Biodiversity Impact Assessment

Zgosht to Cerenec road scheme; Albania National and Regional Roads Project

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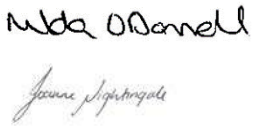
Signature		Signature	
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Executive Summary

RSK have been commissioned to undertake a Biodiversity Impact Assessment (BIA) for the proposed Zgosht to Cerenec Bridge road scheme as part of the Albanian National and Regional Road project on behalf of the European Bank for Reconstruction and Development (EBRD) and the Albanian Development Fund (ADF). This assessment is required to meet EBRD's Performance Requirement 6 (PS6): Biodiversity Conservation and Sustainable Management of Living Natural Resources (EBRD, 2014).

The road scheme entails the rehabilitation of an existing road that lies between Zgosht and Cerenec Bridge, located in East Albania, approximately 41 km from Tirana at the closest point, within the municipalities of Bulqizë and Librazhd and the districts of Dibër and Elbasan. The existing Zgosht to Cerenec road spans 46.5 km and is a predominantly unsurfaced two-way road located in a rural, mountainous area. Approximately 13.5 km of the road crosses the western border of the Shebenik-Jabllanicë National Park which is also designated as a Candidate Emerald Site. It is anticipated that the road will facilitate access into the region which will promote opportunities for economic development including tourism.

The biodiversity baseline of the Project Development Area (PDA) is described in the Albania National Roads Project: Biodiversity Baseline Assessment (RSK, 2020). This biodiversity assessment characterises the existing biodiversity features within the Project footprint and surrounding environs including the Priority Biodiversity Features (PBFs) and critical habitat qualifying features for the Project based on screening. These features are of high conservation importance for the Project. This process of prioritisation provides focus to this impact assessment and ensures that the avoidance, mitigation and restoration measures are focused on the highest biodiversity values and risks within the zone of influence.

This biodiversity impact assessment assesses project-related impacts on PBFs during the pre-construction, construction and operation phases. The assessment covers terrestrial habitats and flora; terrestrial fauna (including avifauna, reptiles and invertebrates) and their habitats; aquatic habitats and flora; and aquatic fauna. An Environment and Social Impact Assessment (ESIA) or an Environmental Impact Assessment (EIA) has not been completed for the project so a precautionary approach was undertaken due to the paucity of project-based environmental and social information and data. The ADF is committed to filling these data gaps and will undertake pre-construction environmental assessments prior to the commencement of works in order to produce an EIA/ESIA for the project at detailed design stage.

Some of the key impacts to PBFs, prior to mitigation, are summarised as follows:

- the permanent loss of a total of 40.41 ha of terrestrial habitat from within the Project footprint including the permanent loss of 6.01 ha habitat from within the Shebenik-Jabllanicë National Park (a critical habitat-qualifying feature)
- habitat clearance, earth works, excavating and levelling works present a risk of accidental fauna collisions with vehicles and machinery resulting in injury or mortality to some individuals of priority biodiversity fauna including Eurasian badgers (*Meles meles)* and wild cat (*Felis sylvestris*) that are PBFs for the project
- loss of breeding and foraging habitat for birds including those that are PBFs for the project such as Western capercaillie (*Tetrao urogallus*)

- loss of habitat and disturbance to roosting bats including those that are PBFs for the project such as Mediterranean horseshoe bat (*Rhinolophus euryale*)
- impacts on aquatic and terrestrial habitats and species associated with them such as serpentine false brome (*Festucopsis serpentine)* and pindus stone loach (*Oxynoemacheilus pindus*) (both critical habitat qualifying species) through air pollution derived from increased traffic volumes
- during operation, the physical structure of the proposed road (i.e. steep sided road embankments, safety barriers and concrete structures), compounded by noise and vehicle movement and artificial lighting is expected to form a barrier to the movement of fauna with home ranges that overlap the project footprint, in particular brown bear *(Ursus arctos)* and Balkan lynx (*Lynx lynx balcanicus)*
- during operation the increased road traffic speed and volume of cars is expected to result in increased collisions with vehicles for those species whose ranges overlap the project footprint (such as Balkan lynx, Eurasian badger and four lined snake, *Elaphe quatuorlineata*)
- Indirect Project-related impacts associated with facilitated access and Project-related in-migration, particularly facilitated access to areas for gathering of medicinal plants, timber and lumber and illegal hunting, poses the greatest risk to habitats and species diversity and abundance within the Project area.

The Biodiversity Management Plan (BMP; RSK, 2020), the Environmental and Social Action Plan (ESA) and the Environmental Management Plan (ESMP) will detail specific avoidance, mitigation and restoration measures to minimise adverse Project-related impacts to habitats and species. Diligent application of best practice measures for minimising and managing the risk of potential Project-related impacts arising from habitat loss and degradation, noise and vibration, accidental vehicle collisions with fauna, artificial light spill, air and water pollutants, barriers to movement, changes in hydrology and water quality is expected to minimise the risks to priority habitats, species and the Shebenik-Jabllanicë National Park.

A key priority for the project is the continued safeguarding and conservation of the Shebenik-Jabllanicë National Park (SJNP), Key Biodiversity Area (KBA) and Important Plant Area (IPA). Pre-clearance checks will be undertaken to avoid any disturbance and injury to bats, badgers and breeding birds in the PDA during construction. Deadwood from within oak woodland located in the working width will be translocated to a suitable receptor site to minimise the habitat loss and risk of mortality to saproxylic beetles. Nationally endemic, rare and threatened plant species will be translocated from within the PDA to a suitable receptor site to minimise the risk of mortality or injury to these individual species. Roosting bats within the PDA will also be translocated to a purpose-built bat roost. The establishment of a wildlife crossing point for priority fauna will be integral to enable Balkan lynx, brown bear and other wildlife to retain access to resources in the PDA.

The implementation of the Reinstatement and Landscaping Plan will be integral to restoring the physical environment and ecosystem function within the PDA as ‘like for like’ (or better) than that which existed prior to Project construction where feasible.

Whilst avoidance, mitigation and restoration actions will reduce the significance of impacts to biodiversity, these actions will not eliminate all residual Project-related impacts. For example, a total of 19.76 ha of natural habitats will be permanently lost from within the PDA. Residual impacts will also arise from wildlife vehicle collisions and facilitated access; and the magnitude of these

impacts was difficult to quantify. The project will commit to working with the SJNP Management Committee to deliver their management objectives relating to tourism and natural resource use.

The Project has also committed to establishing an Environmental Monitoring Plan (EMP). This will incorporate a Biodiversity Monitoring and Evaluation Programme to assess the efficacy of the avoidance and mitigation measures and to inform the requirement for adaptive management. The biodiversity monitoring actions have been developed based on the avoidance and mitigation measures designed for the Project; these are presented in the BMP. Where possible, thresholds will be established for each monitoring approach that will alert the Project that mitigation measures need to be adapted and revised biodiversity management measures are required. ADF are committed to implementing the BMP, EMP and ESAP, and will work with and direct their contractors to ensure full implementation and compliance.

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1 GLOSSARY AND ACRONYMS

A	
AOI	area of influence
ADF	Albanian Development Fund
B	
BMP	Biodiversity Management Plan
C	
CHA	critical habitat assessment
E	
EBRD	European Bank For Reconstruction and Development
ESAP	Environmental and Social Action Plan
EMP	Environmental Management Plan
F	
FAO	Food and Agriculture Organization of the United Nations
H	
Ha	Hectares
I	
IBA	Important Bird Area
IPA	Important Plant Area
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
K	
KBA	Key Biodiversity Area
km	kilometre
M	
m	metre
N	
NTFP	Non-timber Forest Products
P	
PS6	Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
PDA	Project development area and includes the project footprint, the working width, the extent of the rock stabilisation area, areas of associated facilities, stockpile area and borrow pits
PBF	Prioirty Biodiversity Features
R	

RoW	right-of-way
S	
SJNP	Shebenik-Jabllanicë National Park
SOP	Standard Operating Procedure
Z	
ZOI	Zone of influence: the area over which ecological features may be subject to significant effects as a result of the proposed project and associated activities. This is likely to extend beyond the project footprint.

2 INTRODUCTION AND APPROACH

2.1 Introduction

The European Bank for Reconstruction and Development (EBRD) is considering providing a sovereign loan to the Republic of Albania for the benefit of the Albanian Development Fund (ADF) to finance the rehabilitation of the road that lies between Zgosht and Cerenec Bridge (hereafter 'the Project'). The Project has been classified by EBRD as a Category B project in accordance with the 2014 Environmental and Social Policy.

This biodiversity impact assessment assesses project-related impacts on biological aspects during the pre-construction / construction and operation phases, including terrestrial habitats and flora; terrestrial fauna and their habitats; aquatic habitats and flora; and aquatic fauna.

The Project is located in East Albania, approximately 41 km from Tirana at the closest point, within the municipalities of Bulqizë and Librazhd and the districts of Dibër and Elbasan. Approximately 13.5 km of the road will cross the western border of the Shebenik – Jabllanice National Park (IUCN Category 2; national park category 2). This nationally protected area is also designated as a Candidate Emerald Site, Key Biodiversity Area and an Important Plant Area. The beech forests in the Rrajca basin area of the National Park are part of the Ancient Beech Forests of Europe UNESCO World Heritage site called Primeval Beech Forests of the Carpathians and Other Regions of Europe.

2.2 Project description

Road improvement works were undertaken along this section of the road in 2012 by the Albanian Road Authority (ADF, February 2020), . These included:

- widening of the road (preparation of the carriage way e.g. filling the site with raw material)
- construction of roadside channels and ditches
- construction of the retaining walls
- installation of streetlamps
- construction of drainage culverts and structures
- laying of sub-base gravel layer.

According to the Feasibility Study (ADF, February 2020), the road is currently considered to be of an inadequate standard to support existing and predicted levels of vehicle traffic and to meet road safety requirements. The existing Zgosht to Cerenec roadway supports approximately 325 vehicle units per 3 days and is expected to support 1500 vehicle units per 3 days following completion of the Project. Sections of the road have been heavily impacted by surface water runoff resulting in severe localised erosion due to the poor condition of the current drainage system. The poor condition of the road limits vehicle

movement and access across the districts of Dibër and Elbasan, which in turn is limiting economic development within these districts (Feasibility Study, February 2020).

The Project aims to improve access for residents to basic services and increases the possibilities for economic, agricultural and tourism development for the benefit of the rural population. It is anticipated that rehabilitation of this section of the road will:

- facilitate access for community, farmers and other economic enterprises
- facilitate access for tourists to mass tourism destinations in eastern Albania
- enable vehicle access to Dibër and Elbasan regions with a specific focus on Librazhd, Bulqize and Dibër municipalities
- facilitate access between Dibër, Bulqizë and Librazhd to the nearby urban centres.

The Feasibility Study (ADF, February 2020) predicts that the investment into the rehabilitation of the road will lead to economic development, agriculture development and tourism development through facilitating access to new touristic areas such as Parku Shebenik Jabllanicë in Librazhd and access to cultural, natural and historical areas in the Dibra region. The General Local Plans of Librazhd and Bulqize (draft in progress) highlight the importance of this development.

Figure 2-1a: Existing Road

Figure 2.1b: Existing Road

2.2.1 The proposed road works

The road is currently in the design phase; however, it is anticipated that the Project is likely to entail the following road works:

- localised habitat clearance and topsoil removal within some areas of the working width
- construction of the sub-base and base layers along the length of the entire road
- construction of the asphalt layers (6 cm thick binder course and 4 cm wearing course layer)

- cleaning and improvements of the existing drainage system (including concrete channels and culverts). Currently some culverts also serve as animal crossings.
- construction of additional concrete retaining walls
- installation of road safety barriers
- bioengineering works to stabilise and protect escarpments
- installation of traffic signs (i.e. pedestrian and vehicle signage)
- the addition of road markings
- installation of streetlighting along sidewalks in urban areas
- upgrading existing areas of paving
- constructing new areas of paving in urban areas
- the installation of pipes for the optical fibre network in urban areas
- the rehabilitation of several bridges

The road will pass along the existing right of way. However, the detailed design will provide for the final interventions, considering road safety and environmental issues.

2.2.2 The design works

The Project is currently in the early stages of the design phase, hence many of the design details are not finalised. The road designers are however currently taking the following improvement measures into consideration:

- pedestrian safety – e.g. the inclusion of pavements / sidewalks, lighting, signage in urban environments
- road safety – e.g. traffic signage, retaining walls, stabilisation works
- engineering requirements to address erosion issues– e.g. maintenance and enhancement of the existing drainage system and stabilisation of escarpments.

The overall length of the Zgosht to Cerenec road spans 46.5 km. The proposed road works will result in a road width measuring 8 m with asphalted traffic lanes measuring 2 x 3.25 m and gravel shoulders measuring 2 x 0.75 m.

The following road pavement layers have been selected based on the forecast volume of traffic, in particular the percentage volume of heavy goods vehicles, which have a greater damaging effect and determine the overall required pavement thickness.

- Surface course: asphalt concrete 40 mm
- Binder course: asphalt 60 mm
- Base Course: crushed stone base 1x150mm
- Sub-base: granular material 1x150mm
- Regulating layer: granular material 0-300mm is already completed

Where the road passes through hilly or mountainous areas the proposed road, when traversing the sidelong ground, would be supported by a concrete retaining walls when necessary, on the lower side. On the higher side, the excavated slope would be supported by construction of concrete retaining walls to the height necessary for stability.

The road is located in mountainous terrain characterised by a steep gradient and loose rockface. To protect the road and vehicle traffic from rockfalls the rockface within this section of the road will be stabilised using bio-engineering (a safety net that will support the establishment of vegetation), instead of concrete.

2.2.3 Construction approach

Whilst there is much uncertainty regarding the detailed methods of construction at this stage in the Project development, some key aspects of the approach have been confirmed.

For example, habitats and topsoil will only be cleared within key sections of the working width using graders or bulldozers, jackhammers and trucks. The exact area of habitat clearance beyond the road footprint is uncertain but is likely to be a small area and potentially localised. Small excavators, pneumatic drills, jackhammers and trucks will also be used during grading of the road to remove the existing road surface.

The excavated material (i.e. topsoil and rocky substrate) will be stockpiled and reused for construction and landscape restoration. The stockpile areas will be located near the proposed road alignment and will include temporary waste disposal sites for storing inert materials. Habitats within the stockpile areas will be rehabilitated following use. The exact locations of the stockpiling sites and borrow pits are unknown at this stage in the project development.

Other machinery used to construct a new gravel and asphalt layer include compactors, bitumen spreading machines, asphalt laying machinery, road rollers and brushers.

Public utilities (i.e. telephone, electricity and water) are unlikely to be temporarily disrupted during the installation of new pipes and cables to the existing network. There is currently no existing underground infrastructure such as telephone cables, electricity or piping system.

The materials used for road construction will be supplied by a licensed company. Contractors will be required to use or buy material from existing asphalt plants, stone quarries and borrow pits operating with valid environmental and other permits and licenses.

Contract provisions shall require that asphalt and hot-mix plants will be located at least 500 m away from the nearest sensitive social and biodiversity receptor.

Equipment and materials will be transported to site using the existing road network. Truck operators will be required to cover or wet truck loads, avoid hauling materials on public roads during the morning peak traffic hour (8:00am to 9:00am) and to use alternative routes wherever possible to minimize traffic congestion. The contractor will be required to prepare and submit to the works supervisor and municipality a Traffic Management Plan showing routes and times to be used for materials delivery off and on site. Contractors will prepare a traffic management plan with appropriate measures to control and direct traffic and pedestrians.

The waste materials will be disposed in accordance with the official process and the approach will be approved by the local authorities. Waste management and the location of deposit sites will be confirmed together with the Engineer and ADFs Environmental Unit who will also systematically follow the process during construction, in accordance with the approved ESMP.

Solid waste clean-up will be entrusted to licensed operators, with provisions in their contract to carry out visual inspections for toxic materials before handling and segregating waste fractions as necessary, use safety measures while handling and transporting the wastes and disposal of waste at authorized dump sites with approval of the local authorities. The waste disposal site will be at least 100 m away from the road, not near any surface waters or in a vegetated area. The waste disposal site will be selected in cooperation with the supervisor and the contracting authority. It is preferable to recycle the inert materials or to use the regional landfill.

Contractor will be required to properly organize and cover material storage areas; isolate concrete, asphalt and other works from any watercourse by using sealed formwork; isolate wash down areas of concrete and asphalt trucks and other equipment from watercourses by selecting areas for washing that are not free draining directly or indirectly into any watercourse. Contractor will further ensure proper handling of lubricants, fuel, and solvents by using secured storage; ensuring proper loading of fuel and maintenance of equipment; collecting all waste and disposing to permitted waste recovery facility. Special care must be taken during the bridge rehabilitation works, since this project foresees the reconstruction of several bridges.

Construction works will not be carried out at night (not between 7 p.m. and 7 a.m. or as agreed with the public and authorities). Hence, security fencing and artificial lighting will be erected around machinery and plant at night along the proposed alignment. Water from waterbodies located in the project area and the National Park will not be extracted for construction activities (e.g. drilling) or for consumption by the workforce. Water for civil works will be supplied to the Project area using water trucks / tankers.

Personnel facilities such as a portable office and cabins for storage of personal items and equipment will also be installed within the project area but the exact location will be known when the design is finalised. The power supply to the office will be accessed through the existing network. It is anticipated that the workforce will use existing accommodation located close to the Project. The workforce will be defined once the detailed design is finalised and the Bill of Quantities (BoQ) has been defined. The project will follow the Gender Diversity Action Plan to promote women's rights and involvement during the construction phase. This will be monitored by ADF during construction.

2.2.4 Habitat restoration

A Reinstatement and Landscaping Plan for the Project will be prepared and implemented by the Contractor. ADF will approve and monitor the implementation of this Plan. This plan will provide a clear methodology for the reinstatement of the physical environment within the Project footprint, the working width, borrow pits, stockpiling areas and contractor facility area (i.e. arising from habitat clearance, grading etc) in addition to the progressive rehabilitation and restoration of habitats and vascular plant species within the Project Development Area (PDA).

As part of this plan, the Project will develop a planting scheme using vascular plant species of local provenance. This will entail plug planting and seeding along the escarpments and embankments adjacent to the road alignment as part of the bioengineering works.

2.2.5 Operation, monitoring and maintenance

Maintenance road works will be undertaken on an annual basis or when required. The maintenance responsibility of the Zgotsh - Cerenec road after the project implementation lies with Albanian Road Authority. ADF will be responsible for the monitoring and maintenance work for the first 2 years of operation including the establishment of the landscaping scheme. This responsibility will then be devolved to the municipalities (namely Librazhd and Bulqizë). ADF will retain a quality assurance role for monitoring the establishment of habitats and species as part of the Reinstatement and Landscaping Plan and Biodiversity Management Plan.

The establishment of the planting scheme, as specified in the Reinstatement and Landscaping Plan and Biodiversity Management Plan, will be monitored for the first 5 years or until the successful establishment of the vascular plants has been achieved. Over this period, ADF will retain responsibility for closely monitoring the status of the planting scheme and maintenance works (including watering) for the first 2 years of operation. Any dead vascular plants will be replaced by Contractor as 'like for like' during the maintenance timeframe and will be monitored by ADF.

