Serbia, binding measures for the Project Holder are:

34. The horizontal distance between two adjacent wind turbines must be at least the height of one wind turbine.
35. Places with a large number of sensitive species to wind turbines should be avoided, and places where low population densities of sensitive species should be selected for construction.
36. During construction, use the existing road network and avoid the destruction of uncultivated areas, vegetation along agricultural areas and the remains of natural or semi-natural habitats in the wider area.

37. If it is necessary to build additional access roads, organize these works in such a way as not to endanger the stability of the terrain and not to cause erosion processes, ie to minimize the areas that will be cleared of vegetation.
38. Control the movement of people and mechanization only on the listed existing and newly formed roads.
39. It is not allowed to use the network of local roads within the boundaries of the Đerdap National Park for the transport of equipment and the movement of machinery.
40. If there is a need for lighting of the subject location, it is necessary to apply appropriate technical solutions in accordance with the function of the location, first of all use special LED cold lighting, and direct light sources to the ground. Adjust the time dynamics, character and scope of work and engaged anger to the needs of maximum peace in the environment of protected natural resources and minimal disturbance of the usual daily night rhythms of wild animals, all in order to protect the fauna of insects, birds and bats.
41. At the subject location in the period from 01.05. to 01.07. earthworks must not be carried out to remove the surface layer of soil with vegetation, because this is the most critical period for nesting birds. Sensitive and nationally important species (Ural owl and peregrine falcon) nest on the site and in its immediate vicinity, and during the performance of the subject works, the noise level must be maintained within the allowed limits in order to disturb them.
42. Vegetation that is removed during site preparation must be removed before surface earthworks.
43. For each tree with natural cavities or openings that need to be removed during the works, it is necessary to check with an expert or the Institute for Nature Protection of Serbia in terms of determining a potential shelter for bats. If it is determined that the bats use the tree, compensatory measures will be prescribed in terms of establishing artificial habitats.
44. Wherever it is possible to carry out manual removal of vegetation, without the use of heavy machinery, especially on large slopes.
45. As a compensatory measure in relation to the removal of forest vegetation, provide for afforestation and report it only with the planting of indigenous species that have been locally removed, and in proportion to the areas occupied for the needs of wind farms and ancillary facilities. The procedure of species selection and planting must be reported with the consent and recommendations of the competent forest management of PE "Srbijasume".
46. The introduction of invasive plant species for afforestation is prohibited. Invasive (aggressive, allochthonous) species in Serbia are: *Acer negundo* (boxelder maple), *Amorpha fruticosa* (alse indigo-bush), *Robinia pseudoacasia* (Black locust), *Fraxinus pennsylvanica* (Green Ash), *Celtis occidentalis* (Hackberry), *Ulmus pumila* (Siberian elm) *Prunus padus* (bird cherry), *Prunus serotina* (Black cherry).
47. The compensatory measure for the removal of nesting structures and bats (vulnerable groups) must be the installation of artificial holes and tp 100 for bats to be placed in the forest, at least 300 m away from the nearest wind turbine and 50 holes for forest and Ural owl, at least 2 km from the nearest wind turbine.
48. In order to protect migratory species, wind farms above 50 MW of installed capacity should be equipped to ensure continuous monitoring of the passage of birds and bats over the territory occupied by the wind farm.
49. It is not allowed to carry out any interventions in zones with a high concentration of species and individuals of birds and bats, and especially in the zones of their shelter, shelter or nesting place.

50. During all phases of works and activities, if a litter of an animal group is found, it is necessary to temporarily stop the works and contact the Institute for Nature Protection of Serbia to prescribe additional measures.
51. After the commissioning of the wind farm, it is necessary to provide regular monitoring with the planned video surveillance system - recording the suffering of birds and bats. The result of this monitoring must be submitted to the Institute for Nature Protection of Serbia on a quarterly and annual basis. The report should include photographs of killed birds and bats, exact locations and time of finding, distance from the wind turbine and weather conditions.
52. Noise level to be controlled and measured in the post-constructive period in order to maintain the noise level within the permitted limits.
53. In accordance with the results of post-constructive monitoring, especially in case of greater suffering of birds or other species of animals, envisage the possibility of limiting / slowing down wind turbines and inform the Institute, in order to determine the cause of suffering and determine further protection measures.
54. If there is a failure of the wind generator or silencer on the wind generator, it is necessary to suspend operation and repair the failure as soon as possible.
55. Provide for the use of audible warning systems that include broadband noise (not loud, but long-wave) where possible in order to prevent animals from being driven from the site.
56. If it is noticed that birds and bats are kept in large numbers and regularly at certain locations in the immediate vicinity of wind turbines, ie that they are attracted to certain objects (various poles, trees, illegal dumps, etc.) it is necessary, with prior consultation with Institute, or remove the given facilities or apply technical measures to prevent the retention and gathering of birds and bats.
57. Implement protection measures that will minimize the impact of wind farms and ancillary facilities on birds:
    - in order to monitor the impact of transmission lines, wind farms and ancillary facilities, and if birds nest on them, provide for the establishment of platforms for their nesting, in cooperation with the Institute, based on previously obtained special conditions for nature protection issued by the Institute.
58. Dead animals, primarily mammals and birds, after being recorded for the purpose of reporting casualties, must be regularly removed from the wind farm area to a location designated by the competent utility service.
59. When constructing and installing wind turbine poles, it is necessary to apply technical-technological measures, primarily the lighting of buildings, in order to avoid the negative impact of such buildings on the living world.
    - light signaling must be flashing (intermittent);
    - in all phases of construction and the post-construction period, the lighting of all buildings must be kept to a minimum and must be directed towards the ground;
    - wind turbine blades must be alternately painted (one black, two white);
60. The land around the concrete foundations of the pillars and the land on which the cables are laid must be rehabilitated after the completion of the works and restored to their previous condition, thus ensuring that burials and shelters are prevented by mammals that lead an underground lifestyle. prey to predators.
61. All installations must be earthed, secured and adequately insulated in order to prevent or minimize the extinction of wild species.
62. After the completion of construction works, complete remediation of all degraded areas (land leveling and grassing of areas without afforestation) is mandatory, in order to avoid the settlement of animals in the area of wind turbine poles and access roads.

63. Secure the landfill of surplus land that was created during the construction works from washing and dispersal and at the latest after the completion of the works, evacuate from the location and deposit it on the spot and under the conditions of the competent communal service.
64. Disposal of municipal and construction waste and all other forms of organic waste in the area of the wind farm is prohibited.
65. In case of abandonment of the location in question, ie cessation of operation of the wind farm, the investor is obliged to evacuate the installed equipment as soon as possible, remove all facilities and completely rehabilitate the location and restore it to a condition close to the original.
66. If during the works a natural good of geological-paleontological or mineralogical-petrographic origin is encountered, and which is presumed to have the status of a natural monument, the contractor is obliged to inform the relevant Ministry of Environmental Protection within 8 days and take all measures so that the natural good would not be damaged until the arrival of an authorized person.

8.2.6. Wastewater management measures

67. In order to prevent, prevent and mitigate the occurrence and impact of wastewater during works and construction, it is necessary to ensure controlled collection of surface runoff from areas where works are performed through temporarily constructed drainage channels and settling tanks, to prevent direct release into the natural recipient (surrounding land), especially during the rainy season.
68. Potentially oily atmospheric wastewater (may contain suspended solids and petroleum products) that may be generated by runoff from manipulative construction sites must be controlled channeled and treated in a grease and oil separator, which ensures that the quality of treated water meets the criteria prescribed for discharge into a specific recipient.
69. Project Holder is obliged to ensure that the washing and cleaning of equipment and vehicles is carried out in areas equipped with appropriate facilities for controlled collection and treatment of wastewater.
70. For controlled management of faecal wastewater on construction sites, mobile toilets for workers are required. The obligation of the mobile container provider (toilet and sanitary facilities) is to maintain and empty it.

8.2.7. Waste management measures

71. In order to prevent and mitigate the impacts of waste generation during construction and construction, the Project Holder is obliged to include all types and categories of waste and waste materials (municipal waste, construction materials, metal waste, plastic, paper, old tires, etc.). , in accordance with the Law on Waste Management ("Official Gazette of RS", No. 36/09, 88/10, 14/16 and 95/18 (other law)) and bylaws in this area, collects, classifies and disposes to the designated and marked location.
72. Earthen excavated material, which is not stored for re-use, shall be transported to a pre-defined location, for which the consent of the competent local self-government body on whose territory the works are performed has been obtained. Transport of excavated material should be performed by vehicles that have the prescribed baskets and a system of protection against spillage of material.
73. Hazardous waste that may be generated on construction sites (waste oil) should be collected and safely stored in closed containers in a specially designated and marked place in accordance with the Rulebook on the manner of storage, packaging and labeling of hazardous waste "Official Gazette of RS", no. 92/10) and submit for further

treatment to the operator who has a permit for hazardous waste management, with mandatory records (Document on the movement of hazardous waste).

