



Biodiversity Management Plan

The Proposed Shëngjin and Velipojë Road Scheme, Albania

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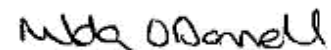


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Acronyms	Definition
ADF	Albanian Development Fund
BIA	Biodiversity Impact Assessment
CHA	Critical Habitat Assessment
EBRD	European Bank for Reconstruction and Development
PA	Project Area
PDA	Project Development Area
PPNEA	Protection and Preservation of Natural Environment in Albania
WW	Working width

1 INTRODUCTION

1.1 Overview

This Biodiversity Management Plan (BMP) has been prepared by RSK for the Shëngjin to Velipojë Road Scheme (here after 'the Project') on behalf of the Albanian Development Fund (ADF). This BMP forms part of the Environmental Impact Assessment (EIA) documents for the Project and has been prepared in accordance with Albanian legislation as well as relevant international best practice and guidelines.

This BMP details the Project's biodiversity management initiatives, commitments and obligations. The aim of the BMP is to safeguard and promote the viability of priority species and habitats associated with the Project. A key priority for the Project is the continued support for the conservation of the River Buna Protected Landscape and the Lake Shkoda and River Buna Ramsar Complex.

This BMP provides a framework for the implementation of the Project's biodiversity mitigation and management measures during the pre-construction / construction and operation phases that will be followed by ADF and the Project contractors. An outline biodiversity monitoring and evaluation strategy has been included to evaluate the efficiency and success of biodiversity management measures and to enable adjustments to be made if required. It is envisaged that this will be developed further by ADF prior to the pre-construction / construction phase.

Implementation of this BMP will ensure the Project's alignment with best practice, legislative requirements and the Project's commitments to biodiversity; including European Bank for Reconstruction And Development (EBRD) Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

This BMP is a dynamic document that will be adapted and updated as and when new information becomes available throughout the lifespan of the Project to ensure its relevancy.

1.2 Project Description

1.2.1 The Proposed Road Alignment

The Project is located on the west coast of Albania, approximately 55 km from Tirana and entails rehabilitation and upgrade of an existing road and the construction of a new section of road between two towns, Shëngjin to Velipojë (Figure 1 1). The proposed footprint of road alignment will traverse the Buna River Protected Landscape (IUCN Category 5; National Park category 2), which is under the management of the Skadar Forestry Service Directorate and is also designated as a Ramsar wetland, Important Bird Area (IBA) and a candidate Emerald Site.



Figure 1.1: Project location

The footprint of the proposed road is 12.6 km in length and covers approximately 12.5 ha. Approximately 2.3 km of the road scheme, located at the north-western end of the proposed road in the village of Rrjoll (near Velipojë);

Figure 1.1), falls within the alignment of the existing Rruga Banks Rrjollë road. This is a predominantly unsurfaced road that extends from the settlement at Baks-Rrjollë, beyond Rrjollë, across exposed sand (Figure 1.2). This existing sandy track is used mainly during summer season by tourists to access the beach.

From this point the proposed road alignment gradually rises across the rugged and generally exposed escarpment to the ridge of Mount Renci (at a high of approximately 280 m above sea level) and the site of a degraded settlement over approximately 5.25 km (Figure 1.3). This section of the proposed alignment crosses unvegetated dunes located at the base of Mount Renci (Figure 1.4), followed by a mosaic of oak scrubland, small stands of Mediterranean evergreen *Quercus* forest dominated by *Quercus ithaburensis* (IUCN Least Concern, LC; Figure 1.5), areas of sparsely vegetated scree, poorly vegetated cliffs and small areas of exposed rock faces (Figure 1.6).

Over the ridge of Mount Renci (Figure 1.7), the alignment traverses a mosaic of degraded pasture, fallow and regenerating fallow that surrounds the degraded settlements. From this point the footprint crosses an adjoining area of maquis, arborescent matorral and thermo-Mediterranean scrub, before joining an existing unsurfaced road / track. The footprint of the proposed road then roughly follows the alignment of this existing road / track for approximately 3.7 km before joining Bulevardi Nënë Tereza near Shëngjin port.

Habitats located along this portion of the proposed alignment are dominated by a mosaic of bare ground, maquis, arborescent matorral and thermo-Mediterranean scrub (Figure 1.8), and miscellaneous inland habitats with sparse or no vegetation. This transitioned into coniferous forest dominated by pine plantations (Figure 1.9), regenerating pine scrub (arising from the clearance of pine stands) with scattered housing and into the urban environment of Shëngjin. The very last section of the existing access route has the characteristics of an established urban road.



Figure 1.2: The unsurfaced road at Baks-Rrjollë



Figure 1.3: Mount Renci and dune



Figure 1.4: Dune near Rrjollë



Figure 1.5: Mediterranean evergreen Quercus forest dominated by *Quercus ithaburensis* and exposed scree on Mount Renci



Figure 1.6: Sparsely vegetated scree on Mount Renci, overlooking wetland habitat within the Buna River Protected Landscape



Figure 1.7: The ridge of Mount Renci, overlooking the Buna River Protected Landscape



Figure 1.8: maquis, arborescent matorral and thermo-Mediterranean scrub and the existing unsurfaced track on Mount Renci



Figure 1.9: Pine plantation dominated by a monoculture of aleppo pine (*Pinus halepensis*) adjacent to the existing unsurfaced track near Shëngjin

1.2.2 Road Design

The proposed roadway will comprise two-lanes and will vary in width between 7 m to 9 m depending on the tip profile. Two hard shoulders will be located either side of the road (measuring between 0.5 m to 1 m depending on the location) in some sections. The road will also be fitted with safety barriers, retaining walls, protection walls and a drainage system. Artificial lighting will be installed along a 7 m section of the road located within Shëngjin. This section of the road will also comprise two shoulders measuring 0.5 m and two sidewalks measuring 1.5 m. Artificial lighting and pavements will also be installed along the end portion of the road at Rrjolli. The road will be surfaced with asphalt. The maximum slope of the road will be 8%, according to the predicted standard.

The section of the road from Shëngjin town to the top of Mount Renci will be constructed over an existing track, characterised by a continuously climbing slope. A viewing platform and access road will be constructed at the highest point to enable tourists to stop for a few minutes to enjoy the view (Figure 1.10).

Excavation will be undertaken to achieve a flat or gentle inclined road surface in sloped areas. In areas of steep gradient, the road embankment will be scaled every 6 m to 8 m height (Figure 1.11). These embankments will be contoured with drainage channels to avoid water damage to the road from surface runoff.

The section of the road from the top of Mount Renci to Baks-Rrjollë is characterised by a steep gradient and loose rockface. To protect the road and vehicle traffic from rockfalls and to avoid massive excavations of the rockface, 'open sided tunnels' will be constructed in key locations (i.e. in areas where the ground slope is above 60°), comprising reinforced concrete platforms situated over the road on concrete pillars (almost like a square tunnel; Figure 1.12).

The rockface within this section of the road will be stabilised using terramesh / geocell geotextile (a safety net that will support the establishment of vegetation), instead of concrete. This geotextile has two layers. The first layer comprises zinc plated wire mesh that is anchored to the rockface and protects the landscape from erosion. The second layer comprises a dense plastic net which can hold substrate for planting and natural revegetation (Figure 1.13, Figure 1.14 and Figure 1.15).

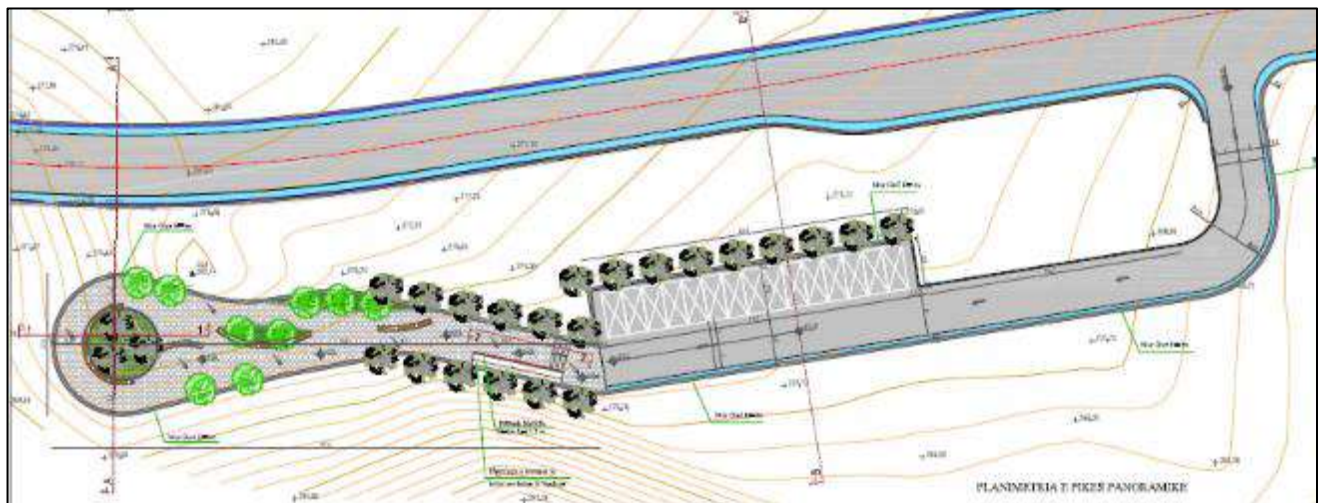


Figure 1.10: Plan of the viewing platform and road alignment

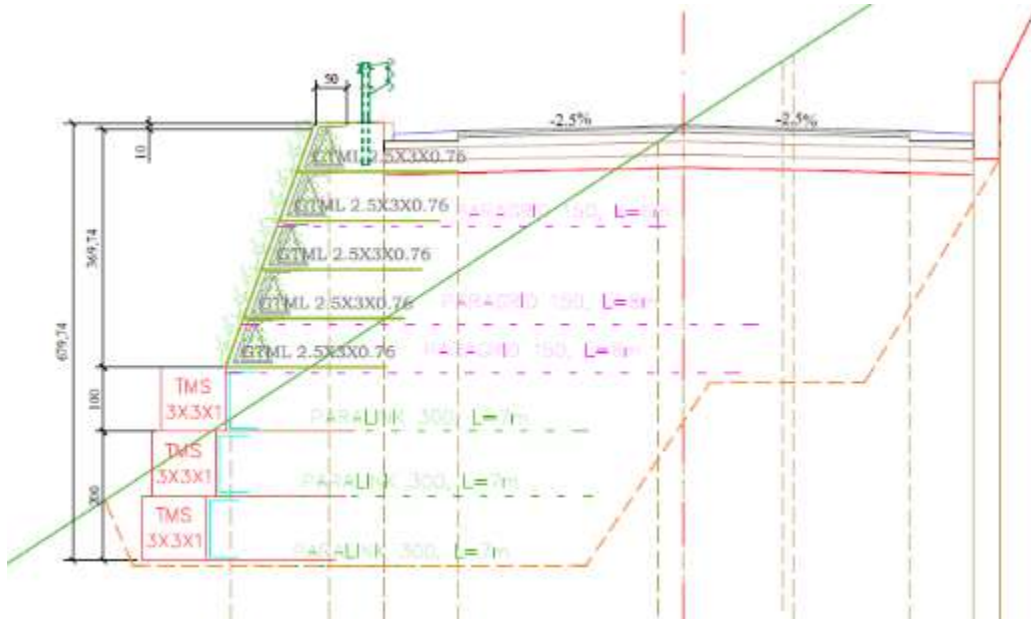


Figure 1.11: Section view of road with scaled embankment

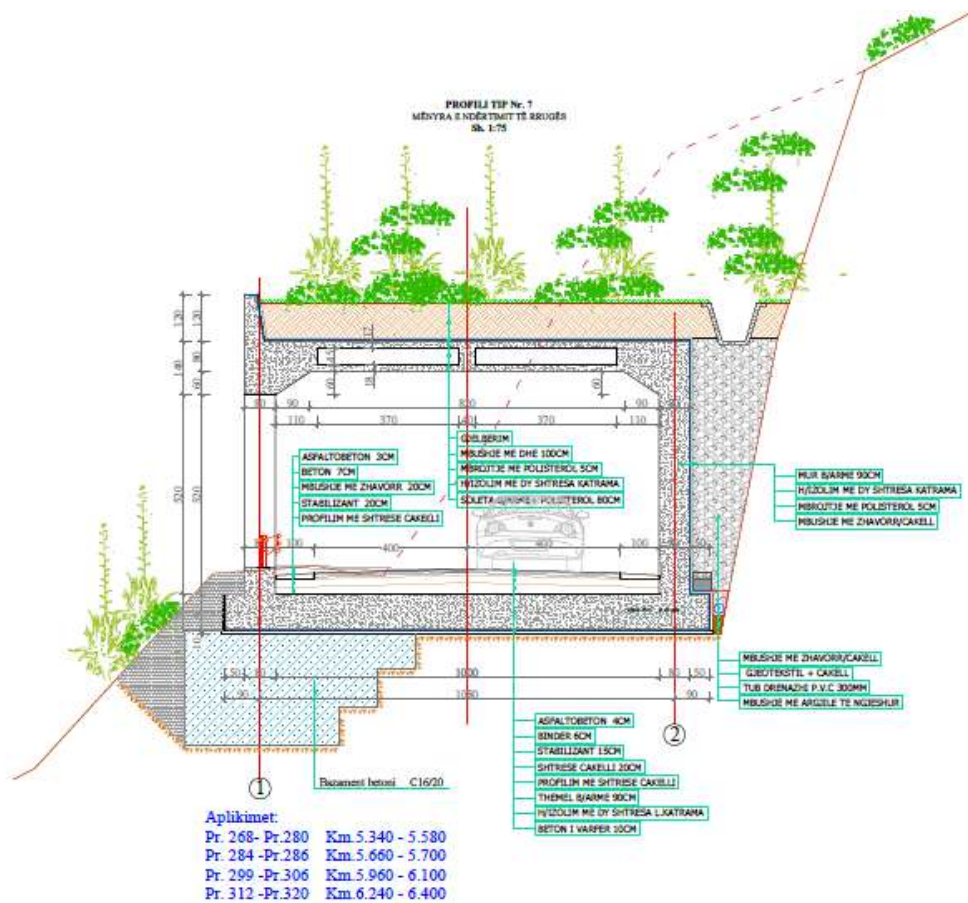
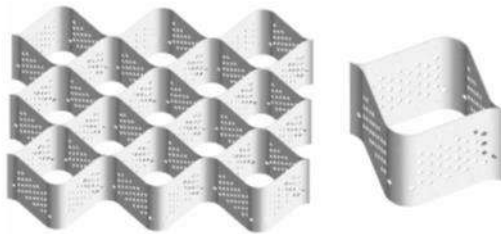


Figure 1.12: Section view of an open sided tunnel on steep sloping terrain

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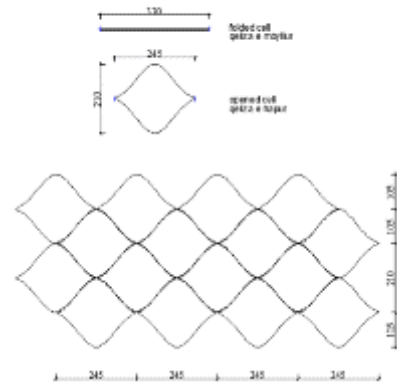


Figure 1.13: Geotextile – second layer

Figure 1.14: Size of geotextile

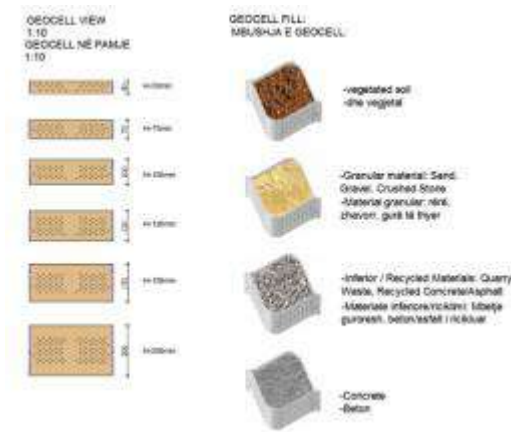


Figure 1.15: Geotextile with substrate

1.2.3 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 be cleared using graders or bulldozers, jackhammers. In total, 434 trees and bushes will be moved from within the footprint / working width during habitat clearance and translocated (or relocated) to suitable receptor sites. Pneumatic drills and jackhammers will also be used during excavation and grading; blasting will not be used during construction. The exact area of habitat clearance beyond the road footprint is uncertain.

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 four 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.

The materials used for road construction will be supplied by a licensed company. The waste materials will be deposited in accordance with the official process and the approach will be approved by the local authorities. Construction works will not be carried out at night; 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 Buna River Protected Landscape 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 tanks.

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 is unknown. The power supply to the office will be accessed through the existing network. It is anticipated that the workforce will use existing accommodation located in Shëngjin.

1.2.4 Habitat Restoration

A Reinstatement and Landscaping Plan will be prepared for the Project by ADF. 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).

The project is committed to translocating (or relocating) a total of 434 trees and bushes (including native oak and pine trees) from within and near the footprint of the proposed road alignment over the period December to January. Rare and threatened vascular plants will also be translocated from within the working width to suitable receptor sites. The Project will also develop a planting scheme using vascular plant species of local provenance. This will entail planting 219 trees and 35 bushes along the sidewalks of the proposed road and seeding along the escarpments and embankments adjacent to the road alignment.

1.2.5 Operation

According to the Economic Analysis Report, Design of Road Shëngjin to Velipojë, Project Ideas (December 2017), the predicted volume of traffic utilising the proposed road is an estimated 1,238 vehicles per year with an average of 2.5 occupants per vehicle. Maintenance road works will be undertaken on an annual basis or when required. 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 Lezhe and Shkoder). ADF will retain a quality assurance role for monitoring the establishment of habitats and species as part of the Habitat and Species Rehabilitation / Restoration Plan and Landscaping Scheme.

1.2.6 Timeline

It is anticipated that the road will take 12 months to construct and the start date will be determined by the Investor according to the procurement process.

1.3 The Project's Approach to Biodiversity and Natural Resource Management

A summary of the Project's approach and commitments to achieving best practice biodiversity management are listed as follows:

- identification and characterisation of biodiversity baseline conditions for the Project based on primary and secondary data sources
- identification of important biodiversity features (priority species and habitats) of high conservation value and relevance to the Project based on critical habitat screening
- application of the mitigation hierarchy to avoid, minimise and rehabilitate Project-related impacts to these biodiversity features during Project construction and operation
- compensation of significant residual impacts to biodiversity receptors
- adherence to national regulatory requirements.

The proposed Shëngjin to Velipojë Road Scheme forms part the Regional and Local Roads Connectivity Project. This project focuses on the role that improved roads can play in enabling connectivity-driven economic gains, particularly in the agricultural and tourism sectors, both key drivers of growth and employment in Albania. An environment Safeguard Framework has been prepared by ADF (2008) as part of this wider project. This framework applies to Phase 1 of the proposed project and is a tool for ensuring that the infrastructure sub-projects comply with the existing laws, regulations and practices in Albania, as well as with the Bank's Operational Policies on Environmental Assessment, Involuntary Resettlement and Cultural Heritage, and with the EBRD Environmental and Social Performance Requirements, and that the projects will not have a lasting adverse impact on the country's population, nor on the natural environment or properties of particular cultural value.

