

Krivača Wind Farm ESIA Addendum

December 2017

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Glossary

Acronym	Definition
AIS	Alien Invasive Species
CAA	Civil Aviation Authority
CBD	Convention on Biological Diversity
C-ESMP	Construction Environmental and Social Management Plan
CLO	Community Liaison Officer
dB	Decibel
D-ESMP	Decommissioning Environmental and Social Management Plan
DSO	Distribution System Operator
EC	European Commission
EHS Guidelines	World Bank Group Environmental, Health, and Safety Guidelines
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMI	Electric and Magnetic Interference
EPRP	Emergency Preparedness and Response Plan
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management and Monitoring Plan
EU	European Union
GHGs	Greenhouse Gases
GIIP	Good International Industry Practice
HRRP	Habitat Removal and Reinstatement Plan
IBA	Important Bird Area
IEMI	International Electric and Magnetic Interference
IFC	International Finance Corporation
IPA	Important Plant Area
IUCN	International Union for Conservation of Nature and Natural Resources
KPI	Key performance indicator
LCA	Landscape character area
LT	Long term
MAB	Man and Biosphere
MAEP	Ministry of Agriculture and Environmental Protection
MV	Medium voltage
NGOs	Non-governmental Organisation
NTS	Non-technical Summary
O-ESMP	Operational Environmental and Social Management Plan
O&M	Operations and maintenance
OHL	Overhead Transmission Lines
OHS	Occupational Health and Safety
PBA	Prime Butterfly Areas

Acronym	Definition
PDR	Detailed Regulation Plan (acronym is appropriate to Serbian language)
PSs	Performance Standards
RoW	Right of Way
SEP	Stakeholder Engagement Plan
ST	Short term
TMP	Traffic Management Plan
TSO	Transmission System Operator
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WB	World Bank
WDPA	World Database on Protected Areas
WTG	Wind Turbine Generators
ZTV	Zone of theoretical visibility

Units and measures

Abbreviation	Unit
ha	hectare
m	metres
masl	Metres above sea level
G	gauss
Hz	Hertz
km	Kilometres
kV	Kilovolts
MV	Medium-voltage
T	tesla
V/m	Volts per metre

1 Introduction

1.1 General introduction

Ivicom Energy d.o.o. (the Sponsor) is proposing to develop a 102.3 megawatt (MW) wind farm in Krivača in Serbia ('the Project'). The Project is planned to consist of wind turbine generators (WTGs), overhead transmission lines (OHLs), substations and roads. More details of Project components are provided in section 1.2.

For Serbian national permitting purposes, the Project has been subject to three environmental impact assessments (EIAs), one undertaken for the wind farm and two for the 110kilovolt (kV) OHLs. The Project is now seeking finance from the International Finance Corporation (IFC). As part of the financing requirements of IFC, further environmental and social impact assessments (ESIA) were identified as being required.

Mott MacDonald Limited has been appointed by the IFC as the international environmental consultant to undertake an ESIA addendum (the 'ESIA addendum') to support its financing of the Project. This ESIA addendum has been completed by Mott MacDonald and Link 011¹ in line with the IFC Performance Standards on Environmental and Social Sustainability (2012) (IFC PSs) and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines). This ESIA addendum presents supplementary studies to address gaps between the information and assessments presented in the national EIAs and IFC requirements.

1.2 Main Project characteristics

The Project will have a total installed capacity of 102.3MW and will consist of 31 WTGs, each with a capacity of 3.3MW². The national EIA for the wind farm (2015) was based on 38 WTG locations, but the number of WTGs was subsequently reduced to 31 to meet the current requirements for the grid connection. The remaining seven WTG locations have been kept in the design as potential additional positions for any future expansion of the Project.

The additional positions are referenced below and presented in Figure 2 and Figure 3 for illustration purposes but it is understood that these will not be utilised for the planned Project and have therefore not been assessed in detail in this ESIA. These alternative positions remain referenced within the report where appropriate.

The WTGs will be grouped into four clusters:

- Venac (WTGs T1-1 to T1-15, with T1-2, T1-3 and T1-7 being future expansion/alternative positions)
- Tilva (WTGs T2-1 to T2-5)
- Debelo brdo (WTGs T3-1 to T3-11, with T3-8 to T3-11 being future expansion/alternative positions)
- Rakobarski vis (WTGs T4-1 to T4-7)

¹ Link 011 are the consultants providing the social aspects of the ESIA addendum as well as the stakeholder engagement plan and the community investment plan.

² The WTG model is still to be confirmed but will be the Vestas V126-3.3MW or Siemens SWT-3.3-130.

Other Project components which are shown in Figure 1, Figure 2 and Figure 3 include:

- On-site 110/33kV substation
- Two single 110kV OHLs connecting the on-site substation to existing substations at Neresnica and Veliko Gradište
- Internal single 35kV and two double 35kV OHLs connecting the on-site substation with the WTG clusters
- An underground MV electrical collection system
- An O&M building (optional)
- 20.6km of access roads
- 20km of service roads
- New line bay at the existing substation at Neresnica
- New line bay at the existing substation at Veliko Gradište

1.3 Project location

As shown in Figure 1, the Project is located in the northeast region of Serbia, in the Braničevo District, approximately 100km east-southeast of the capital Belgrade, covering an area of approximately 242ha.

The Project's 31 WTGs, on-site substation and three internal 35kV OHLs are located on the boundary between the municipalities of Golubac and Kučevo. The two 110kV OHLs for grid connection will cross the municipalities of Golubac, Kučevo and Veliko Gradište.

North-northeast of the planned Project is the Municipality of Golubac, an area of 368km², and a decreasing population of approximately 7,795³. The River Danube, which is the national border with Romania, sits directly north of Golubac and is 2.3km from the nearest proposed WTG. To the south of the site is the Municipality of Kučevo, an area of 721km², and a population of around 14,192³. East of the Project site is Đerdap National Park, with the closest WTG being located 212m from its border.

The location of the WTGs in relation to the National Park Đerdap are illustrated in Figure 2 below.

³Population data source: Statistical institute of the Republic of Serbia (Municipalities and Regions, most recent official estimated data as of 30.06.2015.)

Figure 1: Project location and OHLs

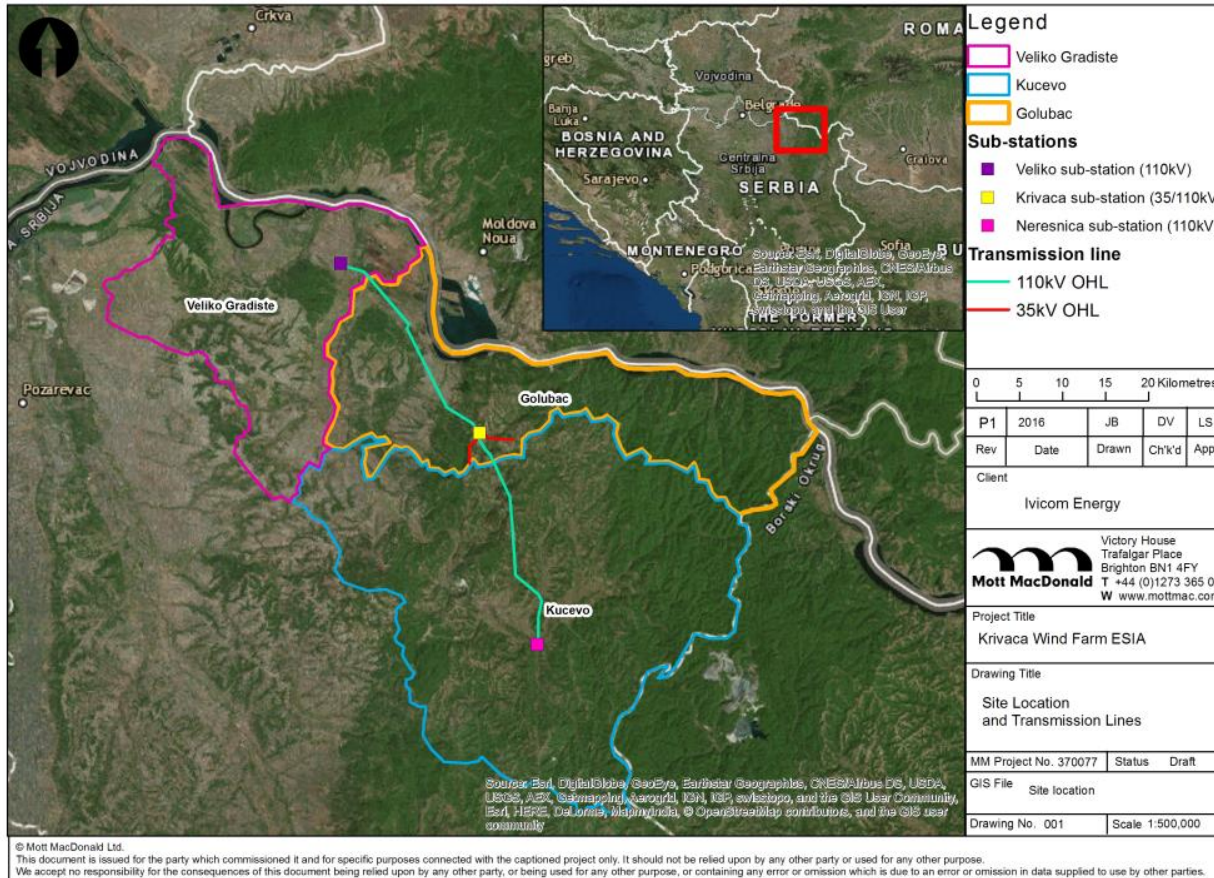


Figure 2: Project location in relation to Đerdap National Park

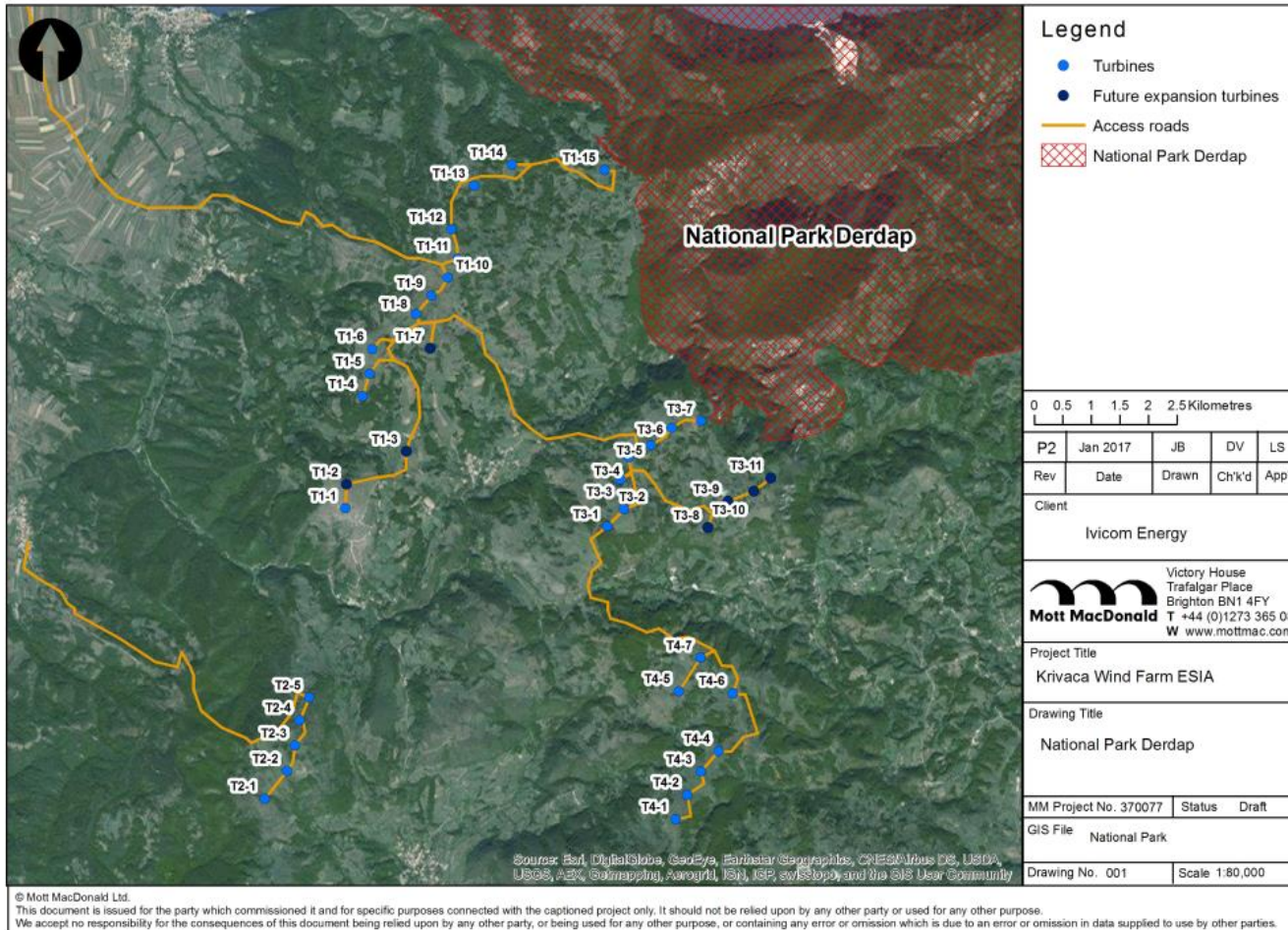
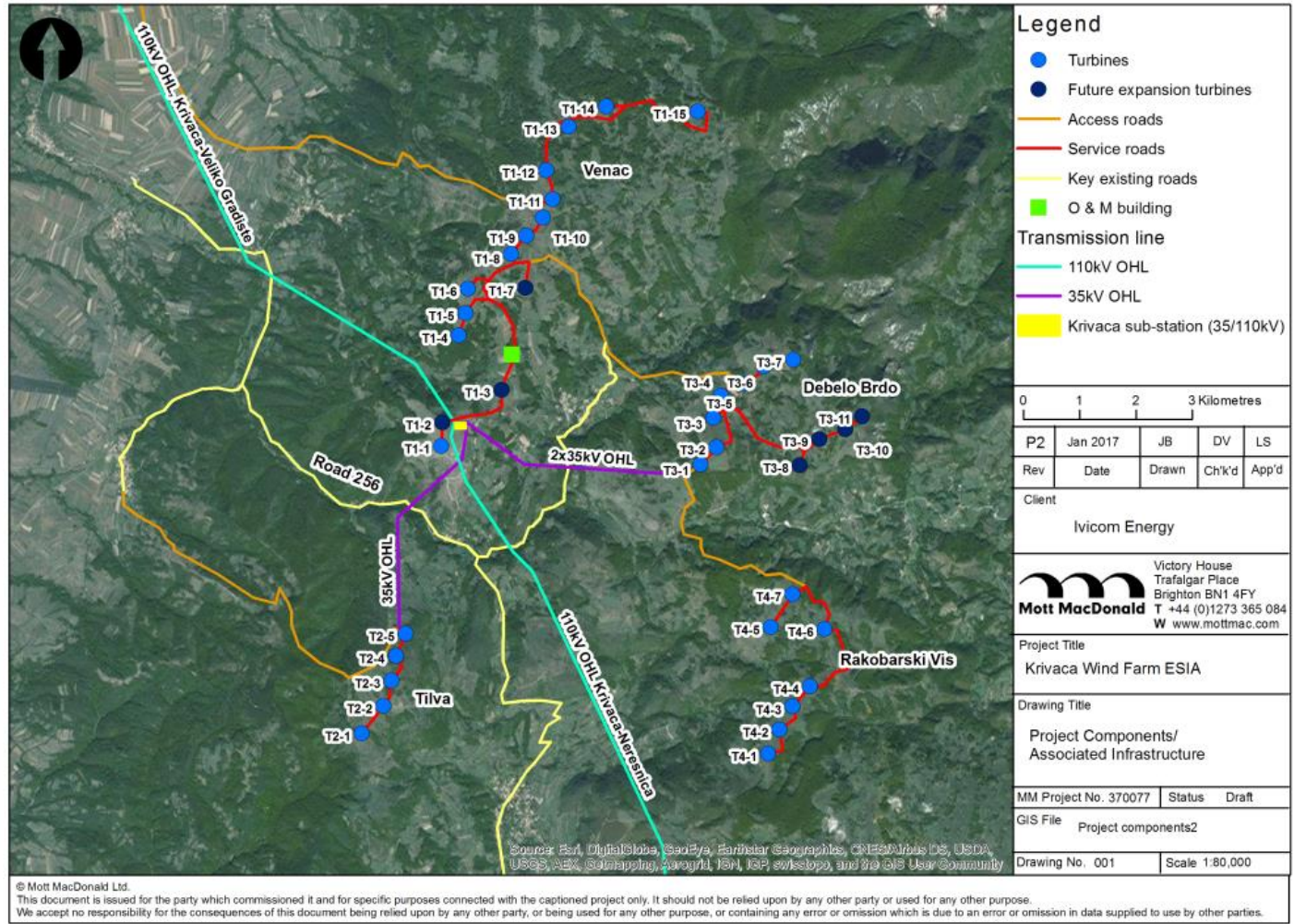


Figure 3: Key Project components



1.4 Outline of the ESIA addendum and associated documentation

The purpose of this ESIA addendum is to assess the Project's potential environmental and social impacts, in order to satisfy the principles of the IFC, and also to identify and define mitigation and management measures which are in accordance with international standards.

The ESIA addendum will present the findings of the environmental and social impact assessment in compliance with applicable regulations, legislation and guidance.

A scoping exercise and report has been undertaken for the Project, in order to define the terms of reference and identify the areas where further assessment is necessary in order to satisfy IFC standards. Therefore, the depth and level of appraisal for different aspects will vary accordingly, in relation to the outcome of the scoping exercise.

Although the ESIA addendum will identify both positive and negative potential impacts, it will focus upon describing and mitigating negative impacts. A more detailed description of the ESIA addendum methodology can be found in section 1.10.

This ESIA addendum is comprised of three volumes organised as follows:

- Volume I: Non-technical summary (NTS)
- Volume II: ESIA addendum report including framework environmental and social management plan (ESMP) and environmental and social action plan (ESAP)
- Volume III: ESIA addendum technical appendices

This report comprises Volume II of the overall ESIA addendum documentation.

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1.5 Documentation associated with this statement

The ESIA addendum documentation will also be supported by the following:

- Stakeholder engagement plan (SEP)
- Community investment plan

1.6 Availability of the impact assessment documentation

The ESIA addendum and other related documentation will be available at the following locations:

- The NTS of the ESIA addendum and SEP, in Serbian and English, will be placed on the Ivicom Energy website (<http://www.ivicom-energy.com>)
- The full ESIA addendum, NTS and SEP, in Serbian and English, will be held at the Ivicom Energy d.o.o office in Žagubica (see contact details in section 1.4) and in the municipalities Golubac and Kučevo.

Information pertaining to the progress of the Project including the findings of the additional impact assessment (ESIA addendum) will also be presented at two public meetings, one in Golubac municipality and the other in Kučevo municipality. Ivicom Energy and environmental and social experts will be available to respond to questions at the meetings.

1.7 Relevant legal aspects in the Republic of Serbia

1.7.1 Environmental impact assessment of wind farms

The European Union (EU) Directive 2001/42/EC on strategic EIA was transposed into Serbian law in 2004 through the Law on Strategic Environmental Impact Assessment (Official Gazette of the RS, No.135/04). This legislation aims to identify and assess the environmental consequences of the individual environmental plans and programs at the preparatory stage, before they are adopted.

Directive 91/11/EC on EIA was transposed into Serbian legislation in 2004, by the Law on Environmental Impact Assessment (Official Gazette of the RS, No.135/04, 36/09). The law ensures that the environmental impacts of projects are identified and assessed prior to permission being granted. The law also outlines the project categories that are subject to an EIA, the procedure to be implemented and the mandatory content of the EIA.

The authority responsible for the environmental regulation in Serbia is the Ministry of Agriculture and Environmental Protection (MEAP).

The national EIA for the wind farm was approved in May 2015 following the process outlined above. As part of this process opinions from the competent authorities and organisations were sought, who issued the conditions to be addressed and/or included as a commitment in the national EIA prior to the approval. The subsequent approval of the EIA by the MAEP means that the conditions were successfully addressed. These conditions are listed in the national EIA and have been taken into consideration in the ESIA addendum.

Other key relevant EU Directives to the Project are the Habitats Directive 92/43/EEC and Birds Directive 2009/147/EC. It is understood that; the former has been partially transposed and the latter fully transposed into Serbian law.

1.7.2 Serbian regulatory controls on overhead power lines

Similar to the regulations governing EIA for wind farms, OHL projects need to be prepared in line with planning and construction regulations. Two national EIAs have been submitted and approved (July 2016) for the respective 110kV OHLs following the same national approval process as the wind farm EIA.

1.7.3 ESIA addendum approach

This ESIA addendum has been prepared to meet with the requirements of the IFC as detailed within section 1.8 below. Since the national EIAs have been approved, the purpose of the ESIA addendum is to provide additional information and mitigation measures over and above those contained within the national EIAs where mandated by the IFC's own requirements. As such, the ESIA addendum does not repeat the baseline information or the assessments contained within the EIAs. It should be read alongside those three documents and will not be subject to further national approval. The additional assessments undertaken for this ESIA addendum have accounted for relevant national legislation (refer to Appendix A) and IFC requirements.

1.7.4 Summary of socio-economic administrative boundaries and regulatory administration

The territorial organisation of the Republic of Serbia is regulated by the Law on Territorial Organisation (Official Gazette of the RS No. 129/2007, 18/2016). According to this Law, the territory of Serbia is divided into 150 municipalities, 23 cities and the City of Belgrade, which is a separate administrative unit.

The Project site is predominantly located on the territory of the municipality Golubac and to a lesser extent the municipalities Kučevo and Veliko Gradište.

The Law on Local Self Government (Official Gazette of the RS No. 129/2007, 83/2014, 101/2016) defines the units of

local self government in Serbia - municipalities, cities and the City of Belgrade. Their bodies of government include: municipal (city) assembly, president of the municipality (mayor) and municipal (city) administration.

Under the Law on Local Self Government, local self governments are responsible for the following: urban and town planning, housing, communal services such as water, transport and heating, local economic development, use and protection of agricultural land, local roads, kindergartens and preschools, primary health care, public information, sport and cultural activities. Some responsibilities are shared with central and/or provincial government, in the areas of education, social welfare and health protection, amongst others. Local self governments are financed from three basic sources: (i) own revenues, (ii) shared national taxes, and (iii) a share of revenues assigned to local government units and determined by unique criteria (grant funds).

Local self governments can also establish local communities to facilitate more efficient fulfilment of citizens' needs in accordance with the Law on Local Self Government. Local communities adopt statutes which regulate their administrative organs (council, assembly, president), how these are elected, their responsibilities and financing in accordance with the law and the statute of the municipality. Local communities are required to organise public hearings to enable residents to discuss the planned local community budget (to be approved by the municipality), the annual financial report and other issues of local importance. Local communities must have announcement boards where all relevant decisions and documents are posted.

Several local communities surround the wind farm: Krivača, Dvorište and Snegotin belonging to the territory of the municipality Golubac and Rakova Bara and Radenka belonging to the municipality Kučevo.

1.7.5 Land acquisition through expropriation

Issues related to provision of compensation for land and assets (or restrictions on land use) acquired in the public interest, i.e. which cannot be refused by affected people/entities, and can lead to physical and/or economic displacement, are regulated by the Expropriation Law (Official Gazette of the RS 53/95, 16/01, 20/09, 55/13, 106/2016).

Public interest is established either through a separate law or by a decision of the Government of Serbia. The Beneficiary of Expropriation can be the state, autonomous province, city, municipality, state funds and public enterprises, as well as companies with majority state ownership, unless otherwise determined by the law.

Upon establishing public interest, the proposal for expropriation is submitted by the Beneficiary of Expropriation to the relevant municipal property administration. Owners of affected properties

are individually invited to a hearing and notified about the submission of the expropriation proposal. If the documentation is in order, a decision on expropriation (first degree) is passed by the municipal property administration. The affected owners can submit an administrative appeal to the Ministry of Finance, which decides in the second degree, after which the decision becomes final. If there is no further (judicial) appeal, the expropriation decision also becomes legally binding. However, the affected owner can choose to submit a judicial appeal to the relevant administrative court, after whose ruling the decision on expropriation becomes legally binding.

When the decision on expropriation becomes legally binding, another hearing must be held by the municipal property administration to discuss and determine the amount of compensation for each affected owner. In case an agreement on the level of compensation is not reached within two months of the decision on expropriation becoming legally binding, the case is referred to the courts to decide. The Beneficiary of Expropriation proceeds with the payment of compensation or provision of replacement properties, after the signing of a compensation agreement or the decision on compensation becoming legally binding.

The Expropriation Law focuses on the process of providing compensation for any affected properties and assets, rather than on addressing further impacts of land acquisition or restrictions on land use, i.e. physical and economic displacement. The law indirectly covers physical and economic displacement, but only for affected people who have formal legal rights or claims that are recognisable under national law. Those who have no recognisable legal right or claim to the land they occupy are not entitled to compensation or assistance, for example informal users of affected land⁴.

Ownership or other formal legal rights on land and structures are recorded in the Real Estate Cadastre. Factual ownership or use of land of those not recorded in property registers can be proven in the expropriation process through sale purchase contracts or inheritance documents.

The market value of land is determined by the tax administration, based on the price obtained in the latest sale transaction of the nearest neighbouring land parcel to the one subject to expropriation. Compensation for structures (residential and business), orchards and vineyards, crops, forest land and timber is determined through valuations of court certified valuers, at market price.

1.7.6 Statutory easements and use restrictions

The Law on Planning and Construction (Official Gazette of the RS 72/09, 81/09, 64/10, 24/11, 121/12, 42/13, 50/13, 98/13, 132/14, 145/14) provides for certain statutory easements in relation to wind farms and other energy objects. These include oversailing of WTG blades and power lines over adjacent land as well as the right of way through neighbouring land during construction. Affected users of land are to be compensated at market prices for any lost crops and damages.

Similarly, the Energy Law (Official Gazette of the RS No. 145/14) provides for the right to access energy facilities for repair or maintenance through neighbouring land. Again, affected users of land are to be compensated at market prices for lost crops and damages, primarily through negotiations and if these fail, through the courts. In addition, during operations, users of neighbouring land plots could become subject to certain use restrictions (e.g. planting trees,

⁴ Persons living in informal settlements (houses on public land or private land that does not belong to them) are resettled in accordance with the Law on Housing and Building Maintenance (Official Gazette of the RS 104/2016).

construction of structures), i.e. they have to request permission from the owner of the energy facility to construct/plant trees in the protection zone.

1.7.7 Information disclosure requirements

Serbian legislation guarantees to its citizens the right to information, i.e. that everyone shall have the right to be informed accurately, fully and timely about issues of public importance. These provisions are included in the Constitution of the Republic of Serbia: (Official Gazette of the RS, No. 98/2006), as well as in the Law on Free Access to Information of Public Importance (Official Gazette of the RS, No. 120/04, 54/07, 104/09, 36/2010).

The Law on Planning and Construction of the Republic of Serbia regulates the development and adoption of spatial, urban, regulation plans in Serbia, which are all subject to a public disclosure and consultation process.

Serbia ratified the Aarhus Convention in 2009, by adopting the Law on Confirming the Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Official Gazette of the RS, No. 38/09). Provisions of the Aarhus Convention were then incorporated into four main laws in the area of environmental protection, including the EIA law.

1.7.8 Labour and working conditions

Serbia was a member state of the International Labour Organization (ILO) between 1919 and 1992 and restarted its membership in 2000. Serbia has ratified 72 ILO International Labour Standards (Conventions), including the eight fundamental conventions.

Labour and human resource management in Serbia is primarily addressed through the Labour Law of the Republic of Serbia (Official Gazette of the RS No. 24/05, 61/05, 54/09, 32/13, 75/14, 13/17). Compliance with labour laws is monitored by the Labour Inspectorate of the Ministry for Labour, Employment, Veteran and Social Policy of the Republic of Serbia.

1.8 Project relevant IFC requirements

1.8.1 IFC Performance Standards

The IFC is a member of the World Bank Group and is recognised as an international leader in environmental and social sustainability policy. As a part of the 'positive development outcomes' outlined in the IFC's Policy on Social and Environmental Sustainability, a comprehensive set of social and environmental PSs are applied in the review process for projects. The revised IFC Policy and PSs on Social and Environmental Sustainability came into force in January 2012. The IFC PSs and their applicability to this Project are given in Table 1 below.

Table 1: IFC PSs applicable to the Project

Performance Standard	Applicable to the Project?
PS1: Assessment and Management of Social and Environmental Risks and Impacts	Yes
PS2: Labour and Working Conditions	Yes
PS3: Resource Efficiency and Pollution Prevention	Yes
PS4: Community Health, Safety and Security	Yes
PS5: Land Acquisition and Involuntary Resettlement	Yes
PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes

Performance Standard	Applicable to the Project?
PS7: Indigenous Peoples	No - There are no indigenous peoples that will be affected by the Project
PS8: Cultural Heritage	Yes

1.8.2 Applicable IFC/World Bank Group EHS guidelines

In addition to IFC PSs, the following World Bank Group guidelines are applicable to the Project:

- EHS Guidelines: General (2007)⁵
- EHS Guidelines: Wind Energy (2015)
- EHS Guidelines: Electric Power Transmission and Distribution (2007)
- EHS Guidelines: Toll Roads (2007)

The ESIA addendum also takes into consideration the United Nations Development Programme (UNDP) Guidelines on the Environmental Impact Assessment for Wind Farms in Serbia (2010).

1.8.2.1 Occupational health and safety requirements

The EHS Guidelines listed above contain details of occupational health and safety (OHS) issues typical to general construction projects and specific to each parameter listed. Mitigation and management measures are specified within each set of guidelines. In addition, IFC PS2 contains requirements for managing the health and safety of the Project workforce including those workers directly employed by the borrower, workers engaged through third parties to perform work related to core business processes of the Project for a substantial duration (contracted workers), and workers engaged by the borrower's primary suppliers (supply chain workers). The main OHS elements of PS2 are:

- Identification of potential hazards to workers
- Provision of preventive and protective measures
- Training of workers
- Documentation and reporting of occupational accidents, diseases, and incidents
- Emergency prevention, preparedness, and response arrangements
- Incorporation of mitigation measures to ensure that primary suppliers are correcting any life-threatening situations within the primary supply chain

1.8.2.2 Community health, safety and security requirements

In addition to the community health, safety and security elements of the Project-relevant EHS Guidelines, IFC PS4 contains requirements for safeguarding the health, safety and security of affected communities. The key aspects are:

- Infrastructure and equipment design and safety
- Hazardous materials management and safety
- Ecosystem services
- Community exposure to disease
- Emergency preparedness and response
- Security personnel

⁵ Covering environmental (air emissions and ambient air quality, energy conservation, wastewater and ambient water quality, water conservation, hazardous materials management, waste management, noise, contaminated land), occupational health and safety, community health and safety, construction and decommissioning

1.9 Gaps between national legislation and IFC requirements in relation to key social issues

1.9.1 Project relevant gaps in relation to labour and working conditions

Ivicom d.o.o. is a registered company operating in Serbia, and as such is required to abide by Serbian legislative requirements. Table 2 provides an overview of Serbian legislative requirements in relation to labour and working conditions relevant for the Project and how they compare to IFC's PS2 requirements.

Table 2: Gaps between relevant Serbian labour legislation and IFC PS2

Issue	Provisions of Serbian legislation	Compliance with IFC PS2
Human Resource Policies and Working Relationships	Labour and working conditions are regulated by the Labour Law, which states that the rights, obligations and responsibilities of workers are governed by employment contracts (Article 3). Employment contracts must be aligned with the law and they can only provide more rights and improved working conditions compared to those stipulated by the law (Article 4). Employers are obliged to present workers with their rights, obligations and responsibilities in writing and contracts must be signed by both parties (Articles 16, 27, 30, 32).	No requirement to adopt and implement a Human Resources (HR) Policy. Compliant in relation to issuing employment contracts.
Working conditions and Terms of Employment	Workers have the right to adequate wages (including paid overtime, expenses), health and safety at work, health protection, protection of personal integrity, dignity and other benefits in case of illness, reduction of the ability to work or old age, financial aid during temporary unemployment and other forms of protection (Article 12). The law sets out in detail employee rights in relation to hours of work, wages, overtime, compensation and benefits.	Compliant
Workers Organizations	Employees have the right to form and join Labour Unions and freely express their views in relation to labour and working condition issues (Articles 13, 206).	Compliant
Non-Discrimination and Equal Opportunity	Discrimination is explicitly prohibited by law, both in relation to employees and those looking for employment (Articles 18 - 20) and the person who feels discriminated against can turn to the court (Article 23). Special protection of vulnerable groups, to give them equal opportunities, is allowed (Article 22). Harassment in any form is also strictly prohibited by law (Article 21). Women employees have the right to special protection during pregnancy and child birth. Employees have the right to special protection for child care. Employees below the age of 18 and those who have disabilities have the right to special protection (Articles 12, 89 – 102). Employers are not allowed to request data from employees on their marital status or family planning (Article 26). Employees are entitled to equal pay for the same work or work of equal value with an employer (Article 104).	Compliant
Grievance Mechanism	The law allows for establishing a mechanism for amicable resolution of disputes between employees and the employer (Article 194). Employees (or their authorised representatives) can turn to the courts for any breach of their labour and working conditions (Article 195).	No requirement to establish an internal grievance mechanism for workers (including to receive anonymous complaints or complaints from contractor/supplier workers), as per PS2.

Issue	Provisions of Serbian legislation	Compliance with IFC PS2
Child and Forced Labour	Employment of minors (over 15) is allowed by law, under certain conditions – approval of parents, guardians and if the work does not jeopardise the minor's health and safety, moral or education (Articles 25, 84 - 88). The law sets out in detail workers' rights in relation to working hours, leave, daily work break, termination of employment, etc. The law applies to foreign citizens working on the territory of the Republic of Serbia	Compliant
Workers Engaged by Third Parties / Supply Chain	As all other employers, contractors and suppliers are expected to comply with national legislation in the area of labour and working conditions. There is no requirement under the law to manage and monitor contractor/supplier performance in the area of labour and working conditions. Monitoring is carried out by the State Labour Inspectorate.	No requirement to manage or monitor contractor / supplier performance in fulfilling the requirements of Serbian labour legislation.

Source: Link 011

1.9.2 Project relevant gaps in relation to land acquisition and involuntary resettlement

Land acquisition for most Project components has been implemented on a voluntary basis, while expropriation is being carried out by relevant municipal authorities for access and service roads. In addition, the construction of OHLs may impact land and assets (crops and trees) which are not being acquired for the Project and certain use restrictions will apply within the OHL protection zone.

Table 3 provides an overview of Serbian legislation requirements in relation to land acquisition and involuntary resettlement relevant for the Project, as well as a summary of how land is being acquired for the Project and how these activities compare to IFC's PS5 requirements. A more detailed presentation of Project related land acquisition is provided in section 3.4.2.

Table 3: Gaps between relevant Serbian labour legislation and IFC PS5

Issue	Provisions of Serbian legislation	Compliance with IFC PS5
Avoid or Minimise Displacement	No explicit requirement to avoid or minimise displacement in the Expropriation Law. Other laws require that planning documents (spatial plans, regulation plans) and projects (feasibility studies) must take into account social impacts, including resettlement. Displacement is often avoided in practice to reduce costs of expropriation and construction. The Project has avoided physical displacement (formal and informal), while the potential for economic displacement is low.	Legislation, as applicable to the Project, is partially compliant. The Project is compliant.
Compensation and Benefits for Displaced Persons	Under the Expropriation law, compensation for all assets is provided at market value (most often calculated through the comparable sales approach) (Articles 41, 42). Costs of the expropriation procedure are borne by the Beneficiary of Expropriation (Article 33). In the process of expropriation and determination of compensation all submissions (documents) and decisions are exempt from taxes (Article 68). Registration fees and taxes for properties which would be bought by people to replace their affected land do not apply for this Project, as the affected area of an individual plot is very small and it is unlikely that people would look to replace it.	Legislation, as applicable to the Project, is partially compliant. The following gaps relevant for the Project have been identified: <ul style="list-style-type: none"> • No requirement for assistance in addition to cash compensation for restoring livelihoods (for formal and informal users) • No requirement for identification of and assistance for vulnerable groups To ensure full compliance, the Project will have to undertake the assessment of impact at household level, i.e. if a household has been economically displaced by the land acquisition and if the affected household is vulnerable. If such cases are identified (among affected owners and formal and informal users of land),

Issue	Provisions of Serbian legislation	Compliance with IFC PS5
	<p>Compensation for agricultural land can be provided in kind (replacement land), if requested by the affected owner (Article 15, 16).</p> <p>If the expropriation of a part of the owner's property results in the owner having no economic interest in using or not being able to use the remainder of the property, that remaining part of the property will also be expropriated, at his/her request (Article 10). The request can be submitted within a period of 2 years after the completion of construction works (Article 30). Viability of the remaining part of the land plot is determined based on an assessment of a licensed appraiser).</p> <p>The Beneficiary of Expropriation acquires the right of accessing the property when the decision on compensation becomes legally binding (i.e. cannot be appealed against) or the day when an agreement on compensation has been reached. (Article 34). The Beneficiary of Expropriation can also request from the Ministry of Finance, urgent access to land / properties (before the decision on compensation becomes legally binding, but not before the decision on expropriation becomes final), in case of an urgent need to construct an object or carry out construction works (Article 35).</p> <p>The Expropriation law allows for increased compensation under certain circumstances, for persons whose sources of livelihoods are adversely affected by expropriation (i.e. who are economically displaced). Those who may be more adversely affected are determined by taking into account the number of household members, the number of household members capable of earning a living or who are employed, the health status of household members, the monthly income of the household. (Article 51).</p> <p>Informal users of land have no rights to compensation and/or assistance for their affected assets (crops), under the Expropriation Law. Formal users of land (renters) have rights as specified in rent contracts. Use of land that does not belong to the owner (both formal and informal) is not widespread in the Project affected area as the land is generally of low quality.</p> <p>The Law on Planning and Construction and the Energy Law provide for the right to construct or access energy facilities for repair or maintenance through neighbouring land. Affected users of land are to be compensated at market prices for lost crops and damages (based on reports from licensed appraisers), primarily through negotiations and if these fail, through the courts. During operations, users of neighbouring land plots are subject to use restrictions within the defined protection zone (e.g. planting trees, constructing structures), unless they receive approval for their activities from the owner of the energy facility. In the Project affected area, use</p>	<p>the Project Sponsor will have to undertake mitigation measures as per PS5 to ensure that economically displaced people, including vulnerable individuals, are assisted to restore their livelihoods appropriate to their specific needs.</p>

Issue	Provisions of Serbian legislation	Compliance with IFC PS5
	restrictions will apply to agricultural land (crossed by OHLs), where in any case there is no construction and the likelihood of the owner wanting to plant tall trees (which would be in the way of OHL lines) is very low.	
Community Engagement	Stakeholder engagement is carried out as part of the process for adoption of planning documents and EIAs. Land acquisition requirements are also presented in these planning documents / public hearings. The Expropriation Law requires the following stakeholder engagement activities: Decision on Public Interest is made public Affected owners (and legal users) must be informed in writing that an expropriation request has been submitted and invited to a meeting by the municipal property administration Individual meetings are held as part of the procedure for determining compensation Informal users of land are outside of the expropriation procedure and not engaged with.	Legislation, as applicable to the Project, is partially compliant. Information is disclosed however consultations do not fully comply with PS5 requirements. The Project has fulfilled legal requirements. Additional measures are included in Project SEP, to ensure full compliance with PS5.
Grievance Mechanism	The Expropriation Law provides affected people with the right to submit administrative and judicial appeals at various stages of expropriation.	Legislation only provides for formal, legal complaint mechanisms. No requirement for establishing a grievance mechanism as required by IFC PSs Additional measures are included in the Project SEP and ESMP/ESAP, to ensure full compliance with PS5.
RAP/LRP Planning and Implementation	The Expropriation Law does not require development / implementation of RAPs/LRPs. The Project requires land acquisition, however without physical displacement, while the potential for economic displacement is low.	Legislation is not compliant. Additional measures are included in the Project ESMP/ESAP, to ensure full compliance with PS5.
Physical Displacement	The Project will not cause physical displacement.	Not applicable.
Economic Displacement	Discussed in section 'Compensation and Benefits for Displaced Persons' above. Although the Project requires acquisition of land, due to the small area of land being acquired from an individual owner/household, the current use of land (low productivity, low use) and the compensation measures being provided under Serbian legislation, it is believed that the Project is not likely to cause economic displacement.	Legislation, as applicable to the Project, is partly compliant. Additional measures are included in the Project ESMP/ESAP, to ensure full compliance with PS5.
Private Sector Responsibilities for Govt. Managed Resettlement	No requirement under the Expropriation Law for Project Sponsors to collaborate with relevant government agencies or to complement government action.	Legislation is not compliant. Additional measures are included in the Project ESMP/ESAP, to ensure full compliance with PS5.
Monitoring	No requirement for monitoring of land acquisition and restoring of livelihoods in the Expropriation Law.	Legislation is not compliant. Additional measures are included in the Project ESMP/ESAP, to ensure full compliance with PS5.

Source: Link 011

1.10 Impact assessment approach

1.10.1 Assessment of impacts

For each discipline, the assessment will identify the likely significant environmental or social impacts. The criteria for determining significance are specific for each environmental and social aspect and will be defined in the relevant specialist assessments. In broad terms significance can be characterised as the product of the degree of change predicted (the magnitude of impact) and the value of the receptor/resource that is subjected to that change (sensitivity of receptor). For each impact the likely magnitude and the sensitivity of the receptor are defined, quantitatively to the extent possible. Generic criteria for the definition of magnitude and sensitivity are summarised below. Where the specific assessments deviate from the methodology presented below, this will be defined within the respective subsections of the ESIA addendum. The methodology for assessing the significance of impacts has been developed by Mott MacDonald.

1.10.1.1 Magnitude

The assessment of impact magnitude will be undertaken in two steps. Firstly, the identified impacts of with the Project are categorised as beneficial or adverse. Secondly, impacts will be categorised as major, moderate, minor or negligible based on consideration of the parameters such as:

- Duration of the impact - ranging from 'beyond decommissioning' to 'temporary with no detectable impact'.
- Spatial extent of the impact – for instance, within the site boundary to within the district, regional, national or international.
- Reversibility - ranging from 'permanent requiring significant intervention to return to baseline' to 'no change'.
- Likelihood – ranging from 'occurring regularly under typical conditions' to 'unlikely to occur'.
- Compliance with legal standards and established professional criteria - ranging from 'substantially exceeds national standards or international guidance' to 'meets the standards' i.e. impacts are predicted to be less than the standard would allow.

Table 4 presents generic criteria for determining impact magnitude. Each detailed assessment will define impact magnitude in relation to its environmental or social aspect.

Table 4: Criteria for determining magnitude

Magnitude (beneficial or adverse)	Definition (considers duration of the impact, spatial extent, reversibility and ability to comply with legislation)
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or Good International Industry Practice (GIIP) without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but small change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

Source: Mott MacDonald

1.10.1.2 Sensitivity

Sensitivity is specific to each aspect and the environmental resource or population affected, with criteria developed from baseline information. Generic criteria for determining sensitivity of receptors are outlined in Table 5. Each detailed assessment will define sensitivity in relation to its environmental or social aspect.

Table 5: Criteria for determining sensitivity

Sensitivity	Definition
High	Receptor (human, physical or biological) with little or no capacity to absorb proposed changes and/or minimal opportunities for mitigation.
Medium	Receptor with little capacity to absorb proposed changes and/or limited opportunities for mitigation.
Low	Receptor with some capacity to absorb proposed changes and/or reasonable opportunities for mitigation.
Negligible	Receptor with good capacity to absorb proposed changes or and good opportunities for mitigation.

Source: Mott MacDonald

1.10.1.3 Impact evaluation and determination of significance

Impacts will be identified and significance will be attributed taking into account the interaction between magnitude criteria and sensitivity criteria as presented in the impact evaluation matrix in Table 6.

Table 6: Significance matrix

Sensitivity	Magnitude							
		Adverse				Beneficial		
		Major	Moderate	Minor	Negligible	Minor	Moderate	Major
High	Major	Major	Moderate	Negligible	Moderate	Major	Major	
Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major	
Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate	
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor	

Source: Mott MacDonald

The objective of the ESIA addendum is to identify the likely significant impacts of the Project on the environment and people. Impacts that have been evaluated as being ‘moderate’ or ‘major’ are significant and identified as such in the specialist assessments. Consequently, impacts that are ‘minor’ or ‘negligible’ are not significant. The significance of impacts will be discussed in the ESIA with and without mitigation.

1.10.1.4 Cumulative impacts

The assessment of cumulative impacts considers the combination of multiple environmental and social impacts that may result when the Project is considered alongside other existing, proposed and/or anticipated future projects in the same geographic area or with a similar development timetable. The assessment of cumulative impacts will identify where particular resources or receptors would experience significant adverse or beneficial impacts as a result of a combination of projects being developed at the same time (inter-project cumulative impacts) and that would not be expected in the case of a stand-alone project or business activity.

Cumulative impacts are considered further in section 4.5.

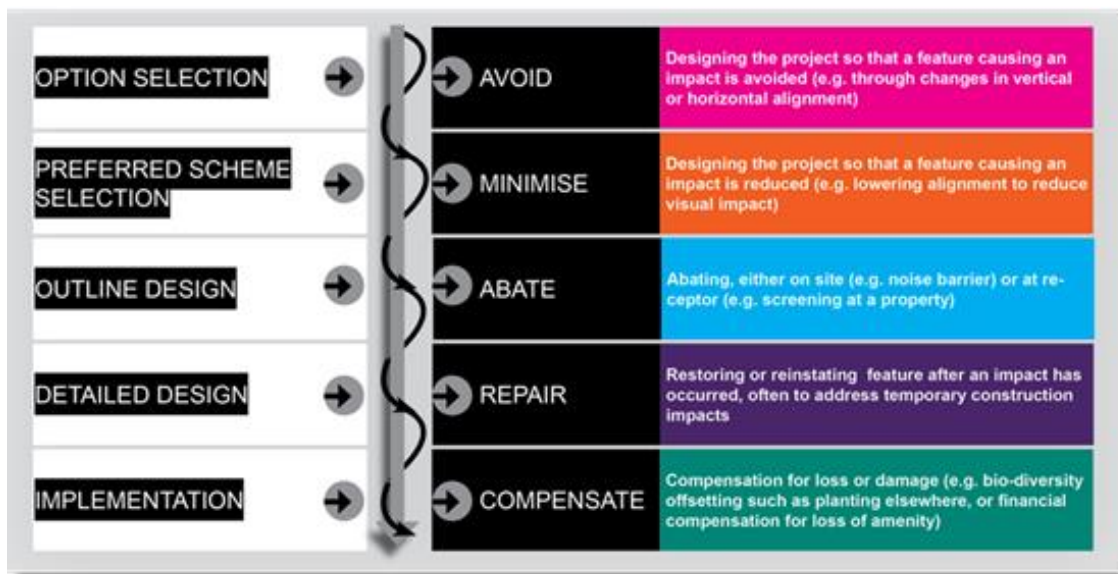
1.10.1.5 Mitigation and enhancement measures

Where feasible the following hierarchy of mitigation measures will be applied:

- Changes in technology choice
- Avoidance and reduce impacts through design (embedded mitigation)
- Abate impacts at source or at receptor
- Repair, restore or reinstate to address temporary construction impacts
- Compensation for loss or damage

An example of the mitigation hierarchy is shown in Figure 4.

Figure 4: Mitigation hierarchy



Source: Mott MacDonald

Consideration has also been given to the identification of enhancement measures. Enhancement measures are actions and processes that:

- Create new positive impacts or benefits
- Increase the reach or amount of positive impacts or benefits
- Distribute positive impacts or benefits more equitably

The proposed management and mitigation measures are described in section 5, with the significant residual impacts identified in section 5.4.9. All the mitigation, management and monitoring measures to address likely Project impacts are presented in the ESMP.

1.10.1.6 Residual impacts

Residual impacts are those significant impacts that remain after the application of mitigation and enhancement measures. Impacts considered 'major' or 'moderate' after application of mitigation and enhancement measures will be presented as significant residual impacts.

1.10.1.7 Uncertainties

Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitations will be explicitly stated. Where applicable, the ESIA makes recommendations concerning measures that should be put in place with monitoring or ESMPs to deal with the uncertainty so that they may be addressed.

2 Project technical description and alternatives

2.1 Introduction

This section presents the technical characteristics of the Project and an overview of Project alternatives which discusses the process for selection of the specific location and configuration of the Project.

2.2 Outline of the Project

2.2.1 Project rationale

Developing energy from renewable sources has been high on the Serbian government's agenda in recent years, particularly as the government is aiming for accession into the EU and has pledged to harmonise its national energy legislation with EU Directives. This includes Serbia's pledge to reach 27% of renewables' share of gross final energy consumption under the European Commission Energy Community Treaty by 2020⁶.

Currently renewable energy in Serbia accounts for only 17% of primary energy generation, with wind power accounting for less than 1%⁷. The Government has implemented incentive schemes and made amendments to the relevant legislation to allow for projects' feasibility and bankability; however, investment in renewable sources in Serbia is still underdeveloped.

As a result, there is a clear need to increase the proportion of renewables within Serbia, and wind power is an area identified to have significant potential. Peak production from wind power coincides with the seasonal peak power consumption in the country, there are sites with resources available for wind energy, and wind power is significantly less environmentally damaging than other technologies such as thermal power.

The Project will therefore support Serbia towards achieving its EU commitments of a 27% renewable energy share by 2020, and help to decrease the country's reliance upon carbon intensive energy activities. Alongside this, the Project will help to facilitate the diversification of energy sources in the Serbian energy sector, which is an important factor in ensuring energy security and supply. The Project will support a decrease in Serbia's reliance upon foreign imported energy sources.

In addition, the Project will also provide the possibility of local employment in the area, specifically during the construction phase of the Project.

2.2.2 Project timetable and contractors

Below is an indicative schedule for the Project's construction, assuming that notice to proceed is granted in October 2017.

⁶ Republic of Serbia Ministry of Energy Development and Environmental Protection, 'National Renewable Energy Action Plan of the Republic of Serbia', (In accordance with the template foreseen in the Directive 2008/29/EC- Decision 2009/548/EC), Belgrade, 2013

⁷ <https://www.globallegalinsights.com/practice-areas/energy/global-legal-insights---energy-4th-ed./serbia>

Table 7: Indicative construction schedule

Event	Indicative dates
Notice to proceed	October 2017
Balance of Plant ⁸ (BOP) works	October 2017 to August 2019
Krivača substation	October 2017 to December 2018
Neresnica substation upgrade	October 2017 to August 2018
Veliko Gradište substation upgrade	October 2017 to August 2018
OHL 110Kv Krivača – V. Gradište	October 2017 to November 2018
OHL 110Kv Krivača – Neresnica	October 2017 to February 2019
Installation and completion of WTGs	May to November 2019
Commissioning of wind farm	January 2020
Commercial operation	First quarter 2020 to 2045 ⁹ (approximately)
Decommissioning/replacement/upgrade	2045

Source: Ivicom Energy

As well as the WTG supplier, there will be one BOP contractor and one connection works contractor for all substations and both OHLs.

2.3 Description of the main plant and processes

2.3.1 Technical features of the proposed WTGs

There are two WTG models under consideration at the time of writing the ESIA. The first is the Vestas V126-3.3MW and the second is the Siemens SWT-3.3-130. The Siemens WTG has a larger rotor diameter however is slightly shorter than the Vestas model. Table 8 provides the technical characteristics of the two WTGs under consideration. The size of the WTGs is considered typical for an onshore wind farm. Final selection of the WTG model will depend on negotiations with the manufacturers. A typical WTG and its components are shown in Figure 5.

Table 8: Characteristics of the WTGs

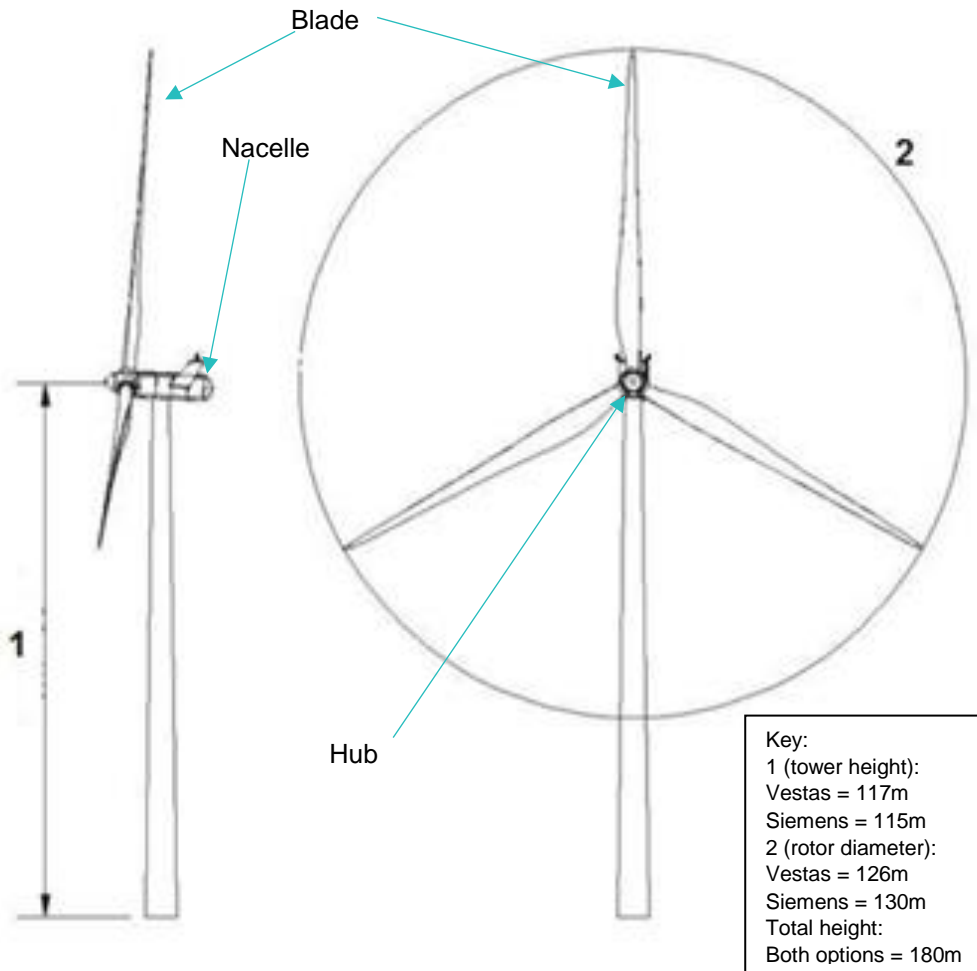
Aspect	Vestas specification	Siemens specification
Power output (MW)	3.3	3.3
Radius of rotor blades (m)	61.66	63.43
Number of rotor blades	3	3
Rotor diameter (m)	126	130
Hub height (m)	117	115
Maximum height of WTG blades (m)	180.3	180
Minimum height of WTG blades (m)	54.3	50
Rotation period (secs)	5	4.9
Max chord (widest point of rotor) (m)	4	4.2
Blades coated in non-reflective red and white paint	Yes	Yes
Highest sound power level (without noise reduction mode) dB(A)	107.5	107.5

⁸ The sum of wind farm civil works and electrical works are usually called balance of plant (BOP). BOP civil engineering scopes of work include roads and drainage, crane pads, WTG foundation, meteorological mast foundations, cable trenches and buildings for electrical switch gear, controls equipment, and a maintenance/spare part facility. BOP electrical work scopes include underground cable networks (medium voltage cables, copper cables and optical fibre cables), electrical switch gear to protect and/or disconnect WTGs or other equipment from the system, and grounding and connections for control rooms, maintenance facilities and point of connection equipment to feed the wind farm's power generation into the electrical grid. Transformers and switches for individual WTGs are located within the WTG and they are provided by the WTG supplier.

⁹ Periodic maintenance will continue throughout this time

Aspect	Vestas specification	Siemens specification
Total number of WTGs	31	31

Figure 5: Diagram of WTG



2.3.2 Wind farm operations

Although final design and selection of specific equipment may change, the following are the key aspects of electricity generation, transmission and distribution for an onshore wind farm:

- WTG blades are turned by the wind resource
- Blades rotating turns a generator which converts this energy to electricity
- The WTG houses a transformer, which increases the voltage to allow transmission to the substation through a network of underground cables
- At the substation the voltage will be increased to allow for long distance transmission
- Electricity is delivered via transmission to the national grid, from where it is distributed to energy customers

2.4 Wind farm infrastructure

2.4.1 Overview of support infrastructure

The key Project components are illustrated in Figure 1, Figure 2 and Figure 3 in section 1.

The infrastructure supporting the wind farm will be as follows:

- On-site 110/33kV substation
- Two 110kV OHLs connecting the on-site substation to existing substations at Neresnica and Veliko Gradište
- Internal 35kV and two double 35kV OHLs connecting the on-site substation with the WTG clusters
- An underground MV electrical collection system
- An O&M building (optional)
- 20.6km of access roads
- 20km of service roads
- New line bay at the existing substation at Neresnica
- New line bay at the existing substation at Veliko Gradište

The Sponsor will be responsible for construction of all the Project components. An overview of the Project components and details of responsibilities for O&M of these components is presented in Table 9.

Table 9: Summary of key Project components and responsibilities

Project Component	Description	O&M by
WTGs	31 WTGs (either Vestas V126-3.3MW or Siemens SWT-3.3-130), as described in 2.3.1 above.	Ivicom Energy
On-site substation - transformer station	An on-site 110/33kV substation at Krivača and control centre office	Transformation facility - Ivicom Energy Connection facility - Transmission system operator (TSO) ¹⁰
On-site 110kV grid connection equipment	An on-site 110kV grid connection facility which connects the on-site Krivača substation with two 110kV OHLs	TSO ¹¹ –Ownership of the grid connection equipment will be transferred to the TSO after commissioning
110kV OHLs	Two 110 kV OHLs connecting the on-site substation to existing substations at Neresnica and Veliko Gradište (approximately 19.4km each)	TSO – Ownership of the 110kV OHLs will be transferred to the TSO after commissioning
35kV OHLs	35kV OHL connecting the on-site substation with Tilva cluster and two double 35kV OHL connecting the on-site substation with the Debelo brdo cluster	Ivicom Energy
Underground electrical collection system	A medium voltage underground electrical collection system which interconnects the WTGs with the on-site substation	Ivicom Energy
O&M building	An on-site office, workshop and storage area approximately in the middle of the site	Ivicom Energy
Access roads	A total of 21km of access roads	Municipalities –

¹⁰ Elektromreža Srbije (EMS)

¹¹ Elektromreža Srbije (EMS)

Project Component	Description	O&M by
	<ul style="list-style-type: none"> • 16km of upgrading current roads • 5km of new roads 	Ownership of the access roads after construction will be transferred to the local municipalities ¹²
Service roads	A total of 20km of service roads <ul style="list-style-type: none"> • 4.2km of upgrading current roads • 15.8km of new roads 	Municipalities – Ownership of the service roads after construction will be transferred to the local municipalities
Line bay equipment at the existing substation in Neresnica	New line bay equipment at existing substation Neresnica for connecting the new 110kV OHL	Distribution system operator (DSO) ¹³
Line bay equipment at the existing substation in Veliko Gradište	New line bay equipment at existing substation Veliko Gradište for connecting the new 110kV OHL	DSO

Source: Ivicom Energy

2.4.2 Associated facilities

Associated facilities, as defined by IFC PS1, are those that are not funded as part of the project¹⁴, and whose viability and existence depend exclusively on the project and whose goods or services are essential for the successful operation of the project. As such, all of the project components are considered to be part of 'the Project' until construction is complete. Once operational, the 110kV OHLs and grid connection equipment, the line bay equipment in the existing substations, and the access and service roads will be considered associated facilities as ownership will be transferred for O&M (refer to Table 9).

2.4.3 Additional infrastructure

This section provides further detail on the infrastructure to be constructed in addition to the WTGs, where available, although details are yet to be finalised:

- **Substation:** a 110/33kV Krivača substation and control building will be built on-site at Golo brdo in Venac cluster. The substation will house the 110kV high voltage facility, switch gear, protection equipment, metering and control equipment, communication equipment and any other electrical infrastructure required to operate the WTG development. The 33kV facility will be housed within the control building. The area of the substation will be fenced to prevent any unauthorised access.
- **Grid connection facility:** a 110kV grid connection facility will be built to connect the on-site substation with two 110kV OHLs. The grid connection will be built within the perimeter of the substation and will be enclosed by a fence. It is anticipated that only TSO will have access to this facility and will be responsible for its operation and maintenance.
- **Construction compound:** a temporary site compound will be established during the construction period. The construction compound will predominantly be used for storage of construction materials and office facilities.
- **Internal electric power network:** internal electric power network will consist of three internal OHLs and underground cables. A new 35kV OHL connecting the on-site substation with Tilva cluster and two new double 35kV OHL connecting the on-site substation with the Debelo brdo cluster will be built as part of the Project. In addition, a network of underground cables is envisaged to connect individual WTGs with the substation or internal OHLs. The underground cables will be buried in trenches and will follow the route of the site access roads wherever possible.

¹² Municipalities of Golubac and Kučevo

¹³ Elektroprivreda Srbije (EPS)

¹⁴ Funding may be provided separately by a client or third party

- Telecommunications: the telecommunications infrastructure is envisaged in the wind farm area to provide a standard telecommunication connection and to enable control of the systems within the complex. The telecommunication network that will be used for control of the systems will include the network of optical underground cables that will be buried in trenches alongside the site access roads.
- Water supply and wastewater: It is anticipated at this stage that water for human consumption and sanitary purposes will either be abstracted from a new borehole well and treated on site or transported to the site and stored in tanks. Any additional water to be used for the construction purposes will need to be supplied to the site via water trucks and stored in tanks. Wastewater will be collected in a septic tank via internal sewerage network. Oil interceptors will be used in areas where leakage of oil or other pollutants may occur, such as substation area, to prevent direct contact with ground as a result of surface water run-off from hardstanding areas. Surface water will further be discharged via an open surface water drainage system from which the water drains naturally on site.

2.4.4 Transport and site access

The site is 134.6km by road from Belgrade. The main access to the site is from Road 256 as shown in Figure 3 in section 1.3 above.

When selecting access routes, a key consideration has been the transportation of large plant and equipment which will occur during construction and decommissioning. The planned access route is discussed further in section 3.4.4.

The new and upgraded access roads will be permanent and open to the public at all times during operations. An example of the type of access track which will be upgraded for the Project can be seen in Figure 6. All roads which will be constructed and widened are located within two municipalities - Golubac and Kučevo - and pass mainly through agricultural and forest land.

Figure 6: Example of an existing access track which will be upgraded for the Project



Source: Link 011

All of the materials required for construction will be transported from sources situated outside of the site boundary. The exact location of these will be known once a contractor is selected. The transportation of these materials would include the use of both public and site access roads as shown in Table 10 below.