74. It is not allowed to dispose of waste materials in the uncovered and unconcreted area around the wind farm.
75. Any incineration of waste and waste materials in the area of the Krivača wind farm is prohibited.

8.2.8. Land and groundwater protection measures

76. In order to preserve and protect productive land, the Project Holder is obliged to ensure that the occupation of arable agricultural land is done as little as possible.
77. The obligation of the Project Holders is to ensure that during the excavation for the turbine foundations, the excavated material is specially disposed of and saved for reuse (for backfilling, leveling, landscaping, landscaping).
78. Project Holder will implement the necessary measures for erosion protection and control, which will include the formation of drainage channels, ensuring the stability of slopes, sowing grass and spraying.
79. The obligation of the Project Holder is to ensure the protection of land and groundwater from pollution during construction works by minimizing excavation slopes during earthworks.
80. The obligation of the Project Holder is to take all preventive measures in order to reduce the risk of potential leakage, leakage or spillage of pollutants (oils, fuels, chemicals) in the construction sites. Store these materials in designated areas, equipped with spill holders and defined working instructions for adequate handling.
81. Repair or any servicing of machinery and vehicles is not allowed on construction sites, in order to prevent possible leakage or spillage of oil and lubricants in the work area.
82. Project Holder is obliged to ensure controlled storage of all potentially polluting substances (fuel, oils, lubricants, chemicals or liquid waste) for this purpose in specially equipped premises, equipped with spillways. Work instructions for adequate handling of hazardous materials must be available on site and in storage.

8.2.9. Air quality protection measures

83. Protection of air quality during construction is primarily related to the prevention of dust and exhaust emissions, so it is necessary to prevent exposure and drying of the soil (or dust emissions), whenever possible.
84. Vehicles transporting powder materials (and other bulk materials) must be covered in order to prevent emanation of dust, scattering of construction materials and small particles.
85. It is obligatory to regularly spray and wet dusty surfaces and transport routes in order to prevent the scattering and dispersal of small particles and emanation of dust.
86. Limit the speeds of transport and other vehicles on all parts of transport routes and access roads.
87. Ensure that all vehicles are equipped with engines that are regularly maintained in accordance with the prescribed standards of the Republic of Serbia, especially in order to prevent the emission of "black" smoke.

8.2.10. Measures after the completion of construction works

88. Upon completion of construction works, the Project Holder is obliged to start the rehabilitation of degraded habitats as soon as possible. Excess soil material created during excavations will be used for this purpose.
89. After the completion of the construction works, the Project Holder will rehabilitate the land in the degraded zones as soon as possible. Only autochthonous species will be used for replanting vegetation, in accordance with the Greening Plan.
90. Project Holder is obliged to ensure that the resulting habitat loss is compensated by the creation of new or improvement of existing habitats, through vegetation management and planting of indigenous species.

8.3. Measures before the start of operation of WF "Krivača"

91. Project Holder is obliged to, before the start of the wind farm operation, prepare a Disaster Management Plan which should include: accident response plan, training program, control plan and program, other instructions and notices. This Plan determines which activities are undertaken in case of accidents, which external institutions are notified and how the consequences of the accident are remedied.
92. The Plan Implementation Force will include (1) workers in charge of managing the operation of the wind farm at the time of the accident, (2) other non-shift workers, (3) the competent fire brigade.

8.4. Measures during the regular operation of WF "Krivača"

8.4.1. Protection measures provided by the project documentation

93. The conceptual design (“Global Substation Solutions” d.o.o., Belgrade, December 2017) envisages the construction of an internal sewage system for the collection of sanitary wastewater from the administrative building and command center of the Transformation “WF Krivača” and PRP “Krivača”. Sewage will be discharged into waterproof septic tanks (capacity2 x 12 m^3).
94. Transformers will be housed in transformer concrete watertight tubs measuring 6.2 x 9.8 m (depending on the transformer manufacturer). Estimated volume when it will be enough to accept the entire amount of transformer oil (about 35 t for both transformers, depending on the transformer manufacturer).
95. Within the substation, the construction of a watertight oil pit, with a capacity of 22 m^3, is planned for the collection of oil in the event of an accident. The oil pit will have partitions that will enable the separation of oil from the collected atmospheric water.

8.4.2. Habitat, flora and fauna protection measures (protection of birds and bats)

96. The foundations of the poles of each wind turbine should be built in such a way as to prevent the burial of mammals that lead an underground way of life, and which are potential prey for birds of prey.
97. Use tubular poles with a pointed tip, not a lattice one, in order to minimize the convenience of landing, nesting, observing and resting birds.
98. The maximum height of the wind generator must not exceed 200 m, and the maximum length of the propeller must not exceed 75 m.

99. Paint the wind turbine blades with red and white alternating strips. Paint so that the red color is on the top of the arm in accordance with the provisions of the Rulebook on Airports ("Official Gazette of RS", No. 23/12).
100. The flash of the lamp must be on all wind turbines at the same time.
101. The use of red continuous or pulsating light is not allowed, as it attracts birds that migrate at night.
102. If the rotor “cleaning” height zone is a cause of high risk to birds, it should be adjusted to a height if possible, to reduce the risk of collision.
103. It is recommended that power lines be laid below or on the ground, as shielded insulated cables, to avoid electric shocks to birds.
104. All overhead lines, transformers and electrical devices must be subject to all prescribed safety measures (bright red plastic ball warning).
105. It is not allowed to install wind turbines on known local migration routes or in places where large numbers of birds and bats gather.
106. If it is determined that any of the wind turbines or the spatial and temporal aspect of the operation of the wind farm has a particular impact on increasing the mortality of birds or bats, it is necessary to find solutions to eliminate or reduce mortality.
107. Minimize works and activities that may attract prey and predators to the wind farm area.
108. Install wind turbines so as to avoid obstructing the flight of birds and bats, locally, from one side of the area to the other.
109. Warn staff and visitors not to disturb birds, especially during nesting.
110. Avoid placing external ladders and platforms on tubular poles in order to prevent birds from landing and nesting.
111. Avoid the use of cables to anchor turbines or meteorological poles with which birds and bats may collide.
112. If there are cables, they need to be marked with means for repelling and warning birds and bats.
113. The obligation of the Project Holder is to participate in the development of the Compensation Plan for habitat restoration, which will eliminate or reduce the negative impacts on sensitive bird species, and maintain or improve the habitat conditions of other species. Habitat restoration means:
    - setting up watering cans at safe distances, which would direct the gathering of birds outside the home of the wind farm;
    - raising the network of planted bushes, the movement of birds is channeled and directed in a safer, desired direction.

8.4.3. Landscape protection measures

114. The obligation of the Project Holder is to develop and implement a Greening Plan in order to mitigate the negative visual impact in sensitive areas (rural settlements) in the wider area. The landscaping plan must include landscaping in the access road network zones, significant and reference points and in the zone of observation from the settlement. Also, the choice of species for landscaping must be defined in the Greening Plan. The choice of species for landscaping must be based on indigenous species.

8.4.4. Water supply management measures

115. The obligation of the Project Holder is to provide adequate water supply. Water supply of the complex TS "Krivača" and the building for the maintenance of the wind farm,

since there are no conditions for connection to the existing water supply network, will be provided by building its own well or setting up a tank at the location.

116. Construction of own source of water supply-wells, must be in accordance with the provisions of the Law on Waters ("Official Gazette of RS", No. 30/10, 93/12, 101/16 and 95/18 (other law)). After the construction of the exploration and exploitation well and the preparation of the Final Technical Report on the construction of the well, it is necessary to conduct detailed hydrogeological research to the extent necessary for the preparation and defense of the Study on Balance and Reserves of Groundwater.

117. Project Holder is obliged to measure and register the quantities of affected water and keep proper records and to submit the results of measurements on an annual basis to the competent water management authority.

118. In addition to the above, the Project Holder is obliged to act in accordance with other obligations that will be imposed by the water consent of the competent water management authority.

8.4.5. Wastewater management measures

119. Considering that the drainage of wastewater will be provided by the construction of a watertight septic tank or WWTP of smaller capacity, the Project Holder is obliged to provide regular control and (monthly or according to subsequently determined dynamics) emptying of septic tanks. Entrust the discharge activities to the organization authorized for the collection and disposal of sanitary wastewater (to the competent utility company or operator with a permit for wastewater management); keep proper records of septic tank cleaning.