Following this period, the municipalities will take over the responsibility for maintenance (including watering) and monitoring work for the following 3 years, as specified in the maintenance agreement. Over this period, ADF will retain a quality assurance role to ensure that these works are completed by the municipalities and any dead vascular plants will be replaced as 'like for like' during this timeframe.

2.2.6 Schedule

The project will have a 2-year time span from the loan approval. The following main activities are envisaged to be undertaken by ADF:

- preparation of the detailed design
- procurement of the civil works
- construction and supervision.

It is anticipated that the road works will take 6 months to complete and the start date will be determined by the Investor according to the procurement process.

2.2.7 ESIA

An Environment and Social Impact Assessment (ESIA) or an Environmental Impact Assessment (EIA) has not been completed for the project. This will be prepared by the Designer. This is expected to be produced for the project by mid July 2020.

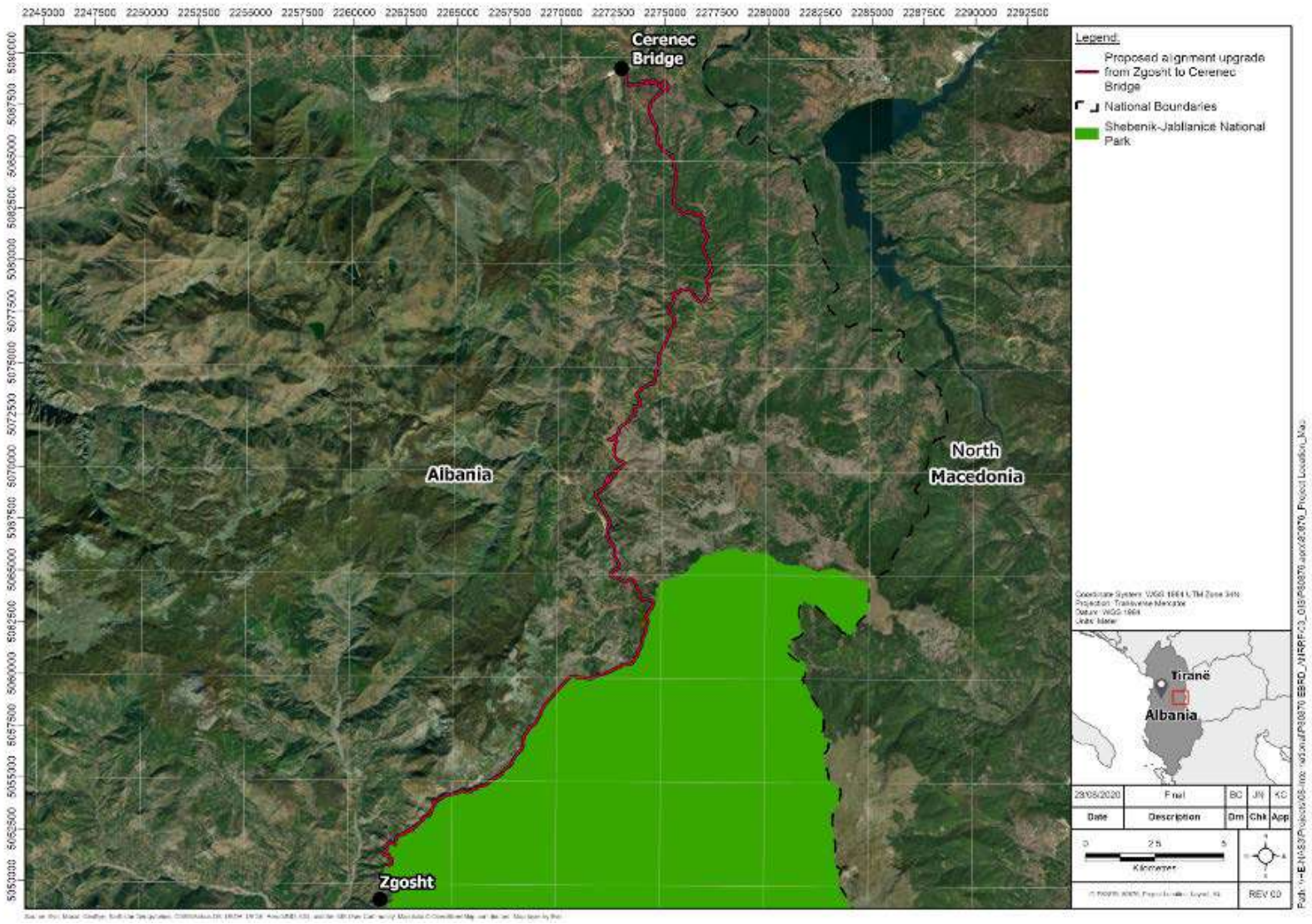

Figure 2-2: Project location

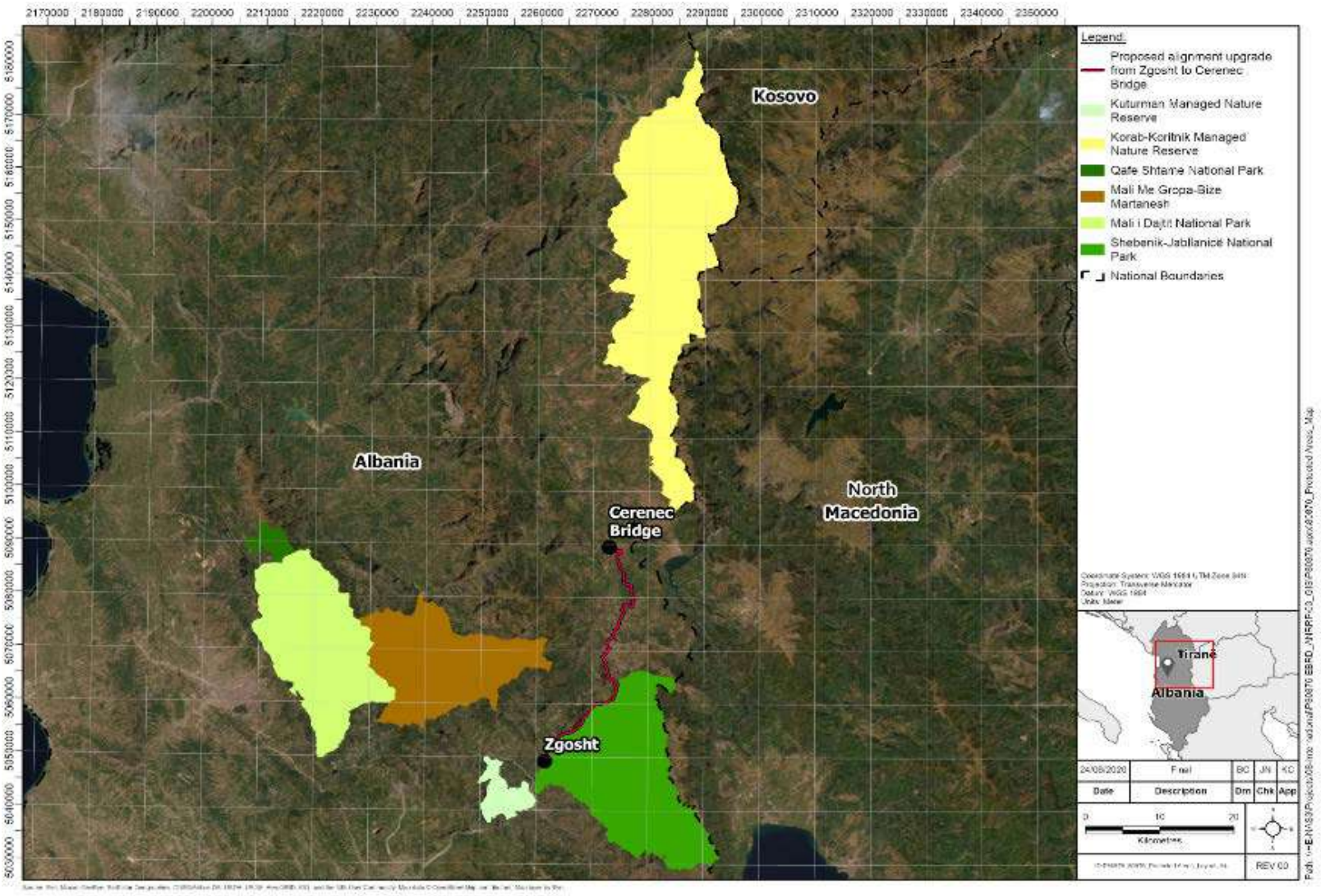

Figure 2-3: Distribution of Protected Areas in proximity to the proposed road alignment

2.3 The biodiversity baseline and priority biodiversity features

The biodiversity baseline of the Project Development Area is described in the Biodiversity Baseline (RSK, June 2020). This assessment characterises the existing biodiversity features within the project footprint and surrounding environs based on the following components:

- habitat mapping
- site visit, botanical scoping survey and biodiversity walkover survey
- literature review

The report also identifies the Priority Biodiversity Features (PBFs) and Critical Habitat-qualifying features for the project based on screening. These features are of high conservation importance for the project. A summary of the Critical Habitat-qualifying features and PBF's are presented in Table 2.1 and Table 2.2 respectively, and a more detailed account is presented in the Biodiversity Baseline (RSK, 2020).

Table 2-1: Summary of Critical Habitat-qualifying features for the Project

EBRD PR6 Criteria	IFC PS6 Criterion Threshold Numbers	Critical Habitat-qualifying Features	Justification
Highly threatened or unique ecosystems	4a	No critical habitat qualifying features	–
	4b	Shebenik-Jabllanicë National Park	Protected area status Priority Annex 1 Habitat
Habitats of significant importance to endangered or critically endangered species	1a	Balkan lynx European Eel	Balkan lynx meets the threshold Precautionary due to the paucity of data
	1b	Pindus stone loach	Precautionary due to the paucity of data
	1c	Balkan Lynx European Eel	Balkan lynx meets the threshold Precautionary due to the paucity of data
Habitats of significant importance to endemic or geographically restricted species	2	Balkan Lynx Chamois Heldreich's Pine	Balkan lynx meets the threshold Precautionary due to the paucity of data

		Serpentine false brome Mountain tea	
Habitats supporting globally significant (concentrations of) migratory or congregatory species	3a	No critical habitat qualifying features	-
	3b	No critical habitat qualifying features	-
Areas associated with key evolutionary processes	N/A	Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe	-
Ecological functions that are vital to maintaining the viability of biodiversity features described (as critical habitat features)	N/A	Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe and waterbodies/courses within the AOA	Precautionary basis assuming the presence of the critical habitat-qualifying species listed above

Table 2-2: Summary of Priority Biodiversity features for the Project

EBRD PR6 Criteria	Priority Biodiversity Features (PBF)
Vulnerable Species	Plants x 7; insect x2; fish x 2, mammals x 9; birds x 23
Threatened Habitats (EU Habitats Directive Annex 1 priority habitats)	• Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)
Significant Biodiversity Features Identified by a Broad Set of Stakeholders or Government	Protected areas within the area of analysis: • Shebenik-Jabllanicë National Park • Kuturman Managed Nature Reserve • Mali Me Gropa-Bize-Martanesh Protected Landscape • Mali I Dajtit
Ecological Structure and Functions Needed to Maintain the Viability of Priority Biodiversity Features	Project falls within Pindus Mountains mixed forests ecoregion (category Palearctic) which covers Greece, Macedonia (FYROM) and Albania. This ecoregion covers 15,300 square miles and is categorised by WWF as Critical / Endangered.

3 BIODIVERSITY IMPACT ASSESSMENT APPROACH

3.1.1 The Mitigation Hierarchy

The mitigation hierarchy is a framework for managing biodiversity and ecosystem services risks as well as direct and indirect project-related impacts to biodiversity receptors and important ecosystem services (CSBI, 2015). The project's adherence to the steps of the mitigation hierarchy is a requirement of EBRD Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. The steps of the mitigation hierarchy are presented in Figure 3.1 and are defined by BBOP (Forest Trends Association, 2019) as follows:

- **Avoidance:** this is the first step in the mitigation hierarchy and is defined as measures taken to avoid causing direct and indirect project-related impacts from the outset. Examples of avoidance measures include the spatial or temporal relocation or removal of infrastructure, to completely avoid impacting key components of biodiversity (i.e. particularly priority species, habitats or ecosystem services). Avoidance is often regarded as the most effective way of reducing potential negative impacts to biodiversity and ecosystem services.
- **Minimisation:** this is the second component of the mitigation hierarchy. Minimisation measures (or mitigation measures) are designed to reduce the duration, intensity and / or extent of direct, indirect and cumulative project-related impacts that cannot be completely avoided, as far as is practically feasible. Robust and pragmatic minimisation measures can be effective in reducing biodiversity impacts below significance thresholds.
- **Rehabilitation / restoration:** this third step in the mitigation hierarchy should be applied to rehabilitate or restore biodiversity and / or ecosystem services that are impacted by project activities that cannot be completely avoided and / or minimised. An example includes rehabilitating degraded habitats or restoring cleared habitats to reduce residual project-related impacts.
- **Offset:** Biodiversity offsets are measures taken to compensate for any residual significant, adverse impacts that cannot be avoided, minimised and / or rehabilitated or restored, to achieve no net loss or a net gain of biodiversity. Biodiversity offsets are measurable positive conservation outcomes on priority biodiversity features that are attributed to Project activities, and whose magnitude outweighs that of the residual adverse biodiversity impacts arising from the Project development. Offsets require investments in conservation management protection where the results of these investments can be quantified. Offsetting is based on systematic biodiversity accounting based on the explicit calculation of biodiversity losses and gains at matched impact and offset sites.

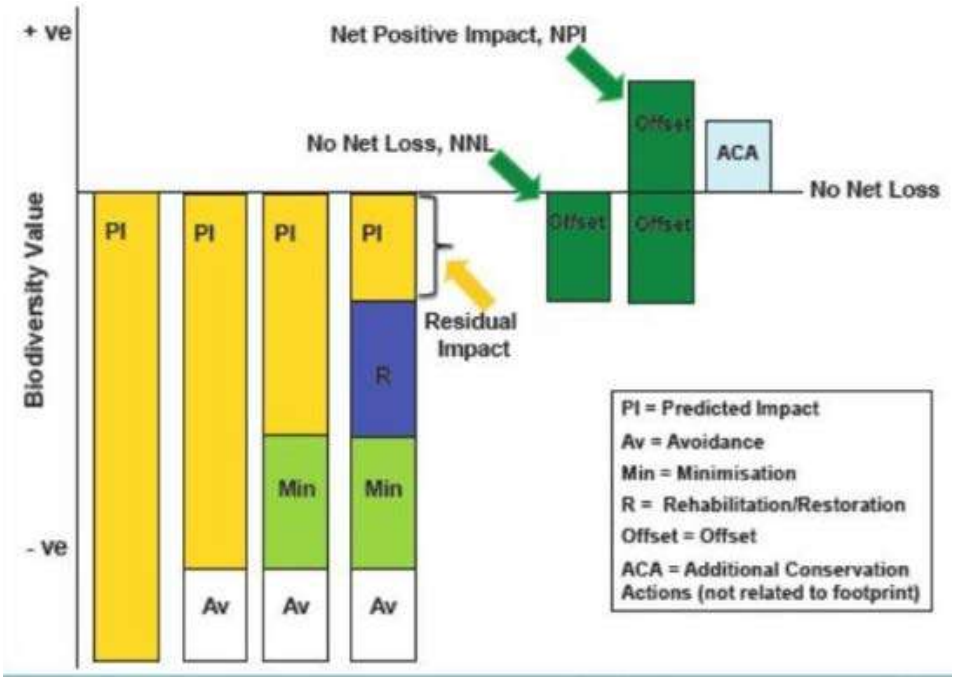

Figure 3-1: The Mitigation Hierarchy (BBOP, 2019)

The ecological, regulatory, economic and reputational drivers for applying the mitigation hierarchy are summarised by Forest Trends Association (2019) as follows:

- Ecological drivers: include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources, through limiting and/or repairing project impacts on BES.
- Regulatory drivers: application of the mitigation hierarchy is promoted and / or a requirement of many financial institutions (including EBRD), industries, governments and NGOs.
- Economic drivers: application of the mitigation hierarchy in combination with best practice biodiversity management can reduce risks, costs and increase the likelihood of permitting for projects and financial institutions.
- Reputational drivers: effective biodiversity and ecosystem service management can enhance stakeholders support for project development and the successful implementation of a project.

It is anticipated that the project will apply the steps of the mitigation hierarchy so that adverse potential project-related impacts are avoided, minimised and restored or rehabilitated where feasible.

3.1.2 Impact Assessment Criteria

The framework for this biodiversity impact assessment follows the general principles of the CIEEM Guidelines for Ecology Impact Assessment in the UK and Ireland (September, 2018). Biodiversity impacts identified in this assessment were characterised as follows:

- Positive or negative impacts: Positive project-related impacts are those that improve the biodiversity within the project development area (PDA) and zone of

influence (ZOI). Negative project-related impacts are those that have an adverse impact on habitat and species in the PDA and ZOI (e.g. a reduction in the range or abundance of species, decline in habitat coverage, etc)

- Extent: The spatial or geographical area in which the impact occurs is referred to as the extent of the impact.
- Magnitude: The magnitude is the size or amount of the impact that has been identified.
- Duration: This refers to the time-frame in which a project-related activity occurs, or the period in which an impact occurs on a particular habitat or species and may be expressed by a number of ways including a species lifecycle or number of generations of a particular species etc.
- Timing and frequency: The particular time and the number of times that a project-related activity occurs.
- Reversibility: Consideration is given to identify whether impacts are reversible or irreversible (permanent) where recovery is not possible within a reasonable timescale.

The assessment only describes the characteristics that are relevant to understanding the project related impacts to a particular biodiversity feature. Impacts were also classified as direct or indirect project-related impacts as follows:

- Direct impacts:
  - direct habitat loss from within the project footprint and RoW
  - hydrological and water quality impacts
  - air quality impacts (i.e. fugitive dust and pollution emissions)
  - noise, vibration and airblast impacts
  - artificial light spill
  - accidental mortality and injury of fauna from collisions with vehicles and machinery
  - barriers effects (i.e. physical obstruction to the movement of fauna)
- Indirect impacts:
  - habitat fragmentation, edge effects and barrier effects (i.e. through habitat fragmentation)
  - induced access (or increased access) and project-related in-migration
  - unsustainable exploitation of natural resources, illegal hunting and wildlife captures
  - alien invasive species introductions

The assessment of impacts to biodiversity receptors was undertaken using the impact matrices presented in Table 3.1 and Table 3.2.