Table 10: Sources of materials to be transported to site

Material	Likely source
Concrete	Golubac, Veliko Gradište
Sand, gravel, crushed stone, asphalt	Golubac/Veliko Gradište
Reinforcement, steel, formwork, geotextile, concrete curbs, site containers, fencing, waterproofing, thermal insulation, water supply system, lighting poles, drainage pipes, earthing, copper rope, power and optical cable (WPP and OHL), OHL towers, heating ventilation and air conditioning equipment	Serbia/depending on selected contractor
Transformers, 110 kV and 33 kV equipment	Serbia/Croatia/depending on selected contractor
WTG components	Denmark for both WTG options Depending on selected contractor Blades are manufactured worldwide. Origin not known at present

Source: Ivicom Energy

During the construction phase it is expected that there will be at least 30 trucks accessing and egressing the site per day for construction equipment and materials. This figure includes 13

separate transportations per WTG - a total of 403 for all 31 WTGs. Delivery of the WTGs will commence in May 2019 (with assumed construction start date of October 2017). In addition, 95 transportations per day are envisaged for WTG foundation works (75 for pouring and 25 for other related foundation works). As there will be no workers' accommodation on site the contractors will provide bus transportation for approximately 150 workers on average throughout construction from nearby towns.

2.5 Grid connection

2.5.1 Proximity to the grid

Two single line 110 kV OHLs will connect the on-site 110/33kV Krivača substation, which is approximately in the centre of the WTG clusters, to existing substations at Neresnica and Veliko Gradište to allow connection to the grid.

2.5.2 Wind farm power distribution

The energy produced from the WTGs will be delivered to the on-site substation and control centre via an underground electrical collection system and three 35kV OHLs which can be seen in Figure 1 and Figure 3. The 35kV OHL towers and cables will be constructed adjacent to the service/access roads on land acquired for roads and will not require any additional land. The 35kV towers will be between 30.2m or 35.4m in height, to be confirmed in the final design. The minimum depth of the underground cables will be 1.25m. All of the underground cables will follow the service roads.

The two 110kV OHLs, shown in Figure 1 and Figure 3, will be approximately 19.4km each and consist of power line towers of between 37.8m and 42.3m in height, to be confirmed in the final design. The OHL towers would typically be spaced around 250-350m apart, and the minimum depth of the foundations will be 2.5m. The 110kV OHLs will cross agricultural and forest land, as well as various categories of roads. The OHLs cross the rivers Pek, Krivačka reka and Ševica, an existing 400kV OHL (No. 401/2 Drmno – Đerdap 1), an existing railway line Mala Krsna – Bor – Rasputnica 2 (Vražogrnac) at the tunnel Neresnica and a public water supply network. The 110kV OHL Krivača – Neresnica also crosses a mineral water supply network in Neresnica operated by a private company (Mineralnavoda d.o.o.). As with the WTG locations, most of the land area affected by the 110kV OHL will continue in its current use, with a very small area temporarily occupied for construction, including laydown areas, and permanently occupied for the feet of the 110kV OHL towers.

2.6 Construction phase

2.6.1 Wind farm

Construction and commissioning of the Project is expected to take approximately 27 months. As is common with large scale developments of this nature, the details of the precise building programme and methods will be subject to agreement with contractors. The key activities for the installation of the WTGs will include:

- Site clearance and preparation
- Levelling of the terrain
- Excavations and creation of the foundations for WTGs
- Delivery and storage of parts of WTGs including anchor cages, towers and blades
- Installation of WTGs

- Connection to the electricity transmission network
- Commissioning

The position and extent of laydown areas would be agreed with each contractor prior to construction. Reserve WTG positions (T1-2, T1-3, T1-7 and T3-8 to T3-11) may be used as laydown areas and the O&M building will be used for storage of materials and equipment. Between T2-1 and T2-5 there will be a site compound, land for which will be leased during construction for site containers or materials storage.

Table 11 below outlines the key construction stages and timeframes for the WTGs.

Table 11: WTG construction stages

WTG cluster	Activity	Construction dates	Approximate timeframe (in months)
1	Excavations, anchor cage (refer to Figure 7), concrete pouring (refer to Figure 8), drainage	May – October 2018	4
	Mechanical installation and completion	May – October 2019	4
2	Excavations, anchor cage, concrete pouring, drainage	May – August 2018	2
	Mechanical installation and completion	May – July 2019	2
3	Excavations, anchor cage, concrete pouring, drainage	September – December 2018	2
	Mechanical installation and completion	June – September 2019	2
4	Excavations, anchor cage, concrete pouring, drainage	April – June 2019	2
	Mechanical installation and completion	August - November 2019	2

Source: Ivicom Energy

Figure 7: Example of anchor cage being installed



Source: Ivicom Energy

Figure 8: Concrete pouring



Source: Ivicom Energy

The BOP contractor will erect fences around the foundations and equipment for the protection of community health, safety and security and to safeguard the equipment and materials. The fence will be removed after the foundation is built. All access routes to the site will be marked with warning signs to warn people of the dangers of the site, however local people will have the right to pass through the unfenced areas.

2.6.2 OHLs and substations

The key activities for the installation of the OHLs will include:

- Excavation of foundations
- Prepare the foundations for OHLs and substation
- Installation of towers
- Installation of earthing for OHLs and substation
- Stringing of OHLs
- Civil works and equipment installation for substation and existing substation upgrades
- Commissioning

The key phases of construction for the OHLs and substations are shown in Table 12.

Table 12: OHLs and substations construction stages

Activity	Construction dates	Approximate timeframe (in months)
Upgrade of Neresnica substation	February – June 2018	3
Upgrade of Veliko Gradište substation	February - June 2018	3
110kV OHL Krivača – Veliko Gradište	February – November 2018	7
110kV OHL Krivača – Neresnica	February 2018 – February 2019	8
Krivača substation	February – October 2018	6
35kV OHL Tilva - Krivača	February – August 2018	4
35kV OHL Debelo brdo - Krivača	May – December 2018	5

2.6.3 Road upgrades and construction

Access roads will have certain priorities during the construction schedule in order to facilitate access for construction of other aspects of the wind farm. The key phases of construction for the access roads are shown in Table 13.

Table 13: Access roads construction stages

Activity	Construction dates	Approximate timeframe (in months)
Access roads for 110kV OHL Krivača – Veliko Gradište	February – March 2018	1
Access roads for 35kV OHL Tilva - Krivača	February – March 2018	1
Access roads for 110kV OHL Krivača – Neresnica	February – May 2018	2
Remaining access roads (top soil, earthworks, drainage, first layer of crushed stone)	February 2018 – May 2019	11
Access roads for 35kV OHL Debelo brdo - Krivača	May – July 2018	1
Remaining access roads (final layer of crushed stone)	February – August 2019	5

Source: Ivicom Energy

2.6.4 Workers and workers' accommodation

During construction, approximately 60-70 staff will be employed by the BOP contractor and the WTG supplier (WTG supply agreement (TSA) team) will comprise approximately 20 people on average throughout the construction period. There may be some peak periods of construction where a slightly greater number of workers is required.

Approximately 30 people will be employed on each of the OHLs (60 total) who will be on the wind farm site for approximately one month and will then move along the OHL routes until completion. Additionally, there will be approximately ten people comprising the construction supervision and investor teams, some of whom will visit the site periodically and some of whom will be in residence.

In total, during construction there will be approximately 150 people on average employed on the Project.

Accommodation will not be provided for workers and it is anticipated that personnel, with the exception of specialists, will be hired from nearby towns and transportation will be provided by the contractors.

2.6.5 Concrete batching

Concrete will be brought from an existing batching plant location near Golubac on the River Danube or from Veliko Gradište. At the time of writing the ESIA no mobile concrete batching plant is envisaged to be established on site.. .

2.7 Operations phase

The Project is expected to operate for approximately 25 years. During operations, the WTGs, 35kV OHLs, the on-site substation and the underground electrical connection system will, be operated by Ivicom Energy. The 110kV OHLs and on-site 110kV grid connection equipment will be operated by the TSO. The access roads and service roads will be transferred to and maintained by the municipalities and as such will be accessible by members of the public. The line bay equipment at Neresnica and Veliko Gradište will be operated by the DSO.

Ivicom Energy has made contact with the Civil Aviation Authority (CAA) who has responded positively that the wind farm should not present an issue in terms of obtaining the necessary approvals. The final designs will be submitted to the CAA which will at that time grant their official approval for the Project, with or without conditions such as lighting on WTGs. Lighting will be pre-installed on the nacelles in case it is mandated to be used by the CAA.

During operations, the WTG supplier shall employ at least one crew with four to five people for servicing during the validity of the TSA which will be for approximately 15 years. Ivicom Energy will also employ two to three workers on permanent contracts to be based at the O&M building, plus up to four security guards. The maintenance contract will be outsourced, including works to remedy snowfall affecting operations.

2.8 Decommissioning phase

Prior to the expiration of the wind farm, an assessment will be undertaken to determine whether decommissioning is required, or whether the replacement of WTGs would allow for continued energy generation. For this ESIA addendum the assessment of decommissioning is assuming that all WTGs and associated infrastructure will be removed, not the refurbishment of the wind farm. However, when the Project reaches the end of its life, options are likely to include the

refurbishment of current equipment to extend Project life, the replacement of the WTGs, and/or potential modifications to be made to the equipment.

Should the Project be decommissioned, the estimated time of removal and rehabilitation of the site would be one year. Prior to decommissioning commencing, a plan would be produced and the necessary permissions obtained under national law. The key aspects of decommissioning would be the dismantling and removal of WTGs and supporting infrastructure, including foundations, and the restoration of the site or replacement of WTGs. New foundations would be needed for any new or replacement WTGs and old foundations would be completely removed. Activities would be similar to the construction phase of the original wind farm and would include the obtaining of any new permits required.

The service life of the OHLs is approximately 30 – 40 years, dependent upon factors such as operating conditions and climatic conditions. After this period of time a rehabilitation and replacement programme is likely to be implemented if the wind farm remains in place.

A detailed environmental impact assessment of any future activities would be carried out near the end of the service life of the wind farm.

2.9 Overview of project alternatives

2.9.1 Introduction

This section provides an overview of alternatives for the proposed Project, it does not intend to present a detailed assessment of the Project alternatives, as this was undertaken as part of the National EIA process. Therefore, only summary information is presented here.

2.9.2 No project alternative

The no project scenario would be that the wind farm would not be built. If the proposed project was not built there would be no negative impacts associated with this type of project (for example visual impact), however the area and wider country would not benefit from the positive impacts the Project would provide. If the no project alternative was pursued, any financial benefits which might occur as a result of the proposed development, for example opportunities for employment of local people (albeit short-term in most cases), as well as indirect employment, would not be realised.

From a national perspective, if the wind farm did not go ahead, Serbia would be more reliant upon alternative sources of electricity, for example fossil fuels, and would potentially fail to fulfil its international commitments to the EU to increase renewable energy in the country. The 'no project' alternative would therefore not be in line with the Serbian Government's commitment to increase renewable energy capacity.

2.9.3 Alternative Project locations

Wind power generation projects are particularly dependent upon the availability of wind resources and are therefore limited to sites where sufficient wind resource can be harnessed. There were a variety of options considered for alternative layouts, and spatial distributions on-site.

The main criteria for the selection of the proposed development were:

- Wind resources
- Availability of space and sparse population density, limiting social impacts

- Accessibility of the site and proximity to connections
- Level of environmental impact

Prior to the Project site being considered at Krivača, Ivicom Energy assessed a feasibility study in Zagubica, approximately 45km south of the Krivača site. However, a number of factors including wind characteristics, climate¹⁵ and poor road infrastructure, led to the rejection of that location.

The Krivača area was reviewed for suitability, including the current site and potential sites at nearby Rakobarski vis and Tilva (5km and 70km away respectively); but in those locations there was less wind, poor access, unfavourable terrain and the potential sites were obscured by forest.

The Project location was assessed to be favourable for the construction of WTGs, mainly because of favourable wind directions, consistency and speed of the wind resource, the characteristics of the land, and also the location of nearby infrastructure. The Project's location was informed by two wind resource assessments:

- Wind Resource and Energy Yield Assessment Wind Farm Krivača, Fractal, January 2014
- Assessment of the meteorological conditions of the proposed wind farm in Serbia, Garrad Hassan, August 2014

The key reasons for the selection of the specific site included:

- Availability of space at the site
- Wind characteristics suitable for the operation of a wind farm
- Acceptable distance of individual WTGs from large scale settlements and houses
- Avoidance of water supply sources and areas of recreational activity
- Avoidance of forested areas

2.9.4 Alternative Project configuration for Krivača wind power plant

2.9.4.1 Wind farm

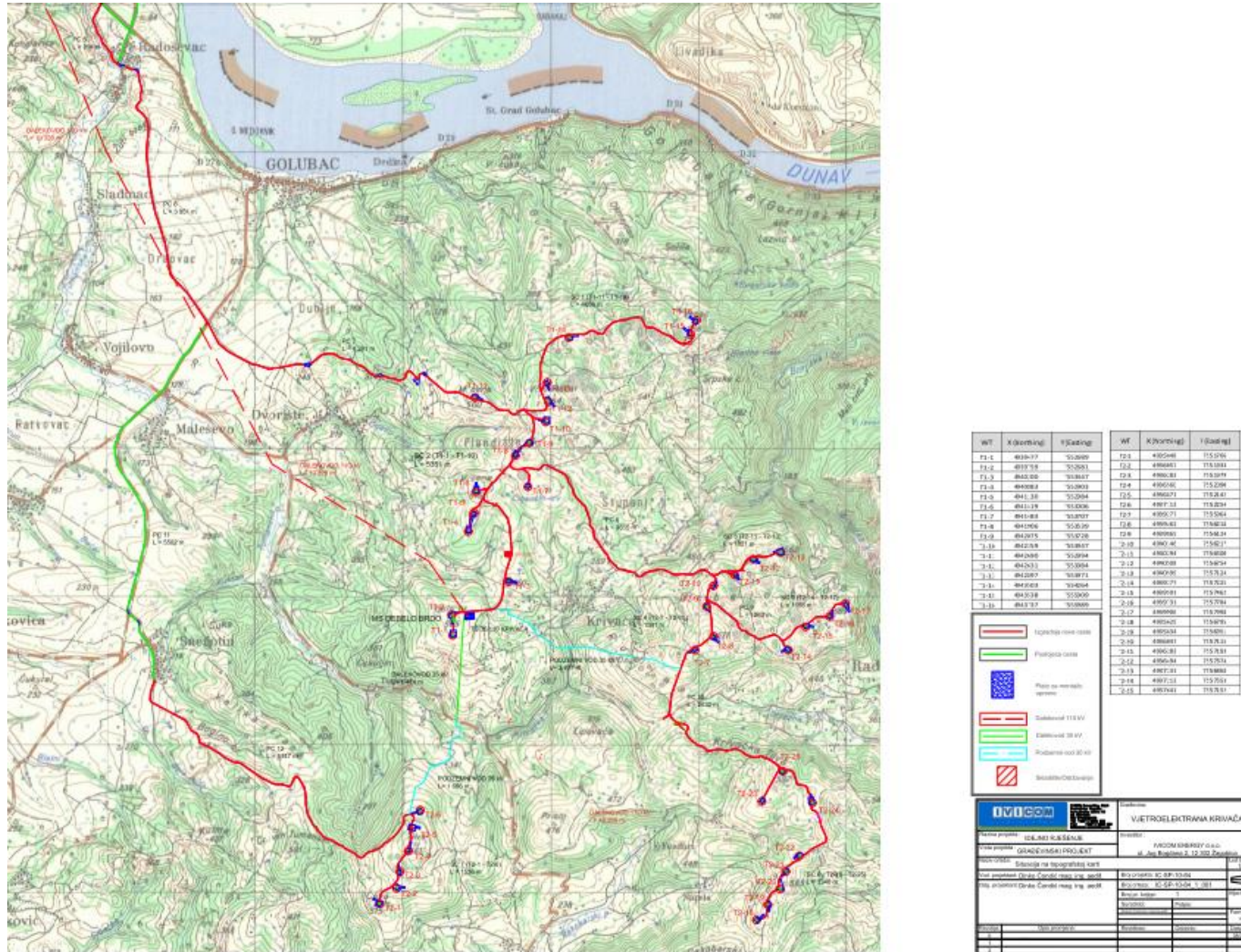
Over a period of seven years, wind data has been collected from meteorological masts at site in order to produce wind yield mapping of the most suitable WTG locations. The process of placing the WTGs has been iterative based on the increased amount of data over time which has improved accuracy. Through this process there have been approximately 20 revisions to the design in order to maximise power output with minimal environmental and social impacts, although the same four clusters of WTGs have been considered throughout.

The initial layout was planned with 41 WTG positions; however, the WTGs were too close together and the total power output was calculated to be 96.4MW. Following this the Project was re-designed with 38 WTG positions which optimised the layout and met with the maximum allowed number of positions according to the detailed regulation plan (PDR). These alternative layouts are presented in Figure 9 and Figure 10 below.

Finally, 31 WTGs were selected to be included in the Project in order to meet the requirements for the grid connection. There are seven additional WTG locations which will remain unused for the planned Project; these may be constructed as an extension to the Project at a later date.

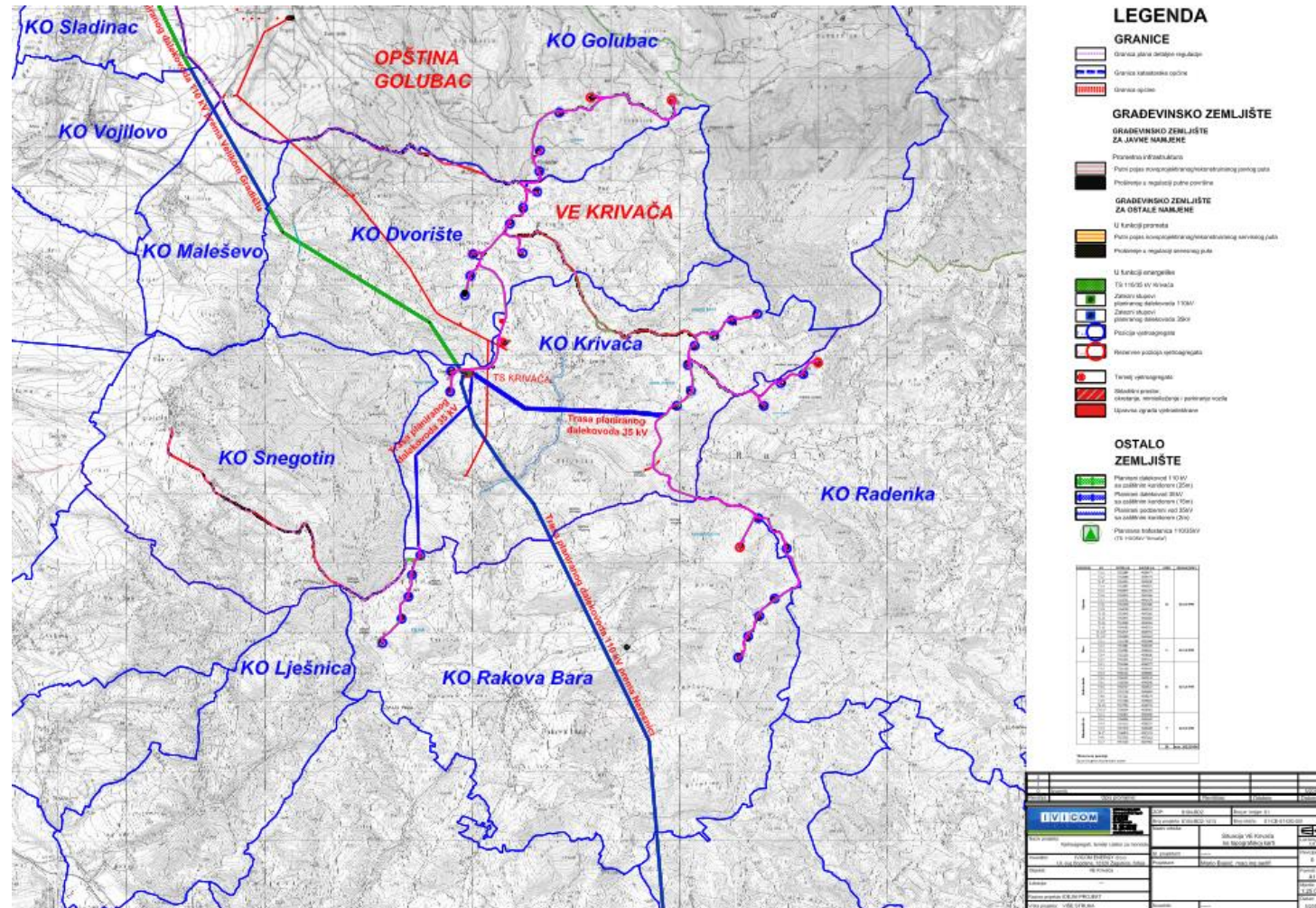
¹⁵ Due to a sharp gradient in the change of temperature in the winter period at Zagubica equipment such as ropes froze very fast and it was not possible to measure the wind in a conventional way.

Figure 9: Alternative layout one, taken from design documentation



Source: Ivicom

Figure 10: Alternative layout two, taken from design documentation



Source: Ivicom

2.9.4.2 Routing of OHLs

Prior to determining the solutions for the OHLs, surveying, photographs, and mapping were used to determine options for routes for the planned lines. Similarly, the conceptual designs took into account various factors such as health and safety, environmental and legal acceptability, and also the restrictions dictated by the site location and grid connection locations.

The OHL routes were finalised as part of the PDR, with approval of the municipality and the OHL operator. This process includes ensuring that sensitive receptors such as distance from buildings and avoidance of tree removal are taken into account during design. The process of the finalising the OHL routes took one year.

2.9.4.3 Technology alternatives

A summary of potential alternative power generation technologies is provided in Table 14.

Table 14: Consideration of alternative generation options

Alternative technology	Comparison to the Krivaca wind power project
Coal fired power plant	This option would rely on fossil fuel imports and the associated emissions are undesirable especially considering Serbia's commitment to renewable energy.
Combined cycle gas turbine operating on natural gas/diesel	This option is also reliant on fossil fuels and has associated emissions. It could also be expensive to run if there are gas shortages and units are forced to operate on diesel.
Hydropower plant	In Serbia, approximately 30% of domestically produced electricity is from hydropower. Over two-thirds of this capacity is concentrated near to the border with Romania, which hosts the Iron Gate 1 and 2 stations (2,116 MW and 540 MW respectively) ¹⁶ . The location of the Krivača wind Project has already developed its hydropower resource.

Source: Mott MacDonald

WTGs

Siemens and Vestas are considered by Ivicom Energy to be the best WTG manufacturers in the field and were the first manufacturers to develop 'plus 3' WTGs which give optimum power production; other suppliers are not able to offer this technology. Hence, no alternative WTG technology was considered for the Project.

2.9.4.4 Site access alternatives

The main considerations for transport of equipment and materials to site are based on:

- Origin of materials and equipment
- Facilities at nearby ports on the River Danube
- Width of local roads and bridges
- Impacts on receptors alongside transport routes
- Road furniture and presence of OHLs

One of the initial site access plans developed involved docking of equipment and materials at Usje on the River Danube. This was rejected because the road route passed through the village of Radoševac where houses were close to the road and there were low voltage OHLs restricting access. Access to the site for delivery of the WTG components is under the jurisdiction of the

¹⁶ <https://www.hydropower.org/country-profiles/western-balkans-serbia>

WTG supplier and the main transport options for the two WTG models under consideration are discussed in detail in section 3.4.4.

3 The existing environment

3.1 Introduction

The following sections discuss the physical environment, ecology and human geography of the proposed Project site.

3.2 Physical environment

3.2.1 Geomorphology, geology and hydrogeology

As indicated in section 1.3 the Project is spread across the territory of three municipalities: Golubac, Kučevo and Veliko Gradište. In the Municipality of Golubac, relief is characterised by a low and highland areas to the far west, and mountains in the central and eastern areas. The lowest point is at the confluence of Pesača and Danube rivers with an altitude of 69masl; and the highest point is the south east of the municipality at Somrdski kamen, with an altitude of 804masl. The majority of the land is between 200-400masl.

In the Municipality of Kučevo, two main types of relief are plains and hilly/mountainous. There is a gradual transition between hilly and mountainous terrain from north to south. The highest point is Blagojev Kamen, with an altitude of 242m and the lowest point is Zelenik at 110masl.

In Veliko Gradište relief is predominantly characterised by plains with some hilly/mountainous areas. The highest altitude is 362m at Lipovačka hill and the lowest is at the Pek river valley at 68masl.

The most notable relief in the area is composed of limestone. The limestone is broken on the surface or covered with a thin layer of tertiary and quaternary sediments, enabling the land to be covered in vegetation.

The three municipalities are characterised by large surface rivers (Danube and Velika Morava), medium sized rivers (Mlava, Pek, Jasenica and Ralja), numerous smaller streams with constant or periodic flow and underground water present in the above river valleys. Soil type mapping carried out for the national EIAs identified a variety of soil types including vertisol, brown acidic soils, and alluvial deposits.

In May 2014, detailed geotechnical investigations were undertaken by Georing Group, covering the Project site area. Investigations have been done in order to inform the main design and confirm the Project construction requirements. Drilling was undertaken at 43 locations. The area is of complex geological formation consisting of rocks and sediments of various geological time periods. The lithological cross-sections identified by drilling to the depth of 15.8m below ground level consisted of various types of clay (humic, silty, marly) and limestone.

In terms of hydrogeological characteristics, the Project area is divided into two separate complexes of rocks of differing hydrological qualities:

- Non-carbonate complex with compacted aquifers
- Carbonate complex with karst aquifers

No flood risk maps or systematically recorded historic flooding data are available for the above mentioned municipalities, however media search suggests that the City of Golubac is prone to

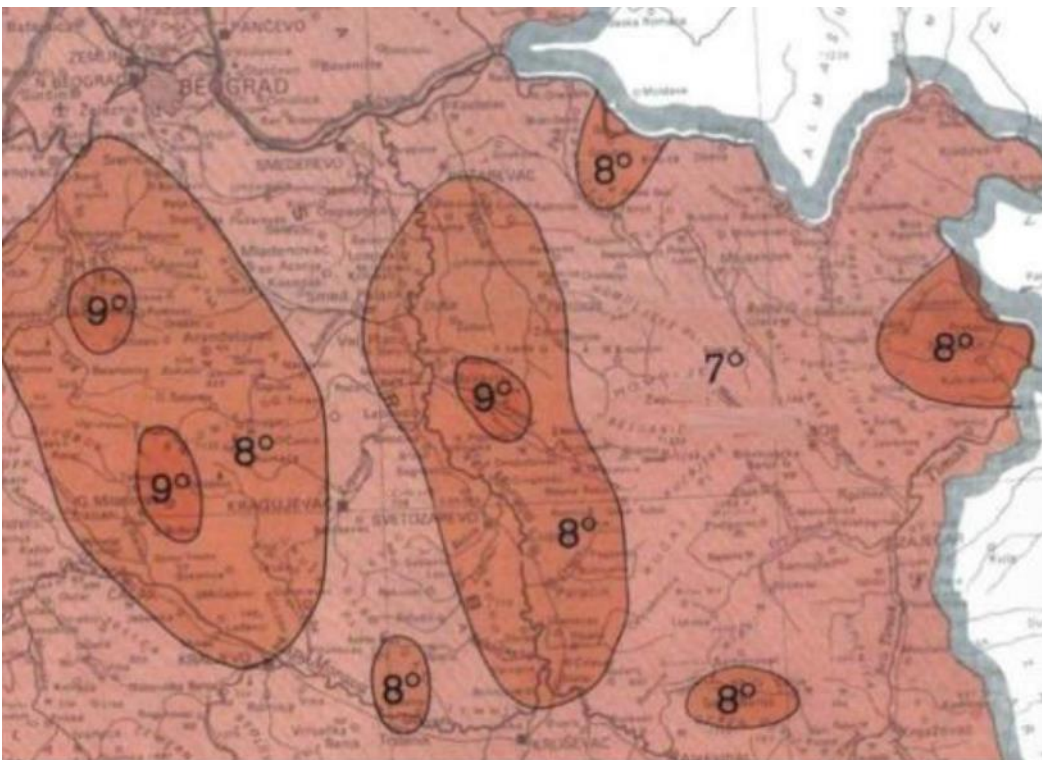
floods, with the latest flood occurring in 2015¹⁷. The City of Golubac is located approximately 13km, and the River Danube is located approximately 2.3km from the nearest WTG. Given the high altitudes and the topography of the terrain it is anticipated that the site will not be subject to flooding. The drainage and the run-off prevention measures to be applied on the Project are discussed in the relevant sections of the report on surface water, effluent and land and ground quality.

3.2.2 Seismology

According to the national EIAs, on the map of seismic hazards for the return period of 475 years, the wind farm area is located in the zone VII (damaging) and VIII (heavily damaging) based upon the 12-grade European macroseismic scale published in 1998. This indicates there is a likelihood of earthquakes of this intensity occurring in the area within a 475 year period.

The temporary seismic maps of Socialist Federal Republic of Yugoslavia published in 1982 by the Seismological Institute of the Republic of Serbia in Belgrade show that the OHLs are located in zones VII (very strong) and VIII (severe) of the basic degree of seismic intensity at 12-grade Mercalli–Cancani–Sieberg scale for a return period of 100 years (refer to Figure 11). This indicates there is a likelihood of earthquakes of this intensity occurring the area within a 100 year period.

Figure 11: Seismic hazard map of Serbia



Source: National EIA studies, EcoLogica Urbo

Information on geotechnical ground conditions and seismic activity and risk has been taken into account in the design of the WTGs and their foundations. Geotechnical assessment concluded that the proposed foundation types are suitable for the ground conditions and seismic risks. It is

¹⁷ <http://www.blic.rs/vesti/srbija/nezapamceno-nevreme-grad-razbijao-prozore-i-izloge-u-golupcu-kolona-vozila-pod-vodom/dhpljt7>

considered that no further assessment is required as part of the ESIA addendum, however it is recommended that the Emergency Preparedness and Response Plan is developed for the Project to identify OHS and community health and safety risks associated with natural hazards or design failure and controls to manage those risks. All of the risks associated with health and safety require controls, irrespective of any assessment of their significance.

3.2.3 Climate and meteorology

The municipality of Golubac (to the north of the Project site) is characterised by a warm and temperate climate, with a mean annual air temperature of around 11°C¹⁸. The warmest temperature can reach over 35°C in the summer months although the highest average is around 21.5°C in August. The coldest month of January characterised by harsh winters and an average temperature of -0.1°C. The most intense rainfall occurs in the months of May and June, with the least in autumn and winter. Areas with higher altitude receive higher rainfall, for example Snegotin with 742mm compared to the average total rainfall of 639mm. The area has an average wind speed of 25-45km/h, and a top speed of 130km/h which can cause a significant drop in temperatures down to -35°C.

The municipality of Kučevo (to the south of the Project site) is also characterised by a warm and temperate climate and is more heavily influenced by surrounding mountain climates. The peak average temperature in the summer is 20.8°C in August and the average annual temperature is around 10.8°C. Due to proximity to the River Danube, the area is exposed to high humidity, which can cause ice formation. The majority of the days of rain are during May and June, and the driest months are February and March. The average annual rainfall is 655 mm.

The climate in Veliko Gradište Municipality to the west of Golubac and north-west of Kučevo Municipalities is similar and generally warm and temperate. Rainfall is significant throughout the year with May and June being the wettest months. The average total rainfall is very similar to Golubac Municipality, at 638mm. The warmest average temperatures are in August, at 21.6°C and January is the coldest with an average of 0.1°C.

3.2.4 Landscape

The River Danube runs through a wide valley to the west, associated with the lower lying land at Golubac and through a more dramatic and incised valley crossing through the edges of the Carpathian Mountains forming the Đerdap Gorge. The topography rises steeply from the River Danube to form prominent but broken ridge lines to the south and north of the river valley. The wider cultivated valley areas contrast with the enclosed higher wooded valley sides. The valley extends from the settlements of Neresnica, south of the proposed wind farm location, running north west to the riverside settlement of Veliko Gradište.

Figure 12 shows the topography of the study area for the Project.

¹⁸ From <https://en.climate-data.org/>, retrieved January 2017

The existing topography of the area where the proposed WTGs will be located can be described as complex. As shown in Figure 12, the proposed WTG locations are distributed over several ridges with elevations ranging from 485m to 590m above sea level. Existing settlements are concentrated in the lower valley areas and consist of small-scale, loosely nucleated rural settlements. The settlements include some outlying properties on the rising ground of the valley sides. The typical local built vernacular includes rendered two and three storey residential properties with terracotta tiled pitched roofs. Outbuildings include open sided timber structures again with pitched roofs.

The national EIAs note that two 110kV OHLs will cross agricultural and forest land, three rivers, the existing railway line as well as various categories of roads. The planned route of the OHL corridor is noted as being outside the construction zone in the municipalities of Golubac, Kučevo and Veliko Gradište.

Figure 13: Properties in the centre of Krivača



Source: Mott MacDonald 2016

Figure 14: Isolated dwellings located on the rising ground



Source: Mott MacDonald 2016

Farming is the dominant activity in the study area and the land use comprises small scale agricultural cultivation with areas of maize, orchards, hay meadows and forestry. The woodland is fragmented in places, giving way to open meadows on plateau areas and includes a range of deciduous species such as beech *Fagus sp.*, oak *Quercus sp.* and hornbeam *Carpinus sp.*

Local roads are paved but forest roads are unpaved, with gravel or earth surfaces. Local traffic intensity is low. Golubac is the main settlement in the Golubac Municipality and the largest settlement in the study area.

The Project site is adjacent to the western end of the Đerdap National Park, designated for its ecological, archaeological and cultural heritage value. Within the Spatial Plan of the Republic of Serbia 2010 – 2020, the area is noted as, *a primary tourist area (Area 6 Donje Podunavije) with the potential to further develop tourism along the navigable route of the Danube Corridor VII (navigation, nautical tourism and thematic routes/tours). Priority cultural landscapes are noted as: the Danube riverbank with prehistoric constructions and fortresses dating from the Middle Ages (Golubac and Lepenski vir).* From the site visit and meeting with the officers of the Đerdap National Park, it is evident that no known sensitive receptors identified in the national park fall within the predicted viewshed analysis (see the zone of theoretical visibility (ZTV) in section A2, Volume III). The recently constructed wind power plant, Moldova Noua wind farm falls within the Iron Gates Natural Park (*Parcul Natural Porțile de Fier*) in the north of the Project area and can be seen from parts of the proposed wind farm site. The Iron Gates Natural Park is located in

southwestern Romania in the counties of Caraş-Severin and Mehedinţi. It is the largest natural park in Romania, stretching along the left bank of the River Danube.

Along the route of the OHLs, rural roads link villages. The landscape is one of cultivated agricultural land, meadows and pasture with solitary trees and scattered fragments of mixed forests (including beech, oak and hornbeam). There are a number of existing OHLs in the study area including the 400kV line number 401/2 Drmno-Đerdap I; several 35kV OHLs as well as a few sections of 10kV OHLs.

The character of the area varies with the steepness of the slopes, the extent of farming and housing development and the remoteness of the area. The Project area falls broadly into three landscape character areas (LCA):

- Steep Wooded Gorge LCA. The LCA is recognised nationally as a designated National Park and characterised by the relative lack of development, high level of tranquillity, extensive vegetation cover and a wilderness quality. The steep wooded gorge LCA straddles the River Danube and the steeply rising landform to the south falls within the Đerdap National Park. The Iron Gates Natural Park is to the north. The LCA will be highly susceptible to change with features that could not be substituted and therefore has a high sensitivity.
- Wooded Hillsides and Plateaus LCA. The LCA has limited areas of development including scattered farmsteads, villages, and road corridors. These areas are characterised by the presence of small scale arable fields associated with farmsteads, open pasture, forest and a medium level of tranquillity. The LCA will be moderately susceptible to change with some features that could be substituted and therefore has a medium sensitivity.
- Cultivated River Valleys LCA. The LCA includes larger settlements, paved roads and overhead power lines set in a wide level valley area. The predominant land use is extensive arable cultivation with limited tree and forest cover. The LCA will have a low susceptibility to change with areas of urban intrusion and landscapes which could be substituted or improved and therefore has a low sensitivity.

Typical features of the LCA are illustrated in the photographs below in Figure 15, Figure 16 and Figure 17.

Figure 15: Steep Wooded Gorge LCA



Source: Mott MacDonald

Figure 16: Wooded Hillside and Plateau LCA



Source: Mott MacDonald

Figure 17: Cultivated River Valleys LCA

Source: Mott MacDonald

3.2.5 Visual amenity

The visual baseline study identified a number of potential visual receptors (people with a view of the Project). The topography within the study area is dynamic and complex to the north and east of the ZTV where the mountainous nature of the landform limits the visual envelope. The more open landscape and wider valley landform to the west afford more opportunities to view the Project elements. The viewshed generated by the WTGs is reproduced in Figure 15, Volume III. It should be noted that this is generated using bare earth data sets (see methodology in section A2, Volume III) and does not take into account the presence of existing buildings or vegetation which may limit visibility.

Residents living within the study area, people using the local roads, visitors to the Đerdap National Park (for this assessment assumed to be focussed on the Golubac Fortress) and the Iron Gates Natural Park (for this assessment assumed to be focussed on the views south from the shore road along the River Danube) and local people working and walking in the landscape are potential visual receptors. These are listed with an assessment of their sensitivity in Table 15 below and presented in Figure 18.

From the site visit and meeting with the officers from the Đerdap National Park, no known sensitive receptors were identified in the national park that fall within the predicted viewshed analysis as the key cultural elements are concentrated along the river corridor and the steep gorge topography and forest cover screen the Project from the river.

The settlements, which are in close proximity to the proposed WTGs, are concentrated in the lower valley areas and adjacent buildings, vegetation and the undulating topography will tend to restrict views towards the proposed WTG locations. Figure 19 illustrates how the settlement of Krivača is located in the valley floor and surrounded by enclosing topography. Outlying properties, some in seasonal use, tend to be located higher up the valley sides and closer to the proposed WTG locations.

Figure 18: Settlements comprising potential visual receptors

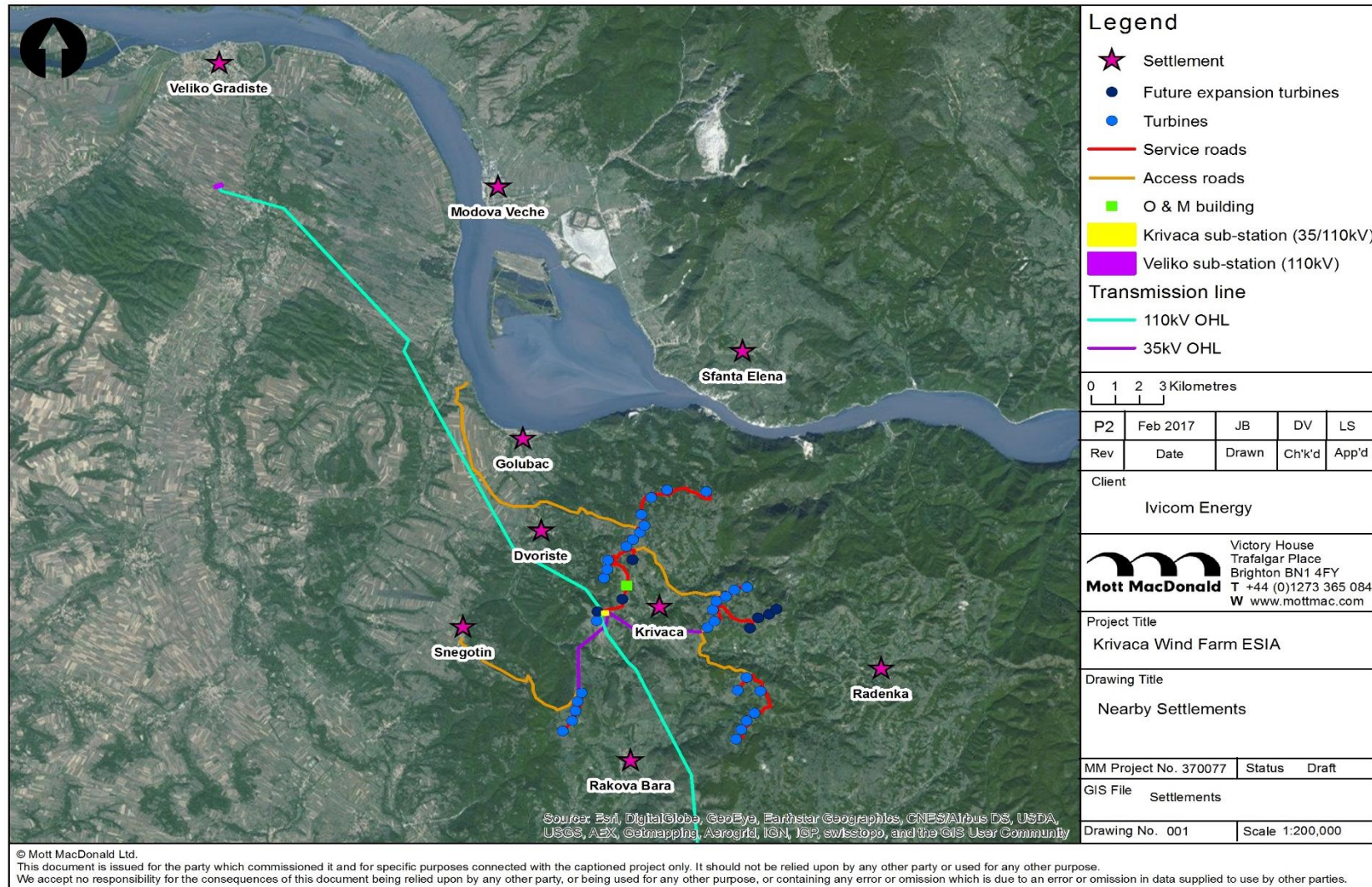


Figure 19: View of Krivača village from the location of the proposed Debelo brdo cluster to the east



Source: Mott MacDonald 2016

Table 15: Visual receptors

Receptor	View
Residents of Radenka village	The rising topography surrounding the village encloses views. The slopes support a mixture of small cultivated fields, pasture and areas of deciduous forest. Limited views to the Project site from the core of the settlement. Some outlying, isolated properties on the higher ground will have open views onto the Rakobarski vis Project site (see figures 20 and 21). The settlement will be approximately 3.1km from WTG T4-6 with an elevation of 577m
Residents of Krivača Village	The relatively steep rising topography surrounding the village encloses views. The slopes support a mixture of small cultivated fields, pasture and areas of deciduous forest, notably to the south and east. Some urbanising influences present along with localised transmission distributor lines and a single telecommunications mast to the east of the village. Limited views to the Project site from the core of the settlement (see figures 22 and 23). Some outlying, isolated properties on the higher ground will have open views onto the Debelo brdo, and Venac Project sites. The closest outlying village property will be approximately 1km from WTG T3-5 at an altitude 543m and 0.5km from T1-1 at an altitude of 486m.
Residents of Rakova Bara village	The rising topography surrounding the village encloses views. The slopes support a mixture of cultivated fields rising up the valley sides, pasture and areas of deciduous forest, notably to the east and west on higher ground. Limited urban influences visible but localised transmission distributor lines are present. Very limited views to the Project site from the core of the settlement. Some outlying, isolated properties on the higher ground may have filtered views onto the Tilva Project site. The edge of the settlement will be approximately 1.6km from WTG T2-2 at an altitude of 533m. Due to the intervening tree cover, clear views of the WTGs are considered unlikely from this receptor point.

Receptor	View
Residents of Golubac	Relatively level topography and cultivated arable land use with limited tree cover affording open views from the edge of the settlement and surrounding fields. Urban influences present including OHLs, paved roads and urban infrastructure. Very limited views to the Project site from the core of the settlement. Some outlying, isolated properties may have filtered views onto the Venac Project site (see figure 24). The settlement centre will be approximately 4.6km from WTG T1-12 at an altitude of 544m. Due to the intervening tree cover, clear views of the WTGs are considered unlikely.
Residents of Dvoriste	Relatively level topography and cultivated arable land to the west with a stronger valley landform rising to the east. Tree cover encloses views from the edge of the settlement enhanced by the rising topography. Urban influences present including OHLs. No direct views expected to the Project site from the core of the settlement. The settlement centre will be approximately 2.2km from WTG T1-6 at an altitude of 512m. Due to the intervening tree cover, clear views of the WTGs are considered unlikely.
Residents of Snegotin	Relatively level topography and cultivated arable land use to the west with a stronger valley landform rising to the east. Tree cover encloses views from the edge of the settlement eastwards enhanced by the rising topography (see figures 26 and 26). Urban influences present including OHLs. No direct views expected to the Project site from the core of the settlement. The settlement centre will be approximately 4.1km from WTG T2-5 at an altitude of 530m.
Visitors to Tuman Monastery	Strong valley topography together with woodland cover encloses views. Urban influences present including OHLs. No direct view of the Project (WTG or OHLs) expected from the monastery. See figures 27 and 28.
Visitors to the National Park (main tourist attractions including monuments of culture including the fortress at Golubac)	Strong incised topography rising steeply from the river corridor. Woodland cover and topography enclose and limit views to the south. The WPP Moldova Noua wind farm close to Sfanta Elena in Romania is part of the view to the north. The fortress is approximately 2.8km from WTG T1-14 at an altitude of 510m. See figures 29 and 30.
Visitors to the Iron Gates Natural Park (Romania) (viewing point on DN57 towards the Golubac fortress)	Steep topography of the gorge encloses views to the south. The Golubac fortress is visible across the River Danube (see figure 29). A single telecommunications mast is visible on the skyline. Typical viewpoints along the DN57 towards the fortress is approximately 3.6km from WTG T1-14 at an altitude of 510m.

Source: Mott MacDonald

Figure 20: Typical view from outlying properties in Radenka village



Source: Mott MacDonald 2016

Figure 21: Typical view from outlying properties in Radenka village



Source: Mott MacDonald 2016

Figure 22: Typical setting for the Krivaca village



Source: Mott MacDonald 2016

Figure 23: Typical setting for outlying properties in Krivaca



Source: Mott MacDonald 2016

Figure 24: View east from Golubac



Source: Mott MacDonald 2016

Figure 25: Typical view from Snegotin looking east



Source: Mott MacDonald 2016

Figure 26: Typical view from Snegotin looking east



Source: Mott MacDonald 2016

Figure 27: Setting for Tuman monastery



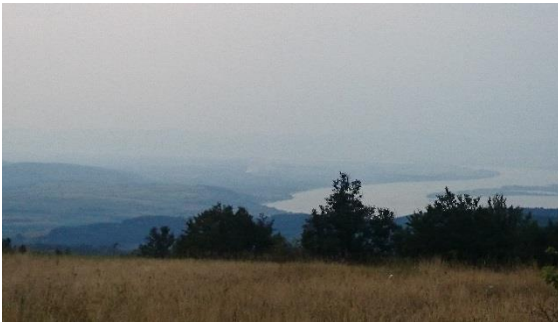
Source: Mott MacDonald 2016

Figure 28: Setting for Tuman monastery



Source: Mott MacDonald 2016

Figure 29: View of Danube gorge from the southern boundary of the National Park boundary



Source: Mott MacDonald 2016

Figure 30: View looking north towards the Moldova Noua WTG



Source: Mott MacDonald 2016

3.2.6 Water resources

There are no water bodies in the proximity of the Project site and the closest water body is the River Danube 2.3km from the closest WTG. One of the OHLs crosses two rivers (Pek and Tumanska).

3.3 Ecology

3.3.1 Introduction

This section presents the biodiversity, ecology and nature conservation baseline conditions in the Project area. The baseline includes protected areas, habitats and species, using information from both primary and secondary sources. The methodology is described in the ecology technical appendix (section A.1, Volume III).

3.3.2 Protected areas and nature conservation

3.3.2.1 Overview

The Project site is located in the Pannonian/Carpathian Basin which supports a significant area of wilderness and the largest remaining area of virgin and natural forests in Europe outside of northern Scandinavia and Russia¹⁹.

3.3.2.2 Đerdap National Park, protection designations

Đerdap National Park is located to the north-west of the Project, approximately 212m from the nearest WTG, T1-15 (Venac cluster) (refer to Figure 2). This protected area has several other designations with overlapping boundaries:

- Important Bird and Biodiversity Area (IBA), designated by BirdLife International
- Important Plant Area (IPA), designated by PlantLife International
- Prime Butterfly Areas (PBA) designated by Butterfly Conservation Europe
- Candidate EMERALD area as part of the Emerald Network of Areas of Special Conservation Interest, and under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). These areas also form the basis for selection as candidate Natura 2000 sites under Article 6 of the Habitats Directive²⁰.
- Proposed Biosphere Reserve under the UNESCO 'Man and Biosphere' (MAB) Programme
- Tentative List as a Natural World Heritage Site under the Convention on the Protection of the World Cultural and Natural Heritage (World Heritage Convention)
- Carpathian Area under the Framework Convention on the Protection and Sustainable Use of the Carpathians

Details of these protected or proposed designations are provided below. Đerdap National Park was established in 1975 and is the largest national park in Serbia (636.1sq km). It is an area of unique natural, cultural, historical and archaeological interest. The Park is located in north-east Serbia, on the border with Romania, along the right bank of River Danube. The park is a forested and narrow mountain area (2-8km wide and 100km long), reaching altitudes of 800m above sea level but only 50m on the banks of River Danube.

Đerdap IBA and National Park is important for breeding raptors and wintering waterbirds, holding 20,000 or more individuals on a regular basis during winter (45,000 recorded in January 1999). This is also believed to be an important area for migrating storks and raptors²¹. The National Park supports 174 species of birds²², of which around 110 species breed²³.

There are nine species of wintering waterfowl in significant numbers: great crested grebe (*Podiceps cristatus*), great cormorant (*Phalacrocorax carbo*), pygmy cormorant (*Microcarbo pygmeus*), mute swan (*Cygnus olor*), greylag goose (*Anser anser*), common pochard (*Aythya ferina*), tufted duck (*Aythya fuligula*), common goldeneye (*Bucephala clangula*) and smew (*Mergellus albellus*). Important breeding birds include raptor species such as European honey buzzard (*Pernis apivorus*), white-tailed eagle (*Haliaeetus albicilla*), short-toed snake eagle

¹⁹ WWF (http://wwf.panda.org/what_we_do/where_we_work/black_sea_basin/danube_carpathian/the_green_heart_of_europe/)

²⁰ Natura 2000 Implementation Factsheet (2011) http://www.ceeweb.org/wp-content/uploads/2012/01/Fact-sheets_Serbia_updated.pdf

²¹ BirdLife International (2017). Important Bird Areas factsheet: Đerdap gorge. Downloaded from <http://www.birdlife.org> on 23/01/2017.

²² Grubač, B., Milovanović, Z., Šekler, M. (2013). Ptice Đerdapa (Birds of Đerdap). JP Nacionalni park "Đerdap" - Zavod za zaštitu prirode Srbije - Veterinarski specijalistički institut "Kraljevo", Donji Milanovac - Beograd.

²³ Puzović, S.(ed.) (2009). Značajnapodručjapptice u Srbiji (Important Bird Areas in Serbia). Ministarstvoživotnesredine i prostornogplaniranja, Zavodzaštituprirode Srbije & Pokrajinski Sekretarijatzazaštituživotnesredine i održivirazvoj, Beograd – Novi Sad. ISBN 978-86-80877-33-4. pp 278.

(*Circaetus gallicus*), lesser spotted eagle (*Clanga pomarina*), golden eagle (*Aquila chrysaetos*), booted eagle (*Aquila pennata*) and peregrine falcon (*Falco peregrinus*).

Flora of the Đerdap National Park comprises 1,013 species and sub-species, which is more than a quarter of the flora of Serbia. Đerdap is also an IPA because of its high plant diversity and functioning as a refuge for many species. There are 57 forest and shrub communities in Đerdap National Park. The vegetation is characterised by the presence of relic forest communities of walnut (*Juglans regia*), hackberry (*Celtis australis*), Turkish hazel (*Corylus colurna*), beech (*Fagus sylvatica*), lilac (*Syringa vulgaris*) and other species. Due to its warm climate and calcareous substrate, Đerdap represents a small enclave of Mediterranean and sub-Mediterranean flora, including walnut, hackberry, Turkish hazel, oriental hornbeam (*Carpinus orientalis*), downy oak (*Quercus pubescens*), smoketree (*Cotinus coggygria*).

Yew tree (*Taxus baccata*) is a relic and an endangered species that occurs in the Park. Other relics include holly (*Ilex aquifolium*) and daphne laurel (*Daphne laureola*).

The National Park supports 14 species and sub-species of Balkan endemic plants²⁴. Eighty-three plant taxa recorded in the National Park are rare and endangered in Serbia²⁵ and fifteen species are listed as extinct or critically endangered²⁶.

A total of 64 species of mammals are recorded in the broader area of Đerdap National Park. Of these, eight species are insectivores, 18 species are rodents, one species of lagomorph, 18 species of bats, 15 species of carnivores and four species of ungulates. The vast majority of the mammal species are native but the following are non-native: muskrat (*Ondatra zibethicus*), coypu (*Myocastor coypus*), raccoon dog (*Nyctereutes procyonoides*) and small Indian mongoose (*Herpestes auropunctatus*). Important species of mammals include Eurasian lynx (*Lynx lynx*), brown bear (*Ursus arctos*), grey wolf (*Canis lupus*), European marbled polecat (*Vormela peregusna*) and all bat species recorded in the area^{27,28}.

There are 13 amphibian species recorded in the Park and the most common are: fire salamander (*Salamandra salamandra*), smooth newt (*Lissotriton vulgaris*), northern crested newt (*Triturus cristatus*), yellow-bellied toad (*Bombina variegata*), common toad (*Bufo bufo*), tree frog (*Hyla arborea*) and agile frog (*Rana dalmatina*). Thirteen reptile species are known from the Park: two species of chelonians, six species of lizards and five species of snakes (Macura & Crnobrnja-Isailović, in press²⁹). Notable species include nose-horned viper (*Vipera ammodytes*), meadow lizard (*Darevskia praticola*) and Hermann's tortoise (*Testudo hermanni*).

Đerdap National Park is also part of a PBA. A PBA is a natural or semi-natural site exceptionally rich in fauna, particularly butterfly fauna, and/or particular community of rare, endemic and

²⁴ Balkan endemic plants (*Acanthus hungaricus*, *Acer hyrcanum* subsp. *intermedium*, *Betonica scardica*, *Campanula sparsa* subsp. *sphaerotrinx*, *Cytisus procumbens*, *Genista subcapitata*, *Viola macedonica* subsp. *macedonica*, *Eryngium palmatum*, *Cerastium rectum* subsp. *rectum*, *Heliosperma pusillum* subsp. *moehringiiifolia*, *Trifolium dalmaticum*, *Trifolium medium* subsp. *balcanicum*, *Sesleria latifolia* and *Festuca panciana*).

²⁵ Stevanovic et al. (1996). Preliminary Red List of Flora of Serbia. Ministry of Environment of the Republic of Serbia.

²⁶ Stevanovic, V. (1999). Red Book of Flora of Serbia. Ministry of Environment of the Republic of Serbia.

²⁷ Ćosić N., Jarić I., Knežević-Jarić J., Stojilković B. Ćirović D. (in press). Diverzitetfaunisisara NP "Đerdap" saokolinom (The Diversity of Mammal Fauna in the NP "Đerdap" with its Surroundings). Macura, B., Jelić I, (Eds.), Nacionalni park „Đerdap“ – vrednosti, lepota prirode i zaštita. Beograd, Ekološko društvo „Endemit“.

²⁸ Grubač, B., Milovanović, Z. (2012). Slepí miševi Đerdapa (Bats of Đerdap). JP Nacionalni park "Đerdap" - Zavod za zaštitu prirode Srbije - Veterinarski specijalistički institut "Kraljevo", Donji Milanovac - Beograd.

²⁹ Macura B., Crnobrnja-Isailović J. (in press). Diverzitetfaunegmizavaca NP "Đerdap" (Diversity of Reptile Fauna of the NP "Đerdap"). Macura, B., Jelić I, (Eds.), Nacionalni park „Đerdap“ – vrednosti, lepota prirode i zaštita. Beograd, Ekološko društvo „Endemit“.

threatened species, as well as species of European and national concern. There are 104 species of butterflies in the PBA area including eight important target species (Jakšić, 2008³⁰).

3.3.2.3 Labudovookno IBA and Ramsar site

Labudovookno IBA and Ramsar site is situated approximately 30km north-west of the Project. This area is also designated as a Special Nature Reserve Deliblato Sands. This designated site is included in the assessment because of the potential overlap of foraging ranges for qualifying waterbird species.

Situated along the southern limit of the Pannonian Plain/Carpathian Basin, the site encompasses an important stretch of River Danube and adjacent areas as well as the Nera River on the border with Romania. Following the construction of the Iron Gates reservoir, the River Danube water level rose and the river flow slowed down, causing the flooding of many river islets, lower coastal parts, and lagoons along the southern areas in the Deliblato Sands and created new aquatic and wetland habitats. Permanent rivers and freshwater marshes are the main wetland types, comprising diverse wetland communities as well as wet meadows and steppe pastures along the riverbanks.

The shallow water of River Danube provides ideal spawning areas for many of the 50 supported fish species, such as wels catfish (*Silurus glanis*), zander (*Sander lucioperca*) and starlet (*Acipenser ruthenus*).

This area is used by wintering wetland birds which form the largest wintering flocks in this part of Europe. The site is an important waterbird habitat, especially as a nesting and wintering site for a range of species such as pygmy cormorants (*Phalacrocorax pygmeus*), little egret (*Egretta garzetta*), greater white-fronted goose (*Anser albifrons*), and common goldeneye (*Bucephala clangula*). Besides the strict protection zone and small-scale forestry mainly on river islets, the site is mainly used for agricultural activities based on cattle and sheep grazing^{31,32}.

3.3.3 Habitats and flora

3.3.3.1 Habitats

The European Nature Information System (EUNIS) habitat classification system has been used to describe and categorise the habitats recorded within the four WTG clusters (Tilva, Venac, Debelo brdo and Rakobarski vis).

The habitats in the wider area exhibit an altitudinal zonation: above 500masl³³, forests are dominated by beech (*Fagus sylvatica*), mixed deciduous forests are present between 400 and 500masl, and Turkey oak (*Quercus cerris*) forests occur below 400masl. Aspect is also an important factor, with oak forests covering mainly southern slopes and beech forests being predominant on northern slopes.

There are two main types of forest in the Project area:

- Sub-thermophilous oak forest dominated by *Quercus cerris*, with *Acer campestre*, *Ailanthus altissima*, *Carpinus orientalis*, *Cornus mas*

³⁰ Jakšić, P. (2008). Developing methods for target species and Prime Butterfly Areas selection criteria in Serbia. Bulletin of the Natural History Museum, 2008, 1: 205-228.

³¹ Puzović, S.(ed.) (2009). Značajnapodručjapoptice u Srbiji (Important Bird Areas in Serbia). Ministarstvoživotnesredine i prostornogplaniranja, Zavodzazaštítuprirode Srbije & Pokrajinski Sekretarijatzazaštítuživotnesredine i održivirazvoj, Beograd – Novi Sad. ISBN 978-86-80877-33-4. pp 278.

³² Ramsar, www.ramsar.org

³³ Metres above sea level

- Moesian beech forest dominated by *Fagus sylvatica*

The Rakobarski vis WTG cluster area supports oak forest only, while the other three WTG cluster areas support both beech and oak forests (Table 16).

Open grasslands represent the dominant habitat in all four WTG cluster areas. Parts of the Venac and Debelo brdo areas support grassland communities dominated by *Calamagrostis epigejos*, and grasslands are dominated by *Arrhenatherum elatius* in most of the Venac, Tilva and Rakobarski vis areas. The grasslands in the Venac and Debelo brdo areas are under higher anthropogenic pressure because of livestock grazing.

Small and few arable fields are present in the Tilva, Venac and Debelo brdo WTG cluster areas. The main crops grown in these areas include corn, wheat and alfalfa (lucerne). Some arable land is neglected and overgrown with weeds.

No major rivers or lakes are present within the Project footprint, but there are ephemeral streams that hold water during winter and periods of heavy rain. The River Danube (which is the border with Romania) is approximately 2.3km north from the nearest proposed WTG location.

There are no human settlements or buildings within the Project footprint. The village of Krivača is approximately 1.5km south of the Venac cluster and 1.5km north-west from Debelo brdo cluster. The village Rakova bara is approximately 3km from Rakobarski vis cluster and about 2km from the Tilva cluster. Unmade roads cross the site, allowing access to the arable fields and forests.

Table 16: Broad forest and grassland habitats in the four WTG clusters

EUNIS habitat type	Vegetation type	IFC category	Habitat sensitivity (conservation importance)	WTG cluster
G1.75 South-eastern sub-thermophilous Quercus wood	Quercetum cerris	Natural	Medium	Rakobarski vis Debelo brdo Venac Tilva
G1.69 Moesian Fagus forest	Fagetum submontanum	Natural	Medium	Debelo brdo Venac Tilva
E1.74 Calamagrostis epigejos stands	Calamagrostietum epigejos	Natural	Low	Debelo brdo Venac
E2.23 Medio-European submontane hay meadows	Arrhenatheretum elatioris	Natural	Low	Rakobarski vis Venac Tilva
Farmland	N/A	Modified	Negligible	Debelo brdo Venac Tilva
Watercourses	N/A	Natural	Medium	Rakobarski vis Debelo brdo Venac Tilva

Table 17 presents the proportions of habitat types in each of the four WTG clusters. Grassland habitats cover more than 80% of the Debelo brdo, Rakobarski vis and Venac cluster areas, while the Tilva area supports grassland and forest habitats in relatively equal proportions. Farmland occupies very small proportions in Debelo brdo, Venac and Tilva WTG clusters, and is absent in the Rakobarski vis WTG cluster area.

Table 17: Habitat proportions (%) in the four WTG clusters (500m buffer)

EUNIS Habitat Type	Rakobarski vis	Debelo brdo	Venac	Tilva
G1.75 South-eastern sub-thermophilous Quercus wood	18.43	6.98	9.95	24.48
G1.69 Moesian Fagus forest	0	0	3.09	21.38
E1.74 Calamagrostis epigejos stands	0	90.71	13.33	0
E2.23 Medio-European submontane hay meadows	81.57	0	72.56	53.74
Farmland	0	2.31	1.08	0.40
Ephemeral water courses	n/a	n/a	n/a	n/a

Source: Mott MacDonald

3.3.3.2 Flora

The flora of the WTG cluster areas is typical of forest and grassland habitats and reflects the anthropogenic pressure that has occurred in some areas. Fifty plant species were recorded in the four areas of the Project in October 2016 (Table 18). All these species are common and none are classified as threatened globally according to the IUCN Red List, threatened in Serbia³⁴, or endemic to Serbia. The tree of heaven (*Ailanthus altissima*) and black locust tree (*Robinia pseudoacacia*) are considered to be invasive in Eastern Europe³⁵ but they are not on the List of Invasive Alien Species of Union Concern³⁶.