1.4 Scope

This BMP is a framework for managing Project risks and impacts to biodiversity and to identify and prioritise appropriate impact management actions. BMPs and Biodiversity Action Plans are recommended as global leading practice by bodies such the UN Global Compact and are a requirement for EBRD Performance Requirement 6 compliance. Specifically, a BMP:

- collates diverse biodiversity management measures in one place, despite various departmental responsibilities for their implementation
- provides a summary of all biodiversity actions planned by the Project, supporting institutional memory
- facilitates communication about sound project biodiversity risk management to external audiences such as regulators
- provides reassurance that risks and impacts are being managed, and ensures investment is prioritised towards actions that most cost-effectively tackle highest risks / impacts

- provides a basis for planning and tracking progress.

This BMP fits within the impact assessment process and is a core component of the Project's Environmental and Social Management and Monitoring Plan.

The scope of this BMP includes:

- management measures to mitigate adverse impacts during pre-construction, construction, operation and closure phases
- a description of the ecological monitoring and reporting commitments including location, frequency and key performance indicators for adaptive management
- a definition of roles and responsibilities
- a presentation of the proposed schedule of works.

1.4.1 The Mitigation Hierarchy

The Project has applied the steps of the mitigation hierarchy so that adverse potential Project-related impacts are avoided, minimised and restored or rehabilitated where feasible. 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 1.16 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.

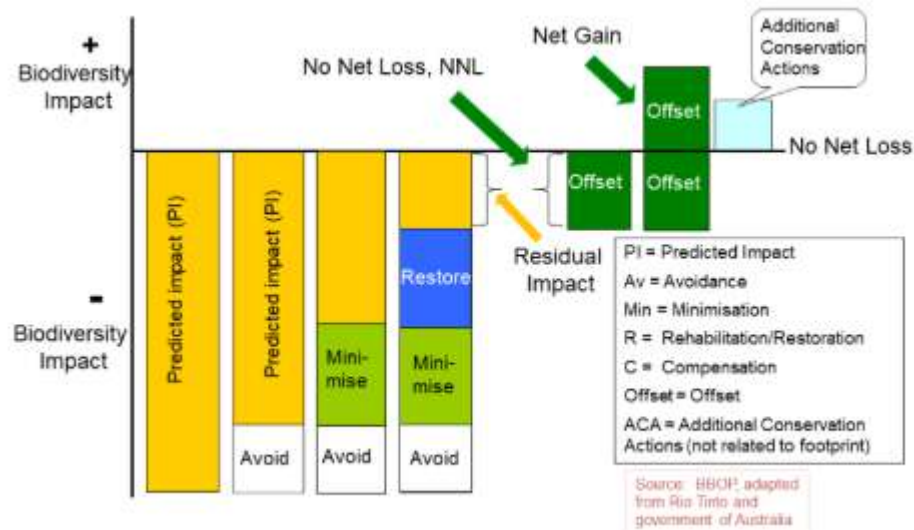


Figure 1.16: The Mitigation Hierarchy (BBOP, 2019)

1.4.2 Stakeholder Consultation and Engagement

In the context of this BMP, stakeholders are individuals, groups or organisations (government and non-government organisations (NGOs)) that either affect, are affected by, or have an interest in biodiversity management. Stakeholder consultation and support is integral to the design and implementation of any BMP and it is important that stakeholders are engaged in this Project’s BMP process. This has been partly achieved through consultation with biodiversity related stakeholders as part the Project’s Habitat Regulations Assessment (RSK, 2019a) in which a workshop was held in Tirana on the 23rd January 2019. The following local and regional government and non-governmental organisations were represented:

- ADZM Lezhe (Regional Protected Areas Agency Lezhe)
- ADZM Shkoder (Regional Protected Areas Agency Shkroder)
- AKZM (National Protected Areas Agency)
- Albanian Development Fund (ADF)
- Protection and Preservation of Natural Environment in Albania (PPNEA)
- Albanian Ornithological Society (AOS)
- University Marin Barleti
- Albaglobal
- Ministry of Tourism and Environment (MTM)
- Klodioda (Designer)

The workshop involved a discussion of the current ecological understanding of the Buna River Protected Landscape, Ramsar site, IBA and candidate Emerald Network Site, identified data gaps, key priority features for the Project, the likely significant effects for each 'qualifying feature of the Ramsar site' and the identification of key avoidance and mitigation measures. Feedback was collated and used to inform both the Habitat Regulations Assessment (RSK, 2019a) and the Biodiversity Impact Assessment (RSK, 2019b). A detailed account of this process and the outcomes are presented in the Habitat Regulations Assessment (RSK, 2019a).

1.5 Important Document Linkages

There are important linkages between this BMP and other Project documentation as follows:

- The Environmental Impact Assessment: Design of Road Shëngjin – Velipojë Project Ideas (December 2017), entails an assessment of the potential Project related impacts on some physical, natural resources and social aspects. The EIA includes the following components:
 - overview of the legislative requirements and baseline conditions relevant to the Project
 - An assessment of Project alternatives - the Project considered four alternative alignments for the proposed Project. The chosen alignment was identified as having the least impact to the biological environment within the zones of influence.
 - a short Environmental Impact Assessment
 - the identification of mitigation measures for the Project.
- the Biodiversity Impact Assessment (RSK, 2019b) supplements the Project's EIA and characterises Project-related impacts to biodiversity features in the project area
- The Habitat Regulations Assessment (RSK, 2019a) assesses Project-related impacts on the candidate Emerald site's conservation objectives to ensure that the integrity of the site is not adversely affected. This assessment entailed stakeholder consultation.
- Albania National Roads Project: Supplementary Biodiversity Assessment – The Proposed Shëngjin and Velipojë Road Scheme (RSK, 2019c). This report includes the following relevant information:
 - an overview of the relevant legislation and guidance
 - biodiversity baseline characterisation of the project area
 - identification and prioritisation of biodiversity features for the Project based on priority biodiversity / critical habitat screening.
- Economic Analysis Report, Design of The Road From Shëngjin – Velipojë, Project Idea (December 2017).

Additional information related to the management of potential biological impacts, and proposed monitoring and mitigation measures, are provided in the following reports and assessments:

- Albania Regional and Local Roads Connectivity Project: Operational Manual (Albanian Development Fund, August 2018)
- Albania's Improvement of the Management and Conditions of the Secondary and Local Roads Project; Environment Safeguards Framework (Albanian Development Fund, 2008)
- Project for Rehabilitation of Regional and Local Roads in Albania: Environmental and Social Management Framework (December 2017). This is a tool for ensuring that sub-projects (including the development of the proposed Shëngjin – Velipojë road) comply with existing laws, regulations and procedures in Albania. An account of the legislation and practices relevant to the EIA and permitting process is explained in detail in this document.
- Albania's Improvement of the Management and Conditions of the Secondary and Local Roads Project; Environment Safeguards Framework, 3rd Draft (March 10, 2008)

2 PRIORITY HABITATS AND SPECIES

2.1 Identification of Priority Habitats and Species

The biodiversity baseline of the PDA is described in the Albania National Roads Project: Supplementary Baseline Biodiversity Assessment – The Proposed Shëngjin and Velipojë Road Scheme (RSK, 2019c). This assessment characterises the existing biodiversity features within the Project footprint and surrounding environs based on the following components:

- habitat mapping
- site visit and rapid biodiversity walkover survey
- targeted ecology surveys
- 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. This process of prioritisation ensures that mitigation actions present within this BMP are focused on the highest biodiversity values and risks within the zone of influence.

A summary of the Critical Habitat-qualifying features and PBFs are presented in Table 2.1 and

Table 2.2 respectively, and a more detailed account is presented in the Supplementary Biodiversity Assessment (RSK, 2019c). Key PBFs for the Project are golden jackals, Eurasian badgers, bats (in particular *Rhinolophus hipposideros* and *R. ferrumequinum*), the great Capricorn beetle, key species of breeding birds (see Section 2.2.5) and nationally endemic, rare and threatened plant species (i.e. *Punica granatum*, *Colchicum autumnale*, *Galatella albanica*, *Origanum vulgare*, *Hypericum perforatum*, *Quercus ilex*, *Arbutus unedo*, *Erica arborea*, *Juniperus oxycedrus ssp. Macrocarpa*, *Ostrya carpinifolia*, *Quercus pubescens*, *Salvia officinalis* and *Satureja montana*).

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	Lake Shkoda and River Buna Ramsar complex Coastal lagoon	Protected area status Priority Annex 1 habitat
Habitats of significant importance to endangered or critically endangered species	1a:	<ul style="list-style-type: none"> • Slender-billed curlew • Atlantic sturgeon • Adriatic sturgeon • Starry sturgeon • European eel 	Precautionary due to the paucity of data
	1b	No critical habitat-qualifying features	-
	1c	<ul style="list-style-type: none"> • Atlantic sturgeon • Adriatic sturgeon • Stellate sturgeon • European eel 	Expert opinion is required to validate this
Habitats of significant importance to endemic or geographically restricted species	2	<i>Quercus robur</i> spp <i>scutariensis</i>	Precautionary due to the paucity of data
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	No critical habitat qualifying features	-
Ecological functions that are vital to maintaining the viability of biodiversity features described (as critical habitat features)	N/A	Buna River, connecting waterbodies and wetland habitats of the Lake Shkoda and River Buna Ramsar complex	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
Vulnerable Species	Plants x 12; insect x1; fish x 5, mammals x 5; reptiles x 2; amphibians x1; birds x 18
Threatened Habitats (EU Habitats Directive Annex 1 priority habitats)	Calcareous rocky slopes with chasmophytic vegetation Embryonic shifting dunes A number of scree types are categorised as Annex 1 habitats (i.e. 8110, 8120, 8130, 8140, 8150, 8160) Coastal lagoon
Significant Biodiversity Features Identified by a Broad Set of Stakeholders or Government	Buna River Protected Landscape, IUCN Category 5; national park category 2, Ramsar site, IBA, IPA and candidate Emerald Network Site
Ecological Structure and Functions Needed to Maintain the Viability of Priority Biodiversity Features	The hydrological regime of these protected areas is essential for the structure and function of the wetlands, coastal lagoon and associated network of rivers and waterways.

2.2 Overview of The Biodiversity Characteristics Within the Project Development Area

2.2.1 Protected Area status

The proposed Project traverses the Buna River Protected Landscape, IUCN Category 5; national park category 2, RAMSAR, Important Bird Area, Important Plant Area and candidate Emerald Network Site. The boundaries of these protected areas are presented in

Figure 2.1.

The Ministry of Environment, Forestry and Water Administration, is responsible for administration of the Buna River Protected Landscape / Landscape Management and the development of the management plan for the protected area. The site is currently under the management of the Skadar Forestry Service Directorate and is currently subject of a management plan *Peizazhin e Mbrojtur Protected Landscape “Lumit Buna – Velipojë”*.

The Buna River Protected Landscape was designated under Regulation No. 682 and is divided into zones. The locations of these zones are presented in Figure 2.2. The majority of the proposed Project is located in Zone B (2b) and a small portion is located in the Central Zone 1b. The Central Zone A (1a) is the most biodiversity sensitive area. A description of these zones is provided in the Albania National Roads Project: Supplementary Biodiversity Assessment – The Proposed Shëngjin and Velipojë Road Scheme (RSK, 2019c).

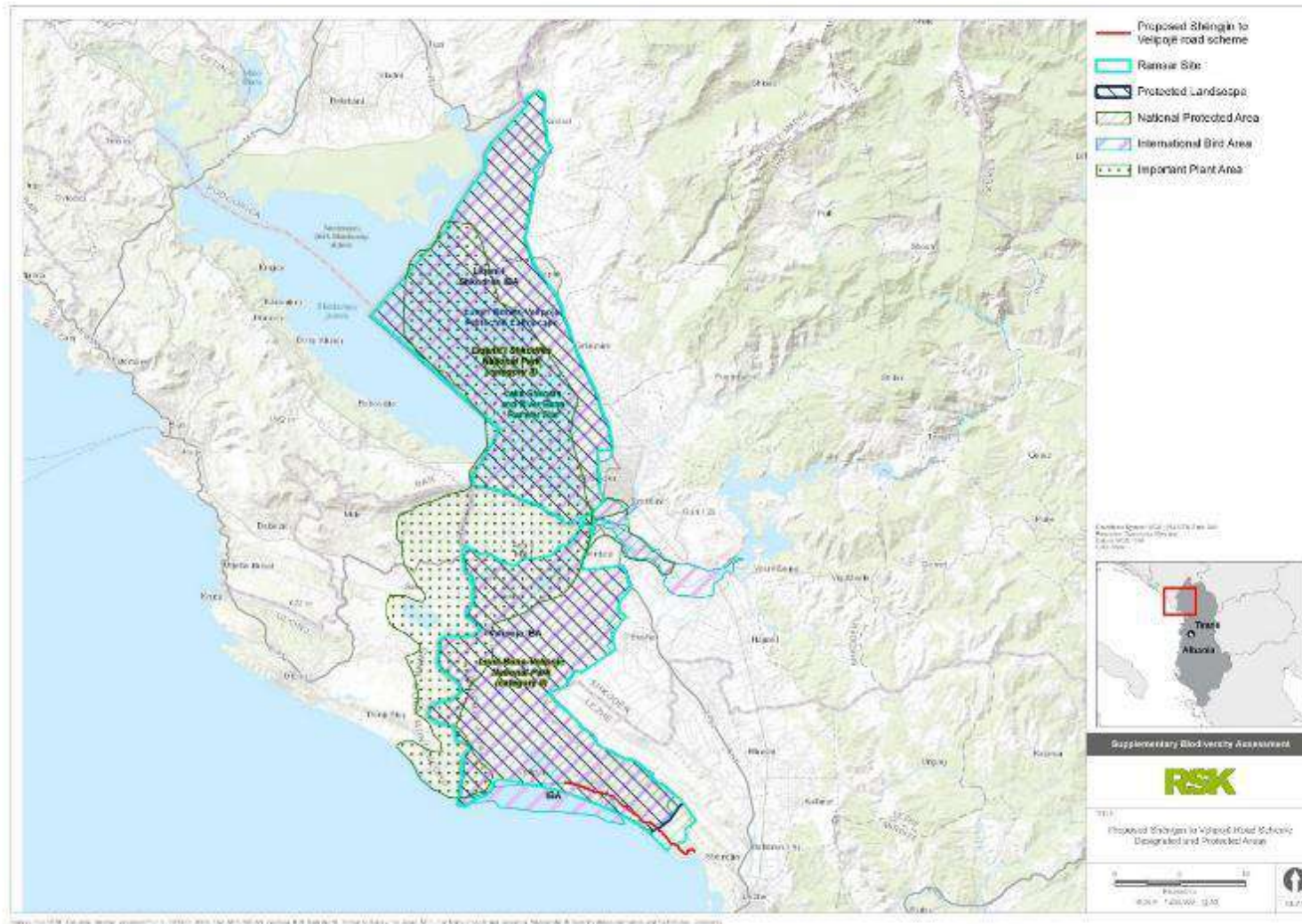


Figure 2.1: Distribution of protected areas in proximity to the Project

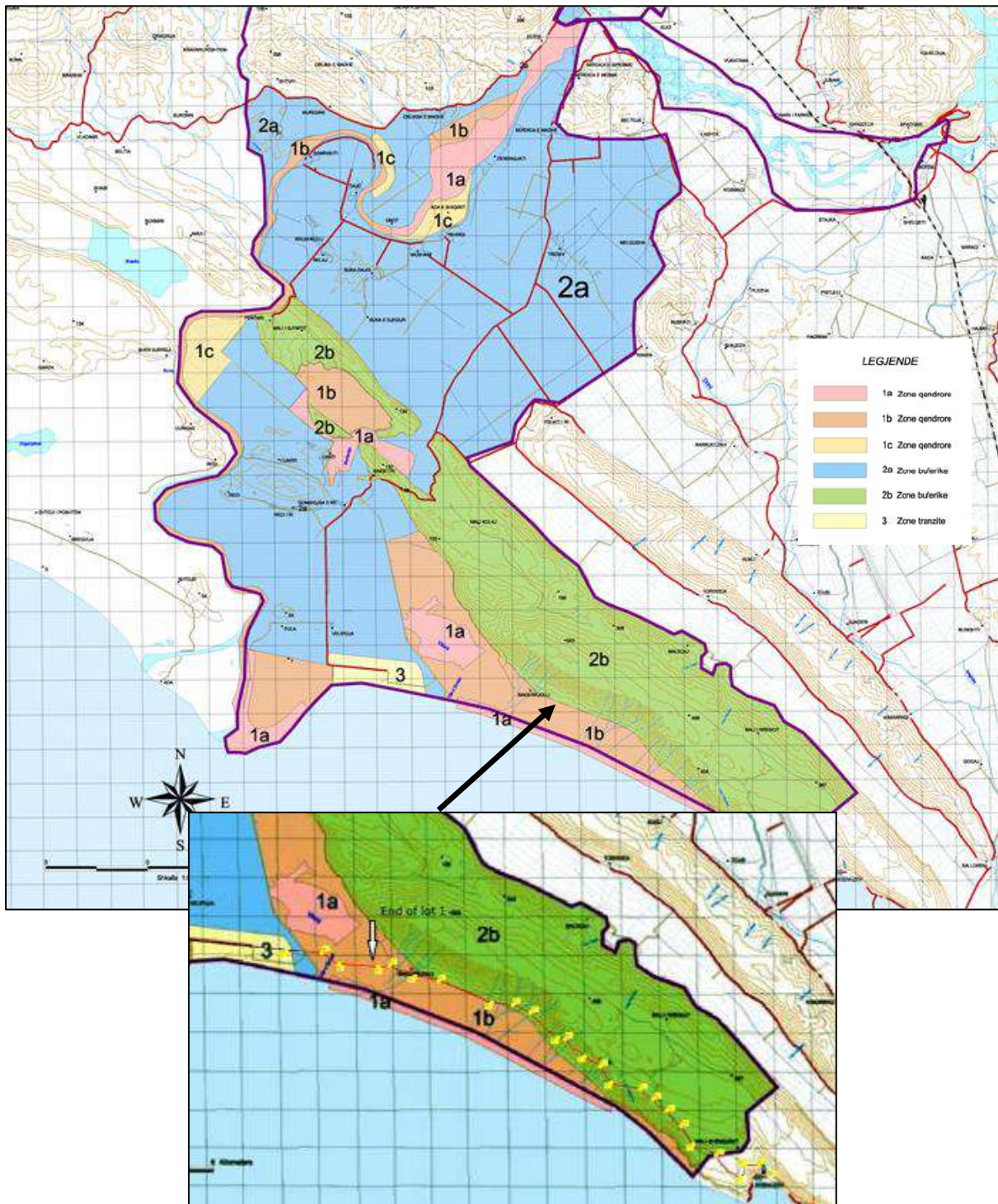


Figure 2.2: Zoning within the Buna River Protected Landscape

2.2.2 Habitats

A habitat map has been produced for the Project. This is presented in Appendix 1. The majority of the habitats located within the footprint of the proposed road and the adjoining buffer are common and widespread in nature and as such do not qualify as Annex 1 habitats (Table 2.3). However, a small section of the buffer overlaps the Annex 1 habitat type 'embryonic shifting dunes' (EU code 2110) which is likely to be artificially maintained by overgrazing and erosion. Furthermore, a significant proportion of the footprint comprises bare scree habitat.

