South Banat Region Wind Power Projects

Rapid Cumulative Impact Assessment

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Acronyms List

ASCI	Area of Special Conservation Interest
CESMP	Construction Environmental and Social Management Plan
CIA	Cumulative Impact Assessment
CHSS	Community Health, Safety and Security
CR	Critically Endangered (IUCN)
E&S	Environmental and Social
EAO	Environmental Assessment Office
EBRD	European Bank for Reconstruction and Development
EHS	Environment, Health, and Safety
EN	Endangered (IUCN)
ERG	Expert Review Group
ESAP	Environmental and Social Action Plan
EIA	Environmental Impact Assessment
ESIA	Environmental & Social Impact Assessment
ESMMP	Environmental & Social Mitigation and Monitoring Plan
EU	European Union
EWK	Electrawinds K-Wind
EWS	Electrawinds-S
GIIP	Good International Industry Practice
IBA	Important Bird and Biodiversity Area
IFC	International Finance Corporation
IPA	Important Plant Area
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
LC	Least Concern (IUCN)
LoE	Likelihood of Effect
MMP	Mitigation and Monitoring Plan
MSB	Migratory Soaring Bird
NT	Near Threatened (IUCN)
OESMP	Operation Environmental and Social Management Plan
PWPP	Participating WPP
PBR	Potential Biological Removal
PR	EBRD Performance Requirement
PS	IFC Performance Standard
pSPA	Potential Special Protection Area
RCIA	Rapid Cumulative Impact Assessment
SEP	Stakeholder Engagement Plan
SNH	Scottish Natural Heritage
SNR	Special Nature Reserve
UoA	Unit of Analysis
VECs	Valued Environmental and Social Components
VU	Vulnerable (IUCN)
WEBG	Wind Energy Balkan Group

WPP	Wind Power Project

Non-Technical Summary

BACKGROUND

Serbia, as a signatory to the Energy Community Treaty with the European Union (EU) as part of the EU accession process, aims to satisfy 27% of its energy needs from renewable sources by 2020. As part of this commitment the national capacity target for wind power is set to 500 MW. Seven wind power projects (WPP) have already signed power purchase agreements and acquired the preliminary status of a privileged power producer.

Within Serbia, Vojvodina Province has the greatest potential for wind energy development due to grid accessibility, availability of infrastructure, and sufficient average annual wind speeds. Within the Province, wind energy developers have selected the South and Southeast Banat region as a priority area for locating their projects. Siting has been informed by mapped information on the wind resource and bird sensitivity as well as published research to determine favourable areas for wind energy development in Vojvodina.

The southern Banat region has several globally important sites for the conservation of birds and biodiversity. Of particular importance is the Deliblatska Pescara Important Bird and Biodiversity Area (IBA) and Important Plant Area (IPA) (comprising Deliblato Sands and Bara Kraljevac Special Nature Reserves (SNR)); and Labudovo Okno designated as an "IBA in Danger" and Wetland of International Importance (Ramsar Site).The Deliblato Sands SNR is one of the most significant bird habitats in Serbia and is on Serbia's tentative list for consideration as a UNESCO World Heritage Site. Socio-economically, the region is characterized by an ethnically diverse population including Romanian, Hungarian, Slovak, and Roma minorities. Most municipalities are rural and categorized as poor and insufficiently developed compared to the national average.

Three of the seven WPPs with power purchase agreements are financed by the International Finance Corporation (IFC) and/or the European Bank of Reconstruction and Development (EBRD). These projects (Alibunar, Kovačica, and Čibuk) form a cluster, and although they are located outside, at a distance of 1-25 km, of the nature conservation areas (IBAs/SNRs), they have the potential for combined or 'cumulative' effects[1] on bird and other biodiversity values for which adjacent or nearby IBAS/SNRs are designated, and on socio-economic characteristics of the area. To align with Good International Industry Practice (GIIP)[2], these projects (referred to as "Participating Wind Power Projects" or PWPPs in this document) participated in this Rapid Cumulative Impact Assessment (RCIA).

By the time the RCIA was carried out, each developer had already completed an Environmental & Social Impact Assessment (ESIA). These concluded that each project would have a minimal negative impact on local bird and bat populations and the surrounding landscape, and a general disturbance to the local communities during the construction process. Overall the ESIAs concluded that the positive benefit of

[1] Cumulative effects result from the successive, incremental, and/or combined effects of developments when added to other existing and/or planned developments.

[2] Defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally.

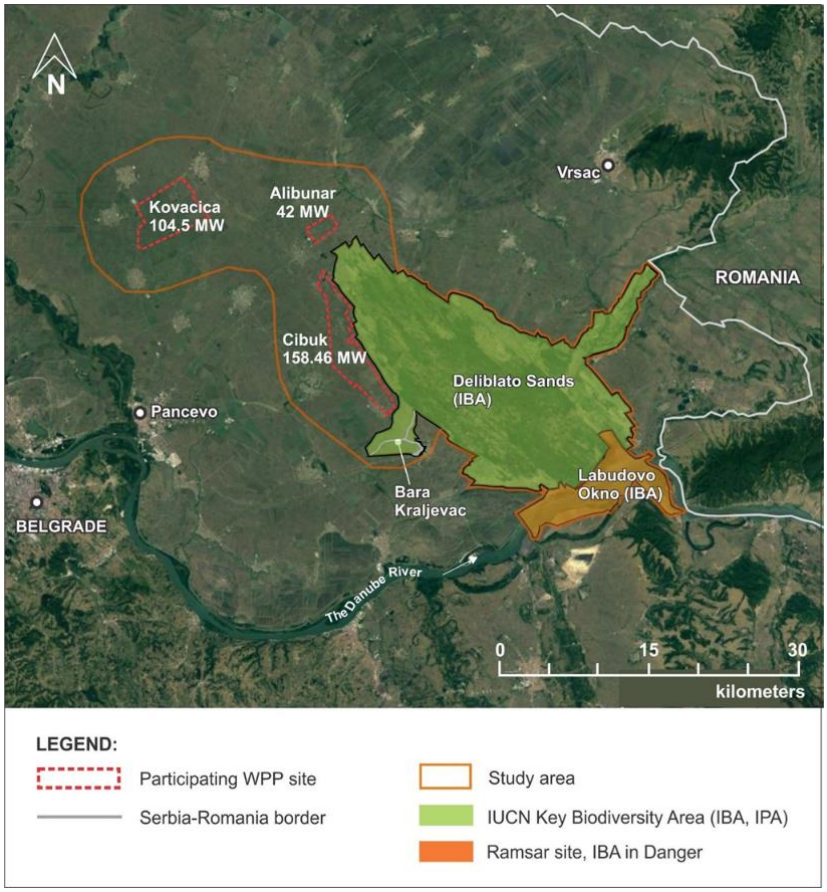
increased local employment and community revenues as well as the overall environmental benefit of generating electricity from wind energy rather than fossil fuels would out-weigh the negative impacts.

All ESIAs were aligned with GIIP and were approved by the Lenders. Mitigation, monitoring and other management commitments were therefore already defined as ESIA commitments as well as in permits with local authorities and in Environmental and Social (E&S) Action Plans designed to conform with Lender requirements. This RCIA therefore builds on impact analysis and existing management commitments.

The overall management and technical direction of the RCIA was undertaken by IFC, supported by a multidisciplinary team of international and Serbian experts. The work was made possible through a partnership with developers and the knowledge of in-country experts who joined an Expert Review Group (ERG).

STUDY AREA AND TIMEFRAME

The study area slightly varied per aspect studied. For biodiversity, it included the land occupied by a 5km buffer around each PWPP site and the Deliblatska Pescara IBA, Labudovo Okno IBA /Ramsar site – see figure below.



The study area for the other aspects ranged from multiple municipalities (Socioeconomics) to certain stretches of roads (Community Health, Safety and Security with respect to construction transport) and overlapping circles with a 30-km radius from the centers of each PWPP (Landscape and Visual Effect). The timeframe of the RCIA assessment was set as three years from the start of operations at each PWPP.

OBJECTIVES

The overall objective of the RCIA was two-fold: (i) to assess the highest E&S risks from potential cumulative effects of the three PWPPs as well as external threats in the study area, and (ii) to confirm that the existing mitigation, monitoring, and other management commitments (included in the ESIA and other documents) were adequate to address potential cumulative effects. Where positive cumulative effects were identified the RCIA recommended how these benefits could be managed and enhanced.

In line with established practices in CIA development, the RCIA focused on 'Valued Environmental and Social Components' (VECs).

VECs are E&S attributes that are considered to be important in assessing risks; they may be:

- physical features, habitats, wildlife populations (e.g., biodiversity),
- ecosystem services,
- natural processes (e.g., water and nutrient cycles, microclimate),
- social conditions (e.g., health, economics), or
- cultural aspects (e.g., archaeology and cultural heritage).

While VECs may be directly or indirectly affected by a specific development, they often are also affected by the cumulative effects of several developments.

RCIA PROCESS

The RCIA process consisted of a scoping and an assessment phase.

SCOPING PHASE

The scoping phase included a review of existing literature and data including the existing EIAs of the PWPPs, a site visit, engagement with stakeholders, the determination of the RCIA spatial and temporal boundaries, a screening process to select VECs and the identification of members for the Expert Review Group (ERG). The VEC screening process identified all potentially relevant E&S attributes as 'candidate VECs'. They were taken from project-specific impact assessments (ESIAs) and were evaluated and selected for the RCIA using a dedicated 'good practice' method. From the candidate VECs, those assessed to be at risk from the cumulative effects of PPWPs were selected to be included in the RCIA. The final selection of VECs included two biodiversity components (birds and bats) and three socio-economic components ([i] community health, safety and security with respect to construction transport; [ii] landscape and visual effect; and, [iii] socioeconomics with respect to employment and procurement opportunities / revenue generation for local government, tourism, and attracting foreign/domestic investment).

ASSESSMENT PHASE

From the five selected VECs, the RCIA assessed which VECs are at highest risk of a cumulative effect from PWPPs and can thus be considered a "priority" VEC. For this assessment, for each of the five VECs, a step-wise methodology was adapted from a framework that had been developed for another IFC initiative – the

Tafila Region Wind Power Projects Cumulative Effects Assessment in Jordan[3]. This process applied commonly accepted concepts within risk assessment practice and is aligned with IFC's Performance Standards (PS) on E&S Sustainability and with IFC's Good Practice Handbook on Cumulative Impact Assessment and Management[4].

Except for the biodiversity VECs, the framework consisted of four steps: (step 1) identify all *receptors* potentially exposed (e.g. for transport VEC: all types of road users); (step 2) evaluate their *sensitivity* (e.g. road user vulnerability); (step 3) assess the *likelihood of a cumulative effect* (e.g. likelihood of an accident due to combined transport for construction of the PWPPs) and assign a *risk* rating (sensitivity combined with likelihood of effect). If receptors at significant risk of exposure were identified, the VEC was determined to be a "priority" VEC. For all identified priority VECs, mitigation measures to safeguard the receptors were proposed (step 4).

For the birds VEC, an extra step was added: (step 1) identify all birds potentially at risk; (step 2) evaluate their sensitivity (relative importance and vulnerability); (step 3) assess the likelihood of a cumulative effect (e.g. collision with turbine blades) and assign a risk rating (sensitivity combined with likelihood of effect). Step 3 resulted in the identification of priority bird VECs. For each priority bird VEC, an annual fatality "threshold" was calculated. This represents the 'limits of acceptable change' relevant to the long-term population viability of each population and was calculated using the species' biological characteristics, the species' population size and estimates of the potential effects of PWPPs and other human activities (external stressors) (step 4). As the PWPPs may represent only a small proportion of the risk to these populations, these limits or thresholds are prescribed for all stakeholders, including but not limited to the PWPPs, to guide conservation planning in the study area. Mitigation, monitoring and other management measures were proposed in step 5.

For the bats VEC, an initial 3-step process equivalent to that for birds was used to identify priority VECs. Fatality threshold targets were not determined for priority bat VECs due to a lack of information on the regional size and status of these populations. Mitigation and monitoring measures were also proposed in step 5.

The RCIA outcomes for birds and bats benefitted from the input and review of an experienced in-country Expert Review Group (ERG).

RESULTS

COMMUNITY HEALTH, SAFETY, AND SECURITY: CONSTRUCTION TRANSPORT

The study area covered the road sections that are used for delivery of construction materials and the turbine sections to at least two PWPPs.

The RCIA was conducted when the PWPPs were at different stages of the construction phase, yet with delivery of construction materials and turbine sections largely finished. That said, all PWPPs had separately contracted the same local transport company which optimized transport planning and delivery of construction materials. Nonetheless, the RCIA assessed all road user groups to be at moderate to major risk

[3] Tafila Region Wind Power Projects Cumulative Effects Assessment (IFC, 2017)
[4] IFC's Good Practice Handbook on Cumulative Impact Assessment and Management (IFC, 2013)

of a cumulative effect from transport-related accidents during construction, and therefore construction transport was identified as a priority VEC. The RCIA concluded that the existing mitigation measures were proportionate to the scope and nature of project activities, and that there was a negligible likelihood of cumulative transport-related effects during construction. No further recommendations were made for mitigation and management related to this VEC.

LANDSCAPE AND VISUAL EFFECTS

The study area covered the combined areas from which the PWPPs are theoretically visible. This included three overlapping circles with a 30-km radius from the centers of each PWPP.

The RCIA distinguished between cumulative '*landscape* effects' – arising when two or more developments introduce features that change the landscape character and any special values attached to it with landscape being the receptor, and cumulative '*visual* effects' – arising where the observers (i.e. receptors) are affected by seeing two or more developments, either simultaneously from one viewpoint, or in succession when moving through the landscape. Both landscape and visual effects were found to be priority VECs.

For landscape effects, the South Banat District was evaluated to be at moderate risk of cumulative effects from the PWPPs, based on the reasoning that wind turbines would become a characteristic feature of the landscape in that area.

For visual effects, the observer groups identified (i.e. residents, road users, recreational users of Deliblato Sands SNR, and people working in the countryside) were evaluated to be at minor to moderate risk of cumulative effects from the PWPPs. Outcomes for visual effects were recognized as precautionary as there was no information on the receptor's evaluation (positive/negative/neutral) of the altered landscape.

Although a cumulative effect will still occur after implementation of planned mitigation measures, the RCIA concluded that the potential for additional measures to reduce the landscape and visual effects of the PWPP development is limited and that the PWPPs had developed measures proportionate to the scope and nature of the projects. The precautionary approach used for the assessment of sensitivity also likely overestimated the significance of visual effects. No further recommendations were therefore made for mitigation and management for this VEC.

SOCIOECONOMICS

The RCIA focused on employment and procurement opportunities, revenue generation for the local government/community, tourism, and attracting foreign and domestic investments. The study area contained all adjacent municipalities (Kovin, Alibunar, Kovačica, and Pančevo) with their respective inhabitants identified as receptors. The PWPPs are located in one of the economically least developed areas of Vojvodina province, and, therefore, the sensitivity to this change was generally assumed to be high, especially in the poorest municipalities. The inhabitants of Kovin, Kovačica and Alibunar were determined to be at moderate exposure to the positive cumulative effects from the PWPPs.

Each PWPP has an agreed community investment programme and the RCIA concluded that the existing mitigation measures were proportionate to the scope and nature of the projects' activities leading to beneficial cumulative effects.

BIRDS

From an initial list of 195 species populations, steps 1 to 3 of the RCIA process identified 24 priority bird VECs to be at highest risk in the study area. With three exceptions, priority bird VECs correspond to species either resident or that have summer breeding populations within Serbia. Of these, 11 were raptors (Eastern Imperial Eagle - *Aquila heliaca*, Booted Eagle - *Hieraaetus pennatus*, White-tailed Sea-eagle - *Haliaeetus albicilla*, Short-toed Snake Eagle - *Circaetus gallicus*, Black Kite - *Milvus migrans*, Long-legged Buzzard - *Buteo rufinus*, Western Marsh-harrier - *Circus aeruginosus*, Saker Falcon - *Falco cherrug*, Eurasian Hobby - *Falco subbuteo*, Northern Goshawk - *Accipiter gentilis*, and Common Barn-owl - *Tyto alba*), and 10 were non-raptors (Common Snipe - *Gallinago gallinago*, Common Sandpiper - *Actitis hypoleucos,* Greater Short-toed Lark - *Calandrella brachydactyla*, Eurasian Skylark – *Alauda arvensis*, Crested Lark - *Galerida crista*ta, Northern Wheatear - *Oenanthe oenanthe*, Collard Sand Martin - *Riparia riparia*, Common Quail - *Coturnix coturnix*, European Bee-eater - *Merops apiaster*, and Common Raven – *Corvus corax*). Additionally, three migrant/wintering populations were identified as at highest risk (Hen Harrier - *Circus cyaneus*, Greater White-fronted Goose – *Anser albifrons*, and White Stork - *Ciconia ciconia*).

Each of these 24 priority bird VEC populations was assessed to determine an annual threshold of fatalities that each could sustain (from PWPP and non-PWPP sources of mortality combined) without affecting their long-term population viability. Those species populations that have been assigned a zero-fatality threshold in the RCIA typically have low reproductive rates and/or have small populations within Serbia. This means that safeguarding their populations is a high priority because, even a very low annual fatality rate would have a long-term impact on the viability of the national population. The allocation of a zero-fatality threshold simply means that these species should be closely monitored and mitigation plans given a high priority.

BATS

An initial list of 22 species regarded as potentially at risk in the study area was reduced to seven priority bat VECs (Serotine bat *Eptesicus serotinus*, Savi's pipistrelle bat *Hypsugo savi*, , Leisler's bat *Nyctalus leisleri,* Noctule bat *Nyctalus noctule,* Kuhl's pipistrelle bat *Pipistrellus kuhlii,* Nathusius' pipistrelle bat *Pipistrellus nathusii,* and Common pipistrelle bat *Pipistrellus pipistrellus)*, through a process that included data review, literature review, and a reasoned evaluation of population sensitivity and likelihood of collision risk.

MITIGATION AND MONITORING APPROACH FOR BIRDS AND BATS

The key recommendation in the RCIA framework for birds was to develop a joint monitoring and mitigation approach comprising a suite of measures that: safeguard priority bird VECs, are based on shared good practice protocols, are implemented consistently across PWPPs, and that are supported by a comprehensive adaptive management mechanism. Specifically, the RCIA recommended: (i) bird fatality search surveys and associated bias correction experiments capable of providing robust fatality estimates for PWPPs; (ii) bespoke species specific monitoring programs focused on better defining the risk and the most effective mitigation measures for priority birds and bats at highest risk, and; (iii) developing aggregated conservation measures such as enhancing raptor prey habitats away from PWPPs and enhancing or creating suitable nesting habitats for non-raptor priority birds in protected areas.

CONCLUSIONS

This RCIA addressed the greatest E&S risks of potential cumulative effects of the three PWPPs by evaluating existing mitigation, monitoring, and other management measures to which the PWPPs had already committed and enhancing and optimizing these to address these cumulative risks. This is especially important given the presence of ecologically and socio-economically sensitive receptors in the South Banat Region. The RCIA goes beyond Serbian regulatory requirements by systematically addressing cumulative effects, which corresponds with requirements in IFC's PS and EBRD's Performance Requirements (PR).

This RCIA had the opportunity to build upon the existing committed mitigation measures (within the PWPP ESIAs) to ensure that cumulative risks were adequately considered. The method implemented a systematic approach to assess cumulative risks and followed a framework specifically developed for the wind energy sector. Data collected and stakeholder engagement conducted as part of project-specific ESIAs were adequate to screen VECs and identify priority VECs. With respect to socio-economic and landscape-related aspects, the RCIA concluded negligible risk of cumulative effects, that may also include positive effects, and that were proportionately addressed by the measures already developed by the PWPPs. With respect to birds and bats, the RCIA benefitted from the review and input of an external Expert Review Group (ERG) with its members selected based on their knowledge and expertise on biodiversity in the South Banat region. The RCIA acknowledges that the existing mitigation, monitoring and management measures were aligned with GIIP, but highlights the opportunity for, and proposes an optimized mitigation and monitoring approach that makes most effective and efficient use of resources to safeguard priority bird and bat populations during the operations phase. The RCIA also recommends coordinating and harmonizing monitoring and mitigation measures across PWWPs so that cumulative effects on populations can be accurately measured, assessed and adaptively managed.

Though the RCIA focuses on one region, it provides a resource for other wind energy developers in Serbia to follow to achieve alignment with international E&S good practices. More broadly, the methods and process are replicable for developers in other Western Balkan countries that are signatories to the EU Energy Community Treaty and committed to the implementation and enforcement of the EU energy legislation for renewable energy.

1. Introduction

1.1 BACKGROUND

The countries in the Western Balkans are still largely dependent on fossil fuels (in a range from 50% to 97% share in the energy mix). In 2006, the Western Balkans countries signed the Energy Community Treaty with the European Union (EU) as part of the EU accession process. The Treaty requires countries' commitment in implementation and enforcement of the EU energy legislation within fixed timeframes. This includes the Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources[5]. The Directive specifies national renewable energy targets for each EU country, taking into account its starting point and overall potential for renewables. In 2012, the Western Balkans countries negotiated their 2020 targets in a range from 25% to 40% (primarily a result of extensive use of hydropower).

Serbia negotiated its target to be 27% of final energy consumption from renewable sources by 2020 (increased from the starting point of 21%). Over the last ten years, the country has developed and refined its strategic and regulatory framework for renewable energy sources, including the wind power sector. The regulatory framework was completed in 2016 by final adoption of three key decrees ("Incentive Decree[6]", "Status Decree[2]", and "PPA Decree[7]").

The energy policy and related strategic objectives of Serbia were defined in the Strategy of Energy Sector Development until 2025[8] and are being implemented by the Programme for Implementation of the Strategy in period 2017-2023[9]. The national capacity target for wind power was set to 500 MW[10]. Seven wind power projects are proposed within this 500 MW capacity target for which developers concluded power purchase agreements and acquired the preliminary status of a privileged power producer, namely: 1. Wind Power Project (WPP) Alibunar (42 MW), 2. WPP Malibunar (8 MW), 3. WPP Plandiste (102 MW), 4. WPP Kovačica (104.5 MW), 5. WPP Čibuk (158.46 MW), 6. WPP Kosava (68 MW), and 7. WPP Kostolac (66 MW).

Modern, utility-scale wind energy potential in the Republic of Serbia has been investigated since at least the mid-1980s, with three suitable areas identified within the country: central Serbia, eastern Serbia and northeast Serbia/southeast Vojvodina Province[11]. Vojvodina Province has attracted the most attention for wind energy development due to the accessibility of grid, transportation and infrastructure, coupled with average annual wind speeds of over 6 meters per second (m/s). A large amount of research has been completed to explore the wind energy potential in the province, including the development of a wind resource atlas[12], a review of siting and planning considerations[13] and environmental sensitivity mapping

[5] Directive 2009/28/EC repealed Directive 2001/77/EC and Directive 2003/30/EC
[6] Decree on Incentive Measures for Electricity Generation from Renewable Energy Sources and High-Efficiency Cogeneration of Electricity and Heat
[7] Decree on the Power Purchase Agreement
[8] Strategy of Energy Sector Development of Serbia until 2025 with projections until 2030 (Off. Journal of RS, No. 101/2015)
[9] Decree on Establishing the Programme for Implementation of the Strategy of Energy Sector Development of Serbia in period 2017-2023 (Off. Journal of RS, No. 104/2017)
[10] The Decree on Conditions of and Procedure for Acquiring the Status of a Privileged Power Producer, Preliminary Privileged Producer and Power Producer from Renewable Energy Sources (Off. Journal of RS, No. 56/2016)
[11] Katić, V. *et al.*: Potentials and Market Prospects of Wind Energy in Vojvodina - Thermal Science, Year 2012, Vol. 16, Suppl. 1
[12] Wind Atlas of Vojvodina 2008. Faculty of Technical Sciences, Novi Sad.
[13] Tijana Đorđević. The possibilities for using wind energy in AP Vojvodina (North Serbia) – Defining the most favorable

for birds by the Institute for Nature Conservation of Vojvodina Province[14] as a tool to help stakeholders identify potential migratory bird pathways and important habitats and protected areas.

One region of Vojvodina Province, the south and southeast Banat, has the greatest wind energy potential. The recently constructed Malibunar WPP and the three WPPs of Alibunar, Kovačica and Čibuk, are located in this area (Figure 1). The WPPs are located within close proximity (1-25 km) of the Deliblato Sands Special Nature Reserve (SNR) and Bara Kraljevac SNR (together Deliblatska Pescara Important Bird and Biodiversity Area [IBA]), and Labudovo Okno. IBA in Danger/Ramsar site. This region of Serbia has been identified as being important for migratory birds and bats (Dordovic 2016, Institute for Nature Protection of Serbia 2009), as illustrated in the environmental sensitivity mapping for birds by the Institute for Nature Protection of Serbia.

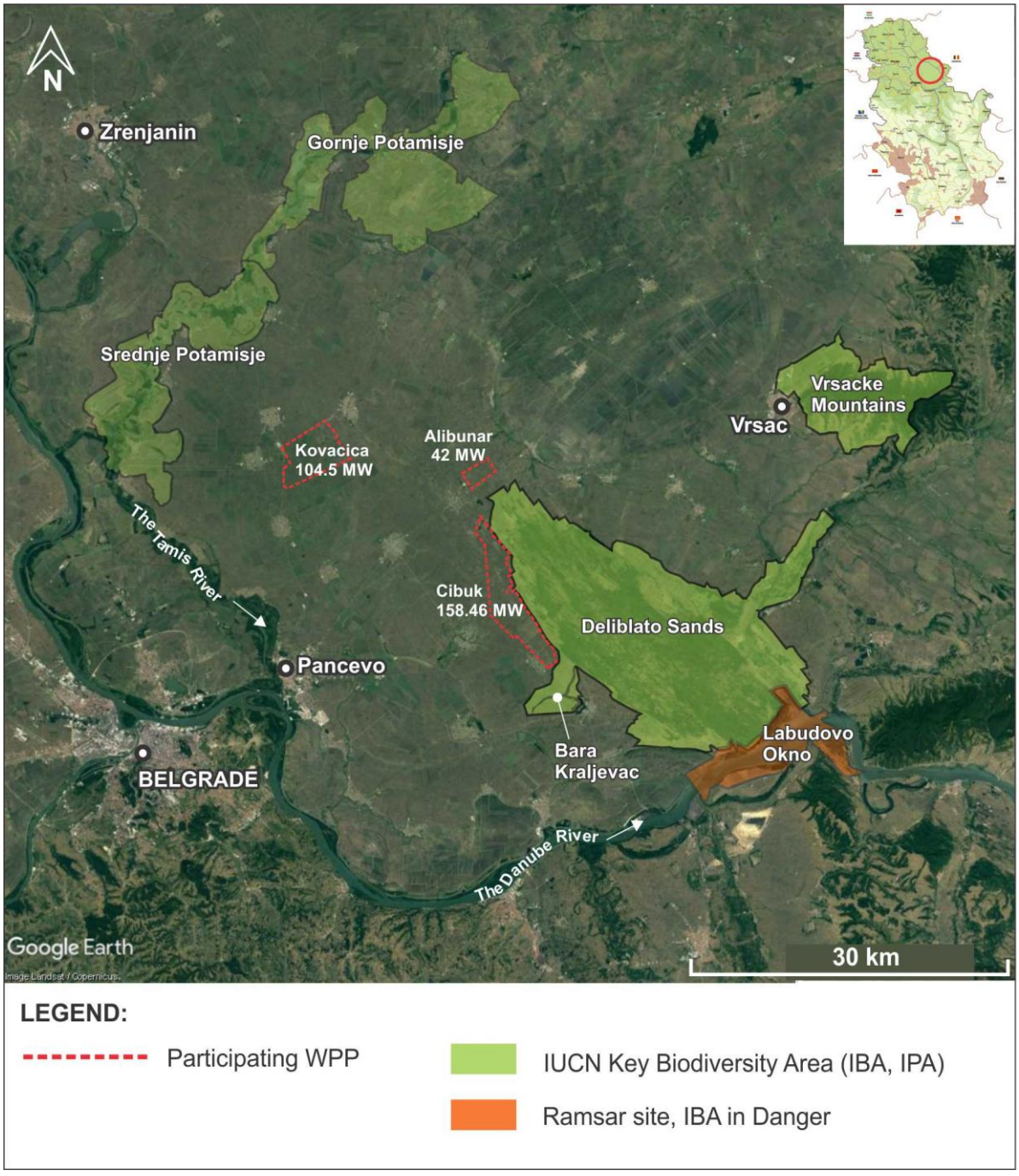
Three WPPs within this area (Alibunar, Kovačica and Čibuk) are financed by the International Finance Corporation (IFC) and/or the European Bank of Reconstruction and Development (EBRD). To conform with Good International Industry Practice¨(GIIP), the three aforementioned WPPs (herewith entitled "Participating Wind Power Projects" or PWPPs) have participated in the development of this Rapid Cumulative Impact Assessment (RCIA) given the clustering of the PWPPs in proximity to the SNR and IBA and considering other potentially sensitive environmental and social (E&S) receptors.

REGIONAL ENVIRONMENTAL CONTEXT

Although the renewable energy sector, which includes wind energy, is considered "green," adverse environmental impacts of renewables also need to be considered. The South Banat region comprises several recognized nature conservation areas (Figure 1), some of which are of international significance. Serbian legislation was largely harmonized with the EU Habitats and Birds Directives (92/43/EEC and 2009/147/EC, respectively). Potential Special Protection Areas (pSPAs)[15] are preliminarily identified based on Important Birds Area (IBA) criteria; Areas of Special Conservation Interest (ASCIs) are selected as part of the EMERALD network (the ecological network under the Bern Convention). Both types of designated nature conservation areas are registered as part of the ecological network of Serbia[16].

areas for the construction of windmill farms: A Review. Geographica Pannonica • Volume 20, Issue 1, 42-50 (March 2016)
[14] Establishment of ecological networks in AP Vojvodina 2009. Institute for nature conservation of Serbia, Belgrade
[15] Special Protection Area (SPAs) are protected sites of European importance for rare or vulnerable birds listed in Annex I of the Birds Directive (2009/147/EC). Potential SPAs (pSPAs) are areas proposed for SPAs as part of the Serbian harmonization with the EU legislation and enforcement of the NATURA 2000 network in Serbia. Areas of Special Conservation Interest (ASCIs) are protected areas in Europe and North Africa, set up by the contracting parties to the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats), which together form the Emerald Network.
[16] Decree on Ecological Network (Off. Journal of RS, No. 102/2010)

FIGURE 1. INTERNATIONALLY RECOGNIZED AREAS IN THE SOUTH BANAT REGION



The central part of the region is occupied by the Deliblato Sands – pSPA and ASCI. Deliblato Sands was nationally designated as a SNR for the special habitats it supports. It is one of the most significant bird habitats in Serbia with 167 recorded species. It is on Serbia's tentative list for consideration as a UNESCO World Heritage Site[17]. The area is recognized as an IBA by BirdLife International[18] , Important Plant Area

[17] http://whc.unesco.org/en/tentativelists/1695/
[18] http://datazone.birdlife.org/site/factsheet/deliblatska-pescara-iba-serbia

(IPA)[19] by PlantLife International, and a Key Biodiversity Area (KBA)[20].

The southern margin of the Deliblato Sands SNR on the banks of the Danube River overlaps an important wetland area known as Labudovo Okno. This area is recognized as a Ramsar site for its breeding and wintering birds, and is also recognized as an IBA in Danger[21].

The south-western boundary of the Deliblato Sands SNR is occupied by a bog area known as Bara Kraljevac, nationally designated as a SNR[22]. The bog area is characterized by floating peat islands and provides or supports habitats for several rare species due to its geomorphological and hydrological characteristics (Paunovic, 2009).

The eastern part of the region is dominated by a hilly area known as Vrsacke Mountains, which is also a pSPA and ASCI. Vrsacke Mountains is nationally designated as Landscape of Outstanding Features[23] and also recognized as an IBA and an IPA, i.e. KBA by IUCN[24].

The northern part of the region is bounded by the Tamis River which has a wide floodplain and forms numerous meanders. The Tamis is a favorable wetland habitat for birds, with a total of 220 species recorded of which 110 are breeding species[25]. The entire stretch of the Tamis in Serbia is nominated for designation as Landscape of Outstanding Features at the national level. The area is recognized as an IBA (Gornje Potamisje and Srednje Potamisje) [26].

The Danube and the Tamis rivers are recognized as ecological corridors of international importance[27].

REGIONAL SOCIAL CONTEXT

The South Banat region is administratively a part of the South Banat District (Autonomous Province of Vojvodina). The City of Pančevo is an administrative center and one of the two industrial centers of the region (the other one is Vrsac). The other six municipalities (Kovin, Alibunar, Kovačica, Plandiste, Bela Crkva, and Opovo) are rural.

The total population is about 290,000 and is ethnically diverse. The ethnic majority is Serbian (70%) and largest minorities are Romanian (7%), Hungarian (5%), Slovak (5%), and Roma (3%).

Apart from Pančevo and Vrsac, which are among the most developed Serbian cities, other municipalities are economically deprived and categorized as "insufficiently developed", i.e., their level of development is

[19] http://www.pzzp.rs/rs/sr/zastita-prirode/podrucja-od-medunarodnog-znacaja/podrucja-sa-medunarodnom-zastitom.html
[20] http://www.keybiodiversityareas.org/site/results?reg=7&cty=271&snm=
[21] IBAs in Danger are most threatened IBAs around the world, identified by BirdLife Partners on the basis of monitoring. IBAs in Danger are sites in dire need of urgent conservation action.
[22] Decree on Designation of the Special Nature Reserve Bara Kraljevac (Off. Journal of RS, No. 14/2009).
[23] By the Law on Nature Protection (Off. Journal of RS, No. 36/2009, 88/2010, 91/2010, 14/2016), Landscape of Outstanding Features is defined as “an area of distinctive presence with significant natural, biological, ecological, aesthetic, cultural and historical values that have evolved over time as a result of interaction between nature, the natural potential of the area and the traditional way of life of local residents”.
[24] http://www.keybiodiversityareas.org/site/results?reg=7&cty=271&snm=
[25] Puzovic et al., 2009
[26] http://datazone.birdlife.org/site/factsheet/gornje-potamisje-iba-serbia, http://datazone.birdlife.org/site/factsheet/srednje-potami%C5%A1je-iba-serbia
[27] Decree on Ecological Network (Off. Journal of RS, No. 102/2010)

below 60% of the national average[28]. the main economic activity is agriculture (corn, sunflower and wheat being the predominant crops). Within the regional context, the average net monthly salary in 2017 was the lowest in Alibunar (260 EUR) and Kovačica and Plandiste (300 EUR) and highest in Vrsac (460 EUR) and Pančevo (420 EUR)[29].

Transport infrastructure primarily comprises the regional road and local roads. The proximity of the Danube River provides a good waterway connection via Pančevo port. The electricity, gas and telecommunications networks are developed. The sewage network is partially developed (in towns), and no wastewater treatment is undertaken. Drinking water is supplied from groundwater wells located in the Danube River alluvion and from the village wells, with the exception of Dolovo and surroundings, which is now connected to the municipal supply.

IFC IN THE REGION

In 2018, IFC, EBRD, and others are investing in the first utility-scale wind power projects (WPPs) in Serbia [Section 1.3], all located in the Autonomous Province of Vojvodina, and totaling approximately 305 MW of capacity. All three projects are currently in construction.

To help promote the long-term sustainability of investments in the wind energy sector in Serbia, IFC commissioned this South Banat Region Wind Power Projects RCIA. This initiative, which focuses on identifying E&S components at highest risk within the Project Setting, is the first of its kind in the Western Balkans. The three IFC/EBRD financed WPPs form the focus of this RCIA.

1.2 OBJECTIVES

The overall objective of the RCIA is two-fold: (i) to assess the highest risks from potential cumulative effects of the three PWPPs as well as external threats in the study area, and (ii) to confirm that the existing mitigation, monitoring, and other management commitments (included in the E&S Impact Assessments [ESIA] and other documents) were adequate to address cumulative effects.

The approach taken to address cumulative effects responds to requirements in IFC's Performance Standards (PS) and the EBRDs Performance Requirements (PR). The RCIA was carried out after comprehensive ESIAs had been developed for the PWPPs and regulatory permits had been established. As mitigation, monitoring and other management commitments had been already defined, the RCIA builds on existing efforts to address potential cumulative effects.

The RCIA takes a risk assessment approach. Priority "Valued Environmental and Social Components" (VECs) were selected on the basis of risks rather than predicted impact. Determining the VECs at the highest risk of cumulative effects will be essential to help focus and align the efforts of the PWPPs' developers and of other stakeholders. The RCIA therefore does not discuss individual WPP-specific impacts; this information is the subject of the project-specific ESIAs.

The RCIA also broadly considers cumulative effects from "external stressors" on VECs. "External stressors" include (for example), impacts from electrocution, poisoning and hunting (on birds) and the effects of a

[28] The Law on Regional Development (Off. Journal of RS, No. 51/2009, 30/2010, 89/2015)
[29] The Republic Institute for Statistics http://devinfo.stat.gov.rs

broad category of "Other industrial development"[30].

1.3 STUDY AREA

The study area of the South Banat Region RCIA was defined through an iterative process throughout the scoping phase. It is based on criteria that are relevant to the selected VECs for the RCIA (see Section 3) and on stakeholder engagement (see Section 2).

A distinction is made between study areas for biodiversity and socio-economic VECs. The study areas for the social VECs differ and are described per VEC in Sections 4, 5 and 6.

The birds and bats VECs share the same biologically relevant area and have therefore the same study area (Figure 2). The study area includes the Deliblato Sands SNR and Bara Kraljevac SNR, together forming Deliblatska Pescara IBA, and Labudovo Okno IBA, the three PWPPs, and a 5km buffer around each WPP.

The biodiversity area is primarily defined by the survey area limits used in the surveys for the three PWPPs of which recorded data were used for the RCIA. The 5km buffer around the three PWPPs accounts for spatial movements and connectivity i.e. foraging distances for breeding birds and commuting bats, and overflights and stop-over use of the area during key migratory periods.

It was considered relevant to include the entire Deliblato Sands SNR and Bara Kraljevac SNR (together Deliblatska Pescara IBA), and Labudovo Okno IBA in the study area due to their importance for both resident and migratory bird and bat populations. The inclusion of these areas also accounts for the potential connectivity to the three PWPPs as well as to other IBAs within the south Banat region such as Gornje Potamisje, Srednje Potamišje IBAs and Tamis River, which was identified as an important consideration by stakeholders.

Information on areas of high bird vulnerability and pathways for bird migration as per the bird sensitivity map published by the Institute for Nature Conservation of Vojvodina Province (2009) further informed the spatial boundaries of the study area (Figure 3).

[30] Referred to as "threats" in the Non-Technical Summary.

FIGURE 2. STUDY AREA FOR BIRDS AND BATS

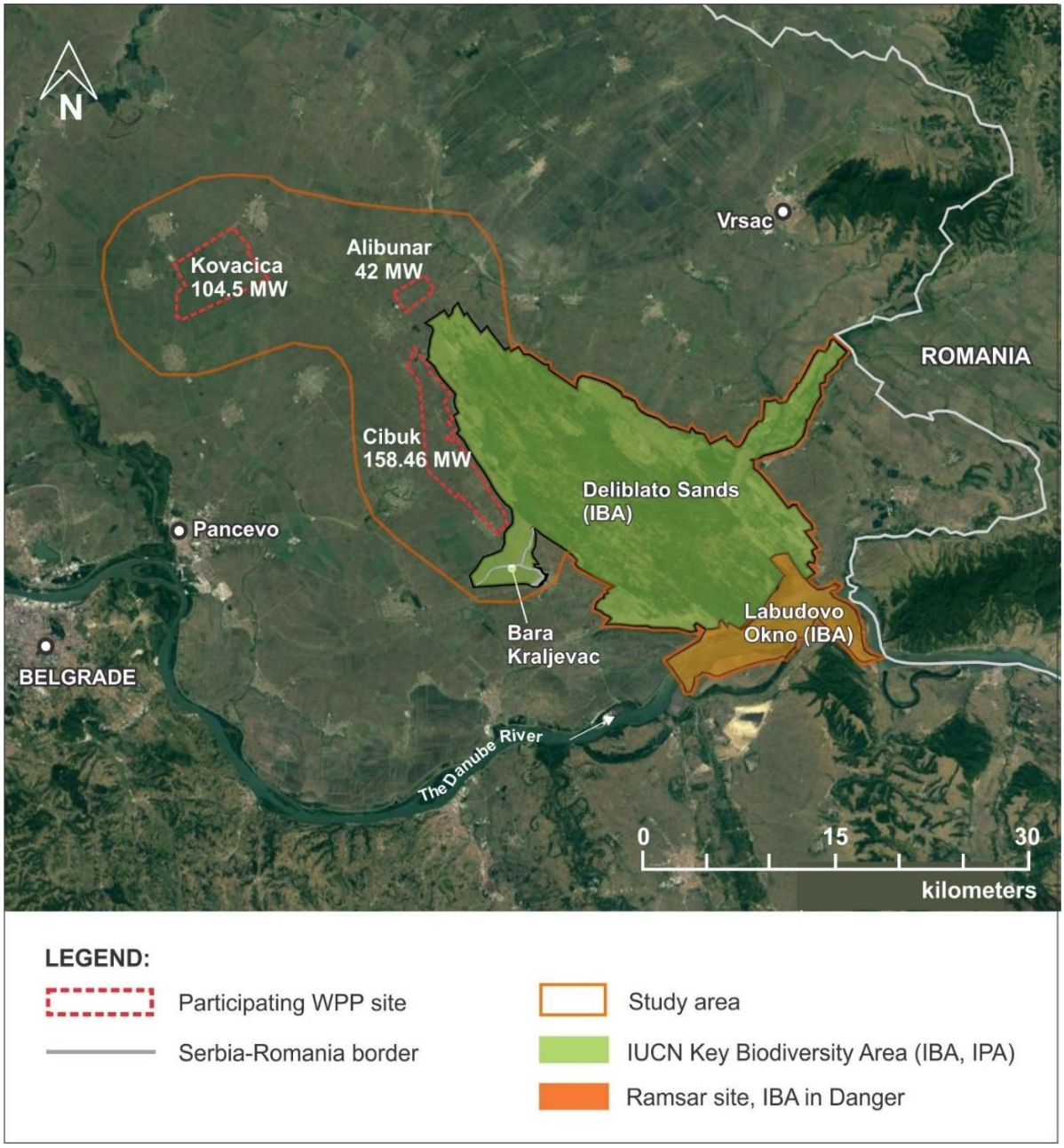
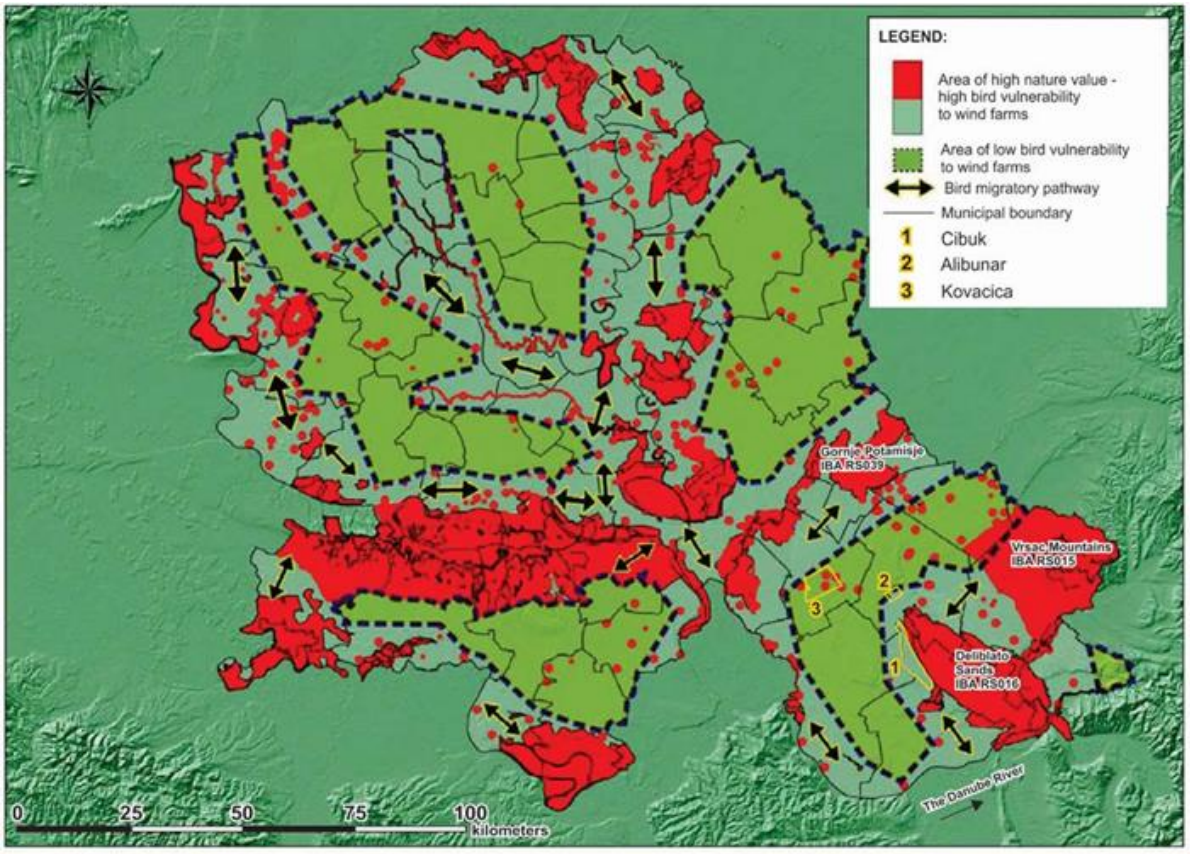


FIGURE 3. BIRD SENSITIVITY MAP PUBLISHED BY THE INSTITUTE FOR NATURE CONSERVATION OF VOJVODINA PROVINCE (2009)



1.4 OVERVIEW OF THE PARTICIPATING WIND POWER PROJECTS

Table 1 describes the three PWPPs; their location is shown in Figure 4, all within South Banat District. Figure 5 shows the location of South Banat District within Vojvodina Province.

TABLE 1. SUMMARY OF PWPPS INCLUDED IN THE RCIA

WIND POWER PROJECT	TOTAL INSTALLED CAPACITY	NO. OF TURBINES	STATUS (May 2018)	OTHER INFORMATION
Čibuk	158.46 MW	57	In construction	The WPP is located approximately 50 km to the northeast of Belgrade in the Municipality of Kovin. The site covers an area of approximately 3,700 ha of predominantly flat agricultural land. The project includes an approximately 11 km 400kV transmission line to convey electricity from the onsite substation to the national grid in the village of Bavanište. The nearest protected area is Deliblato Sands SNR at a distance of approximately 1.3 km to the east. The WPP is expected to be in operation by the end of 2018.
Alibunar	42 MW	21	In construction	The WPP is located between Vladimirovic and Alibunar settlements in the Municipality of Alibunar. The site covers an area of approximately 406 ha of predominantly flat agricultural land. The connection to the national grid is through underground cable connection. The nearest protected area is Deliblato Sands SNR at a distance of approximately 2.5 km to the south-east. The WPP is expected to be in operation by the end of November 2018.
Kovačica	104.5 MW	38	In construction	The WPP is located within the territory of the Municipality of Kovačica. The site covers an area of approximately 3,711 ha of gently sloping agricultural land. The project will connect to the existing 220 kV overhead transmission line through an approximately 1.4 km overhead power line connection in the center of the site. The nearest protected area is Srednje Potamisje IBA at a distance of approximately 10 km to the north-west. The WPP is expected to be in operation by early 2019.