120. Equip septic tank vents with filters that will absorb unpleasant odors.

121. Carry out regular control of oil and grease separators and separator (partition) of the oil pit of the substation. Entrust the separation of the separator from the separated oil phase to an authorized organization (operator who has a permit for hazardous waste management); keep proper records on the cleaning of oil and grease separators and oil pit separators.

8.4.6. Waste management measures

122. In the event that dead animals, primarily mammals and birds, are found in the area of the wind farm, the Project Contractor shall be obliged to remove them from the wind farm area.

123. Hazardous waste, machine, hydraulic - waste oils generated at the site from time to time, during equipment maintenance, should be collected separately in impermeable containers with a sealant that seals them, and the resulting waste should be handled in accordance with the Rulebook on storage, packaging and marking of hazardous waste ("Official Gazette of RS", 92/10), until it is handed over to an authorized operator who has a permit for hazardous waste management.

124. The obligation of the Project Holder is to maintain constant control of the communal hygiene of the complex.

8.4.7. Land and groundwater protection measures

125. Obligation of the Project Holder to establish control and treatment of all waste materials generated in the area of the wind farm in question, in accordance with the Law on Waste Management ("Official Gazette of RS", No. 36/09, 88/10, 14/16 and 95 / 18 (other law)) and bylaws in this area, on the basis of which waste materials are collected, sorted and disposed of at the designated and marked location until the transfer to

operators with a waste management permit for further treatment, with a document on waste movement.

126. Project Holder is obliged to define all work instructions for adequate handling of hazardous materials. Hazardous waste (waste oils) should be stored in impermeable, hermetically sealed containers in accordance with the Rulebook on the manner of storage, packaging and labeling of hazardous waste ("Official Gazette of RS" 92/10), and then hand them over to an authorized Operator for further treatment.

127. In order to protect land and groundwater, it is prohibited to discharge and spill all types of wastewater on land, groundwater, surface water, or the environment in the area of WF "Krivača".

8.4.8. Noise protection measures

128. Ensure proper operation of equipment and devices, by carrying out preventive maintenance in accordance with the manufacturer's recommendations, and thus ensure that the noise level is in accordance with the projected values.

8.4.9. Mitigation measures in case of shadow flicker

129. In the event that after the start of operation of WF "Krivača" residents' complaints about disturbances due to flickering shadows are registered, the Project Holder will, in cooperation and agreement with the injured party, implement protective measures which may include planting greenery with barrier function or installation of curtains, blinds or other shade on endangered objects.

8.4.10. Air traffic protection measures

130. Paint the wind turbine blades with red and white alternating fields so that the red color is on top of the blade. The height of the field must be 1/7 (one seventh) of the total length of the branch in accordance with the Rulebook on Airports ("Official Gazette of RS", No. 23/12 and 60/12).

131. Obstacle marking lights shall be placed on the wind turbine housing so that they can be seen unobstructed from aircraft approaching from any direction.

8.4.11. Measures to protect against unauthorized access

132. It is the responsibility of the Project Holder to provide access to each pillar of the wind turbine.

133. The entrance door of each wind turbine pillar must be locked.

134. Establish a system to prevent unauthorized access and control wind turbines and equipment.

135. Install warning signs on access roads to wind turbines.

136. The space for maintenance and storage should be fenced.

137. The obligation of the Project Holder is to inform the local population and other users of the space about the safety zones and possible dangers during the operation of the wind turbine.

8.4.12. General protection measures

138. Project Holder is obliged to regularly conduct adequate training of employees, which will include the identification of disturbances in the operation of the wind turbine (unusual sounds from the pole, gondola or blades) and ways to act in these cases.

139. In periods of strong gusts of wind (wind speed greater than 25 m / s) wind turbines will automatically stop and maintain in a locked state (due to possible damage to equipment and devices).
140. Project Holder will establish a Program and a plan for the preventive maintenance and monitoring of key parts of wind turbines in order to reduce the risk of failures and potential accidents.
141. Project Holder is obliged to provide and organize regular maintenance of electrical components and rotating parts in the gondola and thus reduce the risk of temperature increase or sparks (and fire) in the gondola.
142. In case of accidents that may occur (blade breakage, wind turbine fall), the generated waste must be completely removed and safely disposed of, ie handed over to the operator who has a waste management permit. If there is a need, it is obligatory to rehabilitate (rehabilitate) the damaged land and compensate for (possibly) the damage done to agricultural crops, forest vegetation or other crops.
143. The obligation of the Project Holder is to install an automatic fire detection system that will ensure the shutdown of the electricity transmission system as soon as possible.
144. The zone around the wind turbine is a no-smoking zone and must be properly marked accordingly.

8.5. Accident protection measures

8.5.1. Accident prevention measures

145. Engage the correct mechanization when performing works on the location.
146. The obligation of the Project Holder is to develop a Contingency Plan which should include:

    - accident response scheme,
    - training program,
    - control program,
    - other instructions and notices.

    This Plan will determine which activities are undertaken in case of accidents, which external institutions are informed and how the consequences are remedied.
147. The implementation of the Emergency Management Plan requires the engagement of all workers in the complex who are in charge of managing the operation of the wind farm and the local competent fire brigade.
148. Wind farms need to have sensors that will detect any imbalance caused by thickening on the propeller. In the event of ice remaining on the propeller, these sensors will ensure that the wind farm does not start operating until the ice is removed from the propeller.
149. Design protection against lightning strikes and fires at the plant, which will take active and passive measures to ensure that the consequences caused by lightning strikes or fires are as small as possible.
150. Wind farms should be located at a distance of at least 500 m from the nearest residential buildings or areas where people are constantly working and living.
151. Design production units so that they can withstand seismic shock waves, ie with a high safety factor.
152. Regular maintenance of electrical components and rotating parts in the gondola, which will reduce the increase in temperature and sparks in the gondola, as a possibility of fire.

153. Organize training of persons in terms of fire protection.

154. The incineration of waste and other combustible materials is prohibited within the area in question.

155. The fire scenario on wind turbines as well as in the substation represents a general type of risk and is the subject of a separate analysis of fire protection conducted by authorized institutions. The study on fire protection is a separate part of the project documentation and determines the manner of response in case of fire and appropriate protection measures.

8.5.2. Accident response measures

156. If due to a malfunction of the mechanization, fuel, oil and lubricants leak to the ground, the Project Holder, ie the contractor is obliged to prevent further spillage of spilled hazardous material.

157. If, as a result of the accident, the land is contaminated, immediately collect the contaminated material in impermeable containers - barrels with lids and hand them over to the Operator holding a Hazardous Waste Management Permit, with the obligatory Document on Hazardous Waste Movement.

158. In case of accidental spillage of hazardous substances, the used sorbent will be collected and deposited according to the Rulebook on the manner of storage, packaging and marking of hazardous waste ("Official Gazette of RS", No. 92/10).

159. In case of land and groundwater degradation, it is necessary to carry out remediation or otherwise rehabilitate the degraded environment in accordance with the Rehabilitation and Remediation Project.

160. Project Holder is obliged to ensure the controlled storage of all potentially polluting substances (fuel, oils, lubricants, chemicals or liquid waste) in purpose-built premises, equipped with spillways. Work instructions for adequate handling of hazardous materials must be available on site and in the storage area.

161. n case of accidental soil pollution (fuel spillage, oil leaks, etc.), the Project Holder is obliged to carry out urgent remediation of the contaminated site and must take all necessary measures to stop the spread of pollution and further environmental degradation. Contaminated land must be removed and disposed of in accordance with hazardous waste management regulations.

8.6. Measures to prevent and mitigate the impact during the closure of WF "Krivača"

The average lifespan of a wind farm is estimated at 25 years, and as changed field conditions, changes in regulations as well as advances in technology can lead to a significantly different approach. For that reason, before the works on the removal of the plant start, the Project Holder is obliged to make the Main Project for the closure and removal of the plant, which will also contain a detailed plan for the rehabilitation of the wind farm area.

162. Within the Main Project of plant closure and removal, it is necessary to define environmental protection measures, in accordance with the field conditions that arose at that time, as well as in accordance with the conditions issued by the competent authorities and institutions.

163. The project with the Recovery Plan should be accepted by the competent authority in the field of environmental protection as well as all other stakeholders (including financial institutions that will participate in financing the project).

164. Before removing the wind farm and clearing the site in question, re-perform the environmental analysis of the site to determine whether special measures and activities are required, depending on the identified species and their habitats.