Table 2.3: The coverage of habitat types within the project footprint

EUNIS Habitat Types	Annex 1 Habitat Status (Current Name as Adopted in Directive 97/62/EC)	Estimated Coverage (ha) in the Road Footprint
Habitats Located within the Footprint and / or Buffer Zone of the Proposed Road Alignment		
Broadleaved deciduous woodland (G1.78 Quercus trojana woodland)	Does not qualify	4.1
Thermophilous Deciduous Woodland	In wider terms this vegetation community is related with two Annex 1 habitats, one of which is priority habitat:	NA
	*91H0: Pannonian woods with Quercus pubescens	
	91M0: Pannonian-Balkan turkey oak – sessile oak forests	
	Further field work and data elaboration is needed on order to clearly define the Annex 1 relevance	
Coniferous woodland	Does not qualify	2.0
<i>Punica granatum</i> dominated communities	Does Not qualify	0.1

EUNIS Habitat Types	Annex 1 Habitat Status (Current Name as Adopted in Directive 97/62/EC)	Estimated Coverage (ha) in the Road Footprint
Temperate and mediterranean-montane scrub (Illyrian <i>Paliurus spina-christi</i> garrigues)	Does not qualify	1.3
Maquis, arborescent matorral and thermo-Mediterranean scrub	Does not qualify	2.1
F6.3 - Illyrian garrigues (F6.36 - Illyrian <i>Teucrium</i> and other labiates garrigues)	Does not qualify	NA
E.1 – Dry grasslands (E1.3 : Mediterranean xeric grassland)	Does not qualify	NA
Miscellaneous inland habitats with sparse or no vegetation	Does not qualify	1.5
Screes	A number of scree types are categorised as Annex 1 habitats (i.e. 8110, 8120, 8130, 8140, 8150, 8160). A botanical survey would be required to more fully characterise the floristic composition of scree habitat within the project footprint and surrounding environs. It was difficult to classify which scree type is present during the sub-optimal survey time – possibly Eastern Mediterranean scree.	1.3
H3 : Inland cliffs, rock pavements and outcrops (H3.5 : Almost bare rock pavements, including limestone pavements)	*8240 – Limestone pavement	NA
	8210 - Calcareous rocky slopes with chasmophytic vegetation	
Coastal dune and sandy shore	(EU code 2110) Embryonic shifting dunes	1.2
Coastal saltmarshes and saline reedbeds	1410 : Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	NA
Arable and market gardens	Does not qualify	0.2
Low density buildings	Does not qualify	3.9

EUNIS Habitat Types	Annex 1 Habitat Status (Current Name as Adopted in Directive 97/62/EC)	Estimated Coverage (ha) in the Road Footprint
Additional Habitats Located Outside the Footprint and Buffer of the Proposed Road Alignment, Within The AOI		
Coastal habitats	N/A	N/A
B1.31 : Embryonic shifting dunes	1210- Annual vegetation of drift lines	NA
Coastal saltmarshes and saline reedbeds	1410 : Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	NA
F9.3 - Southern riparian galleries and thickets	92D0: Southern riparian galleries and thickets (Nerio-Tamaricetea and Securinegion tinctoriae)	NA
B.1.7 – Coastal dune woods	*2270: Wooded dunes with <i>Pinus pinea</i> and/or <i>Pinus pinaster</i>	NA
Sand beaches above the driftline	Does not qualify	N/A
Coastal dune and sandy shore	(EU code 2110) Embryonic shifting dunes	N/A
Brackish coastal lagoons	(EU Code 1150) Coastal lagoons priority Annex 1 habitat	N/A
Inland cliffs, rocky pavements and outcrops	(EU code 8210) Calcareous rocky slopes with chasmophytic vegetation	N/A
Geolittoral wetlands and meadows: reed, rush and sedge stands: natural stands	Does not qualify	N/A
Inland dune juniper scrubs	Does not qualify	N/A
Arable and market gardens	Does not qualify	N/A
Low density buildings	Does not qualify	N/A

2.2.3 Flora

The botanical survey, undertaken in the PDA in June 2019, confirmed the presence of 97 plant species in the PDA. A full list of vascular plant species and their habitats of

occurrence is presented in the Supplementary Biodiversity Baseline Assessment (RSK, 2019). Only a small portion of these species have been assessed by the IUCN Red List of Threatened Species (2019) and these assessed species are categorised as LC. In total, 14 plant species located within the project footprint are rare and threatened at the national scale. The locations of these species is illustrated in

Figure 2.3 and are further described in Table 2.4 and are listed as follows:

- Albanian Red Listed CR:
 - *Punica granatum*
- Albanian Red Listed EN:
 - *Colchicum autumnale*
 - *Galatella albanica* - A national endemic located in *Quercus trojana* woodlands
 - *Origanum vulgare*
 - *Hypericum perforatum*
 - *Quercus ilex*
- Albanian Red Listed VU:
 - *Arbutus unedo*
 - *Erica arborea*
 - *Juniperus oxycedrus* ssp. *Macrocarpa*
 - *Ostrya carpinifolia*
 - *Quercus pubescens*
 - *Salvia officinalis*

- *Satureja montana*
- Albanian Red Listed LRcd:
 - *Crataegus heldreichii*.

According to the Lake Skadar and River Buna Ramsar site information sheet (Ramsar, 2005) this Ramsar site supports the endemic *Quercus robur* spp *scutariensis*. A literature review identified one account of this subspecies as occurring within fragmented agro-pastoral land and meadows near the village of Gostilj near Lake Skadar (Pešić et al., 2018). European oak (*Quercus robur*) is IUCN LC and listed as VU by the National Red List, however neither red list mentions this particular subspecies. Furthermore, the review did not yield any information to validate the authority and validity of the taxonomic classification of this subspecies.

Lake Skadar and River Buna Ramsar site also reportedly supports the following vascular plant species which are threatened and rare in Albania:

- European waterclover (*Marsilea quadrifolia*) – EN
- Marsh pennywort (*Hydrocotyle vulgaris*) – VU
- European frogbit (*Hydrocharis morsus-ranae*) – EN
- Lax-flowered orchid (*Anacamptis laxiflora*) – EN
- *Anacamptis palustris* – EN
- Sea daffodil (*Pancratium maritimum*) – EN
- *Desmazeria marina* – EN
- Sea grape (*Ephedra distachya*) – EN
- *Olea oleaster* – EN
- Bay laurel (*Laurus nobilis*) – EN
- Flowering-rush (*Butomus umbellatus*) – VU
- Great fen-sedge (*Cladium mariscus*) – VU
- Yellow waterlily (*Nuphar lutea*) – VU
- European white waterlily (*Nymphaea alba*) – VU
- *Nymphoides peltate* – VU
- Arrowhead (*Sagittaria sagittifolia*) – VU
- Water caltrop (*Trapa natans*) – EN
- *Adiantum cappilus-veneris* – VU
- Lesser water-plantain (*Baldellia ranunculoide*) - CR
- Greater duckweed (*Spirodela polyrhiza*) – VU
- Field elm (*Ulmus minor*) – VU
- *Hippuris vulgaris* - CR
- Crack willow (*Salix fragilis*) – VU
- *Nymphoidetum peltate* - VU

These species are all listed LC by the IUCN Red List of Threatened Species (2018).



Figure 2.3: Location of nationally endemic, rare and threatened flora species in the PDA

Table 2.4: Nationally rare, threatened and endemic flora species recorded during the 2019 botanical survey

Scientific name	Albanian Red List (2013)	Endemic Status	Habitat of Occurrence	GPS Points (Figure 2.3)
<i>Arbutus unedo</i>	VU A2c		Maquis	392, 396
<i>Colchicum autumnale</i>	EN A1b		<i>Quercus trojana</i> woodland	431 (The assumption is that this species is all over the same habitat)
<i>Crataegus heldreichii</i>	LR cd		<i>Ostrya caprinifolia</i> woodland,	409, 419
<i>Erica arborea</i>	VU A2c		Maquis	392, 396
<i>Galatella albanica</i>	EN A1b	National endemic	<i>Quercus trojana</i> woodlands	438, 440-480
<i>Hypericum perforatum</i>	EN A1b		Everywhere (in all vegetation communities)	398, 412, 415

<i>Juniperus oxycedrus</i> <i>ssp. macrocarpa</i>	VU A1b		Coniferous forests and mediterranean stony grasslands	389, 392
<i>Matthiola tricuspidata</i>	EN A1b	Subendemic	<i>Quercus trojana</i> woodland	Literature
<i>Origanum vulgare</i>	EN A1b		<i>Quercus trojana</i> woodland	409, 414
<i>Ostrya carpinifolia</i>	VU A2c		<i>Ostrya caprinifolia</i> woodland	419, 431
<i>Punica granatum</i>	CR B1		<i>Punica grannatum</i> shrublands, Coniferus forests	389-393, 422, 423
<i>Quercus ilex</i>	EN A1b		Maquis	Literature
<i>Quercus pubescens</i>	VU A2c		<i>Quercus trojana</i> woodland, <i>Ostrya caprinifolia</i> woodland	431
<i>Salvia officinalis</i>	VU A1b		<i>Quercus trojana</i> woodlands, Mediterranean stony grasslands, but more or less everywhere	400, 408, 416, 429, 430, 431, 432, 435, 437
<i>Satureja montana</i>	VU A1c		<i>Quercus trojana</i> woodlands, Mediterranean stony grasslands, but more or less everywhere	398, 400, 408, 410, 413, 416, 431, 432, 435, 436, 437
<i>Viburnum tinus</i>	EN			Literature

2.2.4 Mammals

The Project is reportedly located within a wider wildlife corridor for mammal species and may potentially provide habitat for commuting wolf (*Canis lupus*; IUCN LC and National Red List NT) and European roe deer (*Capreolus capreolus*; IUCN LC; National Red List VU) (Schneider-Jacoby et al, 2006). According to Schneider-Jacoby et al (2006) the presence of brown bears (*Ursus arctos*; IUCN LC; National Red List VU) has been reported in the area, however other comprehensive accounts (Kaczensky et. al. 2013) do not indicate that the area is permanent bear habitat. There is potential that the area is sporadically used by bears as a transitory corridor and passage.

This corridor extends from Klezna to Shëngjin and comprises the two parallel hill ranges (Mount Renci where the Project is located and Mount Jushi - Mali i Jushit), surrounded by agro-pastoral land, the beach and delta. According to Schneider-Jacoby et al (2006), this corridor is of conservation importance at the European scale.

The Buna River Protected Landscape and Ramsar Site which overlaps a portion of this corridor reportedly supports a number of fauna species of conservation importance (IUCN, 2012; AKZM National Agency of Protected Areas 2018) namely, brown bears (*Ursus arctos*), golden jackal (*Canis aureus*; IUCN LC; National Red List VU), Eurasian otter (*Lutra Lutra*; IUCN NT; National Red List VU), Mediterranean horseshoe bat

(*Rhinolophus euryale*; IUCN NT; National Red List VU) and long-fingered bat (*Myotis capaccinii*; IUCN VU; National Red List LR/cd).

The walkover survey identified indirect evidence indicative of fauna activity (i.e. faeces; scrapes and prints) within the footprint of the proposed road and adjoining buffer, namely;

- Eurasian badger (*Meles meles*) – IUCN LC; Albanian Red List EN
- Fox (*Vulpes vulpes*) - IUCN LC
- Wild boar (*Sus scrofa*) - IUCN LC
- Marten species (*Martes* sp.)

Prints of golden jackals and brown hare (*Lepus europaeus*) were also recorded outside the search area, approximately 650 m from the Project footprint at the closest point.

In addition to direct evidence from the field, local residents encountered during the field survey identified the presence of wolves, golden jackals and wild boars within and in close proximity to the Project area and provided anecdotal accounts of the damage that these species cause to property and cattle. Local residents considered the presence of bears and roe deer in the area to be unlikely.

Mammal species recorded during the camera trapping survey, undertaken in the Project area in May 2019 are listed in Table 2.5. Four of these species are nationally rare and threatened, namely the Eurasian badger, golden jackal, wildcat (*Felis silvestris*) and stone marten (*Martes foina*). Grey wolves were not recorded during the survey. These key species are described below in more detail.

Table 2.5: The May 2019 camera trapping results

Species Name	Frequency of Recordings Per Camera Trap Number							Total Number of Recordings
	1	2	3	4	5	6	7	
Golden jackal	-	1	1	-	Camera failed	Camera was stolen	Camera was stolen	2
Wildcat (potential hybrid)	2	-	7	1				10
Red fox	6	1	27	-				34
Eurasian badger	-	-	5	-				5
Marten sp, probably stone marten	-	1	4	2				7
Brown hare	10	18	-	-				28

Species Name	Frequency of Recordings Per Camera Trap Number							Total Number of Recordings
	1	2	3	4	5	6	7	
Bird sp.	-	-	1	-				1
Dogs	1	3	1	2				7
People	1	3	1	2				7
Cows	2	28	26	-				56
Pigs (domestic)	11	-	30	-				41
Goats/Sheep	3	1	13	-				17
Horses	-	1	2	3				6
Unidentified	-	1	-	-				1
Total Rare and Threatened Species Per Camera trap:	2	1	13	1	NA	NA	NA	-

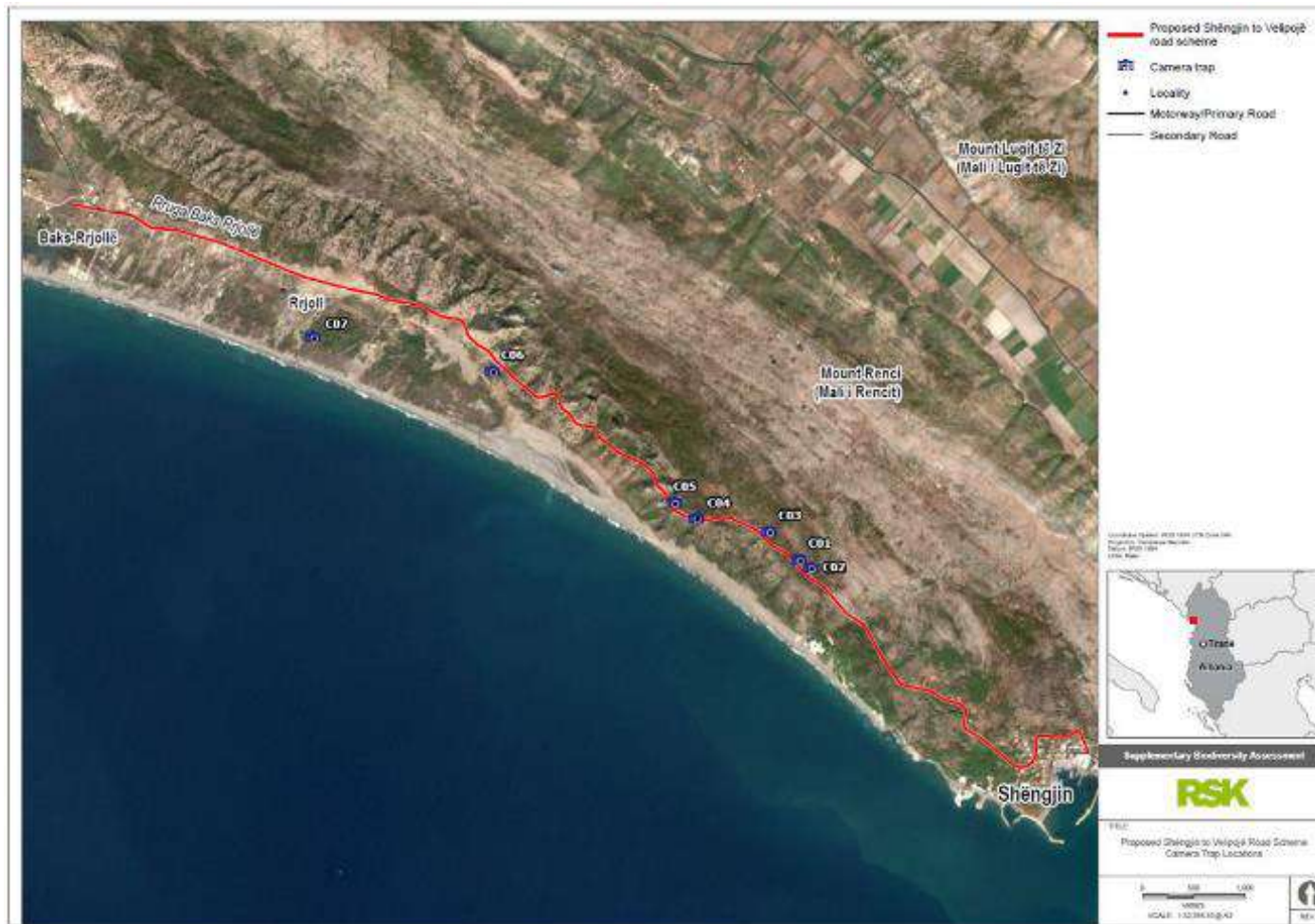


Figure 2.4: Camera trap locations

2.2.4.1 Eurasian Badger

A Eurasian badger dropping was observed within maquis vegetation within the PDA during the walkover survey in November 2018. Furthermore, a Eurasian badger was recorded on five separate occasions by camera trap 3 amongst broadleaved deciduous woodland (*Quercus trojana* woodland) approximately 4.5 km from Shëngjin. This confirms badger activity within the project area and the proposed road alignment. The location of any badger setts within the PDA is currently uncertain at this stage in the project development.

Eurasian badgers are widely distributed in Europe and are categorised globally as LC (IUCN, 2019). In Albania, badgers are listed as EN by the National Red List (MoE 2013). This assessment is thought to be based on expert estimation of population status. Monitoring and research is required to inform an up to date assessment of the population status in Albania. Badgers are widely distributed in Albania and occur in a range of habitats from lowland and agricultural areas to highland forests. Recent camera trapping surveys conducted by PPNEA between 2009 and 2018 have confirmed their presence in a multitude of regions across the country (Trajce, unpubl. data).

Eurasian badgers are opportunistic foragers with an omnivorous diet feeding on a variety of plants, insects and carrion etc. They are found in deciduous and mixed woodlands, meadows, pastureland and scrubland, including Mediterranean maquis. They are increasingly reported to also occupy suburban and urban areas in various European cities (IUCN, 2019).

2.2.4.2 Golden Jackal

Indirect evidence indicative of golden jackal activity (namely prints) were observed outside of the Project footprint on the beach at the foot of Mount Renci near an area of dune wetland during the priority species survey in November 2018. The occurrence of four separate parallel prints indicated the presence of four individuals which is likely to be part of a family group. This species has also been reported as occurring in the Buna River Protected Landscape (IUCN, 2012; AKZM National Agency of Protected Areas Date 2018).

The presence of golden jackals within the Project footprint on Mount Renci was also confirmed by the camera trapping survey in two separate locations approximately 4 km and 4.5 km from Shëngjin respectively. One individual golden jackal was recorded by camera trap 3 on one occasion and one individual golden jackal was recorded by camera trap 2 located amongst maquis, arborescent matorral and thermo-Mediterranean scrub near the road alignment (in the PDA) approximately 4 km from Shëngjin. This confirms habitat usage by golden jackals in the upland rocky areas of Mount Renci within the section of the proposed route between Shengjin and Margjoaj village.

The vocalisation recall survey provided more detailed information regarding habitat usage of golden jackals in the project area. Responses of territorial jackals were recorded at five calling stations (i.e. 62.5% response). In total, 6 to 7 different territorial groups were recorded in the survey area, in the region of the PDA, comprising approximately 10 to 14 individuals in total (Figure 2.5). Further survey work would be required to identify the exact number of groups. The survey confirmed that the jackals are breeding within

the project area as two of the groups (J04 and J06) included vocalisation calls from cubs (Figure 2.5).

All groups, with the exception of group number J07 (Figure 2.5), were recorded residing on the lowland habitats of the area. Group number J07 was assessed as being present on the northern slopes of Mount Renci. Jackal groups showed to have a stronger preference for lowland areas, agricultural fields and wetland ecosystems, rather than the dry rocky areas in the uplands of Mount Renci, which is consistent with findings from studies in other parts of the Balkans and Europe. These results indicate that golden jackals use the upland areas of Mount Renci to commute back and forth from one lowland area to another, whilst denning / residing in the lowland habitats. The evidence of cubs in the vocalisation recall survey further supports this assumption.