FIGURE 4. THE LOCATION OF THE PWPPs WITHIN SOUTH BANAT DISTRICT

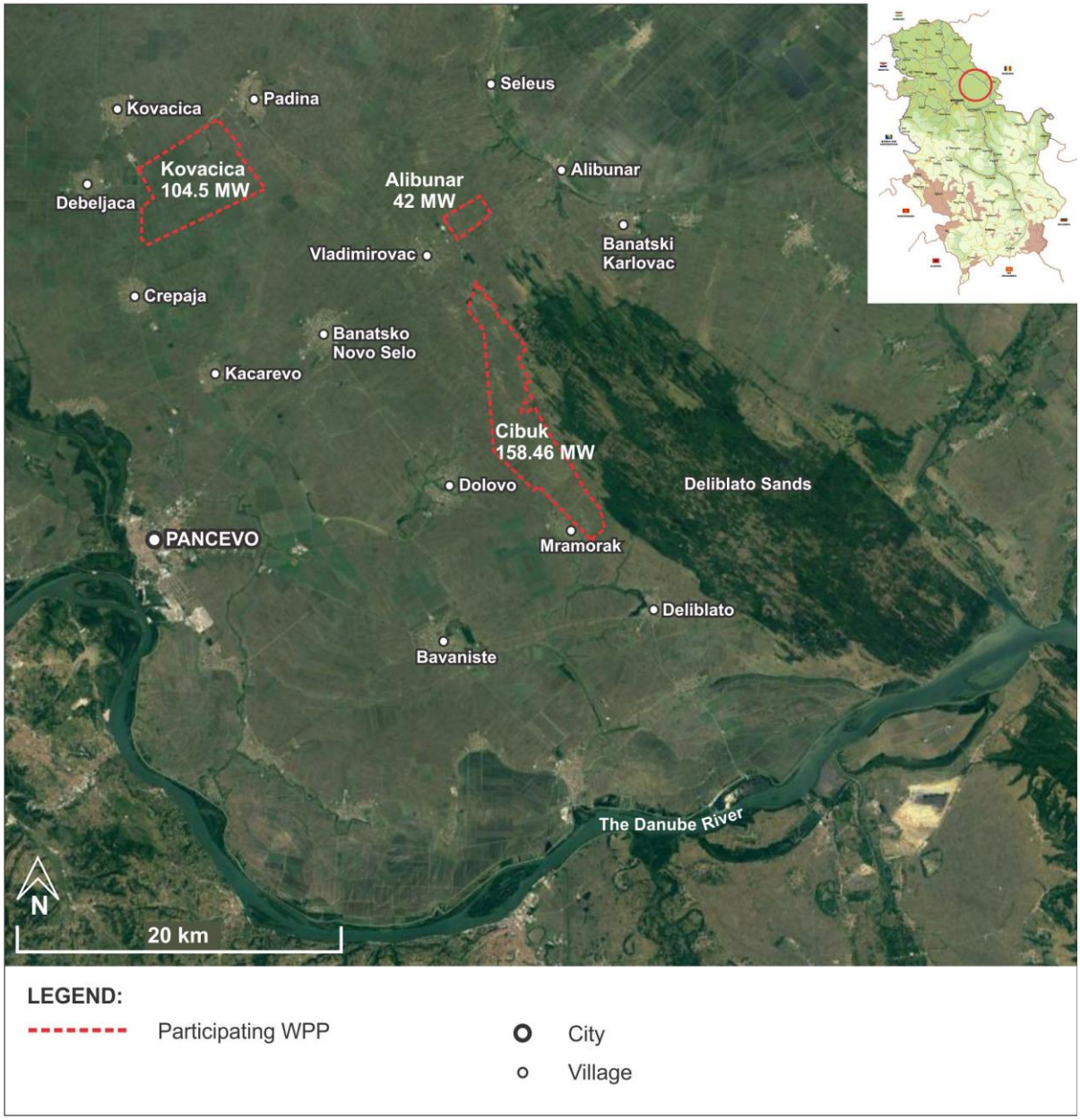
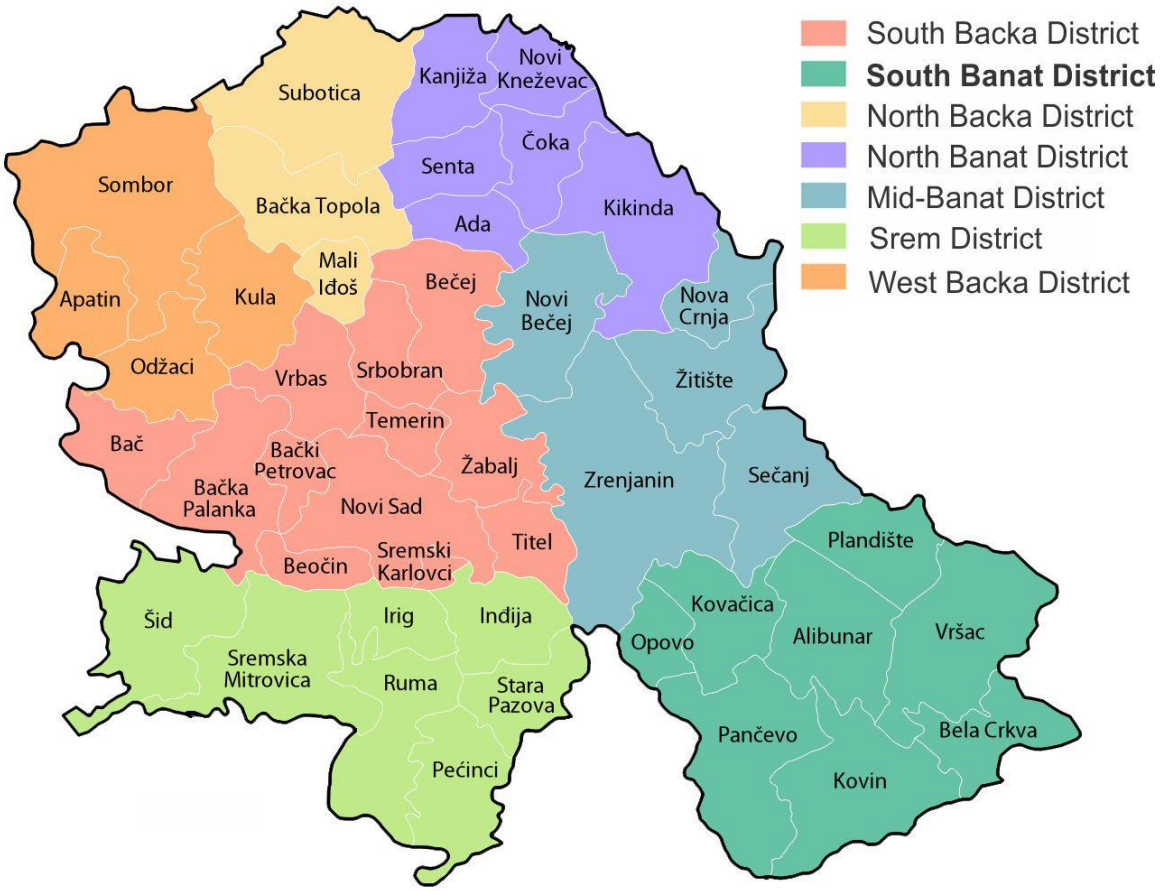


FIGURE 5. THE LOCATION OF SOUTH BANAT DISTRICT WITHIN VOJVODINA PROVINCE[31]



1.5 TEMPORAL SCOPE OF THE RCIA

A challenge in determining the temporal scope of the RCIA is the uncertainty of the actual impacts on the VECs in this early stage. The temporal scope of the assessment might therefore be defined as the time frame during which the proposed mitigation, monitoring, and management measures will be implemented. It is during this time frame that monitoring results should reveal the impacts of the projects. For biological VECs, an initial three-year time frame (from the start of each PWPP becoming operational) is proposed, following which an evaluation would be conducted to determine future monitoring efforts.

Transport during construction was selected as a VEC (see section 3.2), and the cumulative transport-related risks are assessed as part of the RCIA (see section 4). However, the RCIA was conducted when construction was already well underway for all three PWPPs. Therefore, the temporal scope of the proposed mitigation, monitoring, and management measures for this VEC will be the remaining time of the construction period.

1.6 UNIQUE CONTEXT OF THE RCIA

This RCIA was carried out after each developer had conducted their ESIAs[32] in line with GIIP. The ESIAs

[31] The Institute for Territorial Economic Development - http://www.lokalnirazvoj.org/en/books/details/25
[32] - Study on the Environmental Impact Assessment of the Project for the Development of "Alibunar3 Win Park, July 2013
- Čibuk 1 Wind Farm, Dolovo, Serbia, Environmental and Social Impact Assessment, November 2014
- Environmental and Social Impact Assessment of Proposed Kovačica Wind Park, Serbia, December 2013

therefore had been already approved by the Institute of Nature Conservation of Vojvodina Province and by IFC and EBRD as part of the E&S due diligence process. The information and documentation in the ESIAs informed several parts of the RCIA, including the literature review, identification of stakeholders and scoping of the VECs, and assessment of the priority VECs.

As part of the ESIA process, baseline data were collected between 2009 and 2013. Substantial pre-construction data were collected for birds and bats over a four-year period and captured seasonal variation. This extended period of monitoring was assumed to have detected most species using the areas within and immediately surrounding PWPPs sites and therefore provided essential information to conduct the first three steps of the RCIA birds/bats framework.

- The three PWPPs' ESIA assessments identified potential direct and indirect impacts on key birds and bats species. The need to validate these predictions through appropriate monitoring and mitigation protocols was acknowledged in all PWPP Environmental and Social Action Plans (ESAPs) in compliance with lender standards, management plans and local permit conditions.
- As the mitigation, monitoring and other management plans were defined as ESIA commitments in the ESAPs this RCIA builds on the existing efforts. These committed mitigation measures provided the basis to develop the Mitigation and Monitoring Approach for Priority Bird and Bat Species (see Section 7.6), further optimizing existing mitigation to address any cumulative effects.

At the time of conducting the RCIA, all three PWPPs had comprehensive project-specific Stakeholder Engagement Plans (SEPs)[33] in place, providing a road map for ongoing consultation with key stakeholders to each of the projects throughout the lifetime of the projects.

- These SEPs were conducted in line with GIIP and IFC PS1 and/or EBRD PR1.
- Outcomes of project-specific stakeholder engagement as part of the SEPs guided the steps of the RCIA frameworks for some VECs (e.g. Transport, Socio-economics, Birds, Bats).
- Project-specific SEPs informed the identification of stakeholders to be consulted during the RCIA process (see Section 2), who were selected based on their knowledge of biodiversity in the Deliblato Sands SNR/IBA. To make this distinction from the ESIA stakeholder consultation process, this report uses the term "RCIA Stakeholders".
- As part of the RCIA Stakeholders, the RCIA process greatly benefitted from the establishment of an Expert Review Group (ERG), comprising national ornithological and bat experts with knowledge and experience of biodiversity in the Deliblato Sands SNR/IBA (see Sections 2.3, 7, and 8).

At the start of the RCIA process, the developers of all three PWPPs had already coordinated and cooperated on numerous aspects of the projects' processes, e.g. contracting (separately) the same local transport company to facilitate appropriate transport planning of construction material. Their continued cooperative, engaged and supportive participation in the RCIA process was essential for identifying the most significant cumulative risks and formulating opportunities for the joint management of those risks.

The RCIA goes beyond national regulatory requirements and applies international standards and guidance, thus providing a resource for WPPs in the study area and others in the Serbian wind sector to use in

[33] Stakeholder Engagement Plan (SEP) Alibunar WF, 30 June 2017; - Stakeholder Engagement Plan for the Kovačica Wind Park Project, 1 December 2013; Čibuk 1 Wind Farm Stakeholder Engagement Plan (Prepared originally in May 2012 (Updated in February 2013, November 2014, May 2017 and July 2017)

achieving compliance with international requirements. The process adopted some key aspects of international standards, including the application of the mitigation hierarchy concept, the identification of risks through VECs, and the application of good-practice approaches to the management of risks (e.g., adaptive management).

2. RCIA Stakeholder Identification and Engagement

2.1 INTRODUCTION

Stakeholder engagement took place both bilaterally and multilaterally as part of the RCIA process. All stakeholder interactions were recorded, a summary of which is provided in section 2.4.

2.2 RCIA STAKEHOLDER LIST

Stakeholders were selected to provide representation of key E&S considerations potentially associated with the PWPPs, including their current knowledge on community engagement outcomes and plans, and on biodiversity and stressors in the Deliblato Sands SNR/IBA.

The following individuals were represented in the various stakeholder meetings that took place over during the development of the RCIA.

TABLE 2. RCIA STAKEHOLDERS CONSULTED—MINISTRIES AND GOVERNMENT INSTITUTIONS

MINISTRIES AND GOVERNMENT INSTITUTIONS		
The Provincial Institute for Nature Conservation, Novi Sad	Nikola Stojnic	Head of Department for Habitat and Species Conservation
	Slobodan Puzovic	Director of the Institute for Nature Conservation
	Marko Tucakov	Independent Associate for International Cooperation and

TABLE 3. RCIA STAKEHOLDERS CONSULTED—DEVELOPERS

DEVELOPERS		
PWPP Čibuk: Wind Energy Balkan Group (WEBG)	Zeljko Djuric	Project Director
	Aleksandar Anđić	Local Community Relationship Manager
	Branko Karapandža (Wildlife Conservation Society "Mustela")	Consulting Ecologist
	Marcel Florea (GE Renewable Energy)	GE HSE Site Manager
PWPP Kovačica: Electrawinds K-Wind (EWK)	Milos Colic	Project Director
	Ljuboslav Lenhart	Project Manager
	Tatjana Nikolic	PMC HSE Site Coordinator
PWPP Alibunar: Electrawinds-S (EWS), Elicio	Pieterjan Vanoutrive	Legal Counsel
	Danijela Isailovic	Corporate Communications and Public Affairs Manager
	Aleksandar Vulovic	Environmental Officer
	Christophe Bols	Country Manager Serbia
All three PWPPs	Tony Iles	Environmental and Social Coordinator

TABLE 4. RCIA STAKEHOLDERS CONSULTED—CONSERVATION ORGANIZATIONS, ACADEMICS, AND CIVIL SOCIETY ORGANIZATIONS

CONSERVATION ORGANIZATIONS, ACADEMICS, AND CIVIL SOCIETY ORGANIZATIONS		
BirdLife affiliate NGO - The Society for the Protection of Birds	Milan Ruzic	Bird Expert, Director
World Wildlife Fund	Goran Sekulic	Bird Expert, Policy Officer
Institute for Zoology, The Faculty of Biology, University of Belgrade	Jelena Burazerovic	Bat expert, Chair of Animal Ecology and Zoogeography
Individual Experts	Marko Rakovic Stefan Skoric	Bird Experts

2.3 RCIA EXPERT REVIEW GROUP

The RCIA process benefited from the establishment of an Expert Review Group (ERG), including national bird/bat experts from the Institute for Nature Conservation of Vojvodina Province, Bird Protection and Study Society of Serbia, WWF International and the Wildlife Conservation Society "Mustela". All ERG members (see Tables 5 and 6) were selected based on their knowledge and expertise on biodiversity and stressors in the Deliblato Sands SNR and their expressed interest to guide and enhance future monitoring design, mitigation measures and additional conservation actions.

The scope of the ERG was to provide technical review of the RCIA methods and outcomes, to ensure that national expertise and sensitivities are appropriately incorporated in the assessment. This includes consideration of the national context in the selection of priority VECs and the framework of recommendations resulting from the RCIA.

TABLE 5. RCIA ERG MEMBERS – BIRD EXPERTS

NAME	POSITION
Nikola Stojnić	Independent Associate for Ornithology, Head of Dept. for Habitat and Species Conservation, Institute for Nature Conservation of Vojvodina Province
Goran Sekulić	Policy Officer, WWF International, Danube-Carpathian Programme
Milan Ružić	President, Bird Protection and Study Society of Serbia, (Birdlife Affiliate Organization)

TABLE 6. RCIA ERG MEMBERS – BAT EXPERT

NAME	POSITION
Branko Karapandža	Fauna C&M / MM Consulting,

2.4 SUMMARY OF RCIA STAKEHOLDER ENGAGEMENT

Table 7 summarizes the main stakeholder engagement activities and the outcomes per engagement.

TABLE 7. SUMMARY OF RCIA STAKEHOLDER ENGAGEMENT ACTIVITIES

DATE(S)	TYPE OF ORGANIZATION	ORGANIZATION NAME	BILATERAL OR MULTILATERAL	SCOPE OF THE MEETING	MAIN TOPICS OF DISCUSSION	KEY OUTCOMES
19 December 2017	Developers	WEBG, EWK, EWS, Elicio	M	Kick-off for the RCIA	• Scope and proposed timelines for the RCIA • Communication protocols	• RCIA communications protocols
30 January 2018	Developers	Tony Iles (Developer E&S Representative)	B	Presentation of the PWPP ESIAs and initial discussion on potential VECs	• PWPP development schedules • Status of other industrial developments in the region • PWPP roles and responsibilities • Key E&S issues for the PWPPs • Site visit itinerary	• General approach to the site visit • Information request to Developers
19 February 2018	Developers	WEBG, EWK, EWS , Elicio	M	Site visit kick-off meeting	• Site visit goals and itinerary • Overall RCIA process and data availability	• Finalized site visit itinerary and logistics
20 February	Developers	WEBG	B	Site visit to Čibuk WPP	• Site visit with Developer representatives, including bird and bat expert. The visit included a stop at Pančevo port and traversing the portion of the transportation	• Direct observation of the site and setting to complement desktop information

DATE(S)	TYPE OF ORGANIZATION	ORGANIZATION NAME	BILATERAL OR MULTILATERAL	SCOPE OF THE MEETING	MAIN TOPICS OF DISCUSSION	KEY OUTCOMES
					routes that will be shared by the core projects to understand transport logistics. The visit also included a drive through of the WPP site and stops at key locations such as storage areas, batch plant and representative turbine locations and at surrounding settlements.	
20 February	Developers	EWS, Elicio	B	Site visit to Alibunar WPP	• Site visit with Developer representatives. The visit included a drive through of the WPP site and stops at key locations such as representative turbine locations.	• Direct observation of the site and setting to complement available desktop information
21 February	Conservation Organization, Developers	Nature Institute, Tony Iles, EWK	M	To discuss the available ecological information and seek experts' views and opinions on main issues and possible wider conservation actions relevant to the Deliblato Sands SNR.	• Availability of information on bird and bat species in the South Banat region and willingness to provide relevant data in response to specific requests for information; • Key external stressors for birds	• Experts expressed their interest to offer their expertise and knowledge and in the future conservation actions. • Emphasized Saker Falcon as a priority for conservation. Other birds identified included imperial eagle and geese populations. • Despite existing statutory protections of raptors, stakeholders highlighted
21 February	Conservation Organization, Developers	BirdLife, Tony Iles	M			
21 February 2018	Conservation organizations, academia and civil society organizations	World Wildlife Fund, The Institute for Zoology (The Faculty of Biology) of University of Belgrade, Individual Experts	M			

DATE(S)	TYPE OF ORGANIZATION	ORGANIZATION NAME	BILATERAL OR MULTILATERAL	SCOPE OF THE MEETING	MAIN TOPICS OF DISCUSSION	KEY OUTCOMES
					and bats in the South Banat region; • Species considered most vulnerable; • Possible conservation actions.	external threats such as illegal shooting, intentional poisoning, and live trapping and the lack of existing capacity for enforcement or prosecution of these illegal activities. Saker falcons nesting on transmission lines increases their exposure to illegal shooting. Efforts conducted by Birdlife Serbia to reduce persecutions of raptors and other birds have been undertaken. Additionally, efforts have been initiated to install and monitor artificial nests for key raptor species of national and regional concern. • Data on bats are rather limited in Serbia (distribution, population trends, movements). Most of the existing data is old and unreliable. • Convergence of large tracts of land to intensive agriculture resulted in changes to bird, bat and other wildlife habitat in South Banat. The importance of small relict patches of habitat within and around the PWPP sites as important for sustaining bird and bat populations was highlighted. Distribution of colonial prey species is important for raptor foraging behavior. The extent

DATE(S)	TYPE OF ORGANIZATION	ORGANIZATION NAME	BILATERAL OR MULTILATERAL	SCOPE OF THE MEETING	MAIN TOPICS OF DISCUSSION	KEY OUTCOMES
						and status of prey populations is not well understood. • Restoration of steppe habitat in Deliblato Sands SNR by clearance of scrub vegetation is important to enhance foraging habitat for resident raptor species such as imperial eagle. Currently a project has been initiated and additional efforts of this type are desired by stakeholders. • Distribution of colonial prey species important for raptor foraging behavior. • Migratory bird movements, particularly for geese, between currently designated and potential future IBAs highlighted.
21 February 2018	Developers	WEBG, , EWK, EWS , Elicio	M	Ongoing stakeholder engagement	• Update on stakeholder engagement activities, including any grievances received • Mechanisms for stakeholder engagement • Ongoing plans for stakeholder engagement	• A substantial amount of engagement with local communities has been undertaken by the Developers • Communities have a generally positive response to development of the PWPPs so far

DATE(S)	TYPE OF ORGANIZATION	ORGANIZATION NAME	BILATERAL OR MULTILATERAL	SCOPE OF THE MEETING	MAIN TOPICS OF DISCUSSION	KEY OUTCOMES
21 February 2018	Developers	WEBG, EWK, EWS , Elicio	M	Site visit closeout meeting	• Discussion of key site visit observations and next steps in RCIA process	• Proactive discussion to continue with Developers on RCIA process and information needs
22 February 2018	Developers	EWK	B	Site visit to Kovačica WPP	• Site visit with Developer representatives. The visit included a drive through of the WPP site and stops at key locations such as representative turbine locations and small woodland areas.	• Direct observation of the site and setting to complement desktop information
31 May 2018	Developers	WEBG, , EWK, EWS, Elicio	M	Presentation of the draft RCIA	• The RCIA was presented to Developers for initial discussion and feedback	• Initial feedback to be followed by Developer comments for inclusion in the final RCIA
Mid-May to Mid-June 2018	Conservation Organizations	ERG: Institute for Nature Conservation of Vojvodina Province, World Wildlife Fund, BirdLife affiliate Bird Protection and Study Society of Serbia	B	Email communication to obtain input on prioritization of bird VECs	• ERG members were provided the draft outputs of Steps 1 to 3 of the RCIA framework for birds to review whether any further species should be included based on their national expertise.	• Feedback incorporated into the RCIA
Mid-May to Mid-June 2018	Conservation Organization	ERG: Wildlife Conservation Society "Mustela"	B	Email communication to obtain input on prioritization of bat VECs	• ERG member provided the draft outputs of Steps 1 to 3 of the RCIA framework for bats to review whether any further species should	• Feedback incorporated into the RCIA

DATE(S)	TYPE OF ORGANIZATION	ORGANIZATION NAME	BILATERAL OR MULTILATERAL	SCOPE OF THE MEETING	MAIN TOPICS OF DISCUSSION	KEY OUTCOMES
					be included based on his national expertise.	
Continuous	Developers	Tony Iles (Developer E&S Representative)	B	Email communication to obtain clarification on certain E&S topics	• Construction scheduling, bird and bat survey work, transport management	• Clarification obtained

3. Scoping

The scoping phase included stakeholder engagement, a review of published project ESIAs for participating WPPs and high-level review of other information that may affect condition of VECs, a determination of the spatial and temporal boundaries of the RCIA, and a screening process to select VECs.

A well-developed operational monitoring of bird and bat mortality was determined to be essential for informing the adaptive management approach as well as capacity building for operational monitoring.

3.1 LITERATURE AND DATA REVIEW

The literature search comprised the PWPPs' ESIA documentation, as well as publicly available published and gray literature (see Section 9, References) relevant to the RCIA. The literature search focused on the following topics:

- Potential migratory and resident birds using the study area, their ecology, and risks associated with PWPPs;
- Potential migratory and resident bat species using the study area their ecology, and risks associated with PWPPs;
- Approaches to monitoring and mitigation of WPP impacts to birds and bats and social VECs;
- Published guidance on cumulative impact assessment for the onshore wind energy sector;
- Participating WPP ESIA documentation and associated appendices and annexes describing biodiversity surveys; and
- Relevant national regulations, international policy and guidance.

3.2 VEC SELECTION

This RCIA uses a values-based framework to promote a comprehensive, yet focused, understandable, and accessible assessment, by using "Valued" Environmental and Social Components (**VEC**s) as the foundation for the assessment. The selection of appropriate VECs allows the assessment to be focused on E&S aspects valued by most stakeholders. At the same time, the candidate VECs should be comprehensive, so that taken together, the candidate VECs enable a full understanding of the important potential cumulative effects of the projects.

This section describes the two-step approach that was used to (1) **identify candidate VECs**, and (2) **select appropriate VECs** for the purposes of the RCIA. The final list of selected VECs is presented below.

The definitions and selection process of the VECs was based on:

- Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (IFC,2013)
- Canada Environment Assessment Office (EAO) (2013) Guideline for the Selection of Valued Components and Assessment of Potential Effects.

What are VECs?

VECs are E&S attributes that are considered to be important in assessing risks; they may be:

- physical features, habitats, wildlife populations (e.g., biodiversity),
- ecosystem services,
- natural processes (e.g., water and nutrient cycles, microclimate),
- social conditions (e.g., health, economics), or
- cultural aspects (e.g., archaeology and cultural heritage).

While VECs may be directly or indirectly affected by a specific development, they often are also affected by the cumulative effects of several developments. VECs are typically the ultimate recipient of impacts because they tend to be at the ends of pathways of effects.

IDENTIFYING AND EVALUATING CANDIDATE VECS

For the purposes of the RCIA, candidate VECs were identified based on the *issues scoping* that had already taken place in the project-specific impacts assessment stages preceding the RCIA. Available information included project-ESIAs and completed consultation with stakeholders, which is an important part of the process. The underlying assumption is that these reveal the values and priorities of all stakeholders and can as such inform the "Valued" E&S Components. This issues scoping generated an exhaustive list that was reduced to a limited list of candidate VECs that may be affected by the PWPPs and warrant consideration in the RCIA – see first field in table 8 below.

The Canada EAO Guideline (2013) suggests a range of questions to help determine whether a VEC is relevant to the cumulative assessment. These questions were streamlined for use in the RCIA, including to reflect the local context. The questions guided both steps of identifying candidate VECs and selecting appropriate VECs to be focused on in the RCIA.

Potential for Interaction

- *Do any of the PWPPs have the potential to interact with and adversely affect the VEC?*
- *Does the effect of that interaction have the potential to operate cumulatively with the effects from other WPPs or other external stressors including reasonably foreseeable projects or activities?*

To be relevant to the RCIA, a candidate VEC must be potentially affected by at least one of the PWPPs and by other developments / external stressors, or by at least two of the PWPPs i.e., there must be some potential for a cumulative, rather than just project-specific, effect on the VEC.

Focus on Key Issues

- *Is the VEC "valued" i.e., considered as an important issue for stakeholders?*
- *Is the VEC particularly sensitive or vulnerable to disturbance from project effects?*
- *Is there potential for* significant *cumulative effects on the VECs by the PWPPs, including in combination with other external stressors?*

The importance of a potential candidate VEC was determined based on:

1. cultural values or social and / or scientific concern appended to the VEC, for example, via views expressed by the public or government, legislative or regulatory requirements, government management priorities etc.; and / or
2. general sensitivity or vulnerability to disturbance.

Related to the latter, it should be noted that vulnerability/sensitivity was assessed in a qualitative manner based on the available information at that stage, i.e., the project ESIAs and stakeholder engagement during the site visit. At a later stage, for the selected VECs, vulnerability/sensitivity is assessed in a more systematic way to guide the selection of the priority VECs.

If the answer to either of the two questions above was yes, or unknown, the potential for *significant* cumulative effects on the VECs by the PWPPs or in combination with other external stressors was assessed.

Measurability

- *Can the potential effects of the project on the VEC be measured and monitored?*

This aspect is important as the effects as well as the effectiveness of mitigation need to be measured in some way.

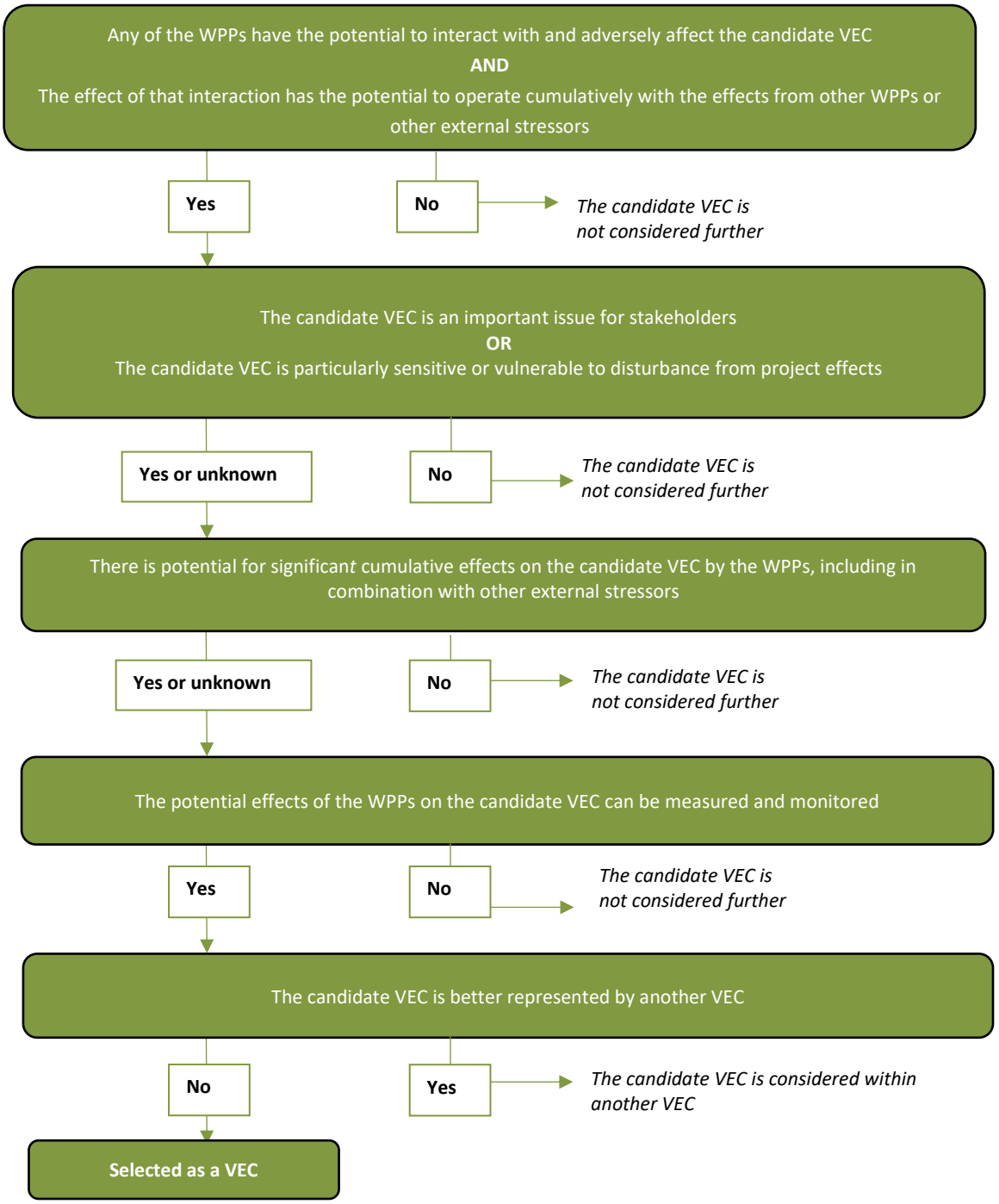
Efficiency

- *Is the candidate VEC better represented by another VEC?*

It is possible that (1) similar VECs (e.g., VECs that may be affected by a project in the same or similar ways) could be grouped together to facilitate a more efficient and accessible assessment or (2) that the VEC could be replaced by another VEC on which the potential effects can be more effectively assessed. If so, it may be useful to replace a candidate VEC by another VEC.

The answer to above questions determined whether the candidate VEC was scoped in or out the final selection of VECs. The process of enquiry is summarized in Figure 6.

FIGURE 6. VEC SELECTION LOGIC



3.3 CANDIDATE VEC EVALUATION - RESULTS

The table below lists the candidate VECs and documents the evaluation of each, following the process described above, thus providing the rationale for VEC selection or rejection. The assessment of potential VECs considers both the construction and operational phases of the PWPPs with the assumption that impacts from the decommissioning phase will be similar to those identified during the construction phase and therefore not to be assessed separately.

TABLE 8. SUMMARY OF SCREENING ASSESSMENT FOR SELECTION OF VECs

	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
Candidate VEC	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
Soil and Ground-water Quality	Yes	No	No further assessment required.					• No planned discharges nor use of large volumes of hazardous materials during construction/operation. • Little risk of accidental release of pollutants during construction and operation. • Any effect of an accidental discharge is restricted to a project, and not considered to be cumulative. • There is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.
Surface Water Quality	Yes	No	No further assessment required.					• No planned discharges nor use of large volumes of hazardous materials during construction/operation. • Little risk of accidental release of pollutants during construction and operation. • Any effect of an accidental discharge is restricted to a project, and not considered to be cumulative. • There is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.
Air Quality & Climate	Yes	Yes	Yes	Unknown	No	No further assessment required.		• There will be no significant emissions to air during operation. Moreover, renewable energy power generation projects displace greenhouse gas emissions from present conventional energy sources and therefore have a positive effect on climate.

Candidate VEC	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
								• Air quality in the local environment can be affected by dust created by completion construction activities. • Any cumulative air quality impacts would be caused by increased traffic but would only represent a short-term and localized risk that would not be expected to be significant. • There is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.
Quiet and Peaceful Environment	Yes	Yes	Yes	Yes	No	No further assessment required.		• Both Alibunar WPP (qualitative) and Čibuk WPP project-specific noise impact assessments note that noise is unlikely to pose a problem at the nearest sensitive receptor and the noise levels will fall within the prescribed limits. • From the Kovačica WPP (quantitative) cumulative noise impact assessment during operations, with consideration of the potential presence of the Alibunar WPP and Čibuk, both WPPs are located at sufficient distances from Kovačica WPP to cause any cumulative noise impacts. • Any cumulative noise impacts would be caused by increase of traffic (during construction) but would only represent a short-term and localized risk to the acoustic environment that would not be expected to be significant. • There is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.
Visual Amenity	Yes	Yes	Potentially yes	Potentially yes	Yes	Yes	No	<u>Shadow flicker</u>:

Candidate VEC	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
								• The ESIAs for all three PWPPs determined the projects are unlikely to cause project-specific significant shadow flicker to the nearest receptors. • Assessments show that none of the shadow-flicker locations overlap between Kovačica and Čibuk WPPs. • Due to the distance between the Kovačica and Alibunar WPPs, and between the Čibuk and Alibunar WPPs, cumulative impact from shadow flicker is unlikely. <u>Landscape and Visual Impact</u>: • Cumulative Landscape Effects: - The Kovačica and Čibuk ESIAs conclude that wind farms, even though potentially changing the landscape character and the perception of that landscape, would become a characterising feature of a large crescent in the northern half of South Banat District, wrapping around Deliblato Sands. This would result in a moderate adverse cumulative landscape effect. • Cumulative Visual Impacts: - The ESIAs indicate different levels of adverse cumulative visual impact on following receptors with varying sensitivity: • Residential properties • Road users • People at work in the open countryside • Visitors / Users of Deliblato Sands Designated (Nature) Area

Candidate VEC	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
								• **Based on the risk of up to moderate (adverse)[34] cumulative effects on the landscape character and up to a moderate effect for most visual observers, this VEC is included in the RCIA.**
Land Access and Associated Livelihoods	Yes	Yes	Yes	Potentially yes	No	No further assessment required.		• This candidate VEC is a sub-component of socioeconomics but it is considered separately because most land is owned by members of the nearby communities. • During construction only, the presence of the projects will restrict some land access and affect associated livelihoods, with agriculture being the dominant land use around all three PWPPs. • However, the overall reduction in land available for agriculture is not expected to have a significant effect on livelihoods of farmers and tenants, due to the availability of land in the wider area, relatively low volume of land required by the projects, and the implementation of negotiated agreement for the land acquisition/lease strategy/compensation of lost crops and damages. • It is possible that any land owner/user is impacted by more than one project, yet there are no known cases. • There is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.

[34] The project-specific ESIAs acknowledge that the wind turbines are perceived as a novel form of development, and that there is insufficient experience in Serbia to know whether the introduction of wind turbine developments will be perceived positively or negatively. Therefore, partly to avoid complex subjective issues and partly to ensure that a 'worst-case scenario' is considered, the ESIAs assumed that introduction of a large structure into a view or any change in the overall character of a landscape brought about by the wind turbines is adverse in nature. For the purposes of this RCIA however, since no information was available on preference of the observers, only significance and magnitude of effects, and not (positive/negative/neutral) evaluation of these effects, will be considered in the RCIA framework for Visual Effect (see Chapter 5).

	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
Candidate VEC	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
Socioeconomics (Other than associated with land use)	Yes	Yes	Yes	Yes	Yes	Yes	No	• Employment and Procurement Opportunities: some positive impacts of in/direct employment opportunities could act cumulatively for receptors benefiting from more than one Project. These benefits will be most apparent during construction. • Revenue Generation for the Local Government / Community: this is predicted to provide a moderate project-specific beneficial impact. • Tourism: Being the first large scale wind farms in Serbia, local residents and community representatives are hoping that people may be encouraged to visit the wider area to see them. As for the PWPPs, although public roads are crossing the sites, the public will not be able to access the turbines and other project facilities for the purposes of tourism. Guided tours for local engineering students are occasionally taking place. • Attracting Foreign and Domestic Investments: The PWPPs presence is predicted to possibly attract further foreign and domestic investments in the respective municipality and the wider area. • Although the individual contribution of a single wind farm may not represent a significant socio-economic effect, the cumulative effect of all developments could represent a significant positive change in respect to local economy and cultural / tourism opportunities. The PWPPs are located in one of the economically least developed areas of Vojvodina province and therefore the sensitivity to this change is also potentially high (positive). • **Based on the risk of up to moderate (beneficial) cumulative effects, this VEC is included in the RCIA.**

	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
Candidate VEC	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
Community infra-structure/utilities	Yes	Yes	Yes	Potentially yes	No	No further assessment required.		Infrastructure/utilities other than transport Infrastructure: • The projects are not expected to place any significant additional demands on community infrastructure/utilities during construction or operation. Also, each project site is within a different municipality (reducing the potential for cumulative effects). Transport Infrastructure: • During operation, few workers will be on site, resulting in negligible risk of cumulative effects from their transport. • The greatest potential for cumulative impact on transportation infrastructure is during construction with transport of project components and equipment. • Most WTG components and electrical equipment for all three PWPPs will be imported via the Port of Pančevo, with temporary storage of some components. There is no evidence of a significant negative effect on the wider harbour operations from this activity. • The main road network through Pančevo will be used by all three PWPPs for the first segment of transport of materials by road. • The deliveries for Čibuk and Alibunar will then continue NE on the E-70 public road, through Banatsko Novo Selo, up to the Čibuk site turn-off point from E-70 on to local roads in the village of Vladimirovac. The deliveries for Kovačica will continue from Pančevo northward on the II-11. • As the construction schedules for the three projects overlap, there is a risk of a cumulative effect on transport infrastructure. This will depend on the extent of overlap between the delivery schedules. One transport

Candidate VEC	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
								company is engaged for all three PWPPs which facilitates appropriate transport planning. • Any potential cumulative effects on community infrastructure will be limited to the construction phase and be of a short-term, localized nature, and would not be expected to be significant. • There is therefore not considered to be sufficient rationale for inclusion of this VEC in the RCIA.
Community Health, Safety and Security (CHSS) - Transport	Yes	Yes	Yes	Yes	Yes	Yes	No	• Only low to negligible project-specific impacts on Community Health, Safety and Security aspects are expected. • Influx of labour: Non-local workers are predicted to predominantly commute to site each day from Pančevo or Belgrade. Any potential cumulative effect on local communities is not excepted to be significant. • As the construction schedules for the three projects overlap, the risk remains of a cumulative effect on community health, safety and security from transport-related accidents during construction. The risk of the cumulative effect will depend on the extent of overlap between the project delivery schedules. • **Based on the risk of significant cumulative effects from transport related accidents, this VEC is included in the RCIA but with a focus on project transport during construction only.**
Occupation-al Health and Safety (OHS)	Yes	No	No further assessment required.					• The risk for OHS impacts is site-specific and no receptor would be at risk of a cumulative effect from more than one project or from one project in combination with other known or reasonably foreseeable projects / activities.

Candidate VEC	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
								• There is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.
Archaeology and Cultural Heritage	Yes	No	No further assessment required.					• There is no mention of any linear or extensive archaeological sites that could be affected by more than one of the PWPPs (either alone or in combination with other known or reasonably foreseeable projects / activities), or any archaeologically significant sites where the setting would be compromised by the presence of multiple projects. • Any impacts on archaeology and cultural heritage, if they occur, are therefore considered to be local, with no identified cumulative effects. • There is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.
Bird populations (migratory, wintering, resident and summer breeding)	Yes	Yes	Yes	Yes	Yes	Yes	No	• There are several inter/nationally recognized areas for nature conservation (KBAs and SNRs) within close proximity to the PWPPs, all of which have bird species as part of their citation. • Important species of critical conservation concern occur within the vicinity of PWPPs, (some of) which are potentially vulnerable to cumulative impacts at the population scale. • The (baseline bird surveys informed) assessments of the PWPPs' ESIAs conclude that there will be no significant impacts on birds. However, the importance of validating these predictions through appropriate monitoring and mitigation protocols is acknowledged in all PWPP ESAPs and committed mitigation measures. • Potential for impact caused by collision with wind turbines and other infrastructure. • Potential for disturbance/displacement from breeding and foraging habitats. • **Based on the risk for up to major (adverse) cumulative effects on bird**

Candidate VEC	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
								populations, this VEC is included in the RCIA.
Bats	Yes	Yes	Yes	Yes	Yes	Yes	No	• Roughly two thirds of Serbian bat species have been recorded within PWPPs area of influence during pre-construction surveys, and/or documented in adjacent designated (Deliblato Sands SNR) or unprotected areas (Paunovic 2016). • Potential for cumulative impacts on breeding, roosting, foraging and migratory habitats for bats located within the projects' area of influence with potential for indirect or direct impacts to species. • Potential for impact caused by collision with rotor blades. • In general, current pre-construction risk assessment methods for bats do not correlate with observed direct impacts. This, in addition to the lack of evidence on observed direct impacts from WPPs in Serbia, warrants a precautionary approach. • The PWPPs' ESIAs assessments conclude that there are potential direct (collision) and indirect (loss of foraging habitat through disturbance) impacts to some species of bats. The importance of validating these predictions through appropriate monitoring and mitigation protocols is acknowledged in all PWPP ESAPs and committed mitigation measures. • **Based on the risk for up to major (adverse) cumulative effects on bat populations, this VEC is included in the RCIA.**
Wildlife habitat and vegetation communities	Yes	Yes	Yes	Yes	Yes	No	Yes. No further assessment required.	• In the projects' area of influence, relic natural habitats are sparsely distributed within an intensively cultivated agricultural context. For this reason, habitats/vegetation communities or features such as

Candidate VEC	POTENTIAL FOR INTERACTION		FOCUS ON KEY ISSUES			Can the potential effects of the projects on the VEC be measured and monitored?	Can the potential effects on the VEC be effectively considered within the assessment of another VEC?	Summary of evaluation for selection or screening out
	On a project-specific basis	Cumulatively	Important issue for stake-holders?	Sensitive or vulnerable to disturbance from project effects?	Potential for significant cumulative effects as a result of the projects?			
and / or other species								shelterbelts, wetlands, shrub/scrub, abandoned buildings/structures or artificial/natural waterbodies can be important features for wildlife. • Potential for cumulative impacts through direct loss or fragmentation of habitats and/or a disruption to patterns of dispersal for species of conservation concern that rely on these habitats. • In particular, the potential cumulative loss of colonial prey species habitats may result in indirect impacts to breeding and resident raptor species, including species of high conservation concern. Also, siting of WPPs near/within these areas of concentrated prey availability has the potential to increase collision risk for raptor species. Consideration of colonial prey habitat will be made in Step 5 of this RCIA for Birds. • Information available within the PWPPs ESIAs stipulates no loss of relic habitat, with the intensively cultivated habitat being the only that is directly lost. However, the information used is limited. This gap is also reflected in all PWPP ESAPs and committed mitigation measures, that do not include habitat and other species monitoring and/or mitigation requirements. • **It is considered that any potential effects on this VEC can be appropriately monitored and measured through bird and bat (selected VECs) monitoring and mitigation and that there is therefore not considered to be sufficient rationale for the inclusion of this VEC in the RCIA.**

4. RCIA Framework — Community Health, Safety and Security: Transport

4.1 OVERVIEW OF RCIA FRAMEWORK FOR COMMUNITY HEALTH, SAFETY AND SECURITY - TRANSPORT

The objectives of the RCIA for Community Health, Safety and Security (CHSS)-Transport are as follows:

- Determine which potential receptors are at the highest risk from the cumulative effects of the PWPPs.
- Identify potential joint mitigation and monitoringmeasures to be undertaken by developers and other stakeholders if CHSS-Transport is identified as a priority VEC.

Based on the scoping analysis in Section 3, it is considered that only transport related accidents during construction have the potential for significant effects on the VEC, and therefore the RCIA only focuses on this aspect of CHSS.

As noted in Section 1.4, the RCIA was conducted when construction was already well advanced for all three PWPPs with most of the construction transport completed, and therefore mitigation, monitoring, and management measures will be implemented (see Section 4.5) for the remaining time of the construction period only.