165. In case of termination of the Project, the Project Holder is obliged to restore the site in question by removing the wind turbine and related equipment.
166. Safely remove all waste materials from the wind farm area, in strict accordance with the provisions of the Law on Waste Management ("Official Gazette of RS", No. 36/09, 88/10, 14/16 and 95/18 (other. Law)), the Rulebook on the manner of storage, packaging and labeling of hazardous waste ("Official Gazette of RS" No. 92/10) and the Rulebook on the conditions and manner of collection, transport, storage and treatment of waste used as secondary raw material or for obtaining energy ("Official Gazette of RS" No. 98/10)).
167. The Project Holder is obliged to empty the contents of the grease and oil separator in accordance with the conditions of the competent utility company.
168. The Project Holder is obliged to empty the contents of the septic tank.
169. Decompose concrete foundations to a depth of 1 m. All waste material generated on that occasion should be shipped from the site and disposed of in accordance with the regulations of the Law on Waste Management ("Official Gazette of RS", No. 36/09, 88/10, 14/16 and 95/18 (other law)).
170. Krivača substation should either be removed or another type of use should be envisaged.
171. When performing works on the arrangement of the complex, engage the correct mechanization.
172. When restoring surfaces, use autochthonous plants for sowing and planting.
173. After the measures taken in case of closure of the plant, the control of the competent inspector for environmental protection is obligatory.

9.0. Monitoring of environmental pollution - monitoring

The main goal of the monitoring system is to provide timely response and warning of possible negative processes and accident situations, as well as a more complete insight into the state of basic environmental factors and determine the need for additional protection measures depending on the degree of threat and type of pollution.

In the previous chapters, a study analysis of possible significant impacts and potential consequences that may occur during the implementation and regular operation of WF "Krivača" on the environment and the population in the area. In order to prevent, eliminate, minimize and reduce to the legal framework all significant impacts on the environment and the population, the environmental protection measures set out in Chapter 8.0 are prescribed.

In addition to the prescribed environmental protection measures, the mechanism of prevention and protection is **environmental monitoring**, ie the program of monitoring the impact on the environment. Prescribed environmental monitoring measures, the Project Holder must implement in compliance with applicable legislation. In addition to internal control and monitoring of project work, authorized - accredited laboratories (institutions, organizations) will be in charge of the implementation of monitoring. Reports on monitoring results must be available and submitted to the competent environmental inspection.

9.1. State of the environment before the start of the Project

The state of the environment, on the location and in the vicinity of the future wind farm "Krivača" is presented in detail in Chapters 2 and 5 of the Study, and in table no. 32 gives a brief overview.

Table no. 32: *Overview of the current state of environmental quality in the impact zone of the planned Project*

Analyzed parameter	Existing quality
Population	At the location where the realization of the wind farm is planned, there are no residential buildings, industrial and production facilities and plants. The nearest settlements, ie rural housing zones to the locations of the planned wind turbines are Krivača, Dvorište, Golubac, Snegotin and Rakova Bara. Each settlement has a specific view in space. The settlements are mostly primary villages, except for Golubac, which is the municipal center. They are economically underdeveloped and in the primary rural settlements agriculture is the dominant activity. The realization of the planned Project - wind farm "Krivača" will not cause demographic changes, ie no significant changes are expected in the demographic structure of the area.
Flora and fauna	In the area of the planned wind farm "Krivača" and the locations planned for the installation of wind generators, there are arable land, meadows, pastures, surrounded by smaller or larger fragments and forest complexes. Typical animal species are represented in these habitats. As it is about wind power plants, special attention must be paid to the impact on ornithofauna and chiropterofauna. Out of the total number of recorded species (107), 66 bird species were singled out as significant (target species). For the target species, based on their protection status, presence in the narrower area, sensitivity to wind farms, endangerment assessment is given.

	Special attention is paid to the analysis of species that are most sensitive to wind turbines (species present in locations intended for wind turbines, predators and species that fly over the subject area during migration or in search of food, as well as species not endangered by collisions with wind turbines from habitat destruction and fragmentation). These are the following bird species: • golden eagle *(Aquila chrysaetos),* • white stork (*Ciconia ciconia),* • greater white-fronted goose (*Anser albifrons),* • common buzzard (*Buteo buteo),* • common kestrel (*Falco tinnunculus),* • Eurasian skylark (*Alauda arvensis),* • hen harrier *(Circus cyaneus)* • common quail *(Coturnix coturnix),* • corn crake *(Crex crex).* Four species of bats have been recorded in speleological objects in the study area: Greater horseshoe bat (*Rhinolophus ferrumequinum*), Mediterranean horseshoe bat (*Rhinolophus euryale*), Common bent-wing bat (*Miniopterus schreibersii*) and Soprano pipistrelle (*Pipistrellus pygma*). Also, additional research has recorded three more species: Common pipistrelle (*Pipistrellus pipistrellus*), Lesser noctule (*Nyctalus leisleri)* and Western barbastelle *(Barbastella barbastellus).* Based on foreign experience, it is considered that the mentioned species of bats, which are present in the subject area of the wind farm, will not be significantly negatively affected.
Land quality	Based on the basic geological map (BGM), it was concluded that in the planning area are mostly layered and bank limestones and massive and bank limestones. The terrain of the location is stable. There is no data on soil pollution, but based on field and environmental insights, it can be concluded that there is no historical pollution at the site and that there are no special requirements for testing and quality control / soil pollution.
Water quality	In the observed area, the dominant watercourse is the Danube River, as a navigable river of international importance, followed by the Pek River, the Tumanska River and several smaller tributaries. The implementation of planning solutions will not have an impact on the quality of surface watercourses given their distance and the characteristics of the Project and planned facilities. Groundwater can be endangered in the construction phase in case of accidents (spillage and leakage of petroleum products) and in case of non-compliance with technological and communal discipline during the use of wind farms (leakage of transformer oil, sanitary-fecal wastewater).

Air quality	The air quality in the observed area is not burdened with pollutants due to the absence of major pollutants, openness and ventilation of the space. The only source of pollutants and dust is traffic on local macadam roads that cross the area. Due to the low frequency of traffic, this impact is negligible. The operation of the wind farm does not lead to emissions of pollutants into the atmosphere. Potential emissions may occur during the execution of works as a consequence of the operation of machinery.
Noise	There are no significant sources of noise in the immediate vicinity, except for noise coming from traffic on local roads.
Meteorological parameters and climate	Not endangered.
Natural and cultural values	Not endangered.
Landscape	In the area of the planned wind farm "Krivača" and the locations planned for the installation of wind generators, there are arable land, meadows, pastures, surrounded by smaller or larger fragments and forest complexes. In the immediate vicinity of the locations provided for wind turbines, there is already a developed road network - rural roads that locals use during the year to perform agricultural work and other activities. Considering that there are already roads in the area of Venac, Debelo brdo, Rakobarski Vis and Tilva, so no significant changes in the structure of the landscape are expected with the reconstruction of the existing and possible construction of new access roads.

9.2. Parameters on the basis of which harmful effects on the environment can be determined

The realization of the subject Project will take place over a longer period of time and, as a rule, leads to certain changes in space and the environment. In order to monitor changes in the planned area, it is necessary to systematically measure, examine and assess the state of the environment in order to enable the protection of natural and created values in the area of the plan.

By assessing the impact of the Project on the environment, the highest probability of impact on the living world was determined, primarily birds and bats, so in that sense it is necessary to monitor the impact of the wind farm, which primarily refers to birds and bats.

In addition to the monitoring of birds and bats, in the Project area it is necessary to conduct monitoring: noise monitoring, monitoring of water, soil and wastewater and waste monitoring.

The required monitoring will provide information on the extent to which environmental protection conditions are respected in the regular operation of the wind farm. In case of non-compliance, the competent institutions shall order appropriate protection measures. Such a program would be particularly important in the initial period of work, during the first two years, perhaps with the possibility of further monitoring if the problem persists.

Environmental monitoring can be performed by independent specialists or competent institutions.

9.2.1. Monitoring of birds and bats

Monitoring of the impact of WF "Krivača" on birds is carried out during two years, with one exit per month or according to the dynamics that will be prescribed at the time of putting the wind farm into operation.

By the decision on the conditions of nature protection 03 no. 019-4 / 5 from 18.03.2020. obligatory regular, standardized monitoring is prescribed, which would record the suffering of birds and other fauna. The results of this monitoring must be submitted regularly, annually, to the Institute for Nature Protection of Serbia. The report should include photographs of the birds killed, the exact locations and timing, the distance from the wind turbines and the weather conditions.

The activities of birds around wind turbines and changes in the ecology of nesting birds are noted. The activity is recorded in each individual wind turbine for half an hour, and includes the type of bird, number, behavior, distance from the wind turbine, height in relation to the propellers. The area around the wind turbine is also searched for injured or dead birds.