2.2.4.3 *Wildcat*

The camera trapping survey, undertaken in the project area in May 2019, recorded what appears to be a wildcat (IUCN LC, Albania Red Listed EN). The potential wildcat was filmed by camera traps 1, 3 and 4, located in the PDA amongst miscellaneous inland habitats with sparse or no vegetation in the upland area of Mount Renci. Given the proximity of cameras to human habitations and villages, it is uncertain whether all the detections belong to pure wildcats or to feral domestic cats or hybrids between wild and domestic cats.

Whilst wildcats use a variety of habitat types (i.e. deserts, scrub grassland, dry and mixed forest), European wildcats are primarily associated with forests, particularly broad-leaved or mixed forests with low level human disturbance. They are also found in Mediterranean maquis scrubland, riparian forest, marsh boundaries and along sea coasts (Yamaguchi et al., 2015).

Wild cats are currently threatened by hybridization with domestic cats, competition with feral domestic cats for prey and territory, disease transmission between domestic cats and wild cats, accidental vehicle collisions, illegal persecution, being killed as bycatch and killed for the Asian fur trade (Yamaguchi et al., 2015).

2.2.4.4 *Stone Marten*

Two separate marten species droppings were observed during the walkover survey in November 2018 within maquis and Mediterranean evergreen Quercus forest, indicating the presence of martens within the project area. Marten species were also recorded during the camera trapping survey in May 2019 within the PDA. It is likely that given the range and distribution of marten species in Albania and their habitat usage, that all the individuals recorded in the project area are stone martens.



Figure 2.5: Locations of call stations(green squares) and buffer zone of 2 km from calling station; identified territorial jackal groups in the study area are marked with yellow rhombus

2.2.4.5 Bats

Of the 32 bat species recorded in Albania, the bat surveys undertaken in May 2019 confirmed that 18 bat species use habitats within proximity to the PDA. This area therefore supports a high diversity of bat species which is likely to be attributed to the mosaic of different habitats found in the area (i.e. caves, bunkers, woodland, agropastoral land and abandoned infrastructure) and the absence of artificial lighting. The majority of bat species identified in the survey area are categorised as LC by the IUCN Red List of Threatened Species (2019) as follows:

- Geoffroy's bat (*Myotis emarginatus*)
- Daubenton's myotis (*Myotis daubentonii*)
- whiskered myotis (*Myotis mystacinus*)
- Natterer's bat (*Myotis nattereri*)
- great mouse-eared bat (*Myotis myotis*)
- greater horseshoe bat (*Rhinolophus ferrumequinum*)
- Savi's pipistelle (*Hypsugo savii*)
- noctule (*Nyctalus noctula*)
- *Eptesicus serotinus* or lesser noctule (*Nyctalus leisleri*)
- pipistrelle (*Pipistrellus nathusii*)
- Kuhl's pipistrelle (*Pipistrellus kuhlii*)
- European free-tailed bat (*Tadarida teniotis*)

A total of five bat species recorded in the survey area are rare and threatened at the national, regional and global scales. These are listed as follows:

- long-fingered bat (*Myotis capaccinii*) – IUCN VU; Albania Red Listed VU
- Blasius' horseshoe bat (*Rhinolophus blasii*) – IUCN VU in the Mediterranean
- Mediterranean horseshoe bat (*Rhinolophus Euryale*) – IUCN Mediterranean VU; Albanian Red Listed VU
- lesser horseshoe bat (*Rhinolophus hipposideros*) - NT in Europe
- Schreiber's bent-winged bat (*Miniopterus schreibersi*) – IUCN NT

The 2019 bat roost surveys confirmed the presence of five bat roosts within proximity to the proposed road alignment (Table 2.6 and

Figure 2.6). These were located in military bunkers, an abandoned house, bridges and a cave. Only one roosting site, the abandoned house (Site 2), was located within the PDA. Two bat species were observed roosting in this location, namely *Rhinolophus hipposideros* and *R. ferrumequinum*, and the surveyors thought that the house may serve as a maternity roost for *Rhinolophus hipposideros*.

A maternity colony of *Myotis emarginatus*, *Myotis schreibersii* and possibly *R. hipposideros* was also identified in a military bunker located 500 m from the project footprint within the Protected Landscape (see Figure 2.6, Site 1). Two of the four entrances to the bunker showed signs of disturbance due to modification works (indicated by the presence of rocks and bags of concrete) and signs of a fire were observed inside the bunker.

The most significant bat roost in terms of the abundance and diversity of bat species was a network of four military bunkers located within the Buna River Protected Landscape, 1.5 km northwest of the project footprint (Site 11). Seven species and over 1600 individuals were recorded roosting at this site. The surveyors considered it likely that other bat species also use this structure as roosting habitat. The bat specialists consider this bat roosting site to be of regional and national importance. It is highly likely that individuals roosting in this bunker will use habitats in the project area (including the project footprint) for commuting and foraging.

A cave (Shpella Suka e vogel), protected as a National Monument (Cat III) and located approximately 700 m from the Project was also surveyed (Site 16). Three species were observed namely *R. ferrumequinum*, *R. hipposideros* and *R. euryale / blasii*. Whilst only a few individuals were recorded in the cave, a large amount of guano (bat faeces) was present suggesting that many individuals may use the cave throughout the year.

An abandoned electrical tower was also inspected for roosting bats (Site 17). Whilst bats were not sighted in this structure, a small amount of guano was observed indicating the occasional usage of the tower by bats.

Table 2.6: Bat roosts located within proximity to the proposed Shëngjin to Velipojë road scheme

Structure Type	Location		Distance from Project Footprint	Confirmed Roost	Bat Species	Estimated Number of Individuals
	In the Protected Landscape	Outside of the Protected Landscape				
Military bunker (Error! Reference source not found. , Site 1)		+	SW of Project, circa 500 m	Maternity roost	<i>Myotis emarginatus</i>	252
				Maternity roost	<i>M.schreibersii</i>	55
				Possibly a maternity colony	<i>R.hipposideros</i>	15
				Confirmed	<i>R.ferrumequinum</i>	1
Abandoned house (Error! Reference source not found. , Site 2 and Error! Reference source not found.)		+	On the proposed alignment	Maternity roost	<i>R. hipposideros</i>	11
				Confirmed	<i>R. ferrumequinum</i>	1
Two bridges (Error! Reference source not found. , Sites 9 and 10;)	+		7km	Confirmed	<i>M.daubentonii.</i>	12
					<i>M.mystacinus</i>	10
					<i>M.nattereri</i>	3
Network of four military bunkers (Error! Reference source not found. , Site 11)	+		North of project - approx 1.5km	Confirmed – roosting site of national and regional importance	<i>Myotis myotis</i>	1
					<i>Myotis myotis/blythii</i>	1200
					<i>R. euryale</i>	200
					<i>Rhinolophus ferrumequinum</i>	1
					<i>Rhinolophus hipposideros</i>	1
					<i>Miniopterus schreibersii</i>	100
					<i>Myotis emarginatus</i>	100
Cave (Shpella)	+		Approx. 700 m	Confirmed – Guano	<i>R.ferrumequinum</i>	1
					<i>R.hipposideros</i>	3

Structure Type	Location			Confirmed Roost	Bat Species	Estimated Number of Individuals
	In the Protected Landscape	Outside of the Protected Landscape	Distance from Project Footprint			
Suka e vogel) (Error! Reference source not found. , Site 16)				also present in significant quantities.	<i>R.euryale/blasii</i>	2

Bat activity transect surveys and mist netting were undertaken in combination with the bat roost inspections. In total, six bat species were recorded foraging and / or commuting during these surveys, namely *Hypsugo savii*, *Pipistrellus kuhlii*, *Miniopterus schreibersii*, *Tadarida teniotis*, *Eptesicus serotinus* / *Nyctalus leisleri* and *Pipistrellus kuhlii* / *P. nathusii* (Table 2.7, Sites 19, 20, 21, 22, 23, 24 & 25). The surveyors were unable to differentiate between *Eptesicus serotinus* versus *Nyctalus leisleri* and *Pipistrellus kuhlii* versus *P. nathusii* based on the quality of the bat echolocation recordings and the lack of social calls. Bat activity (i.e. foraging and commuting) appeared to be centred over habitats located in the north-western portion of the project footprint near Rrjollë and the last 4 km of the project footprint near Shengjin. Whilst bat activity was not recorded amongst the oak woodland located within the project footprint on Mount Renci, this habitat was identified as being of potential importance for foraging and roosting bat species known to be present within the region.

Table 2.7 Location and species of bats recorded during transect and mist net surveys

Site Numbers (and method)	Location of Bat Sighting / Recording			Bat Species
	In the Protected Landscape	Outside of the Protected Landscape	Distance from Project Footprint	
Sites 3 to 8 (Hand held bat detector - D1000X)	+		Max of 0.4 km	<i>Hypsugo savii</i>
				<i>Nyctalus noctula</i>
				<i>Eptesicus serotinus/Nyctalus leisleri</i>
				<i>Pipistrellus kuhlii/nathusii</i>
Site 18 (Mist net)	+		0.5 km	<i>R. ferrumequinum</i> N.B. Pregnant female indicating a maternity roost close by.
Sites 19 to 25	+		Max of 0.5 km	<i>Hypsugo savii</i>
				<i>Pipistrellus kuhlii</i>
				<i>Miniopterus schreibersii</i>
				<i>Tadarida teniotis</i>
				<i>Eptesicus serotinus/Nyctalus leisleri</i>
				<i>Pipistrellus kuhlii/nathusii</i>

2.2.5 Avifauna

The walkover survey of the PDA, undertaken in November 2018, confirmed the presence of several bird species within the project footprint. These are widespread and common in nature and as such are listed as IUCN LC and are not included on the National Red List for Albania, namely: yellowhammer (*Emberiza citronella*), common raven (*Corvus corax*), greylag goose (*Anser anser*), carrion crow (*Corvus corone*) and great tit (*Parus major*). The common kestrel (*Falco tinnunculus*; IUCN LC; Albanian Red Listed VU) was

observed hovering over an area of scrub, interspersed with exposed rocks and scree over the ridge edge of Mount Renci and this PDA was also identified as providing foraging habitat for the common kestrel.

The breeding bird survey, undertaken in early June 2019, confirmed the presence of 95 bird species within the survey area. The majority of the birds recorded were small passerines of which 53 different species were identified during the visit. The rest comprised members of other taxonomic orders including raptors, woodpeckers, owls, waders, herons, gulls and terns, doves, cormorants, moorhens, hoopoes, bee-eaters, grebes, cuckoos, nightjars, pelicans, partridges and swifts. Birds were present in different habitats within the project area including urban areas, pine forests, natural oak forest, Mediterranean maquis, inland cliffs, areas with sparse vegetation, arable land and sand dunes.

Of the 95 species observed, fifty-eight species were confirmed breeding while the remainder were categorised either as probable breeding (12 species) or possible breeding (17 species). A detailed list of birds together with their respective breeding codes is presented in the Supplementary Biodiversity Baseline Assessment (RSK, 2019).

Of the species observed during this survey, five are globally rare and threatened, as follows:

- European turtle-dove (*Streptopelia turtur*) – IUCN VU
- rock partridge (*Alectoris graeca*) – IUCN NT
- oystercatcher (*Haematopus ostralegus*) – IUCN NT at the global scale and VU in Europe
- European curlew (*Numenius arquata*) – IUCN NT at the global scale and VU in Europe
- Dalmatian pelican (*Pelecanus crispus*) – IUCN NT

Turtle dove and rock partridge both breed in the PDA. Turtle dove breeds in forested patches whilst the rock partridge is present in sparse vegetation habitats. Other globally threatened species are waterbirds which occur in wetlands near Baks-Rrjoll. Among them the oystercatcher is possibly breeding but the European curlew and the Dalmatian pelican do not breed in the area.

Furthermore, the survey confirmed the presence of 17 bird species that are classed as rare and threatened at the national level by the Albania Red List (2013). These are listed as follows:

- golden eagle (*Aquila chrysaetos*) - EN
- grey heron (*Ardea cinerea*) – EN (during breeding)
- eagle owl (*Bubo bubo*) – CR
- common buzzard (*Buteo buteo*) – VU (during breeding)
- short-toed eagle (*Circaetus gallicus*) – VU
- little egret (*Egretta garzetta*) – VU (during breeding)
- peregrine falcon (*Falco peregrinus*) – VU (during breeding)
- hobby (*Falco subbuteo*) – VU
- common kestrel (*Falco tinnunculus*) – VU (during breeding)
- oystercatcher (*Haematopus ostralegus*) – VU
- black-winged stilt (*Himantopus himantopus*) – EN

- olive-tree warbler (*Hippolais olivetorum*) – Data deficient
- yellow-legged gull (*Larus michahellis*) – EN (during breeding)
- European bee-eater (*Merops apiaster*) – EN
- pygmy cormorant (*Mycrocarbo pygmaeus*) – CR (during breeding)
- Dalmatian pelican – CR (during breeding)
- European hoopoe (*Upupa epops*) – VU

Most of the above species are threatened during breeding due to human disturbance at breeding grounds, persecution and loss or fragmentation of breeding habitats. The breeding bird status of golden eagle, eagle owl and tawny owl within the PDA is currently uncertain and further survey work would be required to confirm this.

A biodiversity study undertaken in the region of the proposed road alignment by Schneider-Jacoby et al., (2016) identified the presence of the following avifauna species of conservation importance:

- The golden eagle (*Aquila chrysaetos*) reportedly uses breeding habitat within karst galleries of Mount Renci – IUCN LC; Albanian Red List EN; Appendix II of the Bern Convention; Annex I of the Birds Directive; Annex II of the Bonn Convention; Appendix II CITES.
- The Levant sparrow hawk (*Accipiter brevipes*) has been recorded in the Bojana-Buna delta floodplain forest, located some distance from the project footprint. This species is IUCN LC, Albanian Red List CR; Appendix II of the Bern Convention; Annex I of the Birds Directive; Annex II of the Bonn Convention; Appendix II CITES, CMS Appendix II.
- European rollers (*Coracias garrulous*) have been sighted in the Bojana- Buna delta floodplain forest, pastures and semi-natural woodlands in the region – IUCN LC, Albanian Red List CR; Appendix II of the Bern Convention; Annex I of the EU Birds Directive; Annex I of the Bonn Convention.
- Lesser grey shrikes (*Lanius minor*) use pastures, agro-pastoral land and woodland habitats in the region - IUCN LC, Albanian Red List CR; Appendix II of the Bern Convention; Annex I of the Birds Directive.
- Stone curlews (*Burhinus oedicnemus*) have been sighted within the Bojana-Buna delta and Ada Island – IUCN LC, Albanian Red List CR; CMS Appendix II; Birds Directive Annex I; Bern Convention Appendix II.

The Velipoja – Albania IBA and KBA (wherein the proposed road alignment partly traverses) is known to support foraging pygmy cormorants (*Phalacrocorax pygmaeus*; IUCN LC) that overwinter amongst wetland habitat. This species is listed as CR on the National Red List for Albania. It is listed on CMS Appendix II, Annex II of the Bern Convention and Annex I of the EU Birds Directive. Pygmy cormorants historically used to breed within this IBA, near the mouth of the Buna River, however due to disturbance, their breeding habitat is now restricted to Ada Island, located in Montenegro (BirdLife International, 2018).

In addition, the Lake Shkoda and River Buna Ramsar site also reportedly provides habitat for the following species that are nationally and / or internationally rare and threatened (Ramsar, 2005):

- Dalmatian pelican (*Pelecanus crispus*) – IUCN NT; Albania Red List CR. Listed on CMS Appendices I and II, Birds Directive Annex I, Annex II of the Bern Convention, Annex I of the Bonn Convention and CITES Appendix I.
- Lesser white-fronted goose (*Anser erythropus*) – IUCN VU; now extinct in Albania according to the National Red List of Albania. Listed on CMS Appendices I and II, Annex II of the Bern Convention, and Annex I of the Birds Directive.
- Red-breasted goose (*Branta ruficollis*) - IUCN VU; Albania Red List CR. Listed on CMS Appendix I, Annex II of the Bern Convention, and Annex I of the Birds Directive.
- White-headed duck (*Oxyura leucocephala*) - IUCN EN; Albania Red List CR. Listed on CMS Appendix I and II, Annex II of the Bern Convention, Annex I of the Birds Directive and Annex II of CITES.
- Ferruginous duck (*Aythya nyroca*) - IUCN NT; Albania Red List CR. Listed on CMS Appendix I and II, Annex II of the Bern Convention, Annex I of the Birds Directive and Annex II of CITES.
- Slender-billed curlew (*Numenius tenuirostris*) - IUCN CR; Albania Red List CR. Listed on Annex I of the Birds Directive, Annex II of the Bern Convention, Annex I and II of CMS and Annex I of CITES.
- Great snipe (*Gallinago media*) - IUCN NT; Albania Red List CR. Listed on Annex I of the Birds Directive, Annex II of the Bern Convention and Annex I of CMS
- Marbled teal (*Marmaronetta angustirostris*) - IUCN VU. Listed on CMS Appendix I and II and Annex I of the Birds Directive.
- Eurasian oystercatcher (*Haematopus ostralegus*) – IUCN NT; Albania Red List VU. Listed on Annex II (B) of the Birds Directive.
- Eurasian thick-knee or stone curlew (*Burhinus oedicnemus*) - IUCN LC; Albania Red List CR. Listed in Annex I of the Birds Directive
- Eurasian spoonbill (*Platalea leucorodia*) – IUCN LC; Albania Red List EN. Listed in Appendix II of CITES, Annex I of the Birds Directive and Annex II of the Bern Convention.

These species are also categorised as congregatory (and dispersive) and full migrants. Hence, Lake Shkoda and River Buna Ramsar site is not only recognised as an important area for migratory and congregatory birds in the region but for supporting a high diversity of migrant birds (Ramsar, 2005). Habitats located at the mouth of the Bojana-Buna delta (i.e. wetlands and coastal habitats) are of particular importance to many migrating birds to this region (Denac et al., 2010). In addition to the species listed above, the Ramsar site also provides wintering habitat for wood larks (*Lullula arborea*; IUCN LC; not included on the National Red List for Albania). This species is a migratory species that inhabits agro-pastoral land, woodlands and scrub (IUCN, 2018) and the Lake Shkoda and River Buna Ramsar Site reportedly supported a significant portion of the European population in 2003-2004 (Ramsar, 2005). Other migratory and / or congregatory bird species that use habitats within the Ramsar site and are common and widespread in nature include:

- Kentish plover (*Charadrius alexandrinus*; IUCN LC) – migrant. Listed on Annex I of the Birds Directive, Annex II of the Bern convention and CMS Appendix II

- European nightjar (*Caprimulgus europaeus*; IUCN LC; National Red Book of Albania listed Low Risk) – migrant. Listed in Annex I of the Birds Directive and Appendix II of the Bern Convention
- Common redshank (*Tringa tetanus*; IUCN LC) - congregatory (and dispersive) and full migrant. Listed on Annex II of the Birds Directive
- Common sandpiper (*Actitis hypoleucos*; IUCN LC) - congregatory (and dispersive) and full migrant. Listed on Annex II of the Birds Directive
- European roller (*Coracias garrulous*; IUCN LC) - full migrant
- Black-headed bunting (*Emberiza melanocephala*; IUCN LC; National Red Data Book list Data Deficient (DD)) - full migrant
- Lesser grey shrike (*Lanius minor*; IUCN LC National Red Data Book listed DD) - full migrant
- Woodchat shrike (*Lanius senator*; IUCN LC) - full migrant. Listed on Appendix II of the Bern convention
- Black-eared wheatear (*Oenanthe hispanica*; IUCN LC) - full migrant. Listed on Appendix II of the Bern convention
- Eurasian scops-owl (*Otus scops*; IUCN LC) - full migrant
- Great cormorant (*Phalacrocorax carbo*; IUCN LC) - congregatory (and dispersive) and full migrant
- Spotted redshank (*Tringa erythropus*; IUCN LC) - congregatory (and dispersive) and full migrant

The majority of these migratory and congregatory species do not occur within the Ramsar Site or IBA in globally significant numbers. However, during bird counts undertaken between 2001-2004 three bird species reached the 1% criterion of the Ramsar Convention namely: great cormorant with an estimated 3100 individuals, Dalmatian pelican with 30 individuals and spotted redshank with 1000 individuals (Schneider-Jacoby et al. 2004; Ramsar, 2005).