Table 18: Plant species recorded in October 2016 in the four WTG clusters

Scientific name	Common name	Scientific name	Common name
<i>Acer campestre</i>	Field Maple	<i>Fagus sylvatica</i>	Beech
<i>Achillea millefolium</i>	Yarrow	<i>Festuca valesiaca</i>	Wallis fescue
<i>Agropyron repens</i>	Common couch	<i>Filipendula hexapetala</i>	Dropwort
<i>Agrostis capillaris</i>	Common bent	<i>Fragaria vesca</i>	Wild strawberry
<i>Ailanthus altissima</i>	Tree of heaven	<i>Galium verum</i>	Lady's bedstraw
<i>Arrhenatherum elatior</i>	False oat-grass	<i>Helleborus odoratus</i>	Hellebores
<i>Asperula odorata</i>	Sweet scented bedstraw	<i>Knautia arvensis</i>	Field scabious
<i>Betonica officinalis</i>	Common hedge nettle	<i>Leucanthemum vulgare</i>	Ox-eye daisy
<i>Briza media</i>	Quaking grass	<i>Linaria vulgaris</i>	Common toadflax
<i>Calamagrostis epigejos</i>	Wood small-reed	<i>Pastinaca sativa</i>	Wild parsnip
<i>Carex caryophylla</i>	Vernal sedge	<i>Pinus nigra</i>	Black pine
<i>Carpinus orientalis</i>	Oriental hornbeam	<i>Prunus avium</i>	Wild cherry
<i>Centaurea jacea</i>	Brown knapweed	<i>Prunus spinosa</i>	Blackthorn
<i>Cichorium intybus</i>	Common chicory	<i>Quercus cerris</i>	Turkey Oak
<i>Clematis vitalba</i>	Old man's beard	<i>Robinia pseudoacacia</i>	Black locust
<i>Cornus mas</i>	Cornelian cherry	<i>Rosa canina</i>	Dog-rose
<i>Crataegus monogyna</i>	Hawthorn	<i>Rubus hirtus</i>	Bramble
<i>Crepis biennis</i>	Rough hawksbeard	<i>Salvia verticillata</i>	Whorled clary
<i>Cynosurus cristatus</i>	Crested dog's-tail	<i>Sambucus ebulus</i>	Danewort

³⁴ Stevanovic, V. (1999). Red Book of Flora of Serbia. Ministry of Environment of the Republic of Serbia.

³⁵ Weber, E. (2003). Invasive Plant Species of the World. CABI Publishing.

³⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1468477158043&uri=CELEX:32016R1141>

Scientific name	Common name
<i>Dactylis glomerata</i>	Cock's-foot
<i>Daucus carota</i>	Wild carrot
<i>Dianthus</i> sp.	Campion
<i>Dorycnium herbaceum</i>	Prostrate Canary clover
<i>Eryngium campestre</i>	Field eryngo
<i>Euphorbia cyparissias</i>	Cypress spurge

Source: Mott MacDonald

Scientific name	Common name
<i>Silene vulgaris</i>	Maidenstears
<i>Stachys germanica</i>	Downy woundwort
<i>Teucrium chamaedrys</i>	Wall germander
<i>Thymus</i> sp.	Thyme
<i>Trifolium pratense</i>	Red clover
<i>Viola sylvestris</i>	Wood violet

3.3.4 Mammals (excluding bats)

Based on interviews with local hunters, encounters during bird survey fieldwork, and the observed remains of animals killed by vehicles, nine mammal species are known to be present in the WTG cluster areas:

- Roe deer (*Capreolus capreolus*)
- Wildcat (*Felis silvestris*)
- European hare (*Lepus europaeus*)
- Pine marten (*Martes martes*)
- European badger (*Meles meles*)
- Weasel (*Mustela nivalis*)
- Wild boar (*Sus scrofa*)
- Red fox (*Vulpes vulpes*)
- Golden jackal (*Canis aureus*)

As well as beech marten (*Martes foina*), a large number of small mammals belonging to orders Insectivora and Rodentia are likely to be present within the WTG cluster areas. All these species are common and none is classified as threatened globally by the IUCN, threatened in Europe or endemic to Serbia.

The important species of mammals known from the adjacent protected area are likely to be absent from the Project site because of its modified state and the presence of hunters.

Taking into account the Red List status of the species recorded on site, mammals are considered to have some capacity to absorb change and are therefore of low sensitivity.

3.3.5 Bats

A total of 16 bat species was recorded during surveys³⁷ all of which are common. None of these species are classified as threatened globally according to the IUCN, threatened in Europe or endemic to Serbia. One species, western barbastelle (*Barbastella barbastellus*) is classified as vulnerable in Serbia³⁸. Six species are considered high collision risk with WTGs and one is considered to be medium risk (Table 19)³⁹. Two small cave roosts of greater horseshoe bat

³⁷ Mott Macdonald, 2017. Krivaca Wind Farm Bat Monitoring Report (2015-2016). Cambridge: Mott MacDonald.

³⁸ Paunović, M., Karapandža, B., Ivanović, S., 2011. Slepí miševi i procena uticaja na životnu sredinu – Metodološke smernice za procenu uticaja na životnu sredinu i stratešku procenu uticaja na životnu sredinu. Društvo za očuvanje divljih životinja „MUSTELA“, 1-142, Beograd.

³⁹ Rodrigues, L., Bach, L., Duborg-Savage, J., Karapandža, Kovač, D., Kervyn, T., Dekker, J., Kepel, A., Bach, P., Collins, J., Harbusch, C., Park, K., Micevski, B., Minderman, J. (2015) Guidelines for consideration of bats in wind farm projects – Revision 2014. EUROBATS Publications Series No. 6 (English Version). UNEP/EUROBATS Secretariat, Bonn, Germany.

(*Rhinolophus ferrumequinum*) and single small tree roosts for greater mouse-eared bat (*Myotis myotis*) and Leisler's bat (*Nyctalus leisleri*) were recorded.

Table 19: Bat species recorded in the WTG cluster areas

English name	Scientific name	Red List (IUCN/Serbian)*	Collision risk	Manual	Static	Roost
Western barbastelle	<i>Barbastella barbastellus</i>	NT/VU	Medium	x	x	
Bat species	Chiroptera sp.		Low	x	x	
Serotine bat	<i>Eptesicus serotinus</i>	LC/LC	Low	x	x	
Savi's pipistrelle	<i>Hypsugo savii</i>	LC/DD	High	x	x	
Schreibers' bent-winged bat	<i>Miniopterus schreibersii</i>	NT/LC	High	x	x	
Bechstein's bat	<i>Myotis bechsteinii</i>	NT/NT	Low	x	x	
Greater mouse-eared bat	<i>Myotis myotis</i>	LC/LC	Low	x	x	x
Whiskered bat	<i>Myotis mystacinus</i>	LC/LC	Low	x	x	x
Natterer's bat	<i>Myotis nattereri</i>	LC/NT	Low		x	
Myotis species	Myotis sp.		Low	x		
Leisler's bat	<i>Nyctalus leisleri</i>	LC/LC	Low	x		
Noctule	<i>Nyctalus noctula</i>	LC/LC	Low	x	x	x
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	LC/LC	High	x	x	x
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	LC/LC	High		x	
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	LC/DD	High	x	x	
Long-eared species	Plecotus sp.		Low		x	
Mediterranean horseshoe bat	<i>Rhinolophus euryale</i>	NT/NT	Low		x	
Greater horseshoe bat	<i>Rhinolophus ferrumequinum</i>	LC/LC	Low		x	
Particoloured bat	<i>Vespertilio murinus</i>	LC/LC	High		x	
Species Total				13	17	4

LC – Least Concern; NT – Near Threatened; VU – Vulnerable; DD – Data Deficient

Bat activity was low across the four WTG cluster areas, with the following exceptions:

- Very high bat activity for all species recorded only on one night in the Rakobarski vis WTG cluster in September 2016. The noctule bat was the most frequently encountered species across all clusters in autumn with peak number in the Rakobarski vis WTG cluster
- Very high bat activity was recorded in the Tilva and Rakobarski vis WTG clusters in August and early September 2016

Schreibers' bent-winged bat (*Miniopterus schreibersii*) was the most frequently recorded species at all WTG clusters. The number of bat contacts decreased through the autumn migration period. The numbers of noctule bat (*Nyctalus noctula*) fluctuated with small peaks in mid-September and late September to early October which may indicate migratory behaviour.

No bat activity was recorded during pre-hibernation (November-December 2016).

Taking into account the Red List status of the species recorded on site, bats are considered to have some capacity to absorb change and are therefore of low sensitivity. The exception to this

is the western barbostelle which is vulnerable to extinction in Serbia and is therefore considered to have limited capacity to absorb changes and as a result is a species of medium sensitivity.

3.3.6 Birds

3.3.6.1 Breeding birds (excluding raptors)

A total of 51 species, excluding raptors, were recorded in the WTG cluster areas during the breeding bird surveys⁴⁰. Species richness was highest in the Venac WTG cluster and lowest in the Tilva and Rakobarski vis WTG clusters.

European turtle dove (*Streptopelia turtur*) was recorded in all WTG clusters with the greatest abundance (four birds/km/hr) in Debelo brdo and Venac WTG clusters. This species is threatened in Europe (vulnerable) with declining short and long-term trends in Serbia⁴¹. The numbers present are not significant at the national scale, i.e. numbers in the four WTG clusters do not exceed 1%⁴² of the estimated national population of 39,000 to 53,000 pairs⁴¹.

All other species are common and none are classified as threatened globally, threatened in Europe or endemic to Serbia.

Taking into account the Red List status of the species recorded on site, breeding birds are considered to have some capacity to absorb change and are therefore of low sensitivity. The exception to this is European turtle dove which is vulnerable to extinction in Europe and is therefore considered to have limited capacity to absorb changes and as a result, is a species of medium sensitivity.

3.3.6.2 Nocturnal birds

Six nocturnal species of least conservation concern (European Red List) were recorded in the WTG cluster areas⁴⁰. Birds were recorded in relatively low densities with little variation between survey points. A maximum of four territories of Ural owl (*Strix uralensis*) were recorded, which equates to 0.9% of the national population and is therefore close to the 1% threshold for determining significance in bird populations.

All other species are common and none are classified as threatened globally, threatened in Europe or endemic to Serbia.

Taking into account the Red List status of the species recorded on site, nocturnal birds are considered to have some capacity to absorb change and are therefore of low sensitivity. The exception to this is Ural owl which has a large proportion of a small national population within the WTG cluster areas and is therefore considered to have limited capacity to absorb changes and as a result is a species of medium sensitivity.

3.3.6.3 Breeding raptors

Seven raptor species were also observed during the raptor surveys conducted between February and May 2016 within 2km of the WTG clusters

⁴⁰ Mott MacDonald, 2017. Krivaca Wind Farm Bird Monitoring Report (2015-2016). Cambridge: Mott MacDonald.

⁴¹ BirdLife International, 2015. European Red List of Birds. Luxembourg: Office for Official Publications of the European Communities.

⁴² The significance of a bird population is conventionally determined by the 1% threshold. If a count estimate of a species is equal to or exceeds 1% of the population at the geographical frame of reference of the assessment i.e. global, biogeographic, regional, national or site, then the species is considered to be present in significant numbers at that geographic frame of reference.

Four raptor species were recorded during the breeding bird surveys. Common buzzard (*Buteo buteo*) and common kestrel (*Falco tinnunculus*) were recorded in all clusters with common buzzard being the more numerous.

One pair of peregrine falcon (*Falco peregrinus*) (2.0-2.4% of the national population) is highly likely to be holding territory at Sokolica hill in Brnjica gorge, three kilometres northeast from the Venac WTG cluster.

No important raptor species related to the adjacent protected areas such as white-tailed eagle or golden eagle were recorded.

All other species are common and none is classified as threatened globally, threatened in Europe or endemic to Serbia.

Taking into account the Red List status of the species recorded on site, breeding raptor birds are considered to have some capacity to absorb change and are therefore of low sensitivity. The exception to this is peregrine falcon which has a large proportion of a very small national population within the WTG cluster areas and is therefore considered to have limited capacity to absorb changes and as a result is a species of medium sensitivity.

3.3.6.4 Flight activity

Table 20 shows the birds recorded at collision risk height during the surveys. Seven survey target species⁴³ (medium sensitivity) were recorded in the WTG cluster and OHL areas (greater white-fronted goose (*Anser albifrons*), white stork (*Ciconia ciconia*), black stork (*Ciconia nigra*), white-tailed eagle (*Haliaeetus albicilla*), hen harrier (*Circus cyaneus*), black kite (*Milvus migrans*) and peregrine falcon); however, only two were recorded at rotor blade height (hen harrier and peregrine falcon) and three at OHL height (hen harrier, white stork and white-tailed eagle).

The most species and higher frequency of observations were recorded in the Venac WTG cluster followed by Debelo brdo, Tilva and Rakobarski vis⁴⁰. Only one target species, hen harrier, was recorded in Tilva and Rakobarski vis WTG clusters. Wetland birds associated with the IBAs within 30km of the Project site were largely absent and recorded infrequently.

The collision risk of the two species recorded at rotor blade height were estimated using a collision risk model⁴⁴. These were as follows based on an avoidance rate of 95%:

- Hen harrier: one bird every 48 years
- Peregrine falcon: one every 100 years

⁴³ The following criteria were used to select primary target species

- Species with a known risk of collision with WTGs and OHLs.
- Species listed on the European Red List as Vulnerable, Endangered or Critically Endangered (BirdLife International, 2015)
- Species with an uncertain or negative short-term and/or long-term trend in Serbia (BirdLife International, 2015)
- Species that are qualifying features of an Important Bird Area (IBA) that is in danger and/or is known to be threatened by renewable energy projects

Secondary target species will include all raptors, waders, herons and wildfowl not already included in the list of target species above.

⁴⁴ Band, W., 1999. Probability of Collision [excel spreadsheet]. Available: URL <http://www.snh.gov.uk/planning-and-development/renewable-energy/onshore-wind/bird-collision-risks-guidance>

Figure 31: Hen harrier

Source: Mott MacDonald

A total of 13 species were recorded from the 110kV OHL north of the wind farm of which, four were target species. Two records of single hen harrier at collision risk height were recorded from December 2015 and January 2016. There is one record of four white stork (*Ciconia ciconia*) flying at collision risk height in April 2016.

Common buzzard (secondary target species) was the most frequently recorded species with half of flight activity observed at collision risk height.

A total of six species were recorded from the 110kV OHL south of the WTG cluster areas of which one was target species. A single hen harrier was observed at collision risk height in December 2015. Common buzzard (secondary target species) was the most frequently recorded species, with two-thirds of flight activity recorded above collision risk height.

Table 20: Target species recorded at collision risk height

English name	Scientific name	European Red List	Venac	Rako-barski vis	Debelo brdo	Tilva	OHL (N)*
Hen Harrier	<i>Circus cyaneus</i>	Near Threatened	x	x	x	x	x
Peregrine Falcon	<i>Falco peregrinus</i>	Least Concern	x		x		
White Stork	<i>Ciconia ciconia</i>	Least Concern					x
White-tailed Eagle	<i>Haliaeetus albicilla</i>	Least Concern					x

*110kV OHL

3.3.7 Reptiles

Reptiles recorded in the WTG cluster areas include green lizard (*Lacerta viridis*) and sand lizard (*Lacerta agilis*) and were often seen basking on paths or tracks. Less frequently recorded were European near-threatened meadow lizard (*Darevskia praticola*) and the least conservation

concern snake-eyed skink (*Ablepharus kitaibellii*). Habitats within the WTG cluster areas are likely to support a number of other species, including common wall lizard (*Podarcis muralis*), slow worm (*Anguis fragilis*), smooth snake (*Coronella austriaca*), grass snake (*Natrix natrix*), long-nosed viper (*Vipera ammodytes*) and Aesculapian ratsnake (*Zamenis longissimus*). Other species possibly present in wooded and scrub areas around the periphery of the site include the widely distributed but globally/European near-threatened Hermann's tortoise (*Testudo hermanni*) and least conservation concern Balkan wall lizard (*Podarcis tauricus*) are also potentially present in the periphery of woodland and scrub.

All these species are common and none is classified as threatened globally, threatened in Europe or endemic to Serbia.

Taking into account the Red List status of the species recorded on site, reptiles are considered to have some capacity to absorb change and are therefore of low sensitivity.

3.3.8 Amphibians

The scarcity of permanent standing water habitats indicated that the site is unlikely to support a diverse range of amphibian species. Habitats within the Project site, in particular scrub and grassland, are considered to have potential to support some amphibian species, including: European tree frog (*Hyla arborea*), green toad (*Pseudepidalea viridis*), and common toad (*Bufo bufo*). Common fire salamander (*Salamandra salamandra*) was recorded in the beech forest in the northeast part of Project site.

All these species are common and none is classified as threatened globally, threatened in Europe or endemic to Serbia.

Taking into account the Red List status of the species recorded on site, amphibians are considered to have some capacity to absorb change and are therefore of low sensitivity.

3.3.9 Invertebrates

Based on an assessment of the structure of the habitat types in the WTG cluster areas, the intensive anthropogenic influence exerted on them and the absence of unique, rare or scarce habitat types compared to the wider landscape, the assemblage of insect fauna is considered to be of moderate value with respect of species richness and diversity. The most abundant insect groups within the site are likely to be Coleoptera (beetles), Hymenoptera (wasps, bees and ants), Lepidoptera (butterflies and moths), Diptera (true flies) and Hemiptera (true bugs). Representatives from these groups of species were incidentally identified in range of habitats across the Project site. Terrestrial snails (e.g. *Cepaea* sp. and *Helix* sp.) were also very numerous.

All these species are common and none is classified as threatened globally, threatened in Europe or endemic to Serbia.

Taking into account the Red List status of the species recorded on site, invertebrates are considered to have some capacity to absorb change and are therefore of low sensitivity.

3.4 Human geography

3.4.1 Socio-economic environment

3.4.1.1 Local context

As determined by the Ministry of Regional Development and Local Self Government⁴⁵, based on the Law on Regional Development of the Republic of Serbia⁴⁶, the municipality Veliko Gradište belongs to category three (out of four), with a level of development between 60 and 80% of the republic level average. Golubac and Kučevo belong to the last (fourth) category with a level of development lower than 60% of the republic level average. Further to that, Golubac is characterised as a 'devastated area', with a level of development below 50% of the republic level average.

The budgets of the three municipalities in 2015⁴⁷ were as follows:

- Veliko Gradište – 472,629,000 RSD (approximately 3.91 million EUR⁴⁸)
- Golubac – 310,959,000 RSD (approximately 2.58 million EUR)
- Kučevo – 452,589,000 RSD (approximately 3.75 million EUR)

Although severely underdeveloped, the area is characterised by beautiful nature, particularly as Veliko Gradište and Golubac are located on the right bank of the river Danube, bordering with Romania (refer to Figure 32). A third of the National Park Đerdap is located within the territory of Golubac municipality.

⁴⁵ Regulation on establishing a unified list of regional development and development of local government units for 2014 (Official Gazette of the RS 104/14)

⁴⁶ Official Gazette of the RS 51/09,30/10 and 89/15

⁴⁷ Statistical institute of the Republic of Serbia (Municipalities and Regions 2016)

⁴⁸ National Bank of Serbia, average exchange rate for 2015: 1 EUR = 120.7328

Figure 32: Centre of Golubac town, view towards Romania

Source: Link 011

The wind farm area is surrounded by the small local communities Krivača, Dvorište, Rakova Bara, Snegotin and Radenka (refer to Figure 33). A characteristic of all these villages is that they feel almost deserted, particularly in winter time. They are often inhabited by elderly people, some of whom have lived and worked abroad and are now retired and back in their homes, while other family members are still abroad and visit during the holidays (predominantly Christmas, Easter and summer holidays).

Figure 33: Local communities surrounding the Project location



Source: Link 011

The closest permanently occupied dwelling (Krivača village) will be approximately 500m from the WTG T1-1 in the Venac cluster.

3.4.1.2 Demography

Braničevo district as a whole, particularly in the rural areas, is characterised by a substantial depopulation trend (up to 21% reduction of the population in 10 years⁴⁹), as a result of a negative natural increase but also as a result of migration to Serbian cities and abroad, predominantly to EU countries⁵⁰. The most common reasons for out migration are lack of education and employment opportunities in the area. Table 21 shows populations within the Project area of influence.

Table 21: Population of affected municipalities and villages

Affected municipality (population)	Affected villages within the municipality (population)
Golubac (7,795)	Krivača (357)
	Dvorište (240)
	Snegotin (201)
Kučevo (14,192)	Rakova Bara (406)
	Radenka (606)
Veliko Gradište (16,714)	-
Total: 38,701	Total: 1,810

Source: Link 011 based on data from the Statistical institute of the Republic of Serbia, Municipalities and Regions 2016 (most recent official estimated data as of 30.06.2015. and census 2011)

⁴⁹ Regional Strategy of Rural Development for the Braničevo-Podunavlje District for 2016 to 2020 (Draft, 18.07.2016. Regional Development Agency Braničevo Podunavlje d.o.o.)

⁵⁰ Predominantly Austria, Italy, Germany and Switzerland

The average age in Golubac is 46.4, in Veliko Gradište 44.8 and in Kučevo 47.5, all higher than the average age at the Republic level which is 42.2⁵¹.

3.4.1.3 Nationality

The majority of the population in the affected municipalities comprises Serbs, followed by Vlachs who make up over one quarter of the population of Kučevo municipality (refer to Table 22).

Table 22: Nationalities in affected municipalities

Affected municipality	Serbs	Vlachs	Roma	Romanians	Others
Golubac	90.04%	5.09%	0.62%	0.56%	2.78%
Kučevo	66.43%	25.31%	0.25%	0.68%	7.33%
Veliko Gradište	92.51%	2.17%	1.47%	0.37%	3.49%

Source: Link 011 based on data from the Statistical institute of the Republic of Serbia, Municipalities and Regions 2016 (census 2011)

3.4.1.4 Languages

The official language spoken across the country and in the Project area is Serbian. The official alphabet is Cyrillic, while the Latin alphabet is also widely used. In the Project area, the second most spoken language is Vlach. The number of individuals who declared the Vlach language as their first language in the 2011 census: Golubac (11%), Veliko Gradište (4%) and Kučevo (30%)⁵².

According to local residents met in the affected area, Vlach language is often spoken between them, however there is no written form of the language. All residents speak the Serbian language as well.

3.4.1.5 Religion

The dominant religion among the population in all three municipalities is Orthodox (approximately 96%⁵³), followed by a small percentage of persons belonging to the Catholic faith and further followed by other religions.

3.4.1.6 Housing

Housing in the affected villages is built of compacted dirt or bricks and varies from very poor condition to extravagant, multi-storey houses built by those living and working abroad (refer to Figure 34 and Figure 35). Houses are surrounded by fenced yards, with orchards and flower / vegetable gardens. Additional structures, such as summer kitchens, garages, workshops and animal shelters are also located within the yards.

⁵¹ Statistical institute of the Republic of Serbia, Municipalities and Regions 2016

⁵² Statistical institute of the Republic of Serbia, Municipalities and Regions 2016

⁵³ Population data source: Statistical institute of the Republic of Serbia (census 2011)

Figure 34: Houses in local villages



Source: <http://www.ebranicevo.com>

Figure 35: Houses in local villages



Source: <http://radiopozarevac.rs>

3.4.1.7 Infrastructure and Project related transport

The three municipalities jointly have 800km of roads, divided into two categories of state roads and municipal roads (refer to Table 23). All inhabited areas, including the affected communities, have paved access roads.

Table 23: Roads in affected municipalities

Affected municipality	Total km of roads	State roads I		State roads II		Municipal roads	
Golubac	220	87	40%	75	34%	58	26%
Kučevo	321	107	33%	57	18%	157	49%
Veliko Gradište	258	57	22%	103	40%	98	38%
Total km	799	251		235		313	

Source: Link 011 based on data from the Statistical institute of the Republic of Serbia, Municipalities and Regions 2016

The international component of the transportation of the main WTG parts has been agreed and most of the components will arrive either at Pančevo or Smederevo port. Road 14 will most likely have to be used from Pančevo port, passing through the town of Bavanište and bypassing the town of Kovin, then crossing the Smederevo bridge and arriving near the Smederevo port.

From Road 14, the WTG parts will be transported to site by Road 33 and Road 34 (avoiding passing through the town of Požarevac) and bypassing the town of Veliko Gradište. A new 5km bypass will be constructed to avoid the town of Radoševac and connect with Route 256 which is the main access to the site.

More information on Project transport is provided in section 3.4.4 of the ESIA addendum.

Over 76,000 vehicles travel daily on these road sections (approximately 100km) each day. A more detailed overview of the average daily traffic of different categories of vehicles on the applicable road sections is provided in Table 24.

Table 24: Annual average daily traffic on road sections to be used for transport

Road No.	Total km	Private vehicles	Buses	Light trucks	Medium trucks	Heavy trucks	Trucks with trailers	Total vehicles
Road 14	51	19,960	375	517	931	483	3,462	25,727
Road 33	14.6	27,133	305	634	954	471	1,304	30,798
Road 34	33.7	18,441	266	286	226	298	224	19,739
Road 256	Information unavailable							
Total	99.3	65,534	946	1,437	2,111	1,252	4,990	76,264

Source: Link 011 based on data from the Annual average daily traffic report 2016, Roads of Serbia

The number of households connected to the water and sewerage network in all municipalities is not satisfactory⁴⁹ when compared to the national average, where 84% of households are connected to the public water supply and 60% of households are connected to the sewerage network⁵¹. In Golubac, the number of households connected to the public water supply is the highest (73%), while the number of households connected to the sewerage network is lowest (30%). In Veliko Gradište, the percentage of households connected to the water supply is 55% and the sewerage system 46%. In Kučevo, the number of households connected to the public water supply is lowest (38%) and the number of sewerage connections is slightly lower (32%).

Local communities surrounding the wind farm site are not connected to the sewerage system and households are using septic tanks. Drinking water is also supplied by local groundwater wells. Solid waste disposal is insufficient in the local communities and waste is sometimes disposed in illegal waste dumps.

The electricity and telecommunications networks are developed in all local communities, although mobile phone coverage is problematic in some areas near the Project site.

3.4.1.8 Education

With regards to education, approximately one third of the population (30%) in all three municipalities either has no education or has not completed the compulsory primary education (grades 1 to 8). The number of women in this category is two times higher than men. Another 30% have completed primary education and equally, secondary education (grades 9 to 12), while numbers in this category are only slightly in favour of men. Only 6% of the population have completed higher or university education, with the number of women slightly leading in university degrees.

Illiteracy among the population over 10 years of age is highest in the municipality Kučevo (1.63% among men, 7.94% among women), followed by Golubac (1.27% among men, 6.03% among women) and Veliko Gradište (0.83% among men, 2.85% among women). In all three municipalities the vast majority of the illiterate population are women over 65 years of age. Table 25 below summarises levels of education in the three municipalities.

Table 25: Level of education of the adult population in the affected communities (%)

in %	No education		Incomplete primary		Primary		Secondary		Higher (college)		University		Unknown		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
V. Gradište	0.5	1.7	10.0	15.3	18.0	17.6	15.8	13.6	1.6	1.6	1.8	2.1	0.2	0.2	100
Golubac	0.8	3.5	9.6	15.7	16.3	15.2	18.5	13.9	1.7	1.4	1.6	1.2	0.1	0.3	100
Kučevo	1.0	4.5	9.8	16.4	14.4	14.0	19.8	13.3	1.5	1.2	1.3	1.3	0.5	0.8	100

Source: Link 011 based on data from the Statistical institute of the Republic of Serbia, Municipalities and Regions 2016

There are no educational facilities above primary school level in Golubac, including any vocational schools. Kučevo and Veliko Gradište each have only one secondary school⁴¹. The closest secondary level educational facilities and some private higher education facilities are located in Požarevac city (40km from Golubac).

3.4.1.9 Local economy, employment and unemployment

The main economic activities in the three municipalities are manufacturing, particularly in Kučevo (construction materials, limestone and quartz extraction and processing), as well as Veliko Gradište (food processing) and agriculture, most developed in Veliko Gradište. Other economic activity is limited to retail and services including shops, education, health and administration.

Tourism is present in the area, particularly in Golubac and Veliko Gradište and to a lesser extent Kučevo, however the required infrastructure and services to turn tourism into a strong economic branch are still severely underdeveloped. The percentage of foreign tourists that visit Golubac is higher than in the other two municipalities (refer to Table 26), as a result of incoming boats on the Danube. Tourists typically spend one to two days in these locations⁵¹.

Table 26: Number of tourists in the affected municipalities

Affected municipality	Total tourists in 2015	% of foreign tourists	% of domestic tourists
Golubac	2,919	33%	67%
Kučevo	926	6%	94%
Veliko Gradište	14,234	15%	85%

Source: Link 011 based on data from the Statistical institute of the Republic of Serbia, Municipalities and Regions 2016

The average number of employees per 1,000 inhabitants in Golubac is 167, in Veliko Gradište 223 and in Kučevo 162, while at the level of the Republic that number is much higher, 280. However, the percentage of individual private entrepreneurs in all three municipalities is between 20 and 30% of all employed persons, which is higher than the Republic level average of 15%⁵¹.

In all three municipalities, employees are working in the following fields: wholesale, retail and repairs, agriculture (mostly in Veliko Gradište), food processing (mostly in Kučevo), administration, education and health/social services. Construction is noticeably an important employment sector in Kučevo (4.6%) and somewhat lower in Veliko Gradište (3.1%) and Golubac (2.9%)⁵¹.

In Veliko Gradište the average net salary in 2015 was 31,130 RSD⁵⁴ (258 EUR), in Golubac 26,074 RSD (216 EUR) and in Kučevo 33,719 RSD (279 EUR), all lower than the average net salary at the level of the Republic of Serbia, which was 44,432 RSD (368 EUR)⁵⁴.

Unemployment in all three municipalities is high, even higher than the national statistics suggest, as not all unemployed individuals register with the National Employment Service. Youth unemployment is particularly high and a significant percentage of unemployed individuals have no qualifications. The number of men and women among those unemployed is almost equal. Official employment and unemployment data is provided in Table 27.

⁵⁴ The official average middle exchange rate for 2015 – 1 EUR = 120.73 RSD

Table 27: Number of registered employed and unemployed persons in the affected municipalities

Affected municipality	Employed		Unemployed		Women
	Total	Total	Applying for first job	No qualifications	
Veliko Gradište	3,733	1,283	44.30%	47.30%	50.70%
Golubac	1,303	637	31.10%	42.40%	49.50%
Kučevo	2,296	623	25.20%	37.10%	46.10%
Total	7,332	2,543	34%	42%	49%

Source: Link 011 based on data from the Statistical institute of the Republic of Serbia, Municipalities and Regions 2016

According to an interviewed representative of the Golubac municipality⁵⁵ the actual number of unemployed persons is closer to 3,000 (as opposed to the 600 officially registered), however half of them work abroad, suggesting that the actual number of unemployed individuals residing in the municipality is approximately 1,500. Among the unemployed, there are many who have experience with construction works and would be a valuable resource for the Project.

3.4.1.10 Health

Diseases related to the circulatory system are by far the leading cause of death in all three municipalities⁵¹, followed by tumours and diseases of the respiratory system. Life expectancy is lowest in Golubac for men at 69.51 and women at 73.97, in Kučevo it is 69.91 for men and 76.74 for women and in Veliko Gradište, it is highest at 70.20 for men and 79.27 for women. These ages are lower than the national level (72.62 for men and 77.67 for women), except for women in Veliko Gradište.

Golubac and Kučevo have primary health centres, as well as local community health clinics, where doctors are occasionally present (once a week). The quality of primary health care services is unsatisfactory, particularly in small rural communities⁴⁹. There are two general hospitals in the Braničevo district, one in Požarevac (50km from Golubac) and the other in Petrovac (70km from Golubac).

3.4.2 Land use and property

3.4.2.1 Land use in the affected area

The two dominant land use categories in all three municipalities are agricultural and forest land (refer to Table 28). Agricultural land is more present in the flat areas of Veliko Gradište. Moving towards the mountainous areas in the east, in Golubac and Kučevo, the land turns into forest land.

Agricultural land is not used to its fullest potential, particularly in Golubac and Kučevo, where less than half is actively used (farmed)⁴⁹. Indicative is the fact that, in the municipality of Golubac, although the renting of agricultural land is put up for auction each year, no one applies⁵⁶. Interviews with residents of local communities near the Project site and representatives of local authorities all suggest that private land is also not being rented out as it has little productive value and access to much of the land is poor. In addition, many landowners are residing permanently abroad and are not farming or otherwise using their land. It is estimated that only 20% of agricultural land in the Project area is actively used. Informal use of

⁵⁵ Golubac Municipality Coordinator for Public Works, meeting held on 27.12.2016.

⁵⁶ Interview with the Head of Municipal Administration in Golubac, 27.12.2016.

land without knowledge of the owners, as stated by all interviewed individuals, is not a practice in the affected area at all.

The land that is being farmed is mostly a source of food (grass, hay, corn) for small numbers of animals that resident households keep for household consumption.

Table 28: Area of agricultural and forest land in the affected municipalities

Affected municipality	Total area	Total area of agricultural land		Total area of land being used for agriculture		Total area of forest land	
	In ha	in ha	%	in ha	%	in ha	%
Veliko Gradište	34,400.00	24,458.00	71.10%	17,691.00	51.43%	5,000.00	14.53%
Golubac	36,700.00	14,445.00	39.36%	6,416.00	17.48%	17,406.00	47.43%
Kučevo	72,100.00	32,733.00	45.40%	11,622.00	16.12%	34,896.00	48.40%
Total	143,200.00	71,636.00	50.03%	35,729.00	24.95%	57,302.00	40.02%

Source: Link 011 based on data from the Regional Strategy of Rural Development for the Braničevo-Podunavlje District for 2016 to 2020

During the first site visit in 2014, it was determined through discussions with local residents that mushrooms and herbs are collected by households in the local forested areas mainly for household consumption and in rare cases for sale. However, it was subsequently determined that these activities are carried out in areas which are not in the vicinity of the wind farm site. They are mainly performed in the location between the Tuman Monastery and Golubac town, northwest of the Project site.

3.4.2.2 Project site and land acquisition requirements

The estimated Project site under the scope of this assessment, as defined by the Project Detailed Regulation Plan, is approximately 242ha, divided by municipality, as follows: Golubac – 63.22%, Kučevo – 32.64% and Veliko Gradište – 4.13%. The Detailed Regulation Plan specifies that the affected land which needs to be acquired⁵⁷ comprises meadows, fields, forests and unused land.

The Project requires acquisition of land for the following components:

- WTGs, including construction plateaus
- Substation Krivača and O&M building (optional)
- OHLs (110 and 35kV) and an underground MV electrical collection system
- Access (20.6km) and service roads (20km)

The total area of land which has been acquired for the WTGs and other Project components is approximately 131ha, of which 58ha (44%) will be permanently occupied and 73ha (56%) will be temporarily occupied and available for use after construction. The summary of land acquisition requirements is provided below.

⁵⁷ Land acquisition refers to both outright purchases of property and purchase of property rights (i.e. right of way)

Table 29: Summary of land acquisition characteristics

Project component	Type of acquisition	No. of affected plots	Total area affected	Area permanently occupied and unavailable for use	Area of public land acquired	Area acquired from private owners	Area of land that remains to be acquired	No. of private owners
WTGs (31 plus 7 alternatives that are not expected to be used)	Voluntary transaction	142	45 Ha	1.52 Ha	0 Ha	45 Ha	0 Ha	113
Substation	Voluntary transaction	1	1.19 Ha	1.19 Ha	1.19 Ha	0 Ha	0 Ha	-
O&M building	Voluntary transaction	unknown	0.42 Ha (if needed)	0.42 Ha	unknown	unknown	0.42 Ha (if needed)	unknown
OHL towers, underground MV electrical collection system	Voluntary transaction	169	1.35 Ha	1.35 Ha	0 Ha	1.35 Ha	0.1 Ha	160
OHL protection zone	Easement for construction, repairs and maintenance / use restrictions, established by law	unknown	29.69 Ha	0 Ha	/	/	/	unknown
Access and service roads	Acquisition through expropriation	1,003	53.43 Ha	53.43 Ha	12.71 Ha	40.72 Ha	46.9 Ha	669
TOTAL		1,315	131.08 Ha	57.91 Ha	13.9 Ha	87.07 Ha	47.42 Ha	933

Source: Link 011 based on data supplied by Ivicom Energy

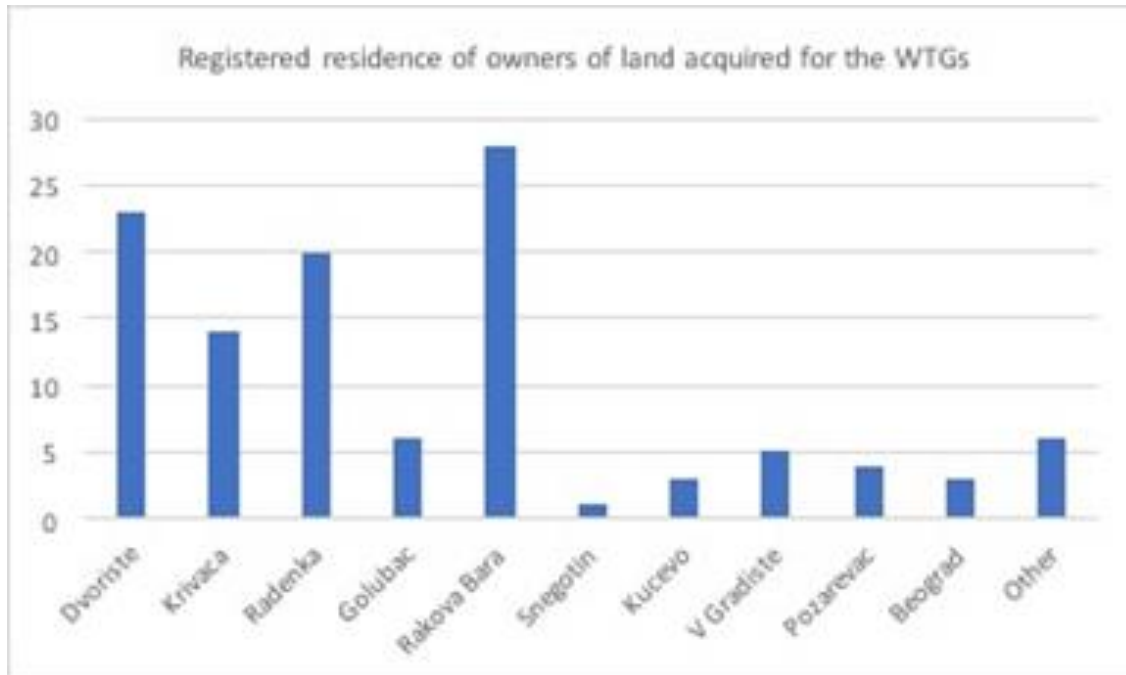
Further land may be needed at a later stage (e.g. more laydown areas, positioning of site containers), as agreed with the construction contractor and it will be leased through voluntary agreements.

3.4.2.3 Land acquired for the WTGs

The Sponsor has acquired land for the construction of WTGs (31 WTGs and seven reserve locations). The locations comprise a construction plateau of an average 1.3ha, within which the WTG with a foundation of approximately 400m² will be placed. The area of the construction plateau will be temporarily occupied during construction and during operation a part of it may be used for repairs and maintenance. Outside of those periods it can be used for agriculture (growing crops and grazing of animals). The only permanently occupied area will be that of the WTG foundation (400m²).

Land for these locations has been secured through voluntary lease agreements with private landowners for a period of 25 years. Land is still available for use, until construction begins, currently planned for October 2017.

The acquisition of land for the construction and operation of the WTGs will affect 142 land plots owned by 113 individuals. While the individuals are officially residing mostly in local communities surrounding the Project site and in other parts of Serbia (refer to Figure 36), some are in fact abroad.

Figure 36: Registered residence of owners of land acquired for the WTGs

Source: Link 011 based on data supplied by Ivicom Energy

An estimated 45ha has been acquired for the WTG locations which will affect a total area of 132.07ha (permanent and temporary use). This means that 34.07% of the total area has been acquired for temporary use, for the construction plateaus. Of the 45ha acquired, only 1.52ha will remain permanently occupied (400m² x 38) and unavailable for use after construction (1.15% of the total area of all affected plots).

To acquire this land, Ivicom Energy organised three meetings with owners of land identified as needed for the WTGs – two in the local community Rakova Bara and one in Krivača. At the meetings, Ivicom Energy representatives presented the Project and the contractual proposal for leasing land. Ivicom Energy organised all activities and covered all expenses related to resolving property issues with local courts and the Cadastre, which needed to be done prior to contract signature (e.g. inheritance proceedings and legal representation for absentee owners), as well as notary and registration fees and taxes upon contract signature. A lawyer has been contracted by Ivicom Energy to assist owners of land with all legal matters. The Ivicom Energy team also organised transport for affected owners where necessary and even visited some owners abroad to conclude contracts.

All voluntary lease agreements for WTG locations have been concluded and owners received a one-off reservation payment. Lease compensation for the area of the construction plateau will be paid at the time of construction. Compensation for the area permanently occupied by the WTG tower (400m² per tower) will be paid in two instalments per year, in June and December. According to interviewed local residents and representatives of local authorities, all landowners who have signed contracts for the WTGs (plateaus and towers) are satisfied with the terms and conditions of the contracts and are eager for construction to begin, to start receiving the lease payments.

Any damages to crops, trees or any other assets made before and during construction, as well as during operation for repairs and maintenance, will be compensated in addition to the lease compensation at full replacement cost, as determined by licensed appraisers.

At present there is no information on whether any of the land acquired for the WTGs is being used by someone other than the owner, formally or informally. However, in light of the fact that rent or informal use of land are not common in the Project area and that agriculture is not intense, the likelihood of such users is low.

3.4.2.4 Land acquired for the substation Krivača and O&M building

Land needed for the construction of the substation Krivača is a plot of 1.19ha of unused land, which was acquired from the municipality Golubac (refer to Figure 37), through a long term lease. This land plot will be permanently occupied and unavailable for other use after construction.

Figure 37: Location of the future substation Krivača



Source: Link 011

The O&M building which may be built will require an area of 0.42ha. It will be built in the vicinity of the substation Krivača, however as a separate facility. Land for this component, if needed, is yet to be acquired by Ivicom Energy and will be acquired through a willing buyer, willing seller agreement.

3.4.2.5 Land acquired for the OHLs and underground cable

The Project requires construction of two 110kV OHLs. The first of the two will connect the wind farm to the existing substation Veliko Gradište, while the second will connect it to the existing substation Neresnica. Each of the two OHLs will be approximately 19.4km long. The OHL to Veliko Gradište requires the construction of 79 towers, while the one to Neresnica requires the construction of 90 towers.

Ivicom Energy subcontracted the company Elektromontaža AD Beograd to plan and construct the OHLs, which also includes the acquisition of land needed for construction and operation.

Land is being permanently acquired for the construction of the OHL towers (80 m² per tower). Easement rights are being established in an 8m wide corridor (4m on each side of the OHL) which will be used during construction and for repairs and maintenance during operations. A protection zone will also be established with certain use restrictions in a 50m wide corridor (25m on each side of the OHL). Any damages to crops, trees or other assets within the construction/protection zone will be compensated to the owners/users of land at full replacement cost, as per national legislation.

Elektromontaža is acquiring land under willing buyer, willing seller agreements⁵⁸ and at the time of developing this ESIA addendum, most have already been concluded with approximately 160 owners of land. As with the WTGs, all expenses i.e. taxes, registration and other fees before and after contract signature have been borne by Elektromontaža and not the affected owners of land. Agreements for only 13 towers (five to Veliko Gradište and eight to Neresnica) out of a total of 169 towers have not been concluded yet, because owners are abroad or heirs of deceased owners have not been identified. Elektromontaža is working on finding/assisting the owners to resolve property issues, so that the remaining agreements can be signed.

The contract between Ivicom Energy and Elektromontaža states that if land for the OHL towers cannot be acquired through voluntary transactions, it should be acquired through expropriation. However, initiating expropriation would be extremely complicated under the existing circumstances and would require a long period of time, which is why Elektromontaža will revise the footprint of the OHL to cross land belonging to owners willing to sign contracts if needed. This seems unlikely as most contracts have already been concluded.

At present there is no information on whether any of the land acquired for the OHLs is being used by someone other than the owner, formally or informally. However, as for the WTGs, the likelihood of non-owner users of affected land, particularly informal users, is low.

In addition to the two 110kV OHLs, three OHLs (35kV) will be constructed in the wind farm location, to connect the WTGs to the Krivača substation. This OHL will be combined with underground cables (35kV). Both the OHL towers and underground cables will be constructed on land which has already been acquired for the WTGs and/or the service roads, which means that no additional land will be needed. Upon construction, the 35kV OHLs will also have a protection zone of 30m (15m on each side of the OHL). The protection zone of the underground cable will be 2m (1m on each side of the cable).

3.4.2.6 Land acquired for the access and service roads

The Project requires upgrading to existing and construction of new roads in two municipalities – Golubac and Kučevo. These have been divided into two categories: access roads (21km) and service roads (20km), refer to Figure 3.

⁵⁸ The agreements are tripartite and are signed between owners of land, Elektromreža and Ivicom.

Approximately 20.2km of existing roads will be upgraded and another 20.8km will be newly constructed. Three quarters of the affected land belongs to private owners, while one quarter is municipal or other public land. Please refer to Table 30 and Table 31 for data on the number of plots affected, the area affected and ownership of affected land.

Table 30: Plots and area of land acquired for service and access roads

Affected municipality	No. of plots	Acquired area in ha	Total plot area in ha	% of plot acquired	No. of private owners affected
Golubac	769	44.1	1,062.70	4.15%	494
Kučevo	234	9.33	133.06	7.01%	175
Total	1,003	53.43	1,195.76	4.47%	669

Source: Link 011 based on data supplied by Ivicom Energy

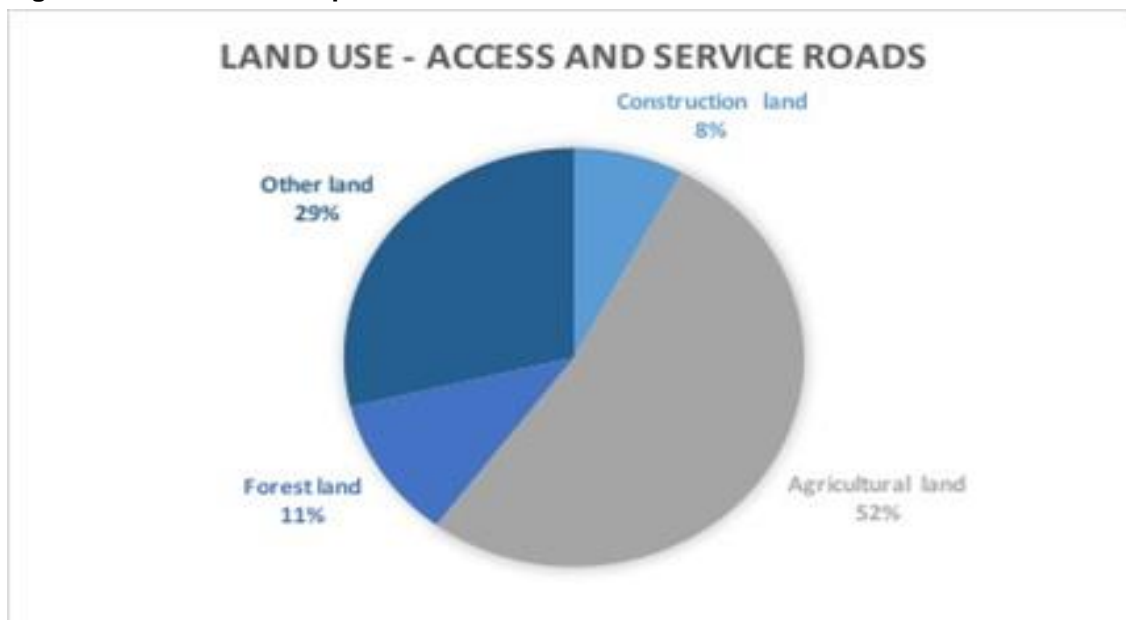
Table 31: Ownership of land acquired for service and access roads

Municipality	Acquired area	Area acquired from private owners in ha	%	Area of public land acquired in ha	%
Golubac	44.1	32.01	72.59%	12.1	27.44%
Kučevo	9.33	8.71	93.35%	0.61	6.54%
Total	53.43	40.72	76.21%	12.71	23.79%

Source: Link 011 based on data supplied by Ivicom Energy

According to cadastral data, most of the affected land is classified as agricultural land (52%), while the rest is forest land (11%), construction land (8%) and other (29%) – refer to Figure 38. The category 'other', which represents one third of the affected land, includes public land which is already classified as an uncategorised road. These are the road sections already in existence, which will be upgraded for the Project.

Figure 38: Use of land acquired for access and service roads



Source: Link 011 based on data supplied by Ivicom Energy

Land for upgrading and construction of roads is being acquired by municipalities (Golubac and Kučevo) through expropriation. The Project has provided funding to the municipalities for acquiring land for these components. The roads will be upgraded/constructed as part of the Project, however they will remain the property of the municipalities, who will be responsible for their maintenance once the roads are operational.

Owners of affected land were identified from Cadastral records which were then updated based on information from the field and with assistance of local community representatives. Owners were invited to group meetings by the responsible persons from the municipalities, where the expropriation process was explained in detail.

At the time of developing this ESIA addendum, according to data provided by municipal departments responsible for land acquisition⁵⁹ approximately 70% of plots have been acquired in Kučevo (78 cases are still being processed), while in Golubac approximately 60% of plots whose owners are present in the municipality (i.e. not abroad) and where inheritance is solved (approximately 50%), have been processed. As opposed to Kučevo, where payments have been executed for the 70% of completed plots, in Golubac no payments have been made yet. The municipality has obtained preliminary agreements for the expropriation (land take) itself, while the compensation amounts have not yet been determined or presented to affected people.

The compensation price in Kučevo was formed using data from recent registered sales of land of a similar quality, in nearby locations. In this case it was a sale carried out in Cerovica, a settlement closer to the town of Kučevo, where market prices of land are higher than in the affected area, where land transactions are non-existent. The same principle for forming the price of land will be used in Golubac and it is expected that it will be similar to the price used by Kučevo municipality.

In Golubac, none of the owners who met with the municipal department have requested the acquisition of the remainder of the plot which is left economically unviable after acquisition (orphan land), while in Kučevo only one owner requested it and the request was granted.

According to all interviewed local residents and representatives of local authorities, affected landowners are looking forward to having access to improved roads, as they will be able to use land more than they are currently using it and they believe that the value of their land will be increased.

As stated by the interviewed Secretary of the Local Council in Radenka Community, with the construction of new roads, that the local community will be better connected to urban municipal centres, which is a significant benefit of the Project for the local population.

3.4.2.7 Discussions with local residents in relation to land acquisition

During the latest field visit to the affected area in December 2016, eight local residents were interviewed by the social consultants after being randomly encountered in the local communities. Two of the owners have land affected by the WTG and roads, four have land affected by roads only and two have land affected by OHLs (with OHL towers). The key outcomes of the interviews are summarised as follows:

- The availability of improved and new roads is a greater benefit than losing small parts of their land plots. Some people have had to invest their own personal funds into creating access

⁵⁹ Interview held with the Head of the Department for Municipal Administration in Golubac on 27.12.2016. and with the Head of the Sector for Property Legal Issues in Kučevo held on 28.12.2016.

tracks to their fields in previous years and are satisfied that these tracks will be improved by the Project and maintained during operations.

- Some of the owners of forest land have not been cutting their forests, due to poor access (i.e. for vehicles to transport the wood), especially since the forests are of a very low quality and there is no economic interest in harvesting the wood. When access to the land improves, this may change.
- There is no sale of land in the affected communities as there are no interested buyers.
- Due to the foreseen access benefits, many of the owners are not interested in the amount of compensation at all, particularly those who live abroad.
- Land in the area is largely used for grazing animals and for cutting hay. Animal husbandry is not carried out for sale, only for household consumption. The benefits of keeping cattle which is used for household consumption are not financial and have more to do with having better quality food available at a same price as bought food. However, for many this represents a burden as it involves strenuous physical labour and less people engage in it every year.
- The fact that all expenses in relation to property legal issues, taxes, registration and other fees are being covered by the Project is appreciated by affected people.

Those who received compensation so far are satisfied with the amount received.

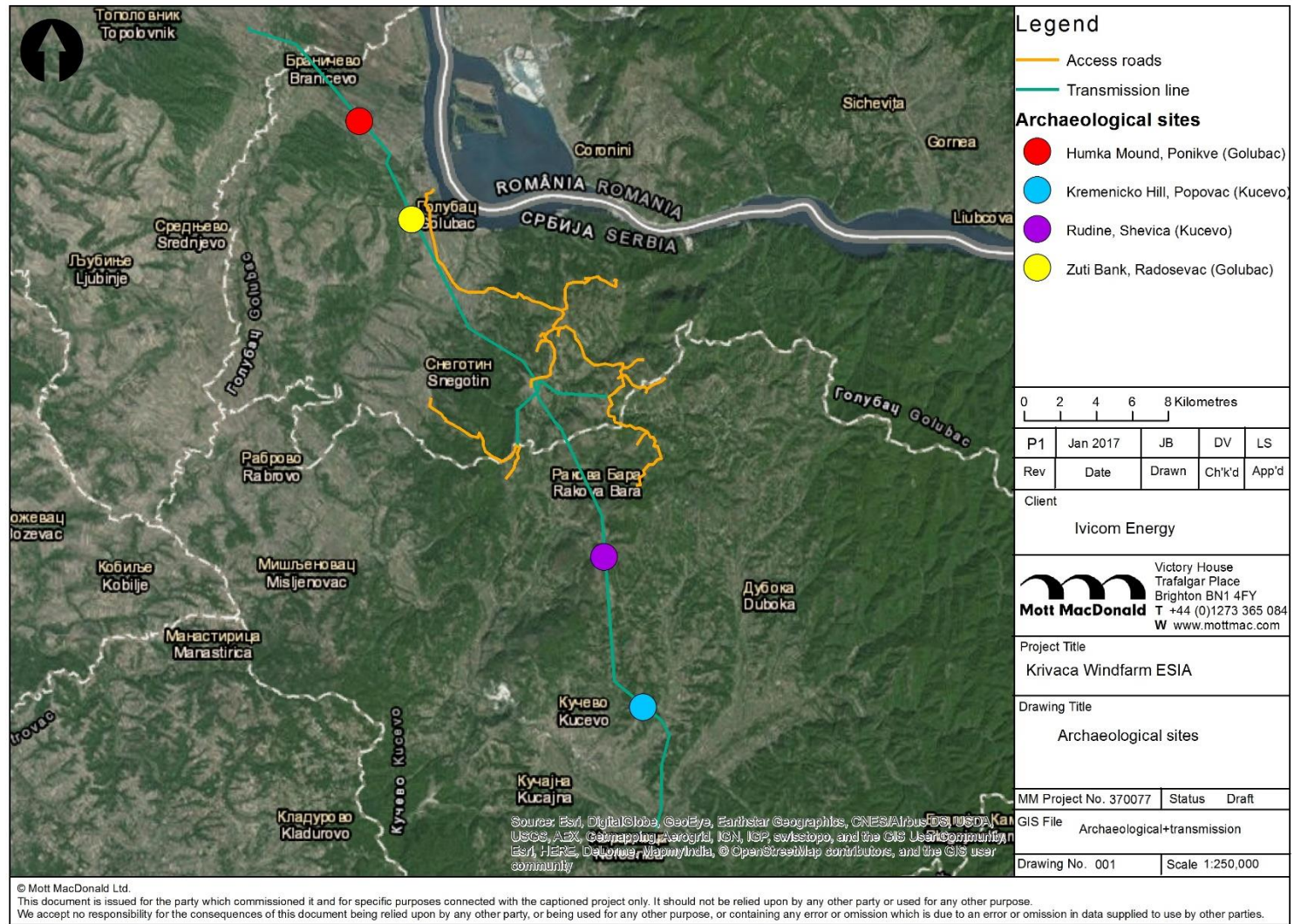
3.4.3 Archaeology and cultural heritage

The Regional Institute for Protection of Cultural Monuments of Smederevo completed a brief analysis of the territory of the Project in February 2013 (Decision No. 37/2-2013) and concluded that there are no cultural heritage assets or archaeological sites within the area of the WTGs and 35kV OHLs. However, it was identified that there is potential for archaeological sites of unknown significance to be located along the route of the two 110kV OHLs.

Further consultation with the Regional Institute for Protection of Cultural Monuments of Smederevo was undertaken in July 2016 to discuss the location, extent and nature of the four potential archaeological sites located along the route of the two 110kV OHLs. As a result, the four archaeological sites have been identified as: (1) Humka Mound, which is understood to be a site of burial tumuli or barrows, located at Ponikve (Golubac), (2) Zuti Bank, (Yellow Hill) which is likely to be a tell settlement site, located at Radoševac (Golubac), (3) Rudine, which is an area of metal work and potentially ore copper mining, located at Šhevica (Kučevo), and (4) Kremeničko Hill, which is understood to be an area of lithic working and mining (likely flint), located at Popovac (Kučevo). The sites are non-protected as cultural sites. Details of the historic significance and extent of these sites is not available from which to provide a summary of the existing environment. However, the presence of a tell settlement site suggests the possibility of extensive and potentially significant archaeological remains.

Figure 39 shows the areas of concern in respect to archaeological sites identified by the Regional Institute for Protection of Cultural Monuments from Smederevo.

Figure 39: Archaeological sites



3.4.4 Transport

3.4.4.1 Transport needs

The Project, located approximately 10km from of the town Golubac in the eastern region of Serbia, requires a local road network capable of handling slow, over-sized and over-weight vehicles accessing the site during the construction and decommissioning phases. Vehicles will be used for the transport of all materials and personnel required for the Project, including aggregates, cement, building materials and WTG parts. The WTG components will represent the main transportation challenges from a logistical point of view given the size of these components, and have been the main focus of several traffic and road surveys. The main WTG parts to be transported to site are:

- Nacelles and hubs
- Towers and adapters
- Blades

In order to accommodate the larger vehicles that will be used during construction, the roads should be 4m wide, with an uphill incline of a maximum of seven degrees, downhill incline of not more than 12 degrees and lateral incline of no more than ten degrees. A maximum uphill climbing ability of 16 to 20 degrees is possible only on hard ground like concrete or asphalt.

Under the current Serbian legislation oversized vehicles are required to apply and obtain permits from the different roads administrators, national and local. The application for these permits should take into consideration the dimensions and weight of the component to be transported. Some fees are calculated and applied based on the exceeding dimension and cargo. Any vehicle of more than 16.5m in length, 2.55m in width and 4.00m in height, will be subject to extra fees depending on the excess dimensions and cargo. As a general limitation, oversized vehicles are not permitted to travel on public roads between 12:00am and 5:00am from Fridays to Mondays.

From the preliminary road surveys undertaken it is envisaged that the Project will need to upgrade 16km of roads and construct 5km to access the Project site (total access roads 20.6km). A further 20km of internal service roads will be required within the Project site, of which 4.2km will be upgraded and 15.8km will be constructed.

3.4.4.2 Transportation options

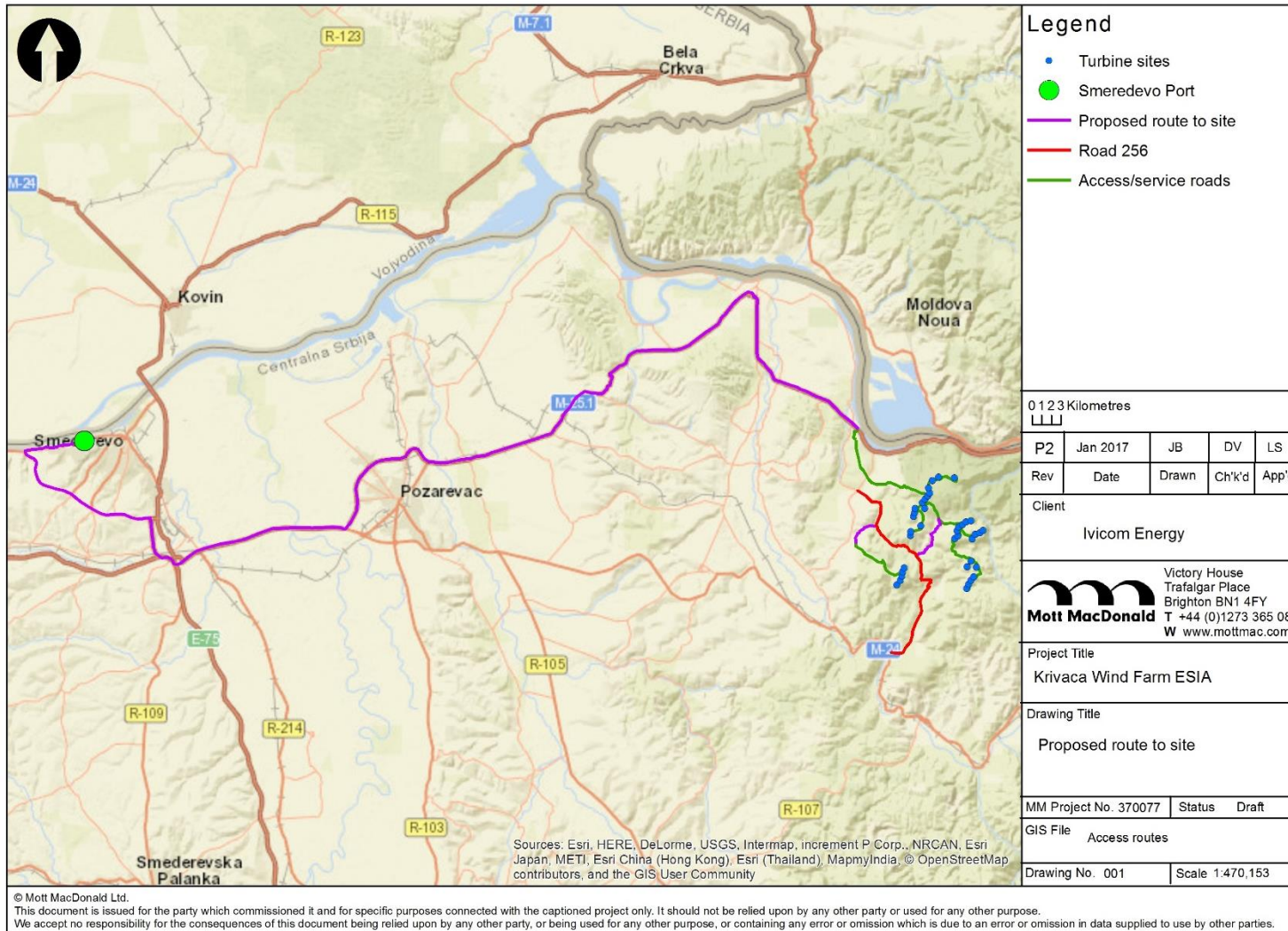
Roads surveys have been commissioned by Ivicom Energy. The responsibility of delivering all WTG parts to site falls with the WTG supplier. The BOP contractor will have responsibility for bringing to site all other materials and equipment required for construction. There have been several studies and surveys undertaken, and although the entire access route has not yet been fully defined, pending selection of the WTG provider, to date the main options being considered are:

- The nacelles, hubs, tower parts and adapters will be manufactured in Germany and delivered by truck to the Regensburg Harbour (in Germany) from where the components will be barged along the River Danube to Smedevero Port and then trucked to the site.
- The blades will be manufactured by Senvion PowerBlades but could be made in several different countries and shipped to site, however, regardless of their origin, the blades will be delivered by barge to the Pančevo Port on the River Danube.

There are sufficient infrastructure and services in place at Pančevo Port to handle all wind farm components without causing disruptions or the need for new infrastructure however the port of Smederevo may also be used if support is needed.