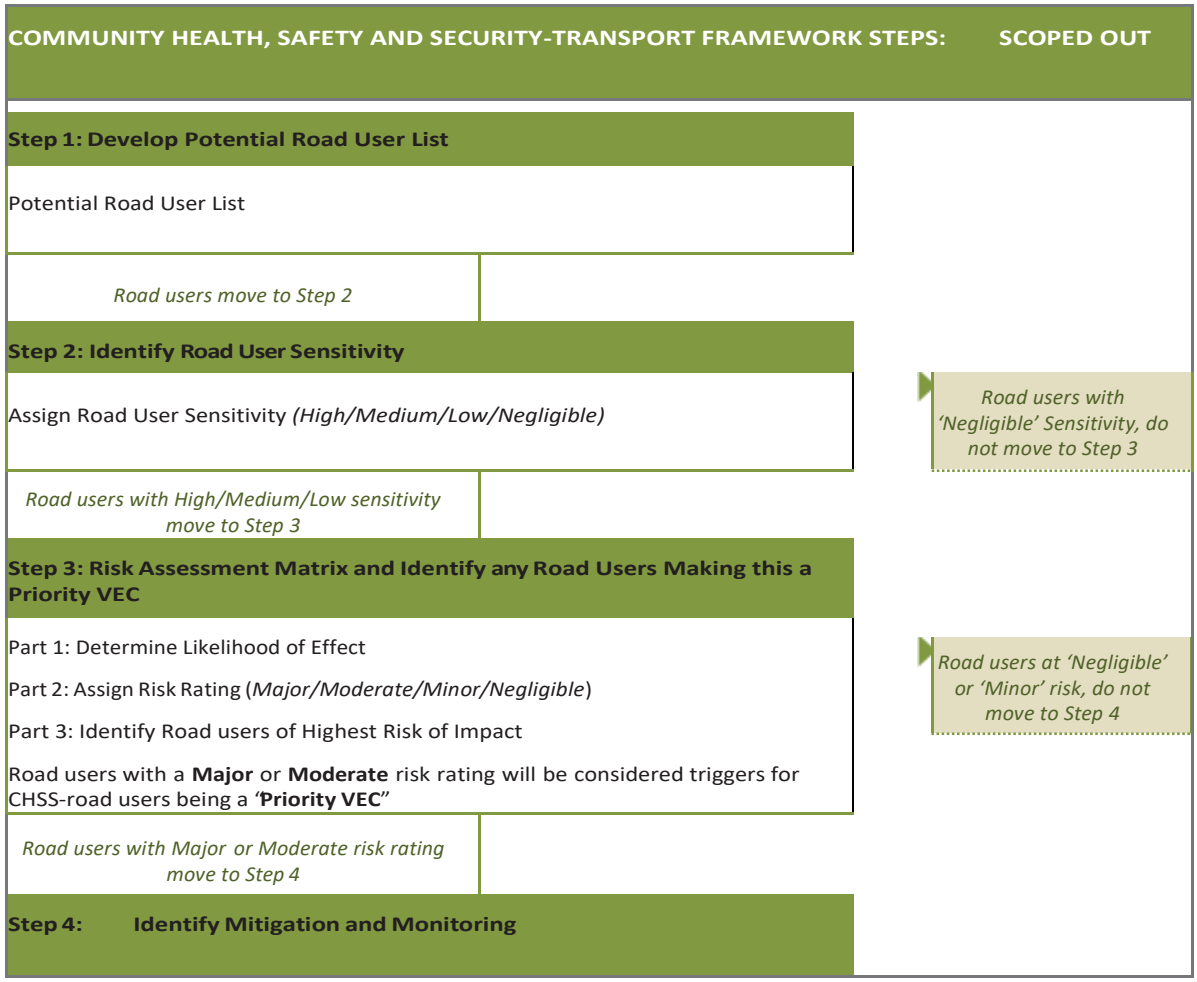
While the study area as specified in Section 1.3 is relevant to the Bird and Bat RCIA frameworks, a study area containing the road sections that are used for project delivery for at least two PWPPs is considered appropriate for the framework related to this VEC. Therefore, only the sections of the E-70 road and adjacent verges/footpaths through Pančevo used by all three PWPPs and the subsequent section of the E-70 used by bothh the Čibuk and Alibunar WPPs were considered (Figure 7)

FIGURE 7. STUDY AREA FOR CHSS-TRANSPORT: ROAD SECTIONS CUMULATIVELY USED FOR PWPP-RELATED TRANSPORT

A qualitative approach using professional judgement was applied to assess risks. The assessment was based on information in the PWPPs ESIAs and SEPs, observations during the site visit, and monthly construction schedules and related project delivery schedules provided by the PWPP project managers.

The RCIA framework for the VEC CHSS-Transport follows a four-step process, summarized in Figure 8.

FIGURE 8. RCIA FRAMEWORK COMMUNITY HEALTH, SAFETY AND SECURITY-TRANSPORT



4.2 STEP 1 – DEVELOP POTENTIAL ROAD USER LIST

4.2.1 METHODS

The purpose of Step 1 is to identify all receptors that could potentially be at risk from the cumulative effects of the WPPs due to construction transport related accidents.

Potential Road User List

Potential road users were considered to include all road users, including those crossing the road, and immediately adjacent users (those on verges or footpaths) of the roads that will be used for transport related to at least two of the three PWPPs. Road users vary in terms of potential exposure to effects and related appropriate mitigation measures to manage effects and were a priori categorized accordingly.

4.2.2 RESULTS

Potential Road User List

All road sections are public roads and are therefore also used for non-project related transport. The following four categories of road users were identified:

- Pedestrians using road verges or adjacent footpaths;
- Cyclists using the road or adjacent footpaths;
- Motorcyclists using the road;
- Car drivers using the road.

4.3 STEP 2 – IDENTIFY ROAD USER SENSITIVITY

4.3.1 METHODS

The purpose of Step 2 is to determine the sensitivity of each receptor category to potential cumulative effects of the WPPs due to construction transport related accidents.

Sensitivity Scoring

For each road user category, sensitivity was scored based on their vulnerability in case of a road traffic accident.

The vulnerability level of road users can be defined in different ways, such as (1) by the amount of external protection in traffic (e.g. pedestrians and cyclists), (2) the capability of driving, i.e. road user groups who may have limitations i (e.g. novice/disabled road users,), or (3) the resilience (e.g. elderly car drivers may have lower resilience). Vulnerable road users do not usually have a protective 'shell', and the difference in mass between the colliding opponents is also often an important factor. Given that there was no information to define task capability or resilience of the road users, only (1) was used to score sensitivity per road user category.

TABLE 9. SENSITIVITY SCORING FOR ROAD USERS

SENSITIVITY SCORING	CRITERIA
Negligible	• The receptor could experience a negligible change in their well-being in response to the effect.
Low	• The receptor could experience a low level of change in their well-being in response to the effect.
Moderate	• The receptor could experience a moderate level of change in their well-being in response to the effect.
High	• The receptor could experience a high level of change in their well-being in response to the effect.

Road users with negligible sensitivity did not move forward to step 3 and were scoped out of the RCIA process.

4.3.2 RESULTS

Studies[35] indicate that occupants of motorized vehicles (such as cars, vans, trucks and busses) are the least sensitive to injury. Most vulnerable are the road users without a vehicle, and thus without a shell (pedestrians) and those using a vehicle without a shell (cyclists and light moped riders). Riders of motorized two-wheelers (motorcycles, mopeds and light mopeds) are only protected from head injuries if they wear the obligatory crash helmet. Because these riders are also to a large extent unprotected, they are also referred to as vulnerable. Given the potentially significant consequences from injury to those involved in a transport-related accident, a precautionary level of sensitivity was assigned to all receptor groups.

TABLE 10. SENSITIVITY SCORING FOR ROAD USERS: RESULTS

ROAD USER CATEGORIES	SENSITIVITY SCORING
Car drivers	Medium
Motorcyclists	High
Cyclists	High
Pedestrians	High

Road Users Progressing to Step 3

All four groups proceeded to step 3.

4.4 STEP 3 – RISK ASSESSMENT MATRIX AND IDENTIFICATION OF PRIORITY ROAD USERS

4.4.1 METHODS

The purpose of Step 3 is to identify the priority road users. These are determined using sensitivity assessments from step 2 and the LoE.

Part 1 – Determine LoE

The LoE for road users was determined on the basis of the likelihood of an accident occurring from the cumulative transport for the PWPPs in the area in combination with other external stressors such as non-project related traffic and the condition of infrastructure observed during the site visit. This likelihood was

[35] E.g., SWOV Fact Sheet Vulnerable road users (https://www.swov.nl/sites/default/files/publicaties/gearchiveerde-factsheet/uk/fs_vulnerable_road_users_archived.pdf)

based on expert review of the project ESIAs and knowledge of the likely direct effects that would occur to road users. LoE scoring is based on the criteria listed in Table 11.

TABLE 11. LIKELIHOOD OF EFFECT SCORING FOR ROAD USERS

LIKELIHOOD OF EFFECT SCORING	CRITERIA
Negligible	• Occurrence of a traffic accident due to cumulative transport for the PWPPs unlikely.
Low	• Occurrence of a traffic accident due to cumulative transport for the PWPPs is less likely.
Medium	• Occurrence of a traffic accident due to cumulative transport for the PWPPs is likely.
High	• Occurrence of a traffic accident due to cumulative transport for the PWPPs is highly likely.

Part 2 – Assign Risk Rating for Each Road User Group

The matrix in Table 12 was used to assign the risk rating for each road user group using the "Sensitivity" and "Likelihood of Effect" (LoE) scores.

TABLE 12. RISK RATING FOR ROAD USERS

SENSITIVITY	LIKELIHOOD OF EFFECT			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

Part 3 – Identify Receptors Triggering Priority VEC Status

The presence of receptors with a Major or Moderate risk rating when their sensitivity and LoE category scores were applied within the matrix will be considered a trigger for CHSS-Transport being considered a Priority VEC.

4.4.2 RESULTS

All four road user groups proceeded to step 3. The assessment of LoE (part 1) and assignment of risk rating

(part 3) is summarized in Table 13. Considerations that applied to all road users include:

- The delivery schedules for the wind turbines to Čibuk and Kovačica will not overlap which reduces the LoE, though other deliveries of materials and equipment could have some overlap.
- The delivery schedules for Čibuk and Alibunar will overlap.
- As an indication of scale, for Kovačica the ESIA predicts an additional approximately 44 heavy vehicles per day during construction (based on a construction period of 18 months). Similar estimates are not available in the ESIAs for Čibuk and Alibunar but this provides a very general indication of the likely number of heavy vehicles to be considered.
- The PWPP ESIAs comment that traffic volumes are currently low to moderate along the majority of the E-70 that will be used by the PWPPs, and already frequented by heavy goods vehicles. Traffic flows on the section of the E-70 within Pančevo are the highest. Heavy traffic flows are expected during peak hours when people are travelling to their place of work or education.

TABLE 13. RISK RATING FOR CHSS-TRANSPORT RECEPTORS

RECEPTOR TYPE	STEP 2:	STEP 3:		
	SENSITIVITY	LIKELIHOOD OF EFFECT ASSESSMENT (NARRATIVE)	LIKELIHOOD OF EFFECTS SCORE	RISK RATING
Pedestrians	High	There is generally a separation of pedestrians from road vehicles in the study area, with footpaths observed in the communities. Pedestrians will still cross the road at a variety of points and could be affected by a vehicle leaving the road so the likely occurrence of a	Low	Moderate
Cyclists	High	All receptors sharing the roads with other vehicles have the same likelihood of a road traffic accident due to cumulative effects of the PWPPs is considered, which is considered to be medium.	Medium	Major
Motorcyclists	High		Medium	Major
Car drivers	Medium		Medium	Moderate

Part 3 – Identify Road Users Triggering Priority VEC Status

Due to their medium to high sensitivity, all road user groups were determined to be at moderate to major

risk of cumulative effects from the PWPPs. CHSS-Transport is therefore considered to be a priority VEC and recommendations will be made on harmonized mitigation, monitoring, and management measures that could be put in place to safeguard these road users during construction (Step 4).

4.5 STEP 4 – IDENTIFY MITIGATION AND MONITORING

> The purpose of this step is to identify the potential joint mitigation and monitoring measures for developers and other stakeholders to consider.

The identification of measures was performed in two parts:

- Part 1: Review of commitments made by the PWPPs in their ESIAs, construction permits, ESAPs, SEPs.
- Part 2: Conclusion as to whether additional measures are required.

Part 1 – Review of Existing Commitments

The following commitments were made by the PWPPs:

- To develop and implement a Construction Transport Management Plan for each PWPP, in particular for heavy vehicles, with considerations such as:
    - using designated routes;
    - avoiding peak traffic hours where necessary;
    - liaising closely with local authorities responsible for traffic management; and,
    - liaising closely with local communities, providing timely information to people/households located along the transport route that there will be increased transport activity in their area
    - Convoys for the wind turbine main components are all provided with a police escort

Part 2 – Need for Additional Measures

The PWPPs have already developed measures proportionate to the scope and nature of project activities. With these measures in place, the PWPPs are predicted to have a negligible likelihood of cumulative transport-related effects during construction, resulting in an overall reduction in the risk rating to Minor. No further recommendations are therefore made for mitigation and management for the VEC.

4.6 SUMMARY OF OUTCOMES FOR CHSS-ROAD USERS

The RCIA framework for CHSS-Transport followed three steps to determine whether it was a priority VEC.

Four main road user groups (pedestrians, cyclists, motorcyclists and car drivers) were identified. For each road user category, sensitivity was scored based on their vulnerability in case of a road traffic accident. Given the potentially significant consequences from injury to those involved in a transport-related accident, a precautionary level of sensitivity was assigned to all receptor groups. This resulted in all four road user groups proceeding to step 3.

The LoE for road users was determined on the basis of the likelihood of an accident occurring from the cumulative transport for the PWPPs in the area in combination with other external stressors such as non-project related traffic and the condition of infrastructure observed during the site visit. The risk rating for the road user groups was determined on the basis of a sensitivity and LoE matrix.

Due to their medium to high sensitivity, all road user groups were determined to be at moderate to major risk of cumulative effects from the PWPPs. CHSS-Transport is therefore considered to be a priority VEC.

The PWPPs have developed measures proportionate to the scope and nature of project activities. With these measures in place, the PWPPs are predicted to have a negligible likelihood of cumulative transport-related effects during construction, resulting in an overall reduction in the risk rating to Minor. No further recommendations are therefore made for mitigation and management for the VEC.

5. RCIA Framework — Landscape and Visual Effect

5.1 OVERVIEW OF RCIA FRAMEWORK FOR LANDSCAPE AND VISUAL EFFECT

The objectives of the RCIA for the Landscape and Visual Effect VEC are as follows:

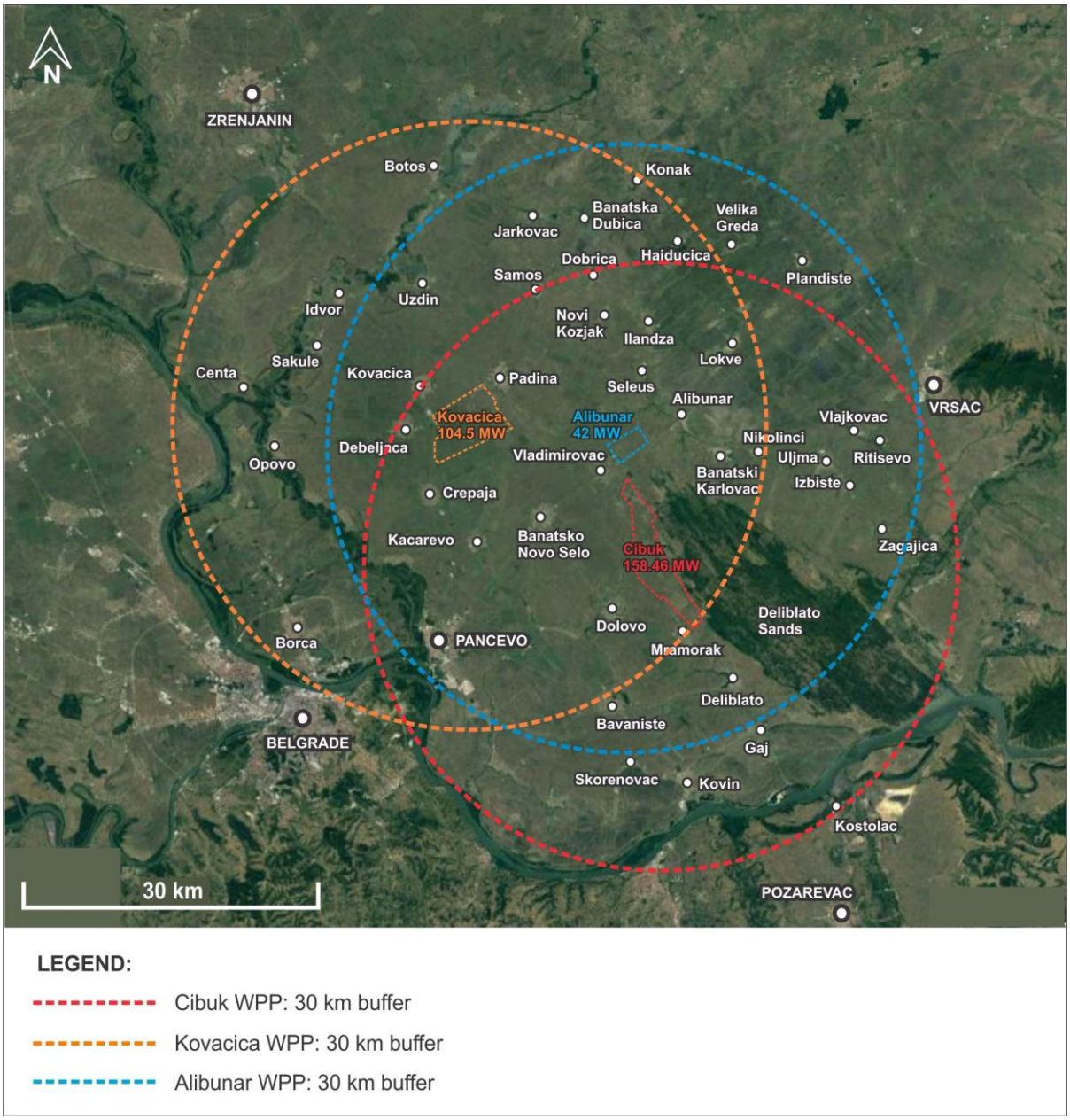
- Determine which potential receptors (landscape character types / observers) are at the highest risk from the cumulative effects of the PWPPs
- Identify potential joint mitigation and monitoring measures to be undertaken by developers and other stakeholders if Landscape and Visual Effect is identified as a priority VEC.

While the study area as specified in Section 1.3 is relevant to the Bird and Bat RCIA frameworks, a study area that represents the area from which the PWPPs may be seen is considered appropriate for the framework related to this VEC. The spatial scope for this VEC is based on the guidance in the Scottish Natural Heritage (SNH) Guidelines (2012). Generally, for the current generation of turbine size, the study area should extend to a minimum of 35km from the outer margin of the windfarm in question (Figure 9).

Both the Kovačica and Čibuk WPP ESIAs include a detailed assessment of landscape and visual effect, including a comprehensive assessment of cumulative effects that also considers the Alibunar WPP. The Kovačica WPP ESIA was guided by the European Landscape Convention[36], ratified by Serbia in 2011, and the SNH Guidelines 2012 on Assessing Cumulative Impacts of Onshore Wind Energy Developments[37]. Both ESIAs set an initial study area for their assessments of 30 km radius from the site center, beyond which any visibility is considered very unlikely to be significant. This is considered a reasonable approach and has been adopted for the RCIA.

[36] https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/176
[37] https://www.nature.scot/sites/default/files/2017-09/A675503%20-%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20developments.pdf

FIGURE 9. STUDY AREA FOR LANDSCAPE AND VISUAL EFFECT VEC



Information reviewed includes the PWPPs ESIAs and observations during the site visit.

The information in the ESIAs was integrated with the four-steps approach of the RCIA framework.

The assessment of significance of potential cumulative landscape/visual effect of the proposed developments is determined by the combination of (1) the magnitude of effect and (2) of the sensitivity of the landscape or the visual receptors, i.e. those who perceive a given view or series of views. It should be noted that, unlike with the other VECs, the RCIA for this VEC predicts the potential significance of effects (instead of LoE), based on the approach used in the ESIAs and international best practice.

The RCIA distinguishes between Landscape and Visual Effect, based on their different receptor, i.e. the landscape and the observer. Mitigation and Monitoring Measures are considered common to both Landscape and Visual Effect and are described below in Step 4.

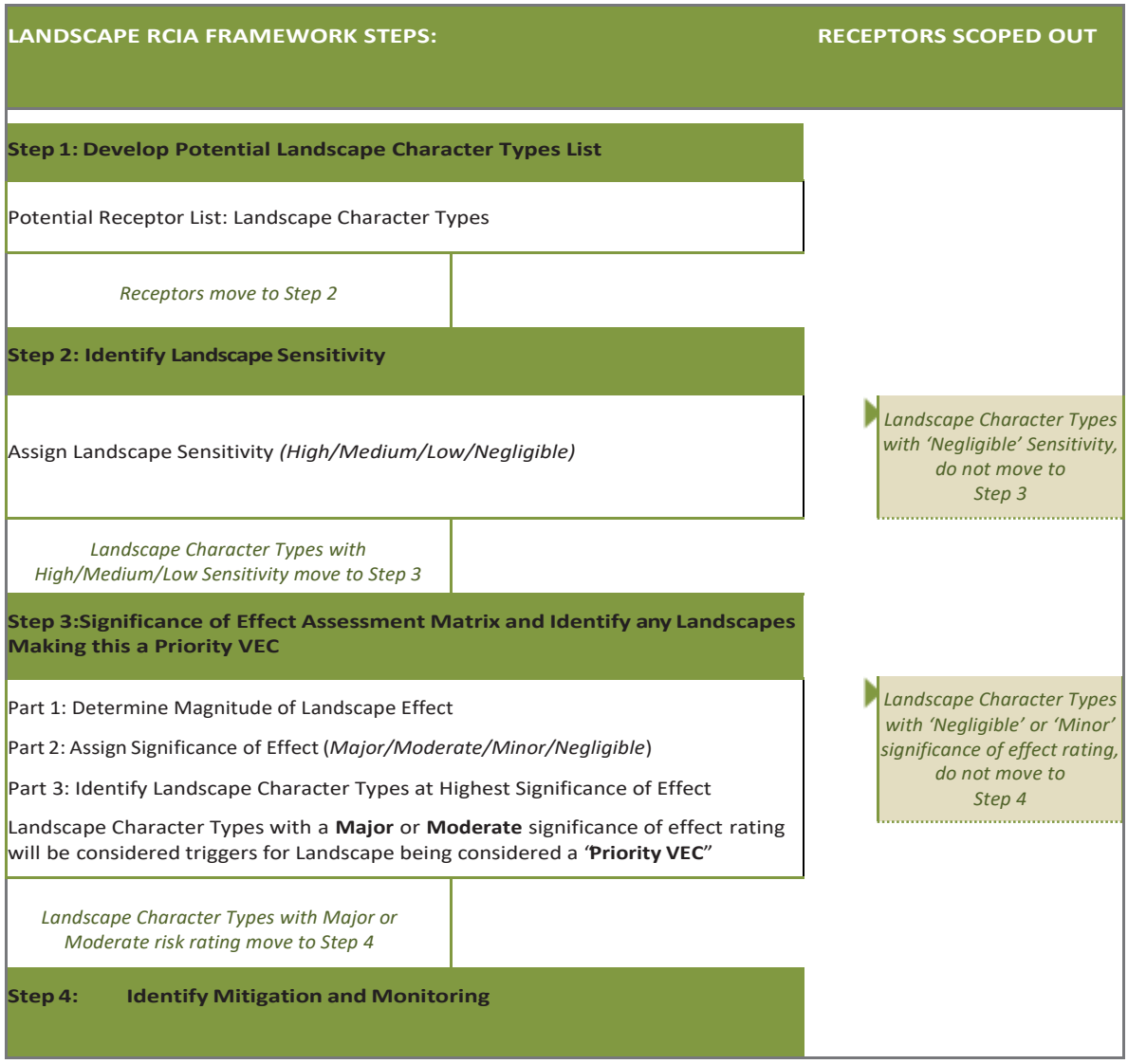
5.2 LANDSCAPE EFFECT

According to the SNH Guidelines 2012, cumulative landscape effects can impact on either the (1) physical fabric (i.e. landscape components) or (2) character of the landscape, or any special values attached to it. As the available ESIAs did not consider (1), only (2) is considered here.

Cumulative effects on landscape character arise when two or more developments introduce new features into the landscape, which can change the landscape character to such an extent that they create a different landscape character type. That change need not be adverse; some derelict or degraded landscapes may be enhanced as a result of such a change in landscape character.

The RCIA framework for Landscape follows a four-step process, summarized in Figure 10.

FIGURE 10. RCIA FRAMEWORK LANDSCAPE



STEP 1 – DEVELOP POTENTIAL RECEPTOR LIST

5.2.1 METHODS

The purpose of step 1 is to identify all landscapes with distinctive character, 'Landscape Character Type', that could potentially be at risk from the cumulative effects of the WPPs.

Potential Receptor List: Landscape Character Types

Landscape Character Types were identified based on information within the PWPPs ESIAs and a site visit.

Landscape Character Types can be defined as distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the

country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation, historical land use, and settlement pattern[38].

5.2.2 RESULTS

Potential Receptor List: Landscape Character Types

The receptor is the Landscape Character Type(s) surrounding the PWPPs. Based on the available information, the landscape character does not vary much and is determined by following key aspects:

- very open and large scale with long views and few focal points;
- almost flat topography, or very gently rolling;
- intensive arable agriculture, within an open-field system with no obvious demarcation between strips of land of varying width and under a variety of arable crops, and accessed by dirt tracks at approximately every 400 m;
- overhead transmission lines crisscrossing the landscape;
- the landscape already contains vertical elements in the form of electricity pylons and telephone poles;
- there are no landscape designations, no specific viewpoints, and no sign of recreational use;
- settlement is generally very much concentrated into villages and small towns (there are no residential properties within the boundary of the PWPPs).

This Landscape Character Type is present in most of the South Banat District, which is one of the seven administrative districts of the autonomous province of Vojvodina. With exception of the Deliblato Sands SNR, the same Landscape Character Type extends in all directions towards the valleys of Danube (south) and Tamis (east/northeast). The landscape character of Deliblato Sands SNR is different. It is more undulating and is internationally designated for its nature conservation interest, though human influences are still present.

Consequently, two landscapes with distinctive character i.e. Landscape Character Types can be distinguished in the area surrounding the PWPPs: South Banat District and Deliblato Sands SNR.

STEP 2 – IDENTIFY LANDSCAPE SENSITIVITY

5.2.3 METHODS

The purpose of this step is to determine the sensitivity to potential effects per landscape character type.

Assign Sensitivity Score per Landscape Character Type

Landscape sensitivity is the relative extent to which the character of an area will change in response to a cumulative effect. The assessment of sensitivity is a matter of professional judgement. The

[38] The Countryside Commission and Scottish Natural Heritage (2002) Landscape Character Assessment: Guidance for England and Scotland (CAX 84), the Countryside Commission and Scottish Natural Heritage, April 2002.

landscape sensitivity scores in the ESIAs considered: scale and openness, landform, land cover and landmark features, settlement pattern and archaeology, landscape context, and perceptual qualities. The sensitivity scores assigned in the ESIAs for the South Banat District as a whole were adopted for this Step 2. A sensitivity score was also developed for the RCIA for Deliblato Sands SNR based on the site visit.

Receptors with negligible sensitivity do not move forward to step 3.

5.2.4 RESULTS

Landscape Character Type 1 South Banat District: low

Landscape Character Type 2 Deliblato Sands SNR: medium

All Landscape Character Types proceeded to Step 3.

STEP 3 – RISK ASSESSMENT MATRIX AND IDENTIFICATION OF RECEPTORS TRIGGERING LANDSCAPE AS A PRIORITY VEC

5.2.5 METHODS

> The purpose of this step is to identify receptors that would trigger Landscape as a priority VEC. This is determined using sensitivity scores from step 2 and the magnitude of landscape effect.

Part 1 – Determine Magnitude of Landscape Effect

The ESIAs determined the magnitude of Landscape Effect based on:

- the nature of the effect as a function of size and scale of the proposed change and the spatial extent of the area influenced, e.g.:
  - would the development create a new component in the landscape?
  - how may the change alter the way the landscape as a whole is perceived?
- the scale at which the landscape character is considered: a development may completely alter the character of the landscape at a very local scale while not having an effect on the wider landscape.

TABLE 14. MAGNITUDE OF LANDSCAPE EFFECT SCORING

MAGNTUDE OF EFFECT SCORING	CRITERIA
Negligible	• The PWPPs are not seen as separate isolated features within the landscape character type.
Low	• The PWPPs are seen as separate isolated features within the landscape character type, too infrequent and of insufficient significance to be perceived as a characteristic of the area.
Medium	• The PWPPs are seen as a key characteristic of the landscape, but not of sufficient dominance to be a defining characteristic of the area.
High	• The PWPPs appear as a dominant characteristic of the area, seeming to define the character type as a PWPP landscape character type.

Part 2 – Assign Significance of Landscape Effect Rating for Each Landscape Character Type

The matrix in Table 15 was used to assign the significance of effect rating for each Landscape Character Type using the "Sensitivity" and "Magnitude of Landscape Effect" scores.

TABLE 15. SIGNIFICANCE OF LANDSCAPE EFFECT RATING FOR LANDSCAPE CHARACTER TYPES

SENSITIVITY	MAGNITUDE OF LANDSCAPE EFFECT			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

Part 3 – Identify Receptors Triggering Priority VEC Status

The presence of receptors with a Major or Moderate significance of effect rating when their sensitivity and magnitude of landscape effect category scores were applied within the matrix will be considered a trigger for Landscape being a Priority VEC.

5.2.6 RESULTS

The assessment of magnitude of effect (part 1) and assignment of significance of effect rating (part 3) is summarized in Table 16.

TABLE 16. SIGNIFICANCE OF EFFECT RATING FOR LANDSCAPE

RECEPTOR	STEP 2:	STEP 3:		
	SENSITIVITY	MAGNITUDE OF EFFECT (NARRATIVE)	MAGNITUDE OF EFFECT	SIGNIFICANCE OF EFFECT RATING
Landscape Character Type 1: South Banat District	Low	With the construction of the three PWPPs, in addition to the other planned WPPs in the area, wind turbines would become a characteristic feature of the landscape in the South Banat District: wrapping around Deliblato Sands SNR. There is therefore considered to be a high magnitude of effect.	High	Moderate
Landscape Character Type 2: Deliblato Sands SNR	Medium	No WPPs are planned to be constructed within Deliblato Sands SNR. With the construction of the three PWPPs, in addition to the other planned WPPs in the area, wind turbines would become a characteristic feature of the landscape in the South Banat District: wrapping around Deliblato Sands. Where views of the WPPs from within Deliblato Sands are available, the WPPs would form only a small proportion of the view. There is therefore considered to be a low magnitude of effect.	Low	Minor

Part 3 – Identify Receptors Triggering Priority VEC Status

Landscape Character Type 1 South Banat District was determined to have a moderate rating for significance of cumulative effects from the PWPPs. Landscape is therefore considered to be a priority VEC and recommendations will be made on mitigation, monitoring, and management measures that could be put in place to safeguard these receptors (Step 4).

5.3 VISUAL EFFECT

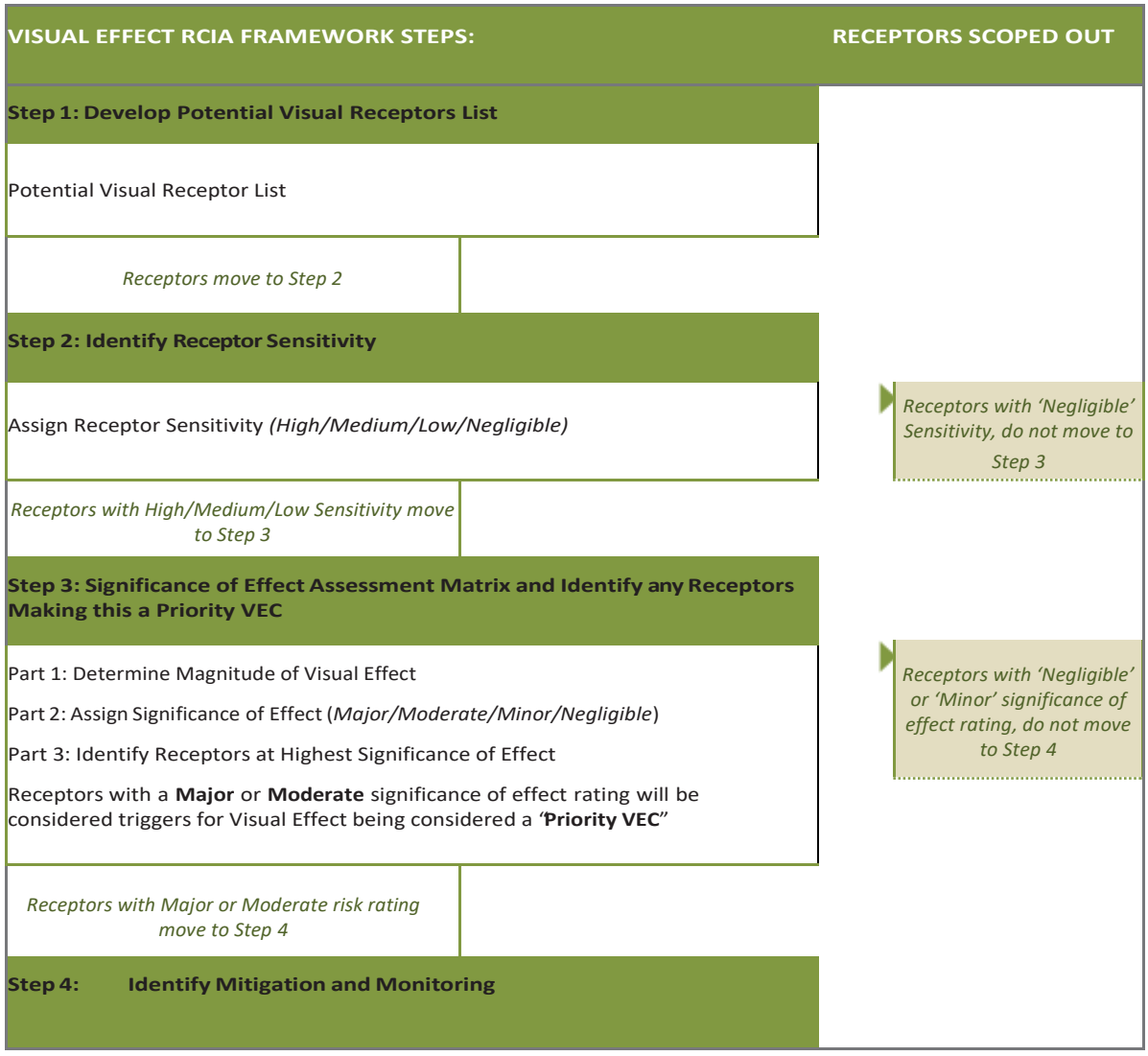
According to the SNH Guidelines 2012, cumulative visual effects are effects that can be caused by combined visibility, which 'occurs where the observer is able to see two or more developments from one view-point' and/or sequential effects which 'occur when the observer has to move to another viewpoint to see different developments'. These effects would result from changes in the character and content of the views experienced due to the introduction of new elements or removal of or damage to existing ones.

The significance of effects of development on views is related to the nature and sensitivity of the receptor, the characteristics of the development being proposed and the extent, nature and characteristics of the views, which itself is a reflection of the landscape character. Also, visual effects can be positively or

negatively evaluated by the receptor. Since no information was available on preference of the observers, only significance and magnitude of effects, and not evaluation of these effects, are considered in this RCIA framework for Visual Effect.

The RCIA framework for Visual Effect follows a four-step process, summarized in Figure 11.

FIGURE 11. RCIA FRAMEWORK VISUAL EFFECT



STEP 1 – DEVELOP POTENTIAL RECEPTOR LIST

5.3.1 METHODS

The purpose of step 1 is to identify all visual receptors that could potentially be at risk from the cumulative effects of the WPPs.

Potential Receptor List

Potential receptor categories were identified based on information within the PWPPs ESIAs and a site visit.

5.3.2 RESULTS

Potential Receptor List

The following receptor categories were identified as potentially subject to significant visual effects:

- People living in residential properties: a limited number of residential properties at the outskirts of Banatsko Novo Selo, Vladimirovac, Kovačica, Padina, Debeljaca and Crepaja.
- Road users of all types of roads/lanes and tracks.
- People at work in the open countryside.
- Visitors / Users of Deliblato Sands: There are potential views of a limited number of turbines of the Čibuk and Alibunar WPPs from a limited number of locations in the Deliblato Sands area. These views would mostly comprise only the upper sections of turbines. It is not clear whether more than one of the PWPPs can be seen from the same location; however, this was included in the assessment as a precautionary approach.

STEP 2 – IDENTIFY RECEPTOR SENSITIVITY

5.3.3 METHODS

The purpose of this step is to determine the sensitivity of each receptor to potential effects.

Assign Receptor Sensitivity Score

Visual sensitivity is the sensitivity of those who experience a given view or series of views to any change in that view. This sensitivity will depend on: (1) the receptor's activity while being exposed to the view, (2) degree of exposure to the view, (3) period of exposure to the view, and (4) the nature of the view. This sensitivity to potential visual effects, including evaluation of this effect as negative/positive/neutral, also very much depends on the individual characteristics of the observer. These characteristics are defined by his background and influence his preferences. By lack of data on these individual backgrounds, the four receptor categories above are a generalization, not accounting for these individual characteristics. Therefore, the assessment of sensitivity is based on professional judgement of the four criteria within each of the receptor categories, and do not include any positive/negative/neutral valuation of this sensitivity. Sensitivity was scored with a negligible, low, moderate, or high score using the criteria listed in Table 17, based on the information in the ESIAs.

Receptors with negligible sensitivity do not move forward to step 3.

TABLE 17. SENSITIVITY SCORING FOR RECEPTORS

SENSITIVITY SCORING	CRITERIA
Negligible	• Visual amenity is of negligible importance to the receptor. Their attention can be expected to be entirely focused away from any view of the landscape.
Low	• Visual amenity is of low importance to the receptor. Their attention can reasonably be expected to be focused away from any actual view.
Moderate	• Visual amenity is of moderate importance to the receptor. Their attention can reasonably be expected to be divided between the surrounding landscape and other activity.
High	• Visual amenity is particularly important to the receptor. Their attention can reasonably be expected to be focused on the view.

Receptors will exhibit a greater or lesser degree of sensitivity to the changes brought about by the proposed PWPPs. It is also possible that receptors will consider the change positive to neutral rather than negative. A precautionary approach was taken by assigning the highest potential sensitivity within the receptor type. However, in practice it is understood that no complaints with respect to visual effects have been received during project-specific stakeholder engagement to date. As such, this assessment may overestimate the significance of visual effects, be it positive/negative/neutral. Therefore, a more conservative approach has been applied in appending the significance of visual effect, based on the number of observers to be affected.

Receptors with negligible sensitivity did not move forward to step 3 and were scoped out of the RCIA process.

5.3.4 RESULTS

The sensitivity of the receptor was determined applying the method explained above:

- Residential receptors were assigned a high sensitivity
- Road users were assigned a medium sensitivity
- People at work in the open countryside were assigned a medium sensitivity
- Recreational users of Deliblato Sands SNR were assigned a high sensitivity assuming that the focus of some visitors is on appreciating the landscape or views.

All receptor categories proceeded to Step 3.

STEP 3 – SIGNIFICANCE OF EFFECT ASSESSMENT MATRIX AND IDENTIFICATION OF RECEPTORS TRIGGERING VISUAL EFFECT AS A PRIORITY VEC

5.3.5 METHODS

The purpose of this step is to identify receptors that would trigger Visual Effect as a priority VEC. These are determined using sensitivity assessments from step 2 and the significance of visual effect.

Part 1 - Determine Magnitude of Visual Effect

The ESIAs determined the magnitude of visual effect based on visibility of the PWPPs:

- because of the flat and open nature of the landscape, there would be extensive theoretical visibility in all directions, except for: small areas along the Danube and Tamis river valleys; areas screened by the hills at Belgrade; former river valleys between Pančevo and Mramorak; most of the Deliblato Sands SNR, and the valley around Banatski Karlovac;
- in practice, because the settlement in South Banat District is very much concentrated into villages and small towns, there would be very little visibility from residential properties: the PWPPs would be visible from the houses on the very edge of each village or town, on the side towards the development, but not from within the town itself;
- given the open nature of the landscape, the magnitude of visual effect is considered almost entirely a function of distance from the site.

Magnitude of Visual Effect scoring is based on the criteria listed in Table 18.

TABLE 18. MAGNITUDE OF VISUAL EFFECT SCORING

MAGNITUDE OF EFFECT SCORING	CRITERIA
Negligible	• No viewers affected, no changes in view
Low	• Few viewers affected, minor changes in view
Medium	• Many/some viewers affected, moderate changes in view
High	• Majority of viewers affected, major changes in view

Part 2 – Assign Significance of Visual Effect Rating for Each Receptor Type

The matrix in Table 19 was used to assign the significance of effect rating for each receptor using the

"Sensitivity" and "Magnitude of Visual Effect" scores.

TABLE 19. SIGNIFICANCE OF VISUAL EFFECT RATING FOR RECEPTORS

SENSITIVITY	MAGNITUDE OF EFFECT			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

Part 3 – Identify Receptors Triggering Priority VEC Status

The presence of receptors with a Major or Moderate risk rating when their sensitivity and magnitude of visual effect category scores were applied within the matrix will be considered a trigger for Visual Effect being a Priority VEC.

5.3.6 RESULTS

The assessment of magnitude of visual effect (part 1) and assignment of significance of Visual Effect rating (part 3) is summarized in Table 20. It should be noted that these scores cannot be interpreted as being positive/negative/neutral, as they do not account for preferences of the receptors.

TABLE 20. SIGNIFICANCE OF EFFECT RATING FOR VISUAL RECEPTORS

RECEPTOR TYPE	STEP 2:	STEP 3:		
	SENSITIVITY	SIGNIFICANCE OF EFFECT ASSESSMENT(NARRATIVE)	SIGNIFICANCE OF EFFECTS SCORE	RISK RATING
Residential receptors	High	At only a small number of residential properties at the outskirts of Banatsko Novo Selo, Vladimirovac, Kovačica, Padina, Debeljaca and Crepaja, the turbines of more than one PWPP will be visible. For the houses with a direct view of the turbines, there will be a low to medium magnitude of effect. For the towns, there will be negligible magnitude of effect.	Low	Moderate

Road Users	Medium	Road users will have views of more than one PWPP from all types of roads/lanes and tracks in the area. This would include numerous locations throughout the study area at a variety of distances most often associated with locations between villages and settlements. From most of the viewpoints, the visual impact is of low magnitude.	Low	Minor
People at Work in the Open Countryside	Medium	People at work in the open countryside will have views of more than one PWPP in a number of areas near the PWPPs. The visual effect depends on the distance and will only be of high magnitude within 2 km from the project sites.	Medium	Moderate
Recreational Users of Deliblato Sands SNR	High	Visitors / Users of Deliblato Sands SNR will potentially have views of a limited number of turbines from a limited number of locations in the Deliblato Sands area. Where views from within Deliblato Sands SNR are available, the PWPPs would form only a small proportion of the view. There is therefore considered to be a low magnitude of effect.	Low	Moderate

Part 3 – Identify Receptors Triggering Priority VEC Status

All receptor categories for visual effects were determined to have a minor to moderate rating for significance of cumulative effects from the PWPPs. Visual effect is therefore considered to be a priority VEC and recommendations will be made on mitigation, monitoring, and management measures that could be put in place to safeguard these receptors (Step 4).

5.4 STEP 4 – IDENTIFY MITIGATION AND MONITORING

> The purpose of this step is to identify the potential joint mitigation and monitoring measures for developers and other stakeholders to consider.

As Landscape and Visual Effect was identified as a priority VEC, recommendations are made on harmonized mitigation, monitoring, and management measures that could be put in place to safeguard receptors.

The identification of measures was performed in two parts:

- Part 1: Review of commitments made by the PWPP in their ESIAs, construction permits, and ESAPs
- Part 2: Conclusion as to whether any additional measures are required

Part 1 – Review of Existing Commitments

The following commitments were made by one or more of the PWPPs as part of Construction Environmental and Social Management Plan (CESMP) and Operation Environmental and Social Management Plan (OESMP):

- Careful planning and implementation to limit the extent of vegetation cleared.
- Erosion measures will be implemented and cleared land will be promptly re-vegetated.
- In response to stakeholder request, if any received, implement off-site mitigation planting to screen views from particularly sensitive receptors.
- Continued engagement with local communities, including the ongoing implementation of a grievance mechanism.

Part 2 – Need for Additional Measures

Although a cumulative effect will still occur after implementation of planned mitigation measures, the assessment acknowledges that the potential for additional measures to reduce the landscape and visual effects of the PWPP development is limited and the PWPPs have developed measures proportionate to the scope and nature of the projects. The precautionary approach used for the assessment of sensitivity also likely overestimates the significance of visual effects. No further recommendations are therefore made for mitigation and management for the VEC.

5.5 SUMMARY OF OUTCOMES FOR LANDSCAPE AND VISUAL EFFECT

The RCIA framework for Landscape and Visual Effect followed three steps to determine whether it was a priority VEC.

The significance of potential cumulative effects of the proposed developments was assessed by combining (1) the magnitude of effect and (2) the sensitivity of the landscape or the visual receptors. It should be noted that, unlike the other VECs, the RCIA for this VEC predicted the potential significance of effects, based on the approach used in the ESIAs and international best practice.

The RCIA distinguished between Landscape and Visual Effect, based on their different receptor. i.e. Landscape Character Type and visual receptor. Two Landscape Character Types and four visual receptor categories were identified.

Landscape sensitivity is the relative extent to which the character of an area will change in response to a cumulative effect. Visual sensitivity is the sensitivity of those who experience a given view or series of views to any change in that view. The sensitivity of the Landscape Character Types assigned in the ESIAs was adopted. For Visual Effect, a precautionary approach was taken by assigning the highest potential sensitivity within the receptor category and without including any information of the receptor's evaluation (positive/negative/neutral) of the effect. For both Landscape Effect and Visual Effect, all receptor categories proceeded to step 3.

The magnitude of Landscape Effect was based on the nature of the effect as a function of size and scale of the proposed change and the spatial extent of the area influenced and the scale at which the landscape character is considered. The magnitude of Visual Effect was based on visibility of the PWPPs as a function of distance from the sites and number of observers.

The risk rating for the receptors was determined on the basis of a sensitivity and significance of effect matrix.

Landscape Character Type 1 South Banat District was determined to have a moderate rating for significance of cumulative effects from the PWPPs. All receptor categories for Visual Effects were determined to have a minor to moderate risk rating for significance of cumulative effects from the PWPPs. Landscape and Visual Effect is therefore considered to be a priority VEC.

Although a cumulative effect will still occur after implementation of planned mitigation measures, the assessment acknowledges that the potential for additional measures to reduce the landscape and visual effects of the PWPP development is limited and the PWPPs have developed measures proportionate to the scope and nature of the projects. The precautionary approach used for the assessment of sensitivity also likely overestimates the significance of visual effects.

6. RCIA Framework — Socioeconomics

6.1 OVERVIEW OF RCIA FRAMEWORK FOR SOCIOECONOMICS

The objectives of the RCIA for Socioeconomics are:

- Determine which potential receptors are 'at the highest risk' of socio-economic change from the cumulative effects of the PWPPs.
- Identify potential joint mitigation and monitoringmeasures to be undertaken by developers and other stakeholders if Socioeconomics is identified as a priority VEC.

Based on the scoping analysis in Section 3, socioeconomics associated with land use were scoped out. The RCIA focuses on the following aspects of this VEC: employment and procurement opportunities, revenue generation for the local government / community, tourism, and attracting foreign and domestic investments.

The potential cumulative effect of all PWPPs is assumed to create positive socio-economic changes. The PWPPs are located in one of the economically least developed areas of Vojvodina province and therefore the sensitivity to this change is generally assumed to be high.