The focus is on monitoring the suffering of birds and bats from wind farms, ie finding dead individuals and estimating the number and composition of species of loss.

Particular attention should be paid to species that are most sensitive to wind turbines (species present in wind turbine sites, predators and species that fly over the area during migration or in search of food, as well as species not endangered by collisions with wind turbines, but from habitat destruction and fragmentation). These are the following bird species:

- golden eagle *(Aquila chrysaetos),*
- white stork (*Ciconia ciconia),*
- greater white-fronted goose (*Anser albifrons),*
- common buzzard (*Buteo buteo),*
- common kestrel (*Falco tinnunculus),*
- Eurasian skylark (*Alauda arvensis),*
- hen harrier *(Circus cyaneus)*
- common quail *(Coturnix coturnix),*
- corn crake *(Crex crex).*

All these types can be considered as targets for monitoring the impact of wind farms in phases during and after construction.

Monitoring should be performed in all seasons in which the given species are present. When monitoring the suffering of birds and bats, the error due to the removal of dead individuals (by other animals or humans) or due to the impossibility of finding each dead individual should be assessed, because such errors affect the assessment of impact.

Bat monitoring should be carried out within 3-5 years from the commissioning of the wind farm and it is mandatory to monitor:

- habitat loss,
- mortality,
- migration,
- behavior.

In order to determine the risk mitigation program and monitor the effects of the measures taken, establish a long-term program for monitoring species and numbers in the project field and environment using automatic ultrasonic bat detector and other techniques and models for risk assessment.

Monitoring after the implementation of WF "Krivača" should answer the following questions:

- What is the rate of suffering of birds and bats caused by WF "Krivača"?
- What is the rate of suffering of protected and important birds and bats caused by WF "Krivača"?
- What is the relationship between the suffering rates of birds and bats and the projected losses?
- Does mortality vary according to the characteristics of the position of objects?
- What is the composition of the loss of nesting birds, and what is the migration of migratory birds, ie local bats and those that are passing by?
- Do data on losses indicate the need to use measures to reduce the negative impact?

The results of monitoring the suffering of birds and bats should be sufficient for statistical processing, to enable comparison of impact forecasts made before construction and possibly, comparison with results obtained at other wind farms, as well as to be the basis for deciding whether corrective changes or measures are needed to mitigate the negative impacts.

If possible, it is necessary to monitor as many turbines as possible that are in as different positions as possible, or by the method of random sampling. It is recommended that wind turbines located in different habitats be always included in the monitoring.

Surfaces for searching for dead birds need to have a certain width that is equal to at least twice the height of the turbine from the ground. It is important that each area for searching for birds and bats is accurately mapped.

It is necessary to keep proper records after each field trip. For each search, the date, start time, end time, name and surname of the tracker, which turbine is processed, time data are recorded. When it finds a dead bird or bat, the searcher marks the location and continues with the search. After searching the entire area, the tracker returns to the location and records the date, type, age and sex (if possible), his name and surname, turbine mark, distance from the turbine, azimuth from the turbine, habitat, condition of the deceased. bird or bat (whole, parts, nausea), estimated time of death (eg <1 day, 2 days). A found bird or bat should be photographed. It is handled in protective rubber gloves for epidemiological reasons, and in order not to transmit human odor to corpses that will be used to examine the carcass removal of predators / vultures. The bodies are placed in plastic bags and marked. Fresh corpses (which were found to have perished the night before) should be randomly scattered on the same day for a removal test.

9.2.2. Noise monitoring

The study proposes measuring the "zero" state of noise levels (since there are no results of previous measurements). It is not expected that the permitted noise levels could be exceeded during the construction works and the imposed measures. If this still happens, it is necessary to apply appropriate additional measures in the construction work management program. In case of noise disturbances during the operation of the wind farm, develop a monitoring program and coordinate it with the competent authority.

Environmental noise measurements are prescribed by the Law on Environmental Noise Protection ("Official Gazette of RS", No. 36/09 and 88/10), and are performed in accordance with the Rulebook on noise measurement methods, content and scope of reports on noise measurement ("Official Gazette of RS", No. 72/10) and the Decree on noise indicators, limit values, methods for assessing noise indicators, harassment and harmful effects of noise in the environment ("Official Gazette of RS", No. 72/10). 75/10).

Measurements of noise levels in the environment are performed by an accredited organization. The measuring points are the nearest residential buildings.

If the measures specified in Chapter 8.0 of this Study are complied with:

- the noise level during construction will be at an acceptable level so that noise monitoring is not required during the construction phase.

During the operation of the Project, there are two distinct sources of noise related to the operation of the wind farm:

- aerodynamic noise caused by the propeller as it moves through the air and
- mechanical noise generated by the operation of mechanical elements in the housing (generator and transmission system).

Since wind turbines are sources of noise during operation, it is necessary to conduct noise monitoring in accordance with applicable laws and regulations. Noise monitoring should be carried out in the manner prescribed by the competent authority. If the monitoring determines that during the work of the Project the permitted noise levels were exceeded, it is necessary to take adequate measures to reduce these impacts to the legally permitted level.

No special traffic monitoring is proposed during construction. However, bearing in mind that mitigation measures prescribe the application of traffic management procedures, it is understood that the applied procedures will be reviewed to determine whether adequate transport routes are used.

9.2.3. Water, soil and wastewater monitoring

Monitoring of surface, groundwater and soil quality is recommended in the construction and regular operation phase of the Project. The implementation of these management measures is usually a request of international financial institutions and includes the following:

- Appropriate training of all employees handling hazardous materials is mandatory.
- It is mandatory to establish appropriate communication procedures in order to obtain information from internal and external stakeholders, including reporting on accidents in which hazardous substances have been used.
- It is mandatory to apply non-compliance procedures and implement corrective measures for each problem identified by internal or external stakeholders.
- Periodic inspections are required to assess environmental performance, including the management of hazardous substances.
- Monitoring the quality of oily (polluted) atmospheric wastewater, based on water sampling at the separator outlet and sample processing. The processing of samples is performed in an authorized laboratory, where data on water quality are obtained from the technological aspect, as well as conclusions on its possible changes. It is necessary to examine biochemical and physical parameters in accordance with the provisions of the Law on Waters ("Official Gazette of RS" No. 30/10, 93/12, 101/16 and 95/18 (other law)).

  The control parameters to be monitored are:

  - physical characteristics (temperature, visible waste materials, noticeable color, noticeable odor, turbidity),
  - pH value,
  - five-day biological oxygen demand (BOD5),
  - chemical oxygen demand (CHD),
  - lead,
  - iron,
  - toluene,
  - benzene,
  - xylene,
  - phenolic compounds (phenol).

  It is necessary to perform measurements and data processing every three months. These are the time intervals in January, April, July and October. The processing of samples is performed in an authorized laboratory, where data on water quality are obtained from the technological aspect, as well as conclusions on its possible changes.

- It is also necessary to keep records of emptying and cleaning oil and grease separators with a precipitator. The obligation of the Project Proponent is to entrust the cleaning to an authorized operator who has a Hazardous Waste Management License, who will also take over the generated hazardous waste, which is in accordance with the Law on Waste Management ("Official Gazette of RS", No. 36/09) 88/10, 14/16 and 95/18 (other law)), with the obligatory completed Document on the movement of hazardous waste.

9.2.4. Waste monitoring

Waste monitoring aims to monitor, control and manage all types and categories of waste in the area of the wind farm "Krivača", as well as reduce negative environmental impacts caused by inadequate waste management, and according to the Waste Management Plan (determination of types, categories and quantities of waste which occurs in the complex), in accordance with the Law on Waste Management ("Official Gazette of RS" No. 36/09, 88/10, 14/16 and 95/18 (other law)).

- Regular emptying of containers with municipal waste through the competent public utility company.
- Assign recyclable waste to an authorized Operator who has an appropriate waste management permit, with the mandatory completion of the Waste Movement Document.
- Handle hazardous waste (sludge from cleaning the grease and oil separator) in accordance with the provisions of the Ordinance on the method of storage, packaging and labeling of hazardous waste ("Official Gazette of RS" No. 92/10), hand it over to the operator who has a permit for hazardous waste management, with mandatory completion of the Document on the movement of hazardous waste.
- Waste oil (hydraulic, transformer) is safely collected in impermeable, non-corrosive, packaging, with original closure and stored on a concrete base, protected from the effects of the atmosphere. The waste is stored on site temporarily, until it is handed over to the authorized Operators who have a hazardous waste management permit.