Table 3-1: Habitat Impact Assessment Matrix

		Magnitude of Impact			
		Negligible	**Small**	**Medium**	**Large**
		Impact is within normal range of variation.	Affects a small area of habitat but without the loss of viability / function of the habitat	Affects a significant proportion of the habitat such that the viability and function of part of the habitat or the entire habitat is reduced but does not threaten the long-term viability of the habitat or species dependent it.	Affects the entre habitat or significant proportion of the habitat, where the viability / function of the entire habitat is reduced and the long-term viability of the habitat and the species dependent on it are threatened.
Sensitivity	Negligible	Not significant	Not significant	Not significant	Not significant
	Low	Not significant	Not significant	Minor	Moderate
	Medium	Not significant	Minor	Moderate	Major
	High	Not significant	Moderate	Major	Major (high)

Table 3-2: Habitat receptor sensivity

Sensitivity Ranking	Characterisation
Negligible	Habitats that are very common and widespread across their natural global range. Habitats significantly degraded by anthropogenic activities that are characterised by a low floristic value (i.e. low species diversity and / or abundance, and / or a high proportion of non-native vascular plants). Habitats that have negligible biodiversity value for species as feeding or breeding areas (or migration routes). Habitats that are not nationally protected or internationally recognised areas for biodiversity.

Low	Habitats that are common and widespread in Albania and Europe. Habitats generally degraded by anthropogenic activities that are characterised by a low floristic value. Habitats with low conservation value in expert opinion. Habitats that are not nationally protected or internationally recognised areas for biodiversity. Habitats that naturally recover quickly following disturbance.
Medium	Habitats that are regionally rare and threatened and are small sized or scattered in their distribution but are not rare and threatened in Albania. Annex 1 priority habitats. Habitats that include an assemblage of species that are uncommon in Albania. Habitats that have a slow rate of recovery following disturbance. Low value habitats used by medium value species as important feeding or breeding areas (or migration routes). Internationally recognised areas such as Key Biodiversity Areas, Important Bird Areas and Important Plant Areas. Habitats that are nationally protected areas for biodiversity.
High	Habitats that are rare and threatened in Albania and Europe. Habitats with limited global extent. Habitats that are highly unlikely to naturally recover following disturbance. Habitats supporting an assemblage of unique or important species. This includes habitats used by high value species as important feeding or breeding areas (or migration routes). Highly threatened and/or unique ecosystems and areas illustrative of key evolutionary processes (i.e. including Areas for Zero Extinction). Sites of international importance / designated for protection at the international level (i.e. World Heritage Sites, Ramsar sites).

Table 3-3: Species Impact Assessment Matrix

Species Value		Magnitude of Impact			
		Negligible	**Small**	**Medium**	**Large**
		Impact is within normal range of variation.	Affects a small proportion of the population but does not substantially affect other species dependent on it or the population of the species itself.	Affects a sufficient proportion of a species population such that it may bring about substantial change in abundance and / or distribution over one or more generations, but does not threaten the long-term viability of that population or any population dependent on it. The size and cumulative effect is also sufficient such that a medium magnitude impact multiplied over a wide range area would be regarded as a large magnitude	Affects an entire population or species in sufficient scale to cause sufficient decline in abundance and / or change in distribution beyond which natural recruitment (reproduction, in-migration from unaffected areas) may not return that population or species, or any population of species dependent upon it, to its former level within several generations, or when there is no possibility of recovery.
Sensitivity	Negligible	Not significant	Not significant	Not significant	Not significant
	Low	Not significant	Not significant	Minor	Moderate
	Medium	Not significant	Minor	Moderate	Major
	High	Not significant	Moderate	Major	Major (High)

Table 3-4: Species Receptor Sensitivity

Sensitivity Ranking	Characterisation
Negligible	Commonly occurring species, not subject to significant decline (i.e. distribution and abundance) at their range at the global and national scales (i.e. species listed as Least Concern by IUCN (2020 or The National Red Data Book for Albania, 2013). No specific value or importance attached to the species. Species that are not legally protected. Introduced or alien invasive species.
Low	Species not protected, listed as widespread or abundant at the national scales but are listed as Near Threated at the global scale by IUCN (2018) or The National Red Data Book for Albania and does not meet the criteria for high or medium value species. Species that will re-colonise disturbed areas, particularly following habitat restoration and rehabilitation but perhaps at a slower rate than other commonly occurring species.
Medium	Species listed as Vulnerable or Data Deficient on the IUCN Red List of Threatened Species. Not meeting the criteria for high value species.
High	Species included on the IUCN Red List of Threatened Species as Critically Endangered and Endangered. Edge species. Keystone species that are critical for the maintenance of high biodiversity in Albania and / or a single population of Critically Endangered and Endangered species. Endemic and/or range-restricted species that trigger Critical Habitat in accordance with Performance Standard 6 IFC thresholds. A migratory and/or congregatory species that is present in globally significant numbers thus triggering Critical Habitat in accordance with Performance Standard 6 IFC thresholds.

3.2 Cumulative Impact Assessment Approach

Cumulative impacts result from the successive, incremental and/or combined effects of a project or activity, when added to other past, existing, planned and/or reasonably anticipated future ones. They may occur because, for example, several projects of the same type are being developed in close spatial or temporal proximity.

EBRD Performance Requirement 1 references the need for the ESIA process to consider cumulative impacts of the project in combination with impacts from other relevant past, present and reasonably foreseeable developments as well as unplanned but predictable activities enabled by the project that may occur later or at a different location.

The spatial and temporal boundaries for the cumulative impact assessment (CIA) are the same as the spatial and temporal boundaries for the assessment of Project-related impacts discussed elsewhere in this report.

This CIA focuses on known and foreseeable developments which may affect the biodiversity of the PDA and investigates whether any have the potential to result in

cumulative impacts (positive and negative) when their impacts are combined with the Zgosht to Cerenec road project. It aims to identify biodiversity receptors which are most at risk from the combined impacts of the existing and potential development identified within the study area.

There is virtually no information on most of the other developments considered in the CIA. Therefore, professional judgement has been used to predict their likely impacts.

4 BIODIVERSITY IMPACT ASSESSMENT

4.1 Terrestrial habitats and flora

4.1.1 Pre-construction and construction

4.1.1.1 Habitat loss and degradation

Impacts to terrestrial habitats and vascular plants are likely to occur during the pre-construction and construction phase when habitats within the project area will be cleared or damaged by project activities. Although works are restricted to road upgrade the following activities will result in either temporary or permanent habitat loss: stabilisation works such as retaining walls and embankments, borrow pits, stockpile sites, workers facilities, the office and equipment storage facilities. The locations of these components and the area of temporary habitat loss or degradation is currently unknown so a precautionary approach has been taken assuming that all habitat within 5 m of the road edge (on both sides) will be permanently cleared to facilitate retaining walls and other structures and a further 5 m will be cleared temporarily to facilitate construction activities such as storage and access. This habitat clearance will result in temporary or permanent loss of natural and modified habitats as detailed in Table 4.1.

Table 4-1: Table showing temporary and permanent habitat loss along the alignment

	Total permanent habitat loss outside of the SJNP (ha)	Total permanent habitat loss inside the SJNP (ha)	Total temporary habitat loss outside of the SJNP (ha)	Total temporary habitat loss inside the SJNP (ha)
Modified habitat	29.94	4.61	23.74	3.7
Natural Habitat	10.47	1.4	16.21	2.75
Total	40.41	6.01	39.95	6.45

The habitat map indicates that modified habitats (i.e. agro-pastoral land, black pine plantations, fallow land, bare-ground / disturbed land, settlements and areas of hard standing) dominate the study area. The botanical scoping survey also identified evidence of disturbance from the previous roadworks in the study area where ruderal plant species have sporadically colonised. These exposed areas of escarpment and disturbed ground are prone to erosion.

Natural habitats within the study area comprise:

- broadleaf woodlands and forests dominated by oak species (i.e. *Quercus petraea*, *Q. frainetto*, *Q. cerris*) or European beech (*Fagus sylvatica*)
- exposed screes with limited vegetation
- deciduous thickets
- aquatic habitat types (i.e. alpine streams, reservoir, ponds)

All the natural habitats located within the study area are common and widespread in nature and as such do not qualify as EU Habitats Directive Priority Annex 1 habitats. Table 4.2 quantifies the areas of habitat loss per habitat type.

Table 4-2: Habitat types along the proposed road and the estimated temporary and permanent loss for each habitat type

EUNIS Habitat Classification	Annex 1 Code and Habitat Type	Annex 1 Priority Habitat Status	Botanical scoping and ground truthing assessment findings	Estimated permanent habitat loss (ha)	Estimated temporary habitat loss (ha)
C1.3 - Permanent eutrophic lakes, ponds and pools	3150 - Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	Not priority	Standing waters inhabited mainly with *Typha angustifolia, Potamogeton sp., Myriophyllim sp*.	0	0
C2 - Surface running waters	3200 – Running water	N/A		0.2	0.15
G1.7 - Thermophilous deciduous woodland	91M0 - Pannonian-Balkanic turkey oak –sessile oak forests	Not priority	These woodlands occupy a very wide surface not only in the study area but along all the region from Librazhd to Bulqize. The woodlands are installed in brown slightly acid soil and represent a mixed woodland usually with co-dominance of *Quercus cerris* and *Quercus frainetto* with total cover between 85 – 100% and a maximum height of trees up to 13 m. Among these woodlands there are areas in which they are better preserved and in high regeneration rates and some other areas in which they are degraded mainly by previous human activities and in these cases, they overlap with hornbeam scrubs. In dry eroded soils the co-dominant species of these plant communities are *Quercus pubescens* and *Carpinus orientalis*. Present species of the woodlands are: *Quercus cerris, Q. frainetto, Q. pubescents, Carpinus orientalis, Ostrya carpinifolia, Acer monsepssulanum, Fraxinus ornus, Acer tataricum, Helleborus odorus, Acinos alpinus, Dactylis glomerate, Clinopodium vulgare, Brachypodium sylvaticum, Teucrium chamaedrys, Fragaria vesca,*	5.94	8.61

			Cephalanthera rubra, Asparagus acutifolius, Geum urbanum, Melica ciliata, Viola odorata, Veronica chamaedrys etc.		
G1.7 - Thermophilous deciduous woodland with Roinia pseudoacacia				0.16	0.21
G3.57 – Pinus nigra reforestation	N/A	N/A	In the study area this habitat type is represented by *Pinus nigra* plantations, so not a natural forest, which are planted 40-60 years ago to protect the soil from erosion. They are mainly monodominant forests but considering they are planted in the Oak phytoclimatic belt, many often in the area are seen as a mixture of pine forest with sparse oak species.	0.13	0.29
G 1.63 - Medio-European neutrophile Fagus forests	9130 - Asperulo-Fagetum beech forests	Not priority	A dense beech forest (old and young) with dominance of *Fagus sylvatica* is regenerating quite healthily in the study area. The forest covers almost always 100% of its surface and can grow up to 30 m with a trunk diameter between 10 – 45 cm. The tree layer is Fagus sylvatica monodominant, and species in the shrub layer are mainly represented by: *Cornus mass, Cornus sanginea, Crategus monogyna, Fraxinus ornus, Juniperus oxycedrus, Rubus ulmifolius, Acer pseudoplatanus* etc. The herbaceous layer is composed of diverse species like: *Fragaria vesca, Helleborus odorus, Aremone agrimonoides, Lactuca muralis, Granium macrorhizum, Carex crupina, Melitis melissophyllum, Hedera helix, Asplenium trichomanes, Epipactis helleborine, Cephalanthera rubra, Saxifraga rotundifolia, Symphytum tuberosum, Festuca heterophylla, Asplenium trichomanes, Ceterach officinalis* etc.	1.86	3.71
Cleared Medio-European neutrophile Fagus forests				0.42	0.6

F3.243 - Balkano-Hellenic deciduous thickets	N/A	N/A	These plant communities represent deciduous shrubs generally dominated by *Caprinus orientalis* which in fact substitute the *Quercion frainetto* and *Ostryo-Carpinion* climax forests. They can have a total cover from 50 % to 85%, mainly in rocky surfaces and surrounded by screes. These scrubs are up to 3 m high and on average 10 years old. The shrub layer is co-dominated by *Carpinus orientalis. Ostrya carpinifolia, Juniperus oxycedrus, Fraxinus ornus, Acer tataricum, Quercus pubescens* etc.	2.76	4.77
E5 - Woodland fringes and clearings and tall forb stands/ E5.3 - Pteridium aquilinum fields	N/A	N/A	Once an oak forest, it has now been cleared and the area used for pasture. Almost 85% of the clear surface is populated by *Pteridium aquilinum*. The other remaining surface is a dry fringe used for pasture with those main plant species: *Teucrium pollium, Micromeria juliana, Verbascum sp., Bromus tectorum, Trifolium resupinatum, Leucanthemum vulgare, Tunica saxifrage, Plantago lanceolata, Filago vulgaris etc.* On the southern part of this fringe the oak forest (91M0) is very well preserved. The terrain is very steep and rocky making human activity more challenging and difficult to access this part of the woodland. It is a very good part of the oak forest to be protected. On the N-NE side of the fringe the vegetation is represented by degraded *Carpinus orientalis* scrubland.	0	0
G 1.3 - Mediterranean riparian woodland; G 1.112 Mediterranean tall Salix galleries; G 1.1 - Riparian and gallery woodland, with dominant Alnus,	92A0 - Salix alba and Populus alba galleries	Not priority	The Oshtuni river and its tributaries hold a magnificent gallery of riparian forest dominated mainly by *Salix alba* (at majority of time monodominant) which is accompanied by *Populus nigra, Alnus glutinsa dhe Acer monspessulanus, Ostrya carpinifolia etc*. Other species are: *Hedera helix, Helleborus odorus, Arum italicum Mill., Brachypodium sylvaticum Dactylis glomerata L., Humulus lupulus, Clematis vitalba* etc. This habitat is already endangered by the HPP which is located at the area and is taking away majority of the water; and at the same lightly from the inert material during road construction in 2012. It is recommended	0.01	0.03

Betula, Populus or Salix			careful attention is paid to the disposal of raw materials during construction to avoid them entering the river, but at the same time consider a clean up the remaining of 2012 works.		
Screes	N/A	N/A	The area in the surroundings is very rich in screes, but they represent mainly the geological formation of screes rather than the habitat itself in the Annex I of the EU Habitat Directive. As such they will not be classified in any of the codes. By any case those geological formations are either with no vegetation at all, or with very few species such as *Pseudofumaria alba, Festuca sp*. etc.	0.94	1.48
Disturbed land from 2012 roadworks	N/A	N/A		3.51	4.28
Quarry	N/A	N/A		0.01	0.02
HPP and trout cultivation	N/A	N/A		0.16	0.32
Road / track	N/A	N/A		17.37	2.86
I1 - Arable land and market gardens	N/A	N/A	The study area passes through and by many small villages, so this type of habitat is present in patches.	12.71	18.71
J2 - Low density buildings	N/A	N/A	There are a number of buildings situation alongside the existing road as it passes through and close to several small villages.	0.23	0.37

Approximately 13.5 km of the Zgosht to Cerenec road traverses the western periphery of the Shebenik-Jabllanicë National Park. 6.45 ha of habitat will be temporarily removed and 6.01 ha permanently removed from within the National Park boundary. It is important to acknowledge that the western periphery of the National Park has been subject to habitat loss and degradation due to the expansion of grazing pasture, cultivated land and settlements. Hence, a significant portion of this section of the 50 m buffer comprises modified habitat (i.e. agro-pastoral land and housing), particularly near settlements such as Fushë Studë. Natural habitats are relatively fragmented in nature and comprise beech woodland, oak woodland, scrub, pine woodland and grassland.

Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe are critical habitat qualifying habitats and as such any direct loss of this habitat type would be of Major significance.

Impacts to habitats located within the project footprint, outside of the SJNP, arising from habitat loss and degradation are expected to be of Minor significance prior to mitigation. Impacts to habitats located inside the SJNP are expected to be of Moderate significance prior to mitigation.

There is also a risk of habitat loss and degradation through accidental spills or seepages of hazardous substances (i.e. diesel fuel, oil, bitumen, concrete etc) and grey-water or septic systems (i.e. portaloos). This impact would most likely occur within the project footprint, the concrete mixing station and near the workers facilities. Impacts to habitats arising from accidental spills and leakages may be of Moderate significance, depending on substance type, volume and location of the accident.

4.1.1.2 Loss of Rare or Threatened vascular plant species

Habitat clearance in the footprint of the proposed road alignment and the associated facilities (i.e. borrow bits, stockpiles, office, worker's facilities etc) will result in the loss of common plant species and has the potential to cause loss of individual plants that are rare or threatened in Albania and are PBFs for the project. The removal of topsoil and long-term stockpiling will also decrease the viability and longevity of the soil seed banks of these species.

The botanical walkover survey, undertaken in the PDA in June 2020, identified *Juniperus oxycedrus* within the study area which is a PBF for the project. Two other species were not identified during the scoping survey but are considered to trigger critical habitat; *Festucopsis serpentine* and *Pinus heldreichii.* As this is a walkover survey the presence of such species cannot be ruled out. The following species have been recorded in the SJNP and IPA and may be present in the PDA based on our understanding of habitat association:

- Albanian Red Listed Endangered (EN):
    - *Bornmuellera baldaccii*
    - *Centaurea candelabrum*
    - *Cistus sintenisii (synonym Cistus albanicus)*
    - *Gentiana lutea*
    - *Hypericum perforatum*

- *Lilium albanicum*
- *Pinus peuce*

- Albanian Red Listed Vulnerable (VU):
  - *Festucopsis serpentine*
  - *Juniperus communis*
  - *Juniperus oxycedrus*
  - *Narthecium scardicum*
  - *Pinus heldreichii*
  - *Ramonda serbica*
  - *Satureja montana*
  - *Saxifraga scardica*
  - *Veronica saturejoides subsp. munellensis*

It is anticipated that at most only a few individuals of each species will be cleared, which is unlikely to have substantial adverse impact on the abundance and / or distribution of the national or global populations of these species over one or more generations and is highly unlikely to threaten the long-term viability of these populations or any populations dependent on them. Impacts to endemic, rare and threatened flora arising from habitat clearance works are therefore expected to be of Minor significance prior to mitigation.

4.1.1.3 Invasive alien species introduction

In the absence of control measures, the increase in the movement of people and vehicles arising from pre-construction and construction activities increases the risk of the introduction and transfer of invasive alien species of vascular plants into the project area. Alien invasive species are often aggressive competitors, rapidly outcompeting existing plant species thus degrading the floristic diversity of habitats and dominating areas. The use of herbicides, burning, mowing and clearing generally favours disturbance-tolerant invasive plants which can rapidly colonise human-disturbed areas.

Whilst alien invasive vascular plants were not identified within the survey area during the baseline assessment and have not been identified as occurring in the Shebenik-Jabllanicë National Park (PROGES and Sapienza University of Rome, 2015), seeds or rhizomes of invasive species could potentially be transferred from affected areas into the project area by vectors e.g. workers and project vehicles. Furthermore, absence of invasive alien species cannot currently be confirmed based on the existing level of baseline information. However, as the majority of construction works will be located in the existing road footprint the potential impacts are considered to be of Minor significance prior to mitigation.