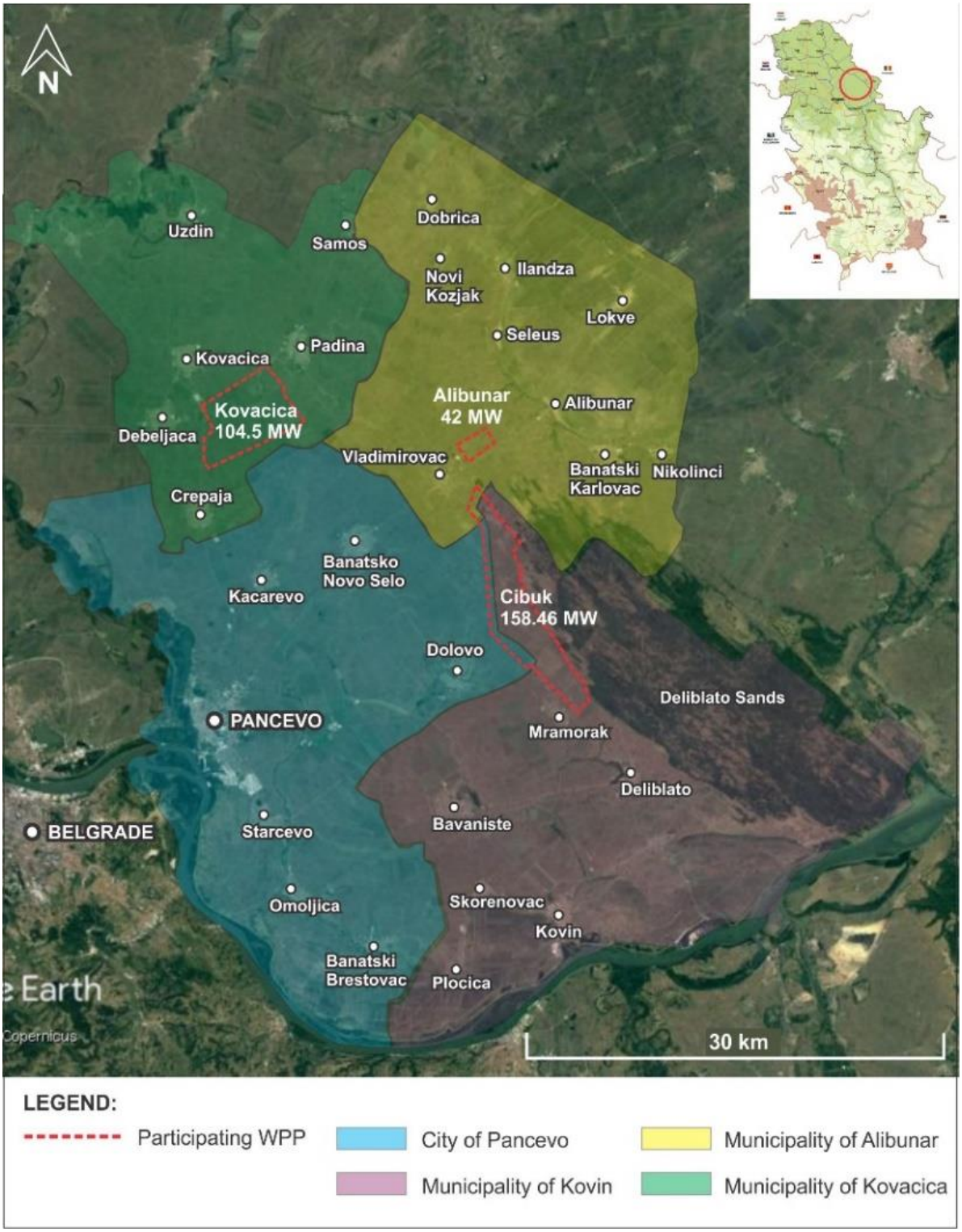
While the study area as specified in Section 1.3 is relevant to the Bird and Bat RCIA frameworks, a study area containing all adjacent municipalities is considered appropriate for the framework related to this VEC (Figure 12).

6.2.1 Background

The PWPPs have been built in an agricultural area and no residential properties or agricultural buildings were demolished or damaged as a consequence of construction. Where land was needed for permanent structures such as the control buildings and sub-stations it was purchased from the owners (at above market rate on a willing seller, willing buyer basis). The land needed for turbine bases, roadways and maintenance lay-down areas was acquired through permanent easement contracts (again at favorable rates).

It was known prior to the start of construction works that some farmers would not be able to cultivate their land throughout the construction period. Their land may have been used for construction lay-down areas, the construction compound or due to the creation of new roadways. These farmers were given a one-off payment to compensate for the loss of crops and income. During the construction process, farmers and land-owners were paid compensation for any damage to crops or land caused by the construction activities. In both sets of cases, the amounts paid were established by agricultural surveys appointed by the local courts. The compensation rates were at market rates.

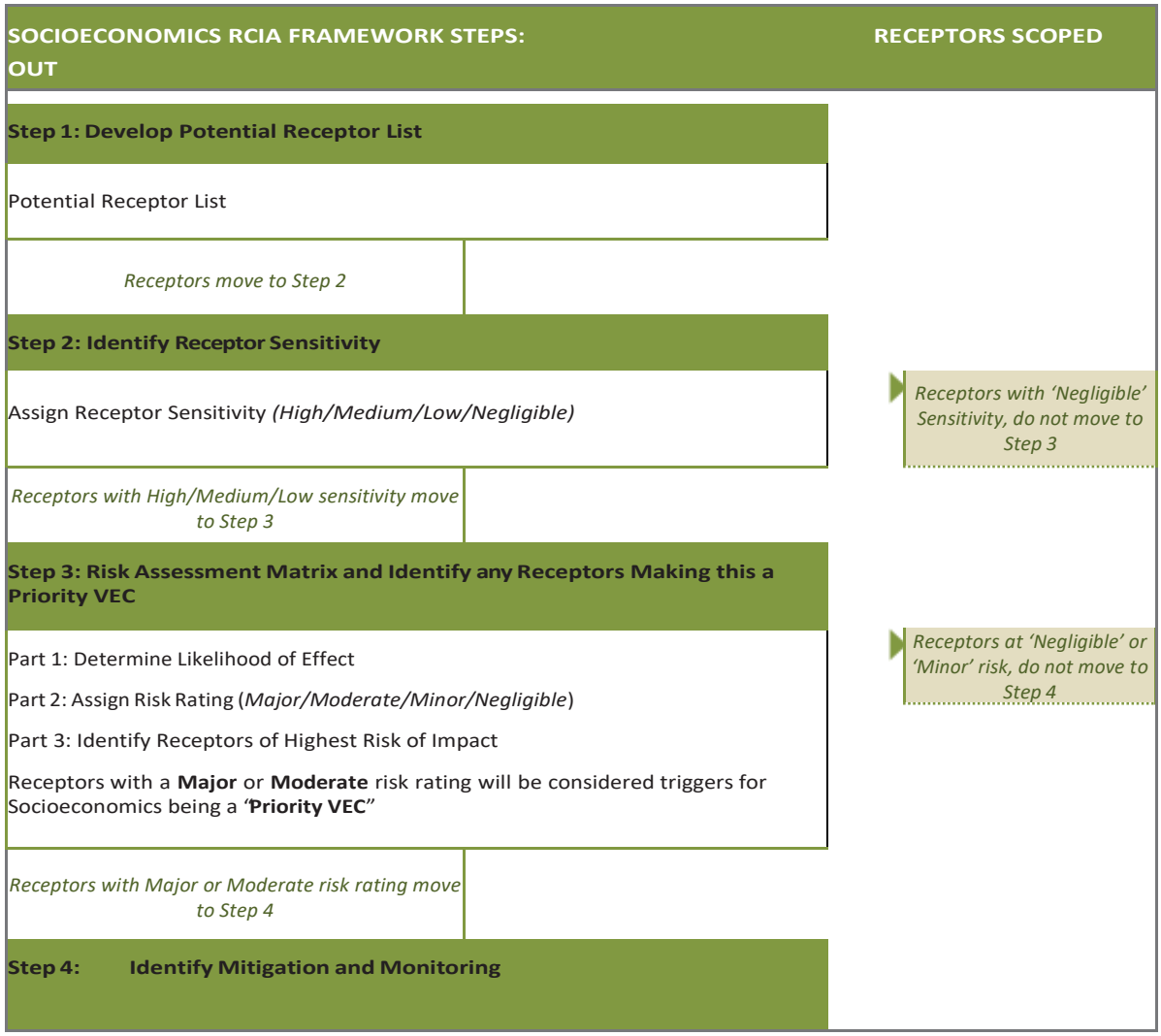
FIGURE 12. STUDY AREA WITH ALL ADJACENT MUNICIPALITIES



A qualitative approach using professional judgement was applied to assess risks. The assessment was based on information in the PWPPs ESIAs and SEPs, and observations during the site visit.

The RCIA framework for Socioeconomics follows a four-step process, summarized in Figure 13.

FIGURE 13. RCIA FRAMEWORK SOCIOECONOMICS



6.2 STEP 1 – DEVELOP POTENTIAL RECEPTOR LIST

6.2.1 METHODS

The purpose of step 1 is to identify all receptors that could potentially benefit from socio-economic changes from the cumulative effects of the WPPs.

Potential Receptor List

Potential receptors were identified based on information within the PWPPs ESIAs, SEPs and a site visit. They include the inhabitants of the adjacent municipalities expected to potentially experience any significant cumulative socio-economic benefits from the PWPPs.

6.2.2 RESULTS

Receptor List

The receptors are the inhabitants of:

- the city of Pančevo
- the municipalities of
  - Kovin
  - Kovačica
  - Alibunar

6.3 STEP 2 – IDENTIFY RECEPTOR SENSITIVITY

6.3.1 METHODS

The purpose of this step is to determine the sensitivity of receptors to potential socio-economic changes from the cumulative effects of the WPPs.

Assign Receptor Sensitivity Score

The sensitivity of receptors to cumulative Socio-economic effects is based on professional judgement of their vulnerability to the effect, i.e. improvements in socioeconomic status. Sensitivity was scored with a negligible, low, moderate, or high score using the criteria listed in Table 21.

TABLE 21. SENSITIVITY SCORING FOR RECEPTORS

SENSITIVITY SCORING	CRITERIA
Negligible	• The receptor has negligible room for improvement in their socio-economic status.
Low	• The receptor is not economically deprived, i.e., their level of development[39] is more than 40% above the national average. The receptor could experience a low level of change in response to the effect.
Moderate	• The receptor is not economically deprived, i.e., their level of development is within 40% of the national average.
High	• The receptor is economically deprived and categorized as "insufficiently developed", i.e., their level of development is below 60% of the national average[40]. The receptor could experience a high level of change in response to the effect.

[39] Development (i.e. development index of a municipality) is a comprehensive measure calculated based on: unemployment rate, gross income per capita, municipal income per capita, education rate, and birth rate. The calculation is defined by the Serbian Decree on Methodology for Calculation of Development Index for Regions and Local Self-Governments (Off. Journal of RS, No. 62/2015).
[40] The Law on Regional Development (Off. Journal of RS, No. 51/2009, 30/2010, 89/2015)

Receptors with negligible sensitivity did not move forward to step 3 and were scoped out of the RCIA process.

6.3.2 RESULTS

The sensitivity of the receptor was determined applying the method explained above.

Apart from Pančevo which is amongst the most developed Serbian cities, other municipalities are economically deprived and categorized as "insufficiently developed"[1], i.e., their level of development is below 60% of the national average, indicating a high sensitivity of its inhabitants to socio-economic improvement. The economic development of the administrative area was taken as a proxy for the economic status of its inhabitants though there will be variability between inhabitants. A precautionary approach was taken in assigning the sensitivity levels to the receptors.

TABLE 22. SENSITIVITY SCORING FOR RECEPTORS: RESULTS

RECEPTORS: INHABITANTS OF:	SENSITIVITY SCORING
City of Pančevo	low
Municipality of Kovin	high
Municipality of Kovačica	high
Municipality of Alibunar	high

Receptors Progressing to Step 3

All receptors proceeded to step 3.

6.4 STEP 3 – RISK ASSESSMENT MATRIX AND IDENTIFICATION OF RECEPTORS TRIGGERING SOCIOECONOMICS AS A PRIORITY VEC

6.4.1 METHODS

The purpose of this step is to identify receptors that would trigger Socio-economics as a priority VEC. These are determined using sensitivity assessments from step 2 and the LoE.

Part 1 – Determine LoE

The LoE for inhabitants was determined on the basis of the likelihood of a measurable socio-economic change occurring due to the cumulative presence of the PWPPs in the area in combination with other developments. This likelihood was based on expert review of the project ESIAs and SEPs, review of the development priorities of the local municipalities and knowledge of the likely direct effects that could occur to the receptor. LoE scoring is based on the criteria listed in Table 23.

TABLE 23. LIKELIHOOD OF EFFECT SCORING FOR SOCIOECONOMIC RECEPTORS

LIKELIHOOD OF EFFECT SCORING	CRITERIA
Negligible	• Socio-economic change due to cumulative effects is not expected.
Low	• Socio-economic change due to cumulative effects is less likely.
Medium	• Socio-economic change due to cumulative effects is likely.
High	• Socio-economic change due to cumulative effects is highly likely.

Part 2 – Assign Risk Rating for Each Receptor Group

The matrix in Table 24 was used to assign the risk rating for each receptor group using the "Sensitivity" and "Likelihood of Effect" scores.

TABLE 24. RISK RATING FOR SOCIOECONOMIC RECEPTORS

SENSITIVITY	LIKELIHOOD OF EFFECT			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

Part 3 – Identify Receptors Triggering Priority VEC Status

The presence of receptors with a Major or Moderate risk rating when their sensitivity and LoE category scores were applied within the matrix will be considered a trigger for Socioeconomics being considered a Priority VEC.

6.4.2 RESULTS

The assessment of LoE (part 1) and assignment of risk rating (part 3) is summarized in Table 25.

TABLE 25. RISK RATING FOR SOCIOECONOMIC RECEPTORS

RECEPTOR TYPE	STEP 2:	STEP 3:		
	SENSITIVITY	LIKELIHOOD OF EFFECT ASSESSMENT (NARRATIVE)	LIKELIHOOD OF EFFECTS SCORE	RISK RATING
Inhabitants of the Municipalities of Kovin, Kovačica and Alibunar	High	Revenue Generation for the Local Government / Community: All three PWPPs have signed profit sharing agreements between the company and the local Municipality, as well as registration of the company on its territory and paying VAT, which will result in increased revenue for the municipality. However, most of these effects would be expected to occur within the respective municipal boundaries. Socio-economic change due to cumulative effects is therefore less likely (low LoE). Employment and Procurement Opportunities: Some positive impacts of minor / low significance related to creation of in/direct employment opportunities are predicted which could act cumulatively for receptors benefiting from more than one Project. These positive effects, mainly during construction and limited to a small portion of the total population, could be experienced beyond the municipal boundaries of the PWPPs and therefore could be expected to act cumulatively (medium LoE). Tourism: It is difficult to assess whether the wind farms alone will be enough of a stimulus to trigger tourism in the wider area. A positive cumulative effect is possible; however, it is considered less likely without efforts to promote the effect (low LoE). Attracting Foreign and Domestic Investments: The PWPPs presence could attract further foreign and domestic investments in the wider area; however, it is considered unlikely without specific efforts to promote the effect (negligible LoE). Overall, a positive cumulative effect on socio-economics is considered possible but less likely without efforts to promote the effect.	Low	Moderate

RECEPTOR TYPE	STEP 2:	STEP 3:		
	SENSITIVITY	LIKELIHOOD OF EFFECT ASSESSMENT (NARRATIVE)	LIKELIHOOD OF EFFECTS SCORE	RISK RATING
Inhabitants of the City of Pančevo	Low	Revenue Generation for the Local Government / Community: There is no revenue sharing agreement in place because no PWPP is located on the territory of Pančevo. Employment and Procurement Opportunities: Some positive impacts of minor / low significance related to creation of in/direct employment opportunities are predicted which could act cumulatively for receptors benefiting from more than one Project. These positive effects, mainly during construction and limited to a small portion of the total population, could be experienced beyond the municipal boundaries of the PWPPs and therefore could be expected to act cumulatively (medium LoE). Tourism: It is difficult to assess whether the wind farms alone will be enough of a stimulus to trigger tourism in the wider area. A positive cumulative effect is possible; however, it is considered unlikely without efforts to promote the effect (low LoE). Attracting Foreign and Domestic Investments: The PWPPs presence could attract further foreign and domestic investments in the wider area; however, it is considered unlikely without specific efforts to promote the effect (negligible LoE).	Low	Minor

Part 3 – Identify Receptors Triggering Priority VEC Status

The receptor (Inhabitants of the Municipalities of Kovin, Kovačica and Alibunar) was determined to be at moderate 'risk' of socio-economic change from the cumulative effects from the PWPPs. Socio-economics is therefore considered to be a priority VEC and recommendations will be made on harmonized mitigation, monitoring, and management measures that could be put in place to safeguard these receptors during construction (Step 4).

6.5 STEP 4 – IDENTIFY MITIGATION AND MONITORING

The purpose of this step is to identify the potential joint mitigation and monitoring measures for developers and other stakeholders to consider.

The identification of measures was performed in two parts:

- Part 1: Review of commitments made by the PWPPs in their ESIAs, construction permits, ESAPs, and SEPs.
- Part 2: Conclusion as to whether additional measures are required.

Part 1 – Review of Existing Commitments

The following commitments were made by one or more of the PWPPs:

- To set goals for and encourage contractors to hire local workers, with preference for those who may be directly affected by noise, traffic, or other project activities.
- To provide timely and transparent information regarding employment opportunities related to the PWPP.
- Agreement to pay a percentage of their annual profits to the Municipality where they are located (all three PWPPs agreed to this measure). The municipality will decide which activities or projects it wishes to invest in, although at least one of the PWPPs retains oversight of the project selection (to ensure compliance with their own bribery and corruption policy).
- To support local communities through the PWPP Social Investment Programs during construction. The primary goal is to support local economic and social development among communities close to the PWPPs. The community funding mechanism by which the local municipalities will receive revenues from the project during operation, is the profit sharing agreements.
- To commission and implement a training program to upgrade skills of unskilled local workers as part of the social investment program during construction.
- To consider providing funding for local students' university education in science and/or engineering disciplines (e.g., ornithology).
- To foster the creation of indirect employment opportunities, by procuring goods and services locally whenever possible.
- If enhanced tourism opportunities for local communities do present themselves, the PWPP would consider supporting these, i.e. helping to facilitate tourism in the region. Visiting the wind farm sites themselves would not be actively promoted due to the facility access restrictions that are in place for the safety of the public.
- To continue participating in investor forums and events, promoting the municipality(ies) as a place for doing business.

Part 2 – Need for Additional Measures

The PWPPs have developed measures proportionate to the scope and nature of project activities. With these measures in place, the PWPPs are predicted to have a positive cumulative effect on socio-economic change in the adjacent municipalities.

6.6 SUMMARY OF OUTCOMES FOR SOCIOECONOMICS

The RCIA framework for Socioeconomics followed three steps to determine whether it was a priority VEC.

Four receptor groups were identified as the inhabitants of four municipalities. The sensitivity of receptors

to cumulative Socio-economic effects was based on their vulnerability to the effect, i.e. improvements in socio-economic status. A precautionary approach was taken in assigning the highest sensitivity indicated to the receptor overall. All receptor groups proceeded to step 3.

The LoE for inhabitants was determined on the basis of the likelihood of a measurable socioeconomic change occurring due to the cumulative presence of the PWPPs in the area in combination with other developments. The risk rating for the receptor was determined on the basis of a sensitivity and LoE matrix.

Three receptor groups (Inhabitants of the Municipalities of Kovin, Kovačica and Alibunar) were determined to be at moderate risk of cumulative effects from the PWPPs. Socioeconomics is therefore considered to be a priority VEC.

That said, upon review of the commitments made by the PWPPs to manage the priority VEC, the proposed measures are considered proportionate to the scope and nature of the PWPP activities. With these measures in place, the PWPPs are predicted to have a positive cumulative effect, on socio-economic change in the adjacent municipalities. This is especially with respect to the agreement of all three PWPPS to pay a percentage of their annual profits to the Municipality where they are located.

7. RCIA Framework — Birds

7.1 OVERVIEW OF RCIA FRAMEWORK FOR BIRDS

The RCIA framework for bird VECs has two objectives:

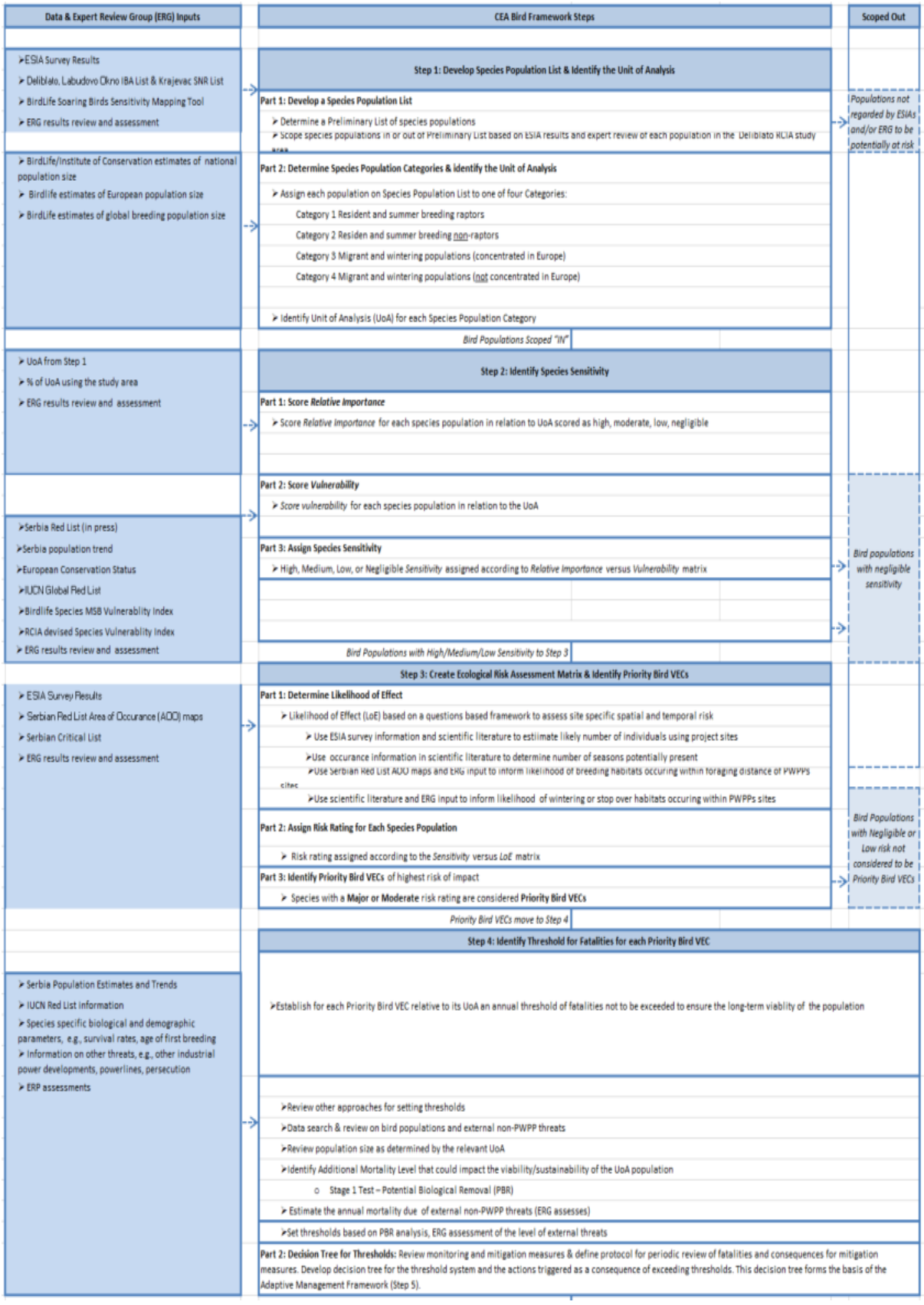
- To determine which bird populations are at the highest risk from the potential cumulative effects of the participating WPPs (PWPPs). These species are identified as 'priority bird VECs'
- To identify and propose joint monitoring, mitigation and other additional conservation measures to help developers, authorities, and other entities address those risks.

The RCIA framework for birds follows the five-step process:

- **Steps 1–3**: The assessment part of the process. In step 1, a preliminary list of potentially at-risk bird populations is defined, and for each of these a relevant population scale (Unit of Analysis, UoA) on which to base an assessment is identified. In step 2, the sensitivity of each of these populations is evaluated and the least sensitive populations removed from the assessment process. *Sensitivity* comprises two components: *relative importance*, which is an estimate or judgment of the proportion of each population likely to use the study area; and *vulnerability*, a scoring of: a) the conservation status at a scale relevant to the UoA, and b) the susceptibility of each species to the adverse effects of wind power projects, especially collision risk, based on peer-reviewed evidence. In step 3, the cumulative *likelihood of effect (LoE)* of PWPPs on each of the populations remaining in the process is estimated. The results from the LoE risk assessment and the sensitivity assessment (step 2) are assessed together and those with the highest sensitivity and LoE considered priority bird VECs. The implementation of steps 1–3 incorporates key inputs at each stage from the ERG.
- **Step 4**: Determines a threshold of fatalities for each priority bird VEC, setting the point at which further loss is considered a risk to long-term viability of the population. Threshold setting considers species-specific biological and demographic parameters, the cumulative risk associated with PWPPs, and the likely effects of external stressors on the population defined by the UoA. External stressors are human-derived effects not associated with PWPPs and include persecution, electrocution by power line, and the effects of other industrial development production.
- **Step 5:** Identifies the measures recommended to form a Joint Mitigation and Monitoring Approach (MMA). Measures include on-site monitoring and mitigation activities; inter-site coordinated monitoring activities, an adaptive management; and a joint management plans focused on aggregated conservation measures for specific priority birds. The primary goal is to ensure that the long-term viability of priority bird populations is not adversely affected by PWPP activities. This is principally achieved through monitoring to assess turbine collision fatality rates against threshold targets, supported by an adaptive management response mechanism that includes protocols and measures that can be implemented to mitigate for emerging risks that may result in exceeded thresholds

The RCIA framework for birds is summarized in Figure 14.

FIGURE 14. RCIA FRAMEWORK BIRDS (DETAILED PROCESS FLOWCHART)



7.2 STEP 1 – DEVELOP SPECIES POPULATION LIST AND IDENTIFY THE UNIT OF ANALYSIS

6.2.1 METHODS

The purpose of step 1 is to identify all bird populations that could potentially be at risk from the cumulative effects within the study area and to determine a relevant UoA by which any effects should be measured.

Part 1: Develop a Species Population List

Throughout the RCIA the term "species population" identifies population groups within a species that use the study area. For example, a single species may be represented by both a population that migrates through the study area and another population that is resident in the study area.

Developing a species population list to be evaluated in the RCIA consisted of two steps: a) creating a preliminary list of bird populations within the spatial boundaries of the study area and; b) a screening process using PWPP ESIA/EIA results, and professional judgement of RCIA team ornithologists and ERG members.

Developing the Preliminary List of Bird Populations

At the outset, a preliminary list of bird populations was collated from three sources of information:

1. *Species populations recorded at PWPPs and reported in the Alibunar EIA*[41]*, Čibuk ESIA*[42] *and Kovačica ESIA*[43]. Baseline surveys were conducted at PWPP sites between September 2009 – May 2013, with different survey methods and survey effort used at each site. A summary of bird surveys and timings is outlined in Table 26. Descriptions of methods used in each survey are described in project ESIA/EIAs.

Together, bird surveys at the three PWPPs were conducted over 4 years and in all months of the year. This extended period of monitoring is likely to have detected most species using the areas within and immediately surrounding PWPPs sites and is considered adequate to inform an approximate index of bird species richness.

[41] Table 7: Results of presence of detection of birds; Table 9: Statuses of populations and conservation of birds.
[42] Appendix C Table C.4 (page 105) – List of species of special interest: recorded within the Survey Area and their status within the survey area; Appendix C Table C.6 (page 107) – Summary of target species flights recorded by Team 1 between January 2010 and October 2010; Appendix C Table C.7 (page 108) – Summary of target species flights recorded by Team 2 between March 2010 and February 2011; Appendix C Table C.8 (page 111) – Significance (nature conservation value) of the survey area for species of special interest based on abundance (locally and regionally) and/or flight activity; Appendix D Table D.5 (page 190) – Flight details of target species recorded during Vantage Point surveys (November 2011 to June 2012); and Appendix DI.III (Page 312) – Full list of species recorded during additional surveys (November 2011 – July 2012).
[43] Table 4 List of target species recorded during the breeding and non-breeding season VP watches; Table 6 All bird species recorded during winter walkover survey; Table 8 - All bird species recorded during breeding walkover survey; Table 9: Summary of flight activity and elevation by raptor species recorded during VP watches in 2012-13.

2. *Species present on IBA and SNR lists*

All IBA trigger species populations listed for Labudovo Okno[44],and Deliblato Sands (Deliblatska Pescara)[45] , and bird populations recorded for the Kraljevac SNR[46], were included in the preliminary list.

3. *Migratory Soaring Bird (MSB) species populations identified from running the Soaring Bird Sensitivity Map tool[47] for the study area plus a 20-km buffer*

The **Soaring Bird Sensitivity Map** tool allows users to define an area of interest and then returns a list of MSB species populations potentially occurring in the defined area, based on a range of relevant datasets. The tool was run for the study area, buffered to 20 km, and the output list of species added to the preliminary list.

Screening of the Preliminary List

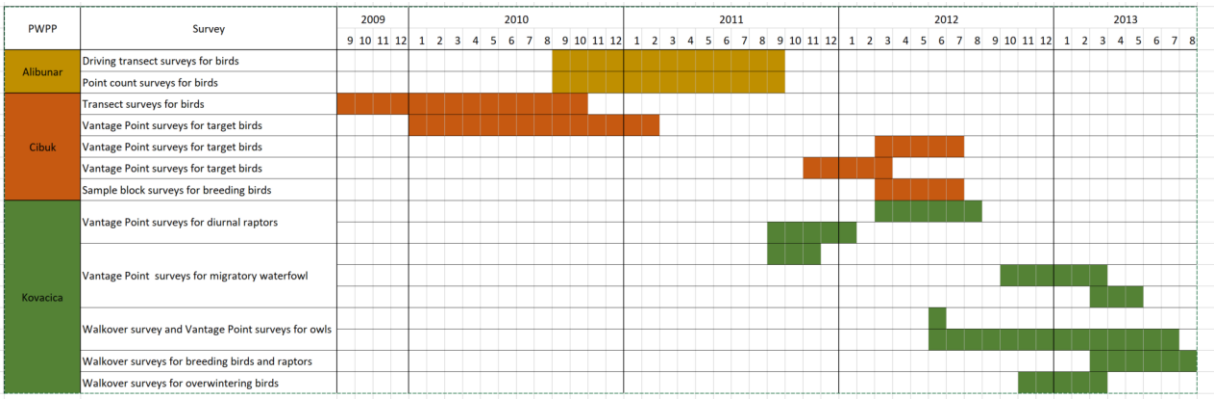
As part of their ESIAs/EIAs[48],[49],[50], all PWPPs assessed the potential for adverse project effects on bird populations recorded during baseline studies. Because the results of these ESIA/EIA*s* have been validated by the Institute of Nature Conservation of Vojvodina Province as part of the ESIA process they were used at the outset to screen out species from the preliminary list. Species populations for which all three ESIAs concluded that there was no potential for a project related adverse effect, were scoped out. However, because these ESIA/EIA baseline study results were between five and nine years old, there was potential for a change in the potential risks to bird populations within the study area. To safeguard against this, and to include potentially at-risk species which may have been difficult to detect during baseline surveys (e.g. nocturnal species) RCIA ornithologists and the ERG reviewed the provisional species population list and scoped back in populations where the potential risk was uncertain as a precautionary approach.

Finalizing the Species Population List

Following the screening of the preliminary list, all species populations scoped-in were assumed to be bird populations potentially at risk from the effects of PWPPs. This group of bird populations is referred to as the Species Population List and assessed for species sensitivity in Step 2. For the Species Population List, and those populations scoped out from the RCIA see Annex A.

[44] http://datazone.birdlife.org/site/factsheet/labudovo-okno-iba-serbia
[45] http://datazone.birdlife.org/site/factsheet/deliblatska-pescara-iba-serbia/text
[46] http://srpkraljevac.rs/en/
[47] https://maps.birdlife.org/MSBtool/
[48] Alibunar EIA - Sections 6.6.5, 6.6.6, and 6.6.12; Table 11: Birds found at the site.
[49] Čibuk ESIA - Appendix C Table C.10 (page 115) – Species for which likely adverse impacts from the proposed wind farm cannot be excluded; Appendix D Table D.1 (page 163) – Potential construction impacts on the 11 species of special interest for which adverse impacts from the wind farm are possible; Appendix D Table D.3 (page 186) – Potential operational impacts of disturbance and habitat loss on the 11 species of special interest for which adverse impacts from the wind farm are possible; Appendix D Table D.6 (page 191) – collision risk analysis results for target bird species; and Appendix D Table D.8 (page 194) – Estimated breeding territories within the wind farm site; Sections D3.2.3 – D3.2.5.
[50] Kovacica ESIA - Section 5.4.79; Table 5.3: Evaluation of ornithological receptors.

TABLE 26. SUMMARY OF BASELINE ESIA/EIA BIRD SURVEYS AT PWPPs



Part 2: Determine Species Population Categories and Identify the Unit of Analysis (UoA)

Defining Species Population Categories

Recognizing that different species groups (e.g., raptors and passerines) and different species ecologies (e.g., migrant, and resident populations) in the Species Population List have different risk profiles in relation to effects from wind farms, species populations were classified into four categories as shown in Table 27.

TABLE 27. SPECIES POPULATION LIST CATEGORIES

Category 1 Resident and summer breeding raptor populations	• Raptors (birds of prey) populations that are resident or summer breeding • Raptor populations that may use the PWPP sites and/or wider study area but do not migrate through the area • Raptor populations differentiated from other resident populations (category 2) for their demonstrated or likely high vulnerability to collision with wind turbines.
Category 2 Resident and summer breeding non-raptor populations	• Non-raptor populations that resident or summer breeding • Non-raptor populations that may use the PWPP sites and/or wider study area but do not migrate through the area
Category 3 Migrant and wintering populations (concentrated in Europe)	• Populations where a majority of the population breeds in Europe, that are not in categories 1 or 2, do not breed in the study area but may migrate through, or winter in the area
Category 4 Migrant and wintering populations (**not** concentrated in Europe)	• Populations where a majority of the population breeds outside Europe, that are not in categories 1 or 2, do not breed in the study area but may migrate through, or winter in the area

Identify the Unit of Analysis (UoA)

The risk to bird populations on the Species Population List from the cumulative effects of PWPPs varies,

due in part to (i) the proportion of birds using the study area relative to a relevant reference population of which they are part. Ideally this reference population (UoA) should be biogeographically determined; however, this was not possible because the origin of migratory birds using the study area is unknown, as is the detailed biogeographical extent of resident and breeding populations. In the absence of this type of information, the UoA is defined at scales appropriate to spatially relevant conservation units (e.g., national, regional and global populations) and are at the same time relevant to the group characteristics of birds in each of the four categories. Based on review of the technical literature, UoAs were identified and defined for the four categories as shown in Table 28.

TABLE 28. UNIT OF ANALYSIS FOR EACH SPECIES POPULATION CATEGORY

CATEGORIES OF SPECIES POPULATIONS	UNIT OF ANALYSIS	COMMENTARY
Category 1: Resident and summer breeding raptor populations	National population	• Minimum national populations were taken from the most recent estimates published by the Bird Protection and Study Society of Serbia and Department of Biology and Ecology, Faculty of Sciences, University of Novi Sad. (Puzovic *et. al.* 2015) *Birds of Serbia: Breeding Population Estimates and Trends for the Period 2008-2013*.
Category 2: Resident and summer breeding non-raptor populations	National population	• As with Category 1, the minimum national population estimates were taken from (Puzovic *et. al.* 2015)
Category 3: Migrant /wintering populations (concentrated in Europe)	European population	• Minimum European populations were taken from the estimates in the Birdlife International document (Staneva & Burfield 2017). *European birds of conservation concern: population trends and national responsibilities*.
Category 4: Migrant /wintering populations (not-concentrated in Europe)	Global population	• Minimum global population size was taken from www.iucnredlist.org

6.2.2 RESULTS

The Preliminary List contained 195 species populations comprising 177 species, of which 18 had 2 different populations (e.g. resident and migratory) relevant to the study area.

After screening the Preliminary List, 40 species populations were removed from the list. The Species Population List therefore comprised 155 species populations (Table 29). These were the populations regarded within the RCIA as potentially at risk from PWPPs and progressed to step 2. For the Species Population List, see Annex A.

TABLE 29. SUMMARY RESULTS OF STEP 1

SPECIES POPULATIONS ON PRELIMINARY LIST	SPECIES POPULATIONS SCOPED OUT AT STEP 1	SPECIES POPULATION CATEGORIES	FINAL SPECIES POPULATION LIST
195	40	**Category 1:** Resident and summer breeding raptor populations.	19
		Category 2: Resident and summer breeding non-raptor populations.	88
		Category 3: Migrant and wintering populations (concentrated in Europe)	24
		Category 4: Migrant and wintering populations (not-concentrated in Europe)	24
		Total	155

7.3 STEP 2 – IDENTIFY SPECIES SENSITIVITY

6.3.1 METHODS

The purpose of step 2 is to determine the species population sensitivity based on the relative importance of the study area to the UoA and its vulnerability at a national, regional, or international scale, depending on the UoA. Relative importance (Part 1 below) is defined as the proportion of birds using the study area relative to the UoA (see Step 1). Vulnerability (Part 2 below) is defined as the conservation status of the population.

Part 1: Relative Importance Scoring

For each bird population, the relative importance proportional to the UoA was identified. The following section describes the process for identifying relative importance for the four species population categories.

Category 1: Resident and Summer Breeding Raptor Populations – Relative Importance.

The *relative importance* of resident and summer breeding raptor populations was defined as the *proportion of the national population using the study area*. For each species population, this was estimated based on (1) the combined number of individuals reported in the PWPP ESIA/EIAs during the breeding period, and (2) judgement by the RCIA ornithologists, to adjust these figures to account for additional individuals not recorded during baseline surveys, and for individuals occurring within the study area beyond the project sites. These estimates were assigned to one of four percentile ranges (Table 30 see column 1). Ranges were set with the intention that they would be appropriate to the level of estimate accuracy. Each proportional range was then assigned to one of four classes: high, moderate, low, or negligible.

TABLE 30. RELATIVE IMPORTANCE SCORING FOR CATEGORY 1 AND 2—RESIDENT AND SUMMER BREEDING RAPTOR AND NON-RAPTOR POPULATIONS

ESTIMATE OF THE MAXIMUM % OF THE NATIONAL POPULATION USING THE STUDY AREA	RELATIVE IMPORTANCE SCORE
≤ 0.5	Negligible
> 0.5 and ≤ 1	Low
> 1 and ≤ 10	Moderate
> 10	High

Category 2: Resident and Summer Breeding Non-Raptor Populations—Relative Importance

The relative importance for category 2 populations was determined using the same approach as for category 1 populations. An estimate of the *proportion of the national population using the study area* was derived from (1) the combined number of individuals recorded in the PWPP ESIA/EIAs during the breeding period, and (2) judgement by RCIA team ornithologists, to account for additional individuals not recorded during baseline surveys, and for individuals occurring within the study area beyond the project sites. As with raptor populations, these estimates were assigned the same four percentile ranges, and each proportional range was assigned to the same four classes: high, moderate, low, or negligible (Table 30).

Category 3: Migrant/wintering populations (concentrated in Europe)—Relative Importance

For migrant and wintering populations, it was possible to distinguish between those species whose populations are concentrated in Europe (Category 3) and those that are more widely distributed (Category 4), using Birdlife and IUCN sources (See table 28 Unit of Analysis).

The *relative importance* of migrant and/or wintering populations concentrated in Europe (category 3) was defined as the *proportion of the European population using the study area.* For each species population, this was estimated based on (1) the combined number of individuals reported in the PWPP ESIA/EIAs during the non-breeding period as with category 1 and 2 populations, and (2) judgement by RCIA ornithologists to adjust this number to account for additional individuals not recorded during baseline surveys, and for individuals occurring within the study area beyond the project sites. The same four percentile ranges and relative importance classes were used to differentiate relative importance (Table 31).

TABLE 31. RELATIVE IMPORTANCE SCORING FOR CATEGORY 3—MIGRANT AND WINTERING POPULATIONS (CONCENTRATED IN EUROPE).

ESTIMATE OF THE MAXIMUM % OF THE EUROPEAN POPULATION USING THE STUDY AREA	RELATIVE IMPORTANCE SCORE
≤ 0.5	Negligible
> 0.5 and ≤ 1	Low
> 1 and ≤ 10	Moderate
> 10	High

*Category 4: Non-breeding/wintering populations (**not** concentrated in Europe)—Relative Importance.*

The *relative importance* of migrant and/or wintering populations not concentrated in Europe was defined as the *proportion of the global population using the study area.* For each species population this was estimated based on (1) the combined number of individuals reported in the PWPP ESIA during the non-breeding period, and (2) judgement by RCIA ornithologists to adjust this number to account for additional individuals not recorded during baseline surveys, and for individuals occurring within the study area beyond the project sites. The same four percentile ranges and relative importance classes were used to differentiate relative importance (Table 32).

TABLE 32. RELATIVE IMPORTANCE SCORING FOR CATEGORY 3—MIGRANT AND WINTERING POPULATIONS (CONCENTRATED IN EUROPE).

ESTIMATE OF THE MAXIMUM % OF THE GLOBAL POPULATION USING THE STUDY AREA	RELATIVE IMPORTANCE SCORE
≤ 0.5	Negligible
> 0.5 and ≤ 1	Low
> 1 and ≤ 10	Moderate
> 10	High

Part 2: Vulnerability Scoring

For each species population, vulnerability was scored using national, regional or international threatened species classifications appropriate to its UoA, and evidence of its susceptibility to wind farm-related impacts. National classifications were applied to resident and summer breeding raptor and non-raptor populations (categories 1 and 2), regional classifications to migrant and wintering populations concentrated in Europe (category 3), and international classifications to migrant and wintering populations not concentrated in Europe (category 4). Additionally, populations in all categories were assigned a Species Vulnerability Index (SVI) score to provide a measure of each populations' susceptibility to wind-farm related impacts (see *Species Vulnerability Index*). These scores were used together with the relevant IUCN threat categories to assign each species to one of four vulnerability classes (negligible, low, moderate or high). The criteria used to score vulnerability are summarized in Table 33.

TABLE 33. VULNERABILITY SCORING FOR EACH SPECIES POPULATION CATEGORY

	CATEGORY 1 AND 2 RESIDENT AND SUMMER BREEDING RAPTOR AND NON-RAPTOR POPULATIONS	CATEGORY. 3: MIGRANT AND WINTERING POPULATIONS (CONCENTRATED IN EUROPE)	CATEGORY 4: MIGRANT AND WINTERING POPULATIONS (NOT CONCENTRATED IN EUROPE)
Vulnerability Guidance/Metrics	IUCN Serbian Red List for birds (in press) • Species Vulnerability Index (SVI) based on Birdlife SVI	• IUCN European population status • Species Vulnerability Index (SVI) based on Birdlife SVI	IUCN Global Red List of Threatened Species • Species Vulnerability Index (SVI) based on Birdlife SVI

Vulnerability Scoring:			
Negligible	Species that are unlisted (LC) on IUCN Serbian Red List & SVI of 6 or below	Species are LC and not 'declining', 'depleted' or 'rare' on IUCN European population status list & SVI of 6 or below	Species that are LC on IUCN Global Red List & SVI of 6 or below
Low	Species that are VU or NT on IUCN Serbian Red List & SVI of 6 or below; or Species which are unlisted (LC) on IUCN Serbian Red List & SVI of 7 or 8; or	Species are VU or NT on IUCN European population status list & SVI of 6 or below; or Species are LC and not 'declining', 'depleted' or 'rare' on IUCN European population status list & SVI of 7 or 8	Species are VU or NT on IUCN Global Red List & SVI of 6 or below; or Species are LC on IUCN Global Red List & SVI of 7 or 8
Moderate	Species that are VU or NT on IUCN Serbian Red List & SVI of 7 or 8; or Species that are LC on IUCN Serbian Red List & SVI of 9 or 10; or	Species that are VU or NT on IUCN European population status list & SVI of 7 or 8, or Species are LC and not 'declining', 'depleted' or 'rare' on IUCN European population status list & SVI of 9 or 10	Species that are VU or NT on IUCN Global Red List & SVI of 7 or 8, or Species are LC on IUCN Global Red List & SVI of 9 or 10
High	Species that are CR or EN on IUCN Serbian Red List; or Species that are VU or NT on the IUCN Serbian Red List & SVI of 9 or 10	Species that are CR or EN on IUCN European population status list, or Species that are VU or NT on IUCN European population status list & SVI of 9 or 10	Species that are CR or EN on IUCN Global Red List, or Species that are VU or NT on IUCN Global Red List & SVI of 9 or 10

Notes: LC = Least Concern; NT = Near Threatened; VU = Vulnerable, EN = Endangered, CR = Critically Endangered

- *IUCN Global Red List of Threatened Species*[51]*:* The IUCN Red List is globally recognized as the most comprehensive approach to assigning threat categories to species, including birds. Individual species are assigned an extinction risk category: Least Concern (LC); Near-threatened (NT); Vulnerable (VU); Endangered (EN); and Critically Endangered (CR). These threat categories were used with SVI scores to assess vulnerability for migratory and wintering populations not concentrated in Europe (category 4), as they provide the most spatially relevant conservation status category for these populations.
- *IUCN European population status list*: The IUCN European population status ratings published in (Staneva & Burfield 2017) assesses European populations against the IUCN Red List criteria using regional application guidelines to identify regionally threatened species i.e. those that are assessed as NT, VU, EN or CR. Species classified as LC are assessed against additional criteria to identify other those of regional conservation concern, specifically, regionally 'declining', 'depleted' and 'rare' species. The European population status list categories were used to score vulnerability for wintering and migratory bird populations concentrated in Europe (category 3). Populations classified as LC and 'depleted', 'declining' or 'rare' were regarded the same as populations with a regionally threatened status of NT, VU and EN respectively.

[51] www.iucnredlist.org

- *IUCN Serbian Red List for birds (in press*): The Serbian Red List for birds assesses breeding and non-breeding populations against IUCN Red List criteria using national application guidelines to identify nationally threatened species i.e. those that are assessed as NT, VU, EN or CR. The RCIA was permitted by the Institute for Nature Conservation of Serbia, the Bird Protection and Study Society of Serbia, and the University of Novi Sad to use a draft version of this document that contained the finalized risk categories for all Red Listed populations. These were used to score vulnerability for resident and summer breeding raptor and non-raptor populations (categories 1 and 2). Populations not included in the Red List were regarded as LC and had their vulnerability class raised by one level (e.g. from negligible to low) if a recent decrease (between 2000-2013) in the population trend was documented[52].
- *Species Vulnerability Index (SVI):* The Birdlife 'Species Vulnerability Index', originally developed for MSBs, scores 37 species, principally raptors but also some large water birds, based on their susceptibility to wind farm-related and power-line related impacts. Scores are informed by scientific literature and other relevant evidence relating to species behavior and documented impacts caused by existing wind and powerline infrastructure. The index uses a 10-point scale, with species at the highest vulnerability scoring 10. Resident and summer breeding raptors (category 2) were assessed using this index. The relevant SVI score was taken from the BirdLife-UNDP Soaring Bird Sensitivity Map tool[47].

To incorporate a measure of susceptibility to the adverse impacts of wind farms for species with no Birdlife SVI score, the RCIA developed a scoring similar to the SVI concept. Scoring incorporated wind farm-related impacts relevant to non-MSB species, namely displacement and habitat change/loss. Information in peer-reviewed literature and regional studies examining species-specific impacts caused by wind farms informed the development of the "Species Vulnerability Index for non-MSBs". Where species-specific information was not available, relevant information from suitable surrogate species was used. The SVI index for non-MSBs was reviewed by RCIA ornithologists to ensure that scores were applied consistently across species. (see Annex D for details about the SVI for non-MSBs).

Species sensitivity results were reviewed by the ERG. Relative importance and/or vulnerability scores were raised by one class (e.g. from negligible to low) in response to additional information provided by the ERG (see Annex B – relative importance and vulnerability scores with * are those adjusted in response to ERG inputs). These adjusted scores were used in the species sensitivity matrix to determine sensitivity for each species population.