Note: The Project Holder is obliged to keep proper records of measurements, measurement results and to integrate environmental monitoring for the complex through the availability of data, in monitoring at the municipal level, when it is established.

10.0. Non-technical short data overview

The subject of updating the Study on Environmental Impact Assessment of the Project for construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka) is the construction of 22 wind turbines, ie wind farm complex "Krivača" on the territory of the municipality of Golubac and the municipality of Kučevo.

With the advancement of technology in the field of wind energy, the Project Holder plans to install wind turbines with higher installed power (maximum possible power of individual wind turbines is 5.8 MW), **higher column heights** and **larger blade diameters**, compared to wind turbines originally planned in the Study on environmental impact assessment for which consent has been obtained (Decision No. 353-02-393 / 2015-16 of 29 May 2015, Ministry of Agriculture and Environmental Protection).

The total installed capacity of the wind farm will not exceed **103.32 MW** at the point of takeover of electricity by EMS, which is conditioned by the **Energy Permit (Decision No. 312-01-00066 / 2015-04 of 17.06.2015, Ministry of Mining and energy).**

The area planned for the realization of the wind power plant "Krivača" is defined by the Detailed Regulation Plan for of the wind power plant "Krivača" in the municipalities of Golubac, Kučevo and Veliko Gradište, for which the first amendment was initiated due to the change in the rules of construction of wind turbines and the rules of parceling.

The project of the wind power plant "Krivača" is harmonized with the spatial planning and urban documentation, with:

- Spatial plan of the special purpose area National Park "Đerdap" (“Official Gazette of RS”, No. 43/13 of 17 May 2013;
- Spatial Plan of the Municipality of Golubac (“Official Gazette of the Municipality of Golubac”, No. 3/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Golubac, whose provisions provide the possibility of using wind as a renewable energy source in the planned Project;
- Spatial Plan of the Municipality of Kučevo (“Official Gazette of the Municipality of Kučevo”, No. 4/2011) with the Strategic Impact Assessment of the Spatial Plan of the Municipality of Kučevo, also provides the possibility of using wind as a renewable energy source.

The basic planning setting for the wind farm "Krivača" is to be located outside the borders of:

- National Park "Đerdap", based on the Spatial Plan of the special purpose area of the National Park "Đerdap" ("Official Gazette of RS" No. 43/13) and
- Spatial plan of the special purpose area of the international waterway E-80 Danube (Pan-European Corridor VII), which is prepared on the basis of the Decision published in "Official Gazette". RS Gazette ”, no. 3/10.

The technical potential for the use of renewable energy sources is great and exceeds all already available sources. Numerous factors such as climate change, increasing greenhouse gas emissions, declining fossil fuel reserves, and high energy prices have led to the encouragement and commercialization of renewable energy sources. For this reason, wind energy has recently become increasingly popular, with a significant increase from year to year, because wind energy is a competitive and economically viable energy source.

The subject project is the construction of the wind farm "Krivača" which is planned in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka).

The environment of the planned wind farm "Krivača" is a sparsely populated area with low housing densities, so no negative impacts caused by activities in populated areas are

expected. Also, there are no production complexes in the area that could endanger the quality of water, air and soil, as well as increase noise levels. The immediate environment of the planned wind farm "Krivača" consists mainly of agricultural and forest land, and the analyzed area is located at a safe distance from the border of the National Park "Đerdap", which is located east of the planned wind farm.

In the area of the wind farm "Krivača", no indicators of terrain instability, landslides, landslides, erosion have been identified. The bearing capacity of the terrain is satisfactory, based on the performed geomechanical research.

More detailed information on habitats and present species was collected during dedicated research conducted for the construction of the Krivača wind farm - "Analysis of the impact of the planned Krivača wind farm on birds and bats" (Zoran Milovanović, January 2015), as well as additional periodic research which were conducted in the period from 2015 to 2019 ("Analysis of the impact of the planned wind farm" Krivača "on birds and bats (2015-2019)", Zoran Milovanović, November 2019). These two documents represent the basic documentation of the research of birds and bats in the subject area.

At the request of the creditors of the Krivača Wind Farm Project, IFC, additional research on birds and bats was conducted in the period September 2015 - August 2016, and the results of this monitoring, combined with the results of previous research, are given in the following three documents:

- Krivaca Wind Farm, Bird Monitoring Report (2015-2016), MottMacdonald, April 2017.) – refers to the monitoring of birds in the subject area,
- Krivaca Wind Farm, Collision Risk Assessment Report (2015-2016), MottMacdonald, April 2017.) – refers to the collisions assessment risk of animal groups with wind turbines,
- Krivaca Wind Farm, Enviromental and Social Impact Assessment Addendum, MottMacdonald, December 2017.) – includes a broader analysis of the impact of wind farms on the environment.

During the one-year research of birds in the subject area and the wider environment in the period January-December 2014, 107 species of birds were recorded. 66 species of birds have been recorded in the narrower area (wider surroundings of locations intended for wind generators). National and international protection status is given for all recorded species.

Of the total number of recorded species, 66 bird species were singled out as significant-target species. For the target species, based on their protection status, presence in the narrower area, sensitivity to wind farms, endangerment assessment is given.

Special attention is paid to the analysis of species that are most sensitive to wind turbines (species present in locations intended for wind turbines, predators and species that fly over the subject area during migration or in search of food, as well as species not endangered by collisions with wind turbines from habitat destruction and fragmentation). These are the following bird species:

- golden eagle *(Aquila chrysaetos),*
- white stork (*Ciconia ciconia),*
- greater white-fronted goose (*Anser albifrons),*
- common buzzard (*Buteo buteo),*
- common kestrel (*Falco tinnunculus),*
- Eurasian skylark (*Alauda arvensis),*
- hen harrier *(Circus cyaneus)*
- common quail *(Coturnix coturnix),*
- corn crake *(Crex crex).*

All these types can be considered as targets for monitoring the impact of wind farms in phases during and after construction.

The research of bats in the subject area included, above all, all available and known speleological objects. The following speleological objects are present in the research area:

- Ivanova cave, located in the immediate vicinity of the Stupanjska river at the foot of Debelo Brdo, in the area of the Đerdap National Park, in the gorge of the Brnjica river (Figure no. 41),
- Funduri Cave, located near the source of the Rakobar River at the foot of Rakobarski Vis (Figure No.39);
- Gaura Mare Cave, located in the gorge of the river Brnjica at the foot of Debelo Brdo (Figure no. 38).

Seven species of bats were recorded in speleological objects in the investigated area:

- greater horseshoe bat *(Rhinolophus ferrumequinum)*,
- Mediterranean horseshoe bat *(Rhinolophus euryale)*,
- common bent-wing bat *(Miniopterus schreibersii),*
- soprano pipistrelle *(Pipistrellus pygmaeus),*
- common pipistrelle (*Pipistrellus pipistrellus),*
- lesser noctule (*Nyctalus leisleri*) and
- western barbastelle (*Barbastella barbastellus).*

An inspection of old, abandoned houses in the subject area did not reveal the presence of bats in them.

Based on foreign experience, it is considered that the mentioned types of bats, which are present in the subject area, will not be significantly affected by wind farms. This will certainly depend on the application of measures that prevent, reduce and eliminate any significant harmful effects of wind turbines on the bat population present in the subject area.

The subject project includes the construction of:

- 22 wind turbines;
- Wind turbine foundations;
- Main and auxiliary plateau and with retaining walls

Installation of 22 wind generators of nominal power up to 5.8 MW is planned within the WF "Krivača".

The wind turbine (WT) will be equipped with a three-bladed propeller with a maximum diameter of 155 m, and the maximum total height of the wind generator will be up to 205 m.

The Project Proponent will select a specific type of wind turbine with the associated configuration, whereby the power of the wind farm at the place of delivery to the electricity grid will not be transferred. at the connection point of 103.32 MW, and the number of installed wind turbines will be in accordance with the valid planning documentation.

The WT gondola, with all its associated equipment, is mounted on the WT pole. A tubular steel pillar is provided for carrying the gondola.

Wind turbines are delivered as a prefabricated product with factory documentation.

The wind generator (wind turbine) has the possibility of complete regulation of the gondola position for the purpose of maximum use of wind power (active wind direction control system).

The power of the wind generator is controlled by a system for turning the blades (pitch), which involves independent control of each of the three blades. The gondola control system (so-called yaw system) has the role of rotating the gondola. With the help of these two control systems, the possibility is provided that the wind turbine makes the best possible use of the available wind potential.