4.1.1.4 Hydrology and water quality

The road is located within a mountainous region characterised by springs, lakes, streams and scattered bogs. Streams originating within the SJNP tend to drain to the east towards the Shkumbini River. The road is within 500 m of alpine streams in a number of locations along its route, including at the northern end where a stream runs parallel to the road

diverging from beneath the Cerenec bridge and at point N41.301309° E20.377186 where the road crosses the stream.

In addition a small pond near a former quarry is located approximately 100 m from the road centre line at N41.327187° E20.419003°, there is an ephemeral pond at N41.281439° E20.340207 and a lake at N41.320795° E20.411035°near Fushë-Studë village in the SJNP. This village is an important tourist destination and is located approximately 200 m from the road centre line.

Construction will not result in direct impacts on the lakes or the streams through clearance activities or water abstraction for activities such as drilling and consumption. The dynamic hydrology of the region has caused surface water runoff resulting in severe localised erosion and deterioration of the existing road surface due to the poor condition of the current drainage system. One of the key aspects of the project is the engineering required to address erosion issues including the maintenance and enhancement of the existing drainage system and stabilisation of escarpments. This engineering may result in some minor changes to the existing surface water in the PDA. Prior to mitigation this change is expected to be of minor significance to the terrestrial habitats and vascular plant species that depend on these water resources.

The primary impact to surface water quality during the pre-construction and construction phase is expected to arise from suspended sediments generated from earthwork activities (e.g. habitat clearance, grading, the creation of borrow pits, stockpiling, bedrock extraction and the use of unsurfaced access roads). Sediment-laden runoff may smother flora, resulting in injury or mortality to plants, and habitat degradation. Sediment-laden runoff generated by the construction activities has the potential to impact water bodies within the SJNP. The magnitude of impacts is likely to be higher during the winter months in periods of high rainfall. Sediment-laden runoff from the construction site is expected to result in localised degradation of terrestrial habitats, which is expected to be of Moderate significance prior to mitigation.

Accidental spills of hazardous substances (i.e. diesel fuel, asphalt, oil and bitumen) and grey-water or septic systems (i.e. portaloos) may potentially contaminate and adversely impact receiving terrestrial habitats resulting in injury or mortality to plants, and habitat degradation or loss. This impact would most likely occur within the project footprint, near the workers facilities or the source of the spillage, the location of which are currently unknown. Prior to mitigation the accidental spills of hazardous substances on terrestrial habitats is considered to be of Moderate significance.

4.1.1.5 Habitat fragmentation and edge effects

Vegetation clearance for the project has the potential to cause habitat fragmentation. Fragmentation of habitats can cause degradation through the altered environmental conditions associated with edge effects. However, fragmentation of habitats is likely to be minimal as all clearance will be undertaken within the 100 m working width alongside the existing road. These roadside habitats are already subject to effects from the road and are likely to be modified. As such these habitats are likely to be less sensitive to these effects. It is expected that this impact will be of Minor significance prior to mitigation.

4.1.1.6 Air quality

Fugitive dust emissions measured as particulate matter of varying particle size (e.g. PM_{10} and $PM_{2.5}$) will be generated by land clearance and earthwork activities. Construction activities such as the removal of the existing road surface and construction of retaining walls and safety barriers are likely to generate dust. These impacts are expected to be relatively localised and occur within approximately 500 m of the source, depending on the prevailing weather conditions. Construction activities on the section of road within the SJNP may therefore affect terrestrial habitats within the landscape (e.g. broadleaved woodland, grasslands.)

An accumulation of dust on leaves can block stomata and thereby impact on normal photosynthetic, transpiration and cellular respiration rates (Sharifi et al., 1997) and finer dust can be directly taken into the stomatal openings (Farmer, 1993) impairing the biological fitness of plants. Prolonged smothering can result in the mortality of an individual. Habitats (i.e. broadleaved woodland) and flora located in close proximity to the dust emission sources are expected to experience the greatest impacts during construction. Impacts to the habitat and plants in these areas are expected to be of Moderate significance prior to mitigation.

Vehicles and plant machinery that use diesel fuel will generate combustion emissions such as CO, SO_2, NOx, particulate matter (PM_{10} and $PM_{2.5}$) and VOCs. Respiration of oxides of nitrogen and sulphur can potentially have a significant impact on the biological fitness of vascular plants.. However, the magnitude of air quality impacts from the combustion of diesel fuel during pre-construction and construction is expected to be relatively low. Construction phase impacts to local air quality generated by combustion emissions will be short term, localised and staged over a two year period. Localised, adverse air quality impacts on flora and habitats are expected to occur within approximately 200 m of the working width, depending on weather conditions. It is anticipated there will be a Minor impact on flora and habitats due to combustion emissions.

4.1.1.7 Induced access and project-related in-migration

Some project induced in-migration may occur through the mobilisation of the construction workforce, but this is expected to be minimal as most construction workers are likely to be local.

The main risks to habitats and vascular plant species of conservation importance arising from project-related in-migration are the unsustainable collection of natural resources (i.e. timber and non-timber products) and indirect habitat loss as the result of increased access to habitats near the project area. The unsustainable collection of natural resources by the workforce and local residents may result in habitat degradation and the decline in abundance and distribution of trees, herbs and grasses. The local populations of vascular plants of conservation importance may also be adversely impacted by increased collection.

Impacts to habitat and flora from in-migration is expected to be of Moderate significance prior to mitigation.

4.1.2 Operation

Many of the adverse impacts to habitats and vascular plant species which occur during the pre-construction / construction phase will continue in varying degrees and intensities into the operation phase. The following discussion of impacts to terrestrial habitats and flora during the operation phase should be considered in addition to those impacts outlined above.

4.1.2.1 Air quality impacts

Emissions of CO, SO_2, NOx, particulate matter (PM_{10} and $PM_{2.5}$) and VOCs from vehicles are expected to increase as traffic volumes increase by approximately 80%. The improved road surface should allow more efficient driving and therefore will in some way ameliorate some of the impacts. Respiration of oxides of nitrogen and sulphur can potentially have a significant impact on the biological fitness of vascular plants (Emberson et al., 2001) and long-term elevated levels of atmospheric N and S depositions and elevated O_3 could predispose trees to insect attacks and other stresses (Bytnerowicz A, et al 2003). The significance of these impacts depends on the sensitivity of the plant community and weather conditions, but impacts are generally felt within a fairly localised area. Where the road passes along the edge of the SJNP sensitive habitats may be affected by adverse air quality from increased traffic movement during the operation of the road. It is anticipated there will be a Moderate impact on flora and habitats due to combustion emissions.

4.1.2.2 Induced access and project-related in-migration

As well as improving access to basic services for residents, the project aims to facilitate access for tourists to destinations in eastern Albania and to encourage economic enterprises such as agriculture. The proposed road upgrade is likely to lead to an increased number of tourists into the SJNP. The management plan (PROGES and Sapienza University of Rome 2015). for the park has management aims to develop a tourism master plan (including a guide, tourist information centre and to facilitate activities like rafting and fishing in the Bushtrizta canyon).

The predicted extent of project-induced in-migration is unknown but the increase in cars using the road is expected to be in the order of 80% (from 325 vehicles per 3 days to 1500 vehicles per 3 days). Project-induced in-migration is expected to lead to an increase in the exploitation of natural resources (i.e. herbs, grasses and timber) and habitat clearance for agro-pastoral activities and the establishment of settlements. Un-controlled harvesting of timber, lumber, peat and medicinal plants are already a threat to the SJNP (PROGES and Sapienza University of Rome, 2015) which could be exacerbated by the proposed road.

Indirect habitat loss and degradation from habitat clearance (increased deforestation) and the encroachment of settlements adjacent to the proposed road alignment poses a significant threat, further contributing to direct project-related impacts of habitat loss and fragmentation. The operating road system will also increase accessibility which may stimulate renewed interest in farming in this area leading to the loss of natural habitats.

If unregulated, project-related in-migration may potentially lead to habitat degradation, habitat loss and a decline in the diversity and abundance of vascular plant species (potentially including PBFs). Habitats and species near the proposed road alignment are

more vulnerable, including those within the SJNP. However, impacts could be wider reaching within the protected area. As the project is an upgrade to an existing road rather than a new road the effects of in-migration are considered to be of Major significance prior to mitigation.

4.1.3 Avoidance, minimisation / mitigation and restoration measures

The Biodiversity Management Plan (BMP), the Environmental and Social Action Plan (ESAP) and the Environmental Management Plan (EMP) detail specific avoidance, mitigation and restoration measures to minimise adverse Project-related impacts to habitats and priority vascular plants. A summary of these measures are provided below.

4.1.3.1 Avoidance

- Preclearance checks will be undertaken for nationally endemic, rare and threatened plant species within the proposed areas of vegetation removal. The contractors will then translocate these species from within the PDA to a suitable receptor site to minimise the risk of causing mortality or injury to these individual species. A method statement for the preclearance checks and translocation scheme will be prepared by an experienced botanist prior to the commencement of works. The botanist will also supervise the translocation works.
- The project will avoid the removal of any stands of native beech forests including Ancient and Primeval Beech Forests of the Carpathians and Other Regions as this is a habitat type of high conservation importance.
- Mature tree removal will be avoided where possible to avoid any impacts to potential bat roosts and to minimise habitat degradation.
- An alien invasive species prevention protocol will be implemented to prevent the introduction and transfer of invasive plant species. This will include the avoidance of affected areas by staff and vehicles where possible and washdown procedures of Project vehicles where necessary. A record will be kept of all affected areas to avoid transfer of alien invasive plant species.
- Bushfire controls will be developed for the Project, including a Project ban on open-burning of waste, specific emergency response procedures developed for managing bushfires and the establishment of fire breaks where required.

4.1.3.2 Minimisation

<u>Pre-construction / construction</u>

Staff and Project contractors will adhere to a Standard Operating Procedure (SOP) for land clearance and stockpiling (i.e. soil, gravel, hardcore etc) to minimise the loss of habitats and vascular plant species to the extent practicable.

To minimise habitat loss to the extent practicable, areas scheduled for habitat and land clearance will be demarcated and mapped in advance and personnel informed that any activities outside the designated areas will be strictly forbidden except for entry and exit along designated access routes. These mapped areas will be incorporated into the Biodiversity Management Plan. This will minimise the risk of habitat clearance outside of these areas. Additional mitigation measures include the following:

- Environmentally sensitive areas will be clearly marked and mapped as ‘No Go Areas’ (i.e. wooded areas, grassland and aquatic habitat) and access by staff and contractors will be strictly forbidden.

- The footprint of the road alignment and PDA will be minimised to limit fauna habitat clearance to the extent practicable.
- A land disturbance permit system will be established and managed by the contractors' Environment Team.
- Habitats clearance will be undertaken by the contractors in a progressive and sensitive manner to enable fauna to move away from the area of works, disperse into surrounding habitats and to avoid fauna from being isolated in fragmented areas of habitat.
- Herbicide and fire will not be permitted to clear vegetation to ensure a minimal impact footprint during habitat clearance and to reduce the risk of mortality and injury to wildlife.
- An ecologist will be on hand to supervise the habitat clearance works and provide advice to the workforce when required.
- Routine checks will be undertaken by the contractors Environmental Team to ensure vegetation clearance is confined to defined areas of disturbance and periodic checks will also be undertaken by ADF and a supervising engineer.

If identified in areas of proposed vegetation clearance, nationally endemic, rare and threatened plant species will be translocated from within the PDA to a suitable receptor site to minimise the risk of causing mortality or injury to these individual species. A method statement for the translocation scheme will be prepared by an experienced botanist prior to the commencement of works and suitable receptor sites identified and secured prior to any habitat clearance works taking place. The botanist will also supervise the translocation works.

Staff and contractors will adhere to a SOP for emission and dust control, erosion and suspended sediment control to minimise impacts from fugitive dust emissions, erosion and suspended sediments on habitats and plants, including in areas of biodiversity sensitivity. The SOP will include the use of dust control measures (i.e. watering, gravel application and wheel washes) on unsealed access tracks and exposed surfaces heavily trafficked by machinery and vehicles (i.e. entry / exit points, vehicle routes and loading and unloading areas.) during the summer months when conditions are dry, when excessive dust generation is evident and during periods of high risk (e.g. dry and windy conditions). Dust suppression water will be taken from suitable recycled water sources where possible. To protect the road and vehicle traffic from rockfalls, the rockface will be stabilised using bio-engineering (a safety net that will support the establishment of vegetation) instead of concrete. Sediment control dams and traps will be installed in suitable locations, particularly along higher elevations above ecologically sensitive areas (i.e. the Shebenik – Jabllanicë National Park) to further minimise the risk of sediment loading impacts.

Emergency spill management procedures will be in place and communicated to all relevant staff and contractors during their induction to minimise the impacts to habitats and plants in the event of an incident.

Emergency response procedures will be prepared for the Project which will include a protocol for responding to accidental spills and leakages of non-hazardous waste and hazardous compounds. Staff and contractors will receive training in spill events management.

Project staff and contractors will be banned from fishing, hunting and the collection of natural resources (including fresh water shellfish, timber and non-timber forest products)

in the vicinity of the project to minimise impacts to aquatic habitats and species. Environmental education and awareness programmes will be conducted for project staff and contractors (e.g. through staff inductions) to emphasise the importance of conserving biodiversity for wildlife and communities.

Operation

ADF will be responsible for project maintenance, including maintenance of the Project's drainage system, during the first two years of operation to ensure that impacts to habitats and plants arising from suspended sediments and runoff continue to be minimised. After this period the responsibility will be handed over to the municipalities of Bulqizë and Librazhd.

The Project will work with the National Agency for Protected Areas and the Regional Agency of Protected Areas to minimise any impacts on priority habitats and priority fauna and their habitats arising from facilitated access, project-related in-migration and the influx of visitors to the Shebenik-Jabllanicë National Park as follows:

- supporting the Shebenik-Jabllanicë National Park Management Committee to develop a Tourism Master Plan, including the development of an Eco-tourism programme, with the aim of promoting sustainable, low impact ecotourism initiatives within this designated site to mitigation any indirect impacts to wildlife and habitats arising from facilitated access. It is anticipated that the programme will support increased environmental awareness, sustainable and safe communities, promote environmental preservation and conservation practices, circular economy through establishing stakeholder engagement networks, capacity building (through the provision of tools, management plans and awareness raising materials) and support policy dialogue.
- Supporting the Shebenik-Jabllanicë National Park Management Committee in delivering the management actions that promote sustainable and authorised use of fish stocks in accordance with the National Park's system of zonation
- providing support for the delivery of management actions relating to the development of forest related economic activities that promote sustainability and enforcement of authorised timber and Non-timber Forest Products (NTFP) resource usage in accordance with the National Park's zonation

4.1.3.3 Rehabilitation / restoration

A Reinstatement and Landscaping Plan for the Project will be prepared and implemented by the Contractor. ADF will approve and monitor the implementation of this Plan. This plan will provide a clear methodology for the reinstatement of the physical environment within the Project footprint, the working width, borrow pits, stockpiling areas and contractor facility area (i.e. arising from habitat clearance, grading etc) in addition to the progressive rehabilitation and restoration of habitats and vascular plant species within the PDA. As part of this plan, the Project will develop a planting scheme using vascular plant species of local provenance. This will entail plug planting and seeding along the escarpments and embankments adjacent to the road alignment as part of the bioengineering works.

The status of the planting scheme, as specified in the Reinstatement and Landscaping Plan, will be closely monitored for the first 5 years following planting or until successful establishment has been achieved.

This will entail the establishment of permanent quadrats within key areas by the contractors. These quadrats will be inspected and photographed by the Project contractors on a regular basis as a means of recording plant health over time. The quadrats will serve as an indicator of success for the wider restored habitats. Regular walkover assessments will also be undertaken to assess establishment over time. A method statement will be prepared by a botanist or a professional landscape architect which will detail the approach.

In the event of dieback, areas of dead vascular plants will be replaced either through plug planting or seeding. This will be undertaken by contractors under supervision of a supervising engineer in consultation with a botanist or a professional landscape architect.

Indicators will include:

- changes in indicators of plant health (i.e. leaf colouration, wilting, early senescence etc)
- changes in plant numbers
- changes in coverage

4.1.4 Residual impacts

Whilst avoidance, mitigation and restoration actions will reduce the significance of impacts to biodiversity, residual impacts will remain for some priority habitats from in-migration and air quality impacts from increased traffic movement.

The proposed mitigation measures will reduce the risk but are unlikely to completely eliminate residual impacts.

A detailed breakdown of the project-related impacts to habitats and flora, recommended measures to avoid, restore / rehabilitate and minimise impacts and the residual impacts are presented in Appendix 1.

4.2 Impact assessment: Fauna and their habitats

4.2.1 Pre-construction and construction phase

4.2.1.1 Loss and degradation of fauna habitat

It is expected that 41.29 ha of fauna (i.e. mammals, reptiles, avifauna and insects) habitat will be permanently cleared from within the footprint of the road alignment; including 6.99 ha of fauna habitats within the Shebenik – Jabllanice National Park. The area of permanent habitat clearance required for structures such as retaining walls, bridge upgrades, drainage and stabilisation is currently unknown so these figures are based on a precautionary approach assuming 50% of all land within the 100 m working width will need to be cleared. This will include the permanent loss of habitat used by fauna that are PBFs for the Project, whose presence has been confirmed within the PDA, namely brown bear (*Ursus arctos*), the Balkan lynx *(Lynx lynx ssp balcanicus*), the otter (*Lutra lutra*) grey wolf (*Canis lupus*), wild cat (*Felis silvestris*), roe deer (*Capreolus capreolus*) and chamois (*Rupicapra rupicapra*.)

It is assumed that all site preparation and construction works will be undertaken within this 100 m working width, resulting in temporary loss of all habitats within this area for activities such as location of borrow pits, stockpile sites, workers facilities, the office and

equipment storage facilities. The expected impacts to fauna arising from habitat clearance are considered to be of Major significance prior to mitigation.

Fauna habitat loss is expected to initially result in the displacement of some fauna species (i.e. mammals and birds) from within these areas. The existing level of habitat connectivity within the zone of influence is expected to facilitate the movement of fauna during habitat clearance. Displacement of fauna may increase competition for resources depending on the species range and the current carrying capacity (number of individuals per area/resources) of the area (Hayward et al., 2007). If the carrying capacity is low and resources are already limited, then competition will be high. Predation is also a likely consequence of reduced habitat size and increased fragmentation (e.g. competitor avoidance (Durant, 2000)). It is anticipated that only a few individuals will be displaced during habitat clearance as habitats are located along the road verge and the adjoining habitats are expected to hold sufficient resources and habitat availability to support the movement of fauna.

No targeted surveys were undertaken for bats and the Shebenik-Jabllanicë National Park management plan does not include bat species within the assessment of values. The walkover survey identified that mature beech trees south of Fushe Stude, caves associated with the canyon at Shkalla e Lunikut and abandoned farm buildings in Llanga village offer the possibility for roosting bats. There are 32 bat species recorded in Albania, several of which are globally and nationally rare and threatened species (Théou and Đurović 2015). Habitat clearance within the PDA, particularly the removal of woodland and grassland is therefore expected to result in the permanent loss of bat foraging and commuting habitat. The felling of mature beech trees has the potential to result in the permanent loss of bat roosting sites and works near to potential roosting sites in caves and structures may disturb bats during sensitive periods. Roosting bats would be less likely to naturally disperse from the habitat during clearance due to other disturbing activity and light spill. Hence, there is a high risk of injury and mortality to roosting bats arising from vehicle and machinery use during land clearance in the absence of suitable mitigation.