Part 3: Assign Species Sensitivity

A matrix (Table 34) was used to determine *sensitivity* for each species population in step 2 using their *relative importance* and *vulnerability* scores.

TABLE 34. SPECIES SENSITIVITY MATRIX

Vulnerability	Relative Importance			
	High	Moderate	Low	Negligible
High	High	High	Medium	Low

[52] (Puzovic et. al. 2015) Birds of Serbia: Breeding Population Estimates and Trends for the Period 2008-2013, provides an assessment of the short-term trend for each species for the period 2000-2013. These assessments were used to adjust the vulnerability class for LC Serbian breeding populations in categories 1 and 2 within the RCIA

Moderate	High	Medium	Low	Low
Low	Medium	Low	Low	Negligible
Negligible	Low	Low	Negligible	Negligible

6.3.2 RESULTS

From 155 species populations assessed for sensitivity in step 2, 98 were scored as negligible and scoped-out, leaving 57 to be assessed for Likelihood of Effect in step 3. Table 35 summarizes the findings of step 2. Annex B provides full details of the species sensitivity results for each of the 155 species populations.

TABLE 35. SUMMARY RESULTS OF STEP 2

SPECIES POPULATION CATEGORIES	SPECIES POPULATION RESULTS FROM STEP 1 (*see Annex A*)	POPULATIONS SCOPED OUT AT STEP 2 (*i.e., Negligible sensitivity*)	SPECIES POPULATIONS SCOPED IN STEP 3
Category 1: Resident and summer breeding raptor populations	19	7	12
Category 2: Resident and summer breeding non-raptor populations	88	57	31
Category 3: Migrant and wintering populations (concentrated in Europe)	24	16	8
Category 4: Migrant and wintering populations (not concentrated in Europe)	24	18	6
Totals	155	98	57

7.4 STEP 3 – ECOLOGICAL RISK ASSESSMENT AND IDENTIFY PRIORITY BIRD VECs

7.4.1 METHODS

The purpose of step 3 is to identify priority bird VECs from the 32 species populations scoped into step 3. Priority bird VECs are identified by evaluating the species sensitivity output from step 2 with the Likelihood of Effect output from this step, which is based on the rank scoring of PWPP-related risk factors associated with each of the candidate species populations.

Part 1: Determine Likelihood of Effect (LoE)

LoE assesses PWPP-related effects on species populations scoped into step 3. Collision with turbine blades, displacement, disturbance and habitat loss all have varying degrees of risk to these populations, as does the extent to which each is exposed to these risks throughout the year. Assessing the risk of colliding with rotating turbine blades using formal collision rate modeling was not possible, because relevant collision rate data was not available for all PWPPs, and only a small proportion of the step 3 populations

were assessed in the project ESIA/EIAs.

For this reason, a questions-based approach was used to provide a relative assessment of the likelihood of PWPP effects on each population in step 3.

Based on a review of the PWPP ESIA/EIAs and site visits to all PWPPs, a number of potential risks were not included in the LoE assessment either because they were not relevant at project sites or there was insufficient information to provide valid assessment The area in and around PWPP sites is predominantly flat and topographically featureless, and therefore bird risk relating to the presence of topographic features, for example valleys and ridges that may focus bird activity at collision risk heights, is likely to be absent.

LoE Question-based framework to determine Priority VECs

The questions-based framework consisted of 5 questions with multiple choice responses, devised specifically to assess LoE for each species population. Three questions were directed to all species populations, Question 4 was directed to breeding populations only (category 1 and 2) and Question 5 to migratory/wintering populations only (category 3 and 4).

A scoring method was applied to the range of available responses to each question. Questions were answered based on site-specific information and judgement by RCIA team ornithologists (Table 36). The scores for the 4 questions were added together for each of the 57 species populations. Summed scores were partitioned into 4 classes based on their quartile range and each proportional range was assigned to the same four classes: high, moderate, low, or negligible. The results of step 3 were reviewed by the ERG. If additional information provided by the ERG indicated that the results from the questions-based framework underestimated the effects of the PWPPs on a species population, the LoE was raised by one class (e.g. from negligible to low).

The questions-based framework used to assess LoE is presented in Table 36.

TABLE 36. QUESTIONS-BASED FRAMEWORK FOR LIKELIHOOD OF EFFECT FOR BIRD SPECIES POPULATIONS

QUESTION	SCORING
1. What is the PWPP level of risk per individual, based on; [1] an estimate of the number of individuals likely to be using PWPP sites, [2] the type and magnitude of risks to which they are potentially exposed, and [3] the extent to which these risks may have an effect, taking into account the likely distribution, behavior, and movements of individuals within and around the sites? (For example: a species occurring in moderate numbers, that is known to have very high susceptibility of colliding with turbines, but only likely to occur in habitat on the edge of project sites (away from turbines), will have a lower risk than a species occurring in low numbers, with the same susceptibility to collision but that is likely to forage in habitat amongst turbines, and at turbine height)	For each population, the RCIA team ornithologists assigned a qualitative score (1 - 4, with 4 representing the highest risk) to determine the risk per individual based on information in project ESIAs, knowledge of habitats at PWPP sites and across the wider study area, and knowledge the ecology and behavior of each species score
2. What is the estimated exposure to risk throughout the year based on monthly occurrence records from ESIA baseline data?	Data from all PWPP ESIA/EIAs was pooled to assess the use by each population throughout the year. In a few cases where annual occurrence of a population was only described generally within the text (e.g. present throughout the year, present during the winter period) In these cases monthly use was approximated based on the text. Each month in which use was recorded within PWPP ESIAs received a score of 0.3 This value was set to be equivalent to the scoring of 'seasonal exposure to risk' below.
3.What is the estimated seasonal exposure to risk throughout the year based on relevant information in scientific literature[53]? *Seasons were spring (March-May), summer (June-August), autumn (September-November) and winter (December-February)*	Each season in which potentially at-risk individuals were assessed to use the study area received a score of 1, allowing a maximum score of 4 if a population was likely to use the area throughout the year

[53] Šćiban, M., Rajković, D., Radišić, D., Vasić, V., & Pantović, U. (2015).
Birds of Serbia – critical list of species: Institute for Nature Conservation of Vojvodina Province and Bird Protection and Study Society of Serbia, Novi Sad, and IUCN (2018) Serbian Red List for Birds (*in press*)

4. With respect to each species population, Is breeding habitat available within the likely foraging distance from turbines at PWPPs? *(Used for resident and summer breeding (category 1 and 2) populations only)*	1) = **unlikely** (Not recorded within likely foraging distance of PWPPs[54], and/or typical breeding habitat for the species is not available based on known habitat types within likely species foraging distance from PWPPs) (2) = **possible** (Not recorded within likely foraging distance of PWPPs but typical breeding habitat for the species is available, based on known habitat types within likely species foraging distance from PWPPs) (3) = **probable** (Recorded within likely foraging distance of PWPPs, but current Area of Occupancy (AOO)[55] not within foraging range, therefore populations assumed not to be currently using this area for breeding activities). 4. =**confirmed** (current AOO within likely \ foraging distance of PWPPs and/or species recorded or judged to be recently (<10yrs) using this area for breeding activities based on information in the ESIAs or other documentation)
5. Are wintering or migratory stopover habitats available for the species population within PWPPs? *(Used for migrant and wintering (category 3 and 4) populations only)*	**0** = **Typical migratory/wintering habitats not likely at PWPPs**. Evidence from ESIAs, scientific literature[52,53] and expert judgement indicates that the population does not use the PWPPs during the migratory/wintering period, and there is negligible potential for them to do so. **2** =**Typical migratory/wintering habitat available at PWPPs**. Evidence from ESIAs, other literature or expert judgement indicates/suggests that **the population uses or has the potential to use these habitats infrequently**. **4** = **Typical migratory/wintering habitat available at PWPPs**. Evidence from ESIAs, other literature or expert judgement indicates/suggests that **the population uses, or has the potential to use, these habitats frequently**.
Total LoE Score for each bird species population	Summed scores were partitioned into 4 classes based on their quartile range and each range classed as negligible, low, moderate and high

a = in situations where ESIA/EIAs did not specify months and used qualifying remarks such as "use was observed year-round" the authors assumed use was observed during 12 months.

Part 2: Assign Risk Rating for Each Species Population

The matrix in Table 37 was applied to each species population scoped into step 3. It evaluated the species *sensitivity* score from step 2 with the LoE score from step 3 to determine a final risk rating, categorized as negligible, minor, moderate, or major.

[54] Assessed using map showing all records for the species *in* IUCN (2018) Serbian Red List for Birds (*in press*).
[55] Assessed using Area of Occupancy map *in* IUCN (2018) Serbian Red List for Birds (*in press*)

TABLE 37. RISK RATING MATRIX

SPECIES SENSITIVITY	LIKELIHOOD OF EFFECT			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

Part 3: Identifying Priority Bird VECs

Priority bird VECs were those species populations that were assigned major or moderate risk rating scores when their *species sensitivity* and *LoE* category scores were applied to the matrix in Table 37. Species populations with either a negligible or minor risk rating were not considered priority bird VECs. However, monitoring and mitigation protocols at PWPPs include post-construction fatality searches around turbines for all bird species populations (see step 5), thus allowing for an iterative review of risks to all species populations that occur at PWPPs.

7.4.2 RESULTS

Of the 57 species populations assessed in step 3 (Table 35), the RCIA process identified 24 priority bird VECs: 11 resident and summer breeding raptor populations (category 1), 10 resident and summer breeding non-raptor populations (category 2), 1 migratory or wintering population (concentrated in Europe) (category 3) and 2 migratory or wintering population (not concentrated in Europe) were identified as priority bird VECs. Figure 15 illustrates the scoping out of bird species populations during steps 1 to 3 of the RCIA process, from the original 195 to the final 24 listed in Table 38. Annex C provides complete details of the LoE and final risk rating results. These 24 species populations are assessed as being at the highest risk from the cumulative effects of the PWPPs in the study area. In step 4, each priority bird VEC population is assessed to determine the number of PWPP-related fatalities that can be sustained without compromising its long-term population viability.

FIGURE 15. SCOPING OUT OF SPECIES POPULATIONS IN STEPS 1 TO 3 OF THE RCIA

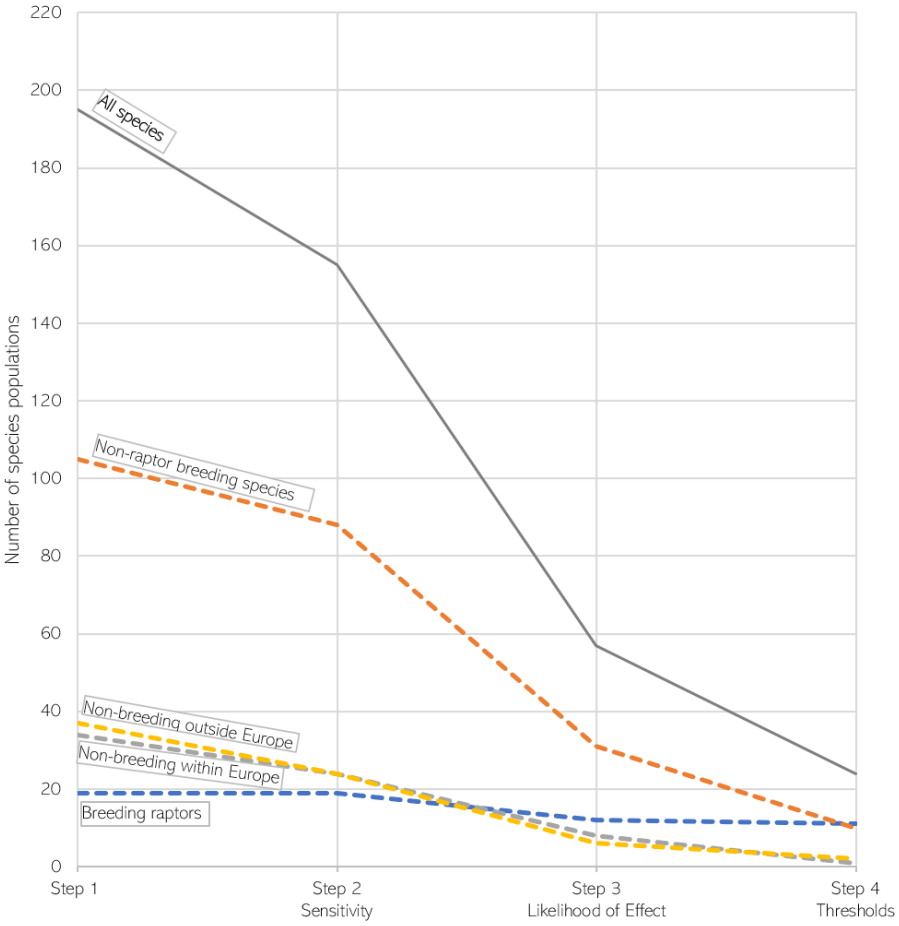


TABLE 38. PRIORITY BIRD VECs

Species Population Category	Species Name	Scientific Name
Category 1: Resident and summer breeding raptor populations	Common Barn-owl	*Tyto alba*
	Short-toed Snake-eagle	*Circaetus gallicus*
	Eastern Imperial Eagle	*Aquila heliaca*
	Booted Eagle	*Hieraaetus pennatus*
	Western Marsh-harrier	*Circus aeruginosus*
	Northern Goshawk	*Accipiter gentilis*
	White-tailed Sea-eagle	*Haliaeetus albicilla*
	Black Kite	*Milvus migrans*
	Long-legged Buzzard	*Buteo rufinus*
	Eurasian Hobby	*Falco subbuteo*
	Saker Falcon	*Falco cherrug*
Category 2: Resident and summer breeding non-raptor populations	Common Quail	*Coturnix coturnix*
	Common Snipe	*Gallinago gallinago*
	Common Sandpiper	*Actitis hypoleucos*

	European Bee-eater	*Merops apiaster*
	Common Raven	*Corvus corax*
	Greater Short-toed Lark	*Calandrella brachydactyla*
	Eurasian Skylark	*Alauda arvensis*
	Crested Lark	*Galerida cristata*
	Collared Sand Martin	*Riparia riparia*
	Northern Wheatear	*Oenanthe oenanthe*
Category 3: Migrant and wintering populations (concentrated in Europe)	Hen Harrier	*Circus cyaneus*
Category 4: Migrant and wintering populations (not concentrated in Europe)	Greater White-fronted Goose	*Anser albifrons*
	White Stork	*Ciconia ciconia*

7.5 STEP 4 – IDENTIFY THRESHOLDS FOR EACH PRIORITY BIRD VEC

7.5.1. METHODS

The purpose of step 4 is to determine for each priority bird VEC (Table 38) a threshold level for when action should be taken through an adaptive management approach to prevent impacts on the long-term viability and sustainability of the UoA population. It should be noted that thresholds are calculated to purposely be highly precautionary. Importantly, the PWPPs represent only a small proportion of the risk to these populations. Although thresholds are calculated to safeguard high risk bird populations from PWPP effects, they are equally relevant to guiding conservation actions concerning other known threats to the UoA population. Thresholds represent the "limits of acceptable change" that establish the trigger for adaptive management measures. In the RCIA, population-specific annual fatality estimates are used to guide threshold setting.

In the RCIA, annual fatality estimates calculated for each priority bird VEC are used to guide threshold settings. For the 12 raptor priority VECs, and possibly Greater White-fronted Goose and White Stork, a principal potential cause of population decline is direct collision with wind turbines blades as they turn. Mortality will be directly monitored on PWPPs sites and be compared with the suggested "threshold" (as calculated in this section). For the remaining 10 priority populations, the principal risks relate to habitat loss, displacement and disturbance, rather than collision. In these cases, annual fatality estimate thresholds were determined to provide a measure of the scale of decline that could indicate a trend toward a non-viable UoA population. These indicators should be factored in when considering mitigation options and conservation actions for these populations.

Step 4 identifies, for each priority bird VEC, an annual threshold number of fatalities which, if exceeded, is likely to compromise the long-term viability of the RCIA reference population (see Table 39). A 'threshold target' is then set by comparing this figure with an estimate of the annual number of fatalities likely from human activity, including, but not limited to effects relating to PWPPs, based on estimates provided by the ERG. When these two figures are similar it indicates a risk to long-term sustainability, and to safeguard the population, the threshold target is set to zero. The PWPPs contribute to safeguarding these populations by aiming to avoid any wind farm related fatalities. Equally, the 'zero-fatality threshold target' signals to other relevant stakeholders (e.g. responsible government agencies, conservation NGOs, and non-PWPPs) that

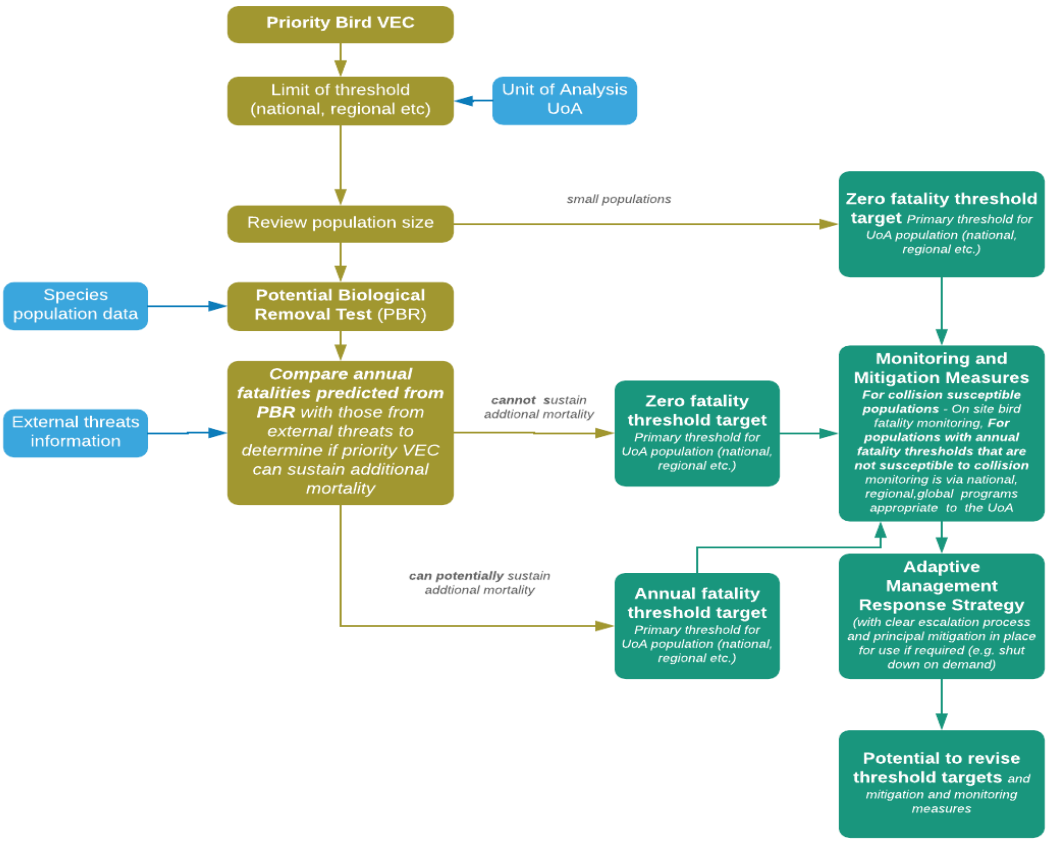
mitigating the threats to these populations should be guided by this threshold. Figure 16 summarizes the threshold setting process and the actions triggered as a consequence of passing thresholds.

Part 1: Threshold-setting Process

The threshold-setting process was guided by related concepts within European and U.S. legal frameworks, specifically criteria underpinning "Favourable Conservation Status" (EC Habitats Directive, Council Directive 92/43/EEC) and "Optimal Sustainable Population" (pursuant to 16 USCS § 1362). The approach for threshold setting in this report was adapted from IFC's Tafila Region Wind Power Projects Cumulative Effects Assessment (TRWPP CEA)[56].

Thresholds were assessed for each priority bird VEC relative to the population size determined by their UoA. For 21 out of 24 priority birds (i.e. resident or summer breeding populations) threshold setting relates to national Serbian populations and takes into account all effects of human activity on these populations). *For some priority bird VECs thresholds provided in this section are highly precautionary, as explained in the methods section below.* These thresholds attempt to provide a precautionary quantitative estimate for when action should be taken through an adaptive management approach.

FIGURE 16. DECISION TREE FOR PRIORITY BIRD VECs



[56] IFC. (2017). Tafila Region Wind Power Projects Cumulative Effects Assessment. International Finance Corporation.

Threshold-Setting Process

1. **Small populations:** For each priority bird VEC, the estimated number of individuals in the UoA was reviewed. Where the minimum population size estimate for a species was small (10 individuals or less), it was assumed that any mortality, displacement, habitat loss or disturbance from the PWPPs would adversely affect its population viability and a *zero-effect threshold target* was applied. To take a precautionary approach, this was the case even when the study area was not known to be an especially important habitat for such species.
2. **Larger populations:** For each priority bird VEC where the UoA population was greater than 10 individuals, the annual number of fatalities that could be sustained without compromising long-term viability was determined using a simple "Potential Biological Removal" (PBR) analysis (see Box). This (quantitative) annual fatality estimate was then compared to a qualitative estimate, provided by the ERG, of the combined annual number of fatalities likely to result from "external threats" on each priority bird population. "External threats" include: 1) persecution, including illegal shooting, poisoning, egg collecting and nest destruction, 2) power-line electrocution, and 3) impacts from other energy generation facilities, including other wind energy projects and lignite power plants[57]. When this fatality estimate exceeded the PBR level, a *zero-annual fatality threshold* target was applied. When the PBR level was not exceeded, the current conservation status of the population was used to assess whether the result was (a) sufficiently close to the PBR to imply no PWPP-related or external threat related mortality was possible without an adverse effect on the population, or (b) sufficiently below the PBR level to indicate that some PWPP-related mortality was possible without an effect on population viability[58]. When the results of this effort were best described by (a) a zero-fatality threshold target was applied to the species. When it was best described by (b) an *annual fatality threshold target* (i.e., greater than zero birds per year) was applied using a more stringent PBR analysis. With respect to external threats, it should be noted that BirdLife International consider that the illegal shooting and poisoning of raptors kills four to eight birds each year[59].

For priority bird VEC populations where expert review informed by PBR analysis concluded that some additional mortality may be possible, the PBR was rerun, applying the weighting within the calculation that assumed the population had an IUCN classification of 'VU', 'EN, or 'CR'. This was a precautionary approach as these priority bird VECs were classified by IUCN as either LC or NT and according to PBR protocol[60] would have received a much less stringent weighting. This precautionary result, using the most stringent weighting available for the PBR calculation, corresponded to 1% of the PBR weighting for a stable population. For these species, annual fatality threshold targets (i e., greater than zero birds per year) were set, using the results of this more stringent PBR result. The reason for taking this precautionary approach was to ensure that threshold number did not approach the "tipping point" at which a population is unlikely

[57] Information on the number of fatalities from external threats is scarce for both the study area and Serbia as a whole, and typically relates to "incidental" reports of fatalities and their apparent causes. To address this information gap and make it possible to incorporate external threats into an assessment of the viability of each population, the ERP identified principal threats for the priority bird VECs and gave approximate range estimates of the annual number of fatalities attributable to each threat individually and all external stressors combined. Range estimates for annual fatalities were < 1, = 1 and < 5, = 5 and < 10, = >10.

[58] It is important that the PBR level is understood to be a crisis point for the population and not a threshold that can be adopted to maintain a viable population or to recover a declining population. The number of annual deaths that can be incurred by a population while maintaining its viability will be some way below the number of deaths predicted by the PBR level and cannot be predicted by this simple analysis.

[59] Report on Illegal Shooting, Poisoning, Trapping, Possessing and Trade of Wild Birds in the Republic of Serbia for the Period 2000-2017". BirdLife International, Drustvo Za Zastitu i Proucavanje Ptica Srbjie, Novi Sad 2017.

[60] Dillingham, P. W., & Fletcher, D. (2008). Estimating the ability of birds to sustain additional human-caused mortalities using a simple decision rule and allometric relationships. Biological Conservation, 141(7), 1783-1792

to remain viable in the long term. Instead it provides a more conservative estimate of when "action needed to be taken" (i.e. via adaptive management).

> **Potential Biological Removal Analysis** is a simple, robust, and precautionary test for assessing the potential for animal populations to sustain additional human derived mortality. (see Wade, 1998; Neil and Lebreton, 2005; Dillingham and Fletcher, 2011). It uses adult survival rate, year of first breeding, and an estimate of the minimum population size to calculate an annual rate of human-caused mortality that if realized would likely result in a nonviable population in the long term.

Primary Threshold Targets

- ***Zero Fatality Threshold Targets***

Priority bird VEC populations that were assigned a zero-fatality threshold target are subject to monitoring, mitigation plans and adaptive management designed to minimize the contact of these species with PWPPs in the study area, and conservation actions designed to reduce the number of fatalities from external threats. For priority bird VECs where colliding with turbine blades is the overriding risk an adaptive management response is triggered when there is an elevated- risk situation or a near-miss incident (see - Adaptive Management below) or if a fatality occurs. For priority bird VECs where the principal risk is displacement, disturbance and/or habitat loss (e.g. waders), a different approach is recommended as described in Section 7, Table 64, Measure 3.1.

- ***Annual Fatality Threshold Targets***

Priority bird VECs assigned an annual fatality threshold target are subject to the same monitoring and mitigation plans and adaptive management as zero fatality threshold populations. For these priority bird VECs, an adaptive management response is triggered when periodic review of the results of post-construction fatality search surveys shows that the annual fatality threshold target has been exceeded. For **populations where collision fatalities are not the principal risk, a different approach is recommended as** described in Section 7, Table 64, Measure 3.1.

Other Threshold Targets

- ***Unpredicted Event Threshold Targets for Large Flocks***

In addition to thresholds set for priority bird VECs, thresholds are required to facilitate mitigating for the risk of multi fatality events to a small number of populations that are not priority bird VECs. This is relevant to the PWPPs because of the potential for flocks of non-priority Bean Geese, Greylag Geese, and Common Crane to occur in the area.

Adaptive Management

For priority birds that are principally at risk from colliding with turbine blades, adaptive management is triggered when fatality target thresholds are exceeded and when new evidence acquired over time shows an increased or decreased risk to a raptor priority bird VEC or an increased risk to a non-priority population. Increased risk to priority birds requires that mitigation and management measures be revised to uphold thresholds and promote the long-term viability of the population. For priority bird VECs that

exhibit a decreased risk over time, their primary threshold target may be reassessed, and revised or reassigned to reflect the reduced risk to their long-term population viability. Non-priority populations that exhibit evidence of increased risk may be assigned as priority bird VECs, may have an appropriate threshold determined and may be subject to associated adaptive management response strategies. Adaptive management is a key component of threshold setting within the RCIA as it provides a mechanism for dealing with the uncertainty associated with determining priority bird populations and with predicting thresholds for priority bird VECs.

Adaptive management strategies should follow a set of clear sequential actions, specifically:

1. Conduct a review to determine the primary reasons why a threshold was exceeded.
2. Review the effectiveness of existing mitigation based on the findings and determine whether a revised mitigation strategy is required.
3. If needed, define a revised threshold target or limit of acceptable change.
4. Define the actions that will be taken if the new threshold or limit of acceptable change is exceeded.

This process is iterative, and the breaching of successive thresholds should be matched by an increase in the measures to protect and promote the viability of priority bird VEC populations.

Adaptive management responses are not limited to exceeded thresholds. Adaptive management may also be triggered in response to other events:

- An elevated risk situation, in which a temporary increase in the level of risk to priority birds near turbines occurs because of changes in human behavior or environmental conditions. For example, changes in agricultural land use or dumping of domestic waste close to a PWPP site may result in an increase in prey availability and scavenging opportunities, and lead to an increased raptor activity in the area, triggering a temporary increase in monitoring effort and engagement with farmers and local authorities.
- A near-miss incident, in which no fatalities were recorded during monitoring but priority birds are reported flying through the rotor-swept area, leading to a review and revision of monitoring and mitigation protocols.

With respect to adaptive management measures for Priority VECs that are not at risk of collision, see details in Section 7, Table 64, Measure 3.1.

7.5.2 RESULTS

12 priority bird VECs were assigned to a zero-fatality threshold target as a result of applying the threshold - setting protocol in step 4. The remaining populations were assigned annual fatality thresholds. Table 39 gives input data and results of the PBR analysis. The PBR results in Table 39 provides, for each species, an estimate of the annual number of fatalities, from any human derived source, that the relevant population (national, regional or global) can sustain before its long-term viability is likely to be compromised. The PBR results give no information about the effect of PWPPs or external threats on these populations. Those species populations that have been assigned a zero-fatality threshold in the RCIA typically have low reproductive rates and/or have small populations within Serbia. This means that safeguarding their populations is a high priority because, even a very low annual fatality rate would have a long-term impact

on the viability of the population. Tables 40-63 summarize the outcomes of steps 1-3, the results of the threshold-setting process and a threshold target for each species.

Biological and demographic parameter values required to conduct threshold-setting analyses were taken from existing species-specific studies for each priority bird VEC. Parameter values derived from studies of populations within Europe were used where they existed; otherwise the results of studies from the most appropriate population outside the region were used. Using surrogate parameter values from different populations of the same species should provide reasonably similar parameter values, provided they are similar in other aspects of their biology, e. g., migratory, non-migratory populations. For some species (Short-toed Snake-eagle, Booted Eagle, Black Kite, Long-legged Buzzard, Greater Short-toed Lark, and Crested Lark), no species-specific parameter values were available. For raptors, typical values for species of similar mass were used to give an indication of a likely threshold. Adult survival and age of first breeding are related to body mass in raptors (Newton, 1979; Newton, McGrady, and Oli, 2016); therefore, using surrogate species with similar mass should allow approximate predictions about the amount of mortality these priority bird VEC populations can sustain. For the two lark species values for Eurasian Skylark were used. These are likely to be similar enough to those for Crested and Greater Short-toed Lark to provide informative PBR results for these two species

TABLE 39. POTENTIAL REMOVAL ANALYSIS: INPUT DATA AND RESULTS FOR PRIORITY BIRD VECs

Category	Species Name	Scientific Name	Unit of Analysis	Pop. estimate taken from	Pop. estimate (No. of individuals	IUCN Serbian Red List Rating	Demographic parameters				
							Demographic parameters taken from	Age at first breeding	Annual adult survival	Recovery factor used in PBR	PBR level estimate annual No. fatalities
Category 1. Resident or summer breeding raptor populations	Common Barn-owl	*Tyto alba*	National pop.	Puzovic *et. al.* 2015	6200	LC	Altyweeg., R, Roulin., A, Kestenholz., M & Lukas J. (2003). Variation and covariation in survival, dispersal, and population size in barn owls *Tyto alba*. Journal of Animal Ecology **72**, pp 391-399.	1	0.72	1	1,643
	Short-toed Snake-eagle	*Circaetus gallicus*	National pop.	Puzovic *et. al.* 2015	240	NT	Surrogate information for lesser spotted eagle used and taken from: Vali., U & Bergmanis., U. (2017). Apparent survival rates of adult Lesser Spotted Eagle *Clanga pomarina* estimated by GPS-tracking, colour rings and wing-tags. Bird Study **64(1)**: pp 1-4.	4	0.92	0.3	5.6
	Eastern Imperial Eagle	*Aquila heliaca*	National pop.	Puzovic *et. al.* 2015	10	CR	Katzner., T, E, Bragin., E, A. & Milner-Gulland., E,J. (2006). Modelling populations of long-lived birds of prey for conservation: A study of imperial eagles (*Aquila heliaca*) in Kazakhstan. Biological Conservation **132**, pp322-335.	4	0.95	0.1	0
	Booted Eagle	*Hieraaetus pennatus*	National pop.	Puzovic *et. al.* 2015	32	EN	Surrogate information of common buzzard used taken from BTO bird facts: https://app.bto.org/birdfacts/results/bob2870.htm	3	0.90	0.1	0.2
	Western Marsh-harrier	*Circus aeruginosus*	National pop.	Puzovic *et. al.* 2015	694	NT	BTO Bird Facts: https://app.bto.org/birdfacts/results/bob2600.htm	3	0.74	0.3	22.9
	Northern Goshawk	*Accipiter gentilis*	National pop.	Puzovic *et. al.* 2015	1800	VU	Kenward., R, E, Marcstrom., V, & Karlbom., M. (1999). Demographic estimates from radio-tagging: models of age-specific survival and breeding in the goshawk. Journal of Animal Ecology **68**, pp 1020-1033.	2	0.83	0.1	22.5
	White-tailed Sea-eagle	*Haliaeetus albicilla*	National pop.	Puzovic *et. al.* 2015	224	NT	Hardy., J, Crick., H., Wernham., C, Riley., H, Etheridge., B. & Thompson., D. (2013). Raptors a field guide to survey and monitoring (3rd Edition). The Stationary Office Limited, Edinburgh.	5	0.94	0.3	3
	Black Kite	*Milvus migrans*	National pop.	Puzovic *et. al.* 2015	68	EN	Surrogate information of red kite used taken from BTO bird facts: https://app.bto.org/birdfacts/results/bob2390.htm	2	0.61	0.1	1.2
	Long-legged	*Buteo rufinus*	National	Puzovic *et.*	40	VU	Surrogate information of common buzzard used taken from BTO bird facts	3	0.90	0.1	0.3

	Buzzard		pop.	*al.* 2015			https://app.bto.org/birdfacts/results/bob2870.htm				
	Eurasian Hobby	*Falco subbuteo*	National pop.	Puzovic *et. al.* 2015	1180	LC	BTO Birds Facts: https://app.bto.org/birdfacts/results/bob3100.htm	2	0.74	1	176
	Saker Falcon	*Falco cherrug*	National pop.	Puzovic *et. al.* 2015	44	CR	Kovács., A, Williams., N. P. & Galbraith, C. A. 2014. Saker Falcon Falco cherrug Global action plan (SakerGap), including a management and monitoring system, to conserve the species. Raptors MoU technical publication no. 2. CMS technical Series no. 31. Coordinating Unit - CMS Raptors MoU, Abu Dhabi, United Arab Emirates.	2	0.80	0.1	0.6
Category 2. Resident or summer breeding non-raptor populations	Common Quail	*Coturnix coturnix*	National pop.	Puzovic *et. al.* 2015	48000	LC	BTO Birds Facts: https://app.bto.org/birdfacts/results/bob3700.htm	1	0.29	1	20,160
	Common Snipe	*Gallinago gallinago*	National pop.	Puzovic *et. al.* 2015	6	CR	BTO Bird Facts: https://app.bto.org/birdfacts/results/bob5190.htm	2	0.48	0.1	0.1
	Common Sandpiper	*Actitis hypoleucos*	National pop.	Puzovic *et. al.* 2015	180	EN	BTO Bird facts: https://app.bto.org/birdfacts/results/bob5560.htm	2	0.84	0.1	2.2
	European Bee-eater	*Merops apiaster*	National pop.	Puzovic *et. al.* 2015	11200	LC	Lessells., C, M. & Krebs., J, R. (1989). Age and breeding performance of European Bee-Eaters. *The Auk*: **Vol. 106, No.3**: pp. 375-382.	1	0.34	1	4,536
	Common Raven	*Corvus corax*	National pop.	Puzovic *et. al.* 2015	2600	LC	Webb., W. C, Boarman., W. I, & Rotenberry., J. T. (2004) Common raven juvenile survival in a human-augmented landscape. The Condor 106(3): pp 517-528	3	0.83	1	244
	Eurasian Skylark	*Alauda arvensis*	National pop.	Puzovic *et. al.* 2015	440000	LC	BTO Bird Facts: https://app.bto.org/birdfacts/results/bob9760.htm	1	0.51	1	153,528
	Greater Short-toed Lark	*Calandrella brachydactyla*	National pop.	Puzovic *et. al.* 2015	140	EN	Surrogate information for skylark used and taken from BTO Bird facts: https://app.bto.org/birdfacts/results/bob9760.htm	1	0.51	0.3	4.9
	Crested Lark	*Galerida cristata*	National pop.	Puzovic *et. al.* 2015	40000	LC	Surrogate information for skylark used and taken from BTO Bird facts: https://app.bto.org/birdfacts/results/bob9760.htm	1	0.513	1	14,000
	Collared Sand Martin	*Riparia riparia*	National pop.	Puzovic *et. al.* 2015	76000	LC	BTO Bird Facts: https://app.bto.org/birdfacts/results/bob9810.htm	1	0.3	1	31,920
	Northern Wheatear	*Oenanthe oenanthe*	National pop.	Puzovic *et. al.* 2015	5800	NT	BTO Bird Facts: https://app.bto.org/birdfacts/results/bob11460.htm	1	0.46	0.3	635

Category 3 Migrant / Wintering. conc. in Europe	Hen Harrier	*Circus cyanus*	European pop.	*Staneva et. al. 2017*	60000	NT	BTO Bird Facts: https://app.bto.org/birdfacts/results/bob2610.htm	2	0.81	0.3	2,379
Category 4 Migrant / Wintering not conc. in Europe	White-fronted Goose	*Anser albifons*	Global pop.	*IUCN Global Red List*	3100000	LC	BTO Bird Facts https://app.bto.org/birdfacts/results/bob1590.htm	3	0.72	1	348,689
	White Stork	*Ciconia ciconia*	Global pop.	*IUCN Global Red List*	700000	LC	Barbraund. C., Barbraund. JC., & Barbraud. M. (2008). Population dynamics of the white stork Ciconia ciconia in western France. IBIS: Vol 141, issue 3: pp 469-479	3	0.78	1	72,528

TABLE 40. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS): **COMMON BARN-OWL** (TYTO ALBA)—REVIEW OF RCIA STEPS 1–3 AND RESULTS OF STEP 4, IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Low
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	8
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	Yes
RCIA *Vulnerability* category score	Moderate
Sensitivity category score	Low
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	1,643
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 164** (equivalent to **2.7%** annual decline in minimum number of individuals in national population.)

TABLE 41 PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **SHORT-TOED SNAKE-EAGLE** (CIRCAETUS GALLICUS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	9
Serbian IUCN Red List conservation status	NT
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Moderate
Sensitivity category score	**Medium**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	<0.01
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Zero fatality**

TABLE 42 PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **EASTERN IMPERIAL-EAGLE** (AQUILA HELIACA): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>10
RCIA *Relative Importance* category score	High
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	9
Serbian IUCN Red List conservation status	CR
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	High
Sensitivity category score	**High**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Major**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	<0.01
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	>1 and ≤5
(iii) Persecution (annual fatality estimate)	>1 and ≤5
Primary Threshold Target	**Zero fatality**

TABLE 43. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **BOOTED-EAGLE** (HIERAAETUS PENNATUS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>10
RCIA *Relative Importance* category score	High
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	9
Serbian IUCN Red List conservation status	EN
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	High
Sensitivity category score	**High**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Major**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	0.2
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	≤1
Primary Threshold Target	**Zero fatality**

TABLE 44. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **WESTERN MARSH-HARRIER** (CIRCUS AERUGINOSUS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	8
Serbian IUCN Red List conservation status	NT
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Moderate
Sensitivity category score	**Medium**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Major**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	23
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Zero fatality**

TABLE 45. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **NORTHERN GOSHAWK** (ACCIPITER GENTILIS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Low
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	6
Serbian IUCN Red List conservation status	VU
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Low
Sensitivity category score	Low
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	23
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Zero fatality**

TABLE 46. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **WHITE-TAILED SEA-EAGLE** (HALIAEETUS ALBICILLA): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	10
Serbian IUCN Red List conservation status	NT
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Low
Sensitivity category score	High
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Major**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	3
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	>1 and ≤5
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Zero fatality**

TABLE 47. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **BLACK KITE** (MILVUS MIGRANS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	8
Serbian IUCN Red List conservation status	EN
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	High
Sensitivity category score	**High**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Major**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	1.2
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Zero fatality**

TABLE 48. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **LONG-LEGGED BUZZARD** (BUTEO RUFINUS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	7
Serbian IUCN Red List conservation status	VU
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Moderate
Sensitivity category score	**Medium**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	0.3
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>1 and ≤5
Primary Threshold Target	**Zero fatality**

TABLE 49. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **EURASIAN HOBBY** (FALCO SUBBUTEO): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	6
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Negligible
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	176
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	>5 and ≤10
(iii) Persecution (annual fatality estimate)	>5 and ≤10
Primary Threshold Target	**Annual Fatality: 18** (equivalent to **1.5%** annual decline in minimum number of individuals in national population.)

TABLE 50. PRIORITY BIRD VEC (CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS) – **SAKER FALCON** (FALCO CHERRUG): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>10
RCIA *Relative Importance* category score	High
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	6
Serbian IUCN Red List conservation status	CR
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	High
Sensitivity category score	**High**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Major**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	0.6
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	>1 and ≤5
(iii) Persecution (annual fatality estimate)	>5 and ≤10
Primary Threshold Target	**Zero fatality**

TABLE 51. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **COMMON QUAIL** (COTURNIX COTURNIX): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Low
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	3
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	Yes
RCIA *Vulnerability* category score	High
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	20,160
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 2016** (equivalent to **4.2%** annual decline in minimum number of individuals in national population.)

TABLE 52 PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **COMMON SNIPE** (GALLINAGO GALLINAGO): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>10
RCIA *Relative Importance* category score	High
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	7
Serbian IUCN Red List conservation status	CR
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	High
Sensitivity category score	**High**
STEP 3 (Likelihood of Effect)	
LoE category score	**Low**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	No PBR
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>1 and ≤5
Primary Threshold Target	**Zero fatality**

TABLE 53. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **COMMON SANDPIPER** (ACTITIS HYPOLEUCOS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

3	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	2
Serbian IUCN Red List conservation status	EN
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	High
Sensitivity category score	**High**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	2.2
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Zero fatality**

TABLE 54. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **EUROPEAN BEE-EATER** (MEROPS APIASTER): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>10
RCIA *Relative Importance* category score	High
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	2
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Negligible
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	4,536
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 454** (equivalent to **4%** annual decline in minimum number of individuals in national population.)

TABLE 55. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **COMMON RAVEN** (CORVUS CORAX): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Low
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	8
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Low
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	244
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	>10
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 24** (equivalent to **1%** annual decline in minimum number of individuals in national population.)

TABLE 56. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **GREATER SHORT-TOED LARK** (CALANDRELLA BRACHYDACTYLA): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>1 and ≤10
RCIA *Relative Importance* category score	Moderate
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	4
Serbian IUCN Red List conservation status	EN
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Negligible
Sensitivity category score	**High**
STEP 3 (Likelihood of Effect)	
LoE category score	**Low**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	2.2
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>5 and ≤10
Primary Threshold Target	**Zero Fatality**

TABLE 57. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **EURASIAN SKYLARK** (ALAUDA ARVENSIS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS (* = raised from Negligible to Low based on input from ERG)

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Low
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	2
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Low*
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	153,528
(i) Other industrial power sources (annual fatality estimate)	>1 and ≤5
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 15,353** ((equivalent to **3.5%** annual decline in minimum number of individuals in national population.)

TABLE 58. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **CRESTED LARK** (GALERIDA CRISTATA): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Low
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	2
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	Yes
RCIA *Vulnerability* category score	Low
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	14,000
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 1,400** ((equivalent to **3.5%** annual decline in minimum number of individuals in national population.)

TABLE 59. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **COLLARED SAND MARTIN** (RIPARIA RIPARIA): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>10
RCIA *Relative Importance* category score	High
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	1
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	Yes
RCIA *Vulnerability* category score	Low
Sensitivity category score	**Medium**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	31,920
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 3,192** (equivalent to **4.2%** annual decline in minimum number of individuals in national population.)

TABLE 60. PRIORITY BIRD VEC (CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS) – **NORTHERN WHEATEAR** (OENANTHE OENANTHE): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Low
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	4
Serbian IUCN Red List conservation status	NT
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Low
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	635
(i) Other industrial power sources (annual fatality estimate)	≤1
(ii) Power lines electrocution/ collision (annual fatality estimate)	≤1
(iii) Persecution (annual fatality estimate)	≤1
Primary Threshold Target	**Annual Fatality: 212** (equivalent to **3.7%** annual decline in minimum number of individuals in national population.)

TABLE 61. PRIORITY BIRD VEC (CATEGORY 3, MIGRANT AND WINTERING POPULATIONS CONCENTRATED IN EUROPE) – **HEN HARRIER** (CIRCUS CYANEUS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	≤0.5
RCIA *Relative Importance* category score	Negligible
BirdLife Species Vulnerability Index (SVI) (wind farms and powerlines)	8
European IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Moderate
Sensitivity category score	Low
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	2,379
(i) Other industrial power sources (annual fatality estimate)	>1 and ≤5
(ii) Power lines electrocution/ collision (annual fatality estimate)	>1 and ≤5
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 793** (equivalent to **1.3%** annual decline in minimum number of individuals in European population)

TABLE 62. PRIORITY BIRD VEC (CATEGORY 4, MIGRANT AND WINTERING POPULATIONS NOT CONCENTRATED IN EUROPE) – **GREATER WHITE-FRONTED GOOSE** (ANSER ALBIFONS): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS. (* = raised from Negligible to Low based on input from ERG)

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	≤0.5
RCIA *Relative Importance* category score	Low*
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	6
Global IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Low*
Sensitivity category score	**Low**
STEP 3 (Likelihood of Effect)	
LoE category score	**High**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	348,689
(i) Other industrial power sources (annual fatality estimate)	>10
(ii) Power lines electrocution/ collision (annual fatality estimate)	>10
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 34,869** (equivalent to **1.1%** annual decline in minimum number of individuals in global population)

TABLE 63. PRIORITY BIRD VEC (CATEGORY 4, MIGRANT AND WINTERING POPULATIONS NOT CONCENTRATED IN EUROPE) – **WHITE STORK** (CICONIA CICONIA): REVIEW OF RCIA STEPS 1 TO 3 AND RESULTS OF STEP 4 IDENTIFYING THRESHOLDS. (* = raised from Low to Moderate based on input from ERG)

STEP 2 (Sensitivity)	
% estimate of national breeding population using the focal area	>0.5 and ≤1
RCIA *Relative Importance* category score	Moderate*
Species Vulnerability Index (SVI) (based on Birdlife SVI, includes non-collision effects)	2
Serbian IUCN Red List conservation status	LC
Adjustment for declining population trend in Serbia	
RCIA *Vulnerability* category score	Moderate
Sensitivity category score	**Medium**
STEP 3 (Likelihood of Effect)	
LoE category score	**Medium**
Final Risk Category Rating for Priority Bird VECs	**Moderate**
STEP 4 (Thresholds)	
PBR level (annual fatality estimate)	4,536
(i) Other industrial power sources (annual fatality estimate)	>10
(ii) Power lines electrocution/ collision (annual fatality estimate)	>10
(iii) Persecution (annual fatality estimate)	>10
Primary Threshold Target	**Annual Fatality: 7253** (equivalent to **1%** annual decline in minimum number of individuals in global population)

7.6 STEP 5 – IDENTIFY A MITIGATION AND MONITORING APPROACH (MMA)

7.6.1. METHODS

The purpose of step 5 is to identify the potential joint mitigation and monitoring measures for developers and other stakeholders to consider. The joint program focuses on the 24 priority bird VECs determined by steps 1 to 3 of the RCIA to be at highest risk from the cumulative effects of the PWPPs.

The Joint MMA is structured around three areas:

- **On-Site Monitoring and Mitigation Measures**, including fatality search surveys and targeted, monitoring of specific priority species aimed at optimizing and enhancing mitigation.
- **Inter-Site Coordinated Monitoring and Adaptive Management**, including identifying cumulative trends, reviewing bird fatality thresholds, and identifying collective actions to ensure risks are mitigated.
- **Joint Management Plan** for developers and other actors and/or stakeholders focused on priority bird VECs as determined by the RCIA process.