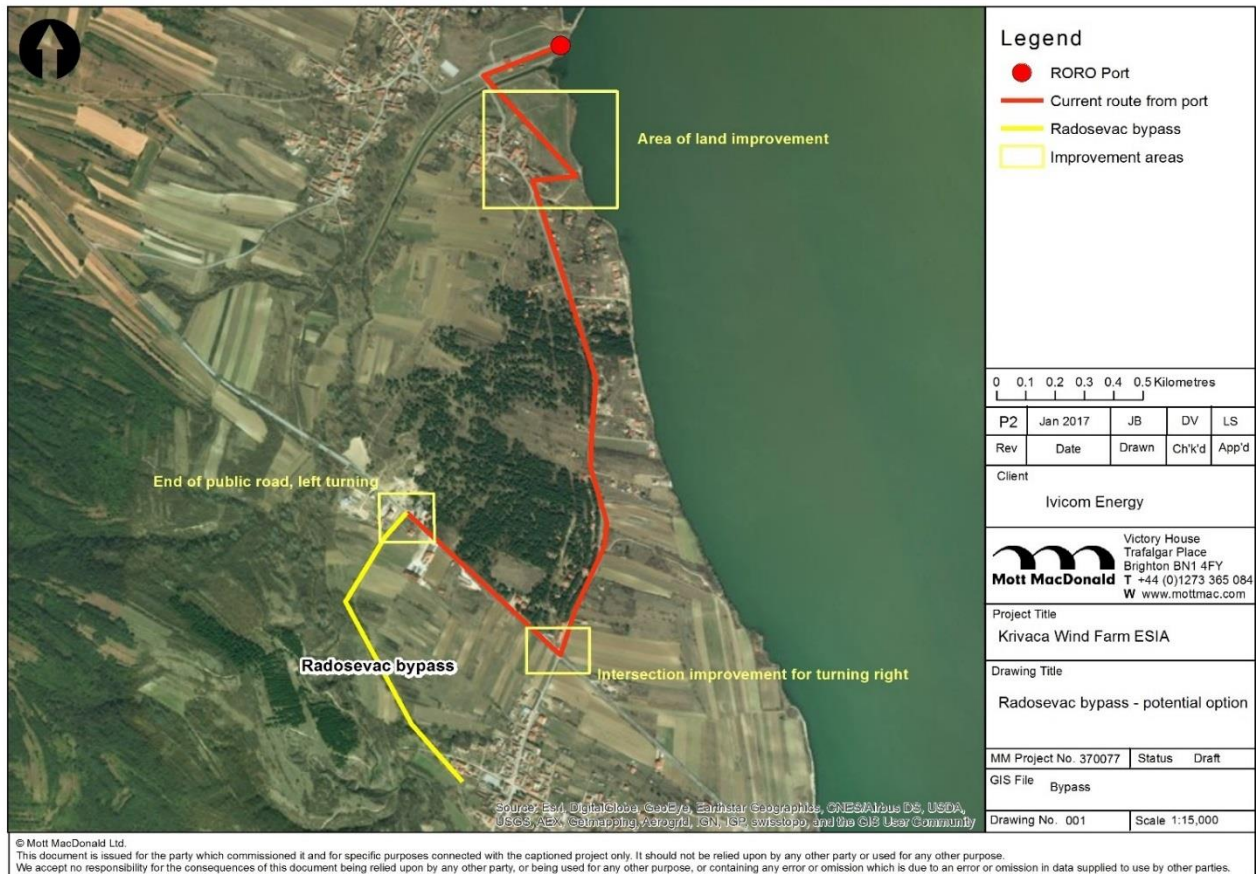
The international component of the transportation of the main WTG parts has been agreed as stated above, as most of the components will arrive either at Pančevo or Smederevo Ports. Road 14 will most likely have to be used from Pančevo Port, passing through the town of Bavanište and bypassing the town of Kovin, then crossing the Smederevo Bridge and arriving near the Smederevo Port. The route to be taken via road from Smederevo Port to the Project area consists of transporting the WTG parts to site by road via Road 33 and Road 34 (avoiding passing through the town of Pozarevac), bypassing the towns of Veliko Gradište and Radoševac and connecting with Route 256 which is the main access to site. A preliminary plan for the access and internal roads is presented in Figure 40 below.

Figure 40: Access routes



The exact routing of the 5km of new access road is yet to be defined however suitable land has been identified that is free of structures. The potential route of these new roads is shown in yellow in Figure 41 below. The 5km to be constructed are roads required to avoid passing through the town of Radoševac as there are a number of obstacles (narrow bridges, railway crossings, narrow turns and OHLs). The new access roads will avoid the town and will provide clear and obstacle-free passing to the required vehicles.

Figure 41: Potential option for the Radoševac bypass

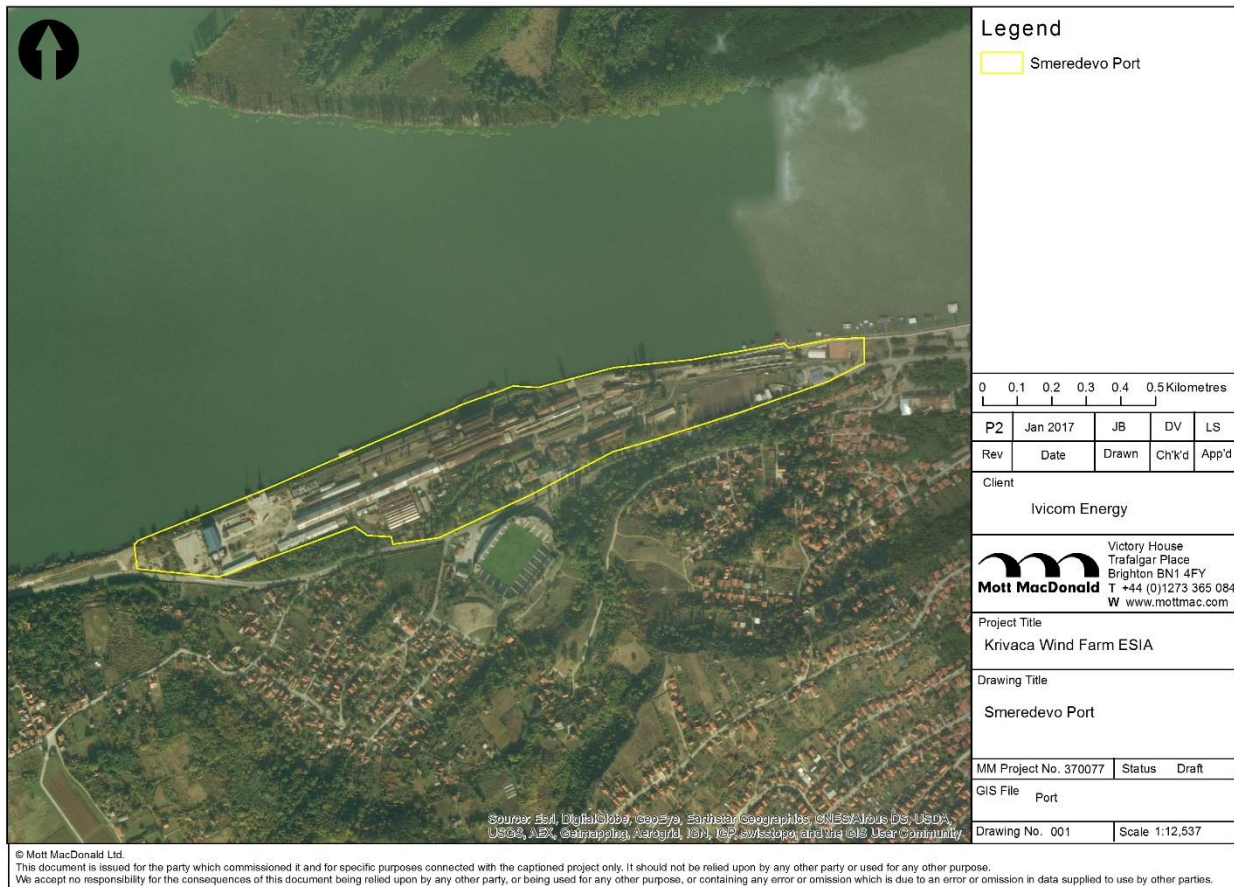


Source: Ivicom Energy

3.4.4.3 Smederevo Port

Smederevo Port (refer to Figure 42) is smaller than the Pančevo Port (discussed further below) however has very good connection to public roads connecting with the rest of Serbia. The infrastructure mainly consists of the old port, marina, new port, terminal for petrol loads, as well as smaller piers (gravel pits) which are located along the bank in the industrial zone. The Port is registered for international traffic and is equipped with reloading infrastructure capable of handling 1.5 million freight tonnes per year. The Port is capable of receiving, handling and storing all materials and equipment, with the exception of the WTG blades, required for the Project.

Figure 42: Smederevo Port

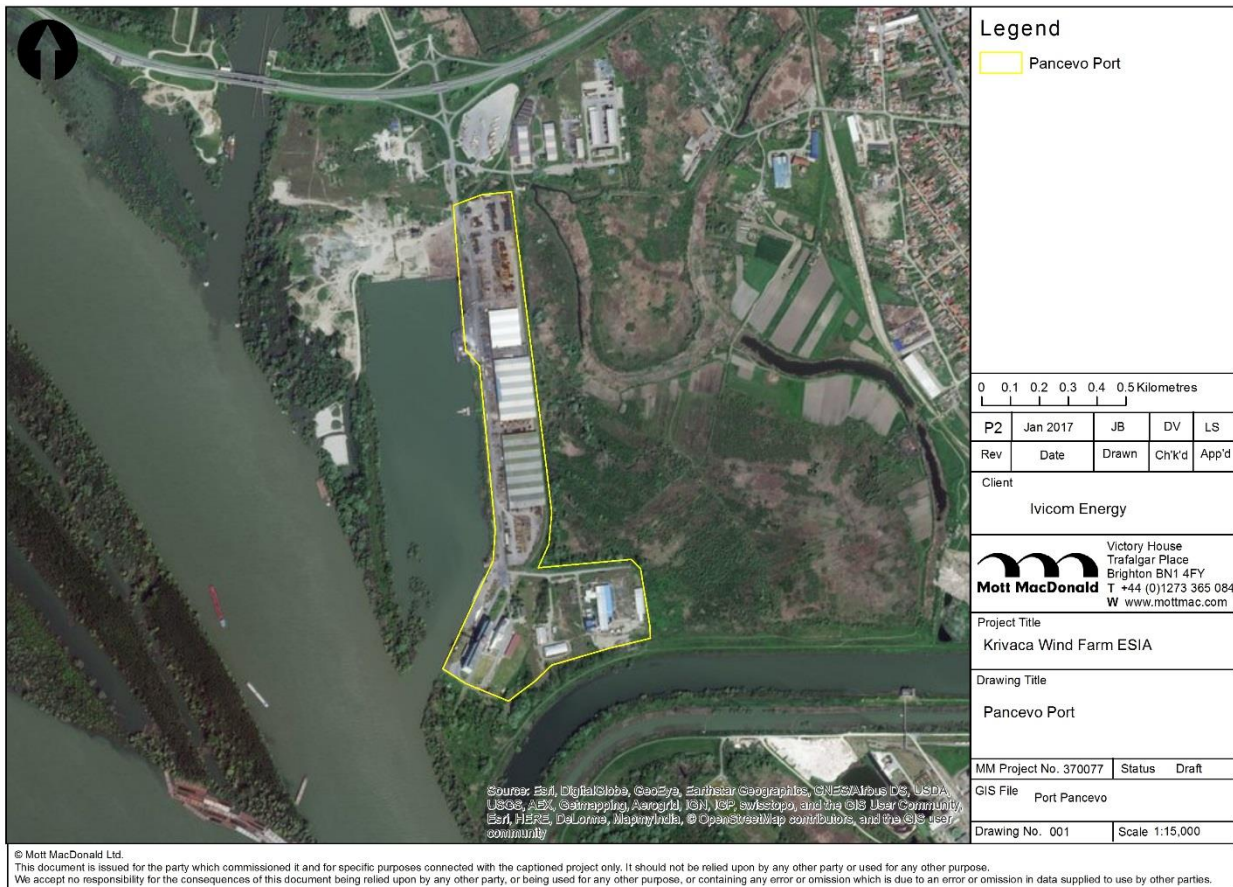


Source: Mott MacDonald

3.4.4.4 Pančevo Port

Pančevo Port (refer to Figure 43) has been operational since 1961 and is located near the capital city of Belgrade, near the Pančevo Bridge. The Port also manages a passenger terminal but is mainly used for commercial purposes. The Port is capable of handling 3,000,000 tonnes of materials and good per year and 10,000 shipping containers. It also has 300,000m² of warehouses and 650,000m² of open-air storage areas. The Port is capable of receiving, handling and storing all materials and equipment required for the Project including all WTG components.

Figure 43: Pančevo Port



Source: Mott MacDonald

3.4.4.5 Access roads network

Overall the public roads to be used from either port are in good condition. The 16km of road that will need to be upgraded represent a mix of relatively minor adjustments and modifications such as widening turns, temporarily removing street signs and rehabilitating road surfaces. Figure 44 and Figure 45 below show some examples as presented in the transport surveys commissioned by Ivicom Energy.

Figure 44: Access roads network – widening turn required

Source: Holleman Route Study, 2015, supplied by Ivicom Energy

Figure 45: Access road network – temporary removal of street signs

Source: Holleman Route Study, 2015, supplied by Ivicom Energy.

3.4.4.6 Service roads network

All existing internal service roads are mainly rural unmade roads that will need to be rehabilitated and widened. The final design of the service roads is yet to be finalised however these will be permanent roads that will provide access to all components of the wind farm and therefore will be maintained in good condition throughout the life of the Project. It is envisaged

that some minor sections of these service roads may be asphalted however the majority of these roads will be kept as unmade roads in line with the rural surroundings. Figure 46 and Figure 47 below present examples of the type of service roads that exist in and around the Project and are for illustrative purposes only.

Figure 46: Example of service road network



Source: Prangl Road Survey Study, 2011, supplied by Ivicom Energy.

Figure 47: Example of service road network



Source: Prangl Road Survey Study, 2011, supplied by Ivicom Energy

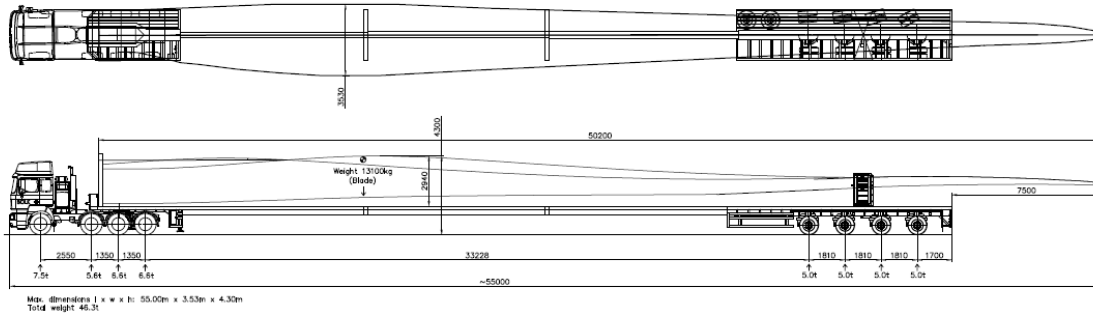
It has been identified that some vegetation clearance is required for the development of the new service roads. The impact to the local environment due to vegetation clearance is discussed separately in section 4.2.1.1.

3.4.4.7 Vehicles

The blades represent the largest components to be transported to site, and therefore represent the major logistical challenge. The blades and the tower sections will be transported on

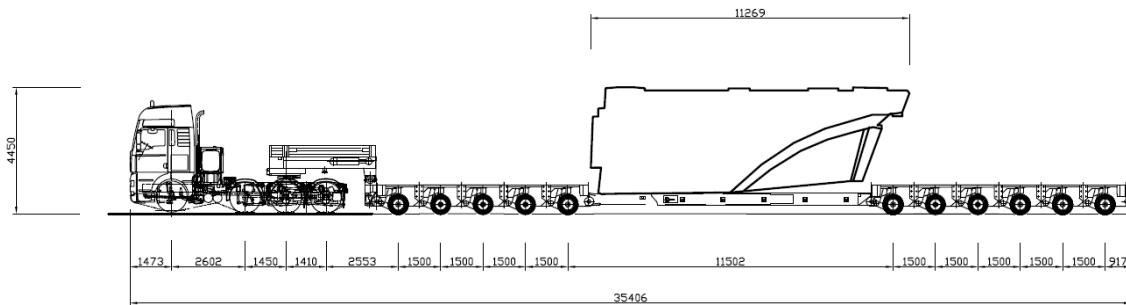
extendible trailers and the nacelles will be transported on 100 tonnes bed trailers or on semitrailers. Figure 48, Figure 49 and Figure 50 below present a typical vehicle for each of the components.

Figure 48: Blades transportation vehicle



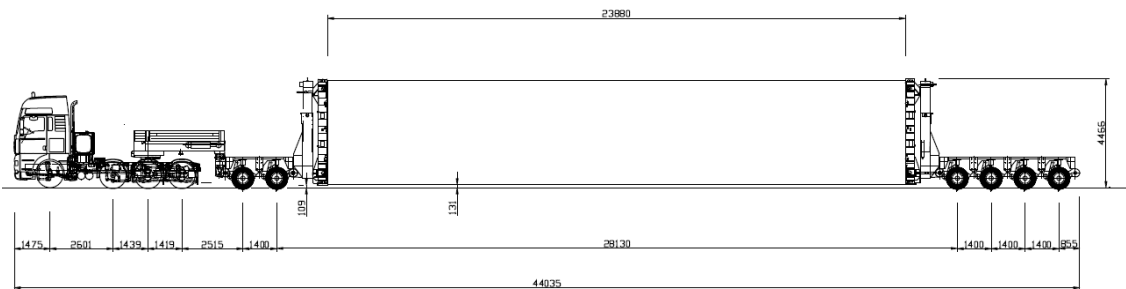
Source: Ivicom Energy

Figure 49: Nacelle transportation vehicle



Source: Ivicom Energy

Figure 50: WTG tower parts transportation vehicle



Source: Ivicom Energy

The rest of the components will be transported on lighter trailers or on standard lorries or container trucks, according to the features of each component. Similarly, all other material required for construction such as concrete, steel, sand (please refer to Table 10 in section 2 for list of materials required during construction), will be transported using conventional trucks.

These will be able to transit through the access and service roads easily as the roads will be designed to accommodate the larger vehicles transporting the WTG parts.

3.4.5 Noise

3.4.5.1 Noise sensitive receptors

There are numerous noise sensitive receptors scattered within the vicinity of the proposed wind farm. These are mainly residential properties and are assigned High sensitivity within the assessment. The grid references of the sensitive receptors considered by the assessment are presented in Table 32 and the locations are shown on a map at Figure 51 below.

Potential impacts upon these receptors have been assessed, and a baseline noise survey has been undertaken to establish existing noise levels in locations considered representative of the majority of the receptors. The selection of the receptors is based on those identified by the National EIA, supplemented by receptor positions that were confirmed during the baseline noise survey as being a permanent residence.

The baseline noise measurements have been undertaken in accordance with the procedures and requirements given in the General EHS Guidelines (section 1.7 Noise)⁶⁰ and the EHS Guidelines for Wind Energy⁶¹. The latter makes reference to more detailed guidance^{62,63} for baseline surveys for wind farm development, which has also been adopted.

Table 32: Noise sensitive receptors

No.	East Coordinate	North Coordinate
A	554504	4939006
B	551263	4942016
C	551696	4941751
D	551194	4941414
E	550124	4940981
F	551295	4940280
G	551835	4939708
H	552986	4938899
I	553062	4938465
J	552598	4938317
K	554380	4937849
L	552743	4937459
M	552312	4937370
N	553014	4936824
O	554786	4940067
P	553966	4939838
Q	554737	4939421
R	554749	4939267
S	553525	4939849
T	555045	4940117
U	555412	4940335

⁶⁰ IFC and World Bank Group. Environmental, Health and Safety General Guidelines (2007).

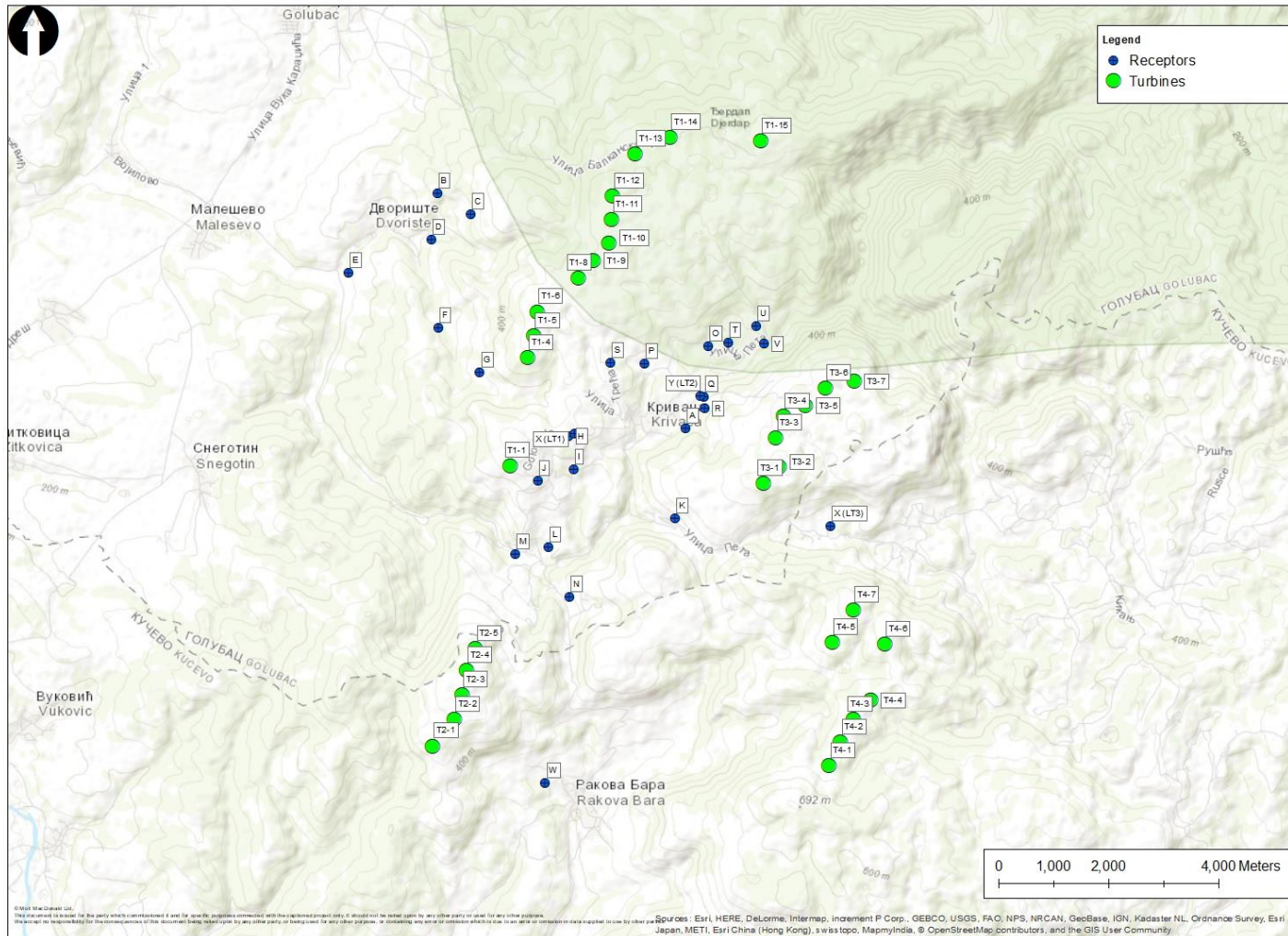
⁶¹ World Bank Group. Environmental, Health and Safety Guidelines for Wind Energy (2015).

⁶² ETSU. Report ETSU-R-97 The Assessment and Rating of Noise from Wind Farms (1997).

⁶³ Institute of Acoustics (IOA) A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (2013).

No.	East Coordinate	North Coordinate
V	555517	4940110
W	552725	4934415
X (LT1)	553067	4938926
Y (LT2)	554699	4939430
Z (LT3)	556390	4937762

Figure 51: Map of noise sensitive receptors and proposed WTG positions



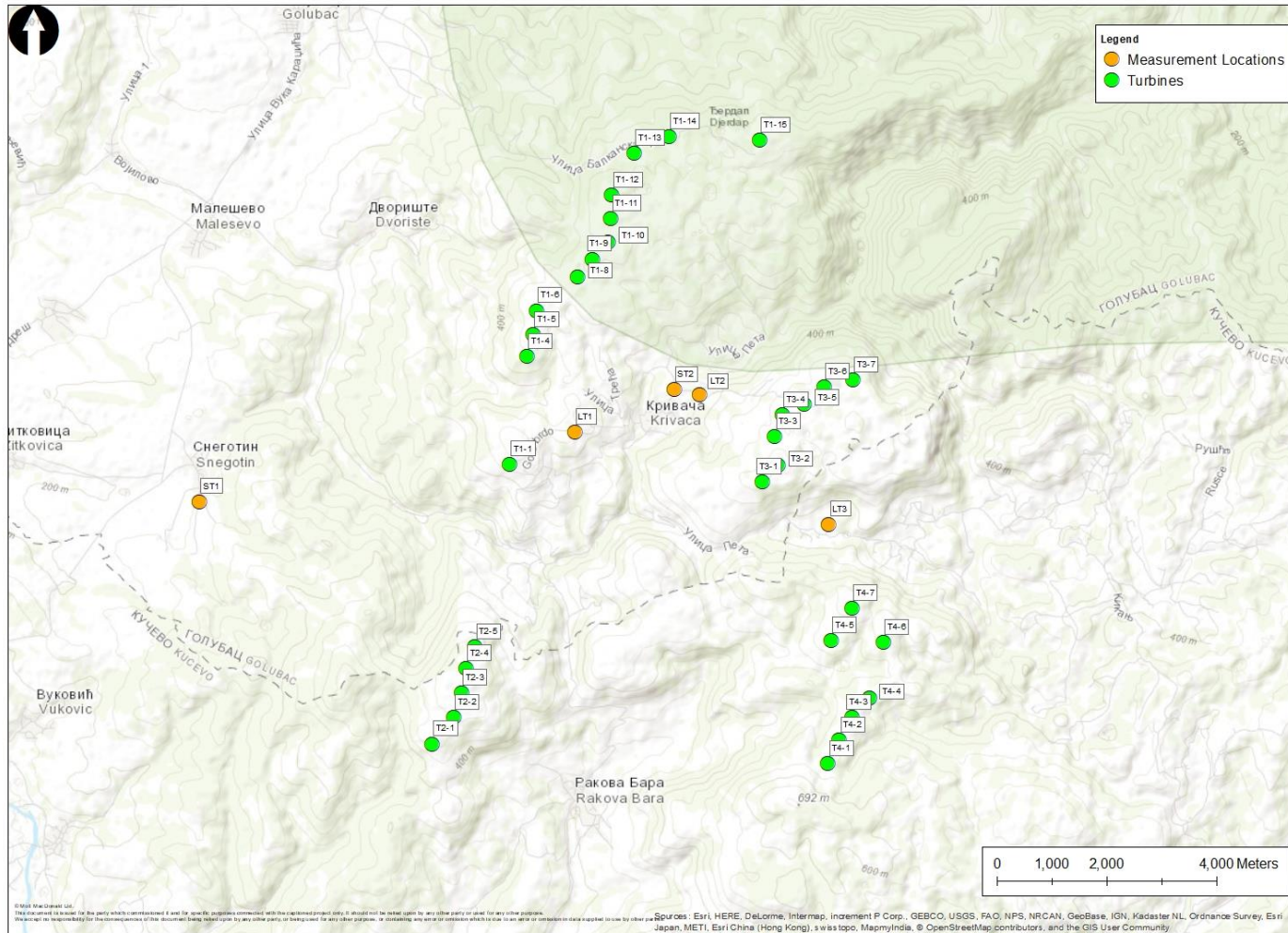
3.4.5.2 Baseline measurement positions

Baseline noise surveys were conducted between Tuesday 8 November and Wednesday 23 November 2016. There are several villages and numerous scattered buildings in the area of the proposed WTGs. The location of receptors was established through site visits and consultation with the local community. Therefore, the positions for the three long-term (LT) noise measurement were selected to represent the closest identified residential receptors to the proposed WTGs.

Two short-term (ST) attended noise measurements were also undertaken at locations representative of sensitive receptors adjacent to potential haul routes to be used during the construction phase. These positions included Snegotin and Krivača villages.

Figure 52 below indicates both the long-term and short-term noise monitoring positions.

Figure 52: Noise monitoring positions and proposed WTG positions



3.4.5.3 Survey periods

The LT measurement positions were undertaken over a period of two weeks to ensure adequate variation in wind speed and direction. The two ST measurements were each conducted over a 15-minute interval. Table 33 below provides further details of the location and times of the noise monitoring surveys.

Table 33: Long and short-term measurement positions and intervals

Receptor	Grid Reference	Distance to Nearest Proposed WTG	Start Time/Date	End Time/Date
Long Term 1 (LT1)	553067 4938926	0.3km S T1-3	08/11/16 10:40	23/11/16 09:50
Long Term 2 (LT2)	554699 4939430	1.1km NW T3-3	08/11/16 11:30	23/11/16 11:10
Long Term 3 (LT3)	556390 4937762	0.6km SW T3-8	08/11/16 12:50	23/11/16 12:40
Short Term 1 (ST1)	548211 4937990	-	23/11/16 14:10	23/11/16 14:25
Short Term 2 (ST2)	554360 4939487	-	23/11/16 16:32	23/11/16 16:47

Details of the monitoring equipment used and measurement of wind speed is included in the Technical Appendix.

3.4.5.4 Results of baseline background noise survey

Table 34 below shows the baseline background noise level at each LT measurement position. These have been derived using a regression curve of noise level (L_{A90} dB) as a function of concurrent wind speeds between 4 and 12 m/s recorded at the closest meteorological mast to each position.

Table 34: Baseline background noise levels

Location	Time	Baseline Background Noise Levels $L_{A90,10minutes}$								
		4m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s
LT1	Day	26.0	29.1	32.6	36.2	39.7	43.0	45.8	48.0	49.4
	Night	23.3	26.2	29.5	33.2	37.0	40.9	44.5	47.9	50.7
LT2	Day	27.9	29.8	31.4	32.8	34.0	34.9	35.5	35.8	35.7
	Night	24.3	25.8	27.3	28.8	30.4	32.0	33.6	35.1	36.6
LT3	Day	26.8	28.8	30.8	32.8	34.6	36.3	37.8	39.1	40.1
	Night	21.8	23.9	26.4	29.1	31.8	34.4	36.7	38.5	39.7

3.4.5.5 Acoustic modelling

A three-dimensional acoustic model was developed using CadnaA V4.5 software to implement the procedures of ISO 9613 'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation' (1996). The prediction of operational noise impacts is based on the following parameters:

- Number of WTGs: 31 x 3.3MW WTGs.
- Receptors: Receptors A – Z (refer to Table 32).

- Noise emission levels (each WTG): Sound power level of 109.5dB(A). This is the 'worst case' scenario and includes a +2dB uncertainty correction. It is assumed the WTGs are operated in an unmitigated/unrestricted mode e.g. 'Noise Mode 0'.
- Hub height: 117m.

The noise model has been used to:

- Describe the study area: The 37dB L_{Aeq} noise contour corresponds with 35dB L_{A90} which defines the study area for the maximum operational noise output from the WTGs in accordance with the IFC Guidelines on Wind Energy.
- Calculate overall operational noise level at each receptor position due to all the WTGs operating simultaneously to assess noise impacts at sensitive receptors by identifying the potential to exceed the guideline noise levels for daytime and night-time in the IFC/World Bank standards. Noise levels from WTGs and background noise levels vary with respect to wind speed therefore the assessment criteria account for variation referenced to standardised wind speeds at 10m height.

4 Assessment of impact

4.1 Introduction

Section 4 presents the assessment of environmental and social impacts for the construction, operations and decommissioning phases for Krivača wind farm. The methodology described in section 1.10 has been used, however where appropriate, the magnitude and sensitivity criteria have been adapted to suit the individual disciplines. Further methodological information by topic area is presented in the Technical Appendices in Volume III.

The assessment has been informed by the regulations and guidelines defined in section 1 as well as by the Project design, the baseline conditions and the scope of the assessment as outlined in the Scoping Report submitted to IFC in December 2016.

Where impacts have been identified as significant, (of moderate or major significance), or where necessary to comply with national and international standards, mitigation and management measures have been specified in section 5 and in the Framework ESMP in section 6.

4.2 Construction impacts

4.2.1 Ecology and nature conservation

In this section the impacts, in the absence of mitigation, associated with the construction of the Project on the ecological features within the area of influence are evaluated using the assessment criteria defined in section 1.10. A summary of the impacts is presented in Table 35 and discussed below.

Table 35: Construction impact summary

Feature	Sensitivity	Habitat loss, degradation and fragmentation*	Disturbance	Incidental Mortality
Protected areas	High	Negligible	N/A	N/A
Habitats	Low	Negligible	N/A	N/A
Forest	Medium	Minor adverse	N/A	N/A
Flora	Low-Medium	Negligible to Minor adverse	N/A	N/A
Mammals (excluding bats)	Low	Minor adverse	Minor adverse	Minor adverse
Bats	Low	Minor adverse	Minor adverse	Minor adverse
Western Barbastelle	Medium	Moderate adverse	Moderate adverse	Moderate adverse
Birds	Low	Minor adverse	Minor adverse	Minor adverse
Ural Owl	Medium	Moderate adverse	Moderate adverse	Moderate adverse
European Turtle Dove	Medium	Moderate adverse	Moderate adverse	Moderate adverse
Reptiles	Low	Minor adverse	Minor adverse	Minor adverse
Amphibians	Low	Minor adverse	Minor adverse	Minor adverse

Feature	Sensitivity	Habitat loss, degradation and fragmentation*	Disturbance	Incidental Mortality
Invertebrates	Low	Minor adverse	Minor adverse	N/A

*Significant impacts denoted by bold type

4.2.1.1 Habitat loss, degradation and fragmentation

Predicted habitat loss and degradation are likely to be limited to the establishment of temporary construction laydown areas, temporary and permanent access routes, erecting OHL tower and WTG bases and under the footprint of substation infrastructure. This temporary and permanent, direct loss, degradation and fragmentation of habitats will likely result in an adverse change in the extent and integrity of the habitats supporting the life cycle stages (breeding, foraging, resting) of the species present in the WTG cluster areas.

Protected Areas

Derdap National Park, IBA, IPA and PBA (overlapping boundaries) are at least 212m from the nearest WTG in the Venac WTG cluster.

The construction of the Project is unlikely to determine the direct or indirect loss or degradation of any habitats in the protected areas mentioned above. This protected area is of high sensitivity given the international and national designations. Therefore, the magnitude of this impact is negligible and the resulting impact is negligible and not significant.

Habitats

Most of the habitats to be affected by the Project, including the proposed access/service roads and OHLs, are grasslands dominated by *Calamagrostis epigejos* or *Arrhenatherum elatius*, which cover more than 80% in the Debelo brdo, Rakobarski vis and Venac WTG clusters, and over 50% in the Tilva WTG cluster area (500m buffer from WTG clusters). These grasslands are natural habitats but most areas are relatively degraded because of overgrazing. The magnitude of the Project impacts on grassland habitats is moderate. Given the low sensitivity of grassland habitats in the WTG cluster areas, the resulting impact is minor adverse and not significant.

The Project will also affect small areas of beech and oak forests, which represent less than a quarter of the area within the 500m buffer from the WTGs. This is considered an impact of minor magnitude. Given the medium sensitivity of forests, the resulting impact is minor adverse and therefore not significant.

Given the forest loss caused by the construction of the Project, forests will be more fragmented. However, the increase in forest fragmentation will be small and therefore the magnitude of this impact is minor. Given the medium sensitivity of forest habitat, the resulting impact from fragmentation is minor adverse and not significant.

The WTG clusters are not likely to affect any watercourses. However, the proposed access/service roads and the OHLs will cross a small number of watercourses, which may be temporarily affected by water pollution events from construction activities, siltation and fragmentation during construction. The magnitude of this impact is minor because the proposed roads will include upgrade of existing roads and there are few watercourses to be crossed; given the medium sensitivity of watercourses, the resulting impact is minor adverse and not significant.

The Project impacts on farmland are considered to be of minor magnitude; given the low sensitivity of this habitat, the resulting impact is negligible and not significant.

Construction of the Project has the potential to introduce and spread (alien) invasive species (AIS), which may contribute to the degradation of natural habitats. This impact is considered to be minor because only two species with low invasive capacity (*Ailanthus altissima* and *Robinia pseudoacacia*) have been recorded in the WTG cluster areas. Given the low and medium sensitivity of the habitats in the WTG cluster areas, the resulting impact is negligible or minor adverse and not significant.

Flora

The individual plant species, flora, in the WTG clusters areas are of low sensitivity because they are common species, and there are no globally/nationally threatened species or Serbian endemic species recorded. The construction of the Project will affect forest and grassland flora through the habitat loss mentioned above. This impact is considered to be of moderate magnitude (mainly because of the grassland loss) and the resulting impact will be minor adverse and not significant.

Mammals (excluding bats)

Mammal species known to be present within the WTG cluster areas are common and widespread and therefore of low sensitivity. The predicted losses will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of habitat loss on mammals is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Bats

No breeding sites were identified although these may be present in trees within the Project footprint. The predicted losses will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of habitat loss on bats (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact (not significant), except for western barbastelle (medium sensitivity) where the impact of habitat loss is therefore considered to be moderate, resulting in a moderate adverse impact which is significant.

Birds

The predicted losses to bird species will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of habitat loss on birds (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact and not significant, except for European turtle dove and Ural owl (medium sensitivity) where the impact of habitat loss is therefore considered to be moderate, resulting in a moderate adverse impact that is significant.

Reptiles

The predicted losses will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of habitat loss on reptiles (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Amphibians

The predicted losses will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of habitat loss on amphibians (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Invertebrates

The predicted losses will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of habitat loss on invertebrates (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

4.2.1.2 Disturbance

The construction of the proposed wind farm would result in the temporary disturbance from the generation of noise, vibration, the presence of people and changes to the physical environment such as soil structure and changes in the exposure to sun, wind and precipitation. Disturbance will likely result in an adverse change in the distribution of the species present in the WTG cluster areas.

Mammals (excluding bats)

Mammal species (low sensitivity) are known to be adversely affected by disturbance related to the construction of wind farms although the impacts may of a smaller magnitude where there is existing disturbance from other human activities⁶⁴. Mammal species known to be present within the WTG cluster areas do not include large carnivores or large numbers of ungulates which are sensitive to disturbance however they are known to occur within the protected areas. The predicted disturbance will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of disturbance on mammals is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Bats

Bats are known to be sensitive to disturbance particularly when the source of disturbance is in close proximity to roost sites. Based on pre-construction surveys, known roost sites occur at low density within WTG cluster areas although there may be a significant number of tree roosts that were not identified during the surveys due to the abundance of trees present and the ephemeral nature of their use. The predicted losses will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of disturbance on bats (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact (not significant), except for western barbastelle (medium sensitivity) where the impact of disturbance is therefore considered to be moderate, resulting in moderate adverse impact that is significant.

Birds

Birds (low sensitivity) are also known to be sensitive to disturbance particularly when the source of disturbance is in close proximity to nest sites. The predicted disturbance will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of disturbance on birds is therefore considered to be moderate; and of minor adverse impact (not significant). This is except for European turtle dove and Ural owl (medium sensitivity) where the impact of disturbance is therefore considered to be moderate, resulting in a moderate adverse impact that is significant.

Reptiles

Reptile species are known to be adversely affected by human activity⁶⁵ although changes in vegetation cover may be beneficial. Reptile species known to be present within the WTG cluster areas are common and widespread species and therefore of low sensitivity. The predicted

⁶⁴ Helldin, J.O., et al, 2012. The impacts of wind power on terrestrial mammals. A synthesis. Report 6510. Stockholm: Swedish Environmental Protection Agency.

⁶⁵ BC Ministry of Water, Land and Air Protection, 2004. Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia. Nanaimo, BC: BC Ministry of Water, Land and Air Protection.

disturbance will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of disturbance on reptiles is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Amphibians

Amphibian species are known to be adversely affected by human activity⁶⁶⁶⁷ although some species may react positively to environmental changes following reduced tree cover⁶⁷. The predicted disturbance will be detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of disturbance on amphibians is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Invertebrates

Invertebrate species are known to be adversely affected by human activity⁶⁸ although species richness can increase if levels of habitat disturbance are similar to natural rates⁶⁹. The invertebrate communities are considered to be of low sensitivity. Taking into account the fact that the species present are common and widespread and the absence of rare or scarce habitats, the magnitude of the impact of disturbance on invertebrates is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

4.2.1.3 Incidental mortality

Construction activities will result in open excavations likely to be harmful to species present within the WTG cluster areas. The presence of open excavations can result in mammals, reptiles and amphibians being injured, trapped and exhausted with the potential for death. Furthermore, the increased movement of vehicles and the presence of harmful substances on site could result in incidental mortality if uncontrolled.

The removal of vegetation and ground works could result in mortality, if for example, vegetation with nesting birds present is removed, trees with roosting bats are felled or groundworks take place at the locations of mammal dens or resting places for reptile and amphibians.

Mammals (excluding bats)

The predicted mortality will be a detectable change with reasonable opportunities for mitigation. The magnitude of the impact of incidental mortality on mammals (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Bats

No breeding sites were identified although these may be present in trees within the Project footprint. The predicted mortality is considered to be a detectable, non-fundamental change. The magnitude of the impact of incidental mortality on bats (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact (not significant), except for western barbastelle (medium sensitivity) where the impact of habitat loss is therefore considered to be moderate, resulting in a moderate adverse impact that is significant.

⁶⁶ Schaijk, M.E. van, 2013. The influence of human disturbance on amphibians and small mammals. [online] Available at: <<http://dspace.library.uu.nl/handle/1874/285785>> [Accessed on 18 January 2017].

⁶⁷ Ward, K. & Chapman, W.K., 1993. The Relation of Disturbance and Biogeoclimatic Zone to Abundance and Distribution of Terrestrial Amphibians. Williams Lake, BC: MOF. [online] Available at: <<https://www.for.gov.bc.ca/rsi/research/cextnotes/extnot18.htm>> [Accessed on 18 January 2017].

⁶⁸ Kimberling, D.N., et al, 2001. Measuring human disturbance using terrestrial invertebrates in the shrub-steppe of eastern Washington (USA). *Ecological Indicators* 1(2): 63–81.

⁶⁹ Holmquist, J.G., 2004. Terrestrial invertebrates: functional roles in ecosystems and utility as vital signs in the Sierra Nevada. [doc] Available at: <<https://irma.nps.gov/DataStore/DownloadFile/146693>> [Accessed on 18 January 2017].

Birds

The predicted mortality will be a detectable, non-fundamental change with reasonable opportunities for mitigation. The magnitude of the impact of incidental mortality on birds (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact (not significant), except for European turtle dove and Ural owl (medium sensitivity) where the impact of incidental mortality is therefore considered to be moderate, resulting in a moderate adverse impact that is significant.

Reptiles

The predicted mortality will be a detectable change with reasonable opportunities for mitigation. The magnitude of the impact of incidental mortality on reptiles (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

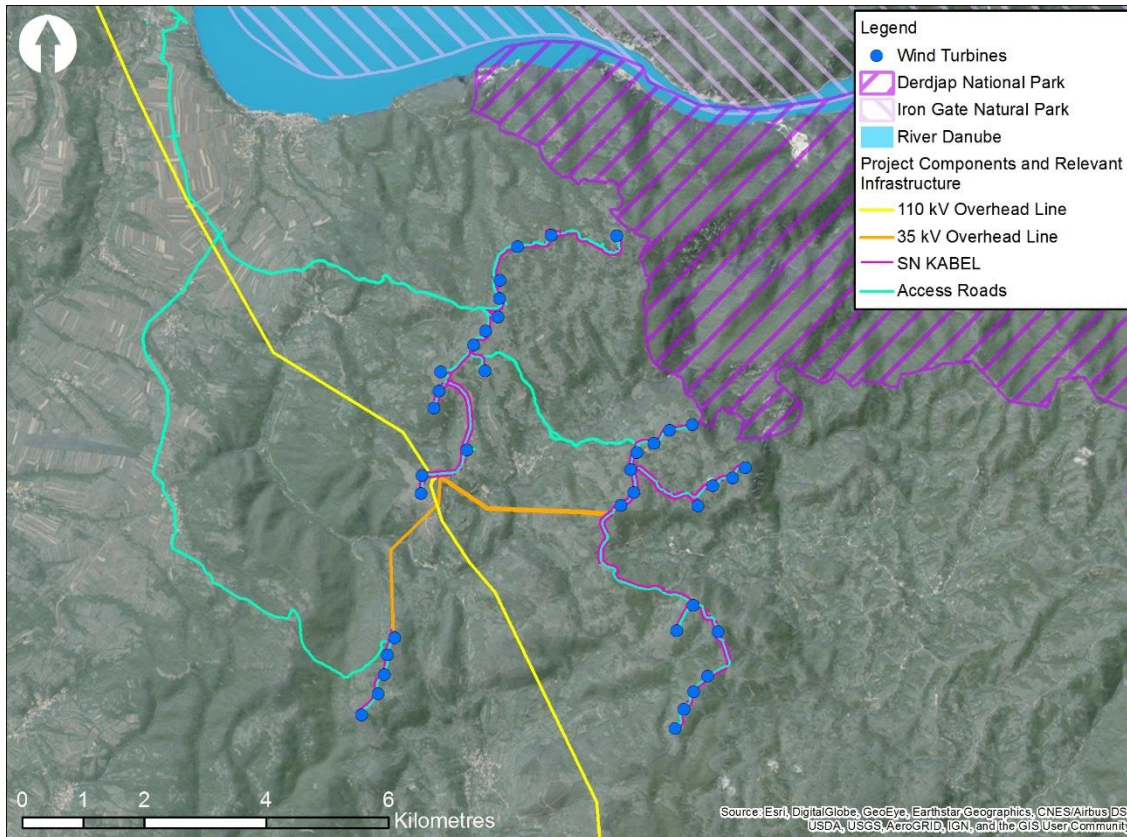
Amphibians

The predicted mortality will be a detectable change with reasonable opportunities for mitigation. The magnitude of the impact of incidental mortality on amphibians (low sensitivity) is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

4.2.2 Landscape and visual

The assessment methodology is set out in section A2, Volume III. Figure 15 below shows the main Project components as well as the Đerdap National Park and Iron Gates Natural Park which are referred to within the landscape and visual assessment.

It has been assumed that the material required for the road construction and concrete aggregate will be sourced from existing quarry sites that are permitted under national legislation and do not form part of this ESIA addendum. Should new quarry sites be required, these should be considered further in an assessment.

Figure 53: Project components

Source: Mott MacDonald

Construction impacts will include:

- Presence of construction traffic, plant and equipment in a rural setting (note that changes to traffic and tranquillity will be discussed in the traffic and noise sections - 0 and 4.2.4, respectively)
- Clearance of land to accommodate construction activities and access roads, laydown facility, foundations for OHL towers and WTG masts and underground utilities changing the land characteristics
- Construction of new access roads, widened existing unsurfaced roads to service the wind farm and OHL construction introducing more prominent elements into a rural setting

4.2.2.1 Landscape impact

The presence of the construction activities associated with the WTGs and OHLs will have no direct effects on the 'Steep Wooded Gorge LCA'. The closest WTG clusters to the border of the Đerdap National Park are the Debelo brdo cluster which is 147m away and the Venac cluster which is 212m away (as reported in the national EIA).

The WTG clusters will be located in the 'Wooded Hillside and Plateau' LCA. The 110kV OHLs cross both the 'Wooded Hillside and Plateaus' and the 'Cultivated River Valleys' LCAs. The presence of the WTGs will introduce large scale structures into a rural setting. The access roads will be unsurfaced, largely utilising existing forest tracks and roads.

Table 36: Landscape impacts during construction phase

Receptor	Construction impacts
Steep Wooded Gorge LCA - recognised nationally as the designated Đerdap National Park and characterised by the relative lack of development, high level of tranquillity, extensive vegetation cover and a wilderness quality - high sensitivity LCA	Indirect impacts of traffic and construction activities associated with the WTGs, including potential artificial lighting, close to the national park boundary will locally reduce tranquillity. This will be a temporary and localised impact that will not directly affect the key landscape elements and cultural features of the national park. The impacts will be reversible. The overall magnitude of change is considered to be negligible due to a very minor loss of landscape elements (tranquillity) affecting a very small proportion of the character area. The overall significance of impact is considered to be negligible and not significant.
Wooded Hillside and Plateau LCA – a medium sensitivity LCA, with limited areas of development including scattered farmsteads, villages and road corridors.	The area is characterised by the presence of small scale arable fields associated with farmsteads, open pasture and fragmented areas of forest cover and a medium level of tranquillity. Direct impacts include the selective clearance of existing woodland areas to accommodate construction activity, movement of construction traffic, including large scale elements for the WTGs and OHL towers, and the presence of construction activity in a rural setting. The undulating topography and woodland areas will contain the impacts to localised areas within the wider LCA. The presence of construction activity will reduce tranquillity locally and the selective removal of woodland areas will emphasise the presence of urbanising influences. The creation of new access roads and widening of existing roads will introduce new, permanent features that form noticeable new elements that are largely characteristic of their setting. The presence of construction activity will represent a temporary addition of new features that form prominent new elements, altering the character of the landscape. The overall magnitude of change is considered to be moderate, due to a detectable change to the landscape that is non-fundamental temporary or permanent. The overall significance of impact is considered to be moderate adverse and significant
Cultivated River Valleys LCA – a low sensitivity LCA, with larger settlements, paved roads, some overhead power lines set in a wide level valley area.	The predominant land use is extensive arable cultivation with limited tree and forest cover. Direct impacts include the clearance of selected areas of existing woodland to accommodate construction access for the OHL towers, movement of construction traffic, and the presence of construction activity in a rural but heavily cultivated agricultural setting. The wide valley areas are contained by the rising topography to the east and localised areas of higher ground but are relatively open. The presence of construction activity will reduce tranquillity locally. However, construction traffic associated with the OHL will be largely characteristic of the setting and accommodated partly on existing roads. The presence of construction activities will have temporary impacts on existing landscape features through the localised clearance of vegetation and a reduction in tranquillity, due to a detectable but small change to the key landscape elements. The magnitude of change is considered minor. The overall significance of impact is considered to be negligible and not significant.

4.2.2.2 Visual amenity impact

The visual baseline study identified a number of potential visual receptors (people with a view of the Project). The topography within the ZTV is dynamic and complex to the north and east of the Aol where the nature of the landform limits the visual envelope. The more open landcover and wider valley landform to the west afford more opportunities to view the Project elements. The viewshed generated by the WTGs is reproduced in Figure 15, Volume II. It should be noted that this is generated using bare earth data sets (see methodology in section A2, Volume II) and does not take into account the presence of existing buildings or vegetation which may limit visibility resulting in a conservative model.

From the site visit and meeting with the officers from the Đerdap National Park, there were no known sensitive receptors identified in the national park that fall within the predicted viewshed analysis. The Đerdap Gorge and the key cultural elements are concentrated along the river corridor and the steep gorge topography and wooded land use screen the Project from view.

Table 37: Visual impacts during construction

Receptor	Construction impacts
Residents of Radenka village – medium sensitivity	The rising topography surrounding the village encloses views. The slopes support a mixture of small cultivated fields, pasture and areas of deciduous forest. The presence of construction activity, clearance of existing vegetation and construction of access roads will not be visible from the centre of the settlement. Some outlying, isolated properties on the higher ground will have distant views towards the Rakobarski vis

Receptor	Construction impacts
Residents of Krivača village – medium sensitivity	cluster. The closest receptor will be approximately 3.1km from WTG T4-6. The scale of the construction works will result in a very minor loss of landscape elements and additions of new features that do not alter the overall quality of the views. The magnitude of change is considered negligible resulting in a negligible and not significant impact on visual amenity.
Residents of Rakova Bara village – medium sensitivity	The relatively steep rising topography surrounding the village encloses views. Urban influences are limited but transmission distributor lines and a single telecommunications mast to the east of the village are visible. The presence of construction activity, clearance of existing vegetation and construction of access roads will not be visible from the centre of the settlement. Some outlying, isolated properties on the higher ground will have close but partly filtered views, due to the presence of tree cover and outbuildings. The closest outlying village properties will be approximately 0.5km from T1-1 and T1-2 to the south west of the settlement in the Venac cluster and a similar distance from the construction activity associated with the 35kV OHL. The construction activity associated with the Debelo brdo cluster will be less visually intrusive due to the presence of tree cover, rising topography and greater distance between the nearest receptors and the cluster. The closest receptor will be approximately 1km from WTG T3-5. The presence of the construction works will have no perceptible change to the views from the centre of the village. Views from individual outlying properties close to the proposed WTG locations T1-1 and T1-2 will be subject to a detectable change in visual amenity through the presence of construction plant and new access roads but views are expected to be filtered by existing vegetation and outbuildings. Overall the magnitude of change is considered to be moderate, resulting in a moderate adverse and significant impact on visual amenity.
Residents of Golubac – low sensitivity	The rising topography surrounding the village enclose views. The slopes support a mixture of cultivated fields rising up the valley sides, pasture and areas of deciduous forest, notably to the east and west on higher ground. Limited urban influences, but localised transmission distributor lines are present. Due to the intervening tree cover and buildings, clear views of the WTG worksites from the core of the settlement are considered unlikely. Filtered views of the worksites associated with the 110kV OHL may be possible, but are will result in a detectable but small change in the views from residential properties in the settlement. The minor magnitude of change will result in a minor and not significant impact on the visual amenity of the residents in the settlement.
Residents of Dvoriste – medium sensitivity	Relatively level topography and cultivated arable land use with limited tree cover affords open views from the edge of the settlement and surrounding fields. Urban influences including OHLs, paved roads and urban infrastructure are present. Very limited views of the construction activity other than possible temporary views of large scale construction traffic from the core of the settlement. Some outlying, isolated properties may have filtered views onto the Venac cluster construction works including widening road access. However, due to the intervening tree cover, clear views of the construction activity are considered unlikely. The construction activity associated with the proposed 110kV OHL to the south of the settlement (approximately 2km away) will introduce new features into the view but these will be inconspicuous as they will be seen in the context of the agricultural machinery and traffic present in the current view. The negligible magnitude of change will result in a negligible and not significant impact on visual amenity.
Residents of Snegotin – medium sensitivity	Relatively level topography and cultivated arable land use to the west with a stronger valley landform rising to the east. Tree cover and the rising topography encloses views from the edge of the settlement. Urban influences present, including OHLs. Very limited views of construction activity from the core of the settlement, apart from possible temporary views of large scale construction traffic. Some outlying, isolated properties may have filtered views towards the construction activity associated with the proposed 110kV OHL to the south of the settlement (less than 1km from the centre). The magnitude of change is considered to be negligible as the presence of construction plant will be seen in the context of the agricultural machinery and traffic in the current view. The negligible magnitude of change will result in a negligible and not significant impact on visual amenity.
Visitors to Tuman Monastery – high sensitivity	Relatively level topography and cultivated arable land use to the west with a stronger valley landform rising to the east. Tree cover and the rising topography encloses views from the edge of the settlement. Urban influences are visible including OHLs. Very limited views of the construction activity from the core of the settlement. The magnitude of change is considered to be negligible. The negligible magnitude of change will result in a negligible and not significant impact on visual amenity.
Visitors to the Đerdap National Park (main tourist attractions including monuments of culture including the fortress at Golubac) – high sensitivity	Strong valley topography together with woodland cover encloses views. Urban influences present including OHLs. The visitors will have temporary views of the construction traffic. No direct view of the Project (WTG or OHLs) expected from the Monastery. The magnitude of change is considered to be negligible, resulting in a negligible and not significant impact.
Visitors to the Iron Gates Natural Park (Romania) (viewing point on DN57)	Woodland cover and steep topography enclose and limit views from the south. The Moldova Noua wind farm close to Sfanta Elena in Romania is present in the view to the north. The construction activities associated with the WTGs and OHL will be screened from the majority of the national park and from the gorge area. The overall magnitude of change is considered negligible resulting in a negligible and not significant impact.
Visitors to the Iron Gates Natural Park (Romania) (viewing point on DN57)	Steep topography of the gorge encloses views to the south. The Golubac fortress is visible across the River Danube. A single telecommunications mast is visible on the skyline. Construction activities associated with the WTGs and OHL will be screened from the gorge area by the existing topography. The overall magnitude

Receptor	Construction impacts
towards the Golubac fortress) – high sensitivity	of change from the main tourist areas associated with the gorge is considered negligible resulting in a negligible and not significant impact.

4.2.3 Traffic and transport

4.2.3.1 Impact on road network from normal construction traffic

Apart from the transportation of WTG parts there will be an increase in vehicles to account for other materials required for construction and for the transportation of workers to site. It is envisaged that there will be at least 30 trucks per day (60 trips) for construction materials and other equipment. There will no workers' accommodation village on site and instead construction workers will be transported by bus from local towns. Although the exact origin of the construction materials and workers is not fully known, the increase in traffic movements on the Roads 33, 34 and 256 during construction is considered of moderate magnitude for the majority of the construction period due to the temporary nature of the change and there will be very few urban areas that Project vehicles will need to pass through. The roads do not currently hold heavy traffic and have sufficient capacity to absorb the additional journeys required for the Project. Given the relatively good conditions of the road network, the sensitivity of the local roads is low. This results in a minor adverse impact and is therefore not significant.

4.2.3.2 Impact on road network from oversized loads traffic

It is estimated that for one WTG, a total of 13 vehicle trips will be required to transport all its components. This results in 494 round-trips (to site and back again) of oversized vehicles on the road network. Due to the relatively good conditions of the existing road networks and the temporary exposure of heavy loads traffic during construction, the sensitivity of the road network is considered to be medium. The magnitude of the slow oversized vehicles on the road is considered to be moderate which results in a moderate adverse impact and is therefore significant without mitigation.

4.2.3.3 Impact of increased traffic on road safety

It is expected that the additional traffic flows from normal construction vehicles will result in a minor impact in traffic volumes and a moderate impact is expected to result from abnormal loads. It is important to note that the oversized vehicles transporting the WTG parts will transit at a low speed and will be at all times escorted by other smaller vehicles. Furthermore, with the new 5km of roads that will be built there will be very few urban areas that will be traversed. It is expected that the only urban or semi-urban areas expected to be crossed are the town of Majilovac and the outskirts of Radoševac. The sensitivity of road safety and community safety is low and the magnitude of the impact due to increase traffic movements along and through urban areas is considered to be moderate. This results in a minor adverse impact and is therefore not significant.

4.2.3.4 Impact on ports capacity

Pančevo Port has the ability to receive, handle and temporarily store all materials and WTG components if required. Similarly, the Smederevo Port has also the capacity to receive all materials and WTG components but the blades. The only benefit of the Smederevo Port is that it is located closer to site therefore reducing the distance of road journeys.

Both ports are designed to handle international trade and are equipped with facilities including barges, mobile heavy cranes and appropriate laydown/storage areas to hold WTG components. The sensitivity of the ports to accommodate and handle the Project materials and WTG is medium. The WTG parts constitute the larger and heavier loads that will need to be carefully handled and managed. The use of the ports to import WTG components into Serbia and logistics for onward transportation will be of moderate magnitude. Therefore, the impact of all materials going through the ports will result in a moderate adverse impact and therefore will be significant.

4.2.4 Noise

Temporary noise impacts are expected to arise during the construction phase mainly due to:

- Site preparation works
- Excavation and foundation works
- Erection of steel structures and reinforcement work
- Construction of buildings
- Delivery and installation of equipment

The key sensitive receptors to construction noise are identified as the scattered residential receptors in proximity to each WTG (refer to Table 11), and the settlements of Krivača and Snegotin who reside immediately adjacent to the haul routes for delivery and installation of equipment.

Construction noise impacts will mainly be associated with the operation of static and mobile items of plant. The inventory of plant to be brought to site is not certain at this stage, however a representative list of items has been compiled in Table 38 below, with reference to the British Standard (BS) 5228 'Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise' (2009+A1:2014) in order to assign reference noise levels to specific items of construction plant in the calculation of noise impacts.

Table 38: Main items of noise emitting plant expected to be used during construction and reference noise levels for the prediction of impacts

Activity	Main items of noise emitting plant	Reference noise level of a single item operating continuously LAeq,T dB at 10 m
Site preparation	Tracked excavator	78
	Dozer	81
	Dozer towing roller	81
	Dump truck	74
Excavation and foundation works	Concrete mixer and pump	80
	Tracked mobile crane	71
	Tracked excavator	78
	Dozer	81
Erection of steel structures and reinforcement works	Concrete mixer and pump	80
	Tracked mobile crane	71
	Tracked excavator	78
	Angle grinder	80
Concreting and construction of buildings	Tracked mobile crane	71
	Tracked excavator	78
	Dozer	81

Activity	Main items of noise emitting plant	Reference noise level of a single item operating continuously LAeq,T dB at 10 m
	Dozer towing roller	81
	Dump truck	74
Preparation, mixing and discharging of concrete	Concrete mixer	76

BS 5228 – 1:2009+A1:2014 provides comprehensive guidance on construction noise and vibration including details of typical noise levels associated with various items of plant or activities, prediction methods and measures and procedures that have been found to be most effective in reducing impacts. The guidance forms the basis for the majority of construction noise assessments in the United Kingdom and is widely recognised internationally.

The 'Example Method 2 – 5dB(A) Change' described in BS 5228 – 1:2009+A1:2014 states: "Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65dB, 55dB and 45dB LAeq,T from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect."

Based on this, Table 39 summarises the criteria used to determine the magnitude of impact of construction noise impacts.

Table 39: Criteria used for the assessment of construction noise impacts

Receptor sensitivity	Noise from construction alone LAeq,T dB		Magnitude of impact			
	Threshold	Negligible	Minor	Moderate	Major	
High and medium	Daytime T = 07:00 to 22:00	Night time T = 22:00 to 07:00	Threshold not exceeded	Threshold exceeded by less than 5dB for any duration	Threshold exceeded by 5dB or more for less than one month	Threshold exceeded by 5dB or more for one month or more
	65	45				

The methodology for the calculation of noise impacts presented in BS 5228 – 1:2009+A1:2014 has been used to predict the level of noise during each of the five main activities within the construction programme. The attenuation of sound between the Project sites (each WTG and proposed building) and the sensitive receptors assumes moderate screening and propagation over hard ground.

Table 40 below presents a summary of the noise impacts during each stage based on the groups of plant operating shown within the inventory of plant shown in Table 38 above. The assessment assumes worse case using the closest receptor which is approximately 500m from a WTG (T1-1).

Table 40: Results of construction noise impacts assessment

Activity	Received noise level LAeq,T dB free field
Site preparation	43
Excavation and foundation works	45
Erection of steel structures and reinforcement works	45
Concreting and construction of buildings	36

The highest received noise levels from construction works are predicted to be during the excavation and foundation works and erection of steel structures and reinforcement works. The

received noise levels from the works are calculated to be up to 45dB $L_{Aeq,T}$ free field at the closest receptor. In each of the four stages considered, noise levels from the works at the closest receptor fall below the 65dB(A) threshold for the daytime and just on the 45dB(A) threshold for the night-time. Noise levels at all other receptor positions will be lower.