Although specific bird surveys were not undertaken as part of the baseline survey the PDA has the potential to provide nesting habitat for birds including the following species that are classified as rare and threatened by the national Albania Red List:

- golden eagle (*Aquila chrysaetos*) – Albanian Red List EN
- northern goshawk (*Accipiter gentilis*) – Albanian Red List VU
- common buzzard (*Buteo buteo*) - Albanian Red List VU
- short-toed snake eagle (*Circaetus gallicus*) - Albanian Red List VU
- peregrine falcon (*Falco peregrinus*) - Albanian Red List VU
- Eurasian hobby (*Falco Subbuteo*) - Albanian Red List VU
- common kestrel (*Falco tinnunculus*) - Albanian Red List VU

Habitat clearance will therefore result in permanent loss of bird nesting habitat from within the project footprint (assumed to be 50% of the 100 m working width) and the temporary loss of bird nesting habitat from within the wider PDA (currently assumed to be the entire 100 m working width.) These works also pose a threat to nesting birds and their eggs if clearance is undertaken during the peak bird nesting season. Whilst some species may

not be able to breed again that same season, this is unlikely to significantly impact national and global population numbers.

4.2.1.2 Fragmentation of fauna habitat / barriers to movement

Habitat clearance for the construction of the road and habitat fragmentation may deter some fauna species from crossing the cleared area, particularly in combination with disturbance arising from vehicle activity, machinery and workers. Hence habitat fragmentation may serve as a barrier to the movement of fauna with home ranges that overlap the project footprint and the PDA, namely brown bear, grey wolf and Balkan lynx. This is likely to limit access to habitats and resources for some fauna species categorised as PBFs for the project. It is expected that some birds may perceive habitat clearance and fragmentation as a barrier to movement. However large ranging birds, particularly those that are adapted to urban environments, will be unaffected.

Cleared land, fragmented habitats and roads are known to create barriers to the movement of fauna. Barriers to home-range use and movement can alter communication, sociality and reproduction. If populations of the same species are permanently separated by artificial barriers, the resultant isolation can lead to genetic diversification and speciation in isolated populations, reduced gene flow, inbreeding or local extinction (Taylor and Goldingay, 2010). There is a high proportion of species that will avoid even narrow (<30 m wide) clearings (Laurance et al., 2009). It appears that some species have specialised locomotion adaptations (e.g. strictly arboreal), exhibit strong psychological avoidance of clearances (e.g. past predation), align their territories along clearings, avoid humans and human-associated activities, avoid generalist or invasive species that are found in clearings or are adapted to the darker, dense forest of interiors and therefore clearings become barriers to movement (Laurance et al., 2009). Impacts to fauna arising from habitat fragmentation and barriers to movement are expected to be of Moderate significance prior to mitigation because construction activities are within the existing road curtilage.

4.2.1.3 Vehicle / machinery collisions

Pre-construction and construction activities (i.e. habitat clearance, earth works, excavating and levelling works etc) present a risk of accidental fauna collisions with vehicles and machinery resulting in injury or mortality to some individuals. Fauna will be most at risk from vehicle collision within the 100 m working width where the majority of vehicle movement will occur. Whilst the likelihood of death or injury may be partly reduced as medium sized fauna and avifauna are expected to avoid areas of high construction activity due to disturbance (i.e. noise, vibration, artificial lighting and presence of humans etc), and are already actively avoiding the road corridor, small-ranging species, slow moving species and small sized mammals which are less able to quickly move away from operating machinery and vehicles may be killed or injured during the construction phase in the absence of mitigation.

Two reptiles listed as near threatened are observed in the SJNP namely Hermann's Tortoise (*Testudo hermanni*) and four-lined snake (*Elaphe quatuorlineata*)). Reptiles can be attracted to roads for temperature regulation and foraging and are often poor at evading oncoming vehicles (Andrews et al 2015.) Clearance of scree and scrub habitat have the potential to result in direct killing or injury of reptiles.

Eurasian badger is listed on the SJNP management plan and the walkover survey confirmed suitable habitat within the PDA, however the location of any badger setts within the project footprint and PDA is currently uncertain. There is a risk that vegetation clearance and grubbing works may result in the destruction of an active badger sett resulting in the injury and / or mortality to any badgers occupying the sett from a vehicle / machinery collision. The risks are greater during the day when badger setts are most likely to be occupied.

The PDA provides important habitat for breeding birds, particularly in the woodland and scrub habitats inside and outside of the SJNP. Of those species listed in the SJNP management plan all except one are IUCN Least Concern but one is listed on the Albanian Red List as Endangered and six as Vulnerable. Habitat clearance during the breeding bird season is expected to result in the injury and / or mortality of nesting birds and their young arising from collisions with machinery and vehicles

Night working during the pre-construction and construction phase would increase the risk of vehicle collisions with moving nocturnal fauna (i.e. badgers, lynx, grey wolves, bats and wildcats), which are less likely to be seen by drivers and may be startled by vehicle headlights. Predators feeding on carrion on or beside roads (i.e. magpies) are vulnerable to collision (Forman and Alexander, 1998) and ground dwelling or low-flying bird species may collide with vehicles and machinery, particularly at dusk or dawn when birds are generally more active.

Although the extent of habitat clearance is small and restricted to land adjacent to the existing road corridor the sensitivity of fauna species in the area is considered high. As such the expected impacts associated with potential vehicle collisions with fauna is considered to be of Major significance prior to mitigation.

4.2.1.4 Air quality

Fugitive dust emissions (e.g. PM_{10} and $PM_{2.5}$) and combustion emissions air pollutants (i.e. SO_2, CO, NOx, particulate matter and VOCs) will be generated during the pre-construction / construction phase which will be short term, localised and staged over two years. Combustion emissions are likely to be less of a risk to fauna during the construction phase compared to dust emissions, due to limited vehicle and machine usage within the project area.

Dust emissions are expected to result from the use and upgrade of the existing unsurfaced road and from construction traffic movement along the road. Air quality impacts arising from fugitive dust emissions are expected to be relatively localised and occur within approximately 200 m of the road. Dust deposition drop-out may also impact fauna habitats in areas near the source site in the dry weather conditions. Dust emissions are however likely to be wider reaching in windy conditions. Depending on weather conditions during the pre-construction / construction phase, fauna habitats located within the National Park could potentially be impacted. However, the existing road is currently unsurfaced and degraded levels of dust in the region are already likely to be high during periods of hot, dry weather.

The magnitude of impacts to fauna arising from the inhalation of these dust emissions and air pollutants is dependent on the quantity, composition, respiratory rates and health of fauna. Emissions can cause irritation and impairment of respiratory functions, skin irritation and vision impairment of fauna. Potential impacts may be cumulative in nature.

Pollutants could also be ingested (for example when deposited on plants or fruit which is then consumed) and then adversely affect the health of fauna. Impacts to priority fauna from fugitive dust emissions during the construction phase could be of Moderate significance prior to mitigation, whilst impact to fauna arising from combustion emissions could potentially be of Minor significance prior to mitigation.

4.2.1.5 Hydrology and water quality

The road crosses or passes near to a number of streams and creeks but there will be no direct impacts on any of these water bodies from construction activities. Rainfall on the steep slopes in the PDA is currently causing damage to the road and surrounding unvegetated areas adjacent to the road. Slope stabilisation and improved drainage will be undertaken as part of the road design including the use of culverts to divert creeks/streams beneath the road. There will no water extraction (i.e. to be used during drilling, piling or consumption) within the zone of influence. Water for civil works will be supplied to the project area using water tankers. Hence fauna water resources will not be significantly impacted for the construction of the proposed road.

Suspended sediments generated by site preparatory works and construction activities (i.e. habitat clearance, earthworks, drilling, top-soil and gravel stockpiling etc) are expected to impact surface water quality prior to the implementation of mitigation measures. During periods of rain, the water quality of downhill and / or downstream water bodies (i.e. alpine lakes and associated waterways) located within the SJNP are at risk of potentially being impacted by suspended sediment-laden runoff prior to mitigation. Waterbodies located nearest to the project area (i.e. two small ponds and a lake all within approximately 200 m of the road) are more vulnerable to the risk of being impacted during construction. The ingestion of water with a high sediment content may adversely affect the health of fauna species of conservation importance by reducing the biological fitness of individuals, or causing the mortality of vulnerable individuals reliant on heavily affected water resources. Whilst impacts to fauna and their habitats have the potential to be of Moderate significance prior to mitigation, many fauna species of conservation importance are expected to avoid using water sources with a high turbidity.

There is also a risk of surface and groundwater contamination through accidental spills or seepages of hazardous substances (i.e. diesel fuel, oil, bitumen etc) and grey-water or septic systems (i.e. portaloos) during construction which could contaminate receiving waters and terrestrial fauna habitats. This would be detrimental to the health of fauna if ingested and may compound the impact of habitat loss. This impact would most likely occur within the RoW, near the workers facilities or the source of the spillage but could be far reaching if receiving waters are impacted. Impacts to fauna and their habitats arising from accidental spills and leakages may be of Major significance, depending on substance type, volume and location of the accident.

4.2.1.6 Noise, vibration and airblast

Baseline noise and vibration monitoring and predictive modelling have not been undertaken for the project to date; however, the Project has committed to delivering an environmental impact assessment at detailed design phase which may include noise and vibration pre-construction baseline surveys and monitoring. Hence a precautionary approach to this assessment has been taken.

The predominant noise emissions generated during the pre-construction and construction phase will be generated by sources such as vehicle traffic, plant vehicles, pneumatic drills and jackhammers and machinery (i.e. pile drivers, excavators / grader and vibratory rollers). Construction noise emissions will relatively localised, temporary and generated over a 2-year period. The impact from noise generated by project construction could potentially be significant within 1 km of the construction site. This would be expected to cause disturbance to fauna and avifauna near the project footprint and fauna within the SJNP. It is anticipated that ground vibration generated during construction by vehicle traffic, plant vehicles, pneumatic drills and jackhammers and other machinery will be relatively more localised and nuisance level vibration impacts are expected to be perceptible within 200 m of the construction site.

Unfamiliar and/or loud noise and vibration emissions are known to evoke a flight reaction in fauna. Mammals and birds are also known to experience stress, reduced biological fitness and decreased breeding success on exposure to noise (Francis and Barber, 2013). Chronic stress can increase species' susceptibility to diseases, pathogens and parasites.High noise and vibration levels may also compromise hearing by damaging inner-ear structures, provided that the acoustic energy is within an animal's sensory range and the animal is close to the source (Barber et al., 2010). The behaviour of birds and social mammals could be adversely affected if vocalisations are masked or the perception of sound is inhibited by high noise and vibration levels, as a large proportion of these species rely on acoustic signals for courtship and mating, and predator detection and avoidance. However, some birds and mammals are known to develop short-term adaptations to noise, such as vocal adjustments (i.e. changing song frequencies, amplitude or timing; Barber et al., 2010). Species that are quickly able to adapt to changes in ambient noise and vibration levels are less affected than species that are unable to adapt. If noise or vibration is perceived as a threat, animals can increase vigilance and anti-predator behaviour (Francis and Barber, 2013).

It is anticipated that noise and vibration emissions arising from construction activities will result in the displacement of fauna from habitats near the project footprint. Some species may be able to habituate to consistent noise and vibration levels during construction while other species are unlikely to adjust. Disturbance caused by noise and vibration during construction to priority mammals and birds is expected to be of Moderate significance prior to mitigation.

4.2.1.7 Light-spill

Project construction will not be undertaken at night. Artificial lighting will only be used to light the office, equipment compound and the plant / machinery storage area located within or near the footprint of the proposed road for security reasons. It is anticipated that the resulting light-spill will be localised and temporary.

Light-spill is known to cause disturbance to crepuscular (fauna that are active primarily during dawn and dusk) and nocturnal species (i.e. lynx, bats and some birds) and can cause a range of behavioural changes such as altered feeding and roosting patterns. Light-spill may affect the circadian rhythms and cycles of activity of nocturnal, crepuscular and diurnal species, including disruption of seasonal acclimatisation, disruption of predator-prey relationships, increased prey intake and altered reproduction behaviour (Gaston et al., 2013; Longcore and Rich, 2004). Many species use lightscapes (e.g. moonlight) as cues for movement around their environment and altering these

lightscapes by light pollution may disrupt these movements by disorienting the animal (Gaston et al., 2013). This can potentially result in physiological stress and thereby reduced biological fitness.

It is expected that artificial lighting may result in the localised displacement of crepuscular and nocturnal species from within the project area (i.e. Balkan lynx, Eurasian badger and bats). Disturbance from artificial lighting is expected to be of Minor significance to fauna prior to mitigation.

4.2.1.8 Induced access and Project-related in-migration

Project-related in-migration is expected to initially occur during the construction phase with the mobilisation of the workforce but is unlikely to significantly increase until the proposed road is in operation. The predicted extent of project induced in-migration during the construction phase of project development is uncertain.

The main potential risks to fauna and their habitat associated with project-related in-migration and facilitated access to the project area are listed as follows:

- the decline in abundance and diversity of fauna species due to the hunting and capture of fauna for food, substance and trade by the workforce and residents
- the decline in fauna resource availability (i.e. food, water, etc) due to the unsustainable collection of natural resources by the workforce and residents which may contribute to existing pressures on local wildlife populations
- inappropriate waste management by the workforce, attracting pest species into the project area; the workers facilities are most at risk
- the stimulation of urban development and agro-pastoral activities within the project area resulting in indirect habitat loss.

These adverse impacts to fauna and their habitats are likely to be of greater risk during operation than construction. Impacts to fauna are expected to be of Moderate significance prior to mitigation.

4.2.2 Operation

Many of the adverse impacts to fauna and their habitats which occur during the pre-construction / construction phase will continue in varying degrees and intensities into the operation phase. The following discussion of impacts to fauna and their habitats during the operation phase should be considered in addition to those impacts outlined above.

4.2.2.1 Vehicle collisions

The operational phase of the road will see an increase in vehicle movements and vehicle speeds from current levels as the condition of the road is improved. This increase in vehicles has the potential to increase mortality through vehicle collision and to increase fragmentation as species avoid road crossings. The vulnerability of a species to roads is influenced by its ecology such as reproductive rates and foraging behaviour. Species that actively avoid roads are less likely to be killed but are subject to habitat fragmentation and lack of access to resources. Larger more mobile mammal species with lower reproductive rates are more susceptible to mortality (Rytwinski T. et al 2015.)

Fauna species present in the area that are also PBFs for the project such as Balkan lynx, Eurasian badger and brown bear are at risk from vehicle collision during the operational

phase due to their low reproductive rates, nocturnal behaviour and mobility. Vehicle collision impacts on fauna prior to mitigation are considered to be of Major significance.

4.2.2.2 Fragmentation of fauna habitat / barriers to movement

Important animal species associated with the SJNP include a number of iconic and threatened medium and large mammals such as the brown bear, the Balkan lynx, the wolf and chamois. Species such as brown bear and grey wolf have large home ranges that are likely to overlap with the PDA including areas outside of the SJNP. The walkover survey identified a number of likely habitat corridors across the road such as the beech forests and riparian habitat. Evidence of wolf, brown bear and otter was observed within the PDA during the walkover survey.

During operation, the physical structure of the proposed road (i.e. steep sided road embankments, safety barriers and concrete structures), compounded by noise and vehicle movement, is expected to form a barrier to the movement of medium sized fauna with home ranges that overlap the project footprint, such as bear and lynx. This may limit access to habitats and resources including prey species. The road may also reduce the carrying capacity of the project area and surrounding landscapes to support these species if the road cannot be circumnavigated by fauna (Forman and Alexander, 1998). As the project is for the improvement of an existing road rather than a new road, species will already be habituated to the road and are likely to already take evasive action. This existing fragmentation is likely to be inflated by increased road use and improved engineering on completion of the road upgrade. These impacts are of Major significance to fauna such as bear and lynx prior to mitigation. The impact to smaller ranging mammals with habitats that overlap the PDA (i.e. badgers, wildcats and stone martens) is expected to be of Minor significance prior to mitigation.

4.2.2.3 Air quality

Combustion emissions generated by vehicle activity are likely to be elevated during the operation phase compared to the construction phase, as vehicle traffic increases within the project area to an estimated 181,500 vehicles per year (1500 vehicles per 3 days). A previous EIA for a similar road project in Albania (The Environmental Impact Assessment: Design of Road Shëngjin – Velipojë Project Ideas December 2017) identified that 90% of all passenger cars registered in Albania are equipped with diesel engines and a large proportion are old imported vehicles with high SO_2 and particulate matter emissions. Furthermore, this EIA states that sulphur content in fuel is likely to be higher than European standards. Hence, impacts to fauna arising from combustion emissions are expected to be of Moderate significance prior to mitigation. Impacts to fauna and their habitats arising from fugitive dust emissions are likely to reduce during operation and as such are considered to be of Minor significance prior to mitigation.

4.2.2.4 Noise and vibration

Noise and vibration emissions during operation will predominantly be generated by vehicle traffic using the upgraded road. The predicted extent is unknown; however noise and vibration emissions are likely to be of lower levels during operation than construction. It is expected that these emissions will result in the continued displacement of medium sized mammals and some sensitive bird species from habitats near the road but they are

unlikely to significant impact reptile species. Impacts to fauna from noise and vibration emissions during operation is expected to be of Minor significance prior to mitigation.

4.2.2.5 Light-spill

Impacts to fauna arising from artificial lighting will continue into the operation phase as artificial lighting will be installed in urban areas such as when the road passes through Fushë Studë and Borove. Impacts of light spill on crepuscular and nocturnal species are considered to be of Minor significance prior to mitigation.

4.2.2.6 Induced access and Project-related in-migration

The Librazhd municipality was historically important for mining minerals including chromium ore and iron-nickel ores. However, since the 1990's many of the mines have closed and the economic situation has suffered resulting in a return to reliance on agro-pastoral activities. It is expected that the development of the new road will facilitate access to the project area by tourists and increase access to previously remote areas particularly within the SJNP that will contribute to and increase the level of existing pressures on natural resources if unmitigated. The predicted extent of project-related in-migration within the project area is currently unknown.

The grasslands within the National Park provide important pasture resources for livestock and are important areas for the collection of medicinal plants such as *Thymus sp., Gentiana lutea, Sideritis syriaca, Hypericum perforatum, Satureja montana and Origanum vulgare.* The forests in the National Park are important sources of timber, firewood and a variety of non-timber forest products including berries and juniper; oak forests in particular are important as a source of winter fodder for livestock.

Increased natural resource collection (i.e. fruits, herbs and timber) may degrade fauna habitat quality and may increase conflict with wildlife for remaining resources, including fauna of conservation importance (i.e. Eurasian badgers which are omnivorous). Overgrazing through agricultural intensification could result in degradation of grassland habitat and loss of flora species of conservation interest.