Note that, for simplicity, this section provides the recommended Mitigation and Monitoring Approach (MMA) for both priority birds and bat VECS. See Section 8 of this document for the RCIA for bats and the resulting priority bat VECs.

7.6.2. RESULTS

As part of the RCIA, a MMA is proposed, to be implemented by the developers (Table 64). All three PWPPs have already committed to a range of monitoring and mitigation measures within their permit conditions and ESIA Environmental and Social Action Plans (ESAPs). These are well aligned with generic industry-standard, good practice guidance for the monitoring and mitigation of wildlife risk at wind energy developments. The MMA seeks to harmonize and optimize existing project specific monitoring and mitigation measures. It suggests a joint approach that monitors risks to all bird (and bat) species through comprehensive fatality monitoring and adaptive management, and focuses other monitoring and mitigation actions on safeguarding priority species that are at highest risk from the cumulative effects of PWPPs through targeted species-specific monitoring and off-site aggregated conservation (habitat enhancement) actions. The joint approach presents cost-saving opportunities for developers.

This MMA is designed to, where possible, align with and complement project-specific Environmental & Social Mitigation and Monitoring Plans (ESMMP) developed for individual WPPs. Whereas each ESMMP contains commitments relevant to the individual WPP sites, the joint RCIA MMP contains actions that require coordination and collaboration between the developers to be carried out together.

Table 65 (Čibuk), Table 66 (Alibunar) and Table 67 (Kovačica) explains how each ESAP action relates to specific measures in the RCIA MMA.

TABLE 64. PROPOSED MMA—PRIORITY BIRD AND BAT VECs

No.	Recommendation Measure	Explanatory Notes	Timeframe
WORKSTREAM 1: ON SITE MONITORING AND MITIGATION MEASURES			
1.1	**Protocol development and design**	**Key objectives:** To provide consistent monitoring and mitigation methods across projects, facilitating effective field surveys, that produce results able to deliver an efficient and appropriate mitigation strategies. **Additional information:** Before the start of on-site mitigation and monitoring activities, detailed and clear protocols should be defined for all relevant components detailed in 1.2 - 1.7 below and integrated into the project-specific ESMMP. Protocols should be designed by an ornithologist (for birds) or ecologist (bats) experienced in assessing bird/bat risk at wind farm developments. Protocols should be based on existing GIIP for the wind energy industry[61], informed by pre-construction survey results and any other relevant information. Recommended protocols: • Bird and bat fatality monitoring (see 1.2) • Bias correction for bird and bat fatality surveys (see 1.3)	Approved protocols in place.
1.2	**Bird and bat fatality search surveys**	**Key objectives:** To monitor and quantify collision fatalities of priority birds/bats and other bird/bat species, so compliance with RCIA fatality thresholds for priority species can be assessed and fatality rates of non-priority species can be evaluated. Fatality monitoring is also the principal measure for informing adaptive management actions (see 1.7) **Additional information:** Bird and bat fatality search programs use well established methods for assessing fatalities at operational wind farms. They involve regular systematic searches of the ground surface around the base of turbines for bird and bat turbine collision fatalities. The results from these surveys are 'corrected' using the results from a series of bias correction experiments (1.3). Fatality monitoring should be designed to provide turbine related fatality rate estimates for PWPPs, and be sufficient to determine spatial and temporal (between season and between year) variation. Design, fieldwork management, analysis and reporting should be conducted by ecologist with experience of conducting bird and bat fatality search surveys, associated bias correction tests and fatality estimate analysis	**Initial 3-year program**. Evaluated at the end of 3-years to assess fatality search effectiveness, identify possible improvements and recommend protocols and survey effort for carcass search surveys beyond the initial 3-year program.
1.3	**Bias correction for bird and bat fatality surveys**	**Key objectives:** To calibrate the results of bird and bat fatality search surveys (1.2) to account for numbers fatalities that may have been "missed" because they were not found by search teams or because they were removed from site by scavengers (e.g. birds and mammals) between search team visits. **Additional information**: Bias correction tests for bird and bat fatality search surveys (1.2) are recommended as standard good practice for wind farm developments. They are needed to correct for differences between actual and observed number of fatalities. Two tests are recommended—Searcher Efficiency Trials & Carcass Removal Trials.	**Initial 2-year program** as a component of bird and bat fatality search program. Conducted at 6-monthly intervals. Evaluated at the end of 2-years to assess its effectiveness in calibrating carcass search results and identify on-going needs.

[61] IFC. (2015). Environmental, health, and safety guidelines for wind energy. Draft for public consultation. International Finance Corporation (IFC). February 2015

No.	Recommendation Measure	Explanatory Notes	Timeframe
1.4	**Species-specific monitoring**	**Key objectives:** To provide species specific monitoring information focused on better defining the risks to priority birds to allow efficient and effective mitigation measures, and additional conservation actions to be implemented. **Additional information:** Targeted species-specific monitoring conducted on and/or off-site with clearly defined objectives, focused on improving the efficiency and effectiveness of mitigation or contributing to the development of additional conservation measures for specific priority species. Prioritizing and designing species-specific monitoring will be determined by an experienced ornithological/ecological consultant in consultation with the ERG.	**Each program to initially run for 1 year,** evaluated at the end of one year to assess effectiveness and identify on-going needs. Candidate monitoring programs will be designed and implemented within the first year of operation.
1.5	**Elevated acoustic bat monitoring**	**Key objectives:** To identify patterns of bat activity at rotor-swept height, or close to it, to inform adaptive management, and inform the development of a Bat Monitoring and Mitigation Plan (BMMP) designed to: • Comply with project permit conditions and project ESAPs; • Focused on the bat species of greatest potential impact identified in project ESIA/EIAs; • Focused on the priority bat VECs identified in this RCIA; • Capable of providing useful information with which to inform adaptive management and/or mitigation measures; and, • Optimized to reduce the financial costs of implementation while maximizing the capacity of monitoring studies to address specific objectives. • Optimized to balance the goals of mitigation measures with operational or financial impacts to PWPPs **Additional information:** To maximize the effectiveness of the bat monitoring, it is recommended that the study should be informed by the results from the first year of bat fatality search surveys and should therefore be initiated at the start of operational year 2. The initial bat fatality results should help focus the acoustic monitoring study on those turbines that present the greatest risk to priority bat VECs. The results from the study would be used to optimize any adaptive bat curtailment measures that might be recommended based on the results of the bat fatality monitoring program.	**Initially for 1-year program** *initiated at the end of year 1 of the bat fatality search surveys* (1.2). Evaluated at the end of one year to assess effectiveness and identify on-going needs. See Section 8.5, which expands on the BMMP.
1.6	**Targeted fatality bird monitoring and bird flight diverters**	**Key objectives:** To understand the risk that transmissline lines present to geese, storks and cranes at activity hotspots and to reduce likelihood of transmission line collision fatalities by fitting of bird diverters to transmission line wires. **Additional** information: Transmission lines erected nearby project sites form no part of the Project sites and are managed by a third party (i.e., Elektromreža Srbije or "EMS", the Serbian national transmission system operator company). These mitigatoin measures are subject to discussion and approval of this third party. Given the known risks of transmission lines, developers may consider conducting some fatality monitoring underneath known high-risk transmission lines. In the event that fatalities are identified, developers should flag this issue to EMS and to conservation organizations for action.	

No.	Recommendation Measure	Explanatory Notes	Timeframe
1.7	**Adaptive Management**	**Key objectives:** To ensure that lessons learned are incorporated into protocols and the project-specific ESMMPs are designed to minimize risks to Priority Bird/Bat VECs. **Additional information:** Adaptive Management will be based on a series of reviews to take place at different timeframes, including an immediate response in the event of a fatality of a Priority Bird/Bat VEC Adaptive management reviews: • Monthly review of bird and bat fatality results: Based on the standardized fatality search survey forms, a monthly report of fatalities along with the identification of bird/bat species will be compiled. • Bi-annual reviews of in-field findings: Bird and bat fatality search survey results and Collision Incident Reports (see below) should be compiled to evaluate and improve effectiveness of monitoring, protocols, identify collision risk hotspots, evaluate Adaptive Management options and, where appropriate, implement those that are practical and most likely to be effective in reducing identified collision risks. Adaptive management responses emerging from the biannual review may include initiating targeted monitoring and mitigation measures. It may also include other actions to take in the landscape, such as further engagement with other stakeholders on non-WPP related landscape factors that might have enhanced risks to birds (e.g. farming activities that may attract collision vulnerable species). • Immediate action in the event of a fatality of a Priority Bird/Bat: In this situation, the following should take place: ▪ The incident should be escalated immediately to management and an investigation of the likely cause of the fatality should take place ▪ The findings should be reviewed with site management and the developer-contracted ornithological specialist ▪ Corrective/remedial actions should be identified. ▪ An Incident report shared with Lenders and included in the Central Data Center (see 2.1 below in this table). **6-monthly reviews of protocols and integration into project-specific ESMMP**.Based on 6-monthly reviews, protocols (see 1.1 - 1.7) should be reviewed to ensure that they incorporate lessons learned and are designed to minimize risks to Priority Birds. Updated protocols should be integrated as part of the project's overarching ESMMP. **All of the above actions should be completed by a competent developer-contracted ornithological specialist and/or external specialist with substantial regional experience.**	
WORKSTREAM 2: INTER-SITE COORDINATED MONITORING ACTIVITIES & ADAPTIVE MANAGEMENT			

No.	Recommendation Measure	Explanatory Notes	Timeframe
2.1	**General Management Arrangementswith respect to Adaptive Management**	It is recommended that the developers create and manage a "Central Data Center" where data from the PWPPs would be shared (see 2.2). The format of the Central Data Center is still to be decided, but it is agreed that this could be a simple mechanism. The data can then be shared between the PWPPs and with the ERG. Recommended that the developers and the ERG meet biannually to: • review immediate incident reporting, as well as monthly and biannual reporting (see 2.2) to assess cumulative issues and provide recommendations in relation to adaptive management responses and trends to inform planning of forward mitigation and monitoring, considering the whole of the study area. Reporting requirements that would be centralized in the Central Data Center are described under the next measure 2.2; • discuss progress and outcomes of Joint Management Plans (see Workstream 3); • conduct an annual review of the Priority bird and bat list to ensure that it is based on the most current data available. For example, a change in a species' status on the IUCN Red List or additional data on external stressors might result in a species being added to or removed from the Priority species lists; • Consider the impact of 'external threats'; • Consider the results of the off-site biodiversity programme.	
2.2	**Data Sharing, Centralized Reporting, and Inter-site Adaptive Management**	It is recommended that a Central Data Center be established as a simple platform accessible by all developers, to enable them to share data with respect to cumulative impacts on birds and bats in the Deliblato Sands SNR region. This Central Data Center would receive following Reports resulting from the reviews described in 1.6 and 2.1,: • Monthly review of carcass search results (see 1.7) • 6-monthly reporting of in-field findings and adaptive management responses, if any (see 1.7) • Incident reports of fatalities (see 1.7) • Updated protocols and/or updated ESMMP, as needed (see 1.7) Analysis of these shared data would be used by the Review Committee (see 2.1) to: • identify any cumulative trends (see 2.1) • monitor compliance with respect to the fatality thresholds established in the RCIA (see 1.2) • identify corrective actions to ensure that risks are mitigated	
WORKSTREAM 3: JOINT MANAGEMENT PLAN			

No.	Recommendation Measure	Explanatory Notes	Timeframe
3.1	**Aggregated Conservation Actions and Management Plan**	With respect to the non-raptor priority VECs that may be affected by displacement risk and other forms of disturbance, mitigation will be more worthwhile if taken place *outside of the project sites*. The RCIA team does not recommend further surveys for these species, including breeding bird surveys, and instead recommends using those resources for implementing off-site "aggregated" conservation actions / habitat enhancement measures. Such actions would function in the same way as a "biodiversity offset", which is a compensatory measure undertaken by a developer(s), usually implemented off-site, to mitigate significant residual impacts on biodiversity and is focused on on-the-ground benefits that would accrue to the affected biodiversity with the goal of achieving "no net loss" over time. This "Aggregated Conservation Action(s)" (aka habitat enhancement measures) could be a set of actions, agreed and co-financed by the developers and agreed on with external stakeholders. The following approach is recommended: • Through stakeholder consultation, identify a preliminary set of off-site conservation actions for the non-raptor priority VECs (and for certain very high risk raptor priority VECs, such as the Saker Falcon, if there are still residual concerns). The actions should be selected with the intention to offset the potential losses estimated to be caused by project-related impacts (e.g., displacement) as presented in step 4 of this report. The priority bird VECs with a "zero fatality" thresholds should receive greater attention. This first preliminary set of actions are should be regarded as "options" to consider. • Also through stakeholder consultation, agree on a final set of measures based on the following criteria: (i) "gains" to be made off-site by carrying out an action that will compensate for predicted "losses" on site for each priority bird VEC, especially those at greater risk; (ii) technical feasibility of carrying out actions over the long-term; (iii) ability to measure on-the-ground outcomes; (iv) political feasibly to carry out over long-term and stakeholder support. • Once the final set of actions has been agreed upon, develop a Conservation Management Plan with roles and responsibilities, monitoring measures, targets and outcomes, and an adaptive management framework, and associated cost-sharing mechanism. Any surveys that need to take place prior to undertaking the action (e.g., "prey base" surveys in the case of certain habitat enhancement measures), should also be included in the management plan	

TABLE 65. ČIBUK – ESAP ACTIONS AND RCIA RECOMMENDED MMA APPROACH COMPARED

ESAP action number	Summary of ESAP action	RCIA suggested monitoring and mitigation approach	Does RCIA monitoring and mitigation approach satisfy objectives of the ESAP action	ESAP items requiring shift in approach to align with RCIA approach	Is the RCIA MMA likely to increase ,reduce or have little or no effect on the level of monitoring and mitigation, compared with the ESAP action?	ESAP item corresponds with recommended MMA No. (from (Table 64)
0	Prepare and submit **annual** operational phase **environmental and social monitoring reports** detailing level of compliance with IFC PSs, EBRD PRs and requirements of the ESAP	6-monthly reporting as part of adaptive management strategy. Reporting will include level of compliance with IFC PSs and EBRD PRs	Yes			1.7
6.1	Appoint qualified professional to **revise bird and bat methodologies** to **include transmission line** corridor and implement monitoring for 3 years	Redirect effort **away from** monitoring all species across site, **and toward** a set of **species-specific monitoring actions focused on better defining the risk and most effective mitigation measures for priority birds at highest risk.** Targeted monitoring programs would be designed and implemented by qualified professionals and would initially run for 1 year. Evaluated at the end of 1 year to assess effectiveness and identify on-going needs.	Yes			1.4
	Appoint qualified professional **conduct and provide report for bat roost survey** (prior to commissioning)	Redirect effort **away from bat roost surveys** across site, and toward **monitoring priority bat activity in areas of highest risk** as determined by bat fatality monitoring. **Initial 1-year monitoring program** is recommended. Evaluated at the end of one year to assess effectiveness and identify on-going needs, but for no longer than 3 years of operation.	No			1.5
6.2	**Evaluate seasonal bird and bat monitoring** to **assess adequacy of previous characterization** of bird and bat use, **re-evaluate impacts**, consider cumulative impacts and recommend mitigation	Adequacy of baseline studies, and impacts on bird/bat species and mitigation needs addressed through **adaptive management and reporting** of the bird/bat fatality surveys results and targeted species-specific monitoring programs.	Yes			1.2 / 1.3 / 1.7
	Evaluate seasonal bird and bat monitoring to consider **cumulative impacts** and recommend mitigation	Assess cumulative impact on birds and bats during operational phase from joint bird and bat fatality survey results and where applicable targeted species-specific monitoring actions.	Yes			2.1 ./ 2.2
	Mitigation recommended for **3-years**	Use a comprehensive adaptive management mechanism to inform implementing mitigation measures for 3-years and implement off-site conservation actions.	Yes			1.7 / 3.1

6.3	Design and implement **bird and bat fatality monitoring for at least 3-years**	Design and implement joint bird and bat fatality monitoring for all bird and bat species initially for 3-years	Yes			1.2/1.2 / 1.3
	Adopt additional **mitigation** measures **if fatalities 'excessive'**	Use a comprehensive adaptive management mechanism to inform implementing mitigation measures initially for 3-years	Yes			1.7
6.4	Appoint qualified ecologist/botanist to **conduct pre-construction surveys** to **identify plants and animals** potentially at risk, identify and where required by authorities implement mitigation to safeguard protected species	Not applicable to operational phase				
6.7	If recommended by experts **install bird diverters on all or part of transmission line conductors**	Conduct expert review and, if required, conduct targeted bird monitoring to identify sections of transmission line where bird diverters would reduce risk to collision vulnerable priority and non-priority flocking species (geese, storks, cranes). As stated above in 1.6 of Table 64, the installation of bird flight diverters would be the responsibility of EMS or other entities.	Yes			1.6
6.8	**Collaborate with other wind farm developers** to understand cumulative impacts, to share information on bird/bat movement, collision risk mortality and management to mitigate cumulative impacts	Assess cumulative effects and manage risks through inter-site monitoring and adaptive management, data sharing and centralized reporting	Yes			2.1/2.2

TABLE 66. ALIBUNAR – ESAP ACTIONS AND RCIA RECOMMENDED MMA APPROACH COMPARED

ESAP action number	Summary of ESAP action	RCIA suggested monitoring and mitigation approach	Does RCIA monitoring and mitigation approach satisfy objectives of the ESAP action	ESAP items requiring shift in approach to align with RCIA approach ➡	Is the RCIA MMA likely to increase ⬆, reduce ⬇ or have little or no effect ⬌ on the level of monitoring and mitigation, compared with the ESAP action?	MMA No. (from (Table 64)
8	Develop an Operational EHS management plans with details of environmental performance requirements, including details of timelines for implementing monitoring and mitigation measures	Assumed that operational ESMMP detailing performance standard requirements, timelines for monitoring and mitigation will be developed before operational phase. ESMMP should be iterative revised in response to bi-annual monitoring/mitigation reviews	Yes		⬆	1.7
	Develop Biodiversity Mitigation Plan that includes 'cost effective' measures to reduce collision risk for birds and bats	Measures to safeguard birds and bats from turbine collision will be developed in response to **bird and bat fatality monitoring** results, **targeted bird and bat activity monitoring** and a comprehensive **adaptive management strategy**. 6-monthly reporting will inform and update monitoring and mitigation measures and provide the most cost effective and effective strategy.	Yes	➡	⬆	1.1/1.2/1.3/1.7/2.1/2.2
	Develop Biodiversity Mitigation Plan that includes 'cost effective' measures to restore feeding and roosting habitats	Measures to enhance feeding or roosting habitat for priority species should be occur off site, be focused on priority species and be developed in consultation with ERG	No	➡	⬌	3.1
9	Engage with other wind farm developers to develop an RCIA and undertake reasonable and financially feasible efforts to update the operational HSE management plan.	Completed				
10	Appoint qualified 3rd party professional bird expert to conduct 1 year of bird activity monitoring, with option to extend for a further year	Redirect effort away from monitoring all species across site, and toward a set of **species specific-monitoring actions focused on better defining the risk and most effective mitigation measures for priority birds at highest risk.** This would be evaluated at the end of the 1 year to assess effectiveness and identify on-going needs	Yes	➡	⬇	1.4

	Appoint qualified 3rd party professional bat expert to conduct 1 year of bat activity monitoring, with option to extend for a further year. Conduct bat roost survey	Redirect effort **away from bat roost surveys** across site, and toward **monitoring priority bat activity in areas of highest risk** as determined by bat fatality monitoring. I**nitial 1-year monitoring program** is recommended. Evaluated at the end of one year to assess effectiveness and identify on-going needs.	No			1.5
11	Design and implement **bird and bat fatality monitoring for at least 3-years**	Design and implement **joint bird and bat fatality monitoring** for all bird and bat species initially for 3-years	Yes			1.2 / 1.3
12	**Evaluate seasonal bird and bat monitoring** to **assess adequacy of previous characterization** of bird and bat use, **re-evaluate impacts**, consider cumulative impacts and recommend mitigation (if required)	**Adequacy of baseline studies**, and **impacts** on bird/bat species and **mitigation needs** addressed through adaptive management / reporting of the bird/bat fatality surveys results and targeted species-specific monitoring programs.	Yes			1.7

TABLE 67. KOVAČICA – ESAP ACTIONS AND RCIA RECOMMENDED APPROACH COMPARED

ESAP action number	Summary of ESAP action	RCIA suggested monitoring and mitigation approach	Does RCIA monitoring and mitigation approach satisfy objectives of the ESAP action	ESAP items requiring shift in approach to align with RCIA approach ➡	Is the RCIA MMA likely to increase ⬆, reduce ⬇ or have little or no effect ⬌ on the level of monitoring and mitigation, compared with the ESAP action?	MMA No. (from (Table 64)
1.8	Actively participate in the RCIA	Active participant. Recommendations include coordination with other developers. Outcomes of RCIA recommend coordinated approaches to mitigation and monitoring programs.		➡	⬆	2.1/2.2
6.1	Appoint responsible independent ecological consultant	All aspects of the monitoring and mitigation plan will be designed, managed and reported by a by an ornithologist (for birds) or ecologist (bats) experienced in assessing bird/bat risk at wind farm developments	Yes		⬌	1.1
	Conduct repeat ornithological surveys to update baseline and finalize mitigation measures	Redirect effort away from repeat baseline surveys and **toward species specific monitoring actions** focused on better **defining the risk and most effective mitigation measures for priority birds at highest risk**.	Yes	➡	⬇	1.4
	Conduct pre-construction bat roost check / survey	Redirect effort **away from bat roost surveys** across site, and toward **monitoring priority bat activity in areas of highest risk** as determined by bat fatality monitoring. I**nitial 1-year monitoring program** is recommended. Evaluated at the end of one year to assess effectiveness and identify on-going needs.	Yes	➡	⬆	1.5
	Conduct operational phase ecological monitoring for an initial period of 3 years	Conduct **bird and bat fatality surveys for an initial period of 3 years**, bat activity surveys for 1-2 years and targeted species-specific bird/bat surveys for minimum of 1 year	Yes		⬌	1.2 / 1.3
	Conduct bird activity monitoring throughout the year (no other timeframe specified)	Redirect effort **away from repeat baseline surveys** and toward **species specific monitoring actions** focused on better defining the risk and most effective mitigation measures for priority birds at highest risk.	Yes	➡	⬇	1.4
	Conduct a breeding bird survey in the area	**Redirect effort to targeted species specific monitoring** to identify specific risk and **off-site aggregated conservation actions** (habitat enhancement) to mitigate displacement effects on breeding birds	No	➡	⬌	1.4 / 3.1
	Conduct monitoring birds and bats found dead near the wind farm (*assumed to be an initial 3-year program*)	Design and implement **joint bird and bat fatality monitoring** for all bird and bat species initially for 3-years	Yes		⬌	1.2 / 1.3

	Record bird and bat fatalities in a database	**Bird and bat fatality** monitoring results **documented as part of adaptive management** reporting schedule	Yes			1.7
	Conduct Saker Falcon monitoring to identify high risk turbines which can be curtailed during critical periods of the annual lifecycle.	**Conduct species specific monitoring focused** on **better defining the risk and most effective mitigation measures** for priority birds at highest risk. Developed in consultation with the ERG. (Saker Falcon study in this ESAP is a good example of this type of monitoring approach)	Yes			1.3
	Conduct bat activity monitoring at turbine 47 to assess if bat activity has reduced following removal of adjacent woodland	An **'elevated acoustic bat monitoring program** to inform adaptive management, and the development of a joint monitoring and mitigation strategy. Monitoring of turbine 47 could be incorporated into this program	Yes			1.5
	Develop a site restoration plan as part of the CEMP to ensure that habitats temporarily lost through development have been restored	Reinstatement should be part of construction phase activities. Any habitat restoration activities should be redirected to off-site aggregated conservation measures	No			3.1

7.7 SUMMARY OF OUTCOMES FOR BIRDS

The RCIA framework for birds concludes that PWPPs within the study area typically have low frequencies of resident and summer breeding bird populations, and the potential for higher concentrations of a few migratory/wintering populations, notably geese, storks and cranes. Despite their scarcity and in some cases absence from baseline ESIAs, many raptor populations have been assessed as priority bird VECs. The RCIA framework seeks to identify and safeguard not only the current, but also the future condition of populations at highest risk from cumulative effects. Existing conservation objectives to increase populations of some raptor species were therefore taken into account within the RCIA assessment. The RCIA bird framework process has benefitted from an experienced in-country ERP for continued technical input and review. The ERP reviewed the results of each step in the RCIA framework. Engagement activities were a cornerstone of the RCIA process.

From an initial list of 195 species populations, steps 1 to 3 of the RCIA process identified 24 priority bird VECs to be at highest risk in the study area. With three exceptions, priority bird VECs were resident or summer breeding populations. Of these, 11 were raptors (Eastern Imperial Eagle - *Aquila heliaca*, Booted Eagle - *Hieraaetus pennatus*, White-tailed Sea-eagle - *Haliaeetus albicilla*, Short-toed Snake Eagle - *Circaetus gallicus*, Black Kite - *Milvus migrans*, Long-legged Buzzard - *Buteo rufinus*, Western Marsh-harrier - *Circus aeruginosus*, Saker Falcon - *Falco cherrug*, Eurasian Hobby - *Falco subbuteo*, Northern Goshawk - *Accipiter gentilis*, and Common Barn-owl - *Tyto alba*), and 10 were non-raptors (Common Snipe - *Gallinago gallinago*, Common Sandpiper - *Actitis hypoleucos,* Greater Short-toed Lark - *Calandrella brachydactyla*, Eurasian Skylark – *Alauda arvensis*, Crested Lark - *Galerida crista*ta, Northern Wheatear - *Oenanthe oenanthe*, Collard Sand Martin - *Riparia riparia*, Common Quail - *Coturnix coturnix*, European Bee-eater - *Merops apiaster*, and Common Raven – *Corvus corax*). Additionally, three migrant/wintering populations were identified as at highest risk (Hen Harrier - *Circus cyaneus*, Greater White-fronted Goose – *Anser albifrons*, and White Stork - *Ciconia ciconia*). Of these, Hen Harrier is concentrated in Europe, whereas White-fronted Goose and White Stork occur more widely.

Each of these 24 priority bird VEC populations was assessed to determine an annual threshold of fatalities that each could sustain (from PWPP and non-PWPP sources of mortality combined) without affecting their long-term population viability. In addition to thresholds set for priority bird VECs, an "unpredicted event threshold" target was recommended to facilitate mitigating for the risk of multiple-fatality events for a small number of non-priority populations that may occur in moderate to large flocks in the study area, in particular Bean Goose - *Anser fabalis* Greylag Goose – *Anser anser,* and Common Crane – *Grus grus*.

The key recommendation in the RCIA framework for birds was to develop a joint monitoring and mitigation approach comprising a suite of measures that safeguard priority bird VECs, based on shared good practice protocols, are implemented consistently across PWPPs, and that are supported by a comprehensive adaptive management mechanism. Specifically, the RCIA recommends; (i) bird fatality search surveys and associated bias correction experiments capable of providing robust fatality estimates for PWPPs; (ii) bespoke species specific monitoring programs focused on better defining the risk and the most effective mitigation measures for priority birds and bats at highest risk and; (iii) developing aggregated conservation measures such as enhancing raptor prey habitats away from PWPPs and enhancing or creating suitable nesting habitats for non-raptor priority birds in protected areas.

Adaptive management is informed by regular review of post-construction monitoring results and will respond to a variety of scenarios including, but not limited to, exceeded priority bird/extreme event thresholds, elevated-risk situations, and deficiencies in monitoring protocols. Exceeded thresholds will trigger immediate review and adaptive management response.

The iterative review process of the RCIA is also designed to allow adaptive management responses to changes in relative importance, vulnerability, likelihood of effect and overall risk to species populations during the lifetime of PWPPs. These changes may be identified through post-construction monitoring protocols and bird fatality search results as well as changes in species conservation status and new information on the effects of external threats. As a consequence, additional priority bird VECs may be added to or removed from the current list on the basis of expert ornithological review of new information from these sources. With time, and as data in Serbia or elsewhere become available, the results and recommendations in this report may be identified as too precautionary and unnecessarily conservative. If that is the case, updated information will be reviewed in consultation with ornithological experts to determine the most appropriate course of action.

8. RCIA Framework — Bats

8.1 OVERVIEW OF RCIA FRAMEWORK FOR BATS

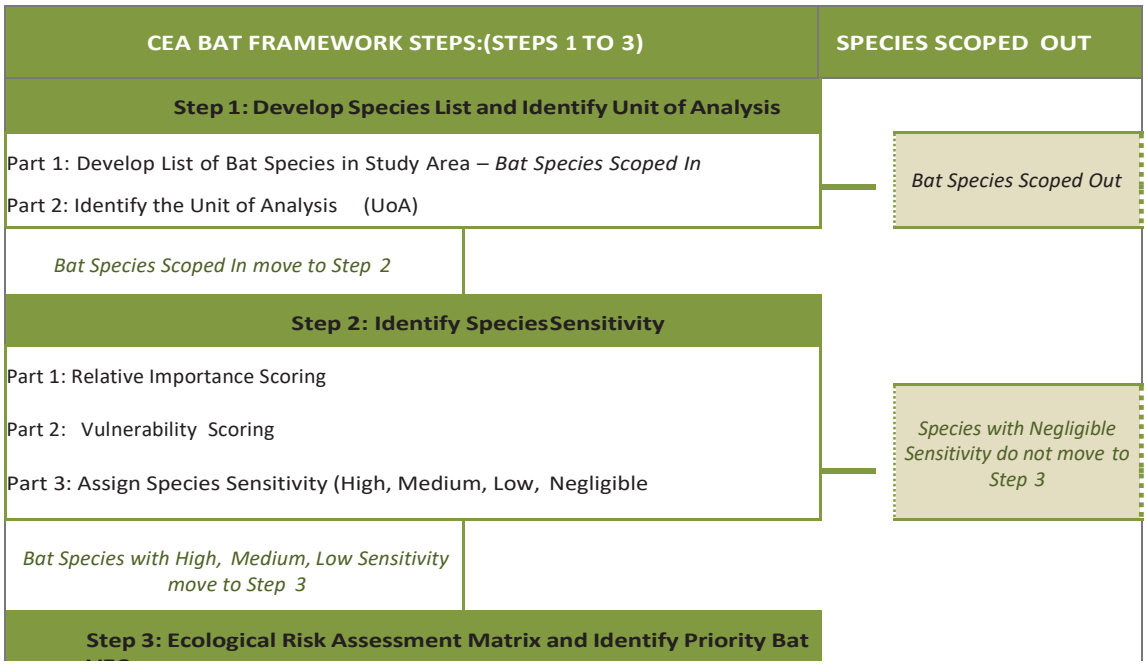
The RCIA framework for bat VECs has two objectives:

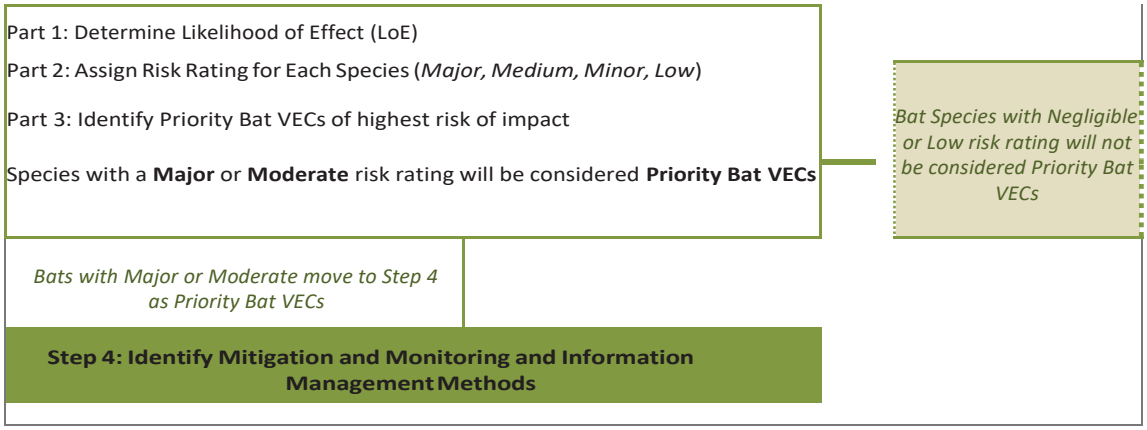
- To determine which bat populations are at the highest risk from the potential cumulative effects of the participating WPPs. These species are identified as 'priority bat VECs'
- To identify and propose a monitoring and mitigation strategy to safeguard priority bats VECs.

The RCIA framework for bats is adapted from the one developed for birds and follows a 4 step process (Figure 17).

Steps 1-3 follow the same rationale as for birds: A species population list is defined (Step 1) comprising all species populations potentially at risk. *Sensitivity* (Step 2) is assessed relative to the UoA using measures of *relative importance* and *vulnerability* of each population. Populations with the highest sensitivity ratings are subject to an ecological risk assessment (Step 3) that (i) identifies populations for which the cumulative effects of PWPPs are likely to be the greatest; and, (ii) provides an overall 'risk rating' for each population by combining the results of the *sensitivity* (Step 2) and *likelihood of effect* assessment (Step 3). Priority bat VECs are those with the highest risk rating. Threshold setting has not been conducted for bats due to limited species-specific information on population sizes and dynamics, (e.g. reproductive rates) that would allow biologically relevant thresholds to be determined. Thresholds may be developed in future as additional information becomes available. A monitoring and mitigation approach for bats is proposed (Step 4).

FIGURE 17. THE DELIBLATO SANDS CIA BAT FRAMEWORK





8.2 STEP 1 – DEVELOP SPECIES POPULATION LIST AND IDENTIFY THE UNIT OF ANALYSIS

8.2.1 METHODS

The purpose of step 1 is to identify all bat populations that could potentially be at risk from cumulative effects within the study area and to determine a relevant UoA.

Part 1: Develop a Species Population List

Developing a species population list for further evaluation in the RCIA consisted of two steps: a) developing a preliminary list of bat populations within the spatial boundaries of the study area, and; b) a screening process incorporating information from PWPP ESIA/EIAs as well as judgement of RCIA team ecologists and the ERG.

Developing the Preliminary List of Bat Populations

At the outset, a preliminary list of bat populations was collated from two sources of information. Together these sources provided adequate data on the bat species most likely present in the study area, as well as the key seasonal periods in which bat species are most likely present at PWPPs:

1. *Species populations documented in publicly available sources.*

Two main sources of information were used: (i) *Distribution, ecology, and centres of bat diversity (Mammalia, Chiroptera) in Serbia*[62], and; (ii) *Bats and Environmental Impact Assessment*[63].

Information on bat populations is limited compared to some other groups. e.g., birds. Their nocturnal behavior; the considerable effort required to study them combined with high study costs, and often lower research priority compared to other animal groups, all contribute to a limited understanding of bat distribution and population sizes. As a result, a precautionary approach was taken when defining the

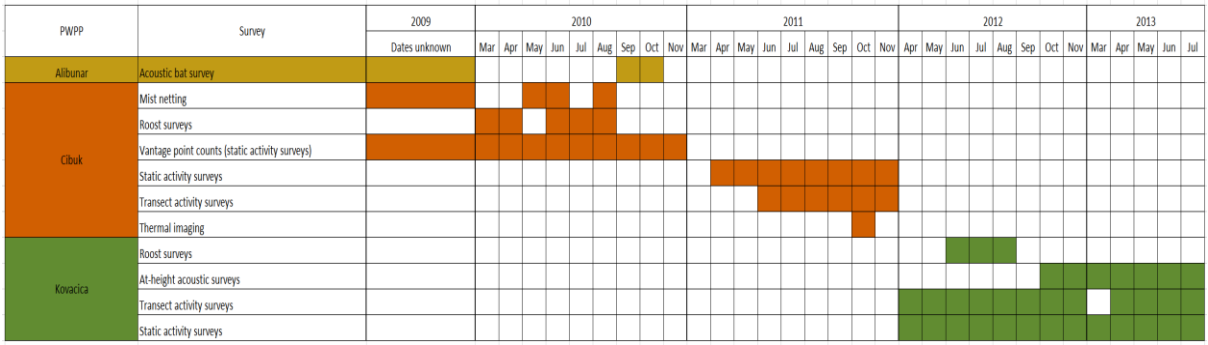
[62] Paunović, M. (2016). Distribution, ecology and centres of bat diversity (Mammalia, Chiroptera) in Serbia. Doctoral dissertation, University of Belgrade.
[63] Paunović, M., Karapandža, B., Ivanović, S. (2011). Bats and Environmental Impact Assessment – Methodological guidelines for environmental impact assessment and strategic environmental impact assessment. Wildlife Conservation Society "MUSTELA", 1-142, Belgrade.

preliminary list of first reviewing all known bat species populations at the national level.

2. *Species populations recorded at PWPPs and reported in the Alibunar EIA[64], Čibuk ESIA[65] and Kovačica ESIA[66].*

Baseline surveys were conducted at PWPP sites between September 2009 – May 2013, with different survey methods and survey effort used at each site. In general, baseline surveys were designed to assess species composition as well as spatial and temporal patterns of bat activity. A summary of bat surveys and timings is outlined in Table 68. Descriptions of methods used in each survey are described in project ESIA/EIAs.

TABLE 68. SUMMARY OF BASELINE ESIA/EIA BAT SURVEYS AT PWPPs



Together, bat surveys at the three PWPPs were conducted over 4 years during months of the year when bats are most likely to be active. The surveys are likely to have detected most species using the areas within and immediately surrounding PWPPs sites, and the combined survey effort is considered adequate to inform an overall index of bat species richness. It should be noted that analysis of acoustic bat survey data to species level is not always possible and in some cases calls may only be reliably grouped based on acoustic parameters[67]. As a result, definitive screening to species level may not always be possible.

Screening of the Preliminary List

The preliminary list was reviewed by the ERG, and based on the information provided, species populations with no known records in the Banat region were removed. As part of the EISAs/EIAs[68],[69],[70], all PWPPs assessed the potential for adverse project effects on bat populations recorded during baseline studies.

[64] Alibunar: Table 8: Results of. presence detection of bats in the "Alibunar" area and neighbouring zones. Table 10: Statuses of populations and conservation of bats.
[65] Čibuk: Table C.2: Confirmed and Unconfirmed Species in the Project Area.
[66] Kovacica: Appendix 5.2 Bat Baseline; Section 5.4; Table 5.4: Evaluation of ecological receptors (bats)
[67] Walters, C. L., Freeman, R., Collen, A., Dietz, C., Brock Fenton, M., Jones, G., ... & Parsons, S. (2012). A continental-scale tool for acoustic identification of European bats. Journal of Applied Ecology, 49(5), 1064 1074.
[68] For Alibunar see Section 6.6. and: Table 12: Behaviour of bats found at the site of the planned Alibunar 2010/2011 wind park in relation to the wind power plants (according to EC 2010, modified version); Table 13: Seasonal changes of activities of bats at the project filed "Alibunar" and its outer zone 2010/2011. Recommendation chart in accordance with the activity index (x)., and; Table 14: Possible impact of wind parks on bats.
[69] For Čibuk see Sections C3.7.5, D2.1.5 and D3.2.2; Table C.3: Nature conservation evaluation of the four species of bat commonly recorded within the study area.
[70] For Kovacica see Section 5.5 and: Table 5.4: Evaluation of ecological receptors (bats); Table 5.5: Overview of the importance of the wind farm site for bat species (high, medium, low and negligible); Table 5.6: Behaviour of bats at wind farms adapted from Wind energy developments and Natura 2000 Guidance Document (European Commission 2011), and; Table 5.7: Potential impacts of the wind farm on local and migratory populations of bat species and the assessment of impact significance.

Because the results of these ESIAs have been validated by the Institute of Nature Conservation of Vojvodina Province as part of the ESIA process, they were used at the outset to screen out species from the preliminary list. Species populations for which all three ESIA/EIAs concluded that there was no potential for a project related adverse effect were scoped out. However, to account for potential changes in bat activity for some populations since the ESIA baseline studies were conducted, and to include potentially at-risk species that may have been difficult to identify during these surveys, a precautionary approach was taken and in consultation with the ERG, some species populations were scoped back in to the assessment.

Finalizing the Species Population List

Following the screening steps above, all species populations scoped in were assumed to be bat populations potentially at risk from the effects of PWPPs. This group of bat populations is referred to as the Species Population List and assessed for species sensitivity in Step 2.

Part 2: Identify the Unit of Analysis (UoA)

The risk to bat populations from the cumulative effects of PWPPs varies, due in part to the proportion of bats using the study area relative to a relevant reference population (UoA) of which they are part. Ideally this should be biogeographically determined. This was not possible because the origin of migratory or the biogeographical extent of resident populations is not known. In the absence of this type of information, the UoA is defined at a scale appropriate to the most spatially relevant conservation unit. While recent population estimates for Serbian bats are available[71], the extent to which bat populations may use or occur within the study area is poorly understood. As a result, the UoA is expressed for each bat population as a measure of the Extent of Occurrence (EOO) within the national population in Serbia.

8.2.2 RESULTS

The bat species population list is shown in Table 69. Thirty one bat species have been confirmed as occurring within Serbia[71],[72]. Of these, 24 have been documented in the study area[73]. PWPP ESIA/EIAs determined effects to 12 species. Based on additional information provided by the ERG, an additional 2 species from the original 24 recorded in the study area (Alcathoe whiskered bat [*Myotis alcathoe*] and Lesser mouse-eared bat [*Myotis blythii oxygnathus*]) were included in the species population list. A lack of conclusive information regarding risk resulted in a further 8 species that were recorded in the study area, but where no effect was concluded in ESIAs/EIAs, were included on the species population list as precautionary measure. After screening the Preliminary List, 22 species populations were retained. These populations were regarded within the RCIA as potentially at risk from PWPPs and progressed to step 2.

TABLE 69. BAT SPECIES POPULATION LIST.

Bats of Serbia		Screening the Preliminary List			Final List
Common Name	Scientific Name	Known to occur in study area?	Effect determination in ESIA/EIAs?	Screening by int'l experts and ERG	Species Population List
Blasius' horseshoe bat	*Rhinolophus blasii*	no	no	no	no

[71] Paunović, M. (2016). Distribution, ecology and centres of bat diversity (Mammalia, Chiroptera) in Serbia. Doctoral dissertation, University of Belgrade.

[72] Pejić, B., Budinski, I., Karapandža, B., Paunović, M. 2017. The first record of European free-tailed bat Tadarida teniotis (Rafinesque, 1814) in Serbia. Bulletin of the Natural History Museum10: 105-111

[73] IBID and PWPP ESIA/EIAs.

Mediterranean horseshoe bat	*Rhinolophus euryale*	no	no	no	no
Greater horseshoe bat	*Rhinolophus ferrumeqinum*	yes	yes	yes	yes
Lesser horseshoe bat	*Rhinolophus hipposideros*	no	no	no	no
Mehely's horseshoe bat	*Rhinolophus mehelyi*	no	no	no	no
Western barbastelle bat	*Barbastella barbastellus*	yes	no	yes[b]	yes
Serotine bat	*Eptesicus serotinus*	yes	yes	yes	yes
Savi's pipistrelle bat	*Hypsugo savii*	yes	no	yes[b]	yes
Schreiber's bent-winged bat	*Miniopterus schreibersii*	yes	no	yes[b]	yes
Alcathoe whiskered bat	*Myotis alcathoe*	yes	no	yes[a]	yes
Bechstein's bat	*Myotis bechsteinii*	yes	no	no	no
Lesser mouse-eared bat	*Myotis blythii oxygnathus*	yes	no	yes[a]	yes
Brandt's bat	*Myotis brandtii*	yes	no	yes[b]	yes
Long-fingered bat	*Myotis capaccinii*	no	no	no	no
Pond bat	*Myotis dasycneme*	yes	no	no	no
Daubenton's bat	*Myotis daubentonii*	yes	no	yes[b]	yes
Geoffroy's bat	*Myotis emarginatus*	yes	yes	yes	yes
Greater mouse-eared bat	*Myotis myotis*	yes	no	yes[b]	yes
Whiskered bat	*Myotis mystacinus*	yes	no	yes[b]	yes
Natterer's bat	*Myotis nattereri*	yes	yes	yes	yes
Leisler's bat	*Nyctalus leisleri*	yes	yes	yes	yes
Noctule bat	*Nyctalus noctula*	yes	yes	yes	yes
Kuhl's pipistrelle bat	*Pipistrellus kuhlii*	yes	yes	yes	yes
Nathusius' pipistrelle bat	*Pipistrellus nathusii*	yes	yes	yes	yes
Common pipistrelle bat	*Pipistrellus pipistrellus*	yes	yes	yes	yes
Soprano pipistrelle bat	*Pipistrellus pygmaeus*	yes	no	yes[b]	yes
Brown long-eared bat	*Plecotus auritus*	yes	yes	yes	yes
Grey long-eared bat	*Plecotus austriacus*	yes	yes	yes	yes
Alpine long-eared bat	*Plecotus macrobullaris*	no	no	no	no
European free-tailed bat	*Tadarida teniotis*	no	no	no	no
Parti-coloured bat	*Vespertilio murinus Linnaeus*	yes	yes	yes	yes

a = Screened in because it is not possible to positively identify the species based on acoustic recordings and the species was grouped during pre-construction data analyses reported in PWPP ESIA/EIAs.

b = Screened in on basis of precautionary approach of this RCIA.

8.3 STEP 2 – IDENTIFY SPECIES SENSITIVITY

8.3.1 METHODS

The purpose of this step is to determine the species population sensitivity based on the relative importance of the study area to the population and its vulnerability at the national scale. Relative importance (Part 1 below) is defined as the proportion of bats using the study area relative to the defined relevant reference population, i.e. – the UoA (see Step 1). Vulnerability (Part 2 below) is defined as the conservation status of the population and its susceptibility to wind farm-related impacts.

Part 1: Relative Importance Scoring

For each bat population, the relative importance proportional to the UoA was identified. This was done by calculating the percentage of the surface area of the EOO of the species that is inside the study

area with respect to the total area of the EOO in the country[74]:

Portion of EOO (km²) within study area / EOO (km²) in Serbia × 100 = Relative Importance (%)

The relative importance for the species was scored as negligible, low, moderate, or high using the criteria in Table 70.

TABLE 70. RELATIVE IMPORTANCE CRITERIA FOR BAT SPECIES

PERCENTAGE OF EOO (IN KM2) THAT FALLS WITHIN STUDY AREA (%)	RELATIVE IMPORTANCE SCORE
≤ 0.5	Negligible
> 0.5 and ≤ 1.0	Low
> 1.0 and ≤ 10.0	Moderate
> 10.0	High

Part 2: Vulnerability Scoring

For each bat species, vulnerability was scored using: 1) national guidance on its conservation status and population trend, and; 2) parameters of its vulnerability to wind farm-related impacts. Vulnerability scoring is summarized in Table 71 and briefly described below.

Species conservation status

Paunović (2016) was identified as the most recent assessment of national conservation status for Serbian bat populations available. It applies IUCN methods for determining conservation status. This information was used for the vulnerability scoring.

Species susceptibility to wind-farm related impacts

Eurobats guidelines[75] provide an overall collision risk rating (high, medium, low or unknown) for groups of bat species and where appropriate for specific species. The rating considers a range of ecological factors including flight behavior, nightly foraging distance and information on bat fatalities at wind farms, A score was assigned for each species based on these ratings (see Table 71).