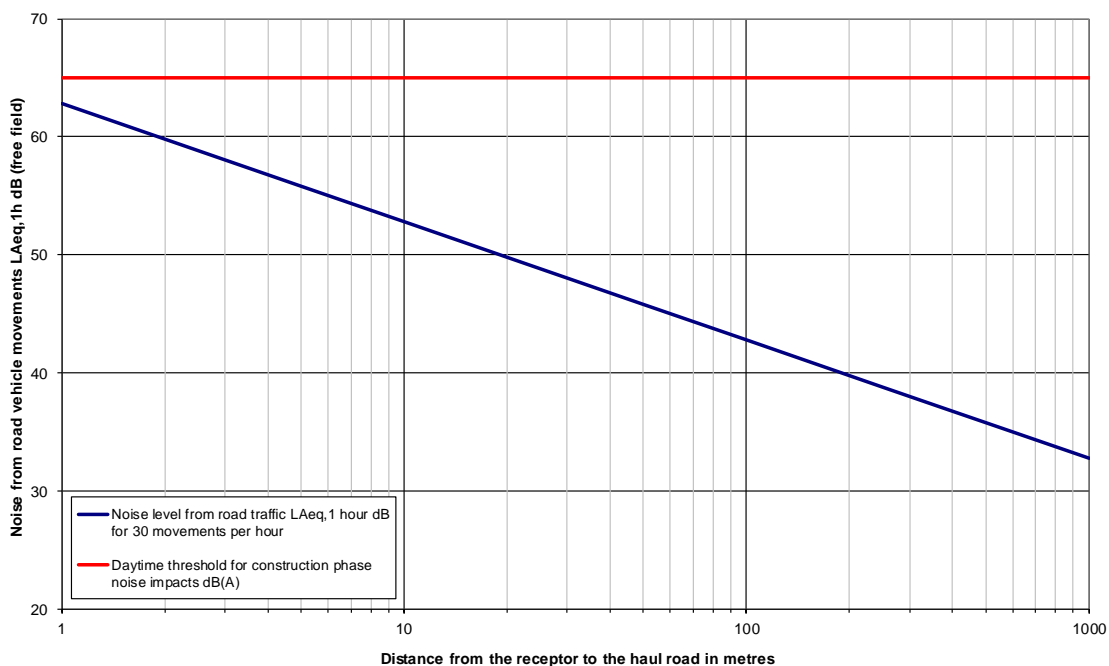
The frequency of road movements during the construction phase is assumed to reach a maximum frequency of 30 deliveries corresponding 60 vehicle movements. These would occur during the daytime period.

Figure 54 shows the calculated noise levels from the passage of 30 trucks per hour i.e. assuming, as a worst case, the arriving deliveries are made in a single one-hour period. The predicted noise level is presented as a function of distance from the road based on:

- Sound Power Level LWA for a heavy vehicle of 98 dB(A); and
- An average speed of 50 km/h in populated areas

The construction noise threshold of 65dB(A) for the daytime is included in the figure. This shows that the daytime limit would not be exceeded at receptors very close to the road i.e. no less than one metre from the road. The magnitude of impact at receptors beyond one metre from the road is assessed as Negligible during the daytime. However, it should be noted that baseline daytime noise levels at roadside receptors was found to be reasonably low (34.5 dB($L_{Aeq,15\text{ minutes}}$)) so the intermittent change in noise level may be relatively large.

Figure 54: Noise level ($L_{Aeq,1\text{ hour}}$ dB) during the daytime from 30 heavy vehicle movements per hour as a function of distance from the road



It is concluded that noise impacts due to works at WTG base positions are predicted to have a magnitude of impact of negligible at all receptors, assuming noisy works can be undertaken during the daytime. Noise from construction traffic is predicted to exceed the threshold for daytime noise impacts at receptors as close as one metre from the haul route. Residential receptors are assigned high sensitivity. Consequently, the assessment concludes the potential construction phase impacts are not significant in all cases.

4.2.5 Socio-economic impacts

The following section describes the socio-economic impacts associated with the Project construction activities, which have been grouped under the following headings:

- Impacts on land use
- Employment and procurement opportunities
- Impacts on livelihoods
- Impacts on community infrastructure

Impacts on community health, safety and security are addressed in section 4.2.6.2.

4.2.5.1 Impacts on land use

The total area of all three municipalities affected by the Project – Golubac, Kučevo and Veliko Gradište is 143,200ha. Most of the land is agricultural and forest land, however in Golubac and Kučevo where most of the construction will take place, less than 20% of agricultural land overall is used.

The total amount of land which will be occupied for the Project, during construction, is approximately 131ha, most of which is agricultural land and to a lesser extent forest land. This represents only 0.09% of the total area of all three municipalities (or 0.12% of the total area of Golubac and Kučevo). Approximately 73ha (56%) will only be temporarily occupied and available again for use after construction is completed.

The construction phase is expected to last approximately 27 months during which most of the land acquired for the WTG construction plateaus will be used, i.e. for WTG construction but also for roads, the 35kV OHLs and underground cables. For any land currently being farmed, this means that two to three season's crops will be affected. The construction period of the OHLs is approximately 12 months however an average plot may be unavailable for use for a period of only a few months, affecting one crop season at most.

The total land which will be unavailable for a short period during construction is only a small portion of land in the area. In addition, very little land is actively used for agricultural purposes and is mostly unused land. The sensitivity of individual users of land is medium as some may not have access to other land for farming. The magnitude of this impact is minor as it will affect a small number of people for a short period of time and therefore the significance of this impact is assessed as minor adverse.

Before construction, some of the existing roads will be upgraded and then used for the transport of materials, equipment and workers which will increase the amount of traffic in the construction area. During the upgrading of these roads, as well as due to increased traffic, particularly the presence of heavy vehicles, some of the local land users may have temporary difficulties accessing their plots of land. The sensitivity of individual farmers experiencing difficulties is medium, yet the magnitude of the impact is considered minor, as it may occur only occasionally for a limited number of individuals, under certain circumstances. The significance of this impact is therefore assessed as minor adverse.

The possibility of further impacts on livelihoods is discussed in section 4.2.5.3.

4.2.5.2 Employment and procurement opportunities

The workforce needed during the construction phase will be sourced locally (from the municipalities Golubac and Kučevo, including the directly affected local communities surrounding the Project site), nationally (from other parts of Serbia) and internationally.

It is estimated that 150 people will be employed in total during construction (refer to section 2.6.4). Due to the technical nature of the Project and the relatively low educational status of the local population, it is likely that skilled and semi-skilled labour will be sourced nationally and internationally. Therefore, only an estimated 20 to 30% (30 to 45 individuals) of the workforce may be locally sourced (primarily as unskilled labour), particularly from the municipalities Golubac and Kučevo. A preference will be given to residents of the affected communities surrounding the Project site, however the availability of working age population in these communities is low.

The total working age population (15 to 65) of Golubac and Kučevo is 13,574 and therefore the above translates to generation of employment for only 0.33% of the local population. The impact on a national level will be negligible. The impact will be significant only for those who are employed and their households, however this will be a very small portion of the total population. Employment opportunities will be short term, during construction, and this too reduces the significance of the impact.

On the other hand, the employment of local residents will be beneficial as it is expected to lead to improved relationships between the Project and local communities, improved local skill sets and limited influx of workers often associated with further negative impacts.

Due to the importance of new employment, particularly for local residents, their sensitivity is considered to be medium. However, due to the short term nature of employment and the small number of people who will benefit, the magnitude of the impact is considered minor. Therefore, the significance of the creation of direct employment opportunities is assessed as minor beneficial.

Indirect employment opportunities will be created in connection to the Project's supply chain (goods and services) and spending of Project employees in local communities.

Table 10 provides an overview of the main materials that will be procured locally, in Golubac and/or Veliko Gradište (concrete, sand, gravel, crushed stone, asphalt). All other available materials and services will also be procured locally whenever possible.

Employment of non-residents who will be present in the area, as well as the increase in incomes of local employees may bring in some minor benefits for local communities in the form of increased spending in local shops, restaurants and bars. Indirect employment is generally likely to provide more opportunities for women, however as the workers will not be accommodated on site, opportunities like catering and laundry services will likely not be needed directly.

There is not enough information in Serbia from similar projects to be able to estimate indirect employment opportunities and this impact will depend on the nature of the local economy, the availability of required goods and services in the Project area and ways in which employees choose to spend their wages. Taking into account that WTG components and other technical equipment will be procured internationally (or at best nationally), the short period of construction and the number of employment opportunities, the magnitude of the impact is considered minor. However, as the generation of any employment opportunities, including indirect ones, is important for local residents, their sensitivity is considered to be medium. The significance of impacts related to indirect employment are therefore assessed as minor beneficial.

Appointed construction contractors and suppliers will have to abide by the Serbian Law on Labour and other relevant legislation, which is largely aligned with international labour related requirements. As per PS2, Ivicom Energy will have to monitor that these requirements are being fulfilled. Any additional measures that must be undertaken will be described in the mitigation section 5.4.6.

4.2.5.3 Impacts on livelihoods

Land for the Project has been and will be acquired through voluntary sale purchase agreements for all components except for access and service roads, for which land is being acquired by the municipalities, using expropriation.

Due to the involuntary nature of the land acquisition for roads which is being carried out as per the Expropriation Law, persons who own the land plots which have been or will be acquired for the upgrading of existing and/or construction of new roads, as well as any non-owners using that land (formally and informally) may be economically displaced and their sensitivity is considered to be medium. The total area of all land plots affected by expropriation for roads is 1,195.76ha, while only 53.43ha (4%) are being acquired and will no longer be available for use. Considering that the area acquired from a single plot of land for upgrading and even construction of new roads is small and that use of land in the affected area for agriculture is not significant, as well as that renting or informal use of land is very rare, if at all present, the likelihood of economic displacement occurring for both owners and users of land is very low.

The construction of new roads however is often associated with the creation of orphan land, i.e. land which is left economically unviable after acquisition of a part of a plot, which could further lead to economic displacement. Under the Expropriation Law, such land has to be acquired at the request of the owner of land, however, in practice, such requests are sometimes refused by the expropriating authorities without proper assessments.

Due to all of the above, the magnitude of this potential impact is assessed as minor and the overall significance of possible impacts on livelihoods associated with expropriation for roads is assessed as minor adverse, but will require monitoring and mitigation.

Any damages to crops, trees or other assets for all Project components where land is acquired voluntarily (WTGs, OHL towers) or where land is not acquired but will be used as necessary and as allowed under national legislation (OHL construction corridor), have to be compensated at full market value. There is a possibility for some of that land to be used by persons who are not the owners of such land (formal or informal users). If they are not identified as the ones who are suffering the losses and compensation is paid to owners of the land instead, these users could be economically displaced by the Project. Again, taking into account, that use of land in the affected area for agriculture is not significant and that renting or informal use of land is very rare, if at all present in Project affected areas, the likelihood of economic displacement occurring is also very low. The magnitude of the impact is considered minor, as it will be short term and affect a small number of people (if any). Nevertheless, the impact on the individual user of land who does not receive compensation and whose sensitivity is considered medium, may be significant and therefore the impact has been defined as minor adverse and requires monitoring and mitigation.

Reduction of land available for agriculture is not expected to have any impact on livelihoods of those farming the land, due to the small scale of land take and the availability of other land in the area which could be acquired by affected people if they wish. Local residents do not depend on land for livelihoods and therefore their sensitivity is considered low. The magnitude of the impact is minor as it will be short term and affect a small number of people, if any. The significance of this impact is assessed as negligible.

Increased incomes generated through direct and indirect employment will have a beneficial impact on livelihoods in the local communities. The households whose members may be employed by the Project, as well as those who benefit indirectly from increased spending of these households and non-local employees, will have increased incomes and consequently an improved standard of living, which is why their sensitivity is considered medium. However due to

the minor magnitude of the impact because of the low number of employees, particularly local residents, and the short-term duration of construction, the significance of these impacts has been assessed as minor beneficial.

Transport and increased traffic are not expected to have significant impacts on livelihoods. Difficulties for local residents to access their land before and during construction will be occasional and impact individuals.

Transport of materials to and from site will be done mainly via state roads on which traffic volumes are moderate, frequented by heavy goods vehicles. The estimated increase in heavy traffic related to the Project is very low, as presented in Table 41 below. The estimated increase in heavy traffic on road 256, for which there is no available data on average daily traffic, is however expected to be more significant.

Table 41: Existing and planned truck traffic on roads to be used for the Project

Road No.	Average daily truck traffic	Average daily truck traffic for the Project	Increase of truck traffic per day
Road 14	5,393	60	1.11%
Road 33	3,363	60	1.78%
Road 34	1,034	60	5.80%
Road 256	information unavailable		
Total	9,790	60	0.61%

Source: Link 011 based on data from the Annual average daily traffic report 2016, Roads of Serbia

As the increase in traffic on state roads will be of a minor magnitude, businesses along transport routes, whose sensitivity is considered low, are not expected to suffer any income losses associated with Project transport and the significance of the impact is assessed as negligible. A greater increase in daily traffic on Road 256 is likely, however still considered to be of a minor magnitude as the impact will occur periodically during construction. This increase could particularly impact the few businesses on this road (e.g. restaurants near the Monastery Tuman), whose sensitivity is considered medium (as they do not generally operate near a busy road) and the significance of the impact on them is assessed as minor adverse, requiring monitoring and mitigation.

4.2.5.4 Impacts on community infrastructure

The upgrading of existing roads and construction of new ones will benefit the local population, including providing improved access to plots of land in remote locations. This impact has been recognised as being important for the local population, particularly for persons whose land currently is not accessible by roads and will be as a result of the Project, whose sensitivity is considered medium. The magnitude of the impact is however low and therefore its significance is assessed as minor beneficial.

On the other hand, damages to road surfaces during transport of heavy machinery, leading to damages to motor vehicles and road accidents, are also possible. Ivicom Energy will make necessary preparations of roads for heavy transport before construction and will maintain these roads during construction, which is why the magnitude of the impact is considered low. However, the sensitivity of the local population is considered to be medium, due to its dependence on local roads, which is why the significance of this impact has been assessed as minor adverse. In addition, if roads used during construction are not well maintained, this could lead to tensions between the Project and the local communities.

Utility infrastructure (water, electricity, sewerage) will be secured locally on the Project site and therefore the Project will not impact any community infrastructure during construction.

4.2.6 Health, safety and security

4.2.6.1 Occupational health and safety risks

Site preparation and construction activities pose several potential risks to the OHS of workers, if not managed appropriately. OHS risks related to the Project are outlined by component below.

Wind farm and general construction risks:

- Working at height will occur throughout construction and include hazards such as falling objects and adverse weather conditions such as high winds and low temperatures
- Working in remote locations
- Lifting operations will be a key component of the construction phase involving use of large, complex pieces of lifting equipment
- Rotating and moving equipment can cause injury or death from being trapped or struck by machinery parts
- Solid particles or liquid chemical sprays may cause eye injury or blindness
- Manual handling can result in ergonomic injuries.

OHLs and substations:

- Workers may be exposed to hazards from contact with live power lines
- Working in proximity to power lines presents the risk of higher exposure to electric and magnetic fields (EMFs)
- Working at height
- Exposure to chemicals including pesticides used for right of way (RoW) clearance and Polychlorinated biphenyl (PCB) in transformers and other electrical components

Access and service roads:

- There will be physical hazards including working in close proximity to moving vehicles, use of heavy machinery, exposure to adverse weather, potential for work in confined spaces such as trenches, falls from machinery and falling objects
- Chemical hazards will include exposure to dust, exhaust emissions, herbicide use and diesel fuel
- There is the potential for exposure to extremely high levels of noise from heavy equipment operation and proximity to traffic

Provided that the OHS risks within the construction phase are appropriately prevented, controlled and mitigated through management and mitigation measures described in section 5.2.7.1 they hold present a low risk to construction workers.

4.2.6.2 Community health, safety and security risks

The most common risks for community health, safety and security during construction are injuries resulting from unauthorised access to construction sites and vandalism, as well as accidents resulting from increased Project related traffic and use of heavy vehicles on local roads.

Any accidents involving local community members will have serious effects on the individual or his/her household and could cause tensions between local communities and the Project. However, provided that all common prevention and mitigation measures are appropriately

implemented, as described in section 5.2.7.2, the risk of injury for community members is assessed as low.

Temporary construction employment opportunities can sometimes cause an increase in vulnerability and susceptibility of local communities to increased crime and alcoholism. However, the overall small number of employment opportunities and the fact that even non-resident workers will be housed in larger towns such as Golubac and will commute to the Project site every day, it is expected that the risk of any local disturbances caused by workers will be negligible.

4.2.7 Other construction impacts

4.2.7.1 Cultural heritage

There are no protected cultural monuments within the Project area, or within the 1km study area. As a result, it is considered that there will be no impacts upon the fabric or setting of protected heritage assets as a result of Project infrastructure or construction activities.

There are four potential undesignated archaeological sites identified within the 1km study area, near to the two 19.4km routes of 110kV OHLs (refer to Figure 39). There is potential for one or more of these archaeological sites to extend into the area of construction works for the 110kV OHL tower foundations. However, the precise location, extent and nature of the archaeological sites remain unknown prior to further surveys. From the information held the identified sites have the potential to range from negligible to high heritage sensitivity. If archaeological remains are found to be present at the location of the Project construction works, this may result in a magnitude of impact of up to major adverse, resulting in a negligible to major adverse impact. If the archaeological sites lie outside the Project Area, then the impact will be negligible.

4.2.7.2 Air emissions

Refer to Volume III for a description of the methodology for the assessment of air emissions, including impact magnitude and receptor sensitivity descriptors.

Emissions of combustion related pollutants

Combustion-related pollutants may be emitted from construction vehicles and on-site construction plant. Emissions from on-site construction plant are not expected to be significant due to the low numbers required, the limited construction period and the rural nature of the Project site; nevertheless, best practice mitigation measures have been included in section 5 to minimise this impact.

Information provided by Ivicom Energy indicates that there will be 13 transports for each of the 38 WTGs which are phased across the construction period, and an approximate average of 30 trucks per day (60 vehicle movements) for construction materials, although there may be peaks in vehicle movements during certain periods. There will be no construction accommodation for the Project so workers will primarily be transported to the site by bus from nearby towns. Good practice guidance from the UK indicates that increases in vehicle movements below 200 per day are unlikely to be significant. Based on these estimated construction vehicle movements, the total number of movements is expected to be less than 200 per day even during peak periods, and therefore not anticipated to have significant impacts on air quality.

It is unknown at present whether concrete will be batched on site or off site however it has been assumed that the transport of concrete or the materials required to batch concrete on site has been included within the estimate of trucks accessing and egressing site per day. In addition,

considering the remote location of the Project, it is considered likely that existing concentrations of road-traffic pollutants are low and therefore any additional vehicle trips associated with the Project will not have a significant impact on air quality. Construction traffic has therefore not been assessed further. However, best practice mitigation measures to reduce vehicle emissions are provided in section 5. The impact of dust suspension on roads as a result of vehicle movements is considered under 'construction dust' below.

Construction dust

Construction activities can result in temporary impacts from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns. The nature of the area and the activities to be carried out means that emissions of construction dust are predominantly associated with the larger fraction of this range which do not penetrate far into the respiratory system. Therefore, the primary air quality issue associated with construction phase dust is normally loss of amenity and/or nuisance caused by, for example soiling of buildings.

The major sources of dust emissions from the Project are likely to include, amongst others:

- Generation of dust due to earthworks, clearing of land and general construction activities
- Suspension of dust from earthworks and stockpiles
- Dust suspension from vehicular movement on unpaved roads

Receptor sensitivity

A number of residential properties are located close to existing access roads that will be upgraded as part of the Project. The surrounding area comprises predominantly agricultural land and some of the Project infrastructure (such as WTG location T3-7 and T1-15) are located within 200m of the National Park boundary. The receptors identified and their classification (in accordance with the criteria defined in Table 11 and Table 13 in Volume III) are presented in Table 42.

Table 42: Receptor sensitivity

Construction activity	Receptor type	Distance from source	Receptor sensitivity
Upgrading the existing access roads and construction of new access roads	Residential	0-50m	Medium
	Agricultural land	0-50m	Medium
Construction of crane pads and foundations	Residential	200-500m	Low
	National Park	100-200m	Low
	Agricultural land	0-50m	Medium
Construction and installation of WTG	Residential	200-500m	Low
	National Park	100-200m	Low
	Agricultural land	0-50m	Medium
Construction of substation, transmission towers and OHLs	Residential	100-200m	Low
	Agricultural land	0-50m	Medium

Taking a 'worst case' approach of applying the highest receptor sensitivity to each construction activity, the receptor sensitivity is considered to be 'medium' for all activities.

Impact magnitude

The likely duration, dust raising potential and overall impact magnitude for each of the construction activities are presented in Table 43.

Table 43: Construction activities and associated impact magnitude

Description of works	Key activities	Dust raising potential	Duration	Impact magnitude
Upgrading the existing access roads and construction of new access roads	Earthmoving Land/vegetation clearance Transport and handling of soil/materials Re-suspension of dust on unsurfaced roads	Medium	> 3 months	Moderate
Construction of crane pads and foundations	Earthmoving Open excavation Preparation of materials (cutting, grinding) Transport of materials to and within site Re-suspension of dust on unsurfaced roads	High	< 3 months (per location)	Moderate
Construction and installation of WTG	Transport of materials within site Construction of pre-fabricated components Preparation of materials (cutting, grinding) Re-suspension of dust on unsurfaced roads	Low	> 3 months	Minor
Construction of substation, transmission towers and OHLs	Earthworks Wind suspension of exposed soil Transport of materials along OHL route and access road Construction and assembly of pre-fabricated components Preparation of materials (cutting, grinding) Re-suspension of dust on unsurfaced roads	Medium	> 3 months	Moderate

Taking the dust raising potential and the duration of the works into account, the magnitude of dust impacts is considered to be 'moderate' for the access roads, transmission and distribution infrastructure and construction of the crane pads and foundations and 'minor' for the installation of the WTG.

Significance

In accordance with the significance matrix presented in section 1.10.1.3, dust impacts during construction of the crane pads and foundations, access roads and transmission and distribution infrastructure are described as moderate adverse. Impacts described moderate are considered to be significant. Dust impacts during WTG installation are described as minor adverse and are therefore not considered to be significant.

To mitigate potentially significant impacts, appropriate good practice dust mitigation measures have been presented in section 5.2.8.2.

4.2.7.3 Water resources

There are no planned direct discharges from the site to surface water or effluent systems. However, installation of the WTG foundations, underground cables, access roads, OHL towers and other ancillary facilities could cause impacts to surface water, effluent and land and ground quality. These activities could pollute surface waters through accidental release of contaminated water from de-watering excavations, exposed ground, spoil heaps, roads or vehicle washing. Leakage or spillage of fuels, oils or chemicals have potential to pollute both soils and water.

Construction activities may expose ground, increasing potential for soil erosion which can result in increased sediment in surface waters.

The sensitivity is considered low because the ground and water have some capacity to absorb emissions and there are reasonable opportunities for mitigation. The magnitude is considered minor because the impact could cause a detectable but small change to the conditions. As such the significance of each impact is considered negligible and not significant.

4.3 Operational impacts

4.3.1 Ecology and nature conservation

In this section the impacts, in the absence of mitigation, associated with the operation of the Project on the ecological features within the AoI are evaluated using the assessment criteria defined in section 1.10. A summary of the impacts is presented in Table 44 and discussed below.

Table 44: Operational impacts summary

Feature	Increased access to Protected Areas*	Displacement	WTG Collision*	OHL Collision
Protected areas	Moderate adverse	N/A	N/A	N/A
Mammals (excluding bats)	N/A	Minor adverse	N/A	N/A
Bats	N/A	Minor adverse	Minor adverse	N/A
Western Barbastelle	N/A	Moderate adverse	Moderate adverse	N/A
Birds	N/A	Minor adverse	Major adverse	Minor adverse
Ural Owl	N/A	Moderate adverse	N/A	Minor adverse
European Turtle Dove	N/A	Moderate adverse	N/A	Minor adverse
Peregrine Falcon	N/A	N/A	Minor adverse	Minor adverse
Hen Harrier	N/A	N/A	Minor adverse	Minor adverse

*Significant impacts denoted by bold type

4.3.1.1 Increased access to protected areas

The proposed access and service road improvements will increase vehicle access to the protected areas (Derdap National Park, IBA, IPA, PBA), which in turn may increase illegal tree logging, hunting/poaching, resource exploitation, tourism, and general habitat degradation. The magnitude of this impact is minor because the increased access will be at one end of the long and narrow protected area, and there is already access into the protected area via a road running alongside the River Danube. Given the high sensitivity of the protected area, the resulting impact is moderate and significant.

4.3.1.2 Displacement

Displacement and the loss of habitat resulting from species avoiding the wind farm and its surrounding area due to WTG operation and maintenance or visitor disturbance is known for birds⁷⁰⁷¹, bats⁷² and mammals⁶⁴.

Mammals (excluding bats)

For mammals of low sensitivity within the WTG cluster areas the predicted risk of displacement will be a detectable but small change. The magnitude of the impact is therefore considered to be moderate, resulting in a minor adverse impact that is not significant.

Bats

The displacement of bats from wind farms is not universal, with the abundance of some species increasing while others decrease (⁷²). Taking a precautionary approach, it is assumed that all bat species will be displaced but the impact is likely to be detectable but non-fundamental. The magnitude of the impact on bats (low sensitivity) is therefore considered to be moderate, with a minor adverse impact (not significant), except for western barbastelle (medium sensitivity) where the impact will be moderate adverse and significant.

Birds

Habituation in birds has not conclusively been proven⁷² and notable bird species, European turtle dove and Ural owl (medium sensitivity) are not known to be sensitive to displacement⁷³⁷⁴). The bird species present within the WTG cluster areas are not considered to be susceptible to displacement, therefore displacement is likely to be a detectable but small change. The magnitude of the impact is therefore considered to be minor, resulting in a negligible to minor adverse impact that is not significant.

4.3.1.3 Collision

Bats and birds are widely known to collide with operational WTGs⁷¹⁷² and OHLs (birds only)⁷⁵. Furthermore, bats are known to suffer from barotrauma related mortality caused by rapid air-pressure reduction near moving WTG blades⁷⁶.

Bats

Species of high to medium collision risk were recorded although activity was generally low across the WTG cluster areas with no evidence of the presence of a migration route.

⁷⁰ Scottish Natural Heritage, 2016. Wind farm impacts on bird guidance. [online] Available at: <<http://www.snh.gov.uk/planning-and-development/renewable-energy/onshore-wind/windfarm-impacts-on-birds-guidance/>> [Accessed on 18 January 2017].

⁷¹ Hötter, H., 2006. The impact of repowering of wind farms on birds and bats. [online] Available at: <https://bergenhusen.nabu.de/imperia/md/nabu/images/nabu/einrichtungen/bergenhusen/projekte/windenergie/impact_of_repowering.pdf> [Accessed on 18 January 2017].

⁷² Hötter, H., et al, 2006. Impacts on biodiversity of exploitation of renewable energy sources: the example of birds and bats. [online] Available at: <http://eolien-biodiversite.com/IMG/pdf/englischemwindkraftstudie_1252510701.pdf> [Accessed on 18 January 2017].

⁷³ Steinborn, H., et al, 2015. Impact of Wind Turbines on Woodland Birds: Results of a three year study in Germany. [pdf] Available at: <http://www.arsu.de/sites/default/files/steinborn_impact_of_wind_turbines_on_woodland_birds.pdf> [Accessed on 18 January 2017].

⁷⁴ Langstone, R.H.W. & Pullen, J.D., 2003. Windfarms and Birds: An analysis of the effects of windfarms on birds, and guidance on environmental assessment criteria and site selection issues. [pdf] Available at: <<https://wcd.coe.int/com.intranet.InstraServlet?command=com.intranet.CmdBlobGet&IntranetImage=1713295&SecMode=1&DocId=1441704&Usage=2>> [Accessed on 18 January 2017].

⁷⁵ BirdLife International, 2007. Position Statement on Birds and Power Lines: On the risks to birds from electricity transmission facilities and how to minimise any such adverse effects. [pdf] Available at: <http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/BHDTF__Position_Power_Lines_and_birds_2007_05_10_.pdf> [Accessed on 18 January 2017].

⁷⁶ Baerwald, E.F., et al, 2008. Barotrauma is a significant cause of bat fatalities at wind turbines. *Current Biology* 18(16): R695–R696.

The predictions of the magnitude of bat mortality at operational wind farms is known to be poor⁷⁷. Taking the precautionary approach collision mortality for bats (low sensitivity) is likely to result in a detectable and fundamental change. The magnitude of the impact is considered to be moderate, resulting in a minor adverse impact (not significant) except for western barbastelle (medium sensitivity) where the magnitude of the impact is moderate and significant.

Birds

A collision risk analysis of flight activity over the period of 12 months⁷⁸ demonstrated that the predicted levels of mortality from the operational WTGs for species vulnerable to collision was very small, with the respective populations likely to be able to maintain their population status.

For peregrine falcon, considered to be of high sensitivity because of the nationally significant population present, mortality is predicted to occur once every 50 years. For hen harrier, which are considered to be of medium sensitivity because of its European near threatened status and unknown national trend, mortality is predicted to occur once every 100 years.

For common and widespread species (low sensitivity) such as common buzzard, northern raven, kestrel and European honey buzzard, higher rates of mortality than for peregrine falcon and hen harrier are predicted. The mortality rates range from three birds per annum for common buzzard to one bird every eight years for European honey buzzard which are likely to result in changes in population size.

For peregrine falcon and hen harrier (medium sensitivity), collision mortality is likely to result in a detectable but small change. The magnitude of the impact is therefore considered to be negligible, resulting in a minor adverse impact that is not significant.

For common and widespread species (low sensitivity), collision mortality is likely to result in a fundamental change. The magnitude of the impact is therefore considered to be major, resulting in a moderate adverse impact that is significant.

A low level of flight activity was recorded at collision risk height in relation to the 100kV OHL. The impact is therefore considered to be minor for all species, with a negligible to minor adverse impact that is not significant.

4.3.2 Landscape and visual

The Project will consist of 31 WTGs, grouped into four clusters with an additional seven locations for potential future expansion/alternative positioning. The infrastructure supporting the wind farm include on-site substation, OHLs connecting the on-site substation to existing substations at Neresnica and Veliko Gradište, an underground MV electrical collection system, 20.6km of access roads, 20km of service roads, and new line bays at the existing substation at Neresnica and Veliko Gradište.

Operational impacts will include:

- Presence of WTGs, plant and equipment introducing large scale and urban elements into an undeveloped rural setting (note changes to tranquillity will be discussed in the noise and traffic sections - 4.3.3 and 4.3.6.1, respectively)
- Presence of OHLs and towers in a rural and undulating landscape changing the landscape character

⁷⁷ Lintott, P.R., et al, 2016. Ecological impact assessments fail to reduce risk of bat casualties at wind farms. *Current Biology* 26(21): R1135–R1136.

⁷⁸ Mott MacDonald, 2017. Krivaca Wind Farm Collision Risk Assessment Report (2015-2016)

- Permanent presence of widened and paved road replacing existing forest roads introducing a more prominent and urbanising element into a rural setting
- Changes in the overall landscape character and visual amenity as a result of the above

4.3.2.1 Impact on land use

The extent of expected permanent landtake for the WTG foundations, substation and OHL tower foundations is relatively small. The total extent of new roads will be 20.8km which would be a small area of landtake. The impact on land use is considered negligible.

4.3.2.2 Landscape impact

The presence of the Project elements including the WTGs and OHLs will not directly affect the steep wooded gorge LCA; the closest WTGs to the border of the Đerdap National Park will be the Debelo brdo cluster at 147 m away and the Venac cluster at 212 m away (as reported in the national EIA). The WTG clusters will be located in the wooded hillsides and plateau LCA. The 110kv OHLs cross both the wooded hillsides and plateau and the cultivated river valleys LCAs. The 110kV towers are expected to be between 38m and 40m in height. The presence of the WTGs will introduce large scale structures into a rural setting. A total of 21km of access roads (16km of upgrading current roads, and 5km of new roads) will be used for accessing the site and the key Project features. A total of 20km of service roads (4.2km of upgraded existing roads and 15.8km of new roads) will be used for servicing the site. The access roads will be unsurfaced, largely utilising existing forest and other roads. The substation includes associated support areas, administrative buildings, power lines, internal roads, green areas and water management and telecommunications infrastructure.

Table 45: Landscape impacts during operation

Receptor	Impacts during operation
Steep wooded Gorge LCA – a high sensitivity LCA, recognised nationally as the designated Đerdap National Park and characterised by the relative lack of development, high level of tranquillity, extensive vegetation cover and a wilderness quality.	Indirect impacts include the presence of WTGs close to the Đerdap National Park boundary, which will locally reduce tranquillity. The impacts will be localised and will not directly affect the key landscape elements and cultural features of the national park. The overall magnitude of change is considered to be negligible due to a very minor loss of landscape elements (tranquillity) affecting a very small proportion of the character area. The overall significance of impact is considered to be negligible and not significant.
Wooded Hillsides and Plateau LCA – a medium sensitivity LCA, with limited areas of development including scattered farmsteads, villages and road corridors. These areas are characterised by the presence of small scale arable fields associated with farmsteads, open pasture and areas of forest cover and a medium level of tranquillity.	Direct impacts include the selected permanent clearance of existing vegetation to accommodate the plateau areas for the 31 WTGs, OHL towers and new access roads, which will be localised. The undulating topography and presence of woodland areas will tend to contain the impacts to localised areas within the wider LCA. The presence of the large scale WTGs will reduce tranquillity locally and the removal of woodland areas will increase the influence of urbanising elements. The presence of the WTGs, OHLs and access roads in the LCA will be prominent new elements that alter the character of the landscape. The overall magnitude of change is considered to be moderate due to a partial alteration to landscape features resulting in non-fundamental permanent change. The overall significance of impact is considered to be moderate adverse and significant.

Receptor	Impacts during operation
Cultivated River Valleys LCA – a low sensitivity LCA, with larger settlements, paved roads, some overhead power lines set in a wide level valley area. The predominant land use is extensive arable cultivation with limited tree and forest cover.	Direct impacts include the clearance of selected areas of existing woodland to accommodate the OHL towers. The WTGs will be visible from parts of the LCA. The presence of the Project elements will introduce urbanising influences resulting in a minor loss of landscape elements and additions of new features that will not alter the overall character of the LCA. The overall significance of impact is considered to be negligible and not significant.

4.3.2.3 Visual amenity impact

A viewshed has been modelled using Vestas V126-3.3 MW GridStreamer-3,300 WTG and a viewshed analysis was undertaken using the visibility toolset in ArcMap. The WTGs are 117m to the hub and 130m to the edge of the wing tip. The modelled viewshed is reproduced in Figure 15, Volume III. The 30km viewshed includes the proposed 110kV and 35kV OHLs and substation element in Krivača.

The topography within the study area is dynamic and complex to the north and east of the Aol where the nature of the landform limits the visual envelope. The more open land cover and wider valley landform to the west afford more opportunities to view the Project elements. It should be noted that this the viewshed has been generated using bare earth data sets (see methodology in section A2, Volume III) and does not take into account the presence of existing buildings or vegetation which may limit visibility.

From the site visit and meeting with the officers from the National Park, there were no known sensitive receptors identified in the National Park that fall within the predicted viewshed analysis. The Đerdap gorge and the key cultural elements in the park are concentrated along the river corridor, where the steep gorge topography and wooded landuse screen the Project from view.

A wireline image from the highest point in Krivača village of the typical view towards the Debelo brdo cluster from an outlying village property to the north east of the centre of Krivaca is illustrated in Figure 16, Volume III. It should be noted that this does not include any tree cover or other screening elements illustrated in the typical view in Figure 52.

Figure 55: Typical view towards the Debelo brdo cluster from an outlying village property to the north east of the centre of Krivaca



Source: Mott MacDonald 2016

Table 46: Visual impacts during operation

Receptor	Operational impacts
Residents of Radenka village – medium sensitivity	The rising topography surrounding the village encloses views. The slopes support a mixture of small cultivated fields, pasture and areas of deciduous forest. A small number of new WTGs and associated infrastructure will be visible from the centre of the settlement. Some outlying, isolated properties on the higher ground will have distant views towards the Rakobarski vis cluster. The closest receptor will be approximately 3.1km from WTG T4-6. The presence of the Project elements including WTGs and associated infrastructure will result in a very minor loss of features and additions of new features that do not alter the overall quality of the views. The magnitude of change is considered negligible resulting in a negligible and not significant impact.

Receptor	Operational impacts
Residents of Krivača Village – medium sensitivity	The relatively steep rising topography surrounding the village encloses views. Limited urban influences present but localised transmission distributor lines are present and a single telecommunications mast to the east of the village. A small number of new WTGs and associated infrastructure will be visible from the centre of the settlement. Some outlying, isolated properties on the higher ground will have close (the closest receptor will be approximately 0.5km from T1-1) but partly filtered views due to the presence of tree cover and outbuildings towards the Venac clusters, notably T1-1 and T1-2 and the 110kV and 35kV OHL. The Debelo brdo cluster will be less visually intrusive due to the screening impact of tree cover, rising topography and the greater distance between the nearest receptors and the cluster. The closest receptor will be approximately 1km from WTG T3-5. A wire line has been produced from the highest point in Krivača village in the direction of Debelo brdo reproduced in Figure 16, Volume III. A small number of new WTGs will be visible from the centre of the village. Views from individual outlying properties close to the proposed WTGs T1-1 and T1-2 will be possible (note these locations are reserve locations). However, they will be partially filtered by existing vegetation and outbuildings. Overall the magnitude of change is considered to be moderate resulting in a moderate adverse and significant impact.
Residents of Rakova Bara village – medium sensitivity	The rising topography surrounding the village encloses views. The slopes support a mixture of cultivated fields rising up the valley sides, pasture and areas of deciduous forest, notably to the east and west on higher ground. Limited urban influences present, but localised transmission distributor lines are visible. Due to the intervening tree cover and buildings, only a small number of new WTGs will be visible from the centre of the village. Filtered views of the new 110kV OHL will be possible but are considered to result in a detectable but small change in the views from residential properties in the settlement. The minor magnitude of change will result in a minor and non- significant.
Residents of Golubac – low sensitivity	Relatively level topography and cultivated arable land use with limited tree cover affords open views from the edge of the settlement and surrounding fields. Urban influences present include OHLs, paved roads and urban infrastructure. A small number of new WTGs will be visible from the core of the settlement. Some outlying, isolated properties may have filtered views onto the Venac cluster and associated infrastructure. However, due to the intervening tree cover, there are few clear views of the Project elements. The new 110kV OHL to the south of the settlement (approximately 2km distant) will be visible in filtered views. They will be seen in the context of the OHL and urbanising elements of the existing views. The negligible magnitude of change will result in a negligible and not significant.
Residents of Dvoriste - medium sensitivity	Relatively level topography and cultivated arable land use to the west with a stronger valley landform rising to the east. Tree cover and the local rising topography enclose views from the edge of the settlement. Urban influences present include OHLs. A small number of new WTGS on the mountain ridges will be possible from the core of the settlement. Some outlying, isolated properties might have filtered views towards some new WTGs and associated infrastructure including the 110kV OHL to the south of the settlement (less than 1km from the centre of the settlement). The OHL will be seen in the context of the OHL and urbanising elements of the existing views. The negligible magnitude of change will result in a negligible and not significant.
Residents of Snegotin – medium sensitivity	Relatively level topography and cultivated arable land use to the west with a stronger valley landform rising to the east. Tree cover and rising topography encloses views from the edge of the settlement eastwards. Urban influences present include OHLs. A small number of new WTGs will be visible over the ridgeline filtered the existing vegetation from the core of the settlement. The magnitude of change is considered to be negligible resulting in a negligible and not significant impact.
Visitors to Tuman Monastery– high sensitivity	Strong valley topography together with woodland cover encloses views. Urban influences present include OHLs. No direct view of the Project (WTG or OHLs) expected from the Monastery. The magnitude of change is considered to be negligible resulting in a negligible and not significant impact.
Visitors to the Đerdap National Park (main tourist attractions including monuments of culture including the fortress at Golubac) – high sensitivity	Woodland cover and steep topography enclose and limit views from the south. The Moldova Noua wind farm has a WTG close to Sfanta Elena in Romania that is visible in the view to the north. A small number of WTGs will be seen from the national park, however, these will be distant views from and seen against hill slopes and existing vegetation. The majority of the Project elements will be screened from most of the national park and from the gorge area. The overall magnitude of change to views from the main tourist areas associated with the gorge are considered negligible resulting in a negligible and not significant impact.

Receptor	Operational impacts
Visitors to the Iron Gates Natural Park (Romania) (viewing point on DN57 towards the Golubac fortress) – high sensitivity	Steep topography of the gorge encloses views to the south. The Golubac fortress is visible across the River Danube. A single telecommunications mast is visible on the skyline. A small number of WTGs will be visible from the national park across the River Danube, however, they will be views from a distance and against hill slopes and existing vegetation. The majority of the Project elements will be screened from the national park and from the gorge area. The overall magnitude of change from the main tourist areas associated with the gorge will be negligible resulting in a negligible and not significant impact.

Source: Mott MacDonald

4.3.3 Noise

The assessment of operational noise impact of the WTGs uses criteria developed with reference to:

- The EHS Guidelines for Wind Energy (2015) which states under section 2.1.2 ‘Noise Monitoring’ that “*Noise impacts should not exceed the levels presented in the General EHS Guidelines.*”
- Section 1.7 ‘Noise’ of the General EHS Guidelines (2007)

The Guidelines note that “*Noise impacts should not exceed the levels presented in Table 1.7.1, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off site*”. Table 1.7.1 of the Guidelines is reproduced in Table 47 below.

Table 47: Table 1.7.1 of the IFC Noise Level Guidelines

Receptor	One Hour L _{Aeq} (dBA)	
	Daytime 07:00 – 22:00	Night-time 22:00 – 07:00
Residential; institutional; educational†	55	45
Industrial; commercial	70	70

Source: Section 1.7 Noise of the General EHS Guidelines

In order to determine the magnitude of impact, the criteria summarised in Table 48 have been used.

Table 48: Assessment criteria for operational noise

Criteria	Magnitude of Impact at each wind speed			
	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Received noise level due to WTG operation	Up to and including the IFC guideline noise level		Above the IFC guideline noise level	
Change in ambient L _{Aeq} dB	Not more than 3dB	More than 3dB	Not more than 3dB	More than 3dB

The overall predicted noise levels due to the operation of the turbines do not exceed 45 dB(A) at any receptor at any wind speed. The calculated change in ambient noise levels varies and is generally more than 3 dB at low wind speeds. As wind speeds and background noise levels increase, the change in ambient noise levels due to the project decreases. Consequently, the magnitude of impact due to operational noise is assessed as either Negligible or Minor Adverse depending on receptor and wind speed. Table 49 and Table 50 present the results of worst-affected receptor, Receptor J, for daytime and night-time respectively.

It is concluded that unmitigated impacts due to the operation of the 31 primary WTGs are predicted to comply with the IFC Noise Level Guidelines and the impacts at all receptors are assessed as Not Significant.

Table 49: Receptor J – daytime

Measurement	6 m/s	7 m/s	8 m/s	9 m/s	10m/s
Turbine noise	44.2	44.9	45.0	45.0	45.0
Baseline LA90 dB daytime (LT1)	32.6	36.2	39.7	43.0	45.8
Baseline LAeq dB daytime	34.6	38.2	41.7	45.0	47.8
Overall LAeq dB	44.6	45.7	46.7	48.0	49.6
Change dB	+10.1	+9.3	+8.3	+7.0	+5.4
Magnitude of impact	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse

Table 50: Receptor J – night-time

Measurement	6 m/s	7 m/s	8 m/s	9 m/s	10m/s
Turbine noise	44.2	44.9	45.0	45.0	45.0
Baseline LA90 dB daytime (LT1)	29.5	33.2	37.0	40.9	44.5
Baseline LAeq dB daytime	31.5	35.2	39.0	42.9	46.5
Overall LAeq dB	44.4	45.3	46.0	47.1	48.9
Change dB	+12.9	+10.1	+6.9	+4.2	+2.3
Magnitude of impact	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Negligible

4.3.4 Socio-economic impacts

The following section describes the socio-economic impacts associated with the operation of the Krivača wind farm, grouped under the following headings:

- Impacts to land use
- Employment and procurement opportunities
- Impacts on livelihoods
- Revenue generation for the local government/community and local development
- Impacts on community infrastructure

Impacts on community health, safety and security are addressed in section 4.3.5.2.

4.3.4.1 Impacts on land use

Approximately 73ha of land previously occupied for construction will become available for use again. The sensitivity of individual users of land is medium however the magnitude of this impact is minor as it will affect a small number of people and as a result the significance of this impact is assessed as minor beneficial.

The remaining 58ha (44%) will remain unavailable during the operation of the wind farm and will be re-zoned to construction land. This includes land occupied by the WTG towers, OHL towers, the substation and O&M building, as well as access and service roads. Of the total area of all three municipalities which is 143,200ha, this represents only 0.04% (0.05 % of land of Golubac and Kučevo). That, together with the fact that agriculture is not very developed in the area, leads to the magnitude of the impact being minor. However the sensitivity of individual users of land is medium, and as a result, the significance of this impact has been assessed as minor adverse.

Land within the protection zone of the OHLs (50m for the 110kV and 30m for the 35kV) and the 35kV underground cables (2m), will be subject to some use restrictions during operations. Owners of this land are prevented from constructing structures and planting trees in accordance with Serbian legislation. However, OHLs are being constructed outside of residential zones, which means that no construction land (on which structures can be built) will be affected. Agricultural use of land in the protection zone will still be allowed and therefore the restrictions are not expected to have a significant impact on land use. The magnitude is considered minor and the sensitivity of users of land is considered low, resulting in the impact being assessed as negligible.

Impacts on livelihoods are discussed in section 4.3.4.3 below.

4.3.4.2 Employment and Procurement Opportunities

A very small workforce of up to 12 employees will be needed during operations (refer to section 2.7). While the stability of long term employment will have a significant beneficial effect on the lives of these individuals and their households, whose sensitivity is medium, this number is very low making the magnitude negligible and resulting in the significance of this impact being assessed as negligible.

Indirect employment may occur as a result of increased spending of those employed by Ivicom Energy, however since this number is so low, this is also assessed as a negligible impact. The procurement of local goods and services is also likely to be minimal and have a negligible impact on local economies. In both cases the receptors' sensitivity (local residents/communities) is considered medium, however the magnitude of the impacts is negligible, as they will benefit a very small number of people.

4.3.4.3 Impacts on livelihoods

During the operational phase, crops may be damaged or lost on land within the protection zone of the OHLs and underground cables, during maintenance and repairs. Damages and lost crops will be compensated at full market value and any disturbed land will be fully reinstated, as required by national legislation, which is why the magnitude is considered to be low. The sensitivity of users of land who are impacted is also low, as their livelihoods are not land based and the affected areas are very small, which is why the significance of this impact is assessed as being negligible.

As land temporarily acquired for construction becomes available for use again (73ha), those who farm this land could experience an increase in incomes. However, due to the small area of land being regained by an individual owner/user whose sensitivity is assessed as being low, as well as the general lack of agricultural activities in the area making the magnitude minor, this impact is assessed as negligible.

4.3.4.4 Revenue generation for the local government/community and local development

Golubac and Kučevo municipality are expected to have the greatest direct benefit from the Project, through collection of annual taxes being paid for all land converted to construction land and lease of municipal land.

The details on the type and amount of direct benefits for the municipalities were unavailable at the time of developing this ESIA addendum. A representative of municipal authorities in

Golubac⁷⁹ (where direct benefits will be largest) estimated that this contribution could be between 5 and 10% of the municipal budget annually.

The contribution to municipal budgets of Golubac and Kučevo will be extremely important, as they are among the least developed municipalities in Serbia. These revenues will allow the municipalities to make important investments and will most likely improve the delivery of certain services to citizens, particularly in terms of infrastructure improvements, including for local communities surrounding the Project site. As the detail of the amount of direct benefits for each of the municipalities is unknown at present the magnitude is considered to be either minor or moderate. Due to the importance of any budget revenues for these municipalities, their sensitivity is considered to be medium and therefore the impact is assessed as minor or moderate beneficial.

During baseline data collection, several of the interviewed stakeholders (refer to section 3.4.1) mentioned that the construction of the wind farm may be accompanied by increased tourism in the area, particularly as it may be among the first wind farms to be constructed in Serbia. The area has some tourist infrastructure i.e. hotel, private accommodation and restaurants, however the existing infrastructure must be improved to attract significant tourism. The area is characterised by beautiful nature and that, together with other attractions such as the Golubac fortress, may represent a potential for further development of tourism. The wind farm alone is unlikely to stimulate tourism in the area further contributing to local economic development, which is why magnitude is considered to be negligible and although the sensitivity of local municipalities can be considered to be medium, the impact significance has been assessed as negligible.

Ivicom Energy has already provided some support to various local activities and initiatives in the area of infrastructure improvements, sports, education, culture, hunting/beekeeping and tourism⁸⁰, and will continue to do so throughout the life of the Project, by implementing the community investment plan (see section 6.7). The presence of Ivicom Energy and the implementation of the Project may contribute to attracting new investments in the municipality and the wider area, fostering local economic development. The sensitivity of the receptors, i.e. local communities is considered to be medium, however at present the magnitude is considered to be minor with potential to grow to moderate, which is why the significance of these impacts is assessed as minor with potential to grow to moderate beneficial, once implementation begins.

4.3.4.5 Impacts on community infrastructure

Ivicom Energy will carry out regular maintenance of upgraded and constructed access roads needed to access WTGs for repairs and maintenance and magnitude is considered minor. Significance is assessed as being minor beneficial for local owners' access to their plots of land, whose sensitivity is characterised as medium.

The water supply, sewerage and electricity supply will be secured locally for the substation and O&M building and there will be no negative impacts on community infrastructure.

⁷⁹ Mayor of Golubac, meeting held in September 2014.

⁸⁰ From 2010 to the end of 2016, over 37,000 EUR were donated to various local institutions, associations and organisations.

4.3.5 Health, safety and security

4.3.5.1 Occupational health and safety risks

Operational activities present similar OHS risks as the construction phase. Additional risks during operations are outlined below for each component of the Project.

Wind farm and general operational risks

- Wind WTG collapse and blade shear or breakage potentially caused by poor maintenance, brake failure or extreme wind conditions
- Potential damage to blades and electrical equipment by lightning strikes leading to fire or blade loss

OHLs and substations

- Exposure to chemicals including pesticides used for RoW maintenance and PCBs in transformers and other electrical components

Provided that the OHS risks are appropriately prevented, controlled and mitigated through management and mitigation measures described in section 5.3.6.1 they present a low risk to the operational workforce.

4.3.5.2 Community health, safety and security risks

Risks associated with community health, safety and security during operations include those associated with:

- Frosting and ice shed
- Blade shear or breakage
- WTG collapse
- Lightning strike and fire
- Issues associated with unauthorised access and vandalism

The risk of frosting and ice build-up leading to ice throw and potential injuries is considered to be low as the areas around WTGs are unlikely to be occupied during cold periods (e.g. for agriculture) and the closest residential dwelling is 500m away from the WTGs (T1-1 and T1-2), which is further than the IFC recommended guidance (1.5 x WTG height, which is 180m). The risk of ice falling directly from the WTGs and causing injuries is also considered low, provided that the local population is made aware of this risk.

Occurrences of blade shear or breakage, WTG collapse and fire of WTGs are extremely rare and due to the distance to the nearest residential dwelling and the low likelihood of persons occupying areas near the WTGs in conditions that could cause such occurrences, the risk of injury is considered low. Fire may be associated with the substation, however as it is located in a remote location and will have a fire protection system, the risk of injury from substation fire is considered low.

Lightning strikes to WTGs are inevitable, however it is expected that with the state of the art design there is little potential for damage caused by lightning, which could further lead to injury. The risk is considered low.

There will be no enclosing fence around the WTGs, however unauthorised access into the WTGs will not be possible, as the tower access doors will be locked. The substation and O&M building will be fenced and locked and there will be onsite security present. The risk of injury from unauthorised access is considered low.

Any accidents involving local community members will have serious effects on the individual or his/her household and could cause tensions between local communities and the Project. However, provided that all common prevention and mitigation measures are appropriately implemented, as described in section 5.3.6.2, the risk of injury for community members is considered low.

4.3.6 Other operational impacts

4.3.6.1 Traffic and transport

Vehicle movements during operations will be very limited and relate to routine inspections of the WTGs and ad hoc maintenance activities. Therefore impacts due to transport and traffic are not considered during operations.

4.3.6.2 Cultural heritage

It is envisaged that the operation of the Project will not impact known cultural monuments or archaeological sites.

4.3.6.3 Air quality

Emissions to air will only originate from vehicles accessing the site to perform maintenance. Vehicle numbers will be very low and impacts in air quality will be negligible and therefore not significant.

4.3.6.4 Water resources

There are no planned discharges from the Project to surface water or the drainage system during operation. There is no pathway between surface water or drainage systems and areas that will store oils or hazardous materials. As such it is likely that any releases will be accidental, with the greatest risk posed by maintenance activities. If there is a release, it is likely to be small in volume. During the operational phase, storage and handling of oils and chemicals could lead to spill or leakage to ground or water.

The sensitivity is considered low because the ground and water have some capacity to absorb emissions and there are reasonable opportunities for mitigation. The magnitude is considered minor because the impact could cause a detectable but small change to the conditions. As such the significance of the impact is considered negligible and not significant.

4.3.6.5 Electric and magnetic fields and electromagnetic interference

Electric fields are created by voltage. The higher the voltage, the stronger the electric field will be. Electric fields are present even if current is not flowing and are measured in volts per metre (V/m). Magnetic fields are created when electric current flows. As current increases, so does the magnetic field. The strength of the magnetic field changes with power consumption but the electric field strength will remain constant⁸¹. Magnetic fields are measured in units of gauss (G) or tesla (T), where 1T equals 10,000G. Electric fields can be shielded by materials that conduct electricity and other materials for example trees and buildings but magnetic fields are difficult to shield and pass through most materials. Both electric and magnetic fields decrease rapidly with distance. Power frequency electromagnetic field (EMF) is typically in the range of 50 – 60 Hertz (Hz), and is considered 'Extremely Low Frequency'.

⁸¹ <http://www.who.int/peh-emf/about/WhatisEMF/en/>

There is some concern over the potential health impacts of EMF, although there is no empirical data to show adverse impacts from OHLs and other power infrastructure. However, there is sufficient reason for concern and the EHS Guidelines stipulate that mitigation should be applied to reduce exposure of the public to EMFs.

Electromagnetic interference (EMI) is interference caused by an electromagnetic disturbance affecting the performance of a device, transmission channel, or system. It is also called radio frequency interference when the interference is in the radio frequency spectrum. The corona of OHL conductors and high frequency currents of OHLs may result in the creation of radio noise. Typically, OHL RoW and conductor bundles are created to ensure radio reception at the outside limits remains normal. However, periods of rain, sleet or freezing rain sharply increases the streaming corona on conductors and may affect radio reception in residential areas near OHLs.

Operational activities could lead to television and telecommunication interference, especially during periods of bad weather.

A secondary issue related to EMI is intentional EMI (IEMI) which is a recognised threat to power infrastructure from hackers or terrorism, carried out to cause disruption to power networks and civil society⁸².

The magnitude of impacts related to EMFs, EMI and IEMI is considered to be minor as changes are unlikely to occur or will occur rarely and will be temporary, generally affecting only a few receptors. The sensitivity of receptors is medium as people living close to power infrastructure will have limited capacity to move to avoid impacts or perceived impacts but mitigation can be incorporated into the design. The resultant significance is minor and therefore not significant, however the Project's detailed design will need to consider risks relating to EMFs, EMI and IEMI and incorporate appropriate mitigation to reduce these as far as reasonably practical.

4.3.6.6 Shadow flicker

Mott MacDonald has recommended the inclusion of a shadow flicker assessment as part of the ESIA addendum in line with the EHS Guidelines on Wind Energy and due to the close proximity of the WTGs to permanent residential receptors. This aspect of the ESIA was outside of our initial scope and it is understood that shadow flicker assessment will be undertaken separately for the Project.

4.4 Closure and decommissioning impacts

4.4.1 Ecology and nature conservation

The impacts are considered to be of the same magnitude as construction related impacts as described in section 4.2.1.

4.4.2 Landscape and visual

It is expected that the vegetation pattern will change over the intervening period and the proximity of sensitive visual receptors to the Project during decommissioning may differ from those described in the baseline. However, based on the information available, the impacts are of the same magnitude as construction related impacts as described in section 4.2.2.

⁸² Radsy and Savage, 'Intentional Electromagnetic Interference (IEMI) and Its Impact on the U.S. Power Grid', 2010, retrieved from http://www.futurescience.com/emp/ferc_Meta-R-323.pdf, January 2017

4.4.3 Traffic and transport

The traffic and roads impacts during the decommissioning phase are likely to mirror the impacts identified for the construction phase, therefore these are not assessed separately. The mitigation and monitoring measures to manage and reduce the impacts are described in section 5.2.4 and 5.4.5 below.

4.4.4 Noise

Decommissioning of the Project is expected to comprise:

- End of life decommissioning works
- Temporary worksite decommissioning
- Existing infrastructure decommissioning
- Site reinstatement works

The noise impacts associated with these works are likely to be similar in magnitude to those generated during the construction phase but of shorter duration. Furthermore, it is expected that the proximity of sensitive receptors to the Project during decommissioning will differ from those described in the baseline. It is not meaningful to assess potential noise and vibration impacts so far in advance as the requirements for mitigation cannot be adequately identified. Therefore, the significance of impacts due to noise and vibration specifically during decommissioning has not been assessed quantitatively. However, based on the assessment of noise from construction impacts the potential for significant adverse impacts is assessed as low.

4.4.5 Socio-economic impacts

Socio economic impacts associated with decommissioning activities will be similar to those during the construction phase, apart from the considerably reduced impact on land use.

In summary, impacts to land use, impacts on livelihoods and employment and procurement opportunities, include the following:

- The total amount of land which will be permanently lost for use beyond operation of the wind farm is approximately 56ha (substation, OHLs and roads). The dismantling of the WTGs will free up only 1.52ha. The sensitivity of local users of land is determined as being low, while the magnitude of these impacts is considered to be minor, resulting in the significance of impacts being assessed as negligible.
- The dismantling of WTGs, disposal of materials and reinstatement of land will generate some direct and indirect employment opportunities. A part of those opportunities will be available for local people. The sensitivity of individuals who will get employment is medium, however the magnitude is minor, as in the construction phase, which is why this impact is assessed as minor beneficial.
- During decommissioning, involuntary resettlement, possibly leading to economic displacement may occur for persons who are using the land plots disturbed during dismantling and transport of WTGs and site clearance, whose crops may be affected. The sensitivity of individually affected land users is medium, while the magnitude of the impact is considered minor. The significance of the impact is assessed as minor adverse.
- The increase in heavy traffic for decommissioning (minor magnitude), may have an impact on businesses along Road 256, whose sensitivity is considered medium, resulting in this impact being assessed as minor adverse.

Impacts on community health, safety and security are addressed in section 4.4.6.2

4.4.6 Health, safety and security

4.4.6.1 Occupational health and safety risks

Potential OHS risks posed by the closure and decommissioning phase of the Project are similar to those of the previous phases, refer to sections 4.2.6.1 and 4.3.5.1. Provided that the decommissioning phase OHS risks are appropriately prevented, controlled and mitigated through management and mitigation measures described in section 5.2.7.1 they present a low risk to the workforce decommissioning the Project components.

4.4.6.2 Community health, safety and security risks

As with the construction phase, the most common risks for community health, safety and security during decommissioning are injuries resulting from unauthorised access to construction sites and vandalism, as well as traffic accidents (refer to section 4.2.6.2). Any accidents involving local community members will have serious effects on the individual or his/her household and could cause tensions between local communities and the Project.

However, provided that all common prevention and mitigation measures are appropriately implemented, as described in section 5.2.7.2, the risk of injury for community members is considered low.

4.4.7 Other closure and decommissioning impacts

4.4.7.1 Cultural heritage

Decommissioning of the Project is not expected to have an impact upon the known cultural heritage resources because the activities associated with decommissioning will be confined to areas previously impacted during the construction phase of the Project.

4.4.7.2 Air quality

Impacts during decommissioning are expected to be of the same nature and similar in magnitude to those predicted for the construction phase.

4.4.7.3 Water resources

Decommissioning impacts are likely to be similar to those experienced during construction. There will be no planned direct discharges from the site to surface water or effluent systems. However, decommissioning of the facilities could cause impacts to surface water, effluent and land and ground quality. These activities could pollute surface waters through accidental release of contaminated water from de-watering excavations, exposed ground, spoil heaps, roads or vehicle washing. Leakage or spillage of fuels, oils or chemicals have potential to pollute both soils and water. Decommissioning activities may expose ground, increasing potential for soil erosion which can result in increased sediment in surface waters.

The sensitivity of each impact is considered low because the ground and water have some capacity to absorb emissions and there are reasonable opportunities for mitigation. The magnitude is considered minor because the impact could cause a detectable but small change to the conditions. As such the significance of each impact is considered negligible adverse and not significant.

4.5 Rapid cumulative impact assessment and transboundary impacts

4.5.1 Introduction

It is important to consider the potential cumulative impact of Krivača wind farm with other wind farms that may be developed within the area at the same time as the Project. According to the spatial plans for Kučevo and Golubac Municipalities, the River Danube region and Branicevo District, wind farms are planned in these areas but the locations have not been specified and projects have not been defined. Therefore, cumulative impacts related to the construction of multiple wind farms during a short period of time (such as those that could have been related to transport of materials and availability of the workforce) have been scoped out of further study. The following sections discuss the cumulative impacts of the existing Moldova Noua wind farm in Romania on birds, bats, landscape and visual amenity.

4.5.2 Cumulative impact on birds and bats

The Moldova Noua wind farm has been subjected to a post construction cumulative impact assessment at the request of the European Investment Bank (EIB)⁸³ (EIB, 2012). This has not been available for review and therefore a quantitative cumulative impact assessment in respect of birds, bats and the integrity of the Munții Almăjului - Locvei SPA and Porțile de Fier SCI is not feasible.

Habitat loss will be appropriately compensated and therefore no cumulative impacts are reasonably foreseeable in the long term. No migratory corridor for birds or bats has been identified on the Project site and therefore cumulative barrier impacts are not likely to arise.

A determination of the magnitude of cumulative impacts related to collision mortality and displacement should be made after the completion of the proposed operational monitoring. After the completion of the monitoring the appropriate level of mitigation for birds and bats can be implemented to avoid significant impacts alone and in-combination.

4.5.3 Cumulative impact on landscape and visual

The Moldova Noua wind farm is already built and operational in Romania and the potential cumulative impacts on landscape resource and visual amenity are discussed below. GLVIA⁸⁴ indicate that cumulative impacts are “...the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together”. Cumulative landscape impacts are defined as “...effects that can impact on either the physical fabric or character of the landscape, or any special values attached to it” and cumulative visual impacts are “...effects that can be caused by combined visibility, which occurs where the observer is able to see two or more developments from one viewpoint...”.

The assessment of cumulative landscape and visual impacts follows the same assessment methodology as set out in section A2, Volume III and is applied to those viewpoints and LCAs where the proposed Project will be seen in combination with, or is intervisible with an existing development. Intervisibility depends upon general topography, aspect, elevation, distance and tree cover, built development or other visual obstruction.

⁸³ EIB, 2012. Environmental and Social Data Sheet. Available at: <<http://www.eib.org/infocentre/register/all/54954184.pdf>> Accessed on 9 February 2017

⁸⁴ Guidelines for Landscape and Visual Impact Assessment, Landscape Institute, I.E.M.A. 2013

The Moldova Noua wind farm is located on a plateau to the north of a steeply rising landform above the River Danube. Although the wind farm is within the Iron Gates Natural Park, the landscape to the north west of the Moldova Noua wind farm already includes mineral industrial areas and settlements. The EIA produced for the Moldova Noua wind farm⁸⁵ did not identify significant adverse effects on landscape and visual receptors. The landform is complex and consequently fragments the combined ZTV (illustrated in Figure 17, Volume III) of the existing and proposed wind farms to the north and east. Additional receptors have been considered within the cumulative assessment to discuss the impact along the River Danube corridor which were not considered in the earlier assessment as they will not experience significant impacts from the Project alone. The combined impacts of the two wind farms on the landscape resource are discussed below.