2.2.6 Reptiles

The walkover survey of the project area confirmed the presence of several reptile species within the project area. Two juvenile snakes, one of which was a nose-horned viper (*Vipera ammodytes*; IUCN LC; Albanian Red List LR/nt) were observed within the project footprint amongst regenerating agro-pastoral land / thicket, near the ridgeline of Mount Renci. A smooth snake (*Coronella austriaca*; IUCN LC; Albanian Red List LR/nt) was also observed basking on an area of exposed coastal dune outside of the project footprint, in close proximity to the dune wetland (located near the settlements of Rrjoll). Two additional snakes were sighted basking in the same location the following morning, however, these individuals moved too quickly to be able to make a full species identification. Two lizards were sighted basking on rocks amongst Mediterranean evergreen Quercus forest located within the project footprint and buffer on Mount Renci, and one lizard was observed basking on a rock amongst regenerating agro-pastoral land within the project footprint and buffer on Mount Renci. These individuals dispersed before a full identification was made.

Lake Skadar and River Buna Ramsar site and the Buna River Protected Landscape provide habitat for 31 species of reptile (Ramsar, 2005). Of these, only one species was reported as being of conservation importance, namely the European pond turtle (*Emys orbicularis*; IUCN NT; Albanian Red List LR/nt).

Loggerhead turtles (*Caretta caretta*; IUCN VU; Albanian Red List EN) are known to use marine habitats in Dirinit Bay (White, Boura and Venizelos, 2011) and in 2002, loggerhead turtles were reportedly recorded egg-laying at Ada island which is located in close proximity to the Buna River Protected Landscape in Montenegro (Schneider-Jacoby et al. 2006). It is however hypothesised that disturbance caused by vehicles and pedestrians, particularly during peak tourist season, are likely to deter turtles from nesting on the beach at the foot Mount Renci, near the proposed project footprint. Green turtles (*Chelonia mydas*; IUCN EN; Albanian Red List CR) are also known to use the marine habitats of Drini Bay for foraging and migration, but on a very sporadic basis (White, Boura and Venizelos, 2011).

The project area is also considered to offer potentially suitable habitat to support the following reptile species of conservation importance:

- Hermann's tortoise (*Testudo hermanni*) – IUCN NT; Albanian Red List LR/nt; Annex II of the Bern Convention; Annex II and IV of the EU Habitats Directive; Annex II of CITES; Annex A of EU Wildlife Trade Regulation 338/97
- Western Caspian turtle (*Mauremys rivulata*) – Not IUCN listed; Albanian Red List VU; Annex III of the Bern Convention
- European adder (*Vipera berus*) – IUCN LC; Albanian Red List LR/nt; Annex III of the Bern Convention
- Nose-horned viper (*Vipera ammodytes*) - IUCN LC; Albanian Red List LR/nt; Annex II of the Bern Convention; Annex IV of the EU Habitats Directive
- Smooth snake (*Cornella austriaca*) - IUCN LC; Albanian Red List LR/nt; Annex II of the Bern Convention; Annex IV of the EU Habitats Directive
- Four-lined snake (*Elaphe quatuorlineata*) - IUCN LC; Albanian Red List CR; Annex II of the Bern Convention; Annex II and IV of the EU Habitats Directive
- European ratsnake (*Zamenis situla* synonym *Elaphe situla*) - IUCN LC; Albanian Red List CR; Annex II of the Bern Convention; Annex II and IV of the EU Habitats Directive
- Aesculapian ratsnake (*Zamenis longissimus* synonym *Elaphe situla*) - IUCN LC; not listed on the Albanian Red List; Annex II of the Bern Convention; Annex IV of the EU Habitats Directive
- Balkan whip snake (*Hierophis gemonensis*, synonym *Coluber gemonensis*) - IUCN LC; Albanian Red List CR; Annex III of the Bern Convention
- Balkan green lizard (*Lacerta trilineata*) - IUCN LC; Albanian Red List LR/cd; Annex II of the Bern Convention; Annex IV of the EU Habitats Directive
- Kotchys gecko (*Mediodactylus kotschy*) - IUCN LC; not listed on the Albanian Red List; Annex IV of the EU Habitats Directive; Annex II of the Bern Convention

2.2.7 Amphibians

Lake Skadar and River Buna Ramsar site and the Buna River Protected Landscape provide habitat for 11 species of amphibian (Ramsar, 2005). Of these, only one species was reported as being of conservation importance, namely the European tree frog (*Hyla arborea*; IUCN LC; Albanian Red List LR/cd). The walkover survey identified that habitats present within the project footprint on Mount Renci are suboptimal to support amphibians throughout their entire lifecycle.

The project area is also considered to offer potentially suitable habitat to support the following amphibian species of conservation importance:

- Balkan water frog (*Pelophylax kurtmuelleri*) – IUCN LC; Albanian Red List VU. Listed on Appendix III of the Bern Convention
- Alpine salamander (*Salamandra atra*) – IUCN LC; Albanian Red List LR/nt. Listed on Appendix II of the Bern Convention and Annex IV of the EU Habitats Directive
- Yellow-bellied toad (*Bombina variegata*) – IUCN LC; Albanian Red List LR/cd. Listed on Appendix II of the Bern Convention and on Annexes II and IV of the EU Habitats Directive
- European green toad (*Bufo viridis*) – IUCN LC; Albanian Red List LR/nt. Listed on Appendix II of the Bern Convention and is listed on Annex IV of the EU Habitats Directive
- European tree frog (*Hyla arborea*) – IUCN LC; Albanian Red List LR/cd. Listed on Appendix II of the Bern Convention and Annex IV of the EU Habitats Directive
- Greek stream frog (*Rana graeca*) – IUCN LC; Albanian Red List low risk (LR/nt). Listed on Annex IV of the EU Habitats Directive and Appendix III of the Bern Convention
- Common frog (*Rana temporaria*) – IUCN LC; Albanian Red List low risk (LR/cd). Listed on Appendix III of the Bern Convention and on Annex V of the EU Habitats Directive

2.2.8 Fish

Lake Skadar and River Buna Ramsar site and the Buna River Protected Landscape is considered to support a high diversity of fish species, due to diversity of its aquatic habitat types (i.e. fresh, brackish and marine). The hydrological network of the Southwestern Balkan, Lake Skadar and Buna and Drin rivers (including Ohrid and Prespa lakes) provide foraging, spawning habitat and nursery ground for fish. Lake Skadar and freshwater wetlands are known to provide important spawning ground for Cyprinidae species. The Vilunit lagoon also provides spawning and nursery habitat for flathead mullet (*Mugil cephalus*; IUCN LC) and thinlip grey mullet (*Chelon ramada*; IUCN LC).

According to the Lake Skadar and River Buna Ramsar site information sheet (Ramsar 2005) the Buna River is a migration corridor for thirteen fish species who migrate from the sea to these lakes and rivers. Of these, six migratory fish species are globally or nationally rare and threatened:

- European sea sturgeon (*Acipenser sturio*) - IUCN CR; Albanian Red List EN and Bern Convention Appendix III
- Adriatic sturgeon (*Acipenser naccarii*) - IUCN CR; Albanian Red List EN and Bern Convention Appendix II

- Stellate sturgeon (*Acipenser stellatus*) - IUCN CR, not evaluated by the Albanian Red List and Bern Convention Appendix III
- Twait shad (*Alosa fallax*) - IUCN LC, Albanian Red List VU and Bern Convention Appendix III
- Brook lamprey (*Lampetra planeri*) - IUCN LC, not evaluated by the Albanian Red List and Bern Convention Appendix III
- River lamprey (*Lampetra fluviatilis*) - IUCN LC and Albanian Red List EN.

Additional fish species that are listed as being present within this Ramsar site that are of conservation importance are listed as follows:

- Marble trout (*Salmo marmoratus*) – IUCN LC; Albanian Red List EN
- *Salmothymus obtusirostris* - IUCN EN; Albanian Red List VU
- *Cyprinus carpio* - IUCN VU; not evaluated by the Albanian Red List
- Nase (*Chondrostoma nasus*) - IUCN LC; Albanian Red List low risk and Bern Convention Appendix III
- Skadar shad (*Alosa sp.nov. 'Skadar'*) – IUCN VU; Bern Convention Appendices II and V.

This Ramsar site is also known to support congregatory species of fish including the Albanian roach (*Pachychilon pictum*; IUCN LC; not evaluated by the Albanian Red List and Bern Convention Appendix III). This is a small cyprinid that inhabits rivers, lakes and wetlands that is currently threatened at the global scale by habitat destruction (i.e. the construction of dams) and water pollution (2018).

2.2.9 Invertebrates

According to the Lake Skadar and River Buna Ramsar site information sheet (Ramsar 2005) the great Capricorn beetle (*Cerambyx cerdo*) inhabits this area. This species is IUCN listed VU, Albanian Red Data Book listed EN and is listed on the Habitats Directive under Annex II & IV. Although the IUCN assessment in 1996 does not cite Albania as part of this species' geographical range, stakeholder consultation, undertaken in 2019 as part of the Habitat Regulations Assessment for the Project, identified that this beetle may be present in the *Quercus* forests located both within the Ramsar site and the wider area and is therefore assumed to be present in the PDA.

2.2.10 Existing Threats To Biodiversity

The current threats to habitat quality and species diversity were identified as occurring or potentially occurring within the project area. These threats are predominantly linked to human habitation and anthropogenic activities in the region. Existing threats to biodiversity in the project area are as follows:

Poaching: Since the 1990s hunting has become one of the major causes of wildlife decline in Albania (Ruppert 2018). To combat the issue, in 2014 the Albanian government approved a complete hunting ban for the whole of Albania. It came into force in March 2014 and was intended to remain effective for two years until March 2016 (law no. 7/2014 "proclaiming the moratorium of hunting in the republic of Albania"). However, because of ineffective management the ban was extended until 2021 (law no. 61/2016 "On the Promulgation of the Moratorium in the Republic of Albania"). Illegal hunting is still

occurring even in protected areas. Birdlife International published the report “The Killing” in 2016 which denounced the illegal killing of 25 million birds in the Mediterranean, with Albania being in the ten most problematic areas for the illegal killing of birds (BirdLife International 2015b). The hunting ban is unpopular with the public and there is limited enforcement, but it has reduced the number of foreigners coming to Albania on hunting holidays. Lake Shkoda and its associated wetlands are targeted for hunting of game and migratory birds. A study by an Albanian non-governmental organisation in January 2017 observed up to 50 gunshots heard and 66 used cartridges found during their survey of the Lake Skadar area (ASPBM 2017). Evidence of hunting (five used gun cartridges) was observed during the walkover field surveys within the project footprint on Mount Renci near Shëngjin (Figure 2-7).

Unsustainable fishing: Uncontrolled fishing is causing a decline in a number of marine fish species in the Bojana-Buna Protected landscape, with some considered to be extinct; all species of sturgeon are considered extinct in the region (Schneider-Jacoby et al, 2006). Local people are heavily dependent on fishing for livelihoods and there is additional external pressure from large international fishing boats. Evidence of illegal fishing within Lake Skadar was also observed by ASPBM in their 2017 survey (ASPBM 2017.)

Alien invasive species encroachment: Whilst alien invasive species were not observed in the study area during the field surveys, invasive species continue to pose a threat to biodiversity. In recognition of this, Albania has adopted an invasive alien species management plan.

Poor waste water and water management: Albania has 0.7 million hectares of arable land of which about 60% is irrigated (figures from 1990) and produces 80% of the agricultural value. More than half the irrigated area is located in the coastal plains (Ministry Environment, Forests and Water Administration 2011.) There are proposals for new dams and channelling of water from other catchments into the Bojana-Buna delta which would ultimately result in the lowering of Lake Skadar and the creation of additional agricultural land. This would cause the loss of fringing alluvial wetlands which are considered key fish spawning grounds (Schneider-Jacoby et al, 2006).

Poor waste management: Albania’s waste management infrastructure is limited, and much household waste is not appropriately disposed of (Lico et al 2015). Litter was observed within the study area around settlements (in particular near Shëngjin and on the beach) during the field surveys (Figure 2-8). 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 (UNEP 2018). 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.

Habitat loss and degradation: localised habitat clearance was observed within and in close proximity to the proposed project footprint, particularly within pine plantations near Shëngjin (Figure 2-9). The risk of uncontrolled habitat clearance for the development of agro-pastoral activities and housing poses a threat to natural habitats and wildlife in the project area. Furthermore, the conversion of natural habitats to agro-pastoral land, over grazing and vehicle damage were identified during the walkover survey as contributing

to erosion of the habitats (i.e. dune wetland and vegetation dunes) located at the base of the Mount Renci (Figure 2-11).

In 1997, the Albanian population reached 3.7 million, or triple its level of 50 years ago (Cat specialist group 1998). The population of Albania is still thought to be increasing. In combination with this trend, habitat clearance for the development of agro-pastoral activities, the development and expansion of settlements and industries and the establishment and upgrade of transport infrastructure is thought to be a driver for the loss and degradation of natural habitats in Albania. The advancement of intensive agricultural methods, as a result of the introduction of a free market economy has also led to a degradation of natural habitats and subsequent loss of biodiversity (Ministry of Environment 2011). Since the 1950s, the forest area has decreased from 45 per cent to 36 per cent of the land cover, resulting in the loss, degradation and fragmentation of habitat for biodiversity and problems with soil erosion (UN 2002). The lack of sustainable management of forest and conversion to agriculture has impacted biodiversity. Pasture area in Albania has reduced from 816,000 ha in 1950 to 445,000 ha in 1997 and can no longer maintain the national flock of about 3 million sheep and goats (UN 2002) This has caused the overgrazing of pastures and lack of regeneration of forests.

Tourism: The Adriatic coastline, beaches and seascapes of the Bojana -Buna delta are important for tourism which fuels regional development and long-term economic growth of the region, in which beaches and woodlands attract nearly 250,000 tourists a year, mostly between July and August (UN 2002). However, unchecked tourism poses a risk to habitat quality and species diversity in the region. Disturbance arising from increased noise and human activity has the potential to cause disturbance and displacement of wildlife. Unauthorised vehicle use on the beaches (Figure 2-10), secondary dune systems and dune wetland and high levels of trampling pose a risk to the quality of these sensitive habitats and driving at night in these habitats increases the risk of accidental vehicle-wildlife collisions.



Figure 2-7: Used gun cartridge



Figure 2-8: Household waste



Figure 2-9: Habitat clearance



Figure 2-10: Vehicle tracks on the beach



Figure 2-11: Erosion

3 TARGETS AND ACTIONS FOR BIODIVERSITY MANAGEMENT TO BE FOLLOWED BY PROJECT CONTRACTORS AND ADF

3.1 Overview of Project-related Impacts to Priority Habitats and Species and Other Biodiversity

The development of the Project will result in impacts of varying degrees of significance to terrestrial and aquatic habitats and species during construction and operation phases, with some ongoing residual impacts. A full assessment of direct and indirect Project-related impacts are presented in the following documents:

- The Environmental Impact Assessment: Design of Road Shëngjin – Velipojë Project Ideas (August 2019), entails an assessment of the potential Project related impacts on some physical, natural resources and social aspects.
- The Biodiversity Impact Assessment (RSK, 2019b) which supplements the Project's EIA and characterises Project-related impacts to biodiversity features in the Project area.
- The Habitat Regulations Assessment (RSK, 2019a) assesses Project related impacts on the candidate Emerald site's conservation objectives to ensure that the integrity of the site is not adversely affected. This assessment entailed stakeholder consultation.

A summary of the assessment on Project-related impacts to biodiversity receptors is presented in Appendix 2. Measures will be implemented by the Project to avoid and minimise impacts to biodiversity to the extent practicable. Progressive restoration and rehabilitation measures will also be employed where possible. Diligent application of best practices for managing potential impacts to biodiversity is expected to significantly decrease the potential for residual impacts. The BIA also identified that the project development and operation is not expected to result in direct significant residual impacts to key critical habitat-qualifying features namely the coastal lagoon, slender-billed curlew, Atlantic sturgeon, Adriatic sturgeon, starry sturgeon, European eel, *Quercus robur* spp *scutariensis* and Buna River, connecting waterbodies and wetland habitats of the Lake Shkoda and River Buna Ramsar complex. Project development will however result in the permanent loss of approximately 13.7 ha habitat from within the Project footprint including the permanent loss of 11.4 ha habitat from within the Buna River Protected Landscape (a critical habitat-qualifying feature).

A key priority for the Project is the continued conservation and safeguard of the Buna River Protected Landscape and Lake Shkoda and River Buna Ramsar site in which the proposed alignment traverses. Therefore avoidance, minimisation and restoration measures will have a focus on the biodiversity values of the Buna River Protected Landscape and Ramsar site. Mitigation measures designed for reducing direct and indirect impacts to biodiversity values of the Buna River Protected Landscape and

Ramsar site will also benefit other habitats and species located outside of these protected areas.

The implementation of specific avoidance and mitigation measures will also focus on key PBFs for the Project namely golden jackals, Eurasian badgers, bats (in particular the lesser horseshoe bat and the greater horseshoe bat), the great Capricorn beetle, key species of breeding birds (see Section 2.2.5) and endemic, nationally rare and threatened plant species (i.e. *Punica granatum*, *Colchicum autumnale*, *Galatella albanica woodlands*, *Origanum vulgare*, *Hypericum perforatum*, *Quercus ilex*, *Arbutus unedo*, *Erica arborea*, *Juniperus oxycedrus ssp. Macrocarpa*, *Ostrya carpinifolia*, *Quercus pubescens*, *Salvia officinalis* and *Satureja montana*). Mitigation measures designed for reducing direct and indirect impacts to these PBFs and their habitats will also benefit other fauna considered in the ESMP and BAP, hence specific mitigation measures are not required for other priority species.

An Environmental and Social Management Plan has been developed by ADF for the Project. This provides detailed plans and procedures for the protection and management of environmental and social receptors, including biodiversity. An Environmental and Social Action Plan has also been prepared for the Project. These plans will be implemented by the ADF and the Project contractors. A summary of the key avoidance, mitigation and habitat restoration / rehabilitation measures that will be implemented by the Project is presented below.

3.2 Avoidance Measures

A number of measures have been developed to avoid impacts, as much as feasible, on priority species and habitats, as described below.

3.2.1 Target A: Avoid the loss and degradation of habitats of high conservation importance

- The proposed road alignment has been rerouted, based on advice from The National Agency of Protected Areas, to avoid the core zone (1A) of the Buna River Protected Landscape to avoid impacting key habitats and wildlife.
- 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.