Vulnerability Scoring

The vulnerability score was the result of adding the scores for (i) conservation status and (ii) Eurobats Risk Rating. Summed scores were partitioned into 4 classes based on the quartile range of all scores and then each proportional range was assigned to four classes of vulnerability: high, moderate, low, and negligible.

[74] http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria .

[75] Rodrigues, L., Bach, L., Dubourg-Savage, M.-J., Karapandža, B., Kovač, D., Kervyn, T., . . . Minderman, J. (2015). Guidelines for consideration of bats in wind farm projects - Revision 2104. EUROBATS Publication Series No.6 (English version) UNEP/EUROBATS Secretariat, Bonn, Germany, 133pp.

TABLE 71. VULNERABILITY SCORING FOR BATS

	Conservation Status	Susceptibility to wind-farm related impacts	Total Vulnerability Score
Parameter	IUCN national conservation status (Paunović 2016)	Eurobats Risk Rating[75]	Summed IUCN national conservation status and EUROBATS risk rating scores for each species were partitioned into 4 classes based on the quartile range of all scores, and these were assigned to four classes of vulnerability: (high, moderate, low, and negligible)
Scoring Criteria	**0** = LC **1** = NT or DD **2** = VU **3** = CR or EN	**0** = Low **1** = Medium. **2** = High	

Least Concern (LC); Near-threatened (NT); Vulnerable(VU); Endangered (EN); Critically Endangered (CR).

Part 3: Assign Species Sensitivity

A matrix (Table 72) was used to determine *sensitivity* for each species population in step 2 using their *relative importance* and *vulnerability* scores. Species populations with Species Sensitivity scores of negligible were scoped out and did not progress to step 3.

TABLE 72. SPECIES SENSITIVITY MATRIX

Vulnerability	Relative Importance			
	High	Moderate	Low	Negligible
High	High	High	Medium	Low
Moderate	High	Medium	Low	Low
Low	Medium	Low	Low	Negligible
Negligible	Low	Low	Negligible	Negligible

8.3.2 RESULTS

From 22 species populations assessed for sensitivity in step 2, four were scored as negligible and scoped out, leaving 17 to be assessed for LoE in step 3 (Table 73). Annex E provides full details of Step 2 and the species sensitivity results for each of the 22 species populations.

TABLE 73. SUMMARY OF STEP 2 RESULTS

Common Name	Scientific Name	Relative Importance Score	Vulnerability Score	Sensitivity Score	Species scoped into Step 3?
Greater horseshoe bat	*Rhinolophus ferrumeqinum*	low	negligible	negligible	no
Western barbastelle bat	*Barbastella barbastellus*	negligible	moderate	low	yes
Serotine bat	*Eptesicus serotinus*	moderate	low	low	yes
Savi's pipistrelle bat	*Hypsugo savii*	moderate	moderate	medium	yes
Schreiber's bent-winged bat	*Miniopterus schreibersii*	negligible	moderate	low	yes
Alcathoe whiskered bat	*Myotis alcathoe*	low	low	low	yes
Lesser mouse-eared bat	*Myotis blythii oxygnathus*	low	low	low	yes
Brandt's bat	*Myotis brandtii*	negligible	low	negligible	no
Daubenton's bat	*Myotis daubentonii*	negligible	negligible	negligible	no
Geoffroy's bat	*Myotis emarginatus*	moderate	negligible	low	yes
Greater mouse-eared bat	*Myotis myotis*	negligible	low	negligible	no
Whiskered bat	*Myotis mystacinus*	negligible	negligible	negligible	no
Natterer's bat	*Myotis nattereri*	High	low	medium	yes
Leisler's bat	*Nyctalus leisleri*	negligible	High	low	yes
Noctule bat	*Nyctalus noctula*	Low	moderate	low	yes

Kuhl's pipistrelle bat	*Pipistrellus kuhlii*	High	moderate	high	yes
Nathusius' pipistrelle bat	*Pipistrellus nathusii*	High	moderate	high	yes
Common pipistrelle bat	*Pipistrellus pipistrellus*	High	moderate	high	yes
Soprano pipistrelle bat	*Pipistrellus pygmaeus*	High	moderate	high	yes
Brown long-eared bat	*Plecotus auritus*	high	moderate	high	yes
Grey long-eared bat	*Plecotus austriacus*	moderate	negligible	low	yes
Parti-coloured bat	*Vespertilio murinus Linnaeus*	negligible	moderate	low	yes

8.4 STEP 3 – ECOLOGICAL RISK ASSESSMENT AND IDENTIFY PRIORITY BAT VECs

8.4.1 METHODS

The purpose of this step is to identify priority bat VECs from the 17 species populations scoped into step 3. Priority bat VECs were identified by evaluating the species sensitivity output from step 2 with the LoE output from this step, which is based on the rank scoring of PWPP-related risk factors associated with each species populations.

Part 1: Determine Likelihood of Effect

LoE assesses PWPP-related effects on species populations scoped into step 3. Collision with turbine blades and habitat loss all have varying degrees of risk to these populations, as does the extent to which each is exposed to these risks throughout the year.

Limitations

Accurately predicting the risk of bats colliding with rotating turbine blades using formal collision risk modeling is extremely challenging. This is due to the known lack of correlation between baseline data derived from acoustic (and other) surveys and observed mortality rates during operational monitoring[76]. An additional limitation was that it was not possible to compare metrics of bat activity on a species by species or "passage rate" basis applying methods developed by Mathews et al (2016) [77], which characterize risk to bats as a function of nightly activity data. For these reasons, a questions-based approach, similar to the one for birds, was developed to provide a relative assessment of the likelihood of PWPP effects on each population in step 3.

LoE Question-based framework to determine Priority VECs.

The questions-based framework consisted of 4 questions with multiple choice responses, devised specifically to assess LoE for each species population. A scoring method was applied to the range of available responses to each question. Questions were answered based on site-specific information derived from PWPP EIA/ESIAs and professional judgement. The scores for the 4 questions were added together for each of the 17 species populations. Summed scores for each species population were partitioned into 4

[76] E.g. see: [76] Hein, C., J. Gruver, and B. Arnett. 2013. Relating pre-construction bat activity and postconstruction bat fatality to predict risk at wind energy facilities: a synthesis. A report submitted to the National Renewable Energy Laboratory. Bat Conservation International, Austin, TX, USA; Baerwald, E. F., J. Edworthy, M. Holder, and R. M. R. Barclay. 2009.; Strickland, M. D., Arnett, E. B., Erickson, W. P., Johnson, D. H., Johnson, G. D., Morrison, M. L., ... & Warren-Hicks, W. (2011). Comprehensive guide to studying wind energy/wildlife interactions. Prepared for the National Wind Coordinating Collaborative, Washington, DC, USA.

[77] Mathews, F., Richardson, S., Lintott, P., & Hosken, D. (2016). Understanding the risk to European protected species (bats) at onshore wind turbine sites to inform risk management.

classes (high, moderate, low, and negligible) based on the quartile range of all summed scores.

TABLE 74 QUESTIONS-BASED FRAMEWORK FOR LIKELIHOOD OF EFFECT FOR BAT SPECIES POPULATIONS

QUESTION	SCORING
Spatial exposure of risk	
1. What is the level of risk based on the number of PWPPs where the species was recorded during ESIA/EIA surveys?	(0) **=** No projects (1) = One project (2) = Two projects (3) = Three projects
2. Is breeding habitat available within the maximum foraging distance of turbines at PWPPs? Maximum foraging distances from Eurobats (2016) were compared with species (breeding) records documented in Paunović 2016[78], and publicly available information[79] on habitats within and adjacent to PWPPs.	(1) **unlikely** (breeding not recorded in Paunović 2016 within maximum species foraging distance from PWPPs and/or typical breeding habitat for the species is not available based on known habitat types within likely species foraging distance from PWPPs). (2) **Possible** (breeding not recorded in Paunović 2016 within likely species foraging distance but typical breeding habitat for the species is available based on known habitat types within likely species foraging distance from PWPPs). (3) **Probable** (breeding recorded in Paunović 2016 within maximum foraging range, but records considered historical). (4) **Confirmed** (breeding recorded in Paunović 2016 within likely species foraging distance from PWPPs and species recorded or judged to be recently (<10yrs) using this area
Temporal exposure of risk	
3. What is the estimated exposure to risk throughout the year based on monthly occurrence records from ESIA baseline data?	Data from all PWPP ESIAs was pooled to assess the use by each population throughout the year. **Each month in which use was recorded** within PWPP ESIAs **received a score of 0.3**
4. What is the estimated seasonal exposure to risk throughout the year based on relevant information in Paunović 2016 [80] in addition to ESIA baseline data. Seasonal exposure reflects a broader assessment of risk compared to question 3, incorporating information from available information on bat species populations and expert judgement.	**Each season in which potentially at-risk individuals were assessed to use the study area received a score of 1,** allowing a maximum score of 3 if a population was likely to use the area throughout the following seasons: **spring migration**; **breeding/maternity**, and; **fall migration**[81].

[78] It was not possible to accurately plot locations and distances and metrics are intended as risk-based estimates only.
[79] Including information from PWPP EIA/ESIAs, Paunović, (2016) and Paunović et al (2011).
[80] Paunović, M. (2016). Distribution, ecology and centres of bat diversity(Mammalia, Chiroptera) in Serbia. Doctoral dissertation, University of Belgrade. Eurobats 2014.
[81] Overwintering/hibernation was not included as a season due to the extremely low potential for bat activity during this period. None of the PWPPs included bat activity surveys during the over-wintering period.

Total LoE Score for each bat species population	Summed scores were partitioned into 4 classes based on their quartile range and each range classed as **negligible**, **low**, **moderate** and **high**

Part 2: Screening of LoE Scores

The results of step 3 were reviewed by the ERG. Where additional information indicating that the results from the question-based framework did not adequately reflect the potential effects of the PWPPs on a species population, the LoE was adjusted either up or down by the ERG.

Part 3: Assign Risk Rating for Each Species Population

The matrix in Table 75 was applied to each species population scoped into step 3. It evaluated the species *sensitivity* score from step 2 with the LoE score from step 3 to determine a final risk rating, categorized as negligible, minor, moderate, or major.

TABLE 75. RISK RATING MATRIX

SPECIES SENSITIVITY	LIKELIHOOD OF EFFECT			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

Part 3: Identifying Priority Bat VECs

Priority bat VECs were those species populations that were assigned major or moderate risk rating scores when their *species sensitivity* and *LoE* category scores were applied to the matrix in Table 75. Species populations with either a negligible or minor risk rating were not considered priority bat VECs. However, recommended monitoring and mitigation protocols at PWPPs include post-construction fatality searches around turbines for all bat species populations (see step 4), thus allowing for an iterative review of risks to all species populations that occur at PWPPs.

8.4.2 RESULTS

Of the 17 species populations assessed in step 3 (Table 76), the RCIA process identified 7 priority bat VECs (Table 76 and 77). These 7 species populations are assessed as being at the highest risk from the cumulative effects of the PWPPs in the study area. Annex E provides complete details of the LoE and final risk rating results.

Based on additional species/site specific information provided by the ERG, Leisler's bat (*Nyctalus leisleri*) had its LoE rating adjusted upward from a 'moderate' to a 'high' rating and four other populations; Natterer's bat (*Myotis nattereri*), Soprano pipistrelle bat (*Pipistrellus pygmaeus*), Brown long-eared bat (*Plecotus auratus*), and Parti-coloured bat (*Vespertilio murinus*) had their LoE rating adjusted downward from medium to negligible.

TABLE 76. SUMMARY LoE RESULTS FOR BATS

Species Population List		Step 2	Step 3			
Common Name	Scientific Name	Sensitivity Score	Part 1 - LoE Score	Part 2 - Adjusted LoE Score based on Screening	Part 3 - Risk Rating	Part 4 - Priority VEC
Western barbastelle bat	*Barbastella barbastellus*	low	negligible	-	negligible	no
Serotine bat	*Eptesicus serotinus*	low	high	-	moderate	yes
Savi's pipistrelle bat	*Hypsugo savii*	medium	high	-	major	yes
Schreiber's bent-winged bat	*Miniopterus schreibersii*	low	negligible	-	negligible	no
Alcathoe whiskered bat	*Myotis alcathoe*	low	negligible	-	negligible	no
Lesser mouse-eared bat	*Myotis blythii oxygnathus*	low	medium	-	minor	no
Geoffroy's bat	*Myotis emarginatus*	low	medium	-	minor	no
Natterer's bat	*Myotis nattereri*	medium	medium	negligible	minor	no
Leisler's bat	*Nyctalus leisleri*	low	medium	high	moderate	yes
Noctule bat	*Nyctalus noctula*	low	high	-	moderate	yes
Kuhl's pipistrelle bat	*Pipistrellus kuhlii*	high	high	-	high	yes
Nathusius' pipistrelle bat	*Pipistrellus nathusii*	high	high	-	high	yes
Common pipistrelle bat	*Pipistrellus pipistrellus*	high	high	-	high	yes
Soprano pipistrelle bat	*Pipistrellus pygmaeus*	high	medium	negligible	minor	no
Brown long-eared bat	*Plecotus auritus*	high	medium	negligible	minor	no
Grey long-eared bat	*Plecotus austriacus*	low	medium	-	minor	no
Parti-coloured bat	*Vespertilio murinus*	low	medium	negligible	minor	no

TABLE 77. PRIORITY BAT VECs

Common Name	Scientific Name
Serotine bat	*Eptesicus serotinus*
Savi's pipistrelle bat	*Hypsugo savii*
Leisler's bat	*Nyctalus leisleri*
Noctule bat	*Nyctalus noctula*
Kuhl's pipistrelle bat	*Pipistrellus kuhlii*
Nathusius' pipistrelle bat	*Pipistrellus nathusii*
Common pipistrelle bat	*Pipistrellus pipistrellus*

8.5 STEP 4 – IDENTIFY MITIGATION AND MONITORING

The purpose of this step is to identify the potential joint mitigation and monitoring measures for developers and other stakeholders to consider. The joint program focuses on the 7 priority bat VECs determined by steps 1 to 3 of the RCIA to be at highest risk from the cumulative effects of the PWPPs.

Bat collisions with turbines represent the greatest cumulative risk to bats resulting from the operational PWPPs. Unfortunately, the extent of bat mortality resulting from operating wind turbines is extremely hard

to predict[82]. As a result, joint monitoring and mitigation planning is recommended for PWPPs so that predicted risks determined in ESIA/EIAs and this RCIA may be validated, and information from observed effects may be used to develop appropriate mitigation measures as part of an adaptive management strategy. As introduced in Section 7.6 of this report, this section expands on the MMA approach for bats, particularly, the development of a BMMP - Bat Monitoring and Mitigation Plan - designed with the following aim:

a. Compliance with project permit conditions and project ESAPs;
b. Focused on the bat species of greatest potential impact identified in project ESIA/EIAs;
c. Focused on the priority bat VECs identified in this RCIA;
d. Capable of providing useful information with which to inform adaptive management and/or mitigation measures, and;
e. Optimized to reduce the financial costs of implementation while maximizing the capacity of monitoring studies to address specific objectives.
f. Optimized to balance the goals of mitigation measures with operational or financial impacts to PWPPs.

Joint Monitoring

Monitoring would be implemented in a coordinated approach using consistent protocols, a single field team, and combined analysis and reporting to reduce costs, increase efficiencies and increase the utility of the data collected for informing the need for either additional monitoring or adaptive management.

The initial monitoring phase of the BMMP for bats will consist of two components:

a. A bat fatality monitoring study to be completed over 3 years. The primary objectives of the study are to: a) assess the extent of bat mortalities at operational PWPPs through a standardized study designed to calculate seasonal and annual estimates of bat mortality; b) assess spatial and temporal patterns of mortality to inform adaptive management and/or mitigation measures, and; c) provide information with which to assess the need for, and design of, additional monitoring. Bat fatality searches will be completed at a sample of turbines at all PWPPs. In addition, searcher efficiency and scavenger removal bias trials will be conducted, and seasonal and annual fatality estimates will be calculated. Specific protocols will be developed in conjunction with IFC.
b. An elevated bat acoustic monitoring study. The objective of the study is to identify patterns of bat activity at rotor-swept heights[83], provide information to be used to assess correlation with observed patterns of mortality derived from the fatality monitoring study, and provide information which could

[82] As a result of the lack of correlation between pre-construction survey methods and post-construction fatality rates. Similarly, while current scientific knowledge and available data suggests elevated risk factors for certain bat species, the predicted effects (and level of effect) of PWPPs on a species-specific basis is less than desired for accurate risk assessment. In addition, the PWPPs are located in a region with few sources of information on wind-energy and bats, resulting in a lack of specific project comparisons in the region with which to infer potentially comparable rates of annual mortality. See: Hein CD, Gruver J, Arnett EB (2013) Relating pre-construction bat activity and post-construction bat fatality to predict risk at wind energy facilities: a synthesis. Bat conservation international, Austin, Texas http://www.batsandwind.org/pdf/Pre-%20Post-construction%20 Synthesis_FINAL%20REPORT.pdf; Arnett, E. B., Baerwald, E. F., Mathews, F., Rodrigues, L., Rodríguez-Durán, A., Rydell, J., ... & Voigt, C. C. (2016). Impacts of wind energy development on bats: a global perspective. In Bats in the Anthropocene: conservation of bats in a changing world (pp. 295-323). Springer, Cham; Kunz, T. H., Arnett, E. B., Erickson, W. P., Hoar, A. R., Johnson, G. D., Larkin, R. P., ... & Tuttle, M. D. (2007). Ecological impacts of wind energy development on bats: questions, research needs, and hypotheses. Frontiers in Ecology and the Environment, 5(6), 315-324;
[83] Roemer, C., Disca, T., Coulon, A., & Bas, Y. (2017). Bat flight height monitored from wind masts predicts mortality risk at wind farms. Biological Conservation, 215, 116-122.

be used to inform adaptive management/mitigation measures. The study would be completed initially during the second year of the fatality monitoring study so that spatial and temporal patterns of mortality observed during the first year of fatality monitoring can be used to inform the bat activity monitoring study. Specific sample size and recommended locations would be determined during protocol development, but a sample size of 6 turbines/meteorological towers per PWPP.

Mitigation

Bat curtailment in the form of turbine cut-in speed adjustment and feathering blades below cut-in speed are currently the most effective means for reducing WPP-induced mortality to bats during the operational phase[84]. Evaluating the need for a bat curtailment program or other mitigation measures would be determined based on the results of the first two years of the bat fatality monitoring program and one year of live bat monitoring (see Table 64, Section 1.5). It is possible to optimize bat curtailment measures (if they are required) using the results of the proposed monitoring program to reduce effects of operating WPPs on bats to the extent possible while minimizing financial impacts to project operators[85]. Other mitigation measures may be relevant depending on how wind-wildlife research on this topic evolves in the coming years.

The monitoring and mitigation approach for bats is summarized in section 7 (see Section 7,6 Table 64,).

8.6 SUMMARY OF OUTCOMES FOR BATS

The RCIA for bats followed a similar methodology to that used for birds except that Step 4 – Identifying thresholds for each priority VEC– was not conducted.

The purpose of step 1 is to identify all bat populations that could potentially be at risk from the cumulative effects within the study area and to determine a relevant UoA by which any effects should be measured. Of the 31 bat species populations in Serbia, 22 were included in the species population list for this RCIA. The UoA was at the national scale for all species populations.

The purpose of step 2 is to determine the species population sensitivity based on the relative importance of the study area to the population and its vulnerability at the national scale. From 22 species populations assessed for sensitivity in step 2, four were scored as negligible and scoped out, leaving 17 to be assessed

[84] Curtailing the movement of turbine blades in low wind speeds has been shown to reduce bat fatalities substantially; increasing the turbine cut-in speed to at least 5.0 m/s has been shown to reduce bat fatalities by 50% or more. Feathering turbine blades below cut-in speed may also reduce bat fatalities because without feathering, blades continue to turn at potentially lethal speeds for bats below manufacturer's cut-in speed. See Hein, C., J. Gruver, and B. Arnett. 2013. Relating pre-construction bat activity and postconstruction bat fatality to predict risk at wind energy facilities: a synthesis. A report submitted to the National Renewable Energy Laboratory. Bat Conservation International, Austin, TX, USA; Baerwald, E. F., J. Edworthy, M. Holder, and R. M. R. Barclay. 2009. A large-scale mitigation experiment to reduce bat fatalities at wind energy facilities. Journal of Wildlife Management 7:3:1077-1081; Arnett, E., G. Johnson, W. Erickson, and C. Hein. 2013. A synthesis of operational mitigation studies to reduce bat fatalities at wind energy facilities in North America. A report submitted to the National Renewable Energy Laboratory. Bat Conservation International. Austin, Texas, USA.

[85] In general, cut-in speed adjustments and feathering blades below cut-in speeds have minimal financial effects to projects because such measures are implemented during periods when wind speeds and resulting revenue generation are low. It is possible to further reduce financial or operational effects of these curtailments by restricting when and where curtailment is implemented move beyond simple "blanket curtailment" for all turbines at all PWPPs. For an example of how bat monitoring data may be used to adjust curtailment regimes see Behr, O., Brinkmann, R., Hochradel, K., Mages, J., Korner-Nievergelt, F., Niermann, I.& Nagy, M. (2017). Mitigating bat mortality with turbine-specific curtailment algorithms: A model based approach. In Wind Energy and Wildlife Interactions (pp. 135-160). Springer, Cham.

for LoE in step 3.

The purpose of step 3 is to identify priority bat VECs from the 17 species populations scoped into step 3. Priority bat VECs are identified by evaluating the species sensitivity output from step 2 with the LoE output from this step, which is based on the rank scoring of PWPP-related risk factors associated with each species populations. Seven priority VECs were identified.

Potential joint mitigation and monitoring measures for developers and other stakeholders to consider were included in step 5 of the RCIA. The joint program focuses on the 7 Priority bat VECs determined by steps 1 to 3 of the RCIA to be at highest risk from the cumulative effects of the PWPPs. The initial monitoring phase of the BMMP for bats will consist of two principal components: 1) a bat fatality monitoring study to be completed over 2 years, and 2) an elevated bat acoustic monitoring study.

Monitoring would be implemented in a coordinated approach using consistent protocols, a single field team, and combined analysis and reporting to reduce costs, increase efficiencies and increase the utility of the data collected for informing the need for either additional monitoring or adaptive management.

The primary objectives of the bat fatality monitoring study are to: a) assess the extent of bat mortalities at operational PWPPs through a standardized study designed to calculate seasonal and annual estimates of bat mortality; b) assess spatial and temporal patterns of mortality to inform adaptive management and/or mitigation measures, and; c) provide information with which to assess the need for, and design of, additional monitoring.

The objective of the bat activity monitoring study is to identify patterns of bat activity at rotor-swept heights, provide information to be used to assess correlation with observed patterns of mortality derived from the fatality monitoring study, and provide information which could be used to inform adaptive management/mitigation measures.

With respect to mitigating the effects of operational wind turbines on bats, curtailment through turbine cut-in speed adjustment and blade feathering are currently the most effective means for reducing WPP-induced mortality to bats. Evaluating the need and scope of mitigation for bats is recommended following completion of the bat fatality and activity monitoring studies as part of an Adaptive Management strategy.

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Annex A. RCIA For Birds Results: Step 1- Species Population List

Species Population Category	Common Name	Scientific Name	Potential effect determined by one of PWPP ESIAs	Deliblato IBA trigger or Global Concern population [86]	Labudovo Okno IBA trigger or Global Concern population [87]	Krajevac SNR[88]	MSB population	Scoped in by ERG
Category 1: Resident and summer breeding raptors populations	Common Barn-owl	*Tyto alba*						
	Little Owl	*Athene noctua*						
	Eurasian Scops-owl	*Otus scops*						
	Northern Long-eared Owl	*Asio otus*						
	Tawny Owl	*Strix aluco*						
	Short-toed Snake-eagle	*Circaetus gallicus*						
	Eastern Imperial Eagle	*Aquila heliaca*						
	Booted Eagle	*Hieraaetus pennatus*						
	Western Marsh-harrier	*Circus aeruginosus*						
	Eurasian Sparrowhawk	*Accipiter nisus*						
	Northern Goshawk	*Accipiter gentilis*						
	White-tailed Sea-eagle	*Haliaeetus albicilla*						
	Black Kite	*Milvus migrans*						
	Eurasian Buzzard	*Buteo buteo*						
	Long-legged Buzzard	*Buteo rufinus*						
	Common Kestrel	*Falco tinnunculus*						
	Red-footed Falcon	*Falco vespertinus*						
	Eurasian Hobby	*Falco subbuteo*						
	Saker Falcon	*Falco cherrug*						
Category 2: Resident and summer breeding non raptor populations	Common Quail	*Coturnix coturnix*						
	Common Pheasant	*Phasianus colchicus*						
	Grey Partridge	*Perdix perdix*						
	Common Pochard	*Aythya ferina*						

[86] http://datazone.birdlife.org/site/factsheet/deliblatska-pescara-iba-serbia/details
[87] http://datazone.birdlife.org/site/factsheet/labudovo-okno-iba-serbia/details
[88] http://srpkraljevac.rs/en/

Species Population Category	Common Name	Scientific Name	Potential effect determined by one of PWPP ESIAs	Deliblato IBA trigger or Global Concern population [86]	Labudovo Okno IBA trigger or Global Concern population [87]	Krajevac SNR[88]	MSB population	Scoped in by ERG
	Ferruginous Duck	*Aythya nyroca*						
	Gadwall	*Mareca strepera*						
	Great Crested Grebe	*Podiceps cristatus*						
	Rock Dove (Feral)	*Columba livia*						
	Common Woodpigeon	*Columba palumbus*						
	European Turtle-dove	*Streptopelia turtur*						
	Eurasian Collared-dove	*Streptopelia decaocto*						
	European Nightjar	*Caprimulgus europaeus*						
	Common Swift	*Apus apus*						
	Common Cuckoo	*Cuculus canorus*						
	Common Moorhen	*Gallinula chloropus*						
	Common Coot	*Fulica atra*						
	White Stork	*Ciconia ciconia*						
	Common Little Bittern	*Ixobrychus minutus*						
	Black-crowned Night-heron	*Nycticorax nycticorax*						
	Squacco Heron	*Ardeola ralloides*						
	Grey Heron	*Ardea cinerea*						
	Purple Heron	*Ardea purpurea*						
	Pygmy Cormorant	*Microcarbo pygmaeus*						
	Great Cormorant	*Phalacrocorax carbo*						
	Northern Lapwing	*Vanellus vanellus*						
	Common Snipe	*Gallinago gallinago*						
	Common Sandpiper	*Actitis hypoleucos*						
	Whiskered Tern	*Chlidonias hybrida*						
	Black Tern	*Chlidonias niger*						
	Common Hoopoe	*Upupa epops*						
	European Bee-eater	*Merops apiaster*						
	Eurasian Wryneck	*Jynx torquilla*						
	Grey-faced Woodpecker	*Picus canus*						

Species Population Category	Common Name	Scientific Name	Potential effect determined by one of PWPP ESIAs	Deliblato IBA trigger or Global Concern population [86]	Labudovo Okno IBA trigger or Global Concern population [87]	Krajevac SNR[88]	MSB population	Scoped in by ERG
	Eurasian Green Woodpecker	*Picus viridis*						
	Great Spotted Woodpecker	*Dendrocopos major*						
	Red-backed Shrike	*Lanius collurio*						
	Lesser Grey Shrike	*Lanius minor*						
	Eurasian Magpie	*Pica pica*						
	Rook	*Corvus frugilegus*						
	Common Raven	*Corvus corax*						
	Hooded Crow	*Corvus cornix*						
	Eurasian Blue Tit	*Cyanistes caeruleus*						
	Great Tit	*Parus major*						
	Eurasian Penduline-tit	*Remiz pendulinus*						
	Greater Short-toed Lark	*Calandrella brachydactyla*						
	Woodlark	*Lullula arborea*						
	Eurasian Skylark	*Alauda arvensis*						
	Crested Lark	*Galerida cristata*						
	Sedge Warbler	*Acrocephalus schoenobaenus*						
	Marsh Warbler	*Acrocephalus palustris*						
	Common Reed-warbler	*Acrocephalus scirpaceus*						
	Great Reed-warbler	*Acrocephalus arundinaceus*						
	Barn Swallow	*Hirundo rustica*						
	Collared Sand Martin	*Riparia riparia*						
	Common Chiffchaff	*Phylloscopus collybita*						
	Long-tailed Tit	*Aegithalos caudatus*						
	Eurasian Blackcap	*Sylvia atricapilla*						
	Barred Warbler	*Sylvia nisoria*						
	Common Whitethroat	*Sylvia communis*						
	Eurasian Treecreeper	*Certhia familiaris*						

Species Population Category	Common Name	Scientific Name	Potential effect determined by one of PWPP ESIAs	Deliblato IBA trigger or Global Concern population [86]	Labudovo Okno IBA trigger or Global Concern population [87]	Krajevac SNR[88]	MSB population	Scoped in by ERG
	Northern Wren	*Troglodytes troglodytes*						
	Common Starling	*Sturnus vulgaris*						
	Mistle Thrush	*Turdus viscivorus*						
	Eurasian Blackbird	*Turdus merula*						
	European Robin	*Erithacus rubecula*						
	Common Nightingale	*Luscinia megarhynchos*						
	Black Redstart	*Phoenicurus ochruros*						
	Whinchat	*Saxicola rubetra*						
	Common Stonechat	*Saxicola torquatus*						
	Northern Wheatear	*Oenanthe oenanthe*						
	Dunnock	*Prunella modularis*						
	House Sparrow	*Passer domesticus*						
	Eurasian Tree Sparrow	*Passer montanus*						
	Tree Pipit	*Anthus trivialis*						
	Tawny Pipit	*Anthus campestris*						
	Western Yellow Wagtail	*Motacilla flava*						
	White Wagtail	*Motacilla alba*						
	Common Chaffinch	*Fringilla coelebs*						
	Hawfinch	*Coccothraustes coccothraustes*						
	Eurasian Bullfinch	*Pyrrhula pyrrhula*						
	European Greenfinch	*Chloris chloris*						
	Common Linnet	*Linaria cannabina*						
	European Goldfinch	*Carduelis carduelis*						
	European Serin	*Serinus serinus*						
	Corn Bunting	*Emberiza calandra*						
	Ortolan Bunting	*Emberiza hortulana*						
	Yellowhammer	*Emberiza citrinella*						
	Reed Bunting	*Emberiza schoeniclus*						

Species Population Category	Common Name	Scientific Name	Potential effect determined by one of PWPP ESIAs	Deliblato IBA trigger or Global Concern population [86]	Labudovo Okno IBA trigger or Global Concern population [87]	Krajevac SNR[88]	MSB population	Scoped in by ERG
Category 3: Migrant and wintering populations (concentrated in Europe)	Greylag Goose	*Anser anser*						
	Tufted Duck	*Aythya fuligula*						
	Stock Dove	*Columba oenas*						
	Corncrake	*Crex crex*						
	Common Crane	*Grus grus*						
	Black Stork	*Ciconia nigra*						
	Eurasian Spoonbill	*Platalea leucorodia*						
	Pygmy Cormorant	*Microcarbo pygmaeus*						
	Eurasian Dotterel	*Eudromias morinellus*						
	Eurasian Curlew	*Numenius arquata*						
	European Honey-buzzard	*Pernis apivorus*						
	Lesser Spotted Eagle	*Clanga pomarina*						
	Greater Spotted Eagle	*Clanga clanga*						
	Western Marsh-harrier	*Circus aeruginosus*						
	Hen Harrier	*Circus cyaneus*						
	Montagu's Harrier	*Circus pygargus*						
	Eurasian Sparrowhawk	*Accipiter nisus*						
	Red Kite	*Milvus milvus*						
	Eurasian Buzzard	*Buteo buteo*						
	Fieldfare	*Turdus pilaris*						
	Common Redstart	*Phoenicurus phoenicurus*						
	Goldcrest	*Regulus regulus*						
	Meadow Pipit	*Anthus pratensis*						
	Eurasian Siskin	*Spinus spinus*						
Category 4: Migrant and wintering populations (not concentrated in Europe)	Bean Goose	*Anser fabalis*						
	Greater White-fronted Goose	*Anser albifrons*						
	Common Goldeneye	*Bucephala clangula*						
	Smew	*Mergellus albellus*						

Species Population Category	Common Name	Scientific Name	Potential effect determined by one of PWPP ESIAs	Deliblato IBA trigger or Global Concern population [86]	Labudovo Okno IBA trigger or Global Concern population [87]	Krajevac SNR[88]	MSB population	Scoped in by ERG
	Common Pochard	*Aythya ferina*						
	Ferruginous Duck	*Aythya nyroca*						
	Garganey	*Spatula querquedula*						
	Mallard	*Anas platyrhynchos*						
	White Stork	*Ciconia ciconia*						
	Glossy Ibis	*Plegadis falcinellus*						
	Wood Sandpiper	*Tringa glareola*						
	Black Tern	*Chlidonias niger*						
	Osprey	*Pandion haliaetus*						
	Short-toed Snake-eagle	*Circaetus gallicus*						
	Golden Eagle	*Aquila chrysaetos*						
	Pallid Harrier	*Circus macrourus*						
	Northern Goshawk	*Accipiter gentilis*						
	Black Kite	*Milvus migrans*						
	Rough-legged Buzzard	*Buteo lagopus*						
	Long-legged Buzzard	*Buteo rufinus*						
	Common Kestrel	*Falco tinnunculus*						
	Merlin	*Falco columbarius*						
	Peregrine Falcon	*Falco peregrinus*						
	Bohemian Waxwing	*Bombycilla garrulus*						

Annex A. RCIA for Birds: Step 1- Species scoped out

Population type	Common Name	Scientific Name	Reason
Resident and summer breeding populations	Mute Swan	*Cygnus olor*	ESIAs concluded negligible effect
	Little Grebe	*Tachybaptus ruficollis*	ESIAs concluded negligible effect
	Great White Egret	*Ardea alba*	ESIAs concluded negligible effect
	Black-winged Stilt	*Himantopus himantopus*	ESIAs concluded negligible effect
	Eurasian Woodcock	*Scolopax rusticola*	ESIAs concluded negligible effect
	Black-headed Gull	*Larus ridibundus*	ESIAs concluded negligible effect
	European Roller	*coracias garrulus*	ESIAs concluded negligible effect
	Common Kingfisher	*Alcedo atthis*	ESIAs concluded negligible effect
	Eurasian Golden Oriole	*Oriolus oriolus*	ESIAs concluded negligible effect
	Eurasian Jay	*Garrulus glandarius*	ESIAs concluded negligible effect
	Eurasian Jackdaw	*Corvus monedula*	ESIAs concluded negligible effect
	Northern House Martin	*Delichon urbicum*	ESIAs concluded negligible effect
	Garden Warbler	*Sylvia borin*	ESIAs concluded negligible effect
	Lesser Whitethroat	*Sylvia curruca*	ESIAs concluded negligible effect
	Spotted Flycatcher	*Muscicapa striata*	ESIAs concluded negligible effect
	Red Crossbill	*Loxia curvirostra*	ESIAs concluded negligible effect
	Black-headed Bunting	*Emberiza melanocephala*	ESIAs concluded negligible effect
Migrant and wintering populations	Alpine Swift	*Tachymarptis melba*	ESIAs concluded negligible effect
	Eurasian Golden Plover	*Pluvialis apricaria*	ESIAs concluded negligible effect
	Whimbrel	*Numenius phaeopus*	ESIAs concluded negligible effect
	Ruff	*Calidris pugnax*	ESIAs concluded negligible effect
	Green Sandpiper	*Tringa ochropus*	ESIAs concluded negligible effect
	Spotted Redshank	*Tringa erythropus*	ESIAs concluded negligible effect
	Common Redshank	*Tringa totanus*	ESIAs concluded negligible effect
	Yellow-legged Gull	*Larus michahellis*	ESIAs concluded negligible effect
	Caspian Gull	*Larus cachinnans*	ESIAs concluded negligible effect
	Eastern Imperial Eagle	*Aquila heliaca*	ESIAs concluded negligible effect
	Northern Shoveler	*Spatula clypeata*	ESIAs concluded negligible effect
	Northern Pintail	*Anas acuta*	ESIAs concluded negligible effect
	Black-necked Grebe	*Podiceps nigricollis*	ESIAs concluded negligible effect
	Booted Eagle	*Hieraaetus pennatus*	ESIAs concluded negligible effect
	Egyptian Vulture	*Neophron percnopterus*	Scoped out by ERG. Not recorded in area
	Red-footed Falcon	*Falco vespertinus*	ESIAs concluded negligible effect
	Eurasian Hobby	*Falco subbuteo*	ESIAs concluded negligible effect
	Saker Falcon	*Falco cherrug*	ESIAs concluded negligible effect
	Great Grey Shrike	*Lanius excubitor*	ESIAs concluded negligible effect
	Willow Warbler	*Phylloscopus trochilus*	ESIAs concluded negligible effect
	Redwing	*Turdus iliacus*	ESIAs concluded negligible effect
	Brambling	*Fringilla montifringilla*	ESIAs concluded negligible effect
	Redpoll	*Acanthis flammea*	ESIAs concluded negligible effect

Annex B. RCIA For Birds Results: Step 2- Species Sensitivity Results

CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS—RELATIVE IMPORTANCE, VULNERABILITY AND SENSITIVITY SCORING

Common Name	Scientific Name	Relative Importance (The numbers in the columns below relate to the minimum number of individuals in the Unit of Analysis (UoA). The first 4 columns show for each Relative Importance class (negligible, low, moderate and high) the equivalent number of individuals that would need to be in the study area for the population to be assigned to a particular class. A class was assigned to each population based on information in the PWPP ESIAs, other relevant literature and expert judgement of the RCIA ornithologists. The final Relative Importance class assigned to each population was reviewed by the ERG.)					Vulnerability (Populations not on Serbian Red List and considered LC, had their ratings increased by one level e.g. medium to high if they had a nationally declining trend. These are highlighted in bold below. See RCIA text for the reasons for this). **The Species Vulnerability Index (SVI)** devised by Birdlife International to rate susceptibility to wind energy developments for a small selection of species was used when available. For species where this was not available an equivalent rating was devised for the RCIA using a range of scientific literature reporting the effects of wind energy on birds.(see Annex X for further details)				Final Sensitivity Rating (populations rated high, medium, low pass through to step 3)
		Negligible 0.5% of National Pop	Low <1% of National Pop	Moderate <10% National Pop.	High >10% National Pop	**FINAL RELATIVE IMPORTANCE RATING** (neg, low, mod, high)	**Serbian Red List (in prep).** (Species not on Red List assumed to be LC)	**Serbian Trend (2008-13)** (SI=small increase, F=fluctuating, S=stable, SD= small decline	**Species Vulnerability Index Score (SVI)**	**FINAL VULNERABILITY RATING** (high, moderate, low, negligible)	**STEP 2 FINAL SENSITIVITY RATING** (high, medium, low, negligible)
Common Barn-owl	*Tyto alba*	< 31	31 - 62	62 - 620	620 - 6200	low	LC	SD	8	moderate	low
Little Owl	*Athene noctua*	< 103	103 - 206	206 - 2060	2060 - 20600	negligible	LC	S	8	low	negligible
Eurasian Scops-owl	*Otus scops*	< 260	260 - 520	520 - 5200	5200 - 52000	negligible	LC	S	8	low	negligible
Northern Long-eared Owl	*Asio otus*	< 177	177 - 354	354 - 3540	3540 - 35400	negligible	LC	SI	8	low	negligible
Tawny Owl	*Strix aluco*	< 185	185 - 370	370 - 3700	3700 - 37000	negligible	LC	S	8	low	negligible
Short-toed Snake-eagle	*Circaetus gallicus*	< 1.2	1.2 - 2.4	2.4 - 24	24 - 240	moderate	NT	SI	7	moderate	medium
Eastern Imperial Eagle	*Aquila heliaca*	< 0.05	0.05 - 0.1	0.1 - 1	1 - 10	high	CR	SI	9	high	high
Booted Eagle	*Hieraaetus pennatus*	< 0.16	0.16 - 0.32	0.32 - 3.2	3.2 - 32	high	EN	SI	9	high	high
Western Marsh-harrier	*Circus aeruginosus*	< 3.47	3.47 - 6.94	6.94 - 69.4	69.4 - 694	moderate	NT	S	8	moderate	medium
Eurasian Sparrowhawk	*Accipiter nisus*	< 14.5	14.5 - 29	29 - 290	290 - 2900	low	LC	SI	6	negligible	negligible
Northern Goshawk	*Accipiter gentilis*	< 9	9 - 18	18 - 180	180 - 1800	low	VU	SD	6	low	low
White-tailed Sea-eagle	*Haliaeetus albicilla*	< 1.12	1.12 - 2.24	2.24 - 22.4	22.4 - 224	moderate	NT	EI	10	high	high
Black Kite	*Milvus migrans*	< 0.34	0.34 - 0.68	0.68 - 6.8	6.8 - 68	moderate	EN	SD	8	high	high
Eurasian Buzzard	*Buteo buteo*	< 38	38 - 76	76 - 760	760 - 7600	low	LC	S	7	low	negligible
Long-legged Buzzard	*Buteo rufinus*	< 0.2	0.2 - 0.4	0.4 - 4	4 - 40	moderate	VU	S	7	moderate	medium
Common Kestrel	*Falco tinnunculus*	< 40	40 - 80	80 - 800	800 - 8000	low	LC	S	6	negligible	negligible

Red-footed Falcon	*Falco vespertinus*	< 2.62	2.62 - 5.24	5.24 - 52.4	52.4 - 524	low	VU	F	6	low	low
Eurasian Hobby	*Falco subbuteo*	< 5.9	5.9 - 11.8	11.8 - 118	118 - 1180	moderate	LC	S	6	negligible	low
Saker Falcon	*Falco cherrug*	< 0.22	0.22 - 0.44	0.44 - 4.4	4.4 - 44	high	CR	SD	6	high	high

CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS—RELATIVE IMPORTANCE, VULNERABILITY AND SENSITIVITY SCORING

Common Name	Scientific Name	Relative Importance (The numbers in the columns below relate to the minimum number of individuals in the Unit of Analysis (UoA). The first 4 columns show for each Relative Importance class (negligible, low, moderate and high) the equivalent number of individuals that would need to be in the study area for the population to be assigned to a particular class. A class was assigned to each population based on information in the PWPP ESIAs, other relevant literature and expert judgement of the RCIA ornithologists. The final Relative Importance class assigned to each population was reviewed by the ERG.)					Vulnerability (Populations not on Serbian Red List and considered LC, had their ratings increased by one level e.g. medium to high if they had a nationally declining trend. These are highlighted in bold below. See RCIA text for the reasons for this). **The Species Vulnerability Index (SVI)** devised by Birdlife International to rate susceptibility to wind energy developments for a small selection of species was used when available. For species where this was not available an equivalent rating was devised for the RCIA using a range of scientific literature reporting the effects of wind energy on birds.(see Annex X for further details				Final Sensitivity Rating (populations rated high, medium, low pass through to step 3)
		Negligible 0.5% of National Pop	Low <1% of National Pop	Moderate <10% National Pop.	High >10% National Pop	**FINAL RELATIVE IMPORTANCE RATING** (high, moderate, low, negligible)	**Serbian Red List (in press).** (Species not on Red List assumed to be LC)	**Serbian Trend (2008-13)** (SI=small increase, F=fluctuating, S=stable, SD= small decline	**Species Vulnerability Index Score (SVI)**	**FINAL VULNERABILITY RATING** (high, moderate, low, negligible)	**STEP 2 FINAL SENSITIVITY RATING** (high, medium, low, negligible)
Common Quail	*Coturnix coturnix*	< 240	240 - 480	480 - 4800	4800 - 48000	low	LC	SD	3	low	low
Common Pheasant	*Phasianus colchicus*	< 1500	1500 - 3000	3000 - 30000	30000 - 300000	negligible	LC	F	4	negligible	negligible
Grey Partridge	*Perdix perdix*	<160	160 -320	320 - 3200	3200 - 32000	low	VU	SD	3	low	low
Common Pochard	*Aythya ferina*	< 8.7	8.7 - 17.4	17.4 - 174	174 - 1740	low	LC	S	2	negligible	negligible
Ferruginous Duck	*Aythya nyroca*	< 6.8	6.8 - 13.6	13.6 - 136	136 - 1360	moderate	LC	SI	2	negligible	low
Gadwall	*Mareca strepera*	< 3.4	3.4 - 6.8	6.8 - 68	68 - 680	moderate	NT	MI	2	low	low
Great Crested Grebe	*Podiceps cristatus*	< 15.3	15.3 - 30.6	30.6 - 306	306 - 3060	negligible	LC	S	6	negligible	negligible
Rock Dove (Feral)	*Columba livia*	< 400	400 - 800	800 - 8000	8000 - 80000	negligible	LC	S	3	negligible	negligible
Common Woodpigeon	*Columba palumbus*	< 670	670 - 1340	1340 - 13400	13400 - 134000	negligible	LC	S	3	negligible	negligible
European Turtle-dove	*Streptopelia turtur*	< 390	390 - 780	780 - 7800	7800 - 78000	negligible	VU	SD	2	low	negligible
Eurasian Collared-dove	*Streptopelia decaocto*	< 1500	1500 - 3000	3000 - 30000	30000 - 300000	negligible	LC	S	2	negligible	negligible
European Nightjar	*Caprimulgus europaeus*	< 36	36 - 72	72 - 720	720 - 7200	high	LC	S	5	negligible	low
Common Swift	*Apus apus*	< 73	73 - 146	146 - 1460	1460 - 14600	negligible	LC	S	3	negligible	negligible
Common Cuckoo	*Cuculus canorus*	< 290	290 - 580	580 - 5800	5800 - 58000	negligible	LC	S	3	negligible	negligible
Common Moorhen	*Gallinula chloropus*	< 85	85 - 170	170 - 1700	1700 - 17000	negligible	LC	S	6	negligible	negligible
Common Coot	*Fulica atra*	< 54	54 - 108	108 - 1080	1080 - 10800	negligible	LC	S	6	negligible	negligible
White Stork	*Ciconia ciconia*	< 12.2	12.2 - 24.4	24.4 - 244	244 - 2440	moderate	LC	S	10	moderate	medium
Common Little Bittern	*Ixobrychus minutus*	< 26.8	26.8 - 53.6	53.6 - 536	536 - 5360	low	LC	S	3	negligible	negligible