The Steep Wooded Gorge LCA will not be directly affected through the presence of both wind farms. Indirect impacts might result in reduced tranquillity locally through the presence of the WTGs in an area valued for its wilderness quality. The overall magnitude of change is considered to be negligible due to a very minor loss of landscape elements (tranquillity) affecting a very small proportion of the character area. The overall significance of impact is considered to be negligible and not significant.

The landscapes of the Moldova Noua and Krivača wind farms are similarly characterised by Wooded Hillsides and Plateau features, although the Romanian site has more elements of urban intrusion (particularly to the west of the Moldova Noua site) than the Krivača location. The presence of the WTGs, OHLs and access roads in the Wooded Hillsides and Plateau LCA will be prominent new elements that alter the character of the landscape, however, the strong gorge landform of the River Danube corridor physically separates the areas, reducing the combined urbanising influences of the wind farms. The overall impacts on landscape character are not considered to differ from the assessment of the Krivača wind farm in isolation. The overall magnitude of change is considered to be moderate resulting in non-fundamental permanent change. The overall significance of impact is considered to be moderate adverse and significant.

The combined presence of the WTGs and OHLs will be apparent in a number of areas of the LCA however, the intervening woodland and topography reduces the combined urbanising influences of the wind farms, resulting in a minor loss of landscape elements and the addition of new features that will not alter the overall character of the LCA. The overall magnitude of change is considered to be minor, resulting in a detectable but small change to the key landscape elements. The overall significance of the impact is considered to be negligible and not significant.

The ZTV for the Moldova Noua and proposed wind farm were modelled to predict the extent of potential intervisibility as illustrated in Figure 17, Volume III. The ZTV was modelled using bare earth data and as such will over-estimate the visibility of the developments. The combined visibility of both wind farms is predicted to include areas mainly to the northwest over the lower lying landform, along the River Danube and on higher ground to the south and west where the tips of the blades may be visible. The main settlement areas tend to be concentrated in the lower lying areas close to the River Danube and in the valley areas. Consequently, both Projects will be visible along the River Danube corridor as elements on the skyline where intervening features such as buildings and tree cover are absent.

⁸⁵ IMPACT ASSESSMENT REPORT, The ENVIRONMENT for investment: "WIND PARK, CONNECTING to SEN St. Helena" • Coronini, Caras Severin County, January 2010

There will be limited intervisibility along the scenic and more remote roads, on both sides of the River Danube and east of Golubac Fortress. Krivača WTGs will not be visible from the fortress due to the steep landform rising upwards from the river.

The modelling indicates that residents in Golubac may be able to view both wind farms from areas within the settlement in succession (not within the same field of view without the observer having to turn their heads). From more distant settlements to the west such as Veliko Gradište, receptors may be able to view the wind farms in combination (within the observers' arc of vision at the same time without moving their heads). Selected receptor viewpoints are discussed below where there is potential intervisibility.

Table 51: Cumulative visual amenity impacts

Receptor	Operational impacts
Residents of Golubac – low sensitivity	Relatively level topography and cultivated arable land use with limited tree cover affords open views from the edge of the settlement and surrounding fields. Urban influences are present including OHLs, paved roads, and urban infrastructure. There are limited views of the WTGs from the core of the settlement. Some outlying properties may have filtered views towards the Krivača and Moldova Noua WTGs on the skyline. The wind farms will not be seen in combination but will be visible in succession, resulting in a detectable but small change in the views from residential properties in the settlement. The minor magnitude of change will result in a negligible and not significant impact.
Visitors to the Đerdap National Park (main tourist attractions including monuments of culture including the fortress at Golubac) – high sensitivity	Woodland cover and steep topography encloses and limits views from the south. The Moldova Noua wind farm close to Sfanta Elena in Romania is in part of the view north but the modelling indicates limited intervisibility of both wind farms. With the presence of existing tree cover this is expected to be negligible. The overall magnitude of change from the main tourist areas associated with the gorge are considered negligible resulting in a negligible and not significant impact.
Visitors to the Iron Gates Natural Park (Romania) (viewing point on DN57 towards the Golubac fortress) - high sensitivity	The steep topography of the gorge encloses views from the south. The Golubac fortress is a main focal point, visible across the River Danube. A single telecommunications mast can be seen on the skyline. The modelling indicates that there may be some intervisibility of the WTGs from the natural park. However, existing vegetation is likely to filter and screen views. Occasional sequential views may be possible but these are very limited from the gorge area. The overall magnitude of change from the main tourist areas associated with the gorge are considered negligible resulting in a negligible and not significant impact.
Residents of Veliko Gradište – low sensitivity	Medium sized town with extensive single storey residential areas to the south. Built elements screen most views and consequently views towards the WTGs will be limited. From the edge of the settlement, elements of the two wind farms may be seen on the skyline in combination, but more likely to be seen in succession, but at approximately 20km distance. The WTGs will appear small, but noticeable elements in the view resulting in a minor magnitude of change resulting in a negligible and not significant impact.
Residents of Moldova Veche – low sensitivity	Medium sized town with residential areas to the south and east. Relatively low lying and gently rolling topography. Views from within the settlement are limited by surrounding built elements and existing vegetation. From the edge of the settlement, elements of the two wind farms may be seen on the skyline in combination. The WTGs will be small, but noticeable elements in the view, resulting in a minor magnitude of change resulting in a negligible and not significant impact.
Residents of Sfanta Elena – medium sensitivity	Small settlement set on a plateau area with some open views to surrounding undulating landform. The Moldova Noua wind farm is located to the south east of the settlement and visible from the outskirts and from locations within the settlement, but these tend to be framed and filtered by existing buildings and vegetation. The Krivača wind farm will be visible on the skyline to the south from some locations – again filtered and screened by existing elements. The Moldova Noua WTGs will be the dominant elements in the view and the Krivača WTG will be subservient in the background. The overall magnitude of change will be minor, resulting in a minor adverse and not significant impact.

4.6 Summary of impacts without mitigation

Table 52 below shows a summary list of the sensitivity, magnitude and significance of all of the identified impacts.

Table 52: Summary of impacts without mitigation

Impact	Sensitivity	Magnitude	Significance	Significant?
Construction impacts				
Ecology - habitat loss, degradation and fragmentation				
Protected areas	High	Negligible	Negligible	Not significant
Habitats	Low/medium	Minor	Negligible/minor adverse	Not significant
Forest	Medium	Medium	Minor adverse	Not significant
Flora	Low	Moderate	Minor adverse	Not significant
Mammals (except bats)	Low	Moderate	Minor adverse	Not significant
Bats	Low	Moderate	Minor adverse	Not significant
Western Barbastelle	Medium	Moderate	Moderate adverse	Significant
Birds	Low	Moderate	Minor adverse	Not significant
Ural Owl	Medium	Moderate	Moderate adverse	Significant
European Turtle Dove	Medium	Moderate	Moderate adverse	Significant
Reptiles	Low	Moderate	Minor adverse	Not significant
Amphibians	Low	Moderate	Minor adverse	Not significant
Invertebrates	Low	Moderate	Minor adverse	Not significant
Ecology - disturbance				
Mammals (except bats)	Low	Moderate	Minor adverse	Not significant
Bats	Low	Moderate	Minor adverse	Not significant
Western Barbastelle	Medium	Moderate	Moderate adverse	Significant
Birds	Low	Moderate	Minor adverse	Not significant
Ural Owl	Medium	Moderate	Moderate adverse	Significant
European Turtle Dove	Medium	Moderate	Moderate adverse	Significant
Reptiles	Low	Moderate	Minor adverse	Not significant
Amphibians	Low	Moderate	Minor adverse	Not significant
Invertebrates	Low	Moderate	Minor adverse	Not significant
Ecology - incidental mortality				
Mammals (except bats)	Low	Moderate	Minor adverse	Not significant
Bats	Low	Moderate	Minor adverse	Not significant
Western Barbastelle	Medium	Moderate	Moderate adverse	Significant
Birds	Low	Moderate	Minor adverse	Not significant
Ural Owl	Medium	Moderate	Moderate adverse	Significant
European Turtle Dove	Medium	Moderate	Moderate adverse	Significant
Reptiles	Low	Moderate	Minor adverse	Not significant
Amphibians	Low	Moderate	Minor adverse	Not significant
Landscape and visual				
Landscape – steep wooded gorge LCA	High	Negligible	Negligible	Not significant
Landscape – wooded hillsides and plateau LCA	Medium	Moderate	Moderate adverse	Significant

Impact	Sensitivity	Magnitude	Significance	Significant?
Landscape – cultivated river valleys LCA	Low	Minor	Negligible	Not significant
Visual amenity – Radenka village	Medium	Negligible	Negligible	Not significant
Visual amenity – Krivača village	Medium	Moderate	Moderate adverse	Significant
Visual amenity – Rakova Bara village	Medium	Minor	Minor adverse	Not significant
Visual amenity – Golubac	Low	Negligible	Negligible	Not significant
Visual amenity – Dvoriste	Medium	Negligible	Negligible	Not significant
Visual amenity – Snegotin	Medium	Negligible	Negligible	Not significant
Visual amenity – Tuman Monastery	High	Negligible	Negligible	Not significant
Visual amenity – Đerdap National Park	High	Negligible	Negligible	Not significant
Visual amenity – Iron Gates Natural Park	High	Negligible	Negligible	Not significant
Traffic and transport				
Impact on road network from normal construction traffic	Low	Moderate	Minor adverse	Not significant
Impact on road network from the movement of oversized load traffic	Medium	Moderate	Moderate adverse	Significant
Impacts of increased traffic during construction on road safety	Low	Moderate	Minor adverse	Not Significant
Impacts on ports capacity	Medium	Moderate	Moderate adverse	Significant
Noise				
WTG base construction	High (residential receptors)	Negligible (below daytime threshold of 65 dB(A) at the closest receptor)	Negligible	Not Significant
Road traffic	High (residential receptors)	Negligible (below daytime threshold of 65 dB(A) at the closest receptor assuming the 30 daily deliveries occur in one hour)	Negligible	Not Significant
Socio-economic				
Loss of land	Low	Moderate	Minor adverse	Not significant
Difficulties to access land	Low	Minor	Minor adverse	Not significant
Direct employment opportunities	Medium	Minor	Minor beneficial	Not significant

Impact	Sensitivity	Magnitude	Significance	Significant?
Indirect employment opportunities	Medium	Minor	Minor beneficial	Not significant
Loss of livelihoods from expropriation for roads	Medium	Minor	Minor adverse	Not significant
Loss of livelihoods from lost crops or damages	Medium (users of land)	Minor	Minor adverse	Not significant
Loss of livelihoods from loss of land	Low	Minor	Negligible	Not significant
Increased incomes from employment	Medium	Minor	Minor beneficial	Not significant
Loss of livelihoods from transport and traffic	Medium (businesses on road 256)	Minor	Minor adverse	Not significant
Improved access to land from roads	Medium	Minor	Minor beneficial	Not significant
Damages to road surfaces causing accidents	Medium	Minor	Minor adverse	Not significant
Cultural heritage				
Potential archaeological sites along route of 110kV OHL	Negligible to high	Negligible to major	Negligible to major adverse	Uncertain
Air quality				
Dust emissions during construction of the crane pads and foundations	Medium	Moderate	Moderate adverse	Significant
Dust emissions during construction of the access roads and transmission and distribution infrastructure	Medium	Moderate	Moderate adverse	Significant
Dust emissions during installation of WTG	Medium	Minor	Minor adverse	Not significant
Emissions of combustion-related pollutants from on-site plant and vehicles	Medium	Minor	Minor adverse	Not significant
Water resources				
Spill or leakage to ground or water	Low	Minor	Negligible	Not significant
Spills of sewage to ground or water	Low	Minor	Negligible	Not significant
Discharge of contaminated water	Low	Minor	Negligible	Not significant
Increased erosion and sedimentation	Low	Minor	Negligible	Not significant
Operational impacts				
Ecology – increased access to protected areas				

Impact	Sensitivity	Magnitude	Significance	Significant?
Protected areas	High	Moderate	Moderate adverse	Significant
Ecology – displacement				
Mammals (except bats)	Low	Moderate	Minor adverse	Not significant
Bats	Low	Moderate	Minor adverse	Not significant
Western Barbastelle	Medium	Moderate	Moderate adverse	Significant
Birds	Low	Minor	Minor adverse	Not significant
Ural Owl	Medium	Moderate	Moderate adverse	Significant
European Turtle Dove	Medium	Moderate	Moderate adverse	Significant
Ecology – WTG collision				
Bats	Low	Moderate	Minor adverse	Not significant
Western Barbastelle	Medium	Moderate	Moderate adverse	Significant
Birds	Low	Major	Major adverse	Significant
Peregrine Falcon	Medium	Negligible	Minor adverse	Not significant
Hen Harrier	Medium	Negligible	Minor adverse	Not significant
Ecology – OHL collision				
Birds	Low	Minor	Minor adverse	Not significant
Ural Owl	Medium	Minor	Minor adverse	Not significant
European Turtle Dove	Medium	Minor	Minor adverse	Not significant
Peregrine Falcon	Medium	Minor	Minor adverse	Not significant
Hen Harrier	Medium	Minor	Minor adverse	Not significant
Landscape and visual				
Landscape – steep wooded gorge LCA	High	Negligible	Negligible	Not significant
Landscape – wooded hillsides and plateau LCA	Medium	Moderate	Moderate adverse	Significant
Landscape – cultivated river valleys LCA	Low	Minor	Negligible	Not significant
Visual amenity – Radenka village	Medium	Negligible	Negligible	Not significant
Visual amenity – Krivača village	Medium	Moderate	Moderate	Significant
Visual amenity – Rakova Bara village	Medium	Minor	Minor	Not significant
Visual amenity – Golubac	Low	Negligible	Negligible	Not significant
Visual amenity – Dvoriste	Medium	Negligible	Negligible	Not significant
Visual amenity – Snegotin	Medium	Negligible	Negligible	Not significant
Visual amenity – Tuman Monastery	High	Negligible	Negligible	Not significant
Visual amenity – Đerdap National Park	High	Negligible	Negligible	Not significant

Impact	Sensitivity	Magnitude	Significance	Significant?
Visual amenity – Iron Gates Natural Park	High	Negligible	Negligible	Not significant
Noise				
WTG noise	High (residential receptors)	Negligible and Minor Adverse depending on receptor and wind speed	Negligible to Moderate	Not significant
Socio-economic				
Availability of land for agricultural and other use	Medium	Minor	Minor beneficial	Not significant
Permanent loss of land for agricultural and other use	Medium	Minor	Minor adverse	Not significant
Impacts on land use as a result of use restrictions	Low	Minor	Negligible	Not significant
Direct and indirect employment opportunities	Medium	Negligible	Negligible	Not significant
Loss of livelihoods from lost crops during repairs and maintenance	Medium	Negligible	Negligible	Not significant
Increased incomes from availability of land for use	Low	Negligible	Negligible	Not significant
Revenue generation	Medium (Golubac and Kučevo)	Minor or moderate	Minor or moderate beneficial	Significant
Increased tourism	Low	Negligible	Negligible	Not significant
Local benefits through the community investment plan	Medium	Minor with potential for moderate	Minor with potential for moderate beneficial	Significant
Improved access to land from maintained roads	Medium	Minor	Minor beneficial	Not significant
Air quality				
Emissions of combustion-related pollutants from plant and vehicles	Medium	Negligible/low	Negligible	Not significant
Water resources				
Pollution of surface waters and soils; increased sedimentation	Low	Minor	Negligible	Not significant
EMFs, EMI and IEMI				
Risks related to EMFs, EMI and IEMI	Medium	Minor	Minor	Not significant
Closure and decommissioning impacts				
Ecology – as per construction impacts				
Landscape and visual – as per construction impacts				
Traffic and transport – as per construction impacts				

Impact	Sensitivity	Magnitude	Significance	Significant?
Noise – as per construction impacts				
Socio-economic – as per construction impacts				
Air quality– as per construction impacts				
Water resources – as per construction impacts				
Cumulative impacts				
Birds and bats – to be reviewed after operational monitoring				
Landscape and visual				
Landscape – steep wooded gorge LCA	High	Negligible	Negligible	Not significant
Landscape – wooded hillsides and plateau LCA	Medium	Moderate	Moderate adverse	Significant
Landscape – cultivated river valleys LCA	Low	Minor	Negligible	Not significant
Visual amenity – Golubac	Low	Minor	Negligible	Not significant
Visual amenity – Đerdap National Park	High	Negligible	Negligible	Not significant
Visual amenity – Iron Gates Natural Park	High	Negligible	Negligible	Not significant
Visual amenity – Veliko Gradište	Low	Minor	Negligible	Not significant
Visual amenity – Moldova Veche	Low	Minor	Negligible	Not significant
Visual amenity – Sfanta Elena	Medium	Minor	Minor adverse	Not significant

5 Management and mitigation

5.1 Introduction

This section describes the management, mitigation and enhancement measures required to manage the Project's impacts and to execute the Project to meet the IFC PSs and EHS Guidelines. Section 5.4.9 summarises the management, mitigation and enhancement measures and identifies the residual impacts when mitigation has been applied. All of the measures identified are included within the Framework ESMP, which constitutes Volume IV of the ESIA.

The Framework ESMP should be used to prepare more detailed management plans, applicable to the phase of the Project. The appropriate plans would be as follows:

- Construction – construction environmental and social management plan (C-ESMP)
- Operations – operational environmental and social management plan (O-ESMP)
- Closure and Decommissioning – decommissioning environmental and social management plan (D-ESMP)

The plans will need to be supported with sub-plans where appropriate, including:

- Emergency preparedness and response plan (EPRP) (including spill response plan)
- Invasive species management plan (ISMP)
- Habitat removal and reinstatement plan (HRRP)
- Waste management plan (WMP)
- Hazardous materials handling and storage plan (HMHP)
- Traffic management plan (TMP)
- Chance finds procedure

A robust 'Environmental and Social Management System (ESMS)' will need to be employed by Ivicom Energy to effectively implement the environmental and social plan. The ESMS should include the following aspects: policy; identification of risks and impacts; management programs; organisational capacity and competency; emergency preparedness and response; stakeholder engagement; and monitoring and review

5.2 Management and mitigation during construction

5.2.1 Introduction

The following sections provide an overview of the management and mitigation measures identified for significant impacts during construction.

5.2.2 Ecology and nature conservation

5.2.2.1 Habitat loss and fragmentation

Measures to avoid or minimise habitat loss and fragmentation will include:

- Minimising land requirements for above ground permanent facilities and minimise areas to be cleared

- Reducing the width of access routes, where possible during construction and operation
- Minimising areas to be cleared. Use hand cutting where possible, avoiding the use of heavy equipment such as bulldozers, especially on steep slopes, water crossings, and forested areas
- Strictly monitoring and controlling Project related vehicle movements; and drivers will be required to follow designated routes only
- The use of sediment traps and pollution spill kits to control the release of pollutants and potentially contaminated sediments into water courses during construction

The removal of trees will be carried out following strict procedures, involving the marking of trees to be felled. A HRRP will be produced by the contractor before the start of construction. The HRRP will set out the minimum requirements for such activities, and detail how re-instatement activities will be carried out. The following aspects and measures will be included as a minimum in the HRRP:

- Vegetation clearance and soil stripping
 - Vegetation is to be cut down and cut material will be removed before soil stripping
 - Use hand cutting where possible, avoiding the use of heavy equipment such as bulldozers, especially on steep slopes
 - Translocation or seed collection for threatened plants
- Soil handling and storage
 - Store top soil separately from subsoil or other materials. Top soil and subsoil will be stored in demarcated areas and will be clearly labelled to prevent mixing of different materials and to allow reinstatement in the correct order (temporary sites only) or to re-use these materials on other sites
 - The seed/root-bearing topsoil will be formed into a shallow mound not higher than 1.5m in height. The subsoil will be stored separately in the same way
 - Any weeds on the soil mounds will be controlled by strimming
 - To maintain the germination capacity of the seed bank, the top soil storage will not exceed 15 weeks if this material is used for reinstatement
- Soil reinstatement and habitat restoration
 - Soils will be reinstated after construction in the temporary sites (e.g. storage yards, points along the OHLs and access roads). Soil reinstatement will be carried out to ensure the top soil is returned to the surface in line with international standards and best practice. Following top soil reinstatement, erosion control measures will be implemented on steep slopes. This may take the form of either the use of a nursery crop or the use of biodegradable erosion control geotextile blankets.

Restoration of any natural habitats that are affected temporarily by construction will be implemented at the end of construction. On small unforested areas, it is expected that the vegetation will gradually establish on its own on the reinstated top soils (after a number of years) as most plants will regenerate from the seed bank.

Any permanent loss of forest habitat will be compensated for off-site. The actual permanent loss will be calculated during pre-construction surveys as described in section 5.5.2 and forest planting may be required to offset losses. Off-site compensation can be achieved by funding new or existing national conservation programmes or by implementing forest planting by Ivicom Energy. Areas suitable for forest planting will be identified in consultation with the relevant authorities and stakeholders. The areas to be planted with forest will be at least the same size as the area of forest lost permanently under the Project. Only native species will be used in any

planting taking place on or off-site. The planted forest will be maintained in the first five years and will be monitored for ten years to ensure the forest habitat establishes successfully.

Bats

To offset for the loss of suitable roosting sites for bats, financial/logistical support will be provided to a specialist consultancy to install up to 100 bat boxes in suitable habitat away from the WTG cluster areas. The boxes will be monitored annually and maintained by the same organisation for three years.

5.2.2.2 Increased access to protected areas

Measures to prevent access to the protected areas will include:

- At the time of site induction, all construction workers will be informed of the importance of the protected areas, the need to avoid entering these areas from the Project site and the disciplinary actions that will be implemented if this restriction is contravened
- To mitigate for the potential increase in access to the protected areas nearby a protocol between the Sponsor, local municipality and national park authority will be developed to minimise hunting, land conversion and recreational disturbance within the Project area due to the creation of new roads. This will include, where practical, restricting access (for example barriers and signage) and cooperative collaboration to monitor, report and prevent unlawful activities. Signage will be in place, where practical, to inform workers and the general public of the appropriate access routes to the protected areas, avoidance of off-road driving, the legislation protecting the area and its species and the legal penalties for contravening the law. This signage will be designed for long-term use and will be replaced if it becomes unreadable during operation.

5.2.2.3 Non-native AIS

The tree of heaven (*Ailanthus altissima*) and black locust tree (*Robinia pseudoacacia*) have been recorded in the WTG cluster areas. These species are considered to be invasive in Eastern Europe but they are not on the List of Invasive Alien Species of Union Concern. The construction of the Project has the potential to spread these species and/or other invasive species.

Implementation of measures to prevent the accidental introductions of invasive species are required under IFC PS6. The Project will employ the following mitigation in order to meet with IFC PS6:

- Must not deliberately introduce AIS irrespective of regulatory framework
- Implement measures to avoid accidental introduction or spreading of alien species in accordance with best practice guidance published by IPIECA (2010⁸⁶) (see below)
- Consider the implementation of best practice measures to eradicate AIS from natural habitats over which Ivicom Energy has management control

Detailed guidelines on the prevention and management of AIS have been published by IPIECA⁸⁶ for the oil and gas industry, but these guidelines are relevant to many other project types, including wind power projects. Preventative, control and monitoring measures will be implemented with regard to the following aspects of the Project:

- Packaging and movement of materials

⁸⁶ IPIECA (2010). Alien Invasive Species and the Oil and Gas Industry. The global oil and gas industry association for environmental and social issues (<http://www.ogp.org.uk/pubs/436.pdf>).

- Minimise traffic and the distance it has travelled
- Source goods/materials locally where possible
- Contain any AIS and report the presence of AIS (Ivicom Energy's EHS manager for the Project will produce a short leaflet about AIS likely to be found in the Project footprint and will brief construction staff)
- Vehicles and plant
 - Clean all vehicles and plant immediately before deployment
 - 'As-new' wash-down is essential before entering non-infested areas and after working in infested areas
 - Pressure wash vehicle tyres in a contained area
 - Contain and destroy AIS residue such as roots and root fragments
 - Train and raise awareness of staff and contractors regarding AIS
 - Record and report the presence of any AIS to the EHS manager
- Soil and vegetation
 - Minimise disturbance to, or movement of, soil and vegetation
 - Prevent soil damage and erosion
 - Ensure imported soil/other materials are safe and free of AIS (source from a reputable supplier, request information on the soil's origin and certification of AIS-free status if possible)
 - Prevent AIS establishment on exposed stored soil (do not store bare soil near known sources of AIS, consider using matting to cover exposed soil)
 - Ensure infested material is disposed of safely
 - Retain as much natural vegetation as possible
- Habitat reclamation
 - Use native plants for reinstatement and landscaping
 - Do not use any non-native species in landscaping
 - Consider that some AIS may be soil-based
 - Avoid altering soil and water body properties

The risk and actual measures to be implemented will be included in the contractors' risk assessment for each WTG cluster. The EHS manager will monitor the construction activities monthly to meet best practice IPIECA guidelines on AIS. In addition, an Invasive Species Management Plan will be produced should invasive species be identified as abundant within the footprint of the works by the EHS manager.

5.2.2.4 Disturbance

Avoiding or minimising the artificial lighting at night is particularly important for bats. Any artificial lighting required should be pointed downwards to minimise light spill.

Best practice noise reduction measures will be implemented during construction and these will include:

- Avoidance of unnecessary revving of engines and switching off equipment when not required
- Vehicles and equipment will be properly maintained to meet the manufacturers' noise rating levels. Any silencers or bearings which become defective will be replaced immediately

- Using reverse warning systems incorporating broadband noise (not high pitched noise) where practicable
- Using enclosures for noisy plant such as pumps or generators
- Minimising drop height of materials
- Limiting the use of particularly noisy plant or vehicles where practicable
- Plant and vehicles will be operated with noise control hoods closed

5.2.2.5 Incidental mortality

Mammals, reptiles and amphibians

Excavations and trenches will be left open for minimal durations to avoid mammals, reptiles and amphibians being entrapped and injured. Protection of deep excavations will be provided overnight or when not actively worked. Excavations will be checked for wildlife before being filled.

Ground works will be undertaken only after above-ground vegetation clearance has been carried out to minimise the likely presence of these species groups. Where mammals, reptiles and amphibians are observed near holes in the ground during ground works, works will stop and a specialist ecological consultancy will advise the contractor on the appropriate measures to avoid injury and mortality.

Project related vehicle movements will be strictly monitored and controlled and drivers will be required to follow designated routes only.

Bats

The mature trees to be felled as part of the Project will be subjected to pre-construction bat roost surveys, which may include inspection from the ground or by climbing, and activity surveys (emergence/re-entry) undertaken at dusk and dawn. Bat activity surveys can only be undertaken between May and September, but inspection of the trees for bat roosts can happen any time of the year.

Should any bat roosts be found in areas to be affected by construction, then mitigation measures will be agreed with the statutory nature conservation organisation. The mitigation may require the removal of the bats by a qualified ecologist and the installation of artificial roosting facilities for bats.

Birds

Above-ground vegetation clearance (i.e. removal of trees and shrubs) will be undertaken between September and March to avoid the breeding bird season.

A local ecological specialist will advise the contractor on the specific locations where bird species are known or likely to breed and on the appropriate mitigation to be implemented. Should species be confirmed breeding in the Project footprint, mitigation may involve fencing the areas around any active nests (allowing a buffer zone of minimum 25m but this depends on species) and delaying the vegetation clearance and construction until the chicks have fledged (this may take up to three weeks depending on species). The EHS manager will make construction staff aware of these restrictions.

5.2.3 Landscape and visual

Construction will be carried out using industry best practice to reduce any potentially adverse impacts. The following mitigation measures should be implemented to mitigate the construction impacts identified in this assessment:

- Lighting associated with the construction phase will be designed in order to minimise the potential impact of light pollution at night particularly in relation to direct light spill into the National Park or residential properties and background sky glow.
- Existing vegetation to be retained will be protected during the construction phase.
- Where vegetation has been removed within the Project area, replacement planting of suitable species will be undertaken. Additionally, where land rights allow, the disturbed areas adjacent to the widened and new access roads will be reinstated and planted/seeded as appropriate to minimise the visual intrusion in the landscape. This will be particularly important where the roads run close to the national park, cross open plateau and traverse steeply rising topography.
- Additional planting will be considered to ensure that the substation facility is integrated into the existing landscape and screened where possible. Noise will be carefully monitored in order to minimise impacts on tranquillity during the construction period;
- Access roads for construction traffic will avoid the National Park and residential areas as far as possible.
- The spoil from all excavations from the Project will be accommodated by using it to form earth banks where possible, profiles to provide screening for building elements where required or re-profiled to smooth flowing contours into the surrounding landform as appropriate and without compromising other sensitive features.
- The construction compounds and temporary access roads will be reinstated following completion of the construction works.

The construction site will be managed to current standards of good working practice, including dust and noise reduction, which will be implemented through the C-ESMP.

5.2.4 Traffic and transport

The TMP should be prepared in line with national legislation and international guidelines. The measures outlined below are required to ensure that all relevant policies and standards are met by the Project. These measures should be developed further by the appointed contractor when developing the TMP although Ivicom Energy retains the overall responsibility that the following measures are included in sufficient detail:

- Assess options to use the concrete batching plant that is close to the construction site in order to limit traffic movements associated with concrete delivery to site
- Provision of bus/minibus services for personnel living in nearby settlements
- Road maintenance fund to cover damage caused by Project-related activities during the construction phase
- Regular inspection and maintenance of roads used by the Project
- Driver training for oversized vehicle drivers and a refresher course every six months for Project drivers
- Speed restrictions for Project traffic travelling through communities (to be agreed with the local transport authority)
- Pedestrian awareness programme along the main site access routes
- Schedule deliveries and road movements to avoid peak periods

- Observe local traffic regulations of no abnormal vehicle movements between 12:00am and 5:00am from Friday to Monday
- Temporary signage, to include signs in each direction along the Road 34 and 256, where the road is a single carriageway, highlighting the dangers of overtaking
- Details of oversized vehicles escort protocols (travelling in convoy, escort vehicles, speed limits)
- Community liaison scheme to facilitate a formal communication channel between Ivicom Energy and communities around the site and along the routes.
- Schedule ports (Smederevo and Pančevo) use in collaboration with port operators
- Utilise low emissions vehicles for the transportation of materials (wherever practicable)
- Workers should be informed and reminded of road safety via toolbox talks and staff notice boards

5.2.5 Noise

Part 4 of the General EHS Guidelines for Construction and Decommissioning includes recommendations for noise reduction and control strategies to be considered for works close to community areas including:

- Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance
- Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines
- Avoiding or minimising Project transportation through community areas

General guidance on the mitigation of noise during construction is given in BS 5228:2009+A1:2014 to minimise adverse impacts due to construction. The assessment of construction phase noise impacts has identified that the phase of activity with the potential to generate the greatest noise impacts is site excavation and foundation works. Specific measures that are relevant to this type of activity include:

- Layout of the temporary construction laydown area to ensure that noisy activities are located furthest away from sensitive receptors
- Unnecessary revving of engines will be avoided and equipment will be switched off when not in use
- Internal haul routes will be kept well maintained
- Plant and vehicles will be sequentially started up rather than all together
- Use of effective exhaust silence systems or acoustic engine covers as appropriate
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to locate site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas
- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturers specifications
- Screening e.g. noise barriers and bunds will be used as appropriate

It is expected that the magnitude of worst case noise impacts can be considered to be **negligible** in all cases. This would be achieved using the application of the measures described above, particularly by carrying out noisy works in the daytime only.

The assessment of construction phase noise impacts due to construction traffic has shown that vehicle movements on public highways are predicted to be not significant. This is based on the assumption that:

- No movements during the night period and restrict movements to avoid sensitive times of the day (early morning or late at night)
- Consideration of routes so that sensitive areas will be avoided or movements are directed along multiple links to minimise the intensity of traffic on individual links in sensitive areas
- Proper maintenance of vehicles, ensure silencers are fitted and that vehicles comply with emission standards
- Avoid queuing vehicles on the access road or at the site access points
- Adherence to speed limits
- Avoid unnecessary revving of engines and use of horns
- Minimise changes in the profile of the road to avoid body slap and rattle noise.

5.2.6 Socio-economic

5.2.6.1 Impacts on land use

During construction the Project will cause a temporary reduction in land available for use, including for agriculture. To mitigate this impact, as well as prevent any further impacts to livelihoods, the following mitigation measures will be implemented:

- Minimise the amount of land occupied during construction
- Position WTGs near edges of land plots to optimise land use
- Upon the completion of construction activities, cost-effective measures will be applied to reinstate the land not permanently occupied, in line with the construction ESMP

Difficulties in accessing land as a result of increased traffic and access road upgrades will be managed by the implementation of following measures:

- Develop and implement a TMP
- Provide timely information to users of land of when access to their land might be more difficult (e.g. scheduled access road upgrades)
- Establish and implement a community grievance mechanism

5.2.6.2 Employment and procurement opportunities

To maximise employment opportunities, the engagement of all workers will follow international best practice, with the main measures comprising the following:

- Provide timely and transparent information regarding employment opportunities related to the Project
- Put in place transparent and fair recruitment procedures
- Ensure that all employee and non-employee workers are engaged in line with both national legislation and applicable international (ILO) standards and recommendations
- Provide a grievance mechanism for workers
- Implement a training programme for the local workforce to enable them to take advantage of job opportunities

To foster the creation of indirect employment opportunities, the Project will procure goods and services locally whenever possible.

5.2.6.3 Impacts on livelihoods

Economic displacement of persons whose land is being acquired for the upgrading and construction of roads (owners and users of land, formal and informal) and generally any loss of livelihoods as a result of loss of land available for agriculture or loss of crops will be mitigated by undertaking the following measures:

- Minimise the amount of land acquired, occupied/disrupted during construction.
- Provide timely information to users of land of when construction is planned to begin and how lost crops and damages will be compensated.
- Compensate all users of land for lost crops and any other damages at full replacement cost, in accordance with national legislation and IFC PS5.
- Fully reinstate the land after disruption.
- Implement a household level land acquisition impact assessment and design appropriate mitigation measures to:
 - Determine whether each household whose land has been acquired for service and/or access roads has been economically displaced and if the household is vulnerable.
 - Determine if any land acquired through a voluntary transaction is being used by someone other than the owner (formal or informal user) as well as whether that user's household has been economically displaced.
 - Develop concrete measures to assist households who have been economically displaced (additional compensation, assistance to restore livelihoods) and those who have been identified as being vulnerable (assistance to restore livelihoods and any other measures depending on the type of vulnerability).
- Establish and implement a grievance mechanism to enable affected people to file complaints directly to Ivicom Energy, including those that are in connection to expropriation for access and service roads. Ivicom Energy will consider these grievances and address them in accordance with the requirements of IFC PS5.

To prevent any livelihood losses as a result of transport and increased traffic, the following measures will be implemented:

- Provide timely information to people/households located along selected transport route that there will be increased transport activity in their area and the possible impacts as well as foreseen mitigation measures.
- Compensate any business losses at full replacement cost, in accordance with national legislation and IFC PS5.
- Establish and implement a community grievance mechanism.

5.2.6.4 Impacts on community infrastructure

Transport of heavy machinery could lead to damages of road surfaces, further causing accidents or vehicle damage. The following measures will be undertaken to mitigate these impacts:

- Preparation of roads for heavy transport before construction
- Restoration of roads to at least pre-construction level

5.2.7 Health, safety and security

5.2.7.1 Occupational health and safety

Ivicom Energy will develop OHS policies and procedures to ensure that the OHS and wellbeing of its workers and the contractors' workers are protected in accordance with Serbian law, IFC PS2, the International Labour Organisation's (ILO) core labour standards and international best practice. These policies and procedures will cover the following:

- OHS risk assessment preparation
- Plans including an OHS Management Plan and method statements, worker code of conduct and an EPRP that establish penalties for violations and rewards for good compliance records and are to be enforced by both contractors and subcontractors
- EPRP to include measures associated with equipment failure in the event of natural hazards
- Assignment of a qualified Environment, Health and Safety Manager for the Project and support OHS officers
- Proper use of personal protective equipment (PPE) by all workers
- Transportation safety of the workers commuting daily to the site from nearby cities
- Main contractor to have an appropriately equipped and staffed first aid room and staff to address workers' health and manage community health interactions
- Construction site and operational facility Emergency Response Team
- Site safety awareness training program and individual training registers for each construction worker
- Specific safety training according to the worker's role and risks presented by their work activities
- Monitoring and reporting of accidents, injuries, lost-time incidents, near misses and community interactions on health issues
- Workers' grievance mechanism
- Toolbox talks on safety, housekeeping and hygiene
- Good housekeeping on site
- Control and quality assurance of drinking water
- Pest and vector control activities

Specific prevention and control measures will be employed and included in the OHS Plan and method statements for the risks identified in section 4.2.6.1 including, for example:

- Using special equipment to prevent falls; ensuring all structures are designed and built to appropriate standards and have means of working-at-height systems fitted; exclusion zones to protect workers from falling objects; all tools and equipment to be fitted with a lanyard; avoiding tower work during poor weather conditions.
- Communication equipment for people working in remote locations; readiness of all necessary safety equipment; means for managers to track working crew's location; first aid personnel and emergency plan in place.
- Ensuring all lifting equipment is suitable; training in lifting equipment and techniques; exclusion zones to prevent unauthorised access to lifting areas; activities carried out in good weather conditions.
- Deactivating and grounding live power distribution lines before work is performed on or near lines; ensuring workers do not approach exposed energised or conductive part unless they are properly insulated and isolated; minimum hot stick distances.

- Identification of potential exposure levels to EMF; training of workers in occupational EMF levels and hazards.
- Training on pesticide application; post-treatment intervals after working with chemicals; ensuring hygiene practices are followed.
- Use specially trained personnel to manage any PCBs in transformers and other electrical components
- Developing a transportation management plan; establishment of work zones; reduction of maximum vehicle speeds in work zones; training in safety issues including hazards of working on foot around vehicles and work at night; use of high visibility safety clothes; barricades for elevated work; use of ladder safety procedures.
- Maintenance of work vehicles to minimise air emissions; reduction of engine idling time; use of extenders; ventilation of indoor areas; installation of ventilation and air filtration systems; use of protective clothing; use of dustless sanding and blasting equipment; avoiding use of lead paint and using respiratory protection.
- Use of PPE to protect against exposure to noise; implementation of work rotation programmes to reduce cumulative exposure.
- Designing machines to eliminate trap hazards and enable routine service; equipping machines with guards; turning off, disconnecting, isolating and de-energising machinery with exposed or guarded moving parts.
- Use of eye shields and protection devices; locating hazardous areas away from transit places.
- Use of mechanical assists to eliminate or reduce exertion and force requirements in manual handling; incorporating rest breaks; quality control and maintenance.

5.2.7.2 Community Health, Safety and Security

In addition to measures undertaken for the health and safety of workers, to prevent injuries among members of the local communities, it will be important to implement security measures and prevention of unauthorised access to all construction sites.

Appropriate site security will be provided, including but not limited to:

- Fencing of areas under construction (e.g. excavations for WTGs and OHL towers), with warning signs on access roads
- Control of access roads to the WTGs and associated equipment
- Fencing off maintenance and equipment storage areas
- 24hour security personnel to prevent unauthorised entry to the construction site, and security cameras where practical (e.g. equipment storage area and the substation)
- Display of contact details for emergency response services and police in the security station, for use in the event of unauthorised entry

The influx of workers into the Project area causing disturbances for the local population will be minimised by the implementation of the following measures:

- Encourage contractors to hire local workforce by giving preference to suitably qualified and experienced applicants from the local communities
- Develop and enforce workers' code of conduct
- Cooperate and coordinate with local health and safety service providers
- Increase in traffic (bringing equipment and materials to the site and employee travel) and use of heavy machinery could lead to more accidents in the local communities and reduced

quality of life. These impacts will be managed with the implementation of the following measures: Provide timely information to people/households located along the selected transport route on possible risks and prevention measures

- Develop and implement a TMP
- Workers' code of conduct (guidance on safe driving)
- Cooperate and coordinate with local health and safety, as well as security service providers

5.2.8 Management and mitigation of other construction impacts

5.2.8.1 Cultural heritage

There are four identified archaeological sites which are near to the 110kV OHL, however the precise location, extent and nature of these sites are unknown. As such it is considered prudent to carry out archaeological surveys prior to the construction phase in order to identify the location, extent and nature of the sites.

The archaeological survey should comprise:

- Walkover survey along the route of the OHL to identify the archaeological sites
- Excavation of test pits at the location of the 110kV OHL tower foundations in order to identify the presence and nature of any archaeological remains.

Based on the available information and according to the Law on Cultural Heritage (Official Journal Gazette of the RS, No. 71/94), the Regional Institute for Protection of Cultural Monuments Smederevo have determined conditions for Ivicom Energy in relation to management and mitigation that need to be fulfilled prior to or during the construction works. The conditions state that:

- Permanent archaeological oversight⁸⁷ is required during all earthworks to foundations, namely the 31 WTGs and the OHLs (35kV and 110kV)
- Where insufficient professional archaeological services and conditions are able to be met Ivicom Energy is bound to alter the design of the Project to an alternative layout which will mitigate impact on the archaeological site
- Promptly inform the Institute about the commencement of earthworks

Ivicom Energy will also develop a chance finds procedure which meets the requirements of IFC PS8 as well as Serbian Law on Cultural Property and the Regional Institute's remaining conditions which are as follows in the case of chance finds (archaeological remains):

- All works are to be immediately halted, the Institute notified and work to remain on hold until the representatives of the Institute secure the findings
- If findings are made Ivicom Energy is obliged to provide conditions for the conservation and public dissemination of archaeological information along with publication for the public archive

All workers and foremen involved in excavation works will be trained in implementing the chance find procedure, their delegated responsibility and authority to stop works, and the types of cultural heritage that may be discovered.

The chance finds procedure will apply to all aspects of the Project.

⁸⁷ This can be provided by Ivicom's EHS manager if professional external services are not available

5.2.8.2 Air emissions

This section presents mitigation measures to manage potential air quality impacts during construction and decommissioning activities. The measures presented are based on the potential impacts identified in section 4.2.7.2 and in line with the EHS Guidelines.

The assessment has shown that significant air quality impacts could occur as a result of dust emission and resuspension during the construction phase, specifically associated with the construction and upgrade of access roads, crane pads and foundations and the transmission and distribution infrastructure. This section describes specific mitigation measures that will be implemented to prevent and minimise these construction dust impacts. Preventative measures such as best practice site management, effective site planning/layout guidelines which will be included within the Project's ESMP are:

- Minimising dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment such as water suppressors
- Minimising dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
- Implementing dust suppression techniques, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- No bonfires and burning of waste materials shall be allowed
- Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with due consideration to meteorological factors (e.g. precipitation, temperature, wind direction, and speed), and location of sensitive receptors
- Designing, installing and applying a simple, linear layout for materials-handling operations to reduce the need for multiple transfer points
- Compacting and periodically grading and maintaining roads
- Covering exposed earth mounds stockpiled during construction with geotextiles

Emissions from mobile sources (on-road and off-road vehicles) will comply with national or regional programs. In the absence of these, the following measures, adapted from the EHS Guidelines for Air Emissions and Ambient Air Quality, will be considered:

- Regardless of the size or type of vehicle, owners/operators will implement the manufacturer recommended engine maintenance programmes
- Enforce a speed limit for trucks on-site at 20kmph
- Drivers will be instructed on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits
- Enforce a 'no-idling' policy
- Old construction vehicles will be replaced with newer more fuel efficient alternatives
- Convert high use vehicles to cleaner fuels where possible
- Install and maintain emission control devices such as catalytic convertors
- Implement a regular vehicle maintenance and repair program

With regards to generators used on site, consideration should be given to the location and height of exhaust pipes to ensure proper dispersion of pollutants. Generators used should be of a modern design and well-maintained to minimise air pollutant emissions.

Weekly visual inspections should be undertaken at construction areas across the site by a suitably qualified/experienced members of the construction team, throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures.

The contractors will be responsible for ensuring the measures included in this report and the ESMP are implemented during the construction of the Project.

5.2.8.3 Water Resources

A range of measures will be employed to reduce the risk posed by leakage or spill of potentially polluting or hazardous materials. A HMHP⁸⁸ will be put in place that includes the requirement for oils, fuels and chemicals to be stored in dedicated storage areas with oil interceptors and adequate spill/leak containment. A spill response plan will provide control in the event of accidental spill or leak. Workers will be trained in these plans and procedures as relevant to their role.

Erosion and sedimentation risk from runoff during land preparation and construction will be minimised by avoiding exposure of bare earth to the elements. In addition, surface runoff will be collected using temporary drainage channels and sedimentation ponds.

Domestic wastewater will be collected at site and removed for treatment in accordance with the Project's Construction WMP (refer to section 6.11).

5.3 Management and mitigation during operations

5.3.1 Introduction

The following sections provide a brief overview of the management and mitigation measures identified for significant impacts during operations.

5.3.2 Ecology and nature conservation

5.3.2.1 Displacement

Given the uncertainty regarding the impacts of displacement of birds and bats it is recommended that mitigation in relation to the potential for displacement impacts to bats and birds is deferred until after the completion of post-construction monitoring (described in section 5.5.1 below). Given the restricted area over which the Ivicom Energy will have physical control of management, it is recommended that compensation is provided off-site. This should take the form of funding to a national or international conservation NGO to undertake activities that would adequately offset the scale of the impact quantified during post-construction monitoring.

5.3.2.2 Collision

Bats

WTGs are known to result in significant rates of mortality if they are within broadleaved or coniferous woodlands or within 200m of woodlands⁸⁹. With the exception of WTG T1-1 in the Venac cluster all WTGs are within 200m of woodland. It is recommended that WTGs are microsituated to maximise the distance separating them from woodland and therefore minimise the inherent high mortality risk.

⁸⁸ See ESMP (section 7) for further details

⁸⁹ Rodrigues, L. et al, 2014. Guidelines for consideration of bats in wind farm projects. Revision 2014. EUROBATs Publication Series No. 6. [pdf] Available at: <http://www.eurobats.org/sites/default/files/documents/publications/publication_series/pubseries_no6_english.pdf> [Accessed on 19 January 2017].

Recent research indicates that bat activity recorded during pre-construction surveys may not accurately reflect activity levels post construction because of changes in bat behaviour following construction⁷⁷. It is therefore recommended that no further mitigation is undertaken until post-construction carcass search surveys have been undertaken (described in section 5.5.1 below). This will test the accuracy of the ESIA predictions, identify if bat behaviour has not altered compared to pre-construction conditions and establish an appropriate mitigation strategy. WTG curtailment and increasing the cut-in speeds will be considered if impacts are recorded during monitoring.

Birds

Temporary shutdown is known to be the most effective mitigation to avoid and reduce bird collision related mortality⁹⁰. It is recommended however to complete post construction monitoring (described in section 5.5.1 below) prior to implementing a mitigation strategy. The monitoring will test the accuracy of the ESIA predictions, identify collision risk hotspots, the species impacted and establish an appropriate mitigation strategy.

For OHL related collisions, no likely locations for collision have been identified and flight activity within the likely collision risk window has been low. It is recommended to complete post construction monitoring to test the accuracy of the ESIA predictions and establish an appropriate mitigation strategy. This could include the installation of bird flight diverters on OHLs.

5.3.3 Landscape and visual

The following mitigation measures will be implemented to mitigate the operational landscape and visual impacts identified in this assessment:

- Lighting associated with the operation phase will be designed in order to minimise the potential impact of light pollution at night particularly in relation to potential light spill into the national park or residential properties.
- Minimise the removal of woodland. Where vegetation is removed, replacement planting of suitable indigenous species will be undertaken. The disturbed areas adjacent to the widened and new access roads will be reinstated and planted/seeded as appropriate to minimise the visual intrusion in the landscape. Maintenance of the planting areas shall be undertaken for one full growing season following planting to ensure establishment.
- Noise will be carefully monitored to minimise impacts on tranquillity during the operation period.

Potential future expansion of the wind farm clusters utilising WTG locations close to residential properties and isolated valleys where there are no urban influences should be considered in detail to address impacts on visual amenity and tranquillity (note that tranquillity in this sense is not solely noise but also the presence of urban influences). Locations that are considered to be particularly sensitive include T1-2 and T1-3 in the Venac cluster which are located in an open plateau setting and close to isolated but permanently occupied dwellings; T1-7 which will be a third WTG within 0.5km of a seasonal dwelling; and WTG T3-11 which will be close to a remote valley area, although the existing woodland cover will limit views.

The operation of the site will be managed to current standards of good working practice, including noise reduction, which will be implemented through the O-ESMP.

⁹⁰ May, R., Reitan, O., Bevanger, K., Lorentsen, S. H. & Nygård, T., 2015. Mitigating wind-turbine induced avian mortality: sensory, aerodynamic and cognitive constraints and options. *Renewable and Sustainable Energy Reviews* 42:170–181.

5.3.4 Noise

The assessment has demonstrated the compliance of operational phase impacts with the IFC Noise Level Guidelines. Operational phase monitoring shall be undertaken to demonstrate this.

5.3.5 Socio-economic

5.3.5.1 Impacts on land use

Approximately 58ha of land will continue to be occupied after construction. All measures previously listed for the construction phase will be implemented to minimise land occupation to the greatest possible extent.

Minor use restrictions will be applied on land within the protection zones of the OHLs and underground cables. The imposition of use restrictions is not expected to have a significant impact on users of affected land. However, to reduce the chances of any further impacts on livelihoods, these use restrictions will be confined only to areas needed for repairs and maintenance.

5.3.5.2 Employment and procurement opportunities

As for construction related employment, the contracting of any individuals for the operation of the Project will follow principles of international best practice. To foster the creation of indirect employment opportunities, the Project will continue to procure goods and services locally whenever possible.

5.3.5.3 Impacts on livelihoods

Economic displacement of persons whose crops may be affected by maintenance and repairs will be mitigated by undertaking the following measures:

- Minimise the amount of land occupied/disrupted during repairs and maintenance.
- Compensate all users of land (owners and non-owner users) for lost crops and any other damages at full replacement cost, in accordance with national legislation and IFC PS5.
- Fully reinstate the land after disruption.
- Implement a community grievance mechanism to enable affected people to file complaints directly to Ivicom Energy. Ivicom Energy will consider these grievances and address them in accordance with the requirements of IFC PS5.

5.3.5.4 Revenue generation for the local government/community and local development

To ensure that direct benefits for the affected municipalities are maximised, all payments for taxes and leases will be made by Ivicom Energy in a timely and transparent manner.

Ivicom Energy will continue to implement the community investment plan (refer to section 6.7) during operations, to support local initiatives, including those that may contribute to tourism development.

Ivicom Energy will continue to support and advocate for new investments in the Project area and region.

5.3.5.5 Impacts on community infrastructure

To ensure that access to land is permanently improved for private landowners, Ivicom Energy will carry out regular maintenance of access and service roads needed for the operation of the wind farm.

5.3.6 Health, safety and security

5.3.6.1 Occupational health and safety

The OHS policies and procedures for the construction phase to be developed by Ivicom Energy, as listed in section 5.2.7.1, will also be applicable for the operational phase and will need to be reviewed and updated to reflect the new phase.

Additional mitigation measures for risks that are specific to the operational phase of wind energy facilities, OHLs and substations include the following:

- Training and evacuation procedures to deal with WTG collapse and blade shear or breakage
- Emergency plan to include fire prevention and special training of staff undertaking maintenance using items such as welding equipment to manage risk of lightning strike and fire

5.3.6.2 Community health, safety and security

A key prevention measure to ensure community health, safety and security is to make the local population aware of the risks associated with the operation of the wind farm, which will be done through community meetings and appropriate warning signs.

In addition, the following measures will be undertaken:

- Appropriate design and maintenance to prevent blade shear or breakage and WTG collapse and in the event that it occurs, clearing of all debris and payment of compensation for any damages
- To prevent lightning strike and fire, the use of appropriate lightning protection and fire resistant components, automatic fire detection systems and firefighting, as well as regular maintenance
- Provide security to the site at various levels, including (but not limited to):
 - Locking of each individual WTG tower access door
 - Operating a permit to work system to prevent unauthorised access
 - Control of access roads to the WTGs and associated equipment
 - Fencing off maintenance and equipment storage areas

5.3.7 Management and mitigation of other operational impacts

5.3.7.1 Water resources

Management and mitigation measures to protect water resources during operation are as per those employed during construction. Fuel and hazardous materials will require correct storage and handling to prevent release to land, groundwater, surface water or drainage networks. In addition, oil interceptors will be used where oil or other pollutants could come into contact with the ground or water. Training will be provided to all personnel who handle hazardous materials.

If the proposed site operational plans and procedures are correctly followed and containment and clean up measures implemented in accordance with the spill response plan (refer to section

6.8), there should be no significant impact to surface water, effluent and land and ground quality during the Project's operation phase.

5.3.7.2 EMFs, EMI and IEMI

The detailed design will need to incorporate measures to reduce the potential impacts of EMFs, EMI and IEMI. These will include, if necessary:

- OHLs or other high voltage equipment will be micro-sited to avoid being located above or adjacent to residential properties or other locations intended for highly frequent human occupancy
- OHL RoW and conductor bundles will be designed to ensure radio reception at the outside limits remains normal
- Direct physical interference of point-to-point communication systems will be avoided
- WTGs will be sited away from the line-of-sight of any broadcaster transmitter
- Non-metallic WTG blades will be used
- Fencing and other methods of protection to avoid public access to facilities at risk of IEMI attacks will be considered

Additional measures to protect workers will include:

- Surveys to identify potential exposure levels in the workplace and the use of personal monitors during working activities if necessary
- Training of workers in the identification of occupational EMF levels and hazards
- Establishment of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure and limiting access to properly trained workers
- Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels⁹¹ which include limiting exposure time through work rotation, increasing the distance between the source and the worker or the use of shielding materials

5.4 Management and mitigation during closure and decommissioning

5.4.1 Introduction

The following sections provide a brief overview of the management and mitigation measures identified for significant impacts during closure and decommissioning. It should be noted that the Project is unlikely to close entirely and a programme of rehabilitation and replacement works is more likely to take place, although proposed activities will depend on any changes in the wind resource over time. For the purposes of this ESIA addendum we have assumed that the Project will be decommissioned and provided high level options for mitigation and management based on the significant impacts identified at this early stage. Prior to any decommissioning or rehabilitation programme, and depending on the scale of activities planned, an environmental and social impact assessment may be needed to accurately identify risks, impacts, mitigation and management measures appropriate at the time.

⁹¹ Refer to EHS Guidelines on Electric Power Transmission and Distribution

5.4.2 Habitats and species

The management and mitigation during close and decommissioning will follow that of construction. The exception to this will be when:

- Any additional sensitive features identified after the establishment of the baseline (i.e. during the construction and operational phases)
- Adverse changes to the conservation status of a species since the baseline studies (e.g. a species that is more sensitive over time as a result of a declining population).

Prior to closure and decommissioning, a review of the baseline data will be conducted to identify changes to the baseline information and the need for additional surveys to inform an ESAP.

5.4.3 Landscape and visual

The management and mitigation during closure and decommissioning will follow that of construction. The exception to this will be when additional sensitive features are identified after the establishment of the initial baseline (i.e. during the construction and operational phases).

Prior to closure and decommissioning, a review of the baseline data will be conducted to identify changes to the baseline information and the need for additional mitigation measures to inform an ESAP.

5.4.4 Noise

The measures described above for the management of noise during the construction phase also apply to the Closure and Decommissioning Phase.

5.4.5 Traffic and transport

The traffic and roads impacts during the decommissioning phase are likely to mirror the impacts discussed during the construction phase, therefore the same management and mitigation measures discussed and presented for the construction phase and TMP will be applied for this phase. Timely and ad-hoc changes, if needed, will be made to the plans and procedures to account for any change in the road network at the end of the Project's lifetime.

5.4.6 Socio-economic

Management and mitigation measures for the decommissioning phase will be the same as those during construction (refer to section 5.2.6).

With regards to impacts on land use, it will be important to clear all materials and equipment upon dismantling of WTGs and fully reinstate the land for agricultural or other use.

5.4.7 Health, safety and security

5.4.7.1 Occupational health and safety

The OHS policies and procedures for the construction and operation phases, as listed in sections 5.2.7.1 and 5.3.6.1, will be applicable for the closure and decommissioning phases. Additional mitigation and management measures specific to this phase include the following:

- Use of specially trained personnel to identify and remove waste material and potentially hazardous materials, to allow for safe dismantling and demolition
- Use of waste-specific PPE based on OHS assessment
- Training and safety monitoring systems for working with demolished structures

5.4.7.2 Community health, safety and security

The mitigation measures to be used during the construction phase also apply to the decommissioning phase (refer to section 5.2.7.2).

5.4.8 Management and mitigation of other decommissioning impacts

5.4.8.1 Air emissions

Management and mitigation measures to control emissions to air in decommissioning will mirror those in place for the construction phase.

5.4.8.2 Water resources

The management and mitigation measures required during the decommissioning phase are likely to be similar to those required during the construction phase. Additionally, the site will be inspected to check for any ground contamination which may have occurred in the operational phase. The inspection will seek to confirm that measures put in place during construction and operation have protected land, surface water and groundwater at the site. Environmental incident and accident records from the operation phase will be checked to ascertain the effectiveness of management control to prevent significant contamination.

5.4.9 Summary of residual impacts

Table 53 below summarises the impacts identified in the ESIA addendum and their residual impact when mitigation is applied and effectively implemented.