3.2.2 Target B: Avoid Project-related disturbance to fauna

Action B1: Avoid disturbance to priority nocturnal fauna from project-related noise and vibration impacts

- Project construction will not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (i.e. bats) from increased noise and vibration.
- Pre-clearance checks will be undertaken of trees to support roosting bats by an experienced bat ecologist prior to the commencement of works to avoid causing disturbance or injury to roosting bats. The surveyor will initially walk the alignment and mark trees with features that may potentially support roosting bats (i.e. holes and crevices). The surveyor will then inspect each potentially suitable tree using a camera /

endoscope. The detected bats will be translocated to a receptor roost by an experienced bat ecologist following a method statement prepared by the ecologist.

Action B2: Avoid disturbance to priority fauna from artificial lighting

- Night working and the use of artificial lighting along the proposed alignment will not be permitted to avoid adverse impacts to priority nocturnal and crepuscular fauna.
- Project vehicles will not be used at night within the project area to avoid adverse impacts to priority nocturnal and crepuscular fauna

Action B3: Avoid accidental machinery and vehicle collisions with wildlife

- Vehicle operation will be restricted to daylight hours to minimise the risk of vehicle collisions with nocturnal and crepuscular wildlife (i.e. Eurasian badgers).
- The PDA is known to provide important habitat for breeding and nesting birds (refer to Section 2.2.5). Hence 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 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 ADF.
- The PDA is known to provide habitat for foraging and commuting Eurasian badgers however the presence of any setts within the PDA is uncertain (see Section 2.2.4.1). Hence, 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.
- Oak woodland located within the project footprint on Mount Renci is of potential importance for foraging and roosting bat species known to be present within the region (see Section 2.2.4.5). The locations of these wooded areas are presented in the Habitat Map (Appendix 1). A bat ecologist will therefore undertake pre-clearance checks of key potentially suitable trees within these wooded areas for roosting bats prior to the commencement of works to avoid causing injury or mortality to roosting bats.

3.2.3 Target C: Avoid adversely impacting fauna, flora and protected areas through spills of hazardous materials

- Avoid spills of hydrocarbon, oil, asphalt, chemicals and other hazardous materials (e.g. paint, solvents etc.) through adherence to SOP04: Water Quality and Pollution Management (Appendix 3).

3.2.4 Target D: Avoid introduction of invasive species and pests

- 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;

- Non-invasive local plant species will only be used for revegetation, as per SOP1: Habitat/ Land Clearance, Stockpiling and Alien Invasive Species Control (Appendix 3); and
- Best practice organic waste management procedures will be followed to avoid attracting pests.

3.3 Mitigation and Minimisation Measures

Biodiversity management controls have been developed to mitigate high-risk potential impacts during the pre-construction / construction and operation phases, as identified in the EIA (ADF, 2018) and Biodiversity Impact Assessment (RSK, 2019b), to priority biodiversity species and habitats. A summary of the proposed mitigation measures outlined in the ESIA are presented in Table 3.1. Implementation of these best-practice mitigation measures will reduce as much as feasible the residual impacts on priority biodiversity features. The following section details the principal targets and actions that will be required to ensure no long-term impact on priority biodiversity features.

3.3.1 Target F: Minimise habitat loss and degradation

Action F1: Ensure a minimal impact footprint during vegetation clearance to the extent practicable:

Staff and Project contractors will adhere to a standard operating procedure for land clearance and stockpiling (i.e. soil, gravel, hardcore etc). This will include the provision of the method statement for habitat clearance which will be prepared by an experienced ecologist. This will be communicated to all relevant personnel (i.e. staff and contractors) during the inductions. Key mitigation measures to be included in this statement are listed as follows:

- 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 this Biodiversity Management Plan. This will minimise the risk of habitat clearance outside of these areas.
- Environmentally sensitive areas will be clearly marked and mapped as 'No Go Areas' (i.e. wooded areas, wetlands, the beach and dune system at the foot of Mount Renci) and access by staff and contractors will be strictly forbidden.
- The footprint of the road alignment and RoW 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.

- Slow moving fauna will be translocated by the contractors to a designated receptor site during the clearance works.
- Herbicide and fire will not be permitted as a means 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

Action L7 Minimising the indirect impacts to habitats and vascular plant species associated with Project-related facilitated access and tourist in-migration

- A Sustainability / Eco-tourism Programme will be implemented by the project to minimise indirect project-related impacts to habitats and vascular plants (and other priority biodiversity features) arising from facilitated access and project-related in-migration (predominantly tourists). The objective of the assignment is to establish a programme of activities and co-ordinated stakeholder consultation to support sustainable ecotourism in the Shëngjin and Velipojë region of Albania by undertaking strategic and local actions. It is anticipated that the programme will support increased environmental awareness, sustainable and safe communities within the Shëngjin and Velipojë region, 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.

3.3.2 Target G: Minimise the risk of causing mortality or injury to endemic, rare and threatened vascular plant species during the habitat clearance works

Action G1: Translocate endemic, rare and threatened plants from within the working width, stockpile areas and facility sites

Nationally endemic, rare and threatened plant species are located within the project footprint and most likely occur throughout the PDA (including working width and potentially within stockpiling sites, office locations etc (refer to Section 2.2.3)). Hence, the contractors will 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. The locations of these species are illustrated in

- Figure 2.3 and described in Table 2.4. A method statement for the translocation scheme will be prepared by an experienced botanist prior to the commencement of works. The botanist will also supervise the translocation works.

3.3.3 Target H: Minimise habitat loss of the great Capricorn beetle

Action H1: Translocate the great Capricorn beetle deadwood habitat from within *Quercus* sp forests located in the working width of the road scheme

- Taking a precautionary approach, it is assumed that deadwood within *Quercus* sp forest located within the project area provides habitat for the great Capricorn beetle (see Section 2.2.9 for further details). Hence, the contractors will translocate dead wood from within *Quercus* sp dominated woodland located in the working width to a suitable receptor site to minimise the habitat loss for the great Capricorn beetle. The locations of these forest sites are illustrated by the habitat map (Appendix 1) and are summarised in
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- **Figure 3-1.** 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.

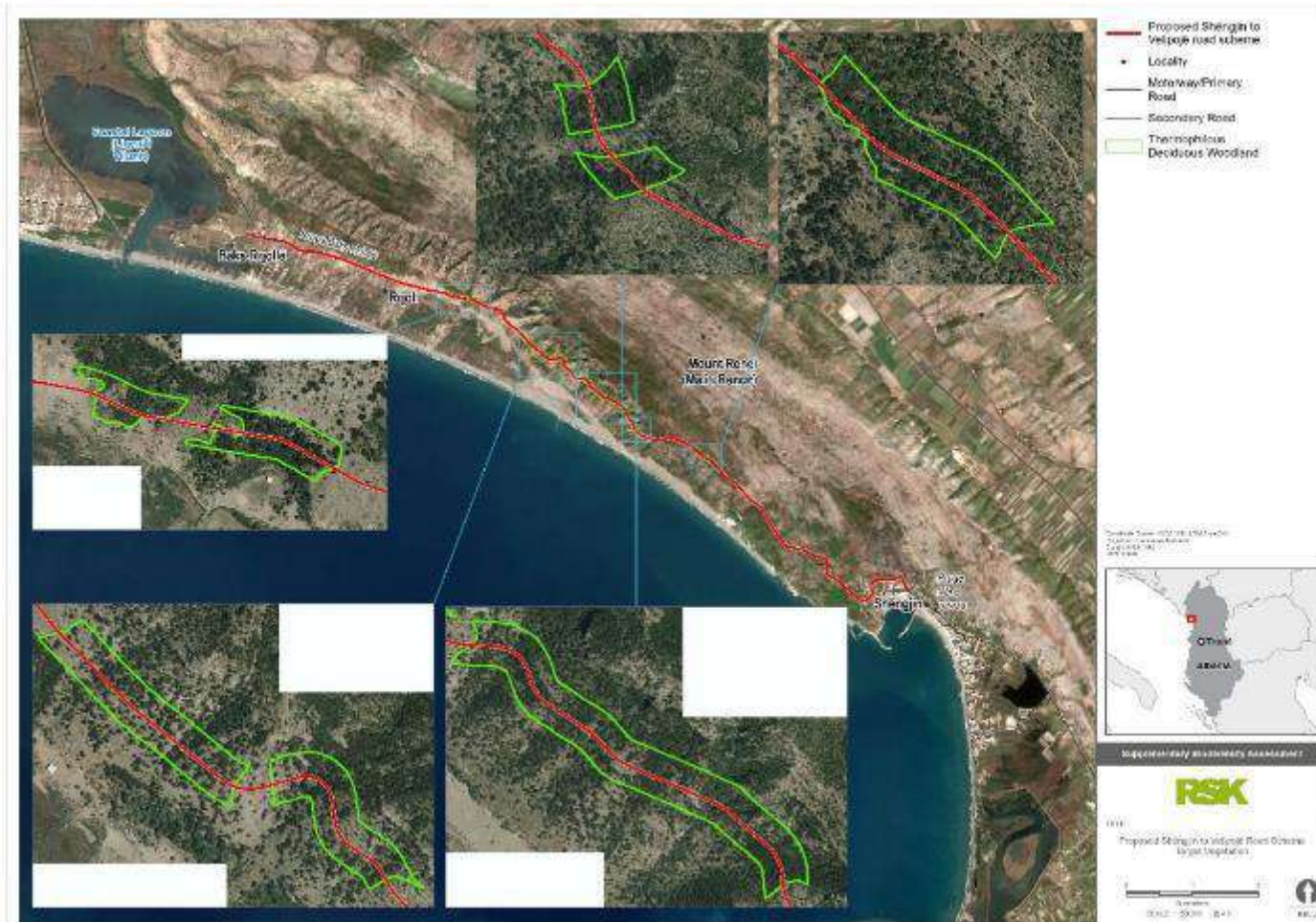


Figure 3-1: Location of dead wood translocation areas (*Quercus sp* dominated woodland)

3.3.4 Target I: Minimise a loss in the local habitat range of golden jackals and other fauna during Operation

Action I1: Establish a wildlife crossing point for golden jackals

The project area provides important habitat for golden jackals and other wildlife. The Jackal groups are thought to have a stronger preference for lowland areas, agricultural fields and wetland ecosystems, rather than the dry rocky areas in the uplands of Mount Renci. However, golden jackals are thought to use the upland areas of Mount Renci to commute back and forth from one lowland area to another, whilst denning / residing in the lowland habitats. The evidence of cubs in the vocalisation recall survey further supports this assumption.

To minimise the loss in the ranges of golden jackals and other fauna during Operation, the contractors will establish a wildlife crossing point. The location of the wildlife crossing point is illustrated in Figure 3-2. This will facilitate the movement of golden jackals and other medium sized mammals 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 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 golden jackals.



Figure 3-2: Wildlife crossing point location

3.3.5 Target J: Minimise the risk of mortality and injury to Eurasian badgers and the destruction of active badger setts during habitat clearance and construction

Action J2: prepare and follow a method statement for badger sett closure and artificial set construction

- 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 replacement sett in a suitable location. These method statements will be followed by the contractors.

3.3.6 Target K: Minimise the risk of mortality and harm to roosting bats and the destruction of their roost during habitat clearance and construction

Action K1: Translocate roosting bats from within the project footprint to a purpose-built bat roost

- The project area provides important habitat for roosting, foraging and commuting bat species that are nationally rare and threatened. A bat roosting site, an abandoned house, is located within the PDA (see Section 2.2.4.5). Hence, this bat roost will be 'soft stripped' by the contractors under supervision of a bat ecologist prior to the commencement of works at a suitable time of year. The bats will then be translocated to a purpose-built bat roost that has been designed by a bat ecologist and constructed by the contractors. The scope of this roost as yet to be determined but could include the provision of bat boxes.

Action K2: Undertake pre-clearance checks of key potentially suitable trees within these wooded areas for roosting bats prior to the commencement of works and translocate any roosting bats identified

- In the event that the presence of a roosting bats are identified roosting in trees, a bat ecologist will translocate (or exclude) these bats from their tree roosts, to bat boxes prior to the commencement of works at a suitable time (i.e. spring and autumn) of year in accordance with a method statement prepared by the bat ecologist. These bat boxes will be located within suitable receptor sites.

3.3.7 Target L: Minimise disturbance to fauna

Action L1: Minimisation of disturbance from noise and vibration

- Staff and contractors will adhere to SOP03: Noise and Vibration Management (Appendix 3) throughout the pre-construction and construction phases. This includes the use of silencers and sound barriers (natural and artificial), particularly within and near the Buna River Protected Landscape, and regular vehicle / machinery maintenance to minimise noise and vibration.

Action L2: Minimisation of vehicle and machinery collisions with fauna

- Habitat 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. Slow moving fauna will be translocated to designated receptor sites (as identified by an ecologist) during the clearance works.
- Where possible, habitat clearance will be undertaken outside of the breeding bird season. Where this is not possible, pre-clearance checks will be undertaken to identify active nesting sites. These will be retained until the young have fledged.
- Reduced speed limits of Project vehicles will be enforced by the contractors and ADF in the construction site and all staff will adhere to the highway code to minimise the risk of accidental fauna collisions. This will be communicated to all relevant personnel during staff and contractor inductions.
- Driver training will be provided by the contractors for key staff members
- Access to Project roads (where appropriate) will be restricted to authorised people only.
- An Injured Wildlife Protocol will be developed for the Project by an experienced ecologist which will be followed by staff and contractors in the event of an incident during construction. 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 should include encounters of wildlife and observation of natural resource collection, illegal hunting and wildlife trade. The protocol will also include procedures for the safe management of injured and dead wildlife.
- Reduced speed limits will be signposted during operation to minimise the risk of accidental injury and mortality to fauna during operation.

Action L3: Lower disturbance to fauna from artificial lighting

- Artificial lighting will be used at the site offices and storage areas (i.e. for tools, machinery and material) on site. Artificial lighting will also be used to light sections of the road during operation. Impacts to fauna caused by disturbance from artificial lighting will be minimised through the use of capped and directional lighting from ecologically sensitive habitats (i.e. the coastal habitats and wetlands of the Buna River Protected Landscape) and the use of office blinds / curtains.

Action L4: Minimise dust and suspended sediments

- Staff and contractors will adhere to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control (Appendix 3) .

- This includes 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 should be taken from suitable recycled water sources where possible.
- Geotextiles will be used to cover exposed areas of rockface and soil prior to the establishment of vegetation in areas of biodiversity sensitivity.
- Sediment control dams and traps will be installed in suitable locations, particularly along higher elevations above ecologically sensitive areas (i.e. the Buna River Protected Landscape) to further minimise the risk of sediment loading impacts.

Action L5: Minimise impacts to habitats and species from adverse emissions

- Staff and contractors will adhere to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control (Appendix 3).
- This includes the use and maintenance of fuel-efficient vehicles, machinery and equipment that comply with industry standards and the use of catalytic converters / low emission engines.

Action L6: Minimise impacts to habitats and species from natural resource exploitation

- Project staff and contractors will be banned from hunting and collecting natural resources within the project area and River Buna Protected Landscape to minimise impacts to fauna and their habitats. This will be communicated to staff and contractors through staff inductions.

Action L7 Minimising the indirect impacts to fauna species and their habitats associated with Project-related facilitated access and tourist in-migration

- A Sustainability / Eco-tourism Programme will be implemented by the project to minimise indirect project-related impacts to habitats and vascular plants (and other priority biodiversity features) arising from facilitated access and project-related in-migration (predominantly tourists). The objective of the assignment is to establish a programme of activities and co-ordinated stakeholder consultation to support sustainable ecotourism in the Shëngjin and Velipojë region of Albania by undertaking strategic and local actions. It is anticipated that the programme will support increased environmental awareness, sustainable and safe communities within the Shëngjin and Velipojë region, 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.

Action L7: Minimise the impact of an accidental spill of hazardous materials on priority habitats and species

- 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.
- Staff and contractors will adhere to the Injured Wildlife Protocol.

3.4 Rehabilitation / Restoration Measures

3.4.1 Target M: Successfully rehabilitate and restore habitats within the project area

Action M1: Develop and implementation of a Reinstatement and Landscaping Plan

A Reinstatement and Landscaping Plan will be prepared for the Project by ADF in consultation with experienced ecologists (including a botanist and a mammal specialist) and approved by the National Agency for Protected Areas or the Regional Agency of Protected Areas (Shkoder and Lezhe). 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 working width. Rehabilitation and restoration works will aim to re-establish ecosystem function in a 'like for like' (or better) than that which existed prior to Project construction where feasible. Habitats temporarily cleared or degraded from within cleared areas (i.e. the working width, borrow pits and stockpiling areas, worker facilities etc) will be restored in accordance with recommendations made by the National Agency of Protected Areas.

Action M2: Restore the physical landscapes that have been adversely impacted by Project activities

- All rubbish and waste materials within the project area (including the project footprint, the working width, borrow pits, stockpiling areas and contractor facility area) will be cleared of all rubbish and waste material in accordance with the project's waste management principles.
- The physical landscape of the project area (i.e. escarpments and embankments) will be restored by clearing the area of debris, filling holes with recycled material from the road works.
- The geocells (the upper layer of the geotextile) will be filled with suitable substrate for the establishment of vascular plant species (i.e. grasses and herbs).

Action M3: Establish and implement a planting scheme for the Project

- A planting scheme will be developed for the Project by ADF in consultation with an experienced ecologist and implemented by the contractor.
- This will include planting 219 trees and 35 bushes along the sidewalks of the proposed road (Figure 3.3). Trees will be planted in urban areas at the beginning and end of the road alignment and around the viewing platform. Planting will take place during the period December to January, during this time holes measuring 1.5 m x 1.5 m x 1.2 m will be dug in the designated areas, filled with organic enriched soil. The trees and bushes will be placed in the centre of each hole, then filled with enriched soil, compacted and watered continuously to promote successful establishment. The species of trees have not been selected however, it is recommended that native tree species of local provenance are used. Suggested species include, but are not limited to, *Quercus ithaburensis*, Greek

each tree and bush will be placed in linen bags and sealed closed to retain the soil. Holes will be dug in the receptor sites measuring 2 m x 2 m x 2 m for trees and 1.2 m x 1.2 m x 1.2 m for bushes. These holes will be lined with enriched organic soil. Specialist machinery will be used to move the trees and place them in the holes. Following translocation, the area around the roots will be filled with enriched soil, compacted and then watered. All translocated trees and shrubs will be tightly secured using cables and pegs attached to wooden stakes to prevent movement during strong winds, until the root system are fully established. The translocated trees and shrubs will be pruned under the supervision of a suitably qualified specialist and regularly watered until they are fully established.

Note: Rare and threatened vascular plants located within the PDA will also be translocated to suitable receptor sites within the wider project area prior to the commencement of the construction phase (see Section 3.3.2).

Action M5: Undertake regular watering and monitoring to minimise the risk of poor species establishment following planting and translocation

- All planted and translocated vascular plants (i.e. trees, bushes, grasses, herbs, including rare and threated species) will be regularly watered by the contractors to promote establishment for the first 5 years following planting / translocation, or until successful establishment has been achieved. Water will be transported to the site via water tanks and will not be extracted from local water sources.
- ADF will monitor the establishment of all planted and translocated vascular plants on a regular basis for the first 2 years following the completion of the construction works. Any dead vascular plants will be replaced as 'like for like' during this timeframe.
- Following this period, the municipalities (namely Lezhe and Shkoder) will take over the responsibility for the watering and monitoring works, as specified in the maintenance agreement. ADF will retain a quality assurance role over the first 3 years of handover to ensure that these tasks are completed. Any dead vascular plants will also be replaced as 'like for like' during this timeframe.

Any residual impacts remaining after these rehabilitation / restoration measures have been fully implemented will require offsetting in order to achieve net gain for critical habitat or no net loss for natural habitat, in order to meet the requirements of EBRD PR6.