The operation of the road may stimulate more agricultural operations and associated development. This may result in indirect fauna habitat loss that could further compound the impact of direct fauna habitat loss, habitat fragmentation and further serve as an additional barrier to the movement of wildlife, particularly wide-ranging species such as lynx, grey wolves and commuting bears. This may limit access to the resources and reduce the current carrying capacity of the species' home ranges.

The proposed road may also facilitate access to habitats in the SJNP for poaching / illegal hunting, which is listed as one of the current threats to species within the park. This will increase pressure on local fauna populations in the vicinity of the road if the hunting ban is not enforced.

In-migration is expected to increase the presence of people within the SJNP for recreational activities. This is likely to increase the disturbance to fauna (i.e. through elevated noise levels and increased presence of people) and poses a risk to the quality and integrity of fauna habitats (i.e. degrading and fragmenting habitats though increased littering. trampling etc).

Pest species (i.e. rodents and birds) and feral dogs may be attracted to the area if litter and food scraps are inappropriately disposed of by passengers and drivers when using the road, thereby creating potential for conflict and disease transmission.

Potential impacts on fauna through facilitated access and project induced in-migration are considered to be Major prior to mitigation.

4.2.3 Avoidance, minimisation / mitigation and restoration measures

The BMP, ESMP and ESAP detail specific measures to avoid, minimise and mitigate impacts to fauna and their habitats. A summary of these measures is provided below.

4.2.3.1 Avoidance

Habitat within close proximity to the road offers suitable habitats to support priority fauna (e.g. brown bears, grey wolves and Eurasian otters) and offers potentially suitable habitat to support badgers, bats and nesting birds. Nationally and globally rare and threatened plant species may also occur within the working width. The following avoidance measures will be undertaken:

- Pre-clearance checks for badger setts will be undertaken by an experienced ecologist within the PDA prior to the commencement of the habitat clearance works to avoid causing injury or harm to badgers and the destruction of their setts.
- Pre-clearance checks will be undertaken by an experienced ornithologist for ground and tree nesting birds within the working width prior to the commencement of the habitat clearance works to avoid causing disturbance or harm to priority nesting birds and their young from collisions with machinery. A ‘no-go area’ comprising a 5 m radius will be demarcated around each active nest by the Project contractors with guidance from the ornithologist. Habitat clearance will be prohibited within these ‘no-go areas’ until the chicks have fledged. A method statement for this check and the management of active nesting sites will be prepared by an experienced ecologist. This method statement will be followed by the Project contractors and monitored by ADF.
- Preclearance checks for Eurasian otter holts will be undertaken by an experienced ecologist within the PDA prior to the commencement of the habitat clearance works to avoid causing injury or harm to otters and the destruction of their holts.
- Prior to the commencement of works, a bat ecologist will undertake pre-clearance checks of key potentially suitable trees within areas of oak and beech woodland in the PDA to avoid causing disturbance or injury to roosting bats, ideally during spring or autumn months.
- Mature tree removal will be avoided where possible to avoid any impacts to potential bat roosts and to minimise habitat degradation.
- Project construction will not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (i.e. bats, grey wolves, badgers, roe deer, brown bears) from increased noise, vibration and artificial lighting.

4.2.3.2 Minimisation

- Prior to vegetation clearance, dead wood from within woodlands and forests located in the working width will be translocated to a suitable receptor site in the Shebenik-Jabllanicë National Park to minimise the habitat loss for the stag beetle. A method statement for the translocation scheme will be prepared by an

experienced ecologist prior to the commencement of works. The ecologist will also supervise the translocation works.

- Habitat clearance will be undertaken in a progressive and sensitive manner to enable fauna to move away from the area of works, disperse into surrounding habitats and to avoid fauna from being isolated in fragmented areas of habitat.
- Slow moving fauna will be translocated to a designated receptor site during the clearance works.
- Tree removal should be undertaken in spring or autumn to minimise disturbance at sensitive times of the year. In the event that the presence of roosting bats are identified within trees amongst stands of oak or beech woodland in the PDA, a bat ecologist will either exclude the bats from their roost or translocate these bats to bat boxes prior to the commencement of works at a suitable time of year (i.e. spring and autumn as opposed to summer and winter) in accordance with a method statement prepared by the bat ecologist. These bat boxes will be located within suitable receptor sites.

- In the event that an active badger sett is identified, an experienced ecologist will prepare a method statement for the sett closure and the construction of a substitute artificial sett in a suitable location. These method statements will be followed by the contractors.
- In the event that an active otter holt is identified, an experienced ecologist will prepare a method statement for the minimisation of disturbance or holt closure and the construction of a substitute artificial holt in a suitable location.
- Reduced speed limits will be enforced during construction along the length of the road to minimise the risk of accidental injury and mortality to fauna arising from vehicle and machinery collisions.
- An Injured Wildlife Protocol will be also developed for the project by an experienced ecologist and followed by staff and contractors in the event of an incident. This will include a mandatory reporting system which will enable an assessment of the incident to be undertaken and the requirements for any further actions or mitigation measures to be determined. Reports will include encounters of wildlife and observation of natural resource collection, illegal hunting and wildlife trade.
- Reduced speed limits will be signposted during operation along the section of road located adjacent to the western border of the Shebenik-Jabllanicë National Park.
- Currently some culverts serve as potential fauna crossing points. It is anticipated that these will be repaired for the continued use by fauna during operation to limit the road from forming a barrier to the movement of fauna species, particularly reptiles, amphibians and small mammals.
- Streams that are considered to provide suitable habitat for foraging and commuting Eurasian otters will only be culverted where necessary. To enable otters to maintain access to their present habitats and to allow existing otter populations to expand and colonise new areas only culverts that are designed to accommodate commuting Eurasian otters should be installed. Box culverts designed to a 1:200 flood return period should be used as opposed to cylindrical culverts which fill rapidly so reducing the air space available and making swimming more difficult. Culverts must be as wide as possible and be large enough to allow the incorporation of a dry ledge that is accessible during high water levels. Mammal ledges can be made of solid concrete integral with the culvert or steel that is bolted onto the culvert using metal brackets although the latter is preferable as it will not impact on fish and freshwater invertebrate populations. Ledges must be at least 500 mm wide and be accessible both from

the bank and the water by the provision of ramps or groups of large boulders. Ledges must be sited at least 150 mm above the appropriate high flood level, allowing 600 mm headroom. These can be installed on both sides of the culvert although on very small watercourses where it may be more practicable to install only one ledge, otters must be guided to the crossing by planting dense scrub on the opposite bank to the ledge although where the route taken by an otter is known, this will be unnecessary as long as the ledge is on that side of the watercourse.

- Wildlife crossing points will be established at key sections of the road to facilitate the movement of larger ranging mammals (e.g. brown bears, grey wolves, roe deer, lynx, Chamois) across the road at night with reduced risk of vehicle collisions, which in addition to killing or injuring wildlife may cause injury to people and vehicles. The wildlife crossing point will comprise the following components:
    - Reduced speed limits will be signposted during operation along the length of the proposed road to minimise the risk of accidental injury and mortality to fauna arising from vehicle collision.
    - Vehicle traffic will be slowed further at the wildlife crossing point. This reduction in speed limit will be signposted and rumble strips (or alert strips) or a suitable alternative will be installed on the approach to the wildlife crossing point.
    - Signs will be installed to identify the wildlife crossing point to vehicle traffic.
    - Streetlighting will not be installed along or near the wildlife crossing point to avoid causing disturbance from artificial lighting.
    - Safety barriers, retaining walls and sidewalks will not be installed along or near the wildlife crossing point to facilitate fauna movement across the road.
    - Strategic planting will be undertaken by the contractors along and near the wildlife crossing point to facilitate fauna movement. The planting scheme will be designed by an ecologist with experience of surveying and monitoring fauna.

Figure 4-1 shows the inidicative potential locations of prposed crossing points based on the fauna scoping survey. Collaboration between the ecologist and the design team will be required to establish the feasibility of the crossing points and agree on a suitable location.

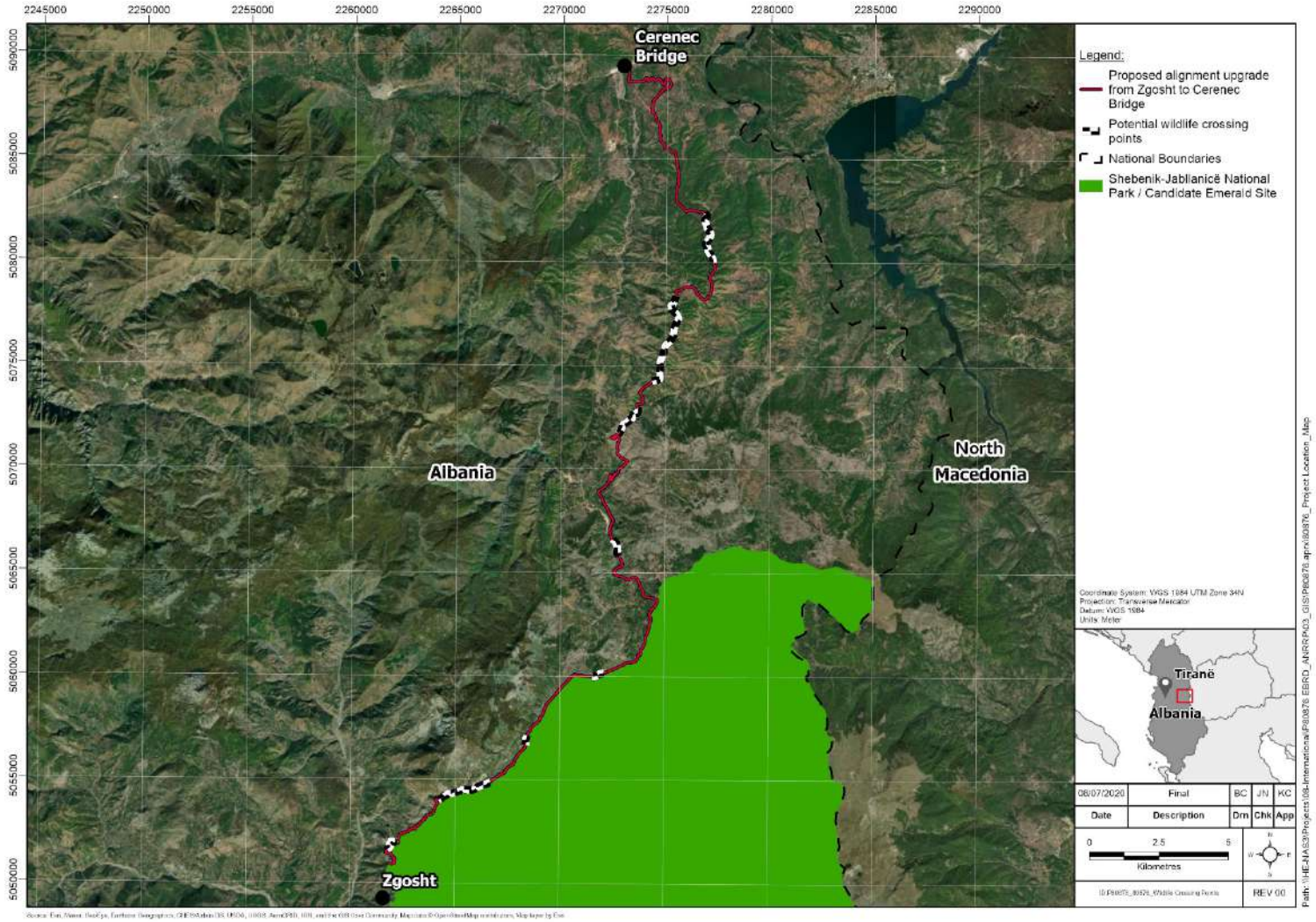

Figure 4-1: Potential wildlife crossing points for consideration

- Staff and contractors will adhere to a SOP for emission and dust control, erosion and suspended sediment control to minimise impacts. This should include the provision of measures to minimise the adverse impact to fauna and their habitats arising from fugitive dust emissions, erosion and suspended sediments on fauna and their habitats. These are described in Section 4.1.3.2.
- Staff and contractors will adhere to a SOP for noise and vibration management throughout the pre-construction and construction phases to minimise disturbance to fauna.
- Project staff and contractors will be banned from fishing, hunting and the collection of natural resources (including fresh water shellfish, timber and non-timber forest products) in the vicinity of the project to minimise impacts to aquatic habitats and species.
- Environmental education and awareness programmes will be conducted for project staff and contractors (e.g. through staff inductions) to emphasise the importance of conserving biodiversity for wildlife and communities.
- ADF will ensure the safe handling of diesel fuel, non-hazardous waste and hazardous compounds by staff and contractors in accordance with health and safety requirements. Emergency response procedures will be prepared for the Project which will include a protocol for responding to accidental spills and leakages of non-hazardous waste and hazardous compounds. Staff and contractors will also receive training in spill events management.
- Staff and contractors will be briefed on the SOPs, emergency response procedures and mitigation measures during a mandatory induction as relevant to their roles and responsibilities (e.g. through staff inductions). The workforce will be informed of the importance of biodiversity and the priority habitats and species present in the project area to raise awareness and improve their understanding regarding the importance of conserving threatened habitats, species and natural resources for the environment and communities.

Operation

ADF will be responsible for project maintenance (including the drainage system) during the first two years of operation to ensure that impacts to fauna and their habitats arising from suspended sediments and runoff continue to be minimised. After this period the responsibility will be handed over to the municipalities.

The risk of injury and mortality to fauna arising from vehicle collisions will be minimised by enforcing reduced speed limits particularly near sensitive fauna habitats in the National Park. Vehicle crossing points will be established with guidance from the project ecologist.

Reporting of injured wildlife via the Injured Wildlife Protocol should be continued through the operational phase and information included in annual environmental and social reports produced by ADF.

The Project will work with the National Agency for Protected Areas, the Regional Agency of Protected Areas and Key relevant NGOs operating in the area (i.e. Protection and Preservation of Natural Environment in Albania (PPNEA)) to minimise any impacts on priority fauna and their habitats arising from facilitated access, project-related in-migration and the influx of visitors to the Shebenik-Jabllanicë National Park. This will entail:

- regularly meeting with the National Park managers including the Shebenik-Jabllanicë National Park Management Committee

- regularly meeting with key relevant NGOs operating in the area (e.g. PPNEA) such as PPNEA
- supporting the delivery of the Park's management actions relating to education and awareness raising through sharing technical ecological knowledge, baseline data and monitoring data regarding priority habitats and species
- sharing monitoring data (e.g. as part of the camera trapping programme and biodiversity offsetting) to inform the Park's development of adverted loss actions
- supporting the Shebenik-Jabllanicë National Park Management Committee (i.e. through sharing data and technical guidance) to develop a Tourism Development Tourism Master Plan with the aim of promoting sustainable local economy, low impact ecotourism initiatives within this designated site to mitigate any indirect impacts to wildlife and habitats arising from facilitated access
- undertake activities and co-ordinated stakeholder consultation to support environmental awareness, sustainable natural resource use, promote environmental preservation and conservation practices, capacity building and support policy dialogue.

4.2.3.3 Rehabilitation / restoration

A Reinstatement and Landscaping Plan for the Project will be prepared and implemented by the Contractor. ADF will approve and monitor the implementation of this Plan. This plan will provide a clear methodology for the reinstatement of the physical environment within the Project footprint, the working width, borrow pits, stockpiling areas and contractor facility area (i.e. arising from habitat clearance, grading etc) in addition to the progressive rehabilitation and restoration of habitats and vascular plant species within the PDA. As part of this plan, the Project will develop a planting scheme using vascular plant species of local provenance. This will entail plug planting and seeding along the escarpments and embankments adjacent to the road alignment as part of the bioengineering works.

The status of the planting scheme, as specified in the Reinstatement and Landscaping Plan, will be closely monitored for the first 5 years following planting or until successful establishment has been achieved.

This will entail the establishment of permanent quadrats within key areas by the contractors. These quadrats will be inspected and photographed by the Project contractors on a regular basis as a means of recording plant health over time. The quadrats will serve as an indicator of success for the wider restored habitats. Regular walkover assessments will also be undertaken to assess establishment over time. A method statement will be prepared by a botanist or a professional landscape architect which will detail the approach.

In the event of dieback, areas of dead vascular plants will be replaced either through plug planting or seeding. This will be undertaken by contractors under supervision of a supervising engineer in consultation with a botanist or a professional landscape architect.

Indicators:

- changes in indicators of plant health (i.e. leaf colouration, wilting, early senescence etc)
- changes in plant numbers
- changes in coverage

4.2.4 Residual impacts

Whilst avoidance, mitigation and restoration actions will reduce the significance of impacts to fauna and their habitat, the project will result in some residual impacts. Based on our current assumption that 5 m from the road edge on both sides will be permanently cleared and a further 5 m temporarily cleared, a total of 41.29 ha of fauna habitats will be permanently lost from within the project area. The majority of this habitat will comprise arable land and market gardens, deciduous thickets and deciduous woodlands.

The physical structure of the operating road compounded by vehicle traffic and noise emissions is highly likely to serve as a barrier to the movement or cause increased mortality of some fauna species of conservation importance. This may restrict access to resources for some fauna species of conservation importance and potentially reduce the carrying capacity of the project area to support wildlife. However, it is anticipated the wildlife crossing will lower the significance of the residual impacts if successful over time.

Indirect habitat loss, and degradation from increased hunting, resource gathering and grazing arising from project-related in-migration and increased population pressure, pose a significant risk to the integrity of fauna habitats, including those fauna habitats located within the SJNP. It is difficult to quantify the residual impact of increased natural resource collection and hunting on fauna populations and their habitats from in-migration however this poses a risk to fauna species of conservation importance. It is anticipated that the proposed mitigation measures will reduce the risk to fauna and their habitats but are unlikely to completely eliminate residual impacts.

A detailed breakdown of the project-related impacts to fauna and their habitats, recommended measures to avoid, restore / rehabilitate and minimise impacts and the residual impacts are presented in Appendix 1.

4.3 Impact Assessment: Aquatic habitats and species

4.3.1 Pre-construction and construction

4.3.1.1 Habitat loss and degradation

The construction of the proposed project will not entail the direct loss of any major tributaries or creeks located within the footprint of the proposed road alignment. This includes the aquatic habitats located within the eastern part of the SJNP associated with the Shkumbin River. Hence, rare and threatened species associated with these (European eel, Mediterranean barbel, pindus stone loach, south European roach and Mediterranean trout) will not be directly impacted by project-related habitat clearance.

Small ephemeral creeks, that transect the Project footprint and are active during the wet season will be diverted using culverts and other drainage infrastructure. These creeks are not characterised by aquatic habitats and species. Hence aquatic habitats and species arising from habitat clearance is expected to be of negligible significance.