Table 53: Summary of residual impacts

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
Construction and decommissioning impacts				
Ecology				
Habitat loss and fragmentation	Negligible to moderate adverse	<ul style="list-style-type: none"> Minimise Project footprint Controlled/designated traffic routes Off-site compensatory tree planting HRRP Installation of 100 bat boxes away from WTG areas 	Negligible to minor adverse	Not significant
Increased access to protected areas	Negligible	<ul style="list-style-type: none"> Workers' site induction to include importance of the protected areas and disciplinary actions Signage will be in place, where practical, to inform people of the appropriate access routes to the protected areas, the legislation protecting the area and its species and the legal penalties for contravening the law 	Minor adverse	Not significant
Introduction of invasive alien species (AIS)	Negligible	<ul style="list-style-type: none"> Implement guidelines on the prevention and management of AIS by IPIECA 	Negligible	Not significant
Disturbance	Minor to moderate adverse	<ul style="list-style-type: none"> Avoid and minimise use of artificial lighting during construction activities Best practice noise reduction measures 	Negligible to minor adverse	Not significant
Incidental mortality	Minor to moderate adverse	<ul style="list-style-type: none"> Minimise time excavations are open Protect deep excavations overnight Check excavations before filling Controlled/designated traffic routes Follow industry best practice pollution prevention guidance Survey mature trees for bats prior to felling and establish no work zones if necessary Removal of bats and provision of artificial roosts prior to tree felling Clear above-ground vegetation between September to March to avoid breeding birds and reduce habitat suitability for mammals, reptiles and amphibians Undertake ground works after above-ground vegetation clearance Survey the Project footprint prior to ground clearance to identify the presence of mammals, reptiles and amphibians and establish no work zones if necessary 	Negligible to minor adverse	Not significant
Landscape and visual				
Changes to landscape character of the steep wooded gorge LCA as a result of: presence of construction traffic, plant, equipment and lighting in a rural setting; clearance of land	Negligible	<ul style="list-style-type: none"> Lighting associated with the construction phase will be designed to minimise the potential impact of light pollution at night Noise will be carefully monitored in order to minimise impacts on tranquillity during the construction period 	Negligible	Not significant

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
to accommodate construction activities and access roads.		<ul style="list-style-type: none"> Construction traffic will be kept to a minimum near the National Park and residential properties 		
Changes to landscape character of the wooded hillsides and plateau LCA through: presence of construction traffic, plant, equipment and lighting in a rural setting; clearance of land to accommodate construction activities and access roads.	Moderate adverse	<ul style="list-style-type: none"> Existing vegetation to be retained will be protected during the construction phase to reduce visual intrusion Where vegetation has been removed, replacement planting of suitable species will be undertaken. Additionally, the disturbed areas adjacent to the widened and new access roads will be reinstated and planted to minimise the visual intrusion in the landscape. The spoil from all excavations from the scheme will be accommodated by using it to form earth banks where possible, profiles to provide screening for building elements where required or re-profiled to smooth flowing contours into the surrounding landform as appropriate and without compromising other sensitive features The construction compounds and temporary access roads will be reinstated following completion of the construction works 	Moderate adverse	Significant
Changes to landscape character of the cultivated river valleys LCA through: presence of construction traffic, plant, equipment and lighting in a rural setting; clearance of land to accommodate construction activities and access roads.	Negligible	<ul style="list-style-type: none"> As above Detailed site selection process for the OHL tower locations to avoid areas of existing tree cover and water courses to minimise vegetation clearance 	Negligible	Not significant
Changes in visual amenity through: presence of construction traffic, plant, equipment and lighting in a rural setting; clearance of land to accommodate construction activities and access roads	Negligible, except moderate adverse for Krivača village and minor adverse for Rakova Bara village	<ul style="list-style-type: none"> As above 	Negligible, except moderate adverse for Krivača village	Significant
Traffic and transport				
Impact on road network from normal construction traffic	Minor adverse	<ul style="list-style-type: none"> Regular inspection and maintenance of roads used by the Project Set up a road maintenance fund to cover damage caused by Project related activities during the construction phase Observe local traffic regulations of no circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday 	<ul style="list-style-type: none"> Minor Adverse 	<ul style="list-style-type: none"> Not significant
Impact on road network from oversized loads traffic	Moderate adverse	<ul style="list-style-type: none"> Driver training for oversized vehicles and a refresher course every six months for Project drivers Observe local traffic regulations of no circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday Details of abnormal load escort proposals to be included in TMP 	<ul style="list-style-type: none"> Minor Adverse 	<ul style="list-style-type: none"> Not significant
Impacts of increased traffic on road safety	Minor adverse	<ul style="list-style-type: none"> Speed restrictions for Project traffic travelling through communities (to be agreed with the local transport authority) 	<ul style="list-style-type: none"> Minor Adverse 	<ul style="list-style-type: none"> Not significant

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
		<ul style="list-style-type: none"> Observe local traffic regulations of no circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday Undertake pedestrian awareness programme along the main site access routes Schedule deliveries and road movements to avoid peak periods Utilise low emissions vehicles for the transportation of materials (wherever practicable) Workers should be informed and reminded of road safety via toolbox talks and staff notice boards 		
Impacts on ports capacity	Moderate adverse	<ul style="list-style-type: none"> Schedule ports deliveries and movements (Smederevo and Pančevo) in collaboration with port operators Ensure undisrupted and constant movement of deliveries from the port to site 	Minor Adverse	Not significant
Noise				
No potential risks assuming the noisiest phase works including WTG foundation construction and vehicle deliveries can be undertaken during the daytime	Negligible	<ul style="list-style-type: none"> Planning activities in consultation with local communities Using noise control devices such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines Avoiding or minimising Project transportation through community areas Layout of the temporary construction laydown area to ensure that noisy activities are located furthest away from sensitive receptors Unnecessary revving of engines and use of horns will be avoided Equipment will be switched off when not in use Internal haul routes will be kept well maintained Plant and vehicles will be sequentially started up rather than all together Use of effective exhaust silencing systems or acoustic engine covers as appropriate Plant will always be used in accordance with manufacturers' instructions Site equipment will be located away from noise-sensitive areas. Loading and unloading will also be carried out away from such areas Maintenance to keep plant and equipment working to manufacturers' specifications Screening e.g. noise barriers and bunds will be used as appropriate No movements during the night period and restrict movements to avoid sensitive times of the day (early morning or late at night) Avoidance of sensitive areas and/or movements to be directed along multiple links to minimise the intensity of traffic on individual links in sensitive areas Proper maintenance of vehicles, ensure silencers are fitted and that vehicles comply with emission standards Avoid queuing vehicles on the access road or at the site access points Adherence to speed limits Minimise changes in the profile of the road to avoid body slap and rattle noise. 	Negligible	Not significant
Socio-economic				

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
Loss of land available for agricultural or other use	Minor adverse	<ul style="list-style-type: none"> Minimise the amount of land occupied during construction Position WTGs near edges of land plots to optimise land use Upon the completion of construction activities, fully reinstate the land not permanently occupied 	Negligible	Not significant
Difficulties accessing land during road upgrades and increased traffic	Minor adverse	<ul style="list-style-type: none"> Develop and implement a TMP Provide timely information to users of land of when access to their land might be more difficult (e.g. scheduled access road upgrades) Establish and implement a community grievance mechanism 	Negligible	Not significant
Creation of direct employment opportunities	Minor beneficial	<ul style="list-style-type: none"> Provide timely and transparent information regarding employment opportunities related to the Project Put in place transparent and fair recruitment procedures Ensure that all employee and non-employee workers are engaged in line with both national legislation and applicable international (ILO) standards and recommendations Provide a grievance mechanism for workers Implement a training programme for the local workforce to enable them to take advantage of job opportunities 	Minor beneficial	Not significant
Creation of indirect employment opportunities	Minor beneficial	<ul style="list-style-type: none"> Procure goods and services locally whenever possible 	Minor beneficial	Not significant
Loss of livelihoods resulting from expropriation for roads	Minor adverse	<ul style="list-style-type: none"> Minimise the amount of land acquired, occupied disrupted during construction. Provide timely information to users of land of when construction is planned to begin and how lost crops and damages will be compensated. Compensate all users of land for lost crops and any other damages at full replacement cost, in accordance with national legislation and IFC PS5. Fully reinstate the land after disruption. Implement a household level land acquisition impact assessment and design appropriate mitigation measures to: <ul style="list-style-type: none"> Determine whether each household whose land has been acquired for service and/or access roads has been economically displaced and if the household is vulnerable. Determine if any land acquired through a voluntary transaction is being used by someone other than the owner (formal or informal user) as well as whether that user's household has been economically displaced. Develop concrete measures to assist households who have been economically displaced (additional compensation, assistance to restore livelihoods) and those who have been identified as being vulnerable (assistance to restore livelihoods and any other measures depending on the type of vulnerability). Establish and implement a community grievance mechanism to enable affected people to file complaints directly to Ivicom Energy, including those that are in connection to 	Negligible	Not significant
Loss of livelihoods resulting from lost crops or damages, particularly for users of land			Negligible	Not significant

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
		expropriation for access and service roads. Ivicom Energy will consider these grievances and address them in accordance with the requirements of IFC PS5.		
Loss of livelihoods as a result of loss of land available for use	Negligible	<ul style="list-style-type: none"> As above 	Negligible	Not significant
Increased incomes generated through employment	Minor beneficial	<ul style="list-style-type: none"> N/A 	Minor beneficial	Not significant
Loss of livelihoods as a result of transport and increased traffic, for businesses on Road 256	Minor adverse	<ul style="list-style-type: none"> Provide timely information to people/households located along selected transport route that there will be increased transport activity in their area and the possible impacts as well as foreseen mitigation measures. Compensate any business losses at full replacement cost, in accordance with national legislation and IFC PS5. Establish and implement a community grievance mechanism. 	Negligible	Not significant
Improved access to land from upgraded and new roads	Minor beneficial	<ul style="list-style-type: none"> N/A 	Minor beneficial	Not significant
Damages to road surfaces leading to damages of vehicles and accidents	Minor adverse	<ul style="list-style-type: none"> Preparation of roads for heavy transport before construction Restoration of roads to at least pre-construction level 	Negligible	Not significant
Cultural heritage				
WTG foundations, roads and substation There are no protected or known undesignated cultural monuments or archaeological sites identified within these area of WTG development.	Negligible	<ul style="list-style-type: none"> Permanent archaeological oversight during all earthworks to foundations Promptly inform the Institute about the commencement of earthworks Chance finds procedure 	Negligible	Not significant
110kV OHL tower foundations There are no protected cultural monuments identified within the area of the proposed 110kV OHLs, however there are four identified potential archaeological sites located near to the two 19.4km routes of 110kV OHLs.	Negligible to major adverse	<ul style="list-style-type: none"> Before construction carry out archaeological survey comprising: <ul style="list-style-type: none"> Walkover survey along the route of the OHL to identify the archaeological sites Excavation of test pits at the location of the 110kV OHL tower foundations in order to identify the presence and nature of any archaeological remains During construction: <ul style="list-style-type: none"> Permanent archaeological oversight during all earthworks to foundations Where insufficient professional archaeological services and conditions are able to be met Ivicom Energy is bound to alter the design of the Project to an alternative layout which will mitigate impact on the archaeological site Promptly inform the Institute about the commencement of earthworks Chance finds procedure 	Minor adverse	Not significant

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
Air quality				
Dust emissions during construction of the crane pads and foundations	Moderate adverse	<ul style="list-style-type: none"> • Good site management, planning and layout to minimise material transport, storage and handling 	Minor adverse	Not significant
Dust emissions during construction of the access roads and transmission and distribution infrastructure	Moderate adverse	<ul style="list-style-type: none"> • Covering stockpiles and re-vegetation of exposed areas • Use of water suppression • No waste burning • Impose speed limit for construction traffic 	Minor adverse	Not significant
Dust emissions during installation of WTG	Minor adverse		Minor adverse	Not significant
Emissions of combustion-related pollutants from on-site plant and vehicles	Minor adverse	<ul style="list-style-type: none"> • Vehicles to comply with national programs, be regularly maintained, have enforced speed limits, no-idling policy, use of cleaner fuels where possible and drivers to be trained on driving practices to reduce fuel consumption and increase safety. • Generators to have appropriate location and height of exhaust pipes to ensure proper dispersion of pollutants • Generators to be of a modern design and well-maintained to minimise air pollutant emissions 	Negligible	Not significant
Health, safety and security				
Risks to workers' health and safety	N/A	<ul style="list-style-type: none"> • OHS policies and procedures including OHS Plan and method statements, worker code of conduct and EPRP • EPRP to include measures associated with equipment failure in the event of natural hazards • Assignment of appropriate personnel for EHS roles • PPE • First aid room and staff • Emergency response team • Site safety and job specific safety training • Monitoring and reporting of incidents, accidents and occupational health • Worker grievance mechanism • Toolbox talks on safety, housekeeping and hygiene • Good housekeeping on site • Drinking water • Pest and vector control 	OHS risks will remain but control measures will reduce them as far as possible	N/A
Risks of injuries from unauthorised access and vandalism	N/A	<ul style="list-style-type: none"> • Fencing of all construction areas, with gates and warning signs on access roads • Control of access roads to the WTGs and associated equipment • Fencing off maintenance and equipment storage areas • 24hour security personnel with security cameras to prevent unauthorised entry to the site 	Risks will remain but control measures will reduce them as far as possible	N/A

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
		<ul style="list-style-type: none"> • Display of contact details for emergency response services and police in the security station, for use in the event of unauthorised entry 		
Disturbances to local communities caused by influx of workers	N/A	<ul style="list-style-type: none"> • Encourage contractors to hire local workforce, i.e. give preference to suitably qualified and experienced applicants from the local communities. • Develop and enforce workers' code of conduct • Cooperate and coordinate with local health and safety service providers 	Risks will remain but control measures will reduce them as far as possible	N/A
Risk of accidents among community members caused by Project transport and increased traffic	N/A	<ul style="list-style-type: none"> • Provide timely information to people/households located along the selected transport route on possible risks and prevention measures • Develop and implement a TMP • Workers' code of conduct (guidance on safe driving) • Cooperate and coordinate with local health and safety, as well as security service providers 	Risks will remain but control measures will reduce them as far as possible	N/A
Water resources				
Spill or leakage to ground or water	Negligible	<ul style="list-style-type: none"> • HMHP • Spill response plan 	Negligible	Not significant
Spills of sewage to ground or water	Negligible	<ul style="list-style-type: none"> • WMP • Spill response plan 	Negligible	Not significant
Discharge of contaminated water	Negligible	<ul style="list-style-type: none"> • Vehicles washed in contained areas with appropriate waste water disposal 	Negligible	Not significant
Increased erosion and sedimentation	Negligible	<ul style="list-style-type: none"> • Minimise exposed soil • Temporary drainage systems • Sedimentation ponds 	Negligible	Not significant
Operational impacts				
Ecology				
Increased access to protected area	Moderate adverse	<ul style="list-style-type: none"> • Develop a protocol between the Sponsor, local municipality and national park authority to minimise hunting, land conversion and recreational disturbance within the project area due to the creation of new roads. This will include, where practical, restricting access (for example barriers and signage) and cooperative collaboration to monitor, report and prevent unlawful activities. • 	Minor adverse	Not significant
Collision with operational WTGs	Minor to major adverse	<ul style="list-style-type: none"> • To be confirmed following operational monitoring • Undertake cumulative impact assessment at the end of monitoring period to inform mitigation strategy 	Minor adverse	Not significant
Collision with OHLs	Minor adverse	<ul style="list-style-type: none"> • To be confirmed following operational monitoring (e.g. the installation of bird flight diverters on the OHLs). 	Minor adverse	Not significant
Displacement	Minor to moderate adverse	<ul style="list-style-type: none"> • To be confirmed following operational monitoring 	Minor adverse	Not significant

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
		<ul style="list-style-type: none"> Undertake cumulative impact assessment at the end of monitoring period to inform mitigation strategy 		
Landscape and visual				
Changes to landscape character of the steep wooded gorge LCA through: the presence of WTGs close to the National Park boundary cleared land to accommodate facilities and access roads,	Negligible	<ul style="list-style-type: none"> Lighting associated with the operation phase will be designed to minimise the potential impact of light pollution at night 	Negligible	Not significant
Changes to landscape character of the wooded hillsides and plateau LCA through: presence of WTGs, OHL, cleared land to accommodate facilities and access roads; and operational lighting.	Moderate adverse		Moderate adverse	Significant
Changes to landscape character of the cultivated river valleys LCA through: through: presence of WTGs, OHL, cleared land to accommodate facilities and access roads; and operational lighting.	Negligible		Minor adverse	Not significant
Changes in visual amenity through: the presence of WTGs, OHL towers and associated infrastructure including lighting in a rural setting; clearance of land to accommodate plant and access roads,	Negligible, except moderate adverse for Krivača village and minor adverse for Rakova Bara village	<ul style="list-style-type: none"> Lighting associated with the operation phase will be designed in order to minimise the potential impact of direct light intrusion and changes to background light levels at night 	Negligible, except moderate adverse for Krivača village and minor adverse for Rakova Bara village	Significant
Noise				
WTG noise during operation at some wind speeds, particularly at night when background noise levels are lower	Negligible to moderate	N/A	Expected to be no more than Minor adverse (not assessed quantitatively – requires WTG noise data under restricted operation)	Not significant
Socio-economic				
Availability of land previously occupied for construction, for agricultural and other use	Minor beneficial	N/A	Minor beneficial	Not significant

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
Permanent loss of land for agricultural and other use	Minor adverse	<ul style="list-style-type: none"> Measures to minimise occupation of land same as for construction phase 	Negligible	Not significant
Impacts on land use as a result of use restrictions	Negligible	<ul style="list-style-type: none"> Confine use restrictions to areas needed for repairs and maintenance 	Negligible	Not significant
Creation of direct and indirect employment opportunities	Negligible	<ul style="list-style-type: none"> Follow principles of international best practice in recruitment and employment, as for construction Procure goods and services locally whenever possible 	Negligible	Not significant
Loss of livelihoods resulting from lost crops or damages during repairs and maintenance	Negligible	<ul style="list-style-type: none"> Minimise the amount of land occupied/disrupted during repairs and maintenance. Compensate all users of land (owners and non-owner users) for lost crops and any other damages at full replacement cost, in accordance with national legislation and IFC PS5. Fully reinstate the land after disruption. Implement a grievance mechanism to enable affected people to file complaints directly to Ivicom Energy. Ivicom Energy will consider these grievances and address them in accordance with the requirements of IFC PS5. 	Negligible	Not significant
Increased incomes resulting from availability of land for agricultural or other use	Negligible	N/A	Negligible	Not significant
Revenue generation for Golubac and Kučevo	Minor or moderate beneficial	<ul style="list-style-type: none"> Pay taxes and lease in a timely and transparent manner Support and advocate for new investments in the Project area and region 	Minor or moderate beneficial	Significant
Increased tourism as a result of the wind farm (if among first in Serbia)	Negligible	<ul style="list-style-type: none"> Implement community investment plan, support activities that contribute to tourism development 	Negligible	Not significant
Local benefits through the community investment plan	Minor with potential to grow to moderate beneficial	<ul style="list-style-type: none"> Implement community investment plan 	Moderate beneficial	Significant
Improved access to land from maintained roads	Minor beneficial	<ul style="list-style-type: none"> Carry out regular maintenance of access and service roads needed for the operation of the wind farm 	Minor beneficial	Not significant
Health, safety and security				
Risks to workers' health and safety	N/A	<ul style="list-style-type: none"> OHS policies and procedures including OHS Plan, worker code of conduct and EPRP to be reviewed and updated for operational phase EPRP update to include: <ul style="list-style-type: none"> Training and evacuation procedures to manage WTG collapse and blade shear or breakage Fire prevention Lightning strike Training for welding staff and staff in other fire risk areas Measures as per construction phase 	OHS risks will remain but control measures will reduce them as far as possible	N/A

Impact	Initial significance	Summary of control measures	Residual impact rating	Significant?
Risks to community health, safety and security from: <ul style="list-style-type: none"> frosting and ice shed blade shear or breakage WTG collapse lightning strike and fire	N/A	<ul style="list-style-type: none"> Inform local population of the risks associated with the operation of the wind farm, through community meetings and appropriate warning signs Appropriate design and maintenance to prevent blade shear or breakage and WTG collapse and in the event that it occurs, clearing of all debris and payment of compensation for any damages To prevent lightning strike and fire, the use of appropriate lightning protection and fire resistant components, automatic fire detection systems and fire fighting, as well as regular maintenance 	Risks will remain but control measures will reduce them as far as possible	N/A
Risks to community health, safety and security in connection to unauthorised access and vandalism	N/A	<ul style="list-style-type: none"> Provide security to the site at various levels, including (but not limited to): <ul style="list-style-type: none"> Locking of each individual WTG tower access door Operating a permit to work system to prevent unauthorised access Control of access roads to the WTGs and associated equipment Fencing off maintenance and equipment storage area 	Risks will remain but control measures will reduce them as far as possible	N/A
Water resources				
Spill or leakage to ground or water	Negligible	<ul style="list-style-type: none"> HMHP Spill response plan 	Negligible	Not significant
EMFs, EMI and IEMI				
Risks related to EMF, EMI and IEMI	Minor	<p>The detailed design will need to incorporate measures to reduce the potential impacts of EMFs, EMI and IEMI. These will include, if necessary:</p> <ul style="list-style-type: none"> OHLs or other high voltage equipment microsited to avoid residential properties or other locations intended for highly frequent human occupancy OHL RoW and conductor bundles designed to ensure radio reception at the outside limits remains normal Direct physical interference of point-to-point communication systems will be avoided WTGs will be sited away from the line-of-sight of any broadcaster transmitter Non-metallic WTG blades will be used Fencing and other methods of protection to avoid public access to facilities at risk of IEMI attacks will be considered <p>Additional measures to protect workers will include:</p> <ul style="list-style-type: none"> Surveys to identify potential exposure levels in the workplace Use of personal monitors during working activities if necessary Training of workers in the identification of occupational EMF levels and hazards Establishment of safety zones and areas with expected elevated EMF levels Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels 	Negligible- minor	Not significant

5.5 Monitoring program

5.5.1 Introduction

IFC PS1 requires internal monitoring and external or independent monitoring of all Category A projects or projects with significant impacts. Monitoring reports will be disclosed by Ivicom Energy every three months during construction and annually during operation.

5.5.2 Ecology and nature conservation

Habitats and flora

To inform the mitigation, pre-construction botanical surveys will be conducted on the footprint of the Project when this is specifically defined for all permanent and temporary components. This will involve more accurate habitat mapping and recording all plant species using a combination of transects and quadrats. The pre-construction surveys will highlight any threatened, endemic or invasive plant species. Additional mitigation will be proposed in the monitoring reports should important habitats and species be identified.

The number of each species of tree species to be lost under the footprint of the Project will be identified during pre-construction botanical surveys. Mitigation tree planting, on sites or off-site, will be maintained for five years and monitored annually for 10 years to ensure the vegetation is established successfully. The maintenance will consist of at least two visits per year to replace any dead trees and control the weeds and pests if necessary.

Bats

In accordance with EUROBATS post construction monitoring will include monitoring of bat activity at height and searches for bat carcasses.

Bat activity monitoring should take place for the first three years of operation from the beginning of spring to the end of autumn. A specialist ecological consultancy will be employed to undertake the monitoring and to analyse the data in accordance with EUROBATS guidance.

Searches for bat carcasses will be conducted at all WTGs for the first three years of operation⁹² from the beginning of spring to the end of autumn, i.e. when bat activity is known to occur in the Project area. Prior to the searches, scavenger rate and search efficiency trials⁹³ will be conducted in accordance with the most up to date existing best practice. Carcass searches will be conducted by a specialist ecological consultancy or appropriately trained and skilled site operatives. Following the first three years of operation an appropriate mitigation strategy will be implemented and a mitigation and monitoring plan will be implemented.

Bat boxes installed as compensation for the loss of tree cavities during construction will be monitored four times each year for the first three years of operation, once in spring, once in summer, once in autumn and once in winter.

Birds

Searches for bird carcasses will be conducted at all WTGs every 15 days for the first three years of operation and within 25m of the 110kV OHL route monthly for the first two years of operation. Prior to the searches, scavenger rate and search efficiency trials will be conducted in accordance with best practice. Searches and fatality rate estimations will be undertaken in

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⁹³ Scavenger rate and search efficiency trials are required to estimate the number of dead bats and birds removed by scavengers before searchers find them and estimate the numbers not found because the efficiency of the searcher is likely to be less than 100%.

accordance with the Guidelines for Assessing the Impact of Wind Farms on Birds and Bats. Carcass searches will be conducted by a specialist ecological consultancy or appropriately trained and skilled site operatives. Following the first three years of WTG operation and two years of 110kV OHL operation, an adaptive management strategy will be implemented and a mitigation and monitoring plan will be implemented.

Monthly breeding bird transect surveys will be conducted between April and June for each of the first three years of operation. Surveys will follow the methodology of the pre-construction breeding bird surveys⁴⁰ and in the Guidelines for Assessing the Impact of Wind Farms on Birds and Bats.

Surveys for breeding peregrine falcon and Ural owl will be conducted for each of the first three years of operation. Surveys will follow the methodology of the pre-construction breeding and nocturnal bird surveys⁴⁰. Breeding peregrine falcon surveys will be undertaken over four days between February and May 2016 in Brnjica gorge. Nocturnal bird playback surveys, where calls of Ural owl are played through a loud speaker and responses recorded, will be conducted over three nights (two nights April-May; one night in October) at the 16 pre-construction survey locations within the wind farm area, including the OHLs.

5.5.3 Noise

The EHS Guidelines for Wind Energy include the following requirements for Noise Monitoring:

- Noise impacts should not exceed the levels presented in the General EHS Guidelines.
- Noise generated from wind energy facilities tends to increase with the speed of the wind, as does overall background noise due to the friction of air over existing landscape features. Increased wind speeds may also mask the noise emitted by the wind energy facility itself, and wind speed and direction may affect the direction and extent of noise propagation. The application of noise guideline values and the assessment of background levels should therefore take these factors into consideration. It is considered good practice to undertake noise compliance testing when the Project becomes operational to verify the modelled noise levels at nearby properties and confirm the appropriateness of any mitigation applied.
- Additional consideration may be required to address the nuisance factor associated with impulsive or tonal (sound of a specific frequency) characteristics of noise emitted from some wind energy facilities' configurations.

The basic requirements of monitoring will be:

- The measurement approach should be consistent with that used in describing the baseline to allow a robust comparison between pre- and post-operational noise levels. Measured noise levels in 10-minute intervals should be referenced to concurrent 10-minute averaged wind speeds corrected to standardised 10m height. Wind speeds that are standardised to 10m height will be derived from readings of wind speeds measured up to hub height and take into account the impacts of wind shear as described within the Institute of Acoustics (IOA) 2013 "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise." as referenced by the EHS Guidelines for Wind Energy ('Supplementary Guidance Note 4: Wind Shear' provides details).
- Where possible, measurement positions used for the baseline monitoring should be used to provide a consistent reference. Further positions should be added as appropriate to be suitable in addressing any emerging issues.

The IFC Guideline requirements specifically deal with operational phase impacts. The assessment has not identified a specific requirement to monitor noise during construction or

closure and decommissioning; however, this may be required in response to any reasonable complaint and noise levels reviewed against criteria to assess the impact of construction noise impacts.

5.5.4 Traffic and transport

The following monitoring provisions should be included as part of the TMP:

- The Project Developer to review contractors' environmental and social management plans to ensure continuity with commitments in the TMP
- Daily vehicle checks and periodic maintenance inspections
- Reporting on monitoring and key performance indicators (KPIs) to be provided to the local transport authority; for example:
 - Number of complaints relating to traffic and transport
 - Reporting of accidents and statistics by contractor to Ivicom Energy
- Monthly monitoring/review meetings to be held between Ivicom Energy and local transport authority
- Periodic road condition reports.

Traffic management KPIs include:

- Project vehicles complying with speed limit of vehicles and not causing traffic congestion on main roads
- Trucks kept in good conditions and maintenance done regularly
- Vehicular accident records maintained up to date and mitigations actions implemented
- Good maintenance of vehicle safety signals (flares, warning lights, reflectors), fuelling procedures and loading/off-loading

5.5.5 Socio-economic

If the household level land acquisition impact assessment determines that there are households which have suffered economic displacement as a result of land acquisition, and that some are vulnerable and require special assistance, a plan to mitigate these impacts and provide assistance will be developed. The implementation of the plan has to be monitored until all vulnerable households have been assisted and all livelihoods have been improved or, at a minimum, fully restored.

Feedback received from various Project stakeholders through the grievance mechanism or at community meetings will alert Ivicom Energy of any problems or issues that need to be dealt with, whether on an individual or community level. For example, frequent grievances regarding levels of traffic related noise at certain times of day or reoccurring difficulties in accessing land with agricultural machines and equipment may indicate that the TMP needs to be adjusted.

Grievance management itself needs to be monitored to ensure that all received complaints are addressed as described in the Project SEP. All of this also pertains to workers' grievances.

Another key activity that requires monitoring is the reinstatement of land upon completion of construction activities, and later after decommissioning. Proper reinstatement is key to ensuring that people can continue to farm their land and expect the same quality of crops, so that their livelihoods do not suffer. The same applies to restoration of roads. This needs to be monitored at the end of construction, to ensure that all roads have been reinstated to at least pre construction level. The same applies during operations, concerning road repairs and maintenance.

The execution of compensation payments for lost crops and damages must be monitored to ensure that it is being paid in a timely manner, so as to prevent any loss of livelihoods and that it is paid to the users of land whose assets are affected (even if they do not own the affected land). If businesses are affected by increased traffic, their losses must be compensated and this too must be monitored to ensure livelihoods are improved or at least restored to the previous level.

Finally, the implementation of the community investment plan should be regularly monitored to ensure that it is achieving its goals and if there is a need to update possible areas of support, revise the application procedure or include more people in the decision making process.

5.5.6 Landscape and visual

There are no monitoring measures set out in the EHS Guidelines for Wind Energy for landscape and visual amenity.

The long term monitoring should include the commitment to ongoing maintenance and management of screening planting where the land is still in Ivicom Energy's control. Where land has been reinstated and handed back to the original landowner the establishment phase should be satisfactorily completed and signed off by a suitably qualified person holding an agricultural or horticultural qualification.

5.5.7 Health, safety and security

5.5.7.1 OHS

Monitoring of OHS issues will be important to keep incidents and accidents to a minimum. Internal and external monitoring will need to ensure that the Project's commitments to OHS are implemented. Quarterly reports encompassing the monthly reports of contractors will be provided to external monitors. Frequency of reporting will reduce if appropriate during the operational phase. The following key areas will regularly be monitored and recorded during the construction phase and the operational phase as appropriate by Ivicom Energy's Project EHS manager and their team.

- Training records will be maintained, especially for:
 - OHS training and hazardous work training
 - Emergency drills
 - Toolbox talks
 - Accidents, incidents and diseases logs will be maintained to monitor the health and safety of Project workers
- Confidential health records for Project workers will be maintained, including occupational injury or disease
- Accidents, incident and occupational disease records will be made anonymous for review by external parties
- Regular site monitoring of OHS issues and PPE compliance will be carried out and recorded

5.5.7.2 Community health, safety and security

Causes of any injuries and accidents among community members will be analysed to determine if the prevention/mitigation measures are adequate or need improvements.

Feedback on prevention and mitigation of injuries, accidents and incidents will be sought from local residents at community meetings and through the community grievance mechanism.

5.5.7.3 EMFs, EMI and IEMI

Monitoring of measures to manage EMFs, EMI and IEMI will include:

- Review of the detailed design by Ivicom Energy and external engineers
- Reporting of surveys of exposure levels to the operations manager and in operational monitoring reports to external monitors
- Training records showing training received on EMFs
- Site walkovers to verify establishment of safety zones and restricted zones
- Review of action plan implementation by external monitors

5.5.8 Cultural heritage

During excavations for the OHLs, permanent archaeological oversight will be established to monitor in case archaeological remains are discovered. The Regional Institute for Protection of Cultural Monuments from Smederevo will be informed when works commence and in the case of discovery of archaeological remains. Any chance finds will also be recorded in a chance finds log book. At the end of the earthworks, the archaeologist on site will issue a report to Ivicom Energy.

5.5.9 Air quality

The following monitoring will be carried out to oversee management of potential construction dust and emissions from construction vehicles:

- Weekly inspections of construction activities
- Maintain record of high dust incidents and record any violations where observed. Impose disciplinary action on construction contractor if appropriate
- Inspect construction vehicles every two weeks (violations to be reported)
- Annual maintenance program for vehicles and plant
- Servicing records to be kept for all machinery

5.5.10 Water resources

The management systems used for both construction and operation will reduce the risk of negative impacts to water resources. In addition, the Project will implement the following monitoring mechanisms to check that management control measures are effective:

- Routine inspections and intermittent audits of excavations and drainage systems, storage, containment and use of all oils and hazardous materials
- Reporting mechanisms to allow all stakeholders to report leakages or spills
- Corrective action process to record and address any recommendations arising from reported leaks, spills or contamination
- Review of environmental performance and suggestions for improvements by external monitors

6 Framework environmental and social management plan

6.1 Introduction

The primary objective of an Environmental and Social Management Plan (ESMP) is to safeguard the environment, site staff and the local population from site activity which may cause harm or nuisance. This ESMP for the Project is intended to provide a framework to ensure transparent and effective monitoring, prevention, minimisation, mitigation, compensation and off-setting measures to address the environmental and social impacts associated with the Project. The mitigation measures described within this Framework ESMP will be applied to the 102.3 megawatt (MW) wind farm in Krivača in Serbia ('the Project'), consisting of wind turbine generators (WTGs), overhead transmission lines (OHLs), substations and roads.

The ESMP, which also covers monitoring, will therefore form the basis of the environmental and social protection measures implemented by Ivicom Energy and its contractors. The implementation of the ESMP ensures that environmental, health and safety (EHS) and social performance is in accordance with the IFC PSs, relevant EHS guidelines and best practice.

6.2 Roles and responsibilities

6.2.1 Ivicom Energy's role

Ivicom Energy will have the overall responsibility for the compliance of the Project during the construction and operational phases with the mitigation measures outlined within the environmental and social management plan (ESMP). The contractors will be required to meet the specific requirements outlined within this ESMP for the construction phase and this is to be implemented through the use of contract clauses within agreements between the Ivicom Energy and the contractors. Clauses to be inserted in the contractor agreements should ensure compliance with this ESMP and appropriate international requirements.

Ivicom Energy is to monitor the contractors' performance on a regular basis and will undertake the following throughout the duration of the construction period:

- Review contractor documents against the requirements of this ESMP
- Undertake regular audits
- Continuously check records
- Set up a contractor reporting structure
- Conduct regular meetings where environment, health, safety and social are agenda items.

During the construction phase Ivicom Energy should closely monitor all reports received from the contractors to monitor compliance. Mitigation measures described for the operational phase will be implemented by Ivicom Energy using the proposed system described in this document.

6.2.2 The contractors' roles

It will be the responsibility of the contractors (BOP contractor, Connection Works contractor and WTG supplier) to implement the construction phase mitigation measures outlined within this document and to ensure compliance of any construction sub-contractors in meeting the requirements within it. The contractors will be required to undertake regular monitoring and inspections of the construction sub-contractors and the Project sites and will be required to keep up to date records as prescribed in this ESMP and report regularly to Ivicom Energy.

6.2.3 Third party auditing

An independent, accredited third party will periodically undertake audits during the construction and operational phase to ensure compliance of the Project with this ESMP. Ivicom Energy and the contractors will be required make available all records of monitoring and meetings during any construction monitoring visits that the auditor may undertake.

6.3 Individual roles and responsibilities

Ivicom Energy's site manager

The site manager responsibilities in relation to environmental management include:

- Overall responsibility for the implementation of the Project's environmental policy and ESMP and environmental compliance on-site
- Ensuring adequate resources are available for the implementation of the ESMP across staff, equipment and training, including EHS managers and staff employed by all contractors and subcontractors on-site
- Ensuring that all EHS plans developed for the site are in compliance with the ESMP and both applicable national and international laws, regulations and standards
- Providing top management leadership in the promotion of a positive culture of responsibility and accountability in construction environmental management
- Ensuring that the Project construction phase activities are carried out in line with the national EIA's conditions
- Ensuring that adherence to all applicable environmental regulations and requirements of the ESMP will be contained in any contractual documents with all the contractors and subcontractors deployed on-site during construction
- Reporting on environmental compliance to Ivicom Energy on a regular basis
- Ensuring that corrective actions are implemented and any identified non-compliance is rectified
- Overall responsibility for contractors' and subcontractors' adherence to the Project's grievance mechanism
- Distribution of the community liaison officer's (CLO's) monitoring reports to senior managers and contractors as appropriate
- Supporting the CLO in any grievance investigations, including ensuring that the investigation team has suitable expert personnel, documentation, stoppage of work in areas until investigation has been completed, the cooperation of contractors (if required)

Ivicom Energy's EHS manager

Responsibilities of the site EHS manager include:

- Overall responsibility for the ESMP and for ensuring that all relevant environmental permits/consents' conditions are satisfactorily discharged

- Identifying and management of resources required to ensure that environmental management measures and monitoring requirements outlined within the ESMP are in place and effectively implemented
- On-going monitoring of the implementation of all commitments under the ESMP and the conditions of the national EIA approval
- Conducting regular (appropriate frequency for the environmental/social aspect in question) audits and inspections to ensure the environmental management measures are implemented
- Preparation of the internal reporting commitments of the ESMP
- Preparation of the external reporting commitments of the ESMP
- Providing management leadership in promotion of a positive culture of responsibility and accountability in environmental management during construction
- Managing the environmental staff and specialist staff in the environment department required for implementation of all commitments under the ESMP
- Ensuring all staff/workers and environmental staff are appropriately trained for their roles in delivering commitments under the ESMP
- Carrying out regular environmental awareness programmes and trainings including tool-box talks for all personnel on-site
- Acting as the day-to-day point of contact on-site for liaison on environmental matters
- Assisting any site personnel with queries or required support in relation to environmental matters
- Ensuring all personnel abide by instructions given in relation to implementation of the controls, monitoring and reporting requirements of the ESMP
- Ensuring that an appropriate line of communication with contractors and construction workers is set up, using language/terminology that they will understand, making them aware of the overall aims and actions within the ESMP
- Ensuring all subcontractors during construction are briefed on the requirements of the ESMP applicable to their role
- Signing-off or recording actions in the ESMP once they have been completed and reporting back to the regulator as necessary
- Leading spill or incident response required during construction
- Ensuring the ESMP is reviewed at least on an annual basis and initiate appropriate document updates
- Reporting to the Site Manager on any environmental matter
- Reporting on environmental incidents and non-conformances to the Site Manager
- Liaising with the subcontractors' EHS representatives and ensure the implementation of the environmental requirements, ESMP and national EIA's conditions by all subcontractors

Ivicom Energy's CLO

A CLO will be responsible for:

- Implementation of a household level land acquisition impact assessment and development of an action plan with appropriate mitigation measures.
- Communication and implementation of the Project's SEP
- Communication and management of the Project's Project performance grievance mechanism

- Undertaking visits to Project-affected communities to talk to community representatives about grievances logged (though co-ordination/designation of this element will require liaising with Ivicom Energy as Project Owner)
- As required undertaking investigations to address community grievances raised (through coordination with the site manager)
- Keeping records of all stakeholder engagement notes
- Keeping records of all grievances logged and how issues are addressed
- Reporting of stakeholder engagement and information disclosure activities to the environmental manager
- Reporting of non-conformances with SEP and any grievances to the environmental manager
- Updating of the SEP as scheduled therein and/or when new stakeholders are identified, the Project scopes changes, and before operation commence

Ivicom Energy's human resources (HR) manager (off-site)

The HR manager is required to develop a Project HR policy which will be fully compliant with national legislation and IFC PS2 requirements.

The HR manager responsibilities in relation to environmental and social management lie in ensuring all applicable national and international requirements in terms of health, safety, social and environmental matters are addressed and appropriate records are maintained for the following:

- Employment contracts and benefits
- Training requirements
- Payrolls records
- Insurance including medical and life insurances
- Employees and workers' information including contact details and emergency contacts
- Staff medical records
- Records of passport retention authorisation letters, in the event the workers/labours requested retention of their passport for security and safety reasons
- Communication of workers' grievance mechanism and maintenance of grievance log
- Leave records

The HR manager will conduct regular (quarterly) labour audits of contractors and subcontractors to monitor compliance with national and international labour laws and the Project's HR policies and procedures.

BOP contractor, connection works contractor and WTG suppliers' environmental representatives

Responsibilities include:

- Ensuring that the ESMP and its associated procedures and methods and national EIA's conditions are effectively implemented on site on a day to day basis
- Ensuring that EHS plans developed for the subcontractor's packages of work are in line and compliant with the ESMP
- Ensuring all management measures and monitoring requirements as specified within the ESMP and EHS plans are adequately implemented

- Ensuring that regular environmentally oriented training and awareness programmes are being delivered to the subcontractor's workforce, including briefings, tool-box talks based on current work packages, spill emergency training, ESMP training
- Undertaking daily environmental inspections at the subcontractor's area
- Undertaking environmental audits regularly as per the requirements specified within the ESMP (on a weekly basis) and produce weekly brief audit reports
- Reporting environmental incidents to the site environmental manager and fully investigate incidents
- Reporting non-conformances to the site environmental manager
- Keeping records of how environmental incidents and non-conformances are addressed and closed
- Keeping records/logs of environmental training and awareness programmes
- Liaising with the site environmental manager on ESMP requirements and environmental management matters
- Maintaining workers' grievance log and escalate/report issues to the site environmental manager

BOP contractor, connection works contractor and WTG suppliers' health and safety managers and representatives

Health and safety manager and representatives should be employed by the main contractor and its subcontractors in order to ensure that OHS standards and requirements are appropriately managed and implemented on site. The roles and responsibilities for health and safety personnel should be identified within the health and safety plans that will be developed by the contractors.

6.4 Mitigation and monitoring

6.4.1 Introduction

IFC PS1 requires borrowers to establish procedures to monitor and measure the effectiveness of the impact mitigation and management programme, as well as compliance with any related legal and/or contractual obligations and regulatory requirements. For Category A projects with significant impacts, such as this one, external monitoring is also required. Ivicom Energy's quarterly reports encompassing the findings of the monthly reports of contractors will be provided to external monitors. Quarterly reports will cover the key areas of environmental and social impact and the efficacy of mitigation and management measures. External monitors will review reports and visit the site to verify the findings and propose actions to improve compliance. Frequency of reporting will reduce if appropriate during the operational phase. The following sections comprise of tables that describe the mitigation, management and monitoring to be carried out during all phases including presenting key performance indicators (KPIs) for measuring success and identifying staff and organisations with responsibilities.

6.4.2 Ecology and nature conservation

Table 54: Ecology and nature conservation management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction and decommissioning				
Habitat loss and fragmentation	<ul style="list-style-type: none"> Minimise Project footprint Avoid the use of heavy machinery Controlled/designated traffic routes Off-site compensatory tree planting Habitat removal and reinstatement plan (HRRP) Installation of 100 bat boxes 	Contractors' environmental staff Ivicom Energy (with regards long term tree compensation)	<ul style="list-style-type: none"> Monthly monitoring by EHS manager during construction Pre-construction habitats and flora surveys of Project footprint to establish specific mitigation measures Assessment of tree compensation scheme (extent and health/condition) every 10 years Bat boxes to be inspected four times each year for the first three years of operation, once in spring, once in summer, once in autumn and once in winter 	<ul style="list-style-type: none"> No increase in Project footprint during construction No overall loss of threatened or protected habitats or plant species No overall decrease in the extent of functional woodland within 50 years No adverse change in habitat extent within temporary construction areas Installation of bat boxes before the removal of trees within Project footprint
Increased access to protected areas	<ul style="list-style-type: none"> Workers' site induction to include importance of the protected areas and disciplinary actions Signage will be in place, where practical, to inform people of the appropriate access routes to the protected areas, the legislation protecting the area and its species and the legal penalties for contravening the law 	Contractors' environmental staff Ivicom Energy	<ul style="list-style-type: none"> Daily reporting of incidents from Project staff and contractors to EHS manager 	<ul style="list-style-type: none"> No construction staff/contractors to enter protected area from Project site
Introduction of invasive alien species (AIS)	<ul style="list-style-type: none"> Implement guidelines on the prevention and management of AIS by IPIECA 	Contractors' environmental staff	<ul style="list-style-type: none"> Monthly monitoring by EHS manager during construction 	<ul style="list-style-type: none"> No records of new AIS or increase in the spatial extent of existing AIS within 50m of the Project footprint
Disturbance	<ul style="list-style-type: none"> Avoid and minimise use of artificial lighting Best practice noise reduction measures 	Contractors' environmental staff	<ul style="list-style-type: none"> Monthly breeding bird transect surveys will be conducted between April and June for each of the first three years of operation. 	<ul style="list-style-type: none"> No statistically significant change in baseline conditions (presence and /or abundance) post construction
Incidental mortality	<ul style="list-style-type: none"> Minimise time excavations are open Protect deep excavations overnight Check excavations before filling 	Contractors' environmental staff	<ul style="list-style-type: none"> Daily reporting of mortality incidents during construction by staff and contractors to the EHS manager. 	<ul style="list-style-type: none"> No records of incidental mortality

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> Controlled/designated traffic routes Follow industry best practice pollution prevention guidance Survey mature trees for bats prior to felling and establish no work zones if necessary Removal of bats and provision of artificial roosts prior to tree felling Clear above-ground vegetation between September to March to avoid breeding birds and reduce habitat suitability for mammals, reptiles and amphibians Undertake ground works after above-ground vegetation clearance Survey the Project footprint prior to ground clearance to identify the presence of mammals, reptiles and amphibians and establish no work zones if necessary 		<ul style="list-style-type: none"> The EHS manager will record each incident and the log will be reviewed quarterly by external monitors. 	
Operations				
Increased access to protected area	<ul style="list-style-type: none"> A protocol will be developed between the Sponsor, local municipality and national park authority to minimise hunting, land conversion and recreational disturbance within the Project area due to the creation of new roads. This will include, where practical, restricting access (for example barriers and signage) and cooperative collaboration to monitor, report and prevent unlawful activities. 	Operational staff	<ul style="list-style-type: none"> Reporting of incidents to the relevant local authorities 	<ul style="list-style-type: none"> No unlawful activities in protected area
Collision with operational WTGs	<ul style="list-style-type: none"> To be confirmed following operational monitoring Undertake cumulative impact assessment at the end of monitoring period to inform mitigation strategy 	Specialist ecological consultancy and/or trained and skilled operational staff	<ul style="list-style-type: none"> Bat activity monitoring should take place for the first three years of operation from the beginning of spring to the end of autumn. 	<ul style="list-style-type: none"> No bat mortality No previously unrecorded species on site that is vulnerable to collision and recorded as a collision victim No significant cumulative impacts

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
			<ul style="list-style-type: none"> Searches for bird carcasses will be conducted at all WTGs every 15 days for the 36 months (three years) of operation. 	<ul style="list-style-type: none"> No statistically significant change in predicted mortality rates No previously unrecorded species on site that is vulnerable to collision and recorded as a collision victim
Collision with OHLs	<ul style="list-style-type: none"> To be confirmed following operational monitoring 	Specialist ecological consultancy and/or trained and skilled operational staff	<ul style="list-style-type: none"> Searches for bird carcasses will be conducted monthly along the OHL corridors (up to 25m either side of the line) for the first two years of operation. 	<ul style="list-style-type: none"> No bird mortality No previously unrecorded species on site that is vulnerable to collision and recorded as a collision victim
Displacement	<ul style="list-style-type: none"> To be confirmed following operational monitoring Undertake cumulative impact assessment at the end of monitoring period to inform mitigation strategy 	Specialist ecological consultancy	<ul style="list-style-type: none"> Monthly breeding bird transect surveys will be conducted between April and June for each of the first three years of operation. Surveys for peregrine falcon and Ural owl will be conducted for each of the first three years of operation. 	<ul style="list-style-type: none"> No statistically significant change in baseline conditions (abundance) No negative change in baseline conditions (loss of territories/breeding pairs) No significant cumulative impacts

6.4.3 Landscape and visual

Table 55: Landscape and visual management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction and decommissioning				
Changes to landscape character through: presence of construction traffic, plant, equipment and lighting in a rural setting; clearance of land to accommodate construction activities and access roads.	<ul style="list-style-type: none"> Design lighting to minimise the potential impact of light pollution at night particularly in relation to potential light spill into the National Park or residential properties Carefully monitor noise to minimise impacts on tranquillity Minimise traffic will be kept to a minimum near the National Park and residential areas Retain existing vegetation to reduce visual intrusion 	Contractors	<ul style="list-style-type: none"> Throughout the Project Replacement planting to be monitored for at least five years after the completion of the Project 	<ul style="list-style-type: none"> Artificial light sources to be directional and task focussed. Noise levels as maintained within standards Construction access to follow defined access roads that avoid the National Park Existing vegetation to be retained for screening and aesthetic reasons to be excluded from the working

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> Use spoil from all excavations to form earth banks where possible, profiles to provide screening for building elements where required or re-profiled to smooth flowing contours into the surrounding landform as appropriate and without compromising other sensitive features Reinstate construction compounds and temporary access roads to their former condition following completion of the construction works. Replace removed vegetation using suitable species 			<p>area during the construction period</p> <ul style="list-style-type: none"> Spoil successfully integrated into the landscape Planting successfully established as part of reinstatement of construction compounds and temporary access roads in the first season following completion of the construction works
<p>Changes in visual amenity through: presence of construction traffic, plant, equipment and lighting in a rural setting; clearance of land to accommodate construction activities and access roads,</p>	<ul style="list-style-type: none"> Detailed site selection process for the OHL tower locations to avoid areas of existing tree cover and water courses to minimise vegetation clearance 	<p>Ivicom Energy</p>	<ul style="list-style-type: none"> Throughout the Project Replacement planting to be monitored for at least five years after the completion of the Project 	<ul style="list-style-type: none"> Record design changes to minimise loss of sensitive landscape features
Operations				
<p>Changes to landscape character of the wooded hillsides and plateau LCA through: presence of WTGs, OHL, cleared land to accommodate facilities and access roads; and operational lighting</p>	<ul style="list-style-type: none"> Design lighting to minimise the potential impact of light pollution at night particularly in relation to potential light spill into the National Park or residential properties 	<p>Ivicom Energy</p>	<ul style="list-style-type: none"> Throughout the Project 	<ul style="list-style-type: none"> Artificial light sources to be directional and task focussed
<p>Presence of new infrastructure in a rural landscape changing the landscape character</p>	<ul style="list-style-type: none"> Replace removed vegetation with suitable indigenous species Reinstate disturbed areas adjacent to the widened and new access roads to minimise the visual intrusion in the landscape. Maintain planting areas for one full growing season following planting to ensure establishment 	<p>Ivicom Energy</p>	<ul style="list-style-type: none"> Throughout the Project Replacement planting to be maintained for at least five years after the completion of the Project 	<ul style="list-style-type: none"> Vegetation established

6.4.4 Traffic and transport

Table 56: Traffic and transport management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction and Decommissioning				
Impact on road network from normal construction traffic	<ul style="list-style-type: none"> Regular inspection and maintenance of roads used by the Project Set up a road maintenance fund to cover damage caused by Project related activities during the construction phase Observe local traffic regulations of no circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday 	WTG Supplier/Ivicom Energy	<ul style="list-style-type: none"> Periodic monitoring of road conditions Review the fund for road repair against budget Quarterly monitoring against implementation of the Traffic Management Plan (TMP) 	<ul style="list-style-type: none"> Fund for road repairs set up and maintained solvent Regular inspection and maintenance of roads used by the Project
Impact on road network from oversized vehicles traffic	<ul style="list-style-type: none"> Driver training for oversized vehicles and a refresher course every six months for Project drivers Observe local traffic regulations of no circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday Details of abnormal load escort proposals to be included in TMP 	WTG Supplier/Ivicom Energy	<ul style="list-style-type: none"> Periodic monitoring that drivers are adequately trained Monitor all abnormal loads are escorted Quarterly monitoring against implementation of the TMP 	<ul style="list-style-type: none"> Driver training for oversized vehicles drivers and a refresher course undertaken every six months No circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday All abnormal load escorted
Impacts of increased traffic on road safety	<ul style="list-style-type: none"> Speed restrictions for Project traffic travelling through communities (to be agreed with the local transport authority) Observe local traffic regulations of no circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday Undertake pedestrian awareness programme along the main site access routes Schedule deliveries and road movements to avoid peak periods 	WTG Supplier/Ivicom Energy	<ul style="list-style-type: none"> Regular monitoring of speed restriction and observance Ensure pedestrian awareness programme is continuous Quarterly monitoring against implementation of the TMP 	<ul style="list-style-type: none"> Speed restrictions for Project traffic set and observed No circulation of oversized vehicles between 12:00am and 5:00am from Friday to Monday Pedestrian awareness programme undertaken Schedule deliveries and road movements during off peak periods Low emissions vehicles used Workers informed and reminded of road safety via

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> Utilise low emissions vehicles for the transportation of materials (wherever practicable) Workers should be informed and reminded of road safety via toolbox talks and staff notice boards 			toolbox talks and staff notice board
Impacts on ports capacity	<ul style="list-style-type: none"> Schedule ports deliveries and movements (Smederevo and Pančevo) in collaboration with port operators Ensure undisrupted and constant movement of deliveries from the port to site 	WTG Supplier/Ivicom Energy	<ul style="list-style-type: none"> Quarterly monitoring against implementation of the TMP to ensure limiting storing parts at the ports and undisrupted transport of materials and parts to the site 	<ul style="list-style-type: none"> All arrivals and movements at the Smederevo and Pančevo Ports done in close collaboration with port operators Minimal storing the WTG parts in the ports

6.4.5 Noise

Table 57: Noise management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction				
No potential risks assuming the noisiest phase works including WTG foundation construction and vehicle deliveries can be undertaken during the daytime	<ul style="list-style-type: none"> Planning activities in consultation with local communities Using noise control devices such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines Avoiding or minimising Project transportation through community areas Layout of the temporary construction laydown area to ensure that noisy activities are located furthest away from sensitive receptors Unnecessary revving of engines and use of horns will be avoided Equipment will be switched off when not in use 	Ivicom Energy and construction contractors	<ul style="list-style-type: none"> Ivicom Energy to carry out quarterly monitoring of noise levels using sound level meter at the nearest residential properties to construction activities for comparison against standards. Record and investigate any complaints via the Project performance grievance mechanism. Monitoring frequency: quarterly or upon complaints of excessive noise. 	<ul style="list-style-type: none"> No noise complaints received

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
<ul style="list-style-type: none"> • Internal haul routes will be kept well maintained • Plant and vehicles will be sequentially started up rather than all together • Use of effective exhaust silencing systems or acoustic engine covers as appropriate • Plant will always be used in accordance with manufacturers' instructions • Site equipment will be located away from noise-sensitive areas. Loading and unloading will also be carried out away from such areas • Maintenance to keep plant and equipment working to manufacturers' specifications • Screening e.g. noise barriers and bunds will be used as appropriate • No movements during the night period and restrict movements to avoid sensitive times of the day (early morning or late at night) • Avoidance of sensitive areas and/or movements to be directed along multiple links to minimise the intensity of traffic on individual links in sensitive areas • Proper maintenance of vehicles, ensure silencers are fitted and that vehicles comply with emission standards • Avoid queuing vehicles on the access road or at the site access points • Adherence to speed limits • Minimise changes in the profile of the road to avoid body slap and rattle noise 				
Operations				
WTG noise	<ul style="list-style-type: none"> • Compliance with IFC Noise Level Guidelines is predicted. Operational monitoring to be undertaken to demonstrate compliance and in response to any reasonable complaint 	Ivicom Energy	<ul style="list-style-type: none"> • Periodic noise monitoring at the measurement positions LT1, LT2 and LT3 or subsequently affected receptors, and in response to reasonable complaint 	<ul style="list-style-type: none"> • Monitored noise levels do not indicate a significant impact • No noise complaints received
Decommissioning				

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
No potential risks assuming noisiest phase works can be undertaken during the daytime	<ul style="list-style-type: none"> Basic methods of noise control as described above in construction section. 	Ivicom Energy and construction contractors	<ul style="list-style-type: none"> Ivicom Energy to carry out quarterly monitoring of noise levels using sound level meter at the nearest residential properties to construction activities for comparison against standards. Record and investigate any complaints via the Project performance grievance mechanism. Monitoring frequency: quarterly or upon complaints of excessive noise. 	<ul style="list-style-type: none"> No noise complaints received

6.4.6 Socio-economic

Table 58: Socio-economic impact management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction				
Loss of land available for agriculture and other use	<ul style="list-style-type: none"> Implement grievance management system Minimise the amount of land occupied during construction Position WTGs near edges of land plots to optimise land use Upon the completion of construction activities, fully reinstate the land not permanently occupied 	Ivicom Energy (site manager and CLO) and construction contractors	<ul style="list-style-type: none"> Record and investigate any complaints via the Project grievance mechanism Review WTG siting plan to ensure land use is optimised Site review after completion of construction activities to determine if unused land is fully reinstated 	<ul style="list-style-type: none"> No complaints in relation to occupancy of land during construction; or on inadequate reinstatement of land
Difficult access to land during road upgrades and construction	<ul style="list-style-type: none"> Implement grievance management system Develop and implement a TMP Provide timely information to users of land of when access to their land might be more difficult (e.g. scheduled access road upgrades) 	Ivicom Energy (site manager and CLO) and construction contractors	<ul style="list-style-type: none"> Record and investigate any complaints via the Project grievance mechanism 	<ul style="list-style-type: none"> TMP has been shared with affected communities and is being implemented No complaints on recurring prevented access to land from landowners and users
Enhancing direct and indirect employment	<ul style="list-style-type: none"> Implement grievance management system Provide timely and transparent information regarding employment opportunities related to the Project 	Ivicom Energy (HR) and construction contractors	<ul style="list-style-type: none"> Record and investigate any complaints via the Project grievance mechanism Record job announcement and maintain employment files (contracts, employee data, training records, etc.) 	<ul style="list-style-type: none"> No complaints on recruitment or labour issues through community grievance mechanism and workers' grievance mechanism

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
<p>Loss of livelihoods resulting from expropriation for roads</p> <p>Loss of livelihoods resulting from lost crops or damages</p>	<ul style="list-style-type: none"> ● Put in place transparent and fair recruitment procedures ● Ensure that all employee and non-employee workers are engaged in line with both national legislation and applicable international (ILO) standards and recommendations ● Provide a grievance mechanism for workers ● Implement a training programme for the local workforce to enable them to take advantage of job opportunities ● Procure goods and services locally whenever possible <ul style="list-style-type: none"> ● Implement grievance management system ● Minimise the amount of land acquired, occupied/disrupted during construction ● Provide timely information to users of land of when construction is planned to begin and how lost crops and damages will be compensated ● Compensate all users of land for lost crops and any other damages at full replacement cost, in accordance with national legislation and IFC PS5 ● Fully reinstate the land after disruption ● Implement a household level land acquisition impact assessment and design appropriate mitigation measures to: <ul style="list-style-type: none"> – Determine whether each household whose land has been acquired for service and/or access roads has been economically displaced and if the household is vulnerable. – Determine if any land acquired through a voluntary transaction is being used by someone other than the owner (formal or informal user) as well as whether that user's household has been economically displaced. 	<p>Ivicom Energy (site manager and CLO)</p>	<ul style="list-style-type: none"> ● Record and investigate any complaints via the worker grievance mechanism ● Record supplier information, including their place of registration and operation ● Ivicom Energy will monitor whether contractors and suppliers are abiding by national labour legislation and international best practice <ul style="list-style-type: none"> ● Monitor the provision of assistance to economically displaced and/or vulnerable households if identified during the household level land acquisition impact assessment. ● Record and investigate any complaints via the Project grievance mechanism ● Engage with local residents to determine if there are complaints that have not been officially submitted to Ivicom Energy and investigate the complaints; prepare meeting notes 	<ul style="list-style-type: none"> ● Livelihoods of economically displaced and vulnerable households fully restored (documented) ● No complaints on inadequate compensation from landowners and users ● Grievance log showing all complaints successfully closed out

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> – Develop concrete measures to assist households who have been economically displaced (additional compensation, assistance to restore livelihoods) and those who have been identified as being vulnerable (assistance to restore livelihoods and any other measures depending on the type of vulnerability). 			
Loss of livelihoods as a result of transport and increased traffic, for businesses on Road 256	<ul style="list-style-type: none"> • Implement grievance management system • Provide timely information to people/households located along selected transport route that there will be increased transport activity in their area and the possible impacts as well as foreseen mitigation measures • Compensate any business losses at full replacement cost, in accordance with national legislation and IFC PS5 	Ivicom Energy (site manager and CLO)	<ul style="list-style-type: none"> • Record and investigate any complaints via the Project grievance mechanism • Engage with local businesses to determine if there are complaints that have not been officially submitted and investigate the complaints; prepare meeting notes 	<ul style="list-style-type: none"> • No complaints on loss of livelihoods from business owners, as a result of transport and traffic • Grievance log showing all complaints successfully closed out
Damages to road surfaces leading to damages of vehicles and potential for accidents	<ul style="list-style-type: none"> • Implement grievance management system • Preparation of roads for heavy transport before construction • Restoration of roads to at least pre-construction state 	Ivicom Energy (site manager and CLO) and construction contractors	<ul style="list-style-type: none"> • Record and investigate any complaints via the Project grievance mechanism • Period monitoring of road conditions 	<ul style="list-style-type: none"> • No complaints on damages of roads or accidents caused by damaged roads
Operations				
Permanent loss of land for agricultural or other use	<ul style="list-style-type: none"> • Implement grievance management system • Measures to minimise occupation of land, same as for construction phase 	Ivicom Energy	<ul style="list-style-type: none"> • Record and investigate any complaints via the Project grievance mechanism 	<ul style="list-style-type: none"> • No complaints in relation to occupancy of land during construction; on inadequate reinstatement of land
Creation of direct and indirect employment opportunities	<ul style="list-style-type: none"> • Implement grievance management system • Follow principles of international best practice in recruitment and employment, as for construction • Procure goods and services locally whenever possible 	Ivicom Energy	<ul style="list-style-type: none"> • Record and investigate any complaints via the Project grievance mechanism • Record job announcements and maintain employment files (contracts, employee data, training records, etc.) • Record and investigate any complaints via the worker grievance mechanism • Record supplier information, including their place of registration and operation 	<ul style="list-style-type: none"> • No complaints on recruitment or labour issues through community grievance mechanism and workers' grievance mechanism

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
			<ul style="list-style-type: none"> Ivicom Energy will monitor whether contractors and suppliers are abiding by national labour legislation and international best practice 	
Loss of livelihoods resulting from lost crops or damages during repairs and maintenance	<ul style="list-style-type: none"> Implement grievance management system Minimise the amount of land occupied / disrupted during repairs and maintenance Compensate all users of land (owners and non-owner users) for lost crops and any other damages at full replacement cost, in accordance with national legislation and IFC PS5 <p>Fully reinstate the land after disruption</p>	Ivicom Energy	<ul style="list-style-type: none"> Record and investigate any complaints via the Project grievance mechanism Engage with local residents to determine if there are complaints that have not been officially submitted to Ivicom Energy and investigate the complaints; prepare meeting notes 	<ul style="list-style-type: none"> No complaints on inadequate compensation from landowners and users Grievance log showing all complaints successfully closed out
Revenue generation for Golubac and Kučevo	<ul style="list-style-type: none"> Pay taxes and lease in a timely and transparent manner Support and advocate for new investments in the Project area and region 	Ivicom Energy	<ul style="list-style-type: none"> Record all payments made to the municipalities and the basis for payment Record all new investments in the Project area and region and how/if they are connected to the Project 	<ul style="list-style-type: none"> All financial obligations towards municipalities are settled New investments in the Project area and region which can be attributed to the Project
Support local initiatives and development	<ul style="list-style-type: none"> Implement community investment plan Implement grievance management system 	Ivicom Energy and municipalities Golubac and Kučevo	<ul style="list-style-type: none"> Record and publish all funded initiatives, including monitoring data received from municipalities Prepare and publish annual reports 	<ul style="list-style-type: none"> No complaints on the implementation of the community investment plan Increased interest from local communities for applying for funding
Improved access to land from maintained roads	<ul style="list-style-type: none"> Implement grievance management system Carry out regular maintenance of access and service roads needed for the operation of the wind farm 	Ivicom Energy	<ul style="list-style-type: none"> Record and investigate any complaints via the Project grievance mechanism Period monitoring of road conditions 	<ul style="list-style-type: none"> No complaints on damages of roads or accidents caused by damaged roads
Decommissioning				
	<ul style="list-style-type: none"> Same as for construction Implement grievance management system Minimise land occupied for decommissioning works Fully reinstate all disturbed land Develop and implement TMP 	Ivicom Energy and construction contractors	<ul style="list-style-type: none"> Record and investigate any complaints via the Project grievance mechanism Same as for construction 	<ul style="list-style-type: none"> Same as for construction

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> • Inform local communities on planned activities, including when traffic may increase or when roads will be repaired • Carry out employment in accordance with international good practice, procure goods and services locally • Compensate all crops, damages, livelihood losses; inform people about the process of compensation • Restore all roads, repair damages 			

6.4.7 Health, safety and security

Table 59: Health, safety and public nuisance management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction				
Risks to health and safety of workers	<ul style="list-style-type: none"> • OHS policies and procedures including OHS Plan and method statements, worker code of conduct and emergency preparedness and response plan (EPRP) • EPRP to include measures associated with equipment failure in the event of natural hazards • Assignment of appropriate personnel for EHS roles • PPE • First aid room and staff • Emergency response team • Site safety and job specific safety training • Monitoring and reporting of incidents, accidents and occupational health • Worker grievance mechanism • Toolbox talks on safety, housekeeping and hygiene • Good housekeeping on site 	Ivicom Energy EHS manager Contractors' OHS Managers	<ul style="list-style-type: none"> • Training records will be maintained, especially for: <ul style="list-style-type: none"> – OHS training and hazardous work training – Emergency drills – Toolbox talks – Accidents, incidents and diseases logs will be maintained to monitor the health and safety of Project workers • Confidential health records for Project workers will be maintained, including occupational injury or disease • Accidents, incident and occupational disease records will be made anonymous for review by external parties • Regular site monitoring of OHS issues and PPE compliance will be carried out and recorded 	Targets to be set for near miss reports submitted per month Zero fatalities across Project lifecycle Zero lost-time accidents across Project lifecycle Zero occupational diseases across Project lifecycle Workers using all recommended PPE at all times Emergency drill frequency to match OHS plan Training kept up to date Worker interviews to verify safety culture

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Risks to local community members	<ul style="list-style-type: none"> ● Drinking water ● Pest and vector control ● Fencing of all construction areas, with gates and warning signs on access roads ● Control of access roads to the WTGs and associated equipment ● Fencing off maintenance and equipment storage areas ● 24hour security personnel with security cameras to prevent unauthorised entry to the site ● Display of contact details for emergency response services and police in the security station, for use in the event of unauthorised entry ● Hire local workforce, i.e. give preference to suitably qualified and experienced applicants from the local communities ● Enforce workers code of conduct, including on safe driving ● Cooperate and coordinate with local health, safety and security service providers ● Provide timely information to people/households located along the selected transport route on possible risks and prevention measures ● Develop and implement TMP 	Ivicom Energy (site manager and CLO) and construction contractors	<ul style="list-style-type: none"> ● Record accidents, incidents and injuries involving community members ● Regular site monitoring to ensure community health, safety and security measures are in place ● Record and investigate any complaints via the Project grievance mechanism 	<ul style="list-style-type: none"> ● No accidents and injuries involving community members ● No complaints regarding community health, safety and security
Operations				
Risks to health and safety of workers	<ul style="list-style-type: none"> ● OHS policies and procedures including OHS Plan, worker code of conduct and EPRP to be reviewed and updated for operational phase ● EPRP update to include: <ul style="list-style-type: none"> – Training and evacuation procedures to manage WTG collapse and blade shear or breakage – Fire prevention – Lightning strike 	Ivicom Energy EHS manager	<ul style="list-style-type: none"> ● Training records will be maintained, especially for: <ul style="list-style-type: none"> – OHS training and hazardous work training – Emergency drills – Toolbox talks – Accidents, incidents and diseases logs will be maintained to monitor the health and safety of Project workers 	<p>Targets to be set for near miss reports submitted per month</p> <p>Zero fatalities across Project lifecycle</p> <p>Zero lost-time accidents across Project lifecycle</p> <p>Zero occupational diseases across Project lifecycle</p> <p>Workers using all recommended PPE at all times</p>

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> ○ Training for welding staff and staff in other fire risk areas – Measures as per construction phase 		<ul style="list-style-type: none"> ● Confidential health records for Project workers will be maintained, including occupational injury or disease ● Accidents, incident and occupational disease records will be made anonymous for review by external parties ● Regular site monitoring of OHS issues and PPE compliance will be carried out and recorded 	<p>Emergency drill frequency to match OHS plan</p> <p>Training kept up to date</p> <p>Worker interviews to verify safety culture</p>
<p>Risks to local community members</p>	<ul style="list-style-type: none"> ● Inform local population of the risks associated with the operation of the wind farm, through community meetings and appropriate warning signs ● Appropriate design and maintenance to prevent blade shear or breakage and WTG collapse and in the event that it occurs, clearing of all debris and payment of compensation for any damages ● To prevent lightning strike and fire, the use of appropriate lightning protection and fire resistant components, automatic fire detection systems and firefighting, as well as regular maintenance ● Provide security to the site at various levels, including (but not limited to): <ul style="list-style-type: none"> – Locking of each individual WTG tower access door – Operating a permit to work system to prevent unauthorised access – Gates and warning signs on access roads – Control of access roads to the WTGs and associated equipment ● Fencing off maintenance and equipment storage area 	<p>Ivicom Energy</p>	<ul style="list-style-type: none"> ● Record accidents, incidents and injuries involving community members ● Regular site monitoring to ensure community health, safety and security measures are in place ● Record and investigate any complaints via the Project grievance mechanism 	<ul style="list-style-type: none"> ● No accidents and injuries involving community members ● No complaints regarding community health, safety and security
Decommissioning				
<p>Risks to health and safety of workers</p>	<ul style="list-style-type: none"> ● OHS policies and procedures including OHS Plan, worker code of conduct and 	<p>Ivicom Energy EHS manager</p>	<ul style="list-style-type: none"> ● Training records will be maintained, especially for: 	

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<p>EPRP to be reviewed and updated for decommissioning phase</p> <ul style="list-style-type: none"> Measures as per construction phase Use trained personnel to identify and remove waste/hazardous material Training and safety monitoring systems for working with demolished structures 	Contractors' OHS managers	<ul style="list-style-type: none"> OHS training and hazardous work training Emergency drills Toolbox talks Accidents, incidents and diseases logs will be maintained to monitor the health and safety of Project workers Confidential health records for Project workers will be maintained, including occupational injury or disease Accidents, incident and occupational disease records will be made anonymous for review by external parties Regular site monitoring of OHS issues and PPE compliance will be carried out and recorded 	
Risks to local community members	<ul style="list-style-type: none"> Same as for construction. 	Ivicom Energy	<ul style="list-style-type: none"> Record accidents, incidents and injuries involving community members Regular site monitoring to ensure community health, safety and security measures are in place Record and investigate any complaints via the Project grievance mechanism 	<ul style="list-style-type: none"> No accidents and injuries involving community members No complaints regarding community health, safety and security

6.4.8 Archaeology and cultural heritage

Table 60: Archaeology and cultural heritage management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Pre-construction evaluation				

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Four potential archaeological sites identified within the 1km study area, near to the two 19.4km routes of 110kV OHLs	<ul style="list-style-type: none"> Carry out archaeological survey comprising: <ul style="list-style-type: none"> Walkover survey along the route of the OHL to identify the archaeological sites Excavation of test pits at the location of the 110kV OHL tower foundations in order to identify the presence and nature of any archaeological remains 	Ivicom Energy, EHS manager	<ul style="list-style-type: none"> Inform the Regional Institute for Protection of Cultural Monuments from Smederevo of: <ul style="list-style-type: none"> Commencement of works Discovery of any archaeological remains Record all chance finds in log book 	<ul style="list-style-type: none"> Correspondence with Institute at appropriate times All chance finds dealt with according to chance finds procedure No loss of or damage to cultural resources
Construction				
Excavation and preparation of the 31 WTG foundations and OHL tower foundations	<ul style="list-style-type: none"> Permanent archaeological oversight during all earthworks to foundations Where insufficient professional archaeological services and conditions are able to be met Ivicom Energy is bound to alter the design of the Project to an alternative layout which will mitigate impact on the archaeological site Promptly inform the Institute about the commencement of earthworks Chance finds procedure 	Ivicom Energy, EHS manager	<ul style="list-style-type: none"> Establish permanent archaeological oversight during the excavations for the 31 WTG foundations and the two 19.4km routes of 110kV OHLs and two internal 35kV OHLs Inform the Regional Institute for Protection of Cultural Monuments from Smederevo of: <ul style="list-style-type: none"> Commencement of works Discovery of any archaeological remains Record all chance finds in log book Report at end of earthworks submitted to Ivicom Energy 	<ul style="list-style-type: none"> CV of person performing archaeological oversight in place during earthworks Correspondence with Institute at appropriate times All chance finds dealt with according to chance finds procedure No loss of or damage to cultural resources
Construction of 5km of access roads and 15.8km of service roads. Upgrading works to 16km of existing roads for access roads and 4.2km of existing roads for service roads. Construction of substation.	<ul style="list-style-type: none"> Promptly inform the Institute about the commencement of earthworks Chance finds procedure 	Ivicom Energy, EHS manager	<ul style="list-style-type: none"> Inform the Regional Institute for Protection of Cultural Monuments from Smederevo of: <ul style="list-style-type: none"> Commencement of works Discovery of any archaeological remains Record all chance finds in log book 	<ul style="list-style-type: none"> Correspondence with Institute at appropriate times All chance finds dealt with according to chance finds procedure No loss of or damage to cultural resources

6.4.9 Air emissions

Table 61: Air emissions management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction dust emission and re-suspension	<ul style="list-style-type: none"> • Good site management, planning and layout to minimise material transport, storage and handling • Covering stockpiles and re-vegetation of exposed areas • Use of water suppression • No waste burning • Impose speed limit for construction traffic 	Contractors	<ul style="list-style-type: none"> • Weekly inspections of construction activities • Maintain record of high dust incidents and record any violations where observed. Impose disciplinary action on construction contractor if appropriate. 	<ul style="list-style-type: none"> • Construction dust emissions minimised such that no complaints are received from local communities.
Emissions from on-site plant and construction vehicles	<ul style="list-style-type: none"> • Vehicles to comply with national programs, be regularly maintained, have enforced speed limits, no-idling policy, use of cleaner fuels where possible and drivers to be trained on driving practices to reduce fuel consumption and increase safety • Generators to have appropriate location and height of exhaust pipes to ensure proper dispersion of pollutants • Generators to be of a modern design and well-maintained to minimise air pollutant emissions 	Contractors	<ul style="list-style-type: none"> • Visual checks of construction vehicles every two weeks (violations to be reported). • Annual maintenance program for vehicles and plant. • Servicing records to be kept for all machinery. 	<ul style="list-style-type: none"> • Plant and vehicles compliant with national programs.