Black-crowned Night-heron	*Nycticorax nycticorax*	< 28	28 - 56	56 - 560	560 - 5600	low	LC	S	3	negligible	negligible
Squacco Heron	*Ardeola ralloides*	< 8	8 - 16	16 - 160	160 - 1600	low	LC	S	3	negligible	negligible
Grey Heron	*Ardea cinerea*	< 25.2	25.2 - 50.4	50.4 - 504	504 - 5040	low	LC	SI	4	negligible	negligible
Purple Heron	*Ardea purpurea*	< 6.5	6.5 - 13	13 - 130	130 - 1300	low	VU	SD	3	low	low
Pygmy Cormorant	*Microcarbo pygmaeus*	< 9	9 - 18	18 - 180	180 - 1800	moderate	LC	MI	4	negligible	low
Great Cormorant	*Phalacrocorax carbo*	< 18.7	18.7 - 37.4	37.4 - 374	374 - 3740	moderate	LC	MI	4	negligible	low
Northern Lapwing	*Vanellus vanellus*	< 20.5	20.5 - 41	41 - 410	410 - 4100	moderate	LC	S	8	low	low
Common Snipe	*Gallinago gallinago*	< 0.03	0.03 - 0.06	0.06 - 0.6	0.6 - 6	high	CR	F	7	high	high
Common Sandpiper	*Actitis hypoleucos*	< 0.9	0.9 - 1.8	1.8 - 18	18 - 180	moderate	EN	SD	2	high	high
Whiskered Tern	*Chlidonias hybrida*	< 28.5	28.5 - 57	57 - 570	570 - 5700	moderate	LC	MI	8	low	low
Black Tern	*Chlidonias niger*	< 0.05	0.05 - 0.1	0.1 - 1	1 - 10	high	CR	F	8	high	high
Common Hoopoe	*Upupa epops*	< 55	55 - 110	110 - 1100	1100 - 11000	negligible	LC	S	1	negligible	negligible
European Bee-eater	*Merops apiaster*	< 56	56 - 112	112 - 1120	1120 - 11200	high	LC	S	2	negligible	low
Eurasian Wryneck	*Jynx torquilla*	< 40	40 - 80	80 - 800	800 - 8000	moderate	LC	S	1	negligible	low
Grey-faced Woodpecker	*Picus canus*	< 25	25 - 50	50 - 500	500 - 5000	moderate	LC	SI	1	negligible	low
Eurasian Green Woodpecker	*Picus viridis*	< 75	75 - 150	150 - 1500	1500 - 15000	moderate	LC	S	1	negligible	low
Great Spotted Woodpecker	*Dendrocopos major*	< 1100	1100 - 2200	2200 - 22000	22000 - 220000	negligible	LC	S	1	negligible	negligible
Red-backed Shrike	*Lanius collurio*	< 770	770 - 1540	1540 - 15400	15400 - 154000	moderate	LC	S	3	negligible	low
Lesser Grey Shrike	*Lanius minor*	<6.8	6.8 - 13.6	13.6 -136	136 - 1360	moderate*	LC	S	1	negligible	low
Eurasian Magpie	*Pica pica*	< 1300	1300 - 2600	2600 - 26000	26000 - 260000	negligible	LC	S	2	negligible	negligible
Rook	*Corvus frugilegus*	< 450	450 - 900	900 - 9000	9000 - 90000	negligible	LC	S	8	low	negligible
Common Raven	*Corvus corax*	< 13	13 - 26	26 - 260	260 - 2600	low	LC	S	8	low	low
Hooded Crow	*Corvus cornix*	< 1300	1300 - 2600	2600 - 26000	26000 - 260000	negligible	LC	S	7	low	negligible
Eurasian Blue Tit	*Cyanistes caeruleus*	< 1900	1900 - 3800	3800 - 38000	38000 - 380000	negligible	LC	S	3	negligible	negligible
Great Tit	*Parus major*	< 6700	6700 - 13400	13400 - 134000	134000 - 1340000	negligible	LC	S	3	negligible	negligible
Eurasian Penduline-tit	*Remiz pendulinus*	< 49	49 - 98	98 - 980	980 - 9800	negligible	LC	S	2	negligible	negligible
Greater Short-toed Lark	*Calandrella brachydactyla*	< 0.7	0.7 - 1.4	1.4 - 14	14 - 140	moderate	EN	S	4	high	high
Woodlark	*Lullula arborea*	< 130	130 - 260	260 - 2600	2600 - 26000	high	LC	S	4	negligible	low
Eurasian Skylark	*Alauda arvensis*	< 2200	2200 - 4400	4400 - 44000	44000 - 440000	low	LC	S	3	low	low
Crested Lark	*Galerida cristata*	< 200	200 - 400	400 - 4000	4000 - 40000	low	LC	SD	4	low	low

Sedge Warbler	*Acrocephalus schoenobaenus*	< 145	145 - 290	290 - 2900	2900 - 29000	negligible	LC	S	1	negligible	negligible
Marsh Warbler	*Acrocephalus palustris*	< 230	230 - 460	460 - 4600	4600 - 46000	negligible	LC	S	1	negligible	negligible
Common Reed-warbler	*Acrocephalus scirpaceus*	< 110	110 - 220	220 - 2200	2200 - 22000	negligible	LC	S	2	negligible	negligible
Great Reed-warbler	*Acrocephalus arundinaceus*	< 300	300 - 600	600 - 6000	6000 - 60000	negligible	LC	S	1	negligible	negligible
Barn Swallow	*Hirundo rustica*	< 1500	1500 - 3000	3000 - 30000	30000 - 300000	negligible	LC	S	2	negligible	negligible
Collared Sand Martin	*Riparia riparia*	< 380	380 - 760	760 - 7600	7600 - 76000	high	LC	SD	1	low	medium
Common Chiffchaff	*Phylloscopus collybita*	< 3600	3600 - 7200	7200 - 72000	72000 - 720000	negligible	LC	S	3	negligible	negligible
Long-tailed Tit	*Aegithalos caudatus*	< 350	350 - 700	700 - 7000	7000 - 70000	negligible	LC	S	1	negligible	negligible
Eurasian Blackcap	*Sylvia atricapilla*	< 10000	10000 - 20000	20000 - 200000	200000 - 2000000	negligible	LC	S	3	negligible	negligible
Barred Warbler	*Sylvia nisoria*	< 62	62 - 124	124 - 1240	1240 - 12400	high	LC	SI	1	negligible	low
Common Whitethroat	*Sylvia communis*	< 750	750 - 1500	1500 - 15000	15000 - 150000	negligible	LC	S	1	negligible	negligible
Eurasian Treecreeper	*Certhia familiaris*	< 180	180 - 360	360 - 3600	3600 - 36000	negligible	LC	S	1	negligible	negligible
Northern Wren	*Troglodytes troglodytes*	< 770	770 - 1540	1540 - 15400	15400 - 154000	negligible	LC	S	1	negligible	negligible
Common Starling	*Sturnus vulgaris*	< 3200	3200 - 6400	6400 - 64000	64000 - 640000	negligible	LC	S	6	negligible	negligible
Mistle Thrush	*Turdus viscivorus*	< 165	165 - 330	330 - 3300	3300 - 33000	negligible	LC	S	2	negligible	negligible
Eurasian Blackbird	*Turdus merula*	< 6000	6000 - 12000	12000 - 120000	120000 - 1200000	negligible	LC	S	3	negligible	negligible
European Robin	*Erithacus rubecula*	< 5000	5000 - 10000	10000 - 100000	100000 - 1000000	negligible	LC	S	5	negligible	negligible
Common Nightingale	*Luscinia megarhynchos*	< 3000	3000 - 6000	6000 - 60000	60000 - 600000	moderate	LC	S	3	negligible	low
Black Redstart	*Phoenicurus ochruros*	< 470	470 - 940	940 - 9400	9400 - 94000	negligible	LC	SI	4	negligible	negligible
Whinchat	*Saxicola rubetra*	< 47	47 - 94	94 - 940	940 - 9400	moderate*	LC	S	3	negligible	low
Common Stonechat	*Saxicola torquatus*	< 103	103 - 206	206 - 2060	2060 - 20600	low	LC	S	4	negligible	negligible
Northern Wheatear	*Oenanthe oenanthe*	< 29	29 - 58	58 - 580	580 - 5800	low	NT	S	4	low	low
Dunnock	*Prunella modularis*	< 82	82 - 164	164 - 1640	1640 - 16400	negligible	LC	S	2	negligible	negligible
House Sparrow	*Passer domesticus*	< 10000	10000 - 20000	20000 - 200000	200000 - 2000000	negligible	LC	S	4	negligible	negligible
Eurasian Tree Sparrow	*Passer montanus*	< 8000	8000 - 16000	16000 - 160000	160000 - 1600000	negligible	LC	S	3	negligible	negligible
Tree Pipit	*Anthus trivialis*	< 220	220 - 440	440 - 4400	4400 - 44000	negligible	LC	S	3	negligible	negligible
Tawny Pipit	*Anthus campestris*	< 31	31 - 62	62 - 620	620 - 6200	moderate	LC	S	3	negligible	low
Western Yellow Wagtail	*Motacilla flava*	< 320	320 - 640	640 - 6400	6400 - 64000	negligible	LC	S	3	negligible	negligible

White Wagtail	*Motacilla alba*	< 300	300 - 600	600 - 6000	6000 - 60000	negligible	LC	S	3	negligible	negligible
Common Chaffinch	*Fringilla coelebs*	< 13000	13000 - 26000	26000 - 260000	260000 - 2600000	negligible	LC	S	2	negligible	negligible
Hawfinch	*Coccothraustes coccothraustes*	< 370	370 - 740	740 - 7400	7400 - 74000	negligible	LC	S	1	negligible	negligible
Eurasian Bullfinch	*Pyrrhula pyrrhula*	< 57	57 - 114	114 - 1140	1140 - 11400	negligible	LC	S	1	negligible	negligible
European Greenfinch	*Chloris chloris*	< 2400	2400 - 4800	4800 - 48000	48000 - 480000	negligible	LC	S	2	negligible	negligible
Common Linnet	*Linaria cannabina*	< 210	210 - 420	420 - 4200	4200 - 42000	negligible	LC	S	2	negligible	negligible
European Goldfinch	*Carduelis carduelis*	< 1400	1400 - 2800	2800 - 28000	28000 - 280000	negligible	LC	SD	2	low	negligible
European Serin	*Serinus serinus*	< 470	470 - 940	940 - 9400	9400 - 94000	negligible	LC	SI	2	negligible	negligible
Corn Bunting	*Emberiza calandra*	< 460	460 - 920	920 - 9200	9200 - 92000	negligible	LC	S	4	negligible	negligible
Ortolan Bunting	*Emberiza hortulana*	< 260	260 - 520	520 - 5200	5200 - 52000	negligible	LC	S	3	negligible	negligible
Yellowhammer	*Emberiza citrinella*	< 570	570 - 1140	1140 - 11400	11400 - 114000	negligible	LC	S	3	negligible	negligible
Reed Bunting	*Emberiza schoeniclus*	< 56	56 - 112	112 - 1120	1120 - 11200	negligible	LC	S	1	negligible	negligible

* indicates rating raised by one level (e.g. low to moderate) based on additional information on relative importance of population in study area and/or vulnerability provided by ERG

CATEGORY 3, MIGRATORY AND WINTERING POPULATIONS (CONCENTRATED IN EUROPE) —RELATIVE IMPORTANCE, VULNERABILITY AND SENSITIVITY SCORING

Common Name	Scientific Name	Relative Importance (The numbers in the columns below relate to the minimum number of individuals in the Unit of Analysis (UoA). The first 4 columns show for each Relative Importance class (negligible, low, moderate and high) the equivalent number of individuals that would need to be in the study area for the population to be assigned to a particular class. A class was assigned to each population based on information in the PWPP ESIAs, other relevant literature and expert judgement of the RCIA ornithologists. The final Relative Importance class assigned to each population was reviewed by the ERG.)					Vulnerability (Populations not on Serbian Red List and considered LC, had their ratings increased by one level e.g. medium to high if they had a nationally declining trend. These are highlighted in **bold** below. See RCIA text for the reasons for this). **The Species Vulnerability Index** (SVI) devised by Birdlife International to rate susceptibility to wind energy developments for a small selection of species was used when available. For species where this was not available an equivalent rating was devised for the RCIA using a range of scientific literature reporting the effects of wind energy on birds.(*see Annex D*)			Final Sensitivity Rating (populations rated high, medium, low pass through to step 3)
		Negligible <0.5% of European Population	Low ≥0.5 - <1% European Population	Moderate ≥1 - <10% European Population	High >10% European Population	FINAL RELATIVE IMPORTANCE RATING (high, moderate, low, negligible)	IUCN European Population Conservation Status	Species Vulnerability Index Score (SVI)	FINAL VULNERABILITY RATING (high, moderate, low, negligible)	STEP 2 FINAL SENSITIVITY RATING (high, medium, low, negligible)
Greylag Goose	*Anser anser*	< 2,590	2590 - 5180	5180 - 51800	51800 - 518000	moderate*	LC	5	negligible	low
Tufted Duck	*Aythya fuligula*	< 5,510	5510 - 11020	11020 - 110200	110200 - 1102000	negligible	VU	2	low	negligible
Stock Dove	*Columba oenas*	< 5,610	5610 - 11220	11220 - 112200	112200 - 1122000	negligible	LC	2	negligible	negligible
Corncrake	*Crex crex*	< 12,900	12900 - 25800	25800 - 258000	258000 - 2580000	negligible	NT	5	low	negligible
Common Crane	*Grus grus*	< 1130	1130 - 2260	2260 - 22600	22600-226000	moderate*	LC	10	moderate	medium
Black Stork	*Ciconia nigra*	< 98	98 - 196	196 - 1960	1960 - 19600	low	LC	10	moderate	low
Eurasian Spoonbill	*Platalea leucorodia*	< 102	102 - 204	204 - 2040	2040 - 20400	negligible	LC	8	low	negligible
Pygmy Cormorant	*Microcarbo pygmaeus*	< 376	376 - 752	752 - 7520	7520 - 75200	moderate	LC	4	negligible	low
Eurasian Dotterel	*Eudromias morinellus*	< 128	128 - 256	256 - 2560	2560 - 25600	negligible	LC	3	negligible	negligible
Eurasian Curlew	*Numenius arquata*	< 2,120	2120 - 4240	4240 - 42400	42400 - 424000	negligible	VU	5	low	negligible
European Honey-buzzard	*Pernis apivorus*	< 1,180	1180 - 2360	2360 - 23600	23600 - 236000	negligible	LC	7	low	negligible
Lesser Spotted Eagle	*Clanga pomarina*	< 164	164 - 328	328 - 3280	3280 - 32800	negligible	LC	9	moderate	low
Greater Spotted Eagle	*Clanga clanga*	< 8	7.7 - 15.4	15.4 - 154	154 - 1540	negligible	EN	10	high	low
Western Marsh-harrier	*Circus aeruginosus*	< 993	993 - 1986	1986 - 19860	19860 - 198600	negligible	LC	8	low	negligible
Hen Harrier	*Circus cyaneus*	< 300	300 - 600	600 - 6000	6000 - 60000	negligible	NT	8	moderate	low
Montagu's Harrier	*Circus pygargus*	< 545	545 - 1090	1090 - 10900	10900 - 109000	negligible	LC	8	low	negligible
Eurasian Sparrowhawk	*Accipiter nisus*	< 4,030	4030 - 8060	8060 - 80600	80600 - 806000	negligible	LC	6	negligible	negligible

Red Kite	*Milvus milvus*	< 252.00	252 - 504	504 - 5040	5040 - 50400	negligible	NT	8	moderate	low
Eurasian Buzzard	*Buteo buteo*	< 8,140	8140 - 16280	16280 - 162800	162800 - 1628000	negligible	LC	6	negligible	negligible
Fieldfare	*Turdus pilaris*	< 142,000	142000 - 284000	284000 - 2840000	2840000 - 28400000	negligible	LC	2	negligible	negligible
Common Redstart	*Phoenicurus phoenicurus*	< 96,300	96300 - 192600	192600 - 1926000	1926000 - 19260000	negligible	LC	3	negligible	negligible
Goldcrest	*Regulus regulus*	< 200,000	200000 - 400000	400000 - 4000000	4000000 - 40000000	negligible	VU	3	low	negligible
Meadow Pipit	*Anthus pratensis*	< 96,700	96700 - 193400	193400 - 1934000	1934000 - 19340000	negligible	LC	3	negligible	negligible
Eurasian Siskin	*Spinus spinus*	< 136,000	136000 - 272000	272000 - 2720000	2720000 - 27200000	negligible	LC	1	negligible	negligible

* indicates rating raised by one level (e.g. low to moderate) based on additional information on relative importance of population in study area and/or vulnerability provided by ERG

CATEGORY 4, MIGRATORY AND WINTERING POPULATIONS (NOT CONCENTRATED IN EUROPE) —RELATIVE IMPORTANCE, VULNERABILITY AND SENSITIVITY SCORING

Common Name	Scientific Name	Relative Importance (The numbers in the columns below relate to the minimum number of individuals in the Unit of Analysis (UoA). The first 4 columns show for each Relative Importance class (negligible, low, moderate and high) the equivalent number of individuals that would need to be in the study area for the population to be assigned to a particular class. A class was assigned to each population based on information in the PWPP ESIAs, other relevant literature and expert judgement of the RCIA ornithologists. The final Relative Importance class assigned to each population was reviewed by the ERG.)					Vulnerability (Populations not on Serbian Red List and considered LC, had their ratings increased by one level e.g. medium to high if they had a nationally declining trend. These are highlighted in **bold** below. See RCIA text for the reasons for this). **The Species Vulnerability Index** (SVI) devised by Birdlife International to rate susceptibility to wind energy developments for a small selection of species was used when available. For species where this was not available an equivalent rating was devised for the RCIA using a range of scientific literature reporting the effects of wind energy on birds.(*See Annex D*)			Final Sensitivity Rating (populations rated high, medium, low pass through to step 3)
		Negligible <0.5% of Global Population	Low ≥0.5 - <1% Global Population	Moderate ≥1 - <10% Global Population	High >10% Global Population	FINAL RELATIVE IMPORTANCE RATING (high, moderate, low, negligible)	ICUN global risk category	Species Vulnerability Index Score (SVI)	FINAL VULNERABILITY RATING (high, moderate, low, negligible)	STEP 2 FINAL SENSITIVITY RATING (high, medium, low, negligible)
Bean Goose	*Anser fabalis*	< 3400	3400 - 6800	6800 - 68000	68000 - 680000	low*	LC	2	low*	low
Greater White-fronted Goose	*Anser albifrons*	< 15500	15500 - 31000	31000 - 310000	310000 - 3100000	low*	LC	6	low*	low
Common Goldeneye	*Bucephala clangula*	< 13500	13500 - 27000	27000 - 270000	270000 - 2700000	negligible	LC	2	negligible	negligible
Smew	*Mergellus albellus*	< 650	650 - 1300	1300 - 13000	13000 - 130000	negligible	LC	1	negligible	negligible
Common Pochard	*Aythya ferina*	< 9750	9750 - 19500	19500 - 195000	195000 - 1950000	negligible	VU	2	low	negligible
Ferruginous Duck	*Aythya nyroca*	< 903.5	903.5 - 1807	1807 - 18070	18070 - 180700	negligible	NT	2	low	negligible
Garganey	*Spatula querquedula*	< 13000	13000 - 26000	26000 - 260000	260000 - 2600000	negligible	LC	3	negligible	negligible
Mallard	*Anas platyrhynchos*	< 95000	95000 - 190000	190000 - 1900000	1900000 - 19000000	negligible	LC	5	negligible	negligible
White Stork	*Ciconia ciconia*	< 3500	3500 - 7000	7000 - 70000	70000 - 700000	moderate*	LC	10	moderate	medium
Glossy Ibis	*Plegadis falcinellus*	< 1150	1150 - 2300	2300 - 23000	23000 - 230000	negligible	LC	10	moderate	low
Wood Sandpiper	*Tringa glareola*	< 15500	15500 - 31000	31000 - 310000	310000 - 3100000	negligible	LC	3	negligible	negligible
Black Tern	*Chlidonias niger*	< 4000	4000 - 8000	8000 - 80000	80000 - 800000	negligible	LC	8	low	negligible
Osprey	*Pandion haliaetus*	< 1665	1665 - 3330	3330 - 33300	33300 - 333000	negligible	LC	6	negligible	negligible
Short-toed Snake-eagle	*Circaetus gallicus*	< 515	515 - 1030	1030 - 10300	10300 - 103000	negligible	LC	7	low	negligible
Golden Eagle	*Aquila chrysaetos*	< 1000	1000 - 2000	2000 - 20000	20000 - 200000	negligible	LC	10	moderate	low
Pallid Harrier	*Circus macrourus*	< 90	90 - 180	180 - 1800	1800 - 18000	negligible	NT	8	moderate	low
Northern Goshawk	*Accipiter gentilis*	< 6400	6400 - 12800	12800 - 128000	128000 - 1280000	negligible	LC	6	negligible	negligible

Black Kite	*Milvus migrans*	< 7350	7350 - 14700	14700 - 147000	147000 - 1470000	negligible	LC	8	low	negligible
Rough-legged Buzzard	*Buteo lagopus*	< 1665	1665 - 3330	3330 - 33300	33300 - 333000	negligible	LC	6	negligible	negligible
Long-legged Buzzard	*Buteo rufinus*	< 695	695 - 1390	1390 - 13900	13900 - 139000	negligible	LC	7	low	negligible
Common Kestrel	*Falco tinnunculus*	< 21550	21550 - 43100	43100 - 431000	431000 - 4310000	negligible	LC	6	negligible	negligible
Merlin	*Falco columbarius*	< 10000	10000 - 20000	20000 - 200000	200000 - 2000000	negligible	LC	4	negligible	negligible
Peregrine Falcon	*Falco peregrinus*	< 466.5	466.5 - 933	933 - 9330	9330 - 93300	negligible	LC	4	negligible	negligible
Bohemian Waxwing	*Bombycilla garrulus*	< 15000	15000 - 30000	30000 - 300000	300000 - 3000000	negligible	LC	1	negligible	negligible

* indicates rating raised by one level (e.g. low to moderate) based on additional information on relative importance of population in study area and/or vulnerability provided by ERG

Annex C. RCIA For Birds Results: Step 3- Likelihood of Effect and Final Risk Rating

CATEGORY 1, RESIDENT AND SUMMER BREEDING RAPTOR POPULATIONS—LIKELIHOOD OF EFFECT AND FINAL RISK RATING

Common Name	Scientific Name	**Question 1** What is the level of risk as a function of frequency of occurrence/relative abundance? (i.e. What is the level of risk per individual using PWPPs sites?)	**Question 2** What is the estimated exposure to risk throughout the year based on monthly occurrence records from ESIA baseline data?	**Question 3** What is the estimated seasonal exposure to risk throughout the year based on relevant information in scientific literature. Seasons were spring (March-May), summer (June-August), autumn (September-November) and winter (December-February)	**Question 4** Is breeding habitat available for the species population within the likely foraging distance of turbines at one or more PWPP?	**Question 5** Are migratory stopover habitats available for the species population within PWPPs?	**Total LoE Score**	**Step 2 Sensitivity Score- high, medium, low, negligible** (using RI*Vulnerability Matrix)	**LoE Score**: negligible, low, moderate, high	**Final Risk Category Rating**
Common Barn-owl	*Tyto alba*	2	2	4	4	N/A	10	low	high	Moderate
Short-toed Snake-eagle	*Circaetus gallicus*	1	0	4	4	N/A	9	high	medium	Major
Eastern Imperial Eagle	*Aquila heliaca*	1	0	4	4	N/A	9	high	medium	Major
Booted Eagle	*Hieraaetus pennatus*	2	2	3	4	N/A	11	high	high	Major
Western Marsh-harrier	*Circus aeruginosus*	4	4	4	4	N/A	16	medium	high	Major
Northern Goshawk	*Accipiter gentilis*	2	4	4	4	N/A	14	low	high	Moderate
White-tailed Sea-eagle	*Haliaeetus albicilla*	2	1	4	4	N/A	11	high	high	Major
Black Kite	*Milvus migrans*	1	1	4	3	N/A	9	high	medium	Major
Long-legged Buzzard	*Buteo rufinus*	1	1	4	4	N/A	10	medium	medium	Moderate
Red-footed Falcon	*Falco vespertinus*	1	1	3	3	N/A	8	low	low	Minor
Eurasian Hobby	*Falco subbuteo*	2	3	3	4	N/A	12	low	high	Moderate
Saker Falcon	*Falco cherrug*	4	4	4	4	N/A	16	high	high	Major

Scoring for questions 1-5
Question 1: (1)= Negligible; **(2)**=Low **(3)**= Moderate **(4)**= High

Question 2: Data from all PWPP ESIAs was pooled to assess the use by each population throughout the year. Each month in which use was recorded within PWPP ESIAs received a score of 0.3 This value was set to be equivalent to the scoring of 'seasonal exposure to risk' below.
Question 3: Each season in which potentially at-risk individuals were assessed to use the study area received a score of 1, allowing a maximum score of 4 if a population was likely to use the area throughout the year
Question 4: 1) = unlikely (breeding not recorded on Serbian Red List within likely species foraging distance from PWPPs and/or typical breeding habitat for the species is not available based on known habitat types within likely species foraging distance from PWPPs) **(2)** = possible (breeding not recorded on Serbian Red List map within likely species foraging distance but typical breeding habitat for the species is available based on known habitat types within likely species foraging distance from PWPPs) **(3)** = probable (breeding recorded on Serbian Red List map within likely foraging range, but current occurrence distribution not within foraging range therefore species assumed not to be currently using this area for breeding activities).**(4).** =confirmed (current occurrence range recorded on Serbian Red List map within likely species foraging distance from PWPPs and/or species recorded or judged to be recently (<10yrs) using this area for breeding activities based on information in the ESIAs or other documentation)
Question 5: Applicable to category 3 and 4 only

CATEGORY 2, RESIDENT AND SUMMER BREEDING NON-RAPTOR POPULATIONS—LIKELIHOOD OF EFFECT AND FINAL RISK RATING

Common Name	Scientific Name	**Question 1** What is the level of risk as a function of frequency of occurrence/relative abundance? (i.e. What is the level of risk per individual using PWPPs sites?)	**Question 2** What is the estimated exposure to risk throughout the year based on monthly occurrence records from ESIA baseline data?	**Question 3** What is the estimated seasonal exposure to risk throughout the year based on relevant information in scientific literature. Seasons were spring (March-May), summer (June-August), autumn (September-November) and winter (December-February)	**Question 4** Is breeding habitat available for the species population within the likely foraging distance of turbines at one or more PWPP?	**Question 5** Are migratory stopover habitats available for the species population within PWPPs?	Total LoE Score	Step 2 Sensitivity Score- high, medium, low, negligible (using RI*Vulnerability Matrix)	LoE Score: negligible, low, moderate, high	Final Risk Category Rating
Common Quail	*Coturnix coturnix*	2	3	3	4	N/A	12	low	high	Moderate
Grey Partridge	*Perdix perdix*	1	1	4	4	N/A	10	low	medium	Minor
Ferruginous Duck	*Aythya nyroca*	1	0	3	1	N/A	5	low	negligible	Negligible
Gadwall	*Mareca strepera*	1	0	4	4	N/A	9	low	medium	Minor
European Nightjar	*Caprimulgus europaeus*	2	0	2	4	N/A	8	low	low	Minor
White Stork	*Ciconia ciconia*	1	0	2	4	N/A	7	medium	low	Minor
Purple Heron	*Ardea purpurea*	1	0	3	3	N/A	7	low	low	Minor
Pygmy Cormorant	*Caprimulgus europaeus*	1	0	4	1	N/A	6	low	negligible	Negligible
Great Cormorant	*Phalacrocorax carbo*	2	1	4	1	N/A	8	low	low	Minor
Northern Lapwing	*Vanellus vanellus*	2	1	3	4	N/A	10	low	medium	Minor

Common Snipe	*Gallinago gallinago*	1	1	4	2	N/A	8	high	low	Moderate
Common Sandpiper	*Actitis hypoleucos*	1	2	4	2	N/A	9	high	medium	Major
Whiskered Tern	*Chlidonias hybrida*	2	1	3	4	N/A	10	low	medium	Minor
Black Tern	*Chlidonias niger*	1	0	3	1	N/A	5	high	negligible	Minor
European Bee-eater	*Merops apiaster*	3	2	3	4	N/A	12	low	high	Moderate
Eurasian Wryneck	*Jynx torquilla*	1	0	3	2	N/A	6	low	negligible	Negligible
Grey-faced Woodpecker	*Picus canus*	1	0	4	2	N/A	7	low	low	Minor
Eurasian Green Woodpecker	*Picus viridis*	1	0	4	2	N/A	7	low	low	Minor
Red-backed Shrike	*Lanius collurio*	1	2	3	4	N/A	10	low	medium	Minor
Lesser Grey Shrike	*Lanius minor*	1	1	3	4	N/A	9	low	medium	Minor
Common Raven	*Corvus corax*	1	2	4	4	N/A	11	low	high	Moderate
Greater Short-toed Lark	*Calandrella brachydactyla*	1	0	2	4	N/A	7	high	low	Moderate
Woodlark	*Lullula arborea*	1	0	3	2	N/A	6	low	negligible	Negligible
Eurasian Skylark	*Alauda arvensis*	3	4	4	4	N/A	15	low	high	Moderate
Crested Lark	*Galerida cristata*	2	4	4	4	N/A	14	low	high	Moderate
Collared Sand Martin	*Riparia riparia*	1	1	3	4	N/A	9	medium	medium	Moderate
Barred Warbler	*Sylvia nisoria*	1	0	3	2	N/A	6	low	negligible	Negligible
Common Nightingale	*Luscinia megarhynchos*	1	1	3	2	N/A	7	low	low	Minor
Whinchat	*Saxicola rubetra*	1	2	3	4	N/A	10	low	medium	Minor
Northern Wheatear	*Oenanthe oenanthe*	2	3	3	4	N/A	12	low	high	Moderate
Tawny Pipit	*Anthus campestris*	1	2	3	4	N/A	10	low	medium	Minor

Scoring for questions 1-5

Question 1: (1)= Negligible; **(2)**=Low **(3)**= Moderate **(4)**= High

Question 2: Data from all PWPP ESIAs was pooled to assess the use by each population throughout the year. Each month in which use was recorded within PWPP ESIAs received a score of 0.3 This value was set to be equivalent to the scoring of 'seasonal exposure to risk' below.

Question 3: Each season in which potentially at-risk individuals were assessed to use the study area received a score of 1, allowing a maximum score of 4 if a population was likely to use the area throughout the year

Question 4: 1) = unlikely (breeding not recorded on Serbian Red List within likely species foraging distance from PWPPs and/or typical breeding habitat for the species is not available based on known habitat types within likely species foraging distance from PWPPs) **(2)** = possible (breeding not recorded on Serbian Red List map within likely species foraging distance but typical breeding habitat for the species is available based on known habitat types within likely species foraging distance from PWPPs) **(3)** = probable (breeding recorded on Serbian Red List map within likely foraging range, but current occurrence distribution not within foraging range therefore species assumed not to be currently using this area for breeding activities).**(4).** =confirmed (current occurrence range recorded on Serbian Red List map within likely species foraging distance from PWPPs and/or species recorded or judged to be recently (<10yrs) using this area for breeding activities based on information in the ESIAs or other documentation)

Question 5: Applicable to category 3 and 4 only

CATEGORY 3, MIGRATORY AND WINTERING POPULATIONS (CONCENTRATED WITHIN EUROPE)—LIKELIHOOD OF EFFECT AND FINAL RISK RATING

Common Name	*Scientific Name*	**Question 1** What is the level of risk as a function of frequency of occurrence/relative abundance? (i.e. What is the level of risk per individual using PWPPs sites?)	**Question 2** What is the estimated exposure to risk throughout the year based on monthly occurrence records from ESIA baseline data?	**Question 3** What is the estimated seasonal exposure to risk throughout the year based on relevant information in scientific literature. Seasons were spring (March-May), summer (June-August), autumn (September-November) and winter (December-February)	**Question 4** Is breeding habitat available for the species population within the likely foraging distance of turbines at one or more PWPP?	**Question 5** Are migratory stopover habitats available for the species population within PWPPs?	Total LoE Score	Step 2 Sensitivity Score- high, medium, low, negligible (using RI*Vulnerability Matrix)	LoE Score: negligible, low, moderate, high	Final Risk Category Rating
Greylag Goose	*Anser anser*	3	1	2	N/A	4	10	low	medium	Minor
Common Crane	*Grus grus*	1	1	2	N/A	4	8	medium	low	Minor
Black Stork	*Ciconia nigra*	1	1	2	N/A	2	6	low	negligible	Negligible
Pygmy Cormorant	*Microcarbo pygmaeus*	1	0	2	N/A	0	3	low	negligible	Negligible
Lesser Spotted Eagle	*Clanga pomarina*	1	0	2	N/A	1	4	low	negligible	Negligible
Greater Spotted Eagle	*Clanga clanga*	1	0	3	N/A	2	6	low	negligible	Negligible
Hen Harrier	*Circus cyaneus*	1	3	3	N/A	4	11	low	high	Moderate
Red Kite	*Milvus milvus*	1	0	2	N/A	2	5	low	negligible	Negligible

Scoring for questions 1-5

Question 1: (1)= Negligible; **(2)**=Low **(3)**= Moderate **(4)**= High

Question 2: Data from all PWPP ESIAs was pooled to assess the use by each population throughout the year. Each month in which use was recorded within PWPP ESIAs received a score of 0.3 This value was set to be equivalent to the scoring of 'seasonal exposure to risk' below.

Question 3: Each season in which potentially at-risk individuals were assessed to use the study area received a score of 1, allowing a maximum score of 4 if a population was likely to use the area throughout the year

Question 4: Applicable to category 1 and 2 only

Question 5: (0) = Typical migratory/wintering habitats not likely at PWPPs. Evidence from ESIAs, scientific literature and expert judgement indicates that the population does not use or the PWPPs during the migratory/wintering period, and there is negligible potential for them to do so.**(2)** =Typical migratory/wintering habitat available at PWPPs. Evidence from ESIAs, other literature or expert judgement indicates/suggests that the population uses or has the potential to use these habitats infrequently. **(4)** = Typical migratory/wintering habitat available at PWPPs. Evidence from ESIAs, other literature or expert judgement indicates/suggests that the population uses, or has the potential to use, these habitats frequently.

CATEGORY 4, MIGRATORY AND WINTERING POPULATIONS (NOT CONCENTRATED WITHIN EUROPE)—LIKELIHOOD OF EFFECT AND FINAL RISK RATING

Common Name	Scientific Name	**Question 1** What is the level of risk as a function of frequency of occurrence/relative abundance? (i.e. What is the level of risk per individual using PWPPs sites?)	**Question 2** What is the estimated exposure to risk throughout the year based on monthly occurrence records from ESIA baseline data?	**Question 3** What is the estimated seasonal exposure to risk throughout the year based on relevant information in scientific literature. Seasons were spring (March-May), summer (June-August), autumn (September-November) and winter (December-February)	**Question 4** Is breeding habitat available for the species population within the likely foraging distance of turbines at one or more PWPP?	**Question 5** Are migratory stopover habitats available for the species population within PWPPs?	Total LoE Score	Step 2 Sensitivity Score- high, medium, low, negligible (using RI*Vulnerability Matrix)	LoE Score: negligible, low, moderate, high	Final Risk Category Rating
Bean Goose	*Anser fabalis*	2	1	2	N/A	4	9	low	medium	Minor
Greater White-fronted Goose	*Anser albifrons*	3	2	2	N/A	4	11	medium	high	Moderate
White Stork	*Ciconia ciconia*	1	1	2	N/A	4	8	low	medium	Moderate
Glossy Ibis	*Plegadis falcinellus*	1	0	2	N/A	2	5	low	negligible	Negligible
Golden Eagle	*Aquila chrysaetos*	1	0	2	N/A	2	5	low	negligible	Negligible
Pallid Harrier	*Circus macrourus*	1	0	2	N/A	2	5	low	negligible	Negligible

Scoring for questions 1-5

Question 1: (1)= Negligible; **(2)**=Low **(3)**= Moderate **(4)**= High

Question 2: Data from all PWPP ESIAs was pooled to assess the use by each population throughout the year. Each month in which use was recorded within PWPP ESIAs received a score of 0.3 This value was set to be equivalent to the scoring of 'seasonal exposure to risk' below.

Question 3: Each season in which potentially at-risk individuals were assessed to use the study area received a score of 1, allowing a maximum score of 4 if a population was likely to use the area throughout the year

Question 4: Applicable to category 1 and 2 only

Question 5: (0) = Typical migratory/wintering habitats not likely at PWPPs. Evidence from ESIAs, scientific literature and expert judgement indicates that the population does not use or the PWPPs during the migratory/wintering period, and there is negligible potential for them to do so.**(2)** =Typical migratory/wintering habitat available at PWPPs. Evidence from ESIAs, other literature or expert judgement indicates/suggests that the population uses or has the potential to use these habitats infrequently. **(4)** = Typical migratory/wintering habitat available at PWPPs. Evidence from ESIAs, other literature or expert judgement indicates/suggests that the population uses, or has the potential to use, these habitats frequently.

Annex D. Vulnerability Scoring: Species Vulnerability Index (SVI) for Non-MSB Species

This annex describes the process used in step 2 of the RCIA Framework for birds (see Section 7.3) to produce a Species Vulnerability Index (SVI) for non-migratory soaring birds (MSB). The non-MSB SVI was developed for the RCIA using a scoring system designed to be broadly comparable with the existing (1-10 scored) SVI index for MSBs[89]. To reflect the principal types wind energy related risk to non-MSB, compared with MSBs, the index incorporates (i) displacement/habitat change and (ii) barrier effects as well as collision.

EU guidance document "Wind energy developments and Natura 2000 (2011) was the principal resource for developing the SVI for non-MSBs. This document provides guidance on ensuring that wind energy developments are compatible with the Habitats and Birds Directives. It is designed for use by competent authorities and developers and other practitioners who are involved in the planning, design, implementation and approval of wind farm plans or projects, and provides (in Annex II) a review of species vulnerability to wind farm developments based data from a wide variety of European studies.

Annex II provides a simple, species-specific, wind energy impact ranking for,(i) collision risk, (ii) displacement effects (iii) barrier effects, and (iv) habitat change/loss, as well as potential positive effects, based on evidence from existing wind farm developments. For each species each of these potential adverse effects are ranked in Annex II as follows:

- XXX = evidence of substantial risk or impact;
- XX = evidence or indications of risk or impact;
- X = potential risk or impact; and
- x =small or non-significant risk or impact, but still to be considered in assessments.

Devising the non-MSB SVI

First the EU guidance rankings for collision risk were assigned a scoring range as follows

- XXX = 9-10;
- XX = 7-8;
- X = 4-6; and
- x = 1-3

Within each of these ranges the collision risk score was refined using the number of existing recorded fatalities from wind energy projects within Europe[90] (Table 1, column 3) to derive a 1-10 scoring system (Table 1, column 4). The final collision risk score was adjusted for (i) displacement / habitat change and (ii) barrier effects based on scores applied to the EU guidance rankings for these two effects (column 5 and

[89] Birdlife International. (2012). Developing and testing the methodology for assessing and mapping the sensitivity of migratory birds to wind energy developments. Final report. Strix for Birdlife International. Cambridge. 17 January 2012
[90] Dürr, T. (2018). Bird fatalities at wind turbines in Europe. 18 March 2018 www.lfu.brandenburg.de/cms/detail.php/bb1.c.312579.de

6).

The final SVI score for each non-MSB population was calculated by adding the scores in column 4, 5 and 6. Any scores that exceeded 10 were assign 10.

This method was applied to all species where information was provided in Annex II of the EU guidance document. For those species where this information was not provided, suitable surrogate species information (i.e. same/similar family or ecological behavior) was used. For approximately 17 passerine species no suitable surrogate information was available. In these circumstances RCIA ornithologists provided a score, based on the knowledge of wind and wildlife impacts and information in relevant literature[91].

[91] In particular, Gove, B., Langston, R. H. W., McCluskie, A., Pullan, J. D., & Scrase, I. (2013). Wind farms and birds: an updated analysis of the effects of wind farms on birds, and best practice guidance on integrated planning and impact assessment. Birdlife International on behalf of the Bern Convention.

TABLE 1. SVI FOR NON-MSB POPULATIONS

EU guidance (2011) definition	EU guidance (2011) ranking	Number recorded collisions at existing EU wind projects (Durr 2018)	[A] Final collision risk score	[B] Adjustment for displacement, habitat, loss/change	[C] Adjustment for barrier effects	Final scoring (max score =10)
Evidence of substantial risk or impact	XXX	10+	10	**Add 1 to collision risk score** if rating for displacement or habitat loss in EU guidance is 'x' or 'X', **Add 2 to collision risk score** if rating for displacement or habitat loss in EU guidance is 'XX' or 'XXX',	**Add 1 to collision risk score** if rating for barrier effect in EU guidance is 'x' or 'X', **Add 2 to collision risk score** if rating for barrier effect in EU guidance is 'XX' or 'XXX',	Final SVI scoring (max 10) = [A] + [B] + [C]
	XXX	0 and <10	9			
Evidence or indications of risk or impact	XX	10 +	8			
	XX	0 and <10	7			
Potential risk or impact	X	> 50+	6			
	X	10 and <50	5			
	X	0 and <10	4			
Small or non-significant risk or impact, but still to be considered in assessments	x	> 50+	3			
	x	10 and <50	2			
	x	0 and <10	1			

Annex E. RCIA For Bats Results: Step 2- Species Sensitivity Results

Common Name	Scientific Name	Relative Importance			Vulnerability				Final Sensitivity Rating (populations rated high, medium, low pass through to step 3)
		For each bat population, the relative importance proportional to the UoA was identified. This was done by calculating the percentage of the surface area of the EOO of the species that is inside the study area with respect to the total area of the EOO in the country (Portion of EOO (km2) within the study area / EOO (km2) in Serbia × 100 = Relative Importance (%)).			For each species, vulnerability was categorized using scores assinged to the: 1) IUCN national guidance on conservation status (Paunović 2016) and 2) the EUROBATS risk rating (Rodrigues et. al. 2015).				
		The 'EOO Score' column gives "*the % of the EOO within the study area*' . These percentages were assigned to one of four relative importance classes (negligible ≤ 0.5; low > 0.5 and ≤ 1.0; moderate > 1.0 and ≤ 10.0; High > 10.0) Relative importance ratings for each species were reviewed and revised either up or down based on supplementary, relative importance information provided by the ERG to obtain a 'Final Relative Importance Rating'			The vulnerability scores were determined by adding the scores assigned to (1) IUCN national conservation status and (2) the EUROBATS risk ratings. Summed scores were partitioned into 4 classes based on the quartile ranges and these were assigned to four classes of vulnerability: high, moderate, low, and negligible. Vulnerability ratings for each species were reviewed and revised either up or down based on supplementary information on vulnerability provided by the ERG to obtain a 'Final Vulnerability Rating'				
		EOO Score	Relative Importance Score	**FINAL RELATIVE IMPORTANCE RATING**	IUCN conservation status	Eurobats Risk Rating	Vulnerability Rating	**FINAL VULNERABILITY RATING**	**STEP 2 FINAL SENSITIVITY RATING**
			negligible ≤ 0.5; low > 0.5 and ≤ 1.0; moderate > 1.0 and ≤ 10.0; High > 10.0	high, moderate, low, negligible)	(0) = LC ; (1) = NT or DD ; (2) = VU ; (3) = CR or EN	(0) = Low. (1) = Medium. (2) = High	(high, moderate, low, negligible)	(high, moderate, low, negligible)	(high, medium, low, negligible)
Greater horseshoe bat	*Rhinolophus ferrumeqinum*	1.85	low	low	0	0	negligible	negligible	negligible
Western barbastelle bat	*Barbastella barbastellus*	0	negligible	negligible	1	1	moderate	moderate	low
Serotine bat	*Eptesicus serotinus*	9.68	moderate	moderate	0	1	moderate	low	low
Savi's pipistrelle bat	*Hypsugo savii*	8	moderate	moderate	0	2	moderate	moderate	medium
Schreiber's bent-winged bat	*Miniopterus schreibersii*	0	negligible	negligible	0	2	moderate	moderate	low
Alcathoe whiskered bat	*Myotis alcathoe*	0	negligible	low	1	0	low	low	low
Lesser mouse-eared bat	*Myotis blythii oxygnathus*	6.12	moderate	low	1	0	moderate	low	low
Brandt's bat	*Myotis brandtii*	0	negligible	negligible	1	0	low	low	negligible
Daubenton's bat	*Myotis daubentonii*	0	negligible	negligible	0	0	negligible	negligible	negligible

Geoffroy's bat	*Myotis emarginatus*	7.14	moderate	moderate	0	0	negligible	negligible	low
Greater mouse-eared bat	*Myotis myotis*	0	negligible	negligible	1	0	moderate	low	negligible
Whiskered bat	*Myotis mystacinus*	0	negligible	negligible	0	0	negligible	negligible	negligible
Natterer's bat	*Myotis nattereri*	15.38	High	High	1	0	low	low	medium
Leisler's bat	*Nyctalus leisleri*	0	negligible	negligible	1	2	high	high	low
Noctule bat	*Nyctalus noctula*	1.72	low	low	0	2	moderate	moderate	low
Kuhl's pipistrelle bat	*Pipistrellus kuhlii*	12	High	High	0	2	moderate	moderate	high
Nathusius' pipistrelle bat	*Pipistrellus nathusii*	20.83	High	High	0	2	moderate	moderate	high
Common pipistrelle bat	*Pipistrellus pipistrellus*	20	High	High	0	2	moderate	moderate	high
Soprano pipistrelle bat	*Pipistrellus pygmaeus*	18.18	High	High	0	2	moderate	moderate	high
Brown long-eared bat	*Plecotus auritus*	18.75	high	high	2	0	moderate	moderate	high
Grey long-eared bat	*Plecotus austriacus*	8.33	moderate	moderate	0	0	negligible	negligible	low
Parti-coloured bat	*Vespertilio murinus Linnaeus*	0	negligible	negligible	0	2	moderate	moderate	low

Annex F. RCIA For Bats Results: Step 3- Likelihood of Effect and Final Risk Rating

Common Name	Scientific Name	Question 1	Question 2	Question 3	Question 4	LoE Score: negligible, low, moderate, high	FINAL LoE SCORE[1]: negligible, low, moderate, high	Step 2 Sensitivity Score- high, medium, low, negligible (using RI*Vulnerability Matrix)	Final Risk Category Rating
		What is the level of risk as a function of the spatial extent of detection?	Is breeding habitat available within the maximum foraging distance of turbines at PWPPs?	What is the estimated exposure to risk throughout the year based on monthly occurrence records from ESIA baseline data?	What is the estimated seasonal exposure to risk throughout the year based on relevant information in Paunović 2016 + ESIA baseline data.				
		(0) No projects/0%; (1) one project/33%; (2) two projects (66%), and; (3) three projects (100%)	(1) unlikley; (2) possible; (3) probable; (4) confirmed	Each month in which use was recorded within PWPP ESIAs received a score of 0.3	Each season received a score of 1: spring migration; breeding/maternity, and; fall migration.				
Western barbastelle bat	*Barbastella barbastellus*	1	2	0	0	negligible	negligible	low	negligible
Serotine bat	*Eptesicus serotinus*	3	4	2.4	3	high	high	low	moderate
Savi's pipistrelle bat	*Hypsugo savii*	2	4	1.5	3	high	high	medium	major
Schreiber's bent-winged bat	*Miniopterus schreibersii*	0	2	0	1	negligible	negligible	low	negligible
Alcathoe whiskered bat	*Myotis alcathoe*	1	1	0	1	negligible	negligible	low	negligible
Lesser mouse-eared bat	*Myotis blythii oxygnathus*	1	4	0	3	medium	medium	low	minor
Geoffroy's bat	*Myotis emarginatus*	2	4	1.2	2	medium	medium	low	minor
Natterer's bat	*Myotis nattereri*	1	4	1.2	1	medium	negligible	medium	minor
Leisler's bat	*Nyctalus leisleri*	2	2	1.5	2	medium	high	low	moderate
Noctule bat	*Nyctalus noctula*	3	4	2.7	3	high	high	low	moderate
Kuhl's pipistrelle bat	*Pipistrellus kuhlii*	3	4	2.7	3	high	high	high	major
Nathusius' pipistrelle bat	*Pipistrellus nathusii*	2	4	2.1	3	high	high	high	major
Common pipistrelle bat	*Pipistrellus pipistrellus*	3	4	2.4	3	high	high	high	major
Soprano pipistrelle bat	*Pipistrellus pygmaeus*	2	4	0.6	2	medium	negligible	high	minor

Brown long-eared bat	*Plecotus auritus*	2	4	0.3	1	medium	negligible	medium	minor
Grey long-eared bat	*Plecotus austriacus*	2	4	0.3	1	medium	medium	low	minor
Parti-coloured bat	*Vespertilio murinus Linnaeus*	2	2	2.1	3	medium	negligible	low	minor

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