3.5 Biodiversity Offsetting

3.5.1 Target N: Offset residual impacts to ensure no net loss / net gain for biodiversity

Action N1: Prepare and Biodiversity Offset Strategy and Implement a Biodiversity Offsets Programme for the Project

Project development will result in the permanent loss of approximately 13.7 ha of habitat from within the Project footprint including the permanent loss of 11.4 ha habitat (including oak woodland, bare screes and coastal dune and sandy shore) from within the Buna River Protected Landscape (a critical habitat-qualifying feature). The Project will therefore develop a Biodiversity Offset Strategy and implement a Biodiversity Offset Programme that will adequately offsets these residual impacts.

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.

The project will apply the following principles based on those developed by the multi-stakeholder Business and Biodiversity Offsets Programme, Standard on Biodiversity Offsets (BBOP, 2012):

- adherence to the mitigation hierarchy: All appropriate avoidance, minimisation and on-site restoration measures will be implemented or explored and reasonably ruled out
- equivalence: Biodiversity gains from offsets must be 'like for like or better'
- limits to what can be offset: The Project will not cause or significantly contribute to species extinction as these impacts cannot be offset
- landscape context: Offsets will be designed accounting for connectivity across the landscape, avoiding fragmentation, and maintaining flows of ecosystem services
- additionality: Conservation gains will be clearly attributable to the Project's actions and will be demonstrably above and beyond results that would have occurred if the offset had not taken place
- precautionary approach: Estimates of gains and losses will be conservative and include a margin of safety proportional to the risks involved in offset delivery
- long-term outcomes: Biodiversity offsets will use an adaptive management approach, incorporating monitoring and evaluation to secure outcomes
- stakeholder participation: Offsets will be based upon appropriate and transparent stakeholder consultation
- transparency: The design, implementation and monitored outcomes of biodiversity offsets will be transparent and communicated in the public domain.

The Project recognises the four major technical principles of offset design to be Equivalence, Additionality, Limits and Long-term outcomes. The Project takes the thorough application of the mitigation hierarchy to be intrinsic to its environmental good practice principles.

Table 3.1: Summary of the proposed avoidance, minimisation and restoration / rehabilitation measure

Project-related Impacts	Avoidance Measures	Minimisation Measures	Rehabilitation / Restoration Measures
Pre-Construction and Construction Phase			
Habitat loss	<ul style="list-style-type: none"> • Avoid habitat clearance in zone 1a of the Buna River Protected Landscape • Avoid the use of herbicides to clear vegetation • Bushfire controls including a Project ban on open-burning of waste 	<ul style="list-style-type: none"> • Demarcation and mapping of habitat / land cleared areas. These mapped areas will be incorporated into this BMP. • Environmentally sensitive areas will be clearly marked and mapped as 'No Go Areas' and access by staff and contractors will be strictly forbidden. • Minimisation of the footprint of the road alignment and RoW to the extent practicable. • Establishment of a land disturbance permit system by the Environmental Team • Habitats clearance will be undertaken in a progressive and sensitive manner. • Translocation of slow-moving fauna. • Herbicide and fire usage will not be permitted as a means to clear vegetation. • An ecologist will be on hand to supervise the habitat clearance works and provide advice to the workforce. • Routine checks will be undertaken by the Environmental Team to ensure compliance. • Specific emergency response procedures developed for managing bushfires • Badger sett closure and the construction of a substitute artificial replacement sett • Establish a wildlife crossing point for golden jackals • Translocate roosting bats from within the project footprint to a purpose-built bat roost • Translocation (or exclude) bats from their tree roosts and the provision of a compensatory roost (i.e. bat boxes) • Translocation of dead wood habitat for the great Capricorn beetle 	<ul style="list-style-type: none"> • Preparation and implementation of a Reinstatement and Landscaping Plan • Progressive habitat restoration along the margins of the right of way.



Project-related Impacts	Avoidance Measures	Minimisation Measures	Rehabilitation / Restoration Measures
Noise and vibration	<ul style="list-style-type: none"> Avoidance of night working to avoid impacts to priority nocturnal, crepuscular fauna 	<ul style="list-style-type: none"> Staff and contractors will adhere to SOP03: Noise and Vibration Management. This includes the use of silencers and sound barriers (natural and artificial) particularly near the Buna River Protected Landscape and regular vehicle / machinery maintenance to minimise noise and vibration. 	
Invasive species transfer and pest immigration	<ul style="list-style-type: none"> The development and implementation of best practice organic waste management procedures to avoid attracting pests The development and implementation of an invasive species prevention protocol will be implemented to prevent the introduction and transfer of invasive species. This will include the avoidance of affected areas by staff and vehicles where possible. A record will be kept of all affected areas near the Project area. To be communicated through induction and training to drivers and other relevant personnel (employees and contractors). 		
Wildlife-vehicle / machinery collision	<ul style="list-style-type: none"> Vehicle and machinery operation to be restricted to daylight hours to avoid collisions with priority nocturnal, crepuscular fauna Pre-clearance checks for nesting birds, roosting bats and badger setts 	<ul style="list-style-type: none"> Progressive and sensitive habitat clearance Translocation of slow-moving fauna. Habitat clearance to be undertaken outside of the breeding bird season where possible Pre-clearance checks and safeguard of active nesting sites. Enforcement of restricted speed limits Adhere to the highway code Driver training and signage Restricted access to Project roads (where appropriate) to authorised people only 	



Project-related Impacts	Avoidance Measures	Minimisation Measures	Rehabilitation / Restoration Measures
		<ul style="list-style-type: none"> • Signposting of reduced speed limits • The development and adherence of an Injured Wildlife Protocol • Translocation of dead wood habitat for the great Capricorn beetle • Establish a wildlife crossing point for golden jackals • Badger sett closure and the construction of a substitute artificial replacement sett • Translocate roosting bats from within the project footprint to a purpose-built bat roost 	
Spills: hydrocarbon, other hazardous materials (i.e. paint, solvents etc.)	<ul style="list-style-type: none"> • Avoid spills of hydrocarbon, oil, asphalt, chemicals and other hazardous materials (e.g. paint, solvents etc.) through adherence to SOP04: Water Quality and Pollution Management 	<ul style="list-style-type: none"> • 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. • Staff and contractors will adhere to Adherence to the Injured Wildlife Protocol. 	<ul style="list-style-type: none"> • Preparation and implementation of a Reinstatement and Landscaping Plan
Artificial lighting	<ul style="list-style-type: none"> • Avoid using artificial lighting where possible, particularly in the Buna River Protected Landscape • Project vehicles will not be used at night within the Project area 	<ul style="list-style-type: none"> • Use of capped / directional artificial lighting to focus lighting away from sensitive areas, particularly in the Buna River Protected Landscape • The use of curtains and blinds in onsite Project office and buildings 	
Dust		<ul style="list-style-type: none"> • Staff and contractors will adhere to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control. • Regular watering during the dry season in areas of biodiversity sensitivity. • Use of geotextiles to cover exposed topsoil prior to the establishment of vegetation in areas of biodiversity sensitivity. 	<ul style="list-style-type: none"> • Preparation and implementation of a Reinstatement and Landscaping Plan • Progressive habitat restoration along the margins of the right of way.
Loss of nationally endemic, rare		<ul style="list-style-type: none"> • Translocation of nationally endemic, rare and threatened plant species 	



Project-related Impacts	Avoidance Measures	Minimisation Measures	Rehabilitation / Restoration Measures
and threatened plant species			
Suspended sediments		<ul style="list-style-type: none"> Staff and contractors will adhere to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control Install sediment control systems (i.e. traps and dams) where necessary 	Preparation and implementation of a Reinstatement and Landscaping Plan
Emissions (NOx, SOx, CO) from vehicle and machinery use		<ul style="list-style-type: none"> Staff and contractors will adhere to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control. This includes the use of fuel-efficient vehicles, machinery and equipment that comply with industry standards Regular maintenance of vehicles / machinery Use of catalytic converters / low emission engines 	
Exploitation of natural resources and illegal hunting		<ul style="list-style-type: none"> Prohibit hunting and natural resource collecting by the Project personnel and contractors when at work. To be communicated through induction and training to all personnel (employees and contractors). The Project will work with key organisations to minimise and monitor impacts of in-migration on natural resource exploitation (including the collection of timber, non-timber products and hunting). 	
Operation Phase			
Noise and vibration from traffic vehicles and human disturbance		<ul style="list-style-type: none"> Use of natural and artificial sound barriers near biodiversity sensitive habitats. Speed restrictions within the Buna River Protected Landscape. 	
Invasive species transfer and pest in-migration		<ul style="list-style-type: none"> Actively monitor and eradicate invasive vascular plant species along the right of way 	



Project-related Impacts	Avoidance Measures	Minimisation Measures	Rehabilitation / Restoration Measures
Accidental vehicle traffic collisions with fauna		<ul style="list-style-type: none"> Enforcement of restricted speed limits, particularly in the Buna River Protected Landscape, communicated through signage Rumble strips or speedbumps will also be installed near biodiversity sensitive areas (e.g. on the approach to Rrjollë to slow vehicle traffic near sensitive fauna habitats in the Buna River Protected Landscape). 	
Artificial lighting		<ul style="list-style-type: none"> Use of capped / directional lighting to focus lighting away from sensitive habitats. Retain natural barriers to minimise light spill artificial light, particularly near the Buna River Protected Landscape (i.e. woodland canopy, earth bund etc.). 	
Emissions (NOx, SOx, CO) from vehicle and machinery use		<ul style="list-style-type: none"> Continued air quality monitoring to inform adaptive management 	
Dust		<ul style="list-style-type: none"> Continued air quality monitoring to inform adaptive management 	
Suspended sediments		<ul style="list-style-type: none"> Use and maintenance of an effective draining system to minimise the risk of suspended sediment loading and runoff. 	
Habitat Loss		<ul style="list-style-type: none"> Specific emergency response procedures developed for managing bushfires 	
Exploitation of natural resources and illegal hunting from Project-related in-migration		<ul style="list-style-type: none"> Collaboration with protected area managers to ensure indirect impacts to the Buna River Protected Landscape are adequately mitigated; Consultation with local authorities to minimise the impacts of in-migration on natural resource exploitation (including the collection of timber, non-timber products and hunting). Prohibit hunting and natural resource collecting by the road maintenance personnel and contractors when at work. To be communicated through induction and training to all personnel (employees and contractors). 	

4 MONITORING, EVALUATION AND ADAPTIVE MANAGEMENT

4.1 Introduction

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 revised biodiversity management measures are required. The draft monitoring measures are summarised in Table 4.1 and the monitoring approach is outlined below.

4.1.1 Remote Sensing

A camera trapping monitoring programme will be developed for the Project and implemented by an experienced ecologist during the construction phase. The programme will entail the establishment of key monitoring sites (i.e. including the wildlife crossing point) and a schedule for the rotation of camera traps at optimum survey periods for fauna species of high biodiversity value. The data will be analysed and entered into a database. Camera trapping will primarily be used to monitor the efficacy of the Project's mitigation measures, identify any changes in priority fauna species habitat and resource use and the requirement for adaptive management. However, the camera trapping programme would also capture information on other wildlife including important prey species for carnivores and omnivores and wildlife diversity. The camera trapping will further the existing knowledge regarding priority species' (and other fauna's) ecology, population dynamics and numbers of individuals. This programme may potentially be run in collaboration with protected area managers, NGOs (i.e. Protection and Preservation of Natural Environment in Albania) and ADF's Environment Team.

Indicators:

- Changes in habitat use by priority fauna species
- Changes in frequency of habitat use by priority fauna

4.1.2 Avifauna Monitoring

Given the importance of the Protected Landscape to support bird species of high biodiversity value, an avifauna monitoring programme will be established for the Project by an experienced ecologist to monitor the effectiveness of the mitigation measures, to assess for any significant changes in priority bird species numbers and habitat usage within the project area and adjacent sensitive habitats and identify the requirement for adaptive management. Key monitoring periods are during the breeding / nesting bird

season (i.e. end May – early June) and during the migratory bird season (March – April / early May). This programme may be run in collaboration with protected area managers, NGOs (i.e. Albanian Ornithological Society) and ADF's Environment Team.

Indicators

- 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

4.1.3 Vehicle / Machinery Collision Reporting

The increase in vehicle traffic and machinery usage increases the risk of accidental injury and mortality to fauna, including priority species, caused by collisions with moving vehicles and machinery. The likelihood may be greater during the initial stages of construction when fauna are dispersing from construction sites into the surrounding environs in order to avoid habitat loss and sources of disturbance (i.e. noise, vibration and light). A mandatory wildlife incident reporting system will be established to record and monitor any accidental vehicle and machinery collisions with fauna and sightings associated with the Project during construction. The incident reporting system will be followed by the contractors and managed by a supervising engineer with support from an experienced ecologist when required. The following information will be recorded by the contractors:

- Species details, any distinguishing features
- Location (e.g. GPS data)
- Time and date
- Weather conditions
- Photographs, if possible
- Any measures or actions undertaken, if applicable
- Relevant government authorities will be notified as necessary.

Indicators:

- Reports of dead fauna
- Reports of a collision with wild fauna.

4.1.4 Anecdotal Observations

A reporting system will be established to monitor anecdotal observations of priority wildlife sightings and field signs recorded by staff, contractors and local residents during construction. The reporting system will be followed by the contractors and managed by a supervising engineer with support from an experienced ecologist when required. This information will be used to assess the requirement for adaptive management.

4.1.5 Monitoring Habitat Restoration and Landscaping

The status of the translocated vascular plants (i.e. trees, shrubs and endemic, rare and threatened species) and the planting scheme (i.e. plug planting and seeding), as specified in the Reinstatement and Landscaping Plan, will be closely monitored for the first 5 years following translocation / 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 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

4.1.6 Monitoring the Efficacy of the Wildlife Crossing Point

Golden jackal monitoring will also be undertaken by experienced ecologists during the first 2 years of operation to assess the effectiveness of the wildlife crossing point and to identify the requirement for any modifications. A combination of techniques will be used including an annual vocalisation re-call survey and a camera trapping monitoring programme by an experienced ecologist. These surveys will also capture information about other wildlife utilising habitats in the project area. The findings and any recommendations will be presented to ADF who will authorise any necessary modifications.

Indicators:

- Changes in habitat use by golden jackals (and other priority fauna)
- Changes in frequency of habitat usage by golden jackals (and other priority fauna)
- Accidental vehicle collisions with golden jackals

Table 4.1: 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 and vocalisation re-call survey techniques	Changes in habitat use by golden jackals (and other priority fauna) Changes in frequency of habitat use by golden jackals (and other priority fauna)	A reduction in golden jackal records on Mount Renci (or other areas) A reduction in territorial group numbers	2 years during operation

		Accidental vehicle collisions with golden jackals	
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5 IMPLEMENTATION

5.1 Roles and Responsibilities

The roles, responsibilities and monitoring systems for the delivery of avoidance, mitigation and management measures are detailed in the Project’s Environmental and Social Management Plan (ESMP), the Environmental and Social Action Plan, the EIA and the Environmental Monitoring Plan (EMP); a summary which relates to biodiversity management is presented below. It is anticipated that this will be updated with more detailed descriptions as the Project progresses.

5.1.1 Staff and Contractors

Implementation of this BMP will require appropriate staff, financial resources, equipment and support systems. It is the responsibility of all ADF staff and Project contractors to comply with the requirements set out in this BMP, ESMP, EMP and EIA. The responsibility of Project contractors and suppliers will be defined through standard terms and conditions of contracts that are consistent with the commitments of the BMP, ESMP and EMP.

ADF is responsible for setting up a suitably experienced and qualified Environment Team to oversee implementation of the BMP by the Project. The team will comprise an ADF environmental and biodiversity expert, an occupational health and safety and social expert. The environmental and biodiversity expert will report directly to the Project Manager. Under the direction of the Environmental and Social Unit manager, the environment team will be responsible for the day-to-day implementation and continued improvement of the BMP, compliance monitoring, compliance with physical and biodiversity rehabilitation activities and reporting.

ADF will contract experienced ecologists (including a botanist, bat ecologist and ornithologist) to implement key mitigation and monitoring measures as described in Sections 3.2.1, 3.2.2, 3.2.3, 3.3.3, 3.3.4, 3.3.5, 3.3.6, 3.3.7, 3.4.1 and Section 4.. An experienced ecologist is defined as a suitably qualified working professional (i.e. that holds a university degree and / or doctorate in a relevant subject area) who is highly experienced at undertaking technical biodiversity survey work and assessments and is competent at providing ecological services for either NGOs, developers and / or government organisations.

A more detailed breakdown of the roles and responsibilities described above is presented below in Table 5.1.

Table 5.1: Summary of staff roles and responsibilities related to biodiversity management

Role	Responsibilities
ADF Project Manager and the Environmental and Social Unit Manager	<ul style="list-style-type: none"> • overall responsibility for the implementation of this management plan • updating this management plan • make the plan available to all employees and contractors • provide leadership on biodiversity matters within ADF’s Environmental Team

Role	Responsibilities
	<ul style="list-style-type: none"> • work effectively with relevant department managers to develop best practice standards to ensure compliance with biodiversity requirements • oversee the implementation of the biodiversity management actions in accordance with this plan • lead stakeholder consultation • disseminate data to biodiversity specialists to enable evaluation of the effectiveness of programmes in achieving biodiversity objectives • monitor and report on compliance with the Project's biodiversity actions, commitments and legal obligations • provide technical and strategic advice on biodiversity matters to the Project Manager • with support from the wider environmental team, prepare quarterly and annual biodiversity reports focusing on compliance, monitoring, evaluation and adaptive management • prepare annual reports for EBRD.
Environmental and biodiversity advisor	<ul style="list-style-type: none"> • provide training and guidance to staff and contractors on the requirements of this management plan • assist with the implementation of the biodiversity management actions in accordance with this management plan • enforcement of the biodiversity 'permit to work' systems • monitor and report on compliance in accordance with the national legislation and regulatory requirements, ESMP, ESAP and BMP • assist in the delivery of biodiversity monitoring, data analysis and reporting • assist with biodiversity offsetting • assist with stakeholder consultation • assist with training and capacity building of employees and contractors.
EHS and social expert	<ul style="list-style-type: none"> • provide technical guidance on social impact management • report to the Environmental and Social Unit Manager on Occupational Health and Safety issues identified in the ESMP and EIA • regularly monitor the implementation of OHS and Social impact mitigation measures conform the ESMP/EIA, EBRD guidelines and National Legislation
Ecological clerk of works	<ul style="list-style-type: none"> • as part of the contractor's team, the ecological clerk of works will provide technical guidance on the implementation of the BMP • coordinate the pre-construction surveys, biodiversity checks and monitoring in accordance with the BMP, ESMP and ESA • undertake supervisory tasks including the supervision of the habitat clearance works, soft stripping the bat roost and translocation works (i.e. endemic, rare and threatened plants, bats, Eurasian badgers, other wildlife during habitat clearance and the relocation of the great Capricorn beetle dead wood habitat). • The provision of biodiversity inductions and presentation to all contractors and staff • management of the biodiversity 'permit to work systems' and compliance monitoring and enforcement.