The basic characteristics of wind turbines are shown in the following table.

characteristic	feature
Potential type of wind turbine	**Nordex N149/4,8 MW** (The specific manufacturer will be defined in the Project Execution phase)
Assigned power WT	max. 5,8 MW
Propeller blade system	Rotor with three blades and horizontal shaft
Rotor diameter	max. 155 m
Height to blade tip	max. 205 m

The technological process of production and distribution of electricity using wind power can be presented as follows:

- propellers (blades) rotate with the help of wind power;
- rotation of the wind turbine blades causes the rotor to rotate, which converts wind energy (kinetic) into electrical energy;
- the transformer inside the wind generator raises the current voltage for further transmission by underground cables to the central transformer station of the complex;
- in the Transformation facility, the voltage is increased to correspond to the national transmission network and placed in the transmission network through the connection and distribution plant;
- electricity is transmitted to the grid and distributed to customers.

In conditions when the wind speed is constantly higher than 3 m / s, the rotation of the wind generator blades begins (clockwise). The rotation of the blades leads to the rotation of the rotor and the creation of kinetic energy which is converted into electrical energy through multipliers and generators. The minimum operating wind speed is 3 m / s and at this speed the wind generator starts producing electricity, with a power of about 20 kW. At a wind speed of 6 m / s, the wind generator generates electricity of about 600 kW. A wind speed of 12 m / s represents the nominal operating speed at which the wind generator reaches its nominal power of about 3000 kW. The maximum operating wind speed is 25 m / s, at which the wind turbine automatically stops and stays locked. At higher wind speeds, the wind turbine will remain locked for safety reasons (primarily due to damage to equipment and devices). The largest amount of electricity produced will be placed in the electricity transmission system. A smaller amount will be used for the internal consumption of the facilities on the site, for the needs of the wind generators themselves to start the hydraulic system for braking the turbine rotor (in cases when the wind speed is constantly higher than 25 m / s). The electricity produced in the generator is distributed to the transformer located in the wind turbine pole and then to the underground, collecting power network of voltage level 35 kV to the central substation.

The realization of the planned project, ie the construction of the wind power plant "Krivača" on the territory of the municipalities of Golubac and Kučevo, does not require special use of natural renewable, non-renewable (difficult to renew) resources.

The regular work of the Project will use the potential of wind to obtain electricity, so that regular work does not lead to the consumption of resources and energy. The main goal of the wind turbine is to convert the kinetic energy of the wind into mechanical energy, and then into the next transformation into electrical energy, so the most important parameter is the amount of useful wind energy in the area.

Realization of the wind power plant implies temporary and permanent occupation of the land, for: formation of a plateau with earthworks, which will be dimensioned in accordance with the technological needs of the installation of wind generators; construction of the foundations of wind turbine poles, storage of wind turbine surface parts; mechanized parking lots; rotor blade mounting space; manipulative space for installation work; transformer station, administrative building and accompanying facilities; road infrastructure. During the realization of the Project, mechanization will be hired to perform construction works, which will use petroleum products

as fuel. Based on the analysis of site characteristics and the characteristics of the planned Project, analysis of the projected scope of works, their local character and limited duration, it was estimated that the use and consumption of fuels does not significantly affect the consumption of petroleum products as non-renewable resources.

The project will contribute to the improvement of electricity supply and the reduction of losses in the electricity network in the subject area, and from the aspect of energy consumption it is a positive aspect.

In the process of environmental impact assessment, it is necessary to consider all aspects of the impact of the Project in question. Special attention must be paid to the generation of waste both in the phase of realization and in the phase of its exploitation, ie regular operation of the wind farm.

The greatest impact and pressure on the environment can be expected during the implementation of the Project, ie during the execution of preparatory and construction works, when the environment suffers negative impacts of local and time-limited nature. On-site works require the engagement of machinery, the operation of which causes the emission of atmospheric pollutants, impulse noise and vibration (when installing piles), dust and the generation of construction waste. In the case of forced labor, these types of pollution and environmental impact may, in the short term, lead to exceeding the limit values. The presence of mechanization, construction waste and untidy location in the phase of realization and execution of construction works, cause visual degradation of space, limited to the visible from the immediate environment. However, given the planned scope and duration of work, the number of means of work, these negative impacts will not cause significant and lasting consequences for the environment. All negative influences of the mentioned type and character cease upon completion of works, without the possibility of recurrence, and the landscape and urban-architectural solution of the complex significantly improves the visual quality of the location, ie the associated ambient unit.

Air emissions can occur only in the implementation phase of the Project. Wind farms are not emitters of air pollution.

During regular operation, wind turbines make noise. The noise caused by the wind turbine decreases with increasing distance from the wind turbine. The Project Proponent, during the determination of the number and disposition of wind turbines, performed preliminary noise modeling. The model found that noise levels from wind turbines are significantly below the legally prescribed levels. For that reason, the planned disposition of the wind generator is very favorable and will not affect the state of the environment in the immediate and wider environment.

Accident (right) situations, smaller in size and scale, are possible on the site during the previous works on arranging the location and during the implementation of the Project, accompanying contents and infrastructure, in case of hazardous spillage or accidental leakage of petroleum products from engaged mechanization and means of work. Such an accident requires urgent suspension of works, remediation and treatment of such generated waste (which has the character of hazardous waste) according to the provisions of the Ordinance on the manner of storage, packaging and labeling of hazardous waste ("Official Gazette of RS", No. 92/10). to the authorized operator who has a License for hazardous waste management for further action, along with the Document on the movement of hazardous waste. On the construction site, during the execution of works on the marked area, a container with sorbent (sand, zeolite) and a marked container (impermeable with a lid) must be placed to act in case of the specified accident.

In order to prevent, prevent, reduce, eliminate and minimize possible significant impacts on the environment, especially on birds, bats and environmental media (land, air, surface and groundwater), this Study prescribes measures to protect and monitor the environment environments, which must be planned and implemented in all phases of implementation and regular work of the Project, as well as in case of an emergency situation at the location or termination of the Project.

Realization of the Project of the wind farm "Krivača" will take place in compliance with the conditions and consent of the holder of public authorizations, according to the project documentation and in compliance with norms and standards of the subject activity, legal regulations, mandatory supervision and implementation of projected protection measures. and a small impact on the environment.

Based on the characteristics of the wind farm "Krivača", planned technical solutions for prevention and environmental protection, possible right situations have been identified:

- leakage of petroleum products from engaged machinery and vehicles,
- ice formation on propellers,
- tearing or breaking the blade,
- wind turbine fall,
- lightning strike and fire.

In order to prevent, prevent, reduce, eliminate and minimize possible significant and harmful impacts on the environment, especially on birds, bats, land, this Study prescribes environmental protection and monitoring measures that must be planned and implemented in the implementation phase and regular work of the Project, as well as in case of an emergency situation at the location.

After obtaining the approval of the Study on Impact Assessment by the competent authority, the measures prescribed by the Study become binding on the Project Holder. Every environmental protection measure must be in accordance with the applicable regulations of the Republic of Serbia.

Based on the above facts, it can be concluded that the project of construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka), can be sustainable and environmentally friendly with strict application projected measures of environmental protection and environmental monitoring as well as measures of prevention, elimination, minimization and reduction in the legal framework of all negative impacts on the environment.

11.0. Data on technical deficiencies or lack of appropriate professional knowledge or skills or inability to obtain appropriate data

During the preparation of the Updated Study on Environmental Impact Assessment of the Project - construction of wind farm "Krivača" in the municipalities of Golubac (CM Golubac, CM Dvorište, CM Krivača) and Kučevo (CM Rakova Bara, CM Radenka), the processor had an insight into all necessary documentation and data, and it can be concluded that there are no identified shortcomings, lack of professional knowledge and skills, and that the study was prepared in accordance with the Law on Environmental Protection ("Official Gazette of RS", No. 135/04, 36/09 , 36/09 (other law), 72/09 (other law), 43/11 (CC), 14/16, 76/18 and 95/18 (other law)) and the Law on Environmental Impact Assessment environment ("Official Gazette of RS", No. 135/04 and 36/09).

12.0. Work team data

Evica Rajić – graduated from the Faculty of Natural Sciences and Mathematics in Belgrade in 1986.