4.3.1.2 Hydrology and water quality

The road passes within 500 m of alpine streams in a number of locations along its route including at the northern end where a stream runs parallel to the road diverging from beneath the Cerenec bridge and at point N41.301309° E20.377186 where the road

crosses a stream. In addition a small pond near a former quarry is located approximately 100 m from the road centre line at N41.327187° E20.419003°, there is an ephemeral pond at N41.281439° E20.340207 and a lake at N41.320795° E20.411035°near Fushë-Studë village in the SJNP. This village is an important tourist destination and is located approximately 200 m from the road centre line. Ephemeral creeks carry runoff from the slopes of the surrounding mountains and are likely to be active during periods of high rainfall. It is anticipated that these will be redirected under or around the proposed road using culverts and a drainage system during construction resulting in minor changes to the hydrology of the existing surface water in the PDA. Habitats associated with the SJNP outside of the 100 m working width include some important aquatic habitats including water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation and alkaline fens. Any changes to surface water hydrology through improved drainage is not expected to impact the hydrology of any receiving waters such as the Shkumbin River or the aquatic habitats within the SJNP and the aquatic fauna associated with them.

There will no water extraction (i.e. to be used during drilling or consumption) undertaken for the project. Water for civil works will be supplied to the project area using water tanks. As such no potential impacts on aquatic species in the surrounding lakes and rivers are anticipated.

The main risk to the surface water quality of aquatic receptors (i.e. Shkumbin River and alpine water bodies close to the PDA) during construction is likely to be suspended sediments prior to mitigation. These are generated by site preparatory works and construction activities (i.e. habitat clearance, earthworks, drilling, top-soil and gravel stockpiling etc). The main input will result from water erosion of disturbed areas during periods of rain resulting in sediment laden runoff, while wind erosion will provide some additional input during drier months. Whilst the full extent of this impact is uncertain, the water quality of downhill and / or downstream water bodies located within the SJNP may also potentially be impacted by suspended sediment-laden runoff prior to mitigation. Waterbodies located nearest to the project area as shown in Figure 4.2 are more vulnerable to the risk of being impacted during construction.

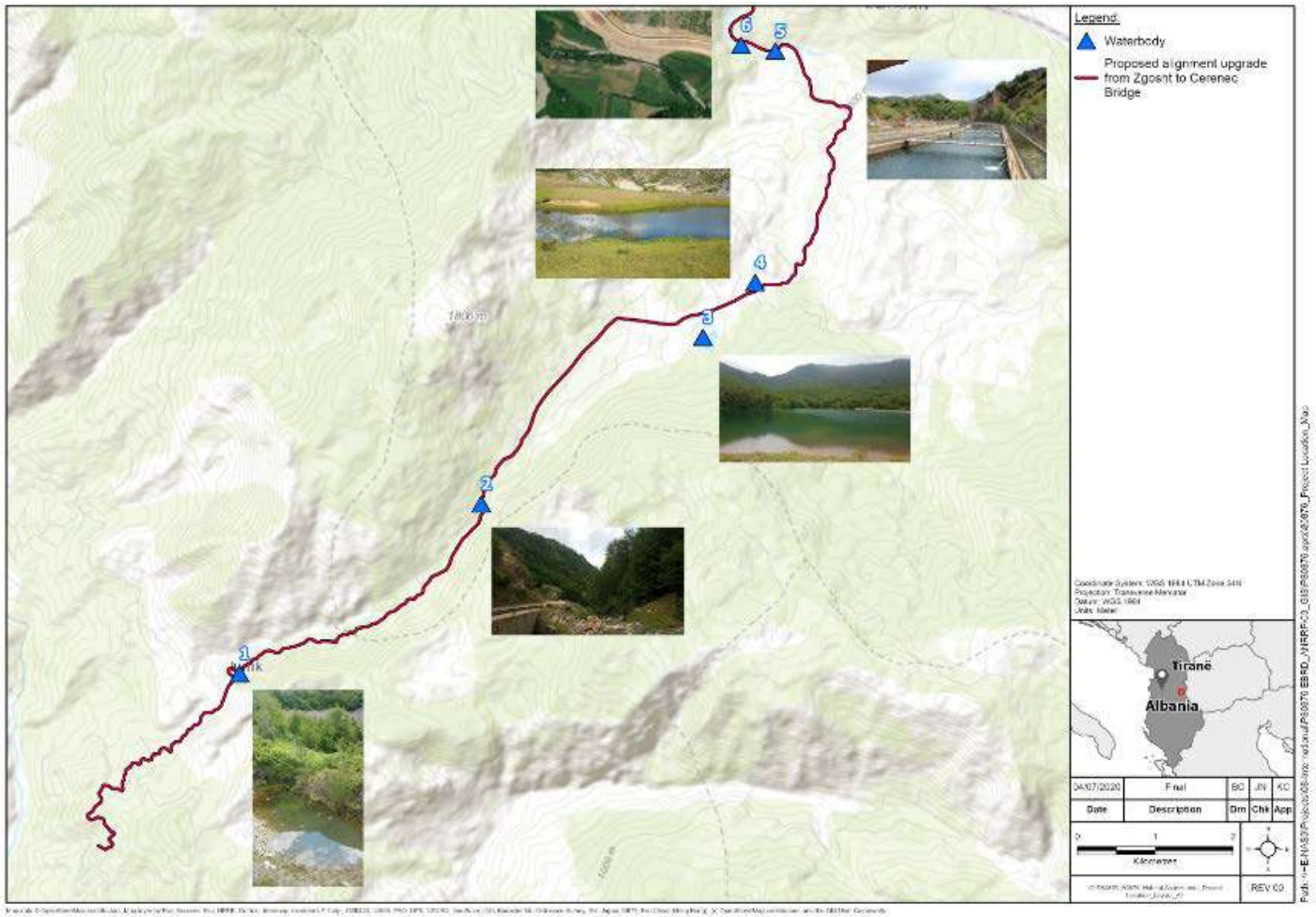

Figure 4-2: Map showing location of waterbodies along the proposed road route

Suspended sediments may smother emergent and riparian vegetation causing a reduction in biological fitness and mortality in severely impacted areas. The deposition of sediments in aquatic environments may result in the localised loss of benthic habitats and macrophytes which are smothered by sediment if unmitigated and may potentially impair the biological fitness of fauna e.g. macro-invertebrates and some species of fish.

Increased nutrients and turbidity from sediment runoff can also lead to the formation of blue-green algal blooms (Conley et al., 2009) which can impair water quality and adversely affect some aquatic fauna. Nutrients can also accumulate along the bottom of streams and lakes in calmer conditions and enhance eutrophication (Webster et al., 2001). Nitrogen and phosphorus are important nutrients in aquatic systems and phosphorus is considered the limiting nutrient for phytoplankton production in freshwater systems. Impacts from suspended sediments to aquatic habitats and species have the potential to be of Moderate significance prior to mitigation.

There is also a risk of surface and groundwater contamination through accidental spills or seepages of hazardous substances (i.e. diesel fuel, oil, bitumen etc) and grey-water or septic systems (i.e. portaloos) during construction that could contaminate receiving aquatic habitats and pose a risk to downstream water quality and aquatic biodiversity. This would be detrimental to the health of fauna and may result in the loss of aquatic habitats. Waterbodies located in close proximity to the road alignment are most vulnerable. Impacts to aquatic habitats and species arising from accidental spills and leakages may be of Major significance, depending on substance type, volume and location of the accident.

4.3.1.3 Air quality

Fugitive dust emissions measured as particulate matter of varying particle size (e.g. PM_{10} and $PM_{2.5}$) will be generated by land clearance and earthwork activities. Construction activities such as the removal of the existing road surface and construction of retaining walls and safety barriers are likely to generate dust. These impacts are expected to be relatively localised and occur within approximately 500 m of the source, depending on the prevailing weather conditions. Construction activities may therefore affect aquatic habitats within 500m such as the lake and ponds.

An accumulation of dust on leaves can block stomata and thereby impact on normal photosynthetic, transpiration and cellular respiration rates (Sharifi et al., 1997) and finer dust can be directly taken into the stomatal openings (Farmer, 1993) impairing the biological fitness of plants. Prolonged smothering can result in the mortality of an individual. Impacts to the aquatic habitats in these areas are expected to be of Moderate significance prior to mitigation.

Vehicles and plant machinery that use diesel fuel will generate combustion emissions such as CO, SO_2, NOx, particulate matter (PM_{10} and $PM_{2.5}$) and VOCs. Respiration of oxides of nitrogen and sulphur can potentially have a significant impact on the biological fitness of vascular plants.. However, the magnitude of air quality impacts from the combustion of diesel fuel during pre-construction and construction is expected to be relatively low. Construction phase impacts to local air quality generated by combustion emissions will be short term, localised and staged over a two year period. Localised, adverse air quality impacts on flora and habitats are expected to occur within approximately 200 m of the working width, depending on weather conditions. It is anticipated there will be a Minor impact on aquatic habitats due to combustion emissions.

4.3.1.4 Noise, vibration and airblast

The project does not intend to use blasting during the pre-construction / construction phase, hence there will be no airbast impacts generated by the project. The predominant noise emissions generated during the pre-construction and construction phase will be generated by sources such as vehicle traffic, plant vehicles, pneumatic drills and jackhammers and machinery (i.e. drilling rigs, pile drivers, excavators / grader and vibratory rollers). Construction noise emissions will relatively localised, temporary and generated over a 2-year period. The impact from noise generated by project construction could potentially be significant within 1 km of the construction site. This is not expected to cause disturbance to aquatic fauna within the lakes and streams of the SJNP.

It is anticipated that ground vibration generated during construction by vehicle traffic, plant vehicles, pneumatic drills and jackhammers and machinery (i.e. drilling rigs, pile drivers, excavators / grader and vibratory rollers) will be relatively more localised and nuisance level vibration impacts are expected to be perceptible within 200 m of the construction site. It is anticipated that fauna (i.e. fish and amphibians) inhabiting ponds within 200 m of the vibration emission source (if present) may potentially experience some level of disturbance. However, based on the existing level of information, impacts to aquatic fauna arising from noise and vibration are unlikely to be significant.

4.3.1.5 Induced access and Project-related in-migration

Project-related in-migration is expected to initially occur during the construction phase with the mobilisation of the workforce but is unlikely to significantly increase until the proposed road is in operation. The predicted extent of project induced in-migration during the construction phase of project development is uncertain. The main potential risks to aquatic habitats and species associated with project-related in-migration and facilitated access to the project area are listed as follows:

- the decline in abundance and diversity of aquatic fauna species and macrophytes (including species of conservation significance) due to increased collection of natural resources, thus contributing to existing pressures on populations at the local level
- the decline in fish stocks due to unsustainable fishing practices
- the degradation of aquatic and riparian habitats though the unsustainable collection of aquatic resources such as water abstraction for agricultural use
- the stimulation of agro-pastoral activities resulting in the pollution of water from agricultural runoff and eutrophication from increased nutrient input

These adverse impacts to aquatic habitats and species are likely to be of greater risk during operation than construction. Impacts to aquatic habitats and species are expected to be of Moderate significance prior to mitigation.

4.3.2 Operation

Many of the adverse impacts to aquatic habitats and species which occur during the pre-construction / construction phase will continue in varying degrees and intensities into the operation phase. It is expected that erosion and sediment loading in receiving waters during operation will be less extensive than during the pre-construction and construction phase, however the risk to aquatic habitats and species associated with spills of non-hazardous compounds and vehicle fuel will remain during operation. Risks to aquatic

biodiversity associated with project-related in-migration are likely to be larger during the operation. These are described below in more detail.

4.3.2.1 Induced access and Project-related in-migration

Project-induced in-migration may increase pressure on aquatic resources in the vicinity of the Project. The proposed road is expected to facilitate access to the SJNP by tourists and trades people. An influx of migrants to the area and other settlements near the project may lead to increased fishing activity, natural resource collection and aquaculture practices in the rivers and lakes within the landscape. Over-exploitation of fish stocks could potentially reduce fish diversity, abundance and breeding success.

Project-related in-migration may stimulate agricultural practices and / or timber and non-timber product collection within the SJNP and forested areas outside of the protected area. This would result in the degradation and loss of riparian habitats and increase the risk of soil erosion along the rivers affecting the permanent water bodies. An increase in suspended sediments and nutrient input may have an adverse impact on the biological health of the these water bodies, resulting in the pollution of water from agricultural runoff and eutrophication from increased nutrient input. Impacts to aquatic habitat and species could potentially be of Major significance prior to mitigation.

4.3.2.2 Air quality impacts

Emissions of CO, SO_2, NOx, particulate matter (PM_{10} and $PM_{2.5}$) and VOCs from vehicles are expected to increase as traffic volumes increase by approximately 80%. The improved road surface should allow more efficient driving and therefore will in some way ameliorate some of the impacts. Respiration of oxides of nitrogen and sulphur can potentially have a significant impact on the biological fitness of vascular plants and long-term elevated levels of atmospheric N and S depositions and elevated O_3 could predispose trees to insect attacks and other stresses (Bytnerowicz A, et al 2003). The significance of these impacts depends on the sensitivity of the plant community and weather conditions, but impacts are generally felt within a fairly localised area. Where the road passes close to sensitive aquatic habitats they may be affected by adverse air quality from increased traffic movement during the operation of the road. It is anticipated there will be a Moderate impact on aquatic habitats due to combustion emissions.

4.3.3 Avoidance, minimisation / mitigation and restoration measures

The BMP, ESAP and ESMP detail specific measures to avoid, minimise and mitigate impacts to aquatic habitats and species. A summary of these recommended measures is presented below and a detailed account is presented in Appendix 1.

4.3.3.1 Avoidance

Direct impacts to water bodies have been avoided.

4.3.3.2 Minimisation

<u>Pre-construction / construction</u>

Staff and contractors will adhere to a SOP for emission and dust control, erosion and suspended sediment control to minimise the risk of adverse impacts to waterbodies near

the PDA arising from fugitive dust emissions, erosion and suspended sediments on fauna and their habitats. These include surface water management infrastructure (e.g. cut-off / diversion drains, velocity dissipation devices, culverts) to be installed in appropriate locations to minimise and control surface water flow over disturbed areas and impacts to sensitive aquatic habitats.

Emergency spill management procedures will be in place to minimise the risk of impacts to receiving aquatic habitats and species. This will be communicated to all relevant staff and contractors during their induction.

Project staff and contractors will be banned from fishing, hunting and the collection of natural resources (including fresh water shellfish, timber and non-timber forest products) in the vicinity of the project to minimise impacts to aquatic habitats and species. Environmental education and awareness programmes will be conducted for project staff and contractors (e.g. through staff inductions) to emphasise the importance of conserving biodiversity for wildlife and communities.

Operation

Surface water management infrastructure (e.g. cut-off / diversion drains, velocity dissipation devices, culverts) will be in place in appropriate locations and actively maintained to minimise and control surface water flow across / under the proposed road thus minimising the risk of sediment loading and surface pollution to waterbodies in the SJNP.

4.3.3.3 Rehabilitation / restoration

The restoration / rehabilitation of aquatic habitats is not required for the project. This should however be reviewed if the project design changes in the future.

4.3.4 Residual impacts

It is difficult to quantify the residual impact from project-related facilitated access and in-migration to aquatic habitats and species; however, it is anticipated the proposed mitigation measures will reduce the risk to fauna and their habitats but are unlikely to completely eliminate residual impacts.

A detailed breakdown of the project-related impacts to aquatic habitats and species, recommended measures to avoid, restore / rehabilitate and minimise impacts and the residual impacts are presented in Appendix 1.

4.4 Monitoring

The Project has committed to establishing an Environmental Monitoring Plan. This will incorporate a Biodiversity Monitoring and Evaluation Programme to assess the efficacy of the avoidance and mitigation measures and to inform the requirement for adaptive management. This could potentially be a collaborative approach with protected area managers and NGOs.

A draft set of monitoring actions has been developed based on the avoidance and mitigation measures designed for the Project. Where possible, thresholds will be established for each monitoring approach that will alert the Project that mitigation measures need to be adapted and that revised biodiversity management measures are

required. The draft monitoring measures are summarised in Table 4.3 and the monitoring approach is outlined below.

Table 4-3: Summary of recommended monitoring approaches

Monitoring Type	Indicators	Triggers for Adapted Management	Recommended Frequency of Census
Camera tapping for priority fauna species	Changes in the location of habitat use Changes in frequency of habitat use	Decline in habitat use	Traps checked every 3 months During construction
Avifauna monitoring for priority bird species	Changes in habitat usage by priority bird species Changes in number of breeding / nesting and migratory bird species (benchmarked against existing monitoring data) Changes in the frequency of habitat use by priority bird species	Decline in habitat use Decline in numbers of nesting and / or migratory birds	1 census during the breeding / nesting bird season (i.e. end May – early June) 1 census during the migratory bird season (March – April / early May). During construction
Vehicle / Machinery Collision Reporting	Reports of dead fauna Reports of a collision with wild fauna.	An increase in incident reports in a specific location or relating to a specific species / continued reports	Incident reporting – ongoing
Anecdotal observations	N/A	N/A	Ongoing
Habitat Restoration and Landscaping	Changes in indicators of plant health Changes in plant numbers	Plant dieback	For the first 5 years of operation or until establishment
Wildlife Crossing Point Monitoring using camera trapping	Changes in habitat use by priority fauna Changes in frequency of habitat use by priority fauna	A reduction in priority fauna area of occupancy and encounters	2 years during operation

Monitoring Type	Indicators	Triggers for Adapted Management	Recommended Frequency of Census
		Accidental vehicle collisions with priority fauna	

5 CUMULATIVE BIODIVERSITY IMPACT ASSESSMENT

5.1 Overview

5.1.1 Summary of key biodiversity receptors

The Biodiversity Baseline Assessment (RSK, 2020) identified the following features of conservation importance within the PDA, these are considered the key biodiversity receptors for this cumulative impact assessment:

- Forest, grassland and scree habitats in the project area may support nationally rare and threatened plant species, some of which would trigger critical habitat or are PBFs for the Project.
- Approximately 13.5 km of the road traverses the western border of the Shebenik-Jabllanicë National Park which is also designated as a Candidate Emerald Site. This site provides important habitat within one of the primary remaining ranges of the Balkan lynx. The species is listed as Critically Endangered on the IUCN Red List of Threatened Species (2020) and on the Albanian Red List (2013) and triggers critical habitat.
- The Zgosht to Cerenec road traverses known habitats for medium to large mammals in Albania. Indirect evidence of fauna species activity was recorded during the baseline scoping assessment in June 2020 near the Zgosht to Cerenec road including Eurasian otter (IUCN listed NT; Albanian Red List VU), brown bears (IUCN VU in the Mediterranean and Albanian Red List VU) and grey wolf (IUCN LC and Albanian Red List NT). Adjacent forest, scrub and grassland habitats offer suitable habitat for other fauna, including bats and nesting birds, which may be PBFs or critical habitat triggers.
- There are a number of waterbodies near the Zgosht to Cerenec road with the potential to support aquatic fauna (amphibians, invertebrates and fish) of national conservation importance.
- Dead or decaying wood within oak forests in the Project area may potentially provide habitat for the saproxylic stag beetle (*Lucanus cervus*) and great Capricorn beetle (*Cerambyx cerdo*), both of which are PBFs for the Project.