6.4.10 Water resources

Table 62: Water resources

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction				
Storage and handling of fuels and chemicals	<ul style="list-style-type: none"> • Hazardous materials handling and storage plan (HMHP) • Spill response plan 	Ivicom Energy's EHS manager	<ul style="list-style-type: none"> • Routine inspections and intermittent audits of excavations, drainage systems 	<ul style="list-style-type: none"> • Site reports indicate low number of spillages

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
	<ul style="list-style-type: none"> • Training for all personnel who handle hazardous materials • Oil interceptors 		and storage, containment and use of all oils and hazardous substances	
Sewage spill from site toilets	<ul style="list-style-type: none"> • Waste management plan (WMP) • Spill response plan • Training for all personnel who transport sewage 	Ivicom Energy's EHS manager	<ul style="list-style-type: none"> • Reporting mechanisms to allow all stakeholders to report leakages or spills • Corrective action process to record and address any recommendations arising from reported leaks, spills or contamination reported 	
Vehicle washing or plant operation	<ul style="list-style-type: none"> • Training for all personnel • Oil interceptors 	Ivicom Energy's EHS manager	<ul style="list-style-type: none"> • Review of environmental performance and suggestions for improvements by external monitors 	
Erosion and sedimentation from excavations	<ul style="list-style-type: none"> • Minimise exposed soil • Temporary drainage • Sedimentation ponds 	Ivicom Energy's EHS manager		<ul style="list-style-type: none"> • Site reports indicate no erosion or sediment issues
Operations				
Storage and handling of fuels and chemicals	<ul style="list-style-type: none"> • As construction 	Ivicom Energy's EHS manager	<ul style="list-style-type: none"> • Reporting mechanisms to allow all stakeholders to report leakages or spills • Corrective action process to address and record any leakages or spills reported • Audits of storage, containment and use of all oils and hazardous substances • Review of environmental performance and suggestions for improvements by external monitors 	<ul style="list-style-type: none"> • Site reports indicate low number of spillages
Decommissioning				
Identification of any contaminated land	<ul style="list-style-type: none"> • Site inspected to check for any ground contamination which may have occurred in the operational phase. 	Ivicom Energy's EHS manager	<ul style="list-style-type: none"> • Review of environmental performance and suggestions for improvements by external monitors 	<ul style="list-style-type: none"> • Any contamination removed

6.4.11 Electric and magnetic fields

Table 63: Electric and magnetic fields management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Pre-construction				

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Potential exposure of public to EMF	<ul style="list-style-type: none"> • Reduce the EMF produced by OHLs, substations, or transformers during detailed design • Avoid installation of OHLs or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy 	Ivicom Energy External engineering consultancy	<ul style="list-style-type: none"> • Approval of final design by external engineers before financial close 	<ul style="list-style-type: none"> • Approval of final design by external engineers before financial close
Operations				
Potential exposure of workers to EMF	<ul style="list-style-type: none"> • Surveys to identify potential exposure levels in the workplace and the use of personal monitors during working activities if necessary • Training of workers in the identification of occupational EMF levels and hazards • Establishment of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure and limiting access to properly trained workers • Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels 	Ivicom Energy	<ul style="list-style-type: none"> • Reporting of surveys of exposure levels to the operations manager and in operational monitoring reports to external monitors • Training records showing training received on EMFs • Site walkovers to verify establishment of safety zones and restricted zones • Review of action plan implementation by external monitors 	<ul style="list-style-type: none"> • No exceedances of safe limits

6.4.12 Electromagnetic interference

Table 64: Electromagnetic interference management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Pre-construction				
Potential creation of radio noise	<ul style="list-style-type: none"> Design OHL RoW and conductor bundles to ensure radio reception at the outside limits remains normal 	Ivicom Energy External engineering consultancy	<ul style="list-style-type: none"> Approval of final design by external engineers before financial close 	<ul style="list-style-type: none"> Approval of final design by external engineers before financial close
Interference to telecommunication systems	<ul style="list-style-type: none"> Avoid direct physical interference of point-to-point communication systems 			
Television interference	<ul style="list-style-type: none"> Site WTGs away from the line-of-sight of any broadcaster transmitter Use non-metallic WTG blades 			
IEMI	<ul style="list-style-type: none"> Consideration of fencing and other methods of protection to avoid public access to at-risk facilities. 			

6.4.13 Waste management

Table 65: Waste management and mitigation

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Construction				
Leakage or spillage of wastes	<ul style="list-style-type: none"> Develop Project's construction WMP (CWMP) to include as a minimum: <ul style="list-style-type: none"> Types and quantities of wastes to be generated during construction Methods and locations for management of each waste type, including provisions for hazardous waste management and disposal Good practice procedures as a priority for waste avoidance, 	Contractors to develop and implement the CWPM Ivicom Energy to maintain oversight of implementation	<ul style="list-style-type: none"> Regular site inspections and auditing during construction phase of the Project's waste management and CWMP implementation Construction monitoring reports 	<ul style="list-style-type: none"> CWMP developed and independently reviewed Waste registers maintained on site to include all waste transfer documentation and the appropriate certificates and licences of the waste contractors and disposal sites used
Fugitive emissions				
Negative visual amenity impact				
Reliance on landfill as disposal option can create odour, methane gas (explosive and polluting) and leachate (polluting)				

Impact to be addressed	Management/mitigation/enhancement	Responsibility	Monitoring	KPI
Offsite disposal increases vehicle movements and associated impacts such as road and community safety	reduction, reuse, recycling and recovery wherever possible – Training needs so that all staff understand the requirements of the plan			
Operations				
Leakage or spillage of wastes	<ul style="list-style-type: none"> ● Develop Project's operational WMP (OWMP) to include as a minimum: <ul style="list-style-type: none"> – Types and quantities of wastes to be generated during operation – Methods and locations for management of each waste type, including provisions for hazardous waste management and disposal – Good practice procedures as a priority for waste avoidance, reduction, reuse, recycling and recovery wherever possible – Training needs so that all staff understand the requirements of the plan 	O&M Contractor	<ul style="list-style-type: none"> ● Regular site inspections and auditing during operational phase of the Project's waste management and OWMP implementation ● Operational monitoring reports 	<ul style="list-style-type: none"> ● OWMP developed and independently reviewed ● Waste register(s) maintained on site to include all waste transfer documentation and the appropriate certificates and licences of the waste contractors and disposal sites used
Minimise waste generation, including hazardous wastes, use of landfill (to reduce odour, methane and leachate) and transport of waste on public roads (to reduce risk of accidents)				
Decommissioning				
Generation and disposal of large waste quantities, including hazardous materials	<ul style="list-style-type: none"> ● The mitigation measures are to be identified prior to decommissioning and are to include good practice procedures for waste avoidance, reduction, reuse, recycling and recovery wherever possible 	Contractors	<ul style="list-style-type: none"> ● Site inspections by EHS managers ● Decommissioning reports 	<ul style="list-style-type: none"> ● Decommissioning plan developed and independently reviewed

6.5 Plans and procedures

The preceding section of this Framework ESMP set out all relevant mitigation activities relevant to the Project as identified through the ESIA addendum. In turn, the various mitigation activities will be implemented via a number of dedicated plans. This section of the Framework ESMP elaborates various framework plans through which the mitigation activities identified will be committed to by the Project.

Prior to construction of the Project, Ivicom Energy will review the contractors' construction ESMP (C-ESMP) in detail in relation to each of the framework plans, policies and procedures defined within this Framework ESMP to ensure adequate management and monitoring of environmental and social aspects have been included. Table 66 below summarises the key plans and policies that are required for the Project.

It is intended that these framework plans will be further elaborated by the contractors and be implemented by the contractors and any sub-contractors which may be employed.

The following outline plans have been defined within this Framework ESMP:

- C-ESMP
- EPRP (including spill response plan)
- SEP
- Invasive species management plan
- HRRP
- WMP
- HMHP
- TMP
- Chance finds procedure

Preparation of the EPRP is a requirement of IFC PS1 to cover potential emergencies during the construction, operation and decommissioning of the Project. The EPRP will form part of the wider suite of plans to be implemented by the contractors. A spill response plan will be prepared as part of the EPRP prior to any large scale storage of chemicals or oil at the construction sites.

Ivicom Energy will also implement the SEP and update it when there are significant changes to the Project, such as change in phase or identification of new stakeholders. The Project performance grievance mechanism will also be implemented throughout the lifecycle of the Project.

6.5.1 Required plans, policies and procedures

Table 66: Plans, policies and procedures

Aspect	Plan/policy	Objective/content	Timescale	Responsibility
Construction environmental and social management	C-ESMP (refer to section 6.6)	<ul style="list-style-type: none"> To implement mitigation activities relevant to the construction phase of the Project and to avoid, mitigate and minimise environmental and social impacts during the construction phase The contractors will be required to develop a C-ESMP which will strictly follow and comply with the General EHS Guidelines and other international requirements outlined within this ESIA addendum during construction activities; as well as incorporate specific mitigation as identified through the ESIA addendum process 	Prior to construction: C-ESMP to be prepared by contractors and approved by Ivicom Energy	Contractors responsible for meeting the requirements of the C-ESMP Contractors' Project Managers responsible for implementation of the C-ESMP by any construction sub-contractors Ivicom Energy responsible for monitoring contractors' compliance with the C-ESMP
Environmental Health and Safety Management System	Ivicom Energy to develop an EHS management system for the Project	<ul style="list-style-type: none"> To promote safe and healthy working conditions through appropriate procedures and culture. Further policies/procedures to be developed if need identified through site audits To include OHS plan and community health and safety plan Refer to national law, IFC PS2 EHS General Guidelines on Occupational Health and Safety (OHS) EHS Guidelines on Wind Energy EHS Guidelines on Electric Power Transmission and Distribution EHS Guidelines on Toll Roads 	Developed prior to construction and updated as needed	Ivicom Energy EHS department responsible for development or adaptation of its own system and monitoring contractors' compliance in accordance with ESMP and existing Ivicom Energy plans Contractors responsible for monitoring of sub-contractors Ivicom Energy has overall responsibility for implementation of EHS system during operation
Local development	Community investment plan (refer to section 6.7)	<ul style="list-style-type: none"> Encourage local development and create benefits for the affected communities Foster a good relationship between the project and affected communities 	Finalised (detailed and agreed with municipalities) by the end of 2017. Implementation to begin in 2018. Updated, as necessary, to suit local needs and respond to community suggestions.	Ivicom Energy (Community Liaison Officer), in cooperation with Golubac and Kučevo municipality
Emergency situations	EPRP (refer to section 6.8)	<ul style="list-style-type: none"> To enable Ivicom Energy, in collaboration with appropriate and relevant third parties, to be prepared to respond to unplanned, accidental and emergency situations associated with the Project in a manner appropriate to prevent and mitigate any harm to people and/or the environment Content should include identification of areas where accidents and emergency situations may occur, communities and individuals that 	Developed prior to construction and updated as needed.	Ivicom Energy EHS department responsible for monitoring contractors' EPRP to confirm compliance with ESMP Contractors responsible for monitoring of construction sub-contractors

Aspect	Plan/policy	Objective/content	Timescale	Responsibility
		may be impacted, response procedures, provision of equipment and resources, designation of responsibilities, communication, including that with potentially affected communities and periodic training to ensure effective response. The EPRP should be discussed with representatives of local emergency services and disclosed to affected communities.		Ivicom Energy has overall responsibility for implementation of EPRP during operation
On-going community engagement	SEP (refer to Volume III)	<ul style="list-style-type: none"> To keep communities and stakeholders informed while listening and responding to concerns about the Project to allow it to run smoothly 	Updated when Project changes significantly, e.g. change of phase/new stakeholders identified	Ivicom Energy CLO
Managing risks related to invasive species	ISMP (refer to section 6.9)	<ul style="list-style-type: none"> To control and manage invasive species 	Prior to construction by contractors To be updated prior to commissioning for operations related procedures	Ivicom Energy EHS department responsible for monitoring contractors during construction phase Contractors responsible for monitoring of construction sub-contractors Ivicom Energy has overall responsibility for implementation of ISMP during operation
Habitat removal and reinstatement	HRRP (refer to section 6.10)	<ul style="list-style-type: none"> To set out the minimum requirements for habitat removal and detail how reinstatement activities should be carried out 	Prior to construction by contractors To be updated prior to commissioning for operations related procedures	Ivicom Energy EHS department responsible for monitoring contractors during construction phase Contractors responsible for monitoring of construction sub-contractors Ivicom Energy has overall responsibility for implementation of HRRP during operation
Waste	WMP (refer to section 6.11)	<ul style="list-style-type: none"> Identify measures for minimisation of waste, appropriate handling and management of waste and safe disposal of construction wastes During construction phases, intended to compliment and work alongside C-ESMP 	Prior to construction by contractors To be updated prior to commissioning for operations related procedures	Ivicom Energy EHS department responsible for monitoring contractors during construction phase Contractors responsible for monitoring of construction sub-contractors Ivicom Energy has overall responsibility for implementation of WMP during operation
Chemicals and fuels. Spent oils and lubricants. Containment failure of storage tanks or pipelines	EPRP (including spoil response plan) HMHP (refer to section 6.12)	<ul style="list-style-type: none"> Appropriate storage, transfer and use of chemicals and fuel on site Identify responsibilities, procedures and equipment required to deal with a spill Identification of key risk points for containment failure within the EPRP 	Prior to construction by contractors. Plans to be updated prior to commissioning for	Ivicom Energy EHS department responsible for monitoring contractors during construction phase. Contractors responsible for monitoring of construction sub- contractors

Aspect	Plan/policy	Objective/content	Timescale	Responsibility
		<ul style="list-style-type: none"> • During construction phases, intended to compliment and work alongside C-ESMP 	operations related procedures	Ivicom Energy has overall responsibility for overseeing implementation of these plans during operation.
Transport	TMP (refer to section 6.13)	<ul style="list-style-type: none"> • Identify measures to manage abnormal load deliveries during construction in order that road safety requirements are managed, impacts to external road users and road infrastructure are minimised, and compliance with local legislation and international guidelines is achieved throughout the construction phase • During construction phases, intended to compliment and work alongside C-ESMP 	Prior to construction by contractors	Ivicom Energy EHS department responsible for monitoring contractors during construction phase Contractors responsible for monitoring of construction sub-contractors
Archaeology	Chance finds procedure (refer to section 6.14)	<ul style="list-style-type: none"> • Refer to the World Bank's Physical Cultural Resources Policy Guidebook and section 6.14 • During construction phases, intended to compliment and work alongside C-ESMP <p>In particular, the procedure is to include:</p> <ul style="list-style-type: none"> • Definition of cultural resources/archaeological features • Ownership of the artefact • Recognition training • Procedure upon any discovery, i.e. <ul style="list-style-type: none"> – Conditions/requirements for work stoppage – Fencing and protection of the find – Internal reporting – Expert analysis – Instructions for moveable finds 	<p>Prior to construction by the contractors</p> <p>Procedures to be communicated to construction sub-contractor by the contractors</p>	Ivicom Energy EHS department responsible for monitoring contractors Contractors responsible for monitoring of construction sub- contractors

6.6 Construction environmental and social management plan framework

6.6.1 Background

The following sub-sections provide a Framework C-ESMP to avoid, mitigate and minimise environmental and social impacts associated with construction activities and to provide the implementation vehicle of specific mitigation activities identified through the ESIA addendum process.

It is intended that the framework C-ESMP plan is to be elaborated by the contractors and will be complemented by the overall environmental and social management system (ESMS) to be developed by Ivicom Energy.

The C-ESMP will be required to strictly follow and comply with the following EHS Guidelines: General; Wind Energy; Electric Power Transmission and Distribution; and Toll Roads as well as the IFC PSs during construction activities.

6.6.2 Approach

6.6.2.1 Preparation of C-ESMP by contractors

The contractors will be required to prepare a dedicated C-ESMP compliant with this framework and requirements of the Republic of Serbia which will be structured as follows:

1. An overarching C-ESMP providing organisational and operational procedures for the implementation of both Project specific mitigation as identified through the ESIA addendum process and general best practices of the industry
2. Parallel framework plans elaborating complimentary environmental and social management measures by themes and indicating the responsibility for implementation, technical details and how implementation will be monitored. Table 67 lists the main parallel plans expected to be developed to properly manage the construction activities and to be in compliance with the EHS Guidelines and IFC PSs.

The C-ESMP will include performance and monitoring indicators consistent with those presented in section 6.4 of this Framework ESMP.

Table 67: List of parallel framework plans

Parallel framework plan	Subsection
Community investment plan	6.7
EPRP (including spill response plan)	6.8
Invasive species management plan	6.9
HRRP	6.10
WMP	6.11
HMHP	6.12
TMP	6.13
Chance finds procedure	6.14

The contractors' C-ESMP documentation has the following objectives:

- Provide the contractors' environmental and social policy
- Provide operational and emergency procedures, developed to address the environmental and social aspects and risks associated with the construction activities

- Clarify the implementation and operation of the C-ESMP to ensure that structure and responsibilities are assigned, staff are trained, aware and competent, and that there is proper communication, documentation, operational control and emergency preparedness and response
- Provide organisational and technical procedures for implementation of the C-ESMP which ensure that construction activities associated with potential environmental and social impacts are carried out in a controlled and responsible way in line with the requirements of section 6.4 of this Framework ESMP
- Provide checking and corrective action through monitoring and measurement
- Provide records collection and storage

The various plans need to be approved by Ivicom Energy ahead of implementation to check for consistency and that all committed mitigation activities have been adequately included and accounted for by the contractors. The plans will be required to be submitted to the lenders as part of the annual implementation plans.

6.6.2.2 Contractors' monitoring of the implementation of C-ESMP

The contractors will be responsible for the implementation of the C-ESMP plans and for monitoring construction sub-contractors and assessing how environmental and social management is undertaken. This will be done through the monitoring of environmental controls and for the overall construction activities in general.

Routine monitoring of construction activities will be undertaken by the contractors in order to ensure that the requirements and measures specified in the C-ESMP are properly implemented and that the adverse impacts are minimised or mitigated.

The contractors will employ their own specialist EHS staff to undertake this monitoring. The contractors will prepare and maintain reports of their inspections and ensure that corrective actions are taken when necessary and to track environmental performance.

6.6.2.3 Ivicom Energy monitoring and auditing of the implementation of the C-ESMP

Ivicom Energy has a number of specialist site based EHS staff within their current EHS team to undertake the monitoring of the site and assess compliance with the C-ESMP. A system of non-conformance, using three levels of non-conformance, will be put in place to prioritise action according to importance and severity.

The non-compliance procedure will allow for the following safeguards:

1. Work can be stopped in the event of a serious non-compliance situation
2. Follow-up visits will be required to verify that the situation has been appropriately rectified by the contractors
3. Investigations will determine the causes of incidents and evaluate if changes need to be made to the documentation to prevent similar incidents from occurring in the future

Periodic auditing will also take place, two months after construction has commenced and at least six-monthly after that, to verify conformance and that the proper procedures are in place.

Together, monitoring, non-conformance systems and auditing will allow evaluation of environmental and social performance, analysis of causes of problems, assessment of compliance with contractual and legal requirements, and enable identification of required corrective actions.

6.6.3 Activities

6.6.3.1 Environment

As per the EHS Guidelines, the contractors are obliged to implement all reasonable measures with regards to noise and vibration, soil erosion, air quality, waste, hazardous materials, wastewater discharges, and contaminated land. Furthermore, the contractors are required to adopt and implement those specific mitigation activities identified through the ESIA addendum process and presented in section 6.4 which are relevant to their construction activities.

6.6.3.2 OHS

As per IFC PS2 and the EHS Guidelines, the contractors are obliged to implement all reasonable precautions to protect the health and safety of workers. Various aspects which should as a minimum be taken into consideration include: the integrity of workplace structures, severe weather and facility shutdown, workspace and exit, fire precautions, lavatories and showers, potable water supply, clean eating area, lighting, safe access, first aid, disease prevention, communication and training, over exertion, slips and falls, working at heights, being struck by objects, moving machinery, lifting operations, hazardous materials, working with live power, EMFs, road safety, noise, dust, confined spaces and excavations, protective equipment, etc. The OHS measures identified in the contractors' C-ESMP will be reviewed to ensure they are consistent with those measures included in Ivicom Energy's overarching OHS management plan.

6.6.3.3 Community health and safety

In a similar way, as per IFC PS4 and the EHS Guidelines, the contractors are obliged to implement risk management strategies to protect the community from (1) physical, chemical, or other hazards associated with sites under construction, (2) hazards associated with the increased traffic, (3) communicable and vector-borne diseases associated with the population of workers.

6.6.4 Staff and resources

As indicated above, the preparation, approval, implementation, and monitoring of the various activities will require specialist EHS staff both from Ivicom Energy and the contractors.

Dedicated equipment will also be required to undertake the monitoring of the various parameters.

A detailed C-ESMP will be a contractual obligation for the contractors and it will be their responsibility to staff their EHS divisions appropriately to be able to comply with these obligations.

To undertake this function, Ivicom Energy intends to have a dedicated EHS manager for the Project who will be a permanent member of staff of the Ivicom Energy EHS department for monitoring the work of the contractors.

6.7 Community investment plan

To date Ivicom Energy has provided support to various local activities and initiatives in the area of infrastructure improvements, sports, education, culture, hunting/beekeeping and tourism⁹⁴,

At the beginning of 2018, Ivicom Energy will designate an annual community investment budget which will be used to finance local initiatives in the forthcoming year in the two municipalities which will be impacted the most by the Project – Golubac and Kučevo.

Once a year, the municipalities will be asked to publish an invitation to interested local communities, associations, and organisations to submit their proposals for funding from the designated annual budget to Ivicom Energy. Proposals in the following areas will be considered:

- Small community infrastructure improvements
- Education and sports
- Support for vulnerable people (e.g. elderly, disabled, youth or children)
- Environmental protection
- Local customs and traditions
- Tourism development

Initiatives targeting directly affected communities will have priority for funding and these include: Krivača, Dvorište and Snegotin villages belonging to the territory of the municipality Golubac and Rakova Bara and Radenka villages belonging to the municipality Kučevo.

Applicants will be asked to include the following sections in their proposals:

1. Name of the local community, organisation, association submitting the proposal and contact details of the responsible person
2. Description of the proposed activity
3. Duration of the activity and implementation period
4. Budget breakdown
5. Explanation of how the action is expected to contribute to local development and/or further socially desirable goals
6. Other relevant information

Once all proposals are collected, Ivicom Energy will organise a meeting with representatives from both municipalities to discuss and vote on the proposals which will be financed from the community investment fund in the forthcoming year.

The number of proposals to be funded will depend on their respective budgets, i.e. those that jointly fit within the allocated budget may be funded. In choosing the applications for funding, Ivicom Energy and the municipalities will take into account the feasibility of the proposed activity, the sustainability of the action, the number of beneficiaries, and compliance with community investment guidelines.

A list of successful proposals will be published on the official websites of the two municipalities and on Ivicom Energy's website along with a brief description, including the name of the action, location, anticipated implementation period and budget.

The two municipalities will monitor the implementation of activities selected for funding on their territories and will send quarterly monitoring reports to Ivicom Energy. Based on this information, a community investment annual report will be developed by Ivicom Energy

⁹⁴ From 2010 to the end of 2016, over 37,000 EUR were donated to various local institutions, associations and organisations.

describing all funded activities and achieved results. The report will also be published on the company website.

The community investment fund will be continually improved and revised to suit local needs and respond to feedback received from the communities.

6.8 Emergency preparedness and response plan

6.8.1 Background

This section presents the proposed structure for the EPRP which will be developed by Ivicom Energy rather than the contractors as, for the avoidance of confusion in an emergency situation, there can only be one EPRP. It should be noted that this section does not constitute the final EPRP and is intended to be used as a guidance document for producing the EPRP.

6.8.2 Objective

An appropriate EPRP is relevant to current phase of the Project. The EPRP should be developed for construction and revised prior to operations. It aims to provide an organisational structure and procedures for staff to prepare and respond effectively to both external and internal accidents, malfunctions, unplanned events and natural disasters that can potentially negatively affect the Project or interact with the Project so that communities are affected.

In the preparation of the EPRP, the following process will need to be followed:

1. Perform HAZOP analysis for the Project covering the relevant phase. Completion of the HAZOP should be undertaken in a workshop or series of workshops and include inputs from all relevant stakeholders (such as Ivicom Energy, the contractors, sub- contractors, local community representatives).
2. Document the perceived level of risk (in a risk register) and the appropriate mitigation measures which are required to reduce risks to acceptable levels. All mitigation measures should have responsibilities and timeframes attached to them.
3. Inform potentially affected communities of significant hazards giving explanations to aid understanding.
4. Set up lines of communication in the event of an emergency (to be reviewed and updated quarterly)
5. Prepare the EPRP (refer to below for the proposed structure).
6. Summarise and disclose the EPRP in a culturally appropriate manner.

6.8.3 Key hazards

Key hazards of and to the Project, which present potential emergency situations, are believed to be as follows and will be considered, inter alia, in the development of the EPRP:

- Fuel and chemical storage, handling and use
- Fire and explosion hazard
- Road traffic accidents
- Construction hazards such as working at height or working in confined spaces
- Power cuts/outages
- Weather, climatic events and natural disasters such as earthquakes
- Terrorism or civil unrest
- Structural failure

6.8.4 Structure of the EPRP

A single EPRP will be prepared by Ivicom Energy which covers the construction phase and will be updated for the operational phase of the Project. It should include detailed policy, plans and procedures to cover each of the principle hazards which could potentially be caused by or impact on the Project as identified through the HAZOP process. A proposed structure for the EPRP is as follows:

- Introduction to the EPRP
- Legislative and policy framework
- Hazard and operability (HAZOP) study and risk register
- Audit and evaluation procedure for the EPRP
- Responsibilities and communications in emergency situations
- Community emergency contact details
- Containment and control of incidents, including available response equipment and materials
- Emergency water supply
- Emergency electrical power
- Emergency preparedness: evacuation
- Emergency preparedness: staff training
- Emergency preparedness: planned drills
- Emergency preparedness: planned evacuation
- Spill response
- Terrorism threat response
- Riot or civil disturbance response
- Explosion response
- Structural failure response
- Fire response
- Severe weather response
- Other emergency situation response (as applicable)
- Restoration, clean-up and remedial measures

It should be stressed that this is an outline structure and it may be necessary to modify or add/delete these proposed headings once the process of producing the EPRP begins in earnest. Drills of the EPRP will need to be exercised at least every six months. Ivicom Energy will inform communities and local authorities regularly as plans change and when testing is due to occur. Emergency contact details for community representatives to be contacted in an emergency will be reviewed and updated at least quarterly.

6.9 Invasive species management plan

An ISMP will be developed and implemented to control and manage invasive species. The plan will be developed by the contractors to identify and report potentially invasive species establishing on the Project site. The EHS manager will check this information or contact a suitably qualified and experienced expert to confirm/inform the presence of invasive species.

Implementing measures to prevent the accidental introduction of invasive species is required under IFC PS6 and includes the following requirements with regard to AIS:

- Must not deliberately introduce AIS irrespective of regulatory framework
- Implement measures to avoid accidental introduction or spreading of alien species (see below)

- Consider the implementation of measures to eradicate AIS from natural habitats over which Ivicom Energy has management control

Preventative, control and monitoring measures will include the following, however, further details will be confirmed on preparation of the ISMP):

- Packaging and movement of materials
 - Minimise traffic and the distance it has travelled
 - Source goods/materials locally where possible
 - Contain any AIS and report their presence
- Vehicles and plant
 - Clean all vehicles and plant immediately before deployment
 - To kill or isolate invasive species in the Project site
 - ‘As-new’ wash-down is essential before entering non-infested areas and after working in infested areas
 - Train workers and raise awareness regarding AIS
 - Pressure wash vehicle tyres in a contained area
 - Contain and destroy AIS residue such as roots and root fragmentation
 - Record and report the presence of any AIS
- Soil and vegetation
 - Minimise disturbance to, or movement of, soil and vegetation
 - Prevent soil damage and erosion
 - Ensure imported soil/other materials are safe and free of AIS
 - Prevent AIS establishment on exposed stored soil (do not store bare soil near known sources of AIS, consider using matting to cover exposed soil)
 - Ensure infested material is disposed of appropriately
 - Retain as much natural vegetation as possible
- Habitat reclamation
 - Use native plants for reinstatement and landscaping
 - Do not use any non-native species in landscaping
 - Consider that some AIS may be soil-based
 - Avoid altering soil and water body properties

6.10 Habitat removal and reinstatement plan

A HRRP will be produced by the contractors before the start of construction. The HRRP will set out the minimum requirements for such activities, and will detail how reinstatement activities should be carried out. The reinstatement plan will include a minimum of up to 10 year operations monitoring along with remediation actions if unsuccessful. The following aspects and measures will be included as a minimum in the HRRP:

- Vegetation clearance and soil stripping
 - Vegetation is to be cut down and cut material will be removed before soil stripping
 - Use hand cutting where possible, avoiding the use of heavy equipment such as bulldozers, especially on steep slopes
 - Translocation or seed collection for threatened plants

- Soil handling and storage
 - Store top soil separately from subsoil or other materials. Top soil and subsoil will be stored in demarcated areas and will be clearly labelled to prevent mixing of different materials and to allow reinstatement in the correct order (temporary sites only) or to re-use these materials on other sites.
 - The seed/root-bearing topsoil will be formed into a shallow mound not higher than 1.5m in height. The subsoil will be stored separately in the same way.
 - Any weeds on the soil mounds will be controlled by strimming.
 - To maintain the germination capacity of the seed bank, the top soil storage will not exceed 15 weeks if this material is used for reinstatement.
- Soil reinstatement and habitat restoration
 - Soils will be reinstated after construction in the temporary sites (e.g. storage yards, points along the OHLs and access roads). Soil reinstatement will be carried out to ensure the top soil is returned to the surface in line with international standards and best practice. Following top soil reinstatement, erosion control measures will be implemented on steep slopes. This may take the form of either the use of a nursery crop or the use of biodegradable erosion control geotextile blankets.

Post-Project restoration of any damaged natural habitats will be implemented to ensure no net loss in the long-term.

On small unplanted areas, it is expected that the vegetation will gradually establish on its own on the reinstated top soils (after a number of years) as most plants will regenerate from the seed bank in the top soil. Only native species will be used in any planting taking place on or off site.

6.11 Waste management plan

6.11.1 Background

This section presents a structure for a WMP which the contractors will use and develop further in order to create fully bespoke WMPs for the Project. It should be developed initially for the construction phase and updated by Ivicom Energy for the operational stage prior to the commissioning of the Project.

6.11.2 Objective

The overall objective of a WMP is to ensure that waste generated is segregated and managed appropriately in order to ensure maximisation of re-use and recycling and overall waste minimisation. Furthermore, the WMP ensures that residual waste requiring off-site management is managed according to best practices of the industry.

6.11.3 Approach and activities

The following key steps will need to be considered for the WMP:

- Identify who is responsible for overall waste management for the Project and inform individuals of their responsibilities. They will be required to hold sufficient authority to ensure compliance with the WMP by other site operatives
- Identify the types and quantities of waste - all waste streams that will be produced require to be identified

- Duty of care - outline waste management procedures and records required to demonstrate appropriate handling and final disposal of all wastes
- Identify suitable waste management sites/landfill sites - the location of waste management sites will need to be identified, ideally the most local sites should be used to minimise transportation costs
- Use waste disposal sub-contractors that comply with the environmental legislative requirements of the local and national area
- Waste must not be burnt
- Training - all staff must be trained to ensure they understand the requirements of the WMP
- Plan - using the steps above, establish indicative percentages of the waste quantities to be produced over the life span of the Project
- Measure - the quantities of wastes produced should be recorded on a monthly basis, and where possible measures taken to re-use, reduce or recycle waste as appropriate
- Monitor - throughout the Project life cycle, waste management on site should be monitored, to ensure compliance with the WMP
- Hazardous classes – hazardous wastes should be classified according to national requirements
- Identify waste management options - a waste hierarchy of reduce, reuse, and recycle and needs to be considered and prepared. Where hazardous wastes are being generated, particular attention to the arrangements for identifying and managing such waste will need to be addressed and procedures put in place

Within the WMP it may be necessary to provide bespoke disposal management plans for various waste streams, particularly those considered hazardous or which are potentially problematic in terms of storage and/or disposal. Some of the expected waste disposal management plans for the Project are, but not necessarily limited to the following:

- Collection and disposal management plan for waste oils
- Wastewater removal and treatment

6.11.4 Implementation

Monitoring requirements of the contractors and Ivicom Energy in relation to the elaboration and implementation of the WMP is consistent with that described previously for the C-ESMP. Staff and resources for both the contractors and Ivicom Energy is the same as those previously defined for C-ESMP implementation.

6.12 Hazardous materials handling and storage plan

6.12.1 Background

This section presents a structure for the HMHP which the contractors will use and develop further in order to create a fully bespoke HMHP for the Project. The HMHP should be complimentary and in parallel to the contractors' C-ESMP and WMP. It should be developed initially for the construction phase and updated by Ivicom Energy for the operational stage prior to the commissioning of the Project.

6.12.2 Objectives

The overall objective of a HMHP is to ensure that all hazardous materials transported, stored and used during the construction and operational phase of the Project are managed

appropriately in order to prevent potential impacts associated with spills, leaks, fugitive emissions and health impacts to workers.

6.12.3 Approach and activities

The following key steps will need to be considered for the HMHP:

- Identify who is responsible for overall hazardous materials for the Project and inform individuals of their responsibilities. They will be required to hold sufficient authority to ensure compliance with the HMHP by other site operatives.
- Identify the types and quantities of hazardous materials to be stored during the construction and operational phases.
- Identify suitable hazardous waste storage sites.
- Ensure that the storage sites have the appropriate mitigations such as bunds.
- Training - all staff must be trained to ensure they understand the requirements of the HMHP.
- Hazardous materials should be stored according to national requirements.

6.12.4 Implementation

Monitoring requirements of the contractors and Ivicom Energy in relation to the elaboration and implementation of the HMHP are consistent with those described previously for the C-ESMP. Staff and resources for both the contractors and Ivicom Energy are the same as those previously defined for the C-ESMP implementation.

6.13 Traffic management plan

6.13.1 Introduction

Pre-defined access routes will be used by long, wide and/or heavy load vehicles transporting large plant components, e.g. WTG blades and other components. These routes will be agreed with the relevant authorities in advance and the police will be notified.

6.13.2 Delivery plan

Project components shall be delivered to site in accordance with the following:

- Plant to be delivered in sufficient time to meet the agreed construction programme.
- Plant to be delivered in accordance with the requirements of the local municipality, police and road authority.
- Loads to be delivered to site by road and stored on site. It will be the contractors' responsibility to identify a suitable storage location and obtain any necessary authorisations.
- A pilot escort vehicle should be used to provide an escort for all abnormal load vehicles travelling to the site by road. The general preference in these situations is to employ a convoy system, with a vehicle at the front and rear to warn oncoming vehicles of the approaching load. The escort would also help to minimise disruption of flow for other road users by pulling the convoy over at pre-identified locations to allow build-up of following traffic to pass. Drivers responsible for operating the convoy should be fully briefed on the route, where and when to make the pre-defined stops, and be aware of all contingency measures in place in the event of an incident occurring. All vehicles and lead traffic management staff shall be in contact with the use of two-way radios
- Employ additional traffic management staff (to be agreed with police if required prior to transportation) for any locations where pedestrians are most likely to be present.

- Ensure road conditions are sufficient to transport the planned loads.
- Ensure clear roadways to allow transporters passage through geometrically constrained sections of the route. At strategic locations parking may need to be restricted at times of delivery.
- Develop contingency plan, in consultation with the police, to cover an event where an abnormal load becomes immovable on the public road, for any reason (for example, breakdown, un-anticipated route restriction, accident).

A driver's induction for abnormal load vehicles will include:

- Safety briefing including detail of all contingency measures
- The need for appropriate care and speed control
- Identification of specific sensitive areas
- Clarification of identified route, the requirement not to deviate from this route, the requirement to adhere to convoy system and pull over at pre-defined points to allow build-up of traffic to pass

6.13.3 Site traffic

The following points will apply to general site traffic:

- General site traffic and general construction traffic will not require the presence of an escort when travelling to and from site
- Drivers shall be aware of route and contingency measures as pre-defined at induction stage
- Drivers of HGVs are to be briefed in good road practice and will be instructed to pull over on narrow sections of road to allow build-up of traffic to pass
- All general site traffic and construction vehicles, including concrete related deliveries, will run to coincide with site working hours
- Normal load construction vehicles will use a defined route and obey on and off site speed limits, which for on site will need to be agreed
- Signage will be kept to a minimum, however temporary direction signs indicating local routes to site and site entrances will be required at strategic locations on local roads
- The detailed signing arrangement will be agreed between the appointed contractors in close liaison with the local municipality and the police service
- Wherever possible, arrangements will be made for site workers to be transported to site via shared transport to minimise unnecessary traffic movements locally
- The contractors will be required to implement induction procedures and regular up-dates for all drivers to establish and promote an overall culture of safety and awareness of other road users

6.13.4 Implementation

Monitoring requirements of the contractors and Ivicom Energy in relation to the elaboration and implementation of TMP Framework are consistent with those described previously for the C-ESMP. Staff and resources for both the contractors and Ivicom Energy are the same as those previously defined for the C-ESMP implementation.

6.14 Chance finds procedure

6.14.1 Overview

Effective protection of cultural heritage is based on an understanding of the key issues, appropriate assessment and the correct action to minimise damage or loss. As unknown features/objects could be encountered during works, in particular earthworks, a 'chance finds procedure' will be in place to stop works and require investigation by an archaeologist in case of such findings.

This section of the Framework ESMP contains a framework 'chance finds procedure' to be adapted by the contractors. Updates or amendments will be made by the contractors where appropriate.

6.14.2 Framework chance finds procedure

6.14.2.1 Definitions

'Chance finds' are defined for the purposes of this procedure as physical cultural resources encountered unexpectedly during Project implementation.

'Physical Cultural Resources' (PCR) are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, palaeontological, historical, architectural, religious, aesthetic, or other cultural significance. Their cultural interest may be at the local, provincial, national or international level.

6.14.2.2 Ownership

The ownership of any chance finds discovered on the Project will be determined by The Ministry of Culture and Information of the Republic of Serbia.

6.14.2.3 Training

So that the contractor and sub-contractor and employees such as equipment operators and supervisors on the Project can identify physical cultural resources, training will need to be given. Prior to commencement of works the contractors (in collaboration with Ivicom Energy) will consult with the authorities mentioned above in order to arrange training for their employees. Ivicom Energy will monitor this process to ensure that effective training is given to the correct members of the construction workforce.

6.14.2.4 Procedure upon discovery

Suspension of work:

- Upon discovery of physical cultural resources, the contractor shall stop work.
- In some cases, all work will need to be suspended, in others just the work in the immediate vicinity of the find will need to stop, in others still, all work within a certain radius of the find must cease. This will depend on the type of find and will be informed by a qualified archaeologist.
- After stopping work, the worker must immediately report the discovery to the contractors' EHS manager who will in turn report the finding to Ivicom Energy's EHS manager.
- Ivicom Energy's EHS manager (in consultation with Ivicom Energy management) may be entitled to suspend work and to request from the contractor some excavations at the contractor's expense if he thinks that a discovery was made and not reported.

Conditions and requirements for work stoppage:

- With the approval of Ivicom Energy's EHS manager, the contractor is then required to temporarily demarcate and limit access to the site, or, the EHS manager may decide that the item can be removed and work may continue, for example where the item is a single coin of archaeological value. This will be done in consultation with the qualified archaeologist.

Chance find report:

- The contractor will submit a chance find report within one day of the find. This will record the following information:
 - Date and time of the discovery
 - Location of the discovery
 - Description of the PCR
 - Estimated weight and/or dimensions of the find
 - Temporary protection that has been implemented

The chance find report will be submitted to Ivicom Energy's EHS manager, and other concerned parties as agreed with the Regional Institute for Protection of Cultural Monuments of Smederevo, and in accordance with national legislation (to be agreed upon submission of this chance finds procedure to the provincial authorities for their comment/approval).

Ivicom Energy's EHS manager is required to inform the Regional Institute for Protection of Cultural Monuments of Smederevo immediately following the submission of the chance find report.

6.14.2.5 Arrival and actions of cultural authority

If deemed necessary by the Regional Institute for Protection of Cultural Monuments of Smederevo, they will send a representative to the discovery site, who will arrive within a stipulated time frame, such as 24 hours if all work has been suspended (details will be agreed between the authority, Ivicom Energy and the contractors). The representative will determine the action to be taken which may include, but will not be limited to:

- Removal of the PCR(s) deemed to be of significance
- Execution of further excavation within a specified distance of the discovery point
- Extension or reduction of the area demarcated by the contractor

These actions should be taken within seven calendar days of the representative arriving on site in the case of the suspension of works.

If the cultural authority fails to arrive within the stipulated period (for example, 24 hours), Ivicom Energy's EHS manager will have the authority to extend the period by a further stipulated time.

If the cultural authority fails to arrive after the extension period, Ivicom Energy's Project Director may have the authority to instruct the contractor to remove the PCR or undertake other mitigating measures and resume work. This must be agreed in advance with the Regional Institute for Protection of Cultural Monuments of Smederevo.

6.14.2.6 Further suspension of work

During the seven calendar day period (see above section on arrival and actions of cultural authority) the cultural authority may be entitled to request the temporary suspension of the work

at or in the vicinity of the discovery site for an additional period of up to 30 calendar days or longer if deemed necessary.

6.14.2.7 Resumption of work

Following approval from the cultural authority Ivicom Energy's EHS manager will issue the contractor with the instruction to recommence works.

6.14.2.8 Review

Ivicom Energy's EHS manager will review the process and amend it as necessary to ensure efficiency and effectiveness of the chance finds procedure in the future.

6.14.3 Implementation

Monitoring requirements of the contractors and Ivicom Energy in relation to the implementation of chance finds procedure are consistent with those described previously for the C-ESMP. Staff and resources for both the contractors and Ivicom Energy are the same as those previously defined for C-ESMP implementation.

7 Environmental and social action plan

Table 68: Environmental and Social Action Plan

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
IFC PS1: Assessment and Management of Environmental and Social Risks and Impacts						
1.1	Submit report to the IFC in accordance with requirements set out within the Environmental and Social Management Plan (ESMP) on environmental, social, health and safety (ESHS) performance and including status of each ESAP element and current status of ESHS issues.	To ensure measures within the ESIA and EIA are being implemented	IFC PS1	Ivicom Energy	Submission of report on specified schedule	Quarterly reports to be submitted during construction Six monthly reporting during operation
1.2	Appoint and maintain suitably qualified and experienced person(s) to be responsible for environmental, social, and occupational health and safety (OHS) for the Project.	To ensure that suitably qualified and experienced ESHS staff are working on the Project and are accountable to Project management.	IFC PS1	Ivicom Energy	Appointment of ESHS personnel confirmed to IFC	Prior to construction
1.3	Produce the ESMP for construction (C-ESMP) and operation (O-ESMP) to implement management and mitigation measures specified within this ESIA addendum. Include an organogram, showing the organisational structure of the Project Management Team hierarchy and defining all key management roles, including for ESHS. Update ESMP with any additional mitigation as required as the Project progresses. Ensure that the engineering, procurement and construction (EPC) contractor or EPC management (EPCM) contractor develops a construction environmental and social management plan (C-ESMP) and associated sub plans and monitors compliance of construction sub-contractors.	Ensure environmental and social management measures prescribed within the ESIA are implemented	IFC PS1 Best practice	Ivicom Energy with assistance from external consultants/ Lenders.	C-ESMP produced	Prior to main construction activities
1.4	Develop an Environmental, Health and Safety Management System (EHSMS) in line with international standards i.e. ISO 14001 (environmental) and OHSAS 18001 (health and safety)	Promote EHS culture within the organisation and meet international best practice Documentation of roles and responsibilities within Ivicom Energy	IFC PS1 Best practice	Ivicom Energy	Evidence of ISO accreditation	During Project lifetime

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
1.5	Include contractual clauses within the contractors' agreement that contractually requires compliance with international requirements and with the requirements of the ESMP/ESAP.	Ensure a unified adoption of international environmental, health, safety and social standards by all parties involved in the Project	IFC PSs Best practice	Ivicom Energy	Evidence of international environmental, health, safety and social contractual obligations within EPC/EPCM contractor contract	Ongoing from commencement of construction
1.6	Conduct quarterly inspections of construction site and EPC/EPCM contractor's occupational health and safety (OHS) performance. Report on performance to Lenders every three months during construction. Report frequency to be increased in the event of significant issues/incidents on site.	Ensure EPC/EPCM contractor's adoption of international requirements for OHS	IFC PS1	Ivicom Energy	Throughout construction	Report available and submitted to Lenders quarterly
1.7	Update C-ESMP for operations (O-ESMP) and decommissioning (D-ESMP), including revision of sub-plans where necessary	To ensure that plans are appropriate to the current phase of the Project	IFC PS1	Ivicom Energy	O-ESMP and sub plans D-ESMP and sub plans	Prior to change in phase
1.8	Publish the Project SEP on the Ivicom Energy website. Update regularly and implement the stakeholder engagement plan (SEP), including Project performance grievance mechanism. As part of the SEP, maintain a register of external communications including minutes of meetings held with stakeholders. Publish annual reports of key environmental and social aspects of the Project.	To maintain good stakeholder engagement and framework for sharing information with the public	IFC PS1	Ivicom Energy	SEP published Report to Lenders on consultation activities Report to Lenders on all grievances received and how resolved	Throughout Project lifecycle

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
1.9	<p>Develop and implement contractor/subcontractor Management Plan to manage ESHS planning and performance of construction and other contractors, including at a minimum:</p> <ul style="list-style-type: none"> • Inclusion of relevant ESAP requirements in contracts/subcontracts. • Clear assignment of Ivicom and contractor ESHS responsibilities. • Contractor reports to include relevant data in reports to Lenders, and to allow evaluation of need for corrective actions. • Verification of training and/or proper credentials for contractor staff/managers responsible for ESHS 	ESHS management of contractors and subcontractors	IFC PS1	Ivicom Energy	Development and implementation of contractor management system ESHS reports to lenders on contractors' oversight	Ongoing from commencement of construction
1.10	<p>Publish the Non-Technical Summary (NTS) of the ESIA addendum on the Ivicom Energy website. Make hard copies of documents available in Ivicom offices and municipal offices.</p>	To inform the public on foreseen impacts and planned mitigation measures	IFC PS1	Ivicom Energy	NTS published, hard copies available	Prior to construction
IFC PS2: Labour Working Conditions						
2.1	Develop/maintain written HR policies and procedures in accordance with national legislation and PS2 requirements and ensure the relevant policies are available to all employees in their language(s). The HR policy/procedure should contain an enforceable code of conduct applicable to all workers, including in particular those who are not of local origin, or a stand-alone code will need to be developed.	To ensure that worker rights are protected and code of conduct communicated	IFC PS2	Ivicom Energy Contractors	HR policy available to all workers	Ongoing from commencement of preparation for construction
2.2	Integrate and maintain mitigation measures relating to labour and working conditions identified in the ESMP into the C-ESMP	Prevent employee or contractor disputes from grievances	IFC PS2 Best practice	Ivicom Energy Contractors	Development of C-ESMP Limited number of labour grievances which are quickly resolved	Prior to construction
2.3	Monitor contractor and supplier performance in management of recruitment and labour issues, including management of worker grievances	Prevent worker grievances	IFC PS2 Best practice	Ivicom Energy	Limited number of labour grievances which are quickly resolved	Ongoing from commencement of preparation for construction

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
2.4	<p>Develop and implement an OHS plan(s) to guide all activities on project site during site preparation, construction, and operation and ensure that all contractors adopt these plans. Requirements to include, at a minimum:</p> <ul style="list-style-type: none"> • Job and task-specific hazard analysis and controls for all activities • Provision of personal protection equipment (PPE), requirements for use of PPE, and enforcement of PPE use • Safety training for all personnel in their language, covering hazards and safety protocols of their jobs • Special training for specific hazards: working at heights, in excavations, with electricity • Review and approval of contractors' OHS plans • Oversight of contractor OHS implementation, including mandatory reporting • Recording incident statistics, including total work hours, lost time incidents, major injuries, fatalities, etc. 	Promote OHS and prevent any incidents	IFC PS2 Best practice	Ivicom Energy Contractors	OHS plans developed Zero incidents	Ongoing from commencement of preparation for construction

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
IFC PS3: Resource Efficiency and Pollution Prevention						
3.1	<ul style="list-style-type: none"> ● Integrate and maintain mitigation measures associated with pollution prevention identified in the ESMP into the C-ESMP. This should include as a minimum: ● Maintain equipment and take other measures to keep noise to a minimum, including avoiding/minimizing use of equipment at night. Monitor for noise at receptor locations upon request by affected people. Implement appropriate mitigation if noise exceeds applicable standards. ● Develop and implement construction phase dust suppression plan to ensure dusty loads are sheeted and unsealed roads are damped-down. ● Develop and implement waste and hazardous materials management plans for construction and operation phases, to cover all liquid and solid wastes and materials (chemicals, fuel, construction debris, excess spoil, domestic/household wastes, spill cleanup debris, etc.). Maximize waste reduction, reuse, recycling, etc. ● Earthen material management measures: <ul style="list-style-type: none"> – Segregate and store in stable piles all topsoil and subsoil salvaged from construction areas. – Store rock in stable piles. – Protect all storage piles with covers, including vegetative cover (native grass species) as needed to prevent wind/water erosion and desiccation. – Use best practices to prevent or retard run-off. – Reinstate all disturbed areas by covering with topsoil and seeding/planting with native species, or returning to tillage. 	Promote EHS culture within the organisation and meet international best practice.	IFC PS3 Best practice.	Ivicom Energy Contractors	Development of C-ESMP No environmental incidents	Prior to and throughout construction

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
PS4: Community Health, Safety and Security						
4.1	<p>Implement safe practices through the C-ESMP during construction to minimise potential impacts to local communities during construction as specified within the ESMP</p> <p>Plans and procedures to include, as a minimum:</p> <ul style="list-style-type: none"> • Traffic management plan. • Public notices of hazards associated with works and equipment during construction and operation. • Emergency preparedness and response plan. • Security measures to prevent unauthorised access during construction and minimize access to substation and turbine interiors during operation. • Develop and implement traffic and transport management plan(s) to include access, routing, diversions, exceptional loads, and driver training. Consult with local stakeholders and provide timely information to users of land of times access to their land may be necessary, or limited. Contracts must ensure compliance with plan(s). Plans must cover transport of turbines, rock/stone, and other materials to be brought to or removed from the site. • During construction and operation, monitor noise at residences upon request and take actions to reduce or control noise as needed to meet applicable standards. Ensure proper noise controls on vehicles and equipment. When designing the substation, use technology whose specifications ensure that noise standards will not be exceeded. 	Promote good practice during construction and to protect the health and safety of local communities.	IFC PS4 Best practice	Ivicom Energy Contractors	Development of C-ESMP No community grievances/ complaints	Throughout construction
IFC PS5: Land Acquisition and Involuntary Resettlement						
5.1	Integrate and maintain mitigation measures relating to land acquisition and compensation identified in the ESMP into the C-ESMP	<p>Prevent economic displacement resulting from land acquisition and/or Project related transport and traffic</p> <p>Prevent grievances from affected land owners and users</p>	IFC PS2 Best practice	Ivicom Energy Contractors	Development of C-ESMP Limited number of grievances which are quickly resolved	Prior to construction and throughout Project lifecycle

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
5.2	Consider all grievances received in relation to compensation for affected land and assets or damages, including those under the responsibility of the municipality (e.g. expropriation) and address them/cooperate with responsible authorities to address them	Prevent economic displacement resulting from land acquisition and/or Project related transport and traffic Prevent grievances from affected land owners and users	IFC PS2 Best practice	Ivicom Energy	Development of C-ESMP Limited number of grievances	Prior to construction and throughout Project lifecycle

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
FC PS6: Biodiversity Conservation and Sustainable Management of Living Material						
6.1	<p>Integrate and maintain mitigation measures relating to biodiversity and sustainable management of living materials identified in the ESMP into the C-ESMP and O-ESMP</p> <p>This should include as a minimum:</p> <p>1) Appoint qualified professional(s) with expertise in birds and bats to:</p> <p>a) undertake pre-construction tree surveys for roosting bats, including ground level inspections, tree climbing and/or emergence/re-entry surveys to inform mitigation measures prior to and/or during felling.</p> <p>b) undertake a breeding bird survey of habitats affected during construction to determine locations of active nests, should works be undertaken between March and August.</p> <p>c) devise a methodology for bird and bat carcass monitoring of the WTGs and OHL over a minimum of three years from the first year of operation.</p> <p>The aim will be to:</p> <ul style="list-style-type: none"> - Assess adequacy of previous characterisation(s) of bird/bat use, residence, and passage - Re-evaluate impacts on birds and bats - Recommend changes to operating parameters (such as rotation speed or operating hours during sensitive periods/hours) and/or other mitigation - Reassess cumulative impact assessment on birds and bats and recommend additional mitigation, if required. <p>2) Appoint qualified professional(s) with expertise in botany to:</p> <p>a) undertake pre-construction botanical surveys of permanent and temporary affected areas to map and record threatened, endemic and invasive plant species.</p> <p>c) prepare and oversee implementation of the HRRP and AIS.</p> <p>b) undertake monitoring of mitigation planting using native species and seeding over 10 years post construction.</p>	Minimise habitat loss and meet international best practice.	IFC PS6 Best practice.	Ivicom Energy Contractors	Development of C-ESMP Limited habitat loss	Prior to and throughout construction and operation
IFC PS7: Indigenous Peoples						
-	Not applicable					

#	Task/measure/corrective action	Purpose of action	Source of requirement	Responsibility	Measure of success	Deadline
IFC PS8: Cultural Heritage						
8.1	Develop and implement mitigation measures as part of the C-ESMP as identified in the ESMP	Minimise potential loss of cultural heritage Meet international best practice.	IFC PS8 Best practice.	Ivicom Energy Contractors	Development of C-ESMP Compliance with chance finds procedure	Prior to construction

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A. Serbian environmental and social legislation

The list of key applicable regulations and standards that will be applied to the Project is presented below. Further details on topic specific legislation are provided in Volume III where appropriate.

- Constitution of the Republic of Serbia: (Official Gazette of the RS, No. 98/2006)
- Law on Environmental Protection (Official Gazette of the RS, No. 36/2009, 88/2010, 91/2010)
- Law on Strategic Environmental Impact Assessment (Official Gazette of the RS, No.135/04)
- Law on Environmental Impact Assessment (Official Gazette of the RS, No.135/04, 36/09)
- Law on Cultural Heritage (Official Gazette of the RS, No. 71/94)
- Law on Environmental Noise (Official Gazette of the RS, No. 36/09 and 88/10)
- Rulebook on Permitted Noise Level in the Environment (Official Gazette of the RS, No. 54/92)
- Law on Air Protection (Official Gazette of the RS No. 36/09, 10/13)
- Rulebook on air quality requirements and monitoring (Official Gazette of the RS No.11/10, 75/10 and 63/13)
- Rulebook on emission limits of air pollutants (Official Gazette of the RS No. 71/10, 6/11-corr.)
- Law on Waste (Official Gazette of the RS No. 36/09, 88/10)
- Law on Water (Official Gazette of the RS No. 30/10, 93/12)
- Law on Expropriation of the Republic of Serbia (Official Gazette of the RS 53/95, 16/01 – Federal Constitutional Court decision, 20/09 and 55/13)
- The Law on Energy (Official Gazette of the RS 145/2014)
- The Law on Fundamentals of Property Relations (Official Gazette of the SFRY 6/80, 36/90, FRY 29/96, RS br. 115/05 – other law)
- The Law on Planning and Construction (Official Gazette of the RS 72/09, 81/09, 64/10 Constitutional Court decision, 24/2011, 121/2012, 42/2013 - Constitutional Court decision, 50/2013 - Constitutional Court decision, 98/2013 - Constitutional Court decision, 132/2014 and 145/2014)
- Law on Free Access to Information of Public Importance (Official Gazette of the RS, No. 120/04, 54/07, 104/09, 36/2010)
- Law on Confirming the Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Official Gazette of the RS, No. 38/09)
- Labour Law of the Republic of Serbia (Official Gazette of the RS No. 24/05, 61/05, 54/09, 32/13 and 75/14)
- Law on Amicable Resolution of Labour Disputes (Official Gazette of the RS No. 125/04, 104/09)

- Law on Strikes (Official Gazette of the FRY No. 29/96 and Official Gazette of the RS No. 101/05 - other law, 103/12 - Constitutional Court decision)
- Law on Prevention of Harassment at Work (Official Gazette of the RS No. 36/10)
- Anti-Discrimination Law (Official Gazette of the RS No. 22/09)
- Law on Preventing Discrimination Against Persons with Disabilities (Official Gazette of the RS No. 33/06, 13/16)
- Law on Vocational Rehabilitation and Employment of Disabled Persons (Official Gazette of the RS No. 36/09, 32/13)
- Pension and Disability Insurance Law (Official Gazette of the RS No. 34/03, 64/04 - Constitutional Court decision, 84/04 – other law, 85/05, 101/05 – other law, 63/06 - Constitutional Court decision, 05/09, 107/09, 101/10, 93/12, 62/13, 108/13, 75/14, 142/14)
- Law on Road Traffic Security (Official Gazette of the RS No. 41/09, 53/10, 101/11, 32/13 – Constitutional Court decision, 55/14, 96/15 – other law, 09/16 - Constitutional Court decision)
- Law on Public Health (Official Gazette of the RS No. 15/16)
- Law on Fire Protection (Official Gazette of the RS No. 111/09, 20/15)
- Law on Emergency Situations (Official Gazette of the RS No. 111/09, 92/11, 93/12)