Employment:

- 1986: PE Directorate for Urbanism and Construction, Kragujevac, engaged in jobs as Chief Planner for spatial and urban planning and ecology;
- 1988: Municipal Assembly of Kragujevac, engaged as an Expert Associate in environmental protection;
- 1988: PE Directorate for Urbanism and Construction, Kragujevac, engaged as: Coordinator for: new programs, post-urban and urban planning and ecology in spatial planning, environmental protection, study research, studies on valorisation of space for further urban development of settlements and cities, waste management studies, environmental impact analysis;
- 2000: ECOlogica Agency, Kragujevac, hired as: Responsible person for the development of: environmental impact analysis, environmental impact assessment;
- 2006: ECOlogica URBO DOO Kragujevac, engaged as: director and responsible person for the development of: strategic environmental impact assessments, environmental impact assessments, spatial and urban plans and projects;

Svetlana Đoković, B.Sc. with Honors in Ecology - graduated from the Faculty of Natural Sciences and Mathematics in Kragujevac in June 2004. From July 2006 until today he works in the company ECOlogica URBO DOO, Kragujevac. Engaged independently or in a professional team on the following tasks:

- Environmental impact assessments of projects
- Strategic environmental impact assessments
- Implementing IPPC procedures
- Waste management plans and obtaining waste management permits
- Local environmental action plans
- Education in the field of environmental protection and safety at work
- Preparation of specific ecological analysis - zero condition analysis, consultations in hiring laboratories for testing emissions, water quality, soil, waste testing
- Preparation of a report on the results of environmental quality testing.
- Independent consultant for environmental and social performance audit.
- Member of the Technical Assessment Commission of the Environmental Impact Assessment Study, on behalf of the Ministry of Environmental Protection

Marin Rajić, B.Sc. eng. of Electrical Engineering - graduated from the Faculty of Electrical Engineering in Belgrade, Department of Electronics in 1981.

- License of the responsible designer of telecommunication networks and systems, no. 353 5027 03
- License of the responsible contractor of telecommunication networks and systems, no. 453 5365 04

Employment:

- 1982 - 1983: „Filip Kljajić“, Kragujevac

- 1984 - 1989: PTT Kragujevac; work in the Investment Service on planning, design and construction of telecommunication capacities
- 1989 - 1991: Association of Yugoslav PTTs Belgrade; work on drafting instructions and regulations in the field of telecommunication lines and networks, especially in the field of optical cables
- 1991 - 1997: PTT Kragujevac; head of the Service for maintenance of local and long-distance TT networks
- 1997 - 2001: Telecom JSC Serbia; Director of the Kragujevac-Jagodina Branch for residential users
- 2001 - 2018: Telecom JSC Serbia; independent professional work on planning, design and execution of works on optical telecommunication networks

  2019 ECOlogica URBO DOO, associate in the preparation of documentation for environmental impact assessment.

Marija Babić, Master of science in Biology-ecologist - completed the Basic Academic Studies in October 2011, and the Master of Academic Studies in November 2014, at the Faculty of Natural Sciences and Mathematics in Kragujevac. In August 2015, she was engaged in the company ECOlogica URBO DOO as an expert associate in the field of environmental impact assessment, development of waste management plans and other tasks in the field of environmental protection.

Sanja Andrejić, master ecologist - completed the Basic Academic Studies in September 2016, and the Master of Academic Studies in December 2017, at the Faculty of Natural Sciences and Mathematics in Kragujevac. In the company ECOlogica URBO DOO, she was hired in November 2018, as an expert associate in the field of environmental impact assessment and other activities in the field of environmental protection.

Zvezdana Novaković, Master in Technology - completed Basic Academic Studies in October 2017, and Master of Academic Studies in July 2018 at the Faculty of Technology and Metallurgy in Belgrade. In the company ECOlogica URBO DOO, she has been engaged, since November 2018, as an expert associate in the field of environmental impact assessment, other tasks in the field of environmental protection and in the implementation of IPPC procedures. Independent consultant for environmental and social performance audit.

Nevena Janjović, B.Sc. spatial planner - completed Basic Academic Studies in July 2018 at the Faculty of Geography, University of Belgrade, not majoring in spatial planning. She has been engaged in the company ECOlogica URBO DOO since November 2018, working as a planner designer.

Nevena Zubić, master in chemistry - completed the Basic Academic Studies in February 2018, and the Master of Academic Studies in September 2019, at the Faculty of Natural Sciences and Mathematics in Kragujevac. She has been engaged in the company ECOlogica URBO DOO since October 2019, as an expert associate in the field of environmental impact assessment and other tasks in the field of environmental protection.

Goca Damljanović, specialist technician - Since 2000, she has been engaged in the company ECOlogica URBO DOO in the field of technical processing of documentation.

APPENDICES

Appendices:

- Excerpt from Business Registers Agency of the Project Holder;
- Notification in accordance with the ESPOO Convention, No. 353-02-672 / 2013-05 of 01.07.2013 - NOTIFICATION TO AN AFFECTED PARTY OF A PROPOSED ACTIVITY UNDER ARTICLE 3 OF THE CONVENTION;
- Decision on approval of the Study on Environmental Impact Assessment of the construction of the wind farm "Krivača" no. 353-02-393 / 2015-16 from 29.05.2015, Ministry of Agriculture and Environmental Protection, Belgrade;
- Decision on determining the scope and content of the updated Study on Environmental Impact Assessment, no. 353-02-1989 / 2019-03 from 19.11.2019, Ministry of Environmental Protection;
- Decision on the adoption of the first amendment to the Detailed Regulation Plan of the area of the wind farm "Krivača" in the municipality of Golubac ("Official Gazette of the Municipality of Golubac", No. 9/2019.);
- Decision on the adoption of the First Amendment to the Detailed Regulation Plan of the area of the wind farm "Krivača" on the territory of the Municipality of Kučevo ("Official Gazette of the Municipality of Kučevo", No. 11/2019.);
- Decision on energy permit, no. 312-01-00066 / 2015-04 dated 17 June 2015, Ministry of Mining and Energy;
- Location conditions ROP-MSGI-33565-LOCH-2/2019, number 350-02-00545 / 2019-14 from 09.06.2020, Ministry of Construction, Transport and Infrastructure Belgrade;
- Decision on the conditions of nature protection, 03 number: 020-169 / 2 from 14.08.2012, the Institute for Nature Protection of Serbia issued the conditions;
- Decision on the conditions of nature protection, 03 no. 019-4 / 5 from 18.03.2020, Institute for Nature Protection of Serbia, Belgrade;
- Conditions no. 4 / 3-09-0239 / 2019-0002, dated 4 December 2019, Directorate of Civil Aviation of the Republic of Serbia, Belgrade;
- Conditions no. 373/2 - 2019, dated November 29, 2019, Regional Institute for the Protection of Cultural Monuments Smederevo;
- Decision on the construction permit for the construction of 31 wind turbines in the area of the wind farm "Krivača", no. 351-03-01919 / 2015-07 dated 24 November 2015, the territories of the municipalities of Golubac and Kučevo;
- Confirmation on the application of works for the construction of wind turbines, according to the issued Decision on the construction permit, was approved by the Ministry of Construction, Transport and Infrastructure, document no. 351-06-02986 / 2017-07 from 12/12/2017.

GRAPHIC APPENDICES

Graphic appendices:

- Macrolocation - satellite image of Google Earth; - Situation of WF "Krivača" 22 wind turbines - Conceptual design (CD) - 3. Project of hydraulic installations of retaining walls, number of technical documentation GSS -VEKV-IDP-003, "Global Substation Solutions" Belgrade, June 2020;
- Plateau situation T1-1 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-003, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-4 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-004, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-5 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-005, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-6 - Conceptual design (CD) - 2/3 Plateau design for wind turbine installation, number of technical documentation GSS -VEKV-IDP-002-3-006, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-8 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-007, "Global Substation Solutions" Belgrade, June 2020;
- Plateau situation T1-9 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-009, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-10 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-009, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-11 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-010, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-12 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-011, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-13 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-012, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T1-15 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-013, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T2-1 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-014, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T2-2 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-015, “Global Substation Solutions” Belgrade, June 2020;

- Plateau situation T2-2 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-015, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T2-3 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-016, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T2-4 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-017, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T2-5 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-018, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T3-1 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-019, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T3-2 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-020, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T3-3 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, technical documentation number GSS -VEKV-IDP-002-3-021, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T3-4 - Conceptual design (CD) - 2/3 Plateau design for wind turbine installation, technical documentation number GSS -VEKV-IDP-002-3-022, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T3-5 - Conceptual design (CD) - 2/3 Plateau design for wind turbine installation, number of technical documentation GSS - VEKV-IDP-002-3-023, “Global Substation Solutions” Belgrade, June 2020;
- Plateau situation T3-7 - Conceptual design (CD) - 2/3 Plateau design for wind turbine assembly, number of technical documentation GSS -VEKV-IDP-002-3-024, “Global Substation Solutions” Belgrade, June 2020;
- Basic dimensions of wind turbines – Conceptual design (CD) - 6. Project of mechanical installations of wind turbines, number of technical documentation GSS -VEKV-IDP-006-002, "Global Substation Solutions" Belgrade, June 2020;