5.1.2 Summary of key project impacts

Elsewhere in this report, 25 pre-mitigation impacts of moderate or major significance have been identified and described as a result of the Project. With the application of mitigation measures, these have been reduced to the following three moderate residual impacts:

- air quality: fugitive dust emissions smothering plants and habitats adversely impacting the biological fitness of plants and habitat quality
- fragmentation of fauna habitat / barriers to movement: barrier to movement of fauna
- fragmentation of fauna habitat / barriers to movement: accidental vehicle / machinery collisions with fauna resulting in injury or mortality.

5.2 Projects Included in the Cumulative Impact Assessment

Stakeholder engagement, including with the ADF and local communities, has identified a number of existing or planned activities within the PDA and wider region that could have

the potential for cumulative impacts in combination with the Project. These are summarised in Table 5-1 and illustrated in Figure 5-1.

Table 5-1: Activities within the PDA and wider region

Project / activity	Description
The Arber Motorway in Diber prefecture	This 26.8 km-long, two-lane highway is currently under construction and is intended to link Tirana with the isolated Dibra region on the Macedonian border. Once operational, it will shorten travel times from 4 hours to 1.5 hours. The Arber Motorway will intersect with the Zgosht to Cerenec road at Cerenec bridge
Librazhd – Polis road	ADF are involved in the upgrade of this 3.2 km road segment, which is to the south-southwest of the Zgosht to Cerenec road
Librazhd - Babje road	ADF are involved in the upgrade of this 6.4 km road segment, which is to the south-southeast of the Zgosht to Cerenec road
DI-Tek HPP	This is an existing HPP near Borove with an adjacent fish farm. This project appears to be within or immediately adjacent to the Zgosht to Cerenec road working width (depending on the final detailed design).
Drini HPP	This new HPP is currently under construction near Stebleve and is anticipated to be operational within one year.
Gega quartz quarry at Lunik village	This existing quarry is approximately 150 m from the Zgosht to Cerenec road and is owned by the same enterprise as the DI-TEK HPP. It opened in 2018 and the materials produced at the quarry are transported to a metallurgical factory at Elbasan.
Hotel expansion at Joen village (near Stebleve)	This existing hotel / restaurant has plans to expand with the development of an additional 24 rooms, a swimming pool, a snow-skating course and a zipline

The cumulative impacts of these projects and induced tourist development is described below.

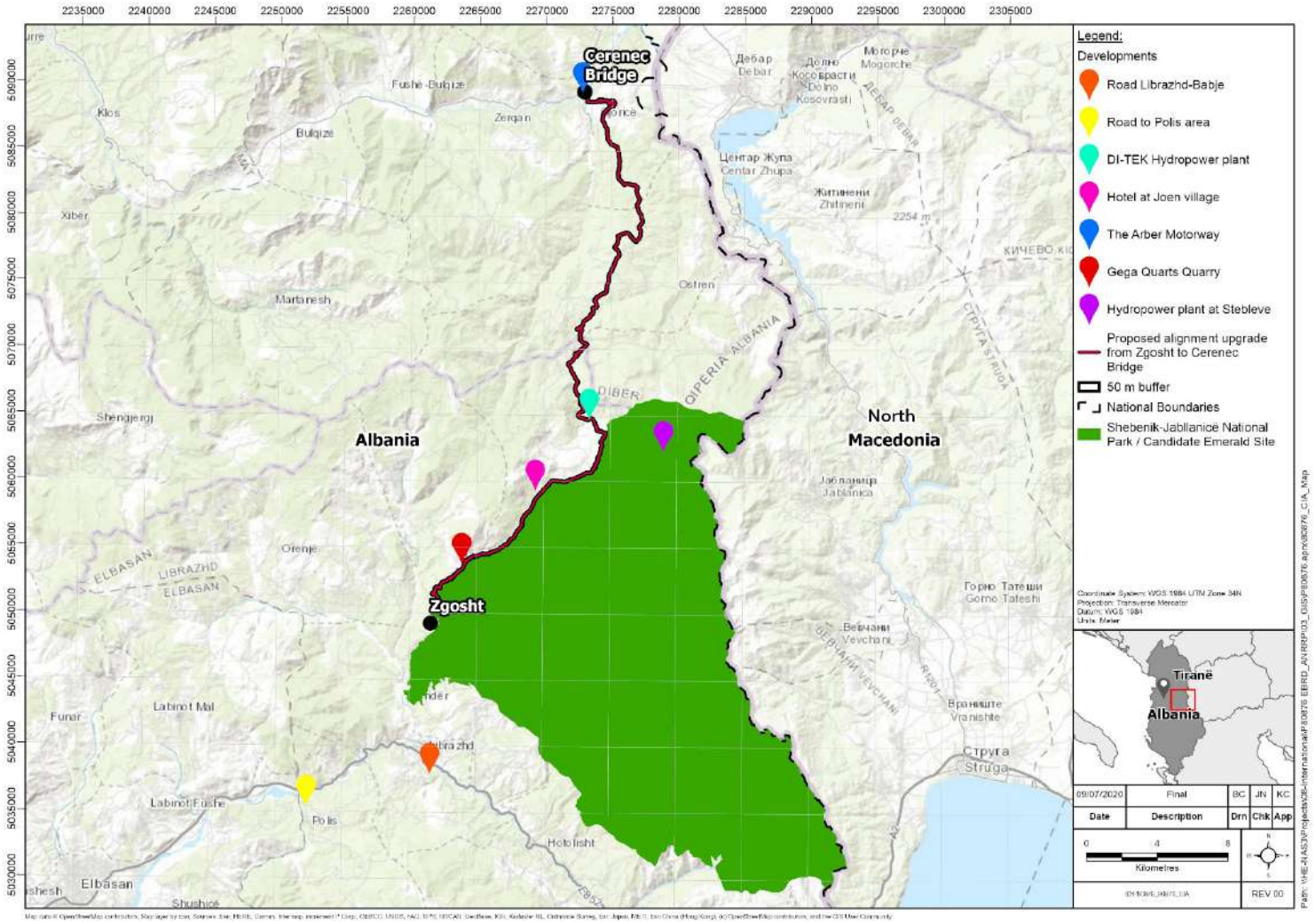

Figure 5-1: Activities considered in the CIA

5.3 Road Projects

Construction of the Arber Motorway commenced in 2014 but was paused due to the reallocation of funds towards disaster relief (https://reconnectingasia.csis.org/database/projects/tirana-dibra-arber-motorway-construction-ppp/59f42bb9-3ef9-40c9-afa5-e36ff25b447f/). The project website indicates that project completion is due in 2022 which would indicate that the construction phase of the Arber Motorway could potentially closely precede or overlap with construction of the Zgosht to Cerenec road. Assuming the Arber Motorway is eventually constructed in entirety, both it and the Zgosht to Cerenec road would be operational at the same time.

The two local road upgrade projects (Librazhd to Polis and Librazhd to Babje) are part of a larger investment programme for the rehabilitation of Albania's regional and local road network, funded in part by the ADF. The construction timeframe for these upgrades is currently unknown but, as with the Arber Motorway, it is assumed that they would be operational at the same time as the Zgosht to Cerenec road at some point in the future.

Construction of the Arber Motorway and, to a lesser extent, the local road upgrades is likely to lead to habitat loss and degradation. It will also result in increased vehicle traffic through the PDA and could potentially result in additional fragmentation of fauna habitat / barriers to fauna movement and accidental vehicle / machinery collisions with fauna resulting in injury or mortality.

In the particular case of the Balkan lynx, Figure 5-2 shows the known, currently fragmented distribution of the species and clearly illustrates the importance of the PDA as part of this distribution. The Arber Motorway and the local road upgrades are also located within the known range of the species and hence pose a risk of similar impacts to those posed by the Project.

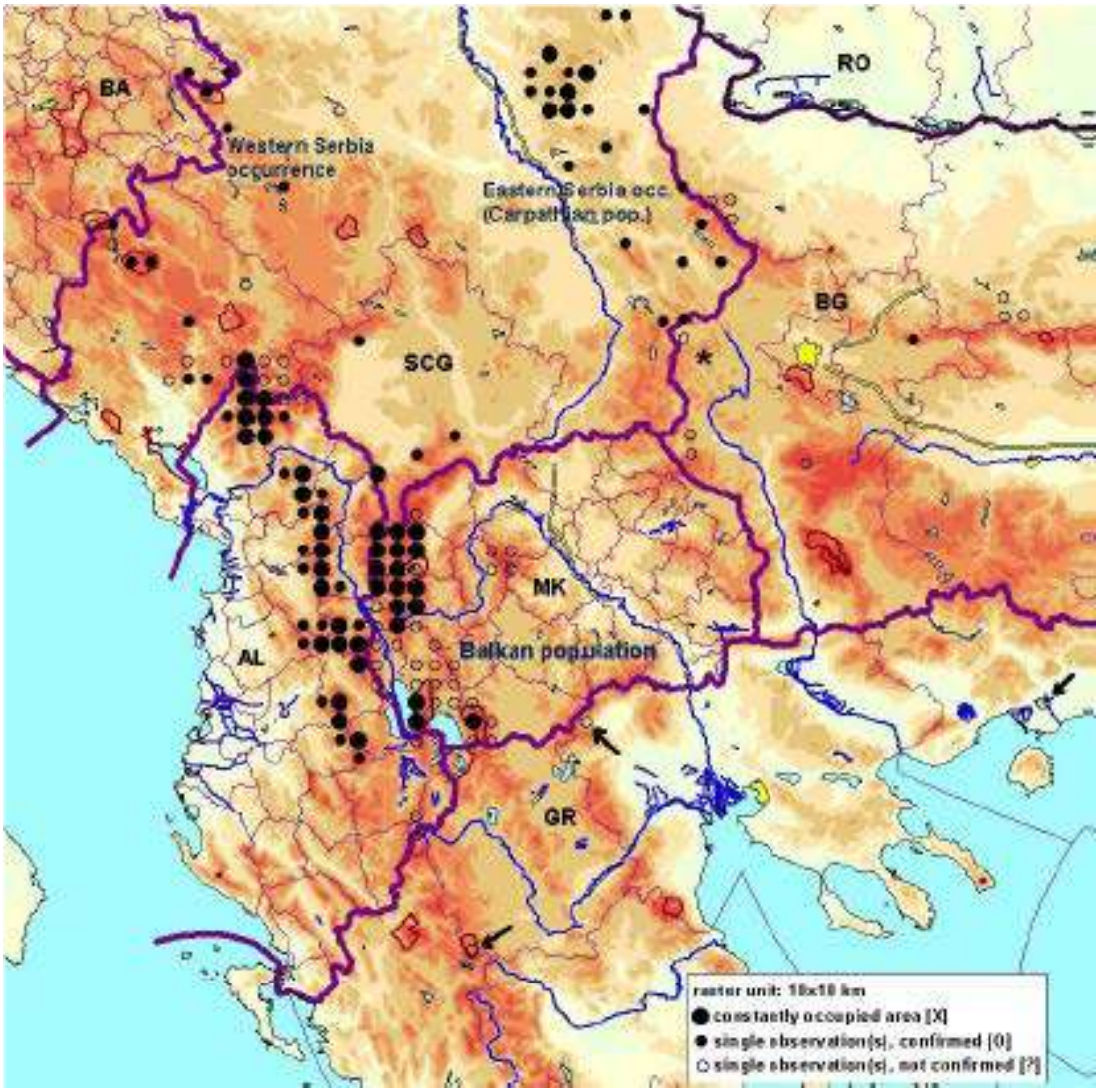

Figure 5-2: Distribution of Balkan lynx (source: Lynx compendium, IUCN/SSC Cat Specialist Group, http://www.catsg.org/balkanlynx/20_blx-compendium/index.htm)

The primary mitigation proposed by the Project to minimise the risk of vehicle strike (causing injury or mortality) and barriers to lynx movement is the incorporation of wildlife crossing points into the road design at key locations (see Section 4.2.3.2). This mitigation adequately addresses the Project impact on Balkan lynx but will not address potential impacts posed by the other road projects. It is recommended that the ADF, as a key stakeholder in the local road upgrade projects, consider incorporating wildlife crossings into those projects as well.

5.4 Hydropower Plant

The existing HPP near Borove also operates an adjacent fish farm. The business is currently finalising the construction of a restaurant to sell fish to domestic and international tourists, which are anticipated to increase with the upgrade of the Zgosht to Cerenec road (see Section 5.6). There is also a second HPP currently being constructed in the vicinity of Stebleve, which is anticipated to be operational within a year.

It was noted in the botanical scoping assessment undertaken as part of the Biodiversity Baseline Assessment (RSK, 2020) that the watercourse diversion and water drawdown associated with the development of the Borove HPP has impacted on the habitat type *92A0 - Salix alba and Populus alba galleries*. Impacts from the road widening undertaken previously (as the first stage of this Project) were also observed during the survey, in relation to water quality impacts due to the placement of waste rock and other inert material near to the watercourse.

Further construction works associated with the second HPP and those associated with the Project could compound these impacts. It is recommended that the Project pay particular attention to dust mitigation and waste management measures in this area and remove inert waste left over from the first stage of the Project on completion of construction of the final stage.

5.5 Quartz Quarry

The existing Gega quartz quarry located at Lunik is the only known quarry in the PDA. It is located approximately 150 m from the Zgosht to Cerenec road and presumably the existing road is used to transport the stone to Elbasan for processing. Based on professional judgement, it is considered likely that the key potential impacts from the quarry on biodiversity relate to noise and dust.

One of the identified residual impacts of moderate significance for the Zgosht to Cerenec project is the potential for fugitive dust emissions to smother plants and habitats in the vicinity of the construction works. Where the road is close to the existing quarry, the risk of cumulative dust impacts is considered possible. It is recommended that the Project pay particular attention to dust mitigation measures in this area (particularly given the proximity of the Shebenik-Jabllanicë National Park) and consider starting a dialogue with the operator of the quarry to investigate options to further reduce this risk.

5.6 Tourism Development

One of the primary objectives of the Project is to facilitate sustainable tourism in this remote, mountainous part of Albania. By improving access, particularly to the Shebenik-Jabllanicë National Park, it is anticipated that numbers of tourists (both domestic and international) visiting the area will increase and this has been taken into consideration in the traffic modelling and proposed project design.

One proposed tourism development identified during the stakeholder engagement meetings is the expansion of the existing hotel / restaurant at Joen village near Stebleve. The stakeholder engagement meetings also indicated that additional tourism facilities such as horse riding were proposed for the region but insufficient details are available for these to be included in the CIA.

Unchecked tourism poses a risk to habitat quality and species diversity in the region. Disturbance arising from increased noise and human activity arising from tourist activity has the potential to cause disturbance and displacement of wildlife particularly within proximity to the Shebenik-Jabllanicë National Park.

Albania's waste management infrastructure is limited, and much household waste is not appropriately disposed (Lico et al 2015). Littering within the PDA does not appear to be

an issue currently, due to limited access except by local community members, however this could change with an influx of people. Plastic waste can have detrimental effects on the biological fitness of wildlife and / or result in the mortality of individuals if ingested. Chlorinated plastic can release harmful chemicals into the surrounding soil, which can then seep into groundwater, causing potentially harmful effects to the aquatic environment and species dependant on it. Poor waste management may also attract pest species (i.e. vermin) which in turn may result in the displacement of natural wildlife and act as vectors of disease. These impacts could result from Project-related tourist in-migration if not properly managed.

However, protected areas have great potential for the development of sustainable tourism; they can improve the socio-economic status of the local communities while contributing to biodiversity conservation. Furthermore, the IUCN is committed to continuing to support the Albanian authorities in the development of sustainable tourism in protected areas, including visitor management planning, development of soft tourism infrastructure, and capacity building for interpretation and visitor management (IUCN, 2016).

6 CONCLUSION

This biodiversity impact assessment assessed the project-related impacts on biodiversity aspects during the pre-construction / construction and operation phases, including terrestrial habitats and flora; terrestrial fauna and their habitats; aquatic habitats and flora; and aquatic fauna. A precautionary approach was undertaken due to the paucity of project-based information and data. The ADF is however committed to filling these data gaps and will undertake pre-construction assessments for noise, air quality, water quality and soil conditions prior to the commencement of works. This data will be used to inform the ESIA / EIA due to be completed by the designer.

The assessment identified that the project will result in impacts of varying degrees of significance to terrestrial and aquatic habitats and species during construction and operation, with some residual impacts continuing during operation. It is understood that the road will not be decommissioned within the foreseeable future and as such will remain in operation.

A key priority for the project is the continued conservation of the Shebenik – Jabllanice National Park, Candidate Emerald Site, KBA, IPA and the Ancient Beech Forests of Europe UNESCO World Heritage. Diligent application of best practice measures for minimising and managing the risk of potential Project-related impacts arising from habitat loss and degradation, noise and vibration, accidental vehicle collisions with fauna, barriers to fauna movement, artificial light spill, air and water pollutants is expected to minimise the risks to PBFs and the SJNP. Pre-clearance checks will also be undertaken to avoid disturbance and injury to bats, badgers and breeding birds in the PDA during construction. Nationally endemic, rare and threatened and PBF plant species will be translocated from within the PDA to a suitable receptor site to minimise the risk of mortality or injury to these individual species. Roosting bats within the PDA will also be translocated to a purpose-built bat roost. The establishment of a wildlife crossing point for Balkan lynx (a critical habitat qualifying species) and other priority fauna will be integral to enable wildlife to retain access to resources in the PDA. In order to reduce the potential risk of significant cumulative impacts on Balkan lynx, it is recommended that the ADF also consider establishing wildlife crossing points on the Librazhd – Polis road and the Librazhd – Babje road upgrades, for which they are a key stakeholder.

The implementation of the Reinstatement and Landscaping Plan and habitat establishment monitoring will be integral to restoring the physical environment and ecosystem function within the PDA as 'like for like' (or better) than that which existed prior to Project construction where feasible.

Whilst avoidance, mitigation and restoration actions will reduce the significance of impacts to biodiversity, these actions will not eliminate all residual Project-related impacts. For example, a total of 41.29 ha of land will be permanently lost from within the PDA and 6.99 ha will be permanently lost from within the SJNP (critical habitat-qualifying feature). Residual impacts will also arise from Project-related in-migration, operational vehicle collisions and fragmentation; the magnitude of these impacts was difficult to quantify. The project will commit to working with the SJNP Management Committee to deliver their management objectives relating to tourism and natural resource use.

The Project has also committed to establishing an Environmental Monitoring Plan. This will incorporate a Biodiversity Monitoring and Evaluation Programme to assess the efficacy of the avoidance and mitigation measures and to inform the requirement for adaptive management. Biodiversity monitoring actions have been developed based on the avoidance and mitigation measures designed for the Project. These are presented in the BMP. Where possible, thresholds

will be established for each monitoring approach that will alert the Project that mitigation measures need to be adapted and that revised biodiversity management measures are required. ADF are committed to implementing the EMP, BMP and ESAP and will work with and direct their contractors to ensure full implementation and compliance.

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APPENDIX 1
BIODIVERSITY IMPACT ASSESSMENT TABLE OF RESULTS