Role	Responsibilities
Experienced ecologists	<ul style="list-style-type: none"> • Coordinate the Reinstatement and Landscaping Plan • Support ADF and Project contractors during the construction phase • undertake pre-clearance checks (i.e. for roosting bat, Eurasian badger setts and nesting birds) • the provision of method statements • undertake specialist supervisory tasks including the supervision of the habitat clearance works, soft stripping the bat roost and translocation works • Undertake the bat translocation works (including identification and preparation of a suitable compensatory roost site) • Supervise any Eurasian badger sett closures • Supervise the translocation of endemic, rare and threatened vascular plants • deliver targeted monitoring works (i.e. camera trapping, bird surveys and vocalisation recall surveys) • provide inputs into the Reinstatement and Landscaping Plan • provide specialist ecological advice regarding the establishment of the wildlife crossing and associated planting scheme
General staff and contractors	<ul style="list-style-type: none"> • comply with requirements of the BMP, EIA, ESAP and ESMP, relevant to their specific job requirements • uphold the Project's biodiversity objectives as defined in the BMP and ESAP • use appropriate materials, equipment, machinery and vehicles to minimize EHS and Biodiversity risks • attend training and site inductions • reporting of accidents and incidents • comply the Albanian law requirements
supervising engineer	<ul style="list-style-type: none"> • undertake daily monitoring of implementation of ESMP / EIA, OHS and Social requirements • input into monthly reporting • ensure the training of workers, use of appropriate equipment, machinery and vehicles and compliance with health and safety procedures and protective equipment • documentation and reporting of occupational accidents, diseases and incidents • compliance monitoring • the provision of quarterly reports on status of implementation of the criteria on ESMP, ESIA, ESAP, OHS and social and environmental mitigation measures. The report will include a chapter on environmental, social and biodiversity performance, based on ESIA, ESMP, SEAP and BMP items. The content of the report will be agreed with ADF (subject to review by EBRD). In case of any accidents or negative impact on the environment (not predicted by the ESIA / ESMP) the supervising engineer will report to ADF and EBRD immediately.

5.2 Capacity Building

ADF will provide specific environmental and social training that is relevant to the roles and responsibilities of all employees and contractors, inclusive of an initial induction for any on-site workers.

The Environment Team will also receive specific training relevant to their job requirements. This may include species identification, survey techniques, the use of equipment and data analysis.

During periodic site inspections, workers' knowledge of general environmental, health and safety issues will be evaluated to monitor enforcement and compliance with Project procedures and plans.

The construction operator and / or supervisor will be fully aware of the EIA / ESMP and BMP provisions and trained regarding their implementation. The ADF staff will provide training on ESMP / EIA / BMP implementation and reporting, in line with EBRD's guidelines and the Environmental and Social Management Framework of the Project. The workers will be trained before commencement of works (and upon the employment, for newcomers) regarding safety issues and also by ADF staff during site visits to the construction site.

A Site Instruction Manual will be prepared and distributed to all employees (including contractors) summarising environmental and social requirements, responsibilities, and work procedures.

A Sustainability / Eco-tourism Programme will be implemented by the project to minimise indirect project-related impacts to habitats and vascular plants (and other priority biodiversity features) arising from facilitated access and project-related in-migration (predominantly tourists). The objective of the assignment is to establish a programme of activities and co-ordinated stakeholder consultation to support sustainable ecotourism in the Shëngjin and Velipojë region of Albania by undertaking strategic and local actions. It is anticipated that the programme will support increased environmental awareness, sustainable and safe communities within the Shëngjin and Velipojë region, 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.

As part of the wider regional and local Roads Connectivity Project, capacity-building trainings will be provided to the municipalities to enhance their knowledge and understanding of the ways in which, the participation of both women and men in road maintenance can be enhanced and local ownership and sustainability of road maintenance activities promoted. This will include working with several contractors to explore opportunities to promote women's employment in high-skilled jobs in their respective workforce (ADF, 2018).

5.3 Procurement

ADF will be directly responsible for all Project-related procurement. Procurement will be conducted according to World Bank Procurement Regulation for IPF Borrowers, issued in July 2016, for the supply of goods, works, and non-consulting and consulting services,

and the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated October 15, 2006, and revised in January 2011 and as of July 1, 2016. Under the World Bank Procurement Regulation for IPF Borrowers, the Project Procurement Strategy for Development (PPSD) will be used to analyse and determine the optimum procurement approach to deliver the right procurement result. The PPSD provided a strategic assessment of the operating context and beneficiaries' capabilities, as well as the market, the different stakeholders, and the risks affecting the procurement processes and informed the Procurement Plan.

The Procurement Plan and the Project Summary Document (PSD) might be updated annually or as necessary to reflect the actual needs of the Project. The Procurement Plan and all its updates shall be subject to EBRD "Prior Review" and No Objection before implementation. The Procurement Plan and all subsequent updates will be published EBRD Client e-Procurement Portal (ECEPP (ADF, 2018).

5.4 Monitoring and Maintenance Works

5.4.1 Monitoring and Maintenance During Construction and Operation

ADF will be responsible for overseeing the delivery of the monitoring works throughout the construction phase and during the first two years of operation following completion of the construction phase. After this period the responsibility will be handed over to the municipalities, namely Lezhe and Shkoder.

During the construction phase, the supervising engineer / contractor will report on the implementation of the ESMP, BMP, ESAP and EMP to ADF on a monthly as well as on the implementation of works. The report will include a chapter or section on the environmental performance including performance measures relating to biodiversity. The content of the report will be agreed with ADF and subject to review by EBRD. In case of accident or negative impact on the environment including biodiversity (not predicted by the EIA / ESMP) the supervising engineer will report to ADF and EBRD immediately.

The establishment of the translocation scheme and the planting scheme, as specified in the Habitat and Species Rehabilitation / Restoration Plan and Landscaping Scheme, 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 translocated vascular plants (i.e. trees, shrubs and rare and threatened species) and the planting scheme (i.e. plug planting and seeding) and maintenance works (including watering) for the first 2 years of operation. Any dead vascular plants will be replaced by ADF as 'like for like' during this timeframe.

Following this period, the municipalities (i.e. Lezhe and Shkoder) 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.

5.5 Reporting Commitments

ADF will provide an annual environmental and social report to EBRD which includes reporting on project progress, compliance, the provision of any material changes or updates to the ESAP, BMP and ESMP in accordance with the loan agreement.

During construction, there will be weekly and monthly management meetings, where required.

Contractors (ECW) will prepare a pre-construction report with analysis provided to EBRD prior to the commencement of works. And include biodiversity management plan implementation update to ADF by monthly reporting.

5.6 Updating the BMP

This BMP will be updated, when necessary, to reflect any significant changes; such as the use of blasting during the pre-construction / construction phase and the associated mitigation measures. Any material changes to the BMP will be included in the change of process by the Environmental and biodiversity advisor.

5.7 Performance Review and Auditing

Regular audits of the Project ESMP and associated management systems including the BMP and ESAP implementation will be undertaken internally by ADF. The audits will assess:

Adequacy of the plans with respect to the scale and nature of anticipated impacts and current development stage of the Project;

- workforce awareness, competence and compliance with the ESMP, BMP and associated plans and procedures
- performance of managers and operators in implementing, maintaining and enforcing the ESMP, BMP and associated plans
- suitability of allocated resources, equipment and budget for implementation of the ESMP and BMP.

All audit recommendations will be discussed with the contractors and also where appropriate ADF. Corrective actions will be followed up through the relevant ADF tracking database to ensure the process is documented and items closed.

5.8 Disclosure

ADF's website will be used to routinely display the ESMP and EMP. The ESMP will also be disclosed by the municipalities following finalisation. This BMP, in addition to the ESIA and Non-technical Summary, will also be disclosed by EBRD on their website.

5.9 Project Schedule

It is anticipated that the road will take 12 months to construct and the start date will be determined by the Investor according to the procurement process. The outline Project schedule is presented in Figure 5.1.

5.10 ADF Point of Contact

The point of contact for this project is:

Nertis Mero

Specialist at the Environment and Social Unit

Department of Infrastructure

Albanian Development Fund

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Tirana, ALBANIA

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Nr.No	PERSHKRIMI I PUNIMEVE DESCRIPTION OF WORKS	Periudha ne Muaj Period in Month																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Punime prishjeje, çmontimi dhe spostimi linjash Demolition, dismantling and line shifting	■	■	■				■			■																				
2	Punime germimi dhe mbushjeje Excavation and filling works	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■														
3	Punime shtresash te bazes Base layer work						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■									
4	Punime shtresash asfaltike Works of asphaltic coatings																			■	■	■	■	■	■	■	■	■	■		
5	Punime ne Vepra Arti te Vogla Small structure works (small bridges, culverts etc)			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
6	Punime ne Vepra Arti te Medha Big structures works (Viaduct, big bridges etc.)			■	■	■	■	■	■	■	■			■	■	■			■	■	■	■	■	■							
7	Punime ne rrjetin KUSH Works on rainwater sewers network			■	■	■	■	■						■	■	■	■	■	■	■	■	■									
8	Punime ne Trotuare Works on sidewalks														■	■	■			■	■	■				■	■	■			
9	Punime ne ndricimin rrugor Works on road lighting																■	■	■	■	■	■	■	■			■	■	■		
10	Punime ne sinjalistiken rrugore Works on road signage																							■	■	■	■	■	■	■	■
11	Punime per gjelberimin Works for greening														■	■								■	■	■	■	■			

Figure 5.1: Programme of works

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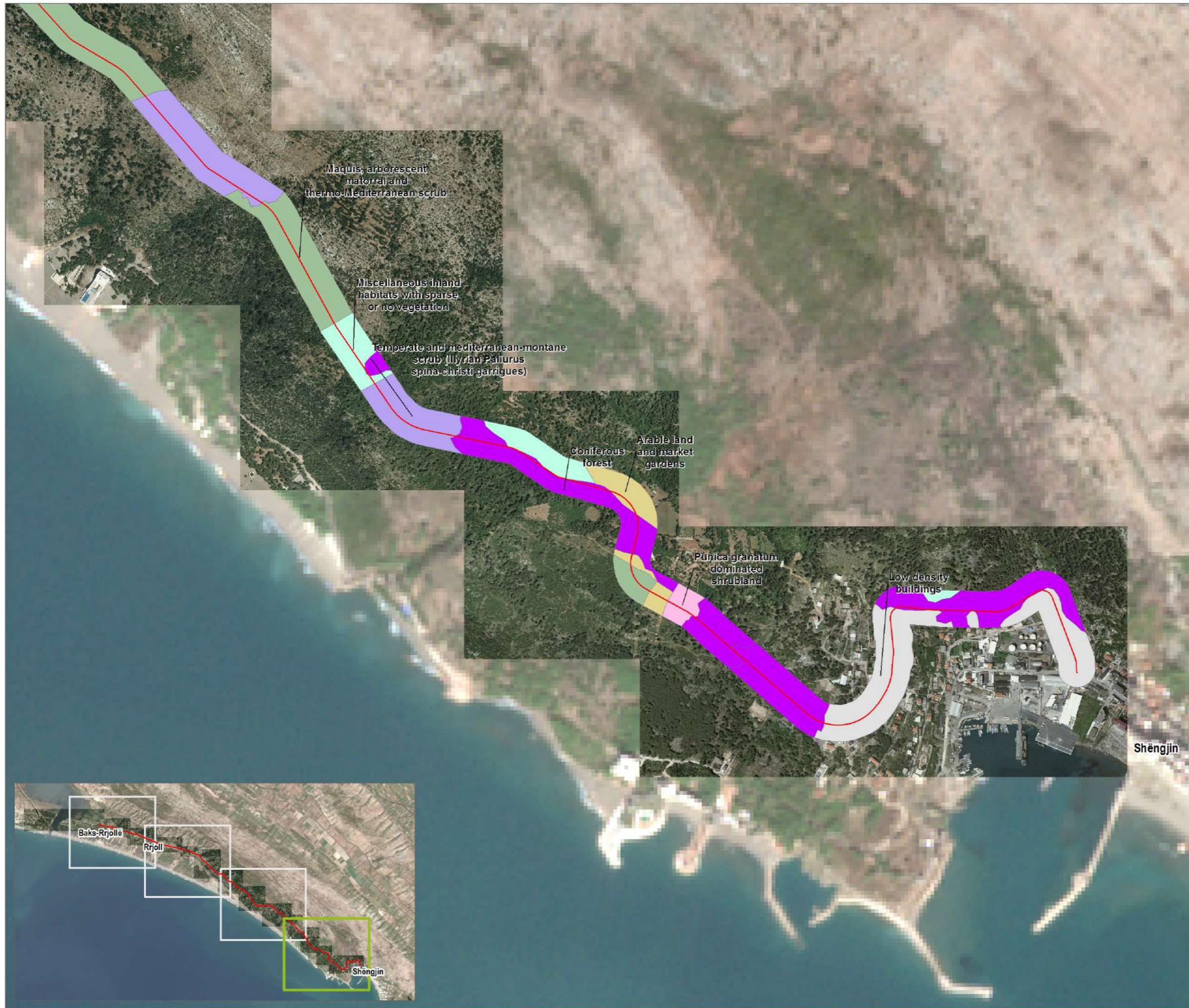
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APPENDIX 1 HABITAT MAP



Sheet 1 of 4

— Proposed Shëngjin to Velipojë road scheme

Vegetation

- Thermophilous Deciduous Woodland
- Coniferous forest
- Punica granatum dominated shrubland
- Temperate and mediterranean-montane scrub (Illyrian Paliurus spina-christi garrigues)
- Maquis, arborescent matorral and thermo-Mediterranean scrub
- Miscellaneous inland habitats with sparse or no vegetation
- Coastal habitats
- Arable land and market gardens
- Screens
- Low density buildings

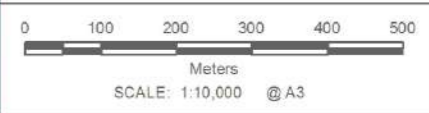
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 Projection: Transverse Mercator
 Datum: WGS 1984
 Units: Meter



Supplementary Biodiversity Assessment



TITLE:
 Proposed Shëngjin to Velipojë Road Scheme
 Vegetation Mapping



Proposed Shëngjin to Velipojë road scheme

Vegetation

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Coordinate System: WGS 1984 UTM Zone 34N
Projection: Transverse Mercator
Datum: WGS 1984
Units: Meter



Supplementary Biodiversity Assessment



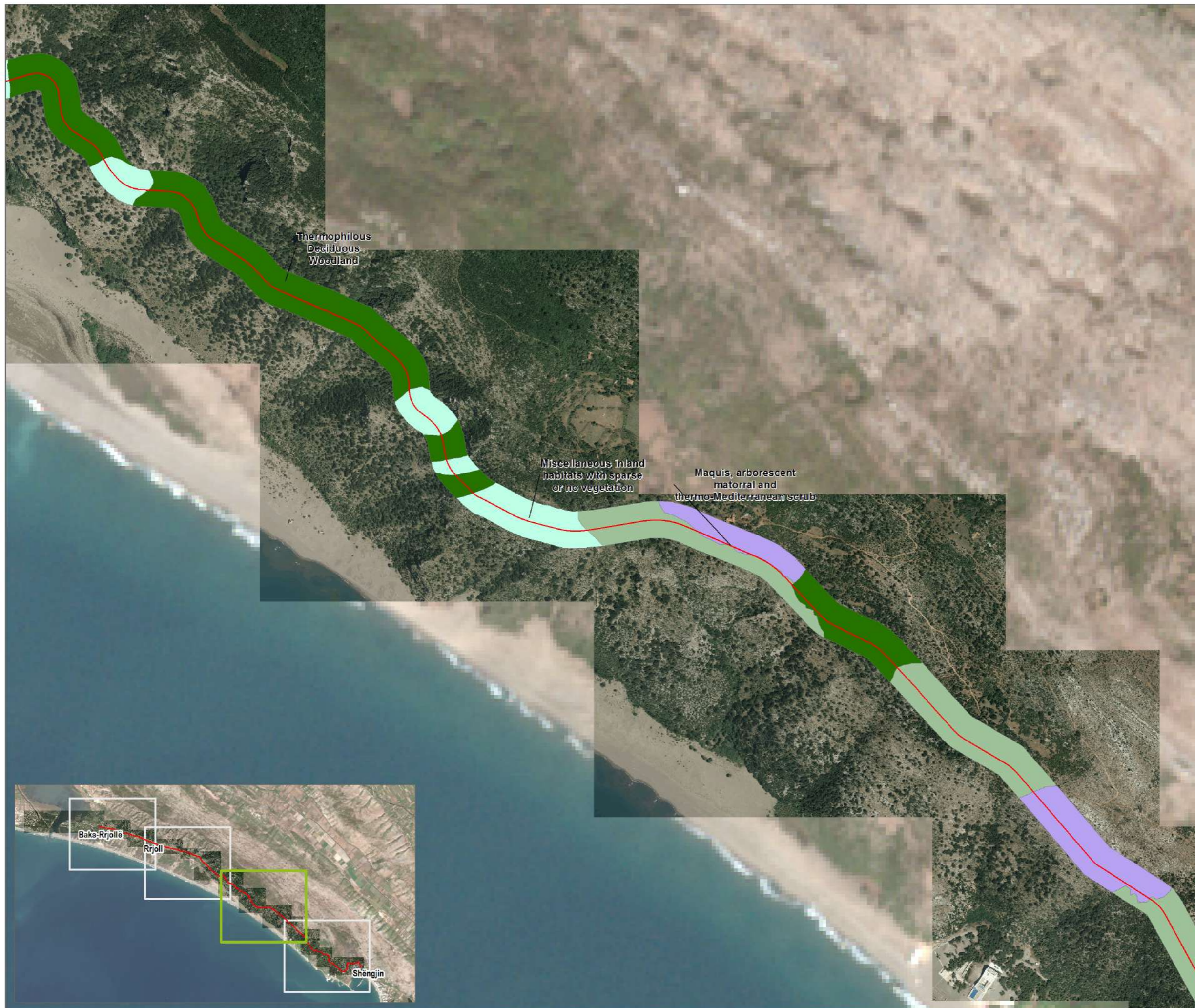
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Proposed Shëngjin to Velipojë Road Scheme
Vegetation Mapping



SCALE: 1:10,000 @ A3



REV 0



Proposed Shëngjin to Velipojë road scheme

Vegetation

- Thermophilous Deciduous Woodland
- Coniferous forest
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Coordinate System: WGS 1984 UTM Zone 34N
Projection: Transverse Mercator
Datum: WGS 1984
Units: Meter



Supplementary Biodiversity Assessment



TITLE:
Proposed Shëngjin to Velipojë Road Scheme
Vegetation Mapping



SCALE: 1:10,000 @ A3



REV 0





Sheet 4 of 4

— Proposed Shëngjin to Velipojë road scheme

Vegetation

- Thermophilous Deciduous Woodland
- Coniferous forest
- Punica granatum dominated shrubland
- Temperate and mediterranean-montane scrub (Illyrian Paliurus spina-christi garrigues)
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- Miscellaneous inland habitats with sparse or no vegetation
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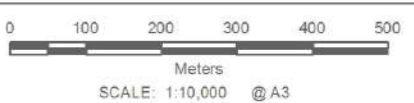
Coordinate System: WGS 1984 UTM Zone 34N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Units: Meter



Supplementary Biodiversity Assessment



TITLE:
 Proposed Shëngjin to Velipojë Road Scheme
 Vegetation Mapping



APPENDIX 2 SUMMARY BIODIVERSITY IMPACT ASSESSMENT

Receptor Type	Project-related Impacts	Summary Description	Pre-construction & Construction	Operation	Sensitivity	Magnitude	Impact Significance	Avoidance	Minimisation	Rehabilitation / Restoration	Monitoring	Sensitivity	Magnitude	Impact Significance	Residual Impact
Habitat and Flora															
Habitat and Flora	Habitat Loss and Degradation	Loss of terrestrial habitat arising from habitat clearance within the Project Development Area (PDA) outside of the Buna River Protected Landscape	✓		Medium	Small	Minor	N/A	Adherence to a Standard Operating Procedure (SOP) 1: Habitat/ Land Clearance, Accidental Vehicle and Machinery Collisions with Fauna, Stockpiling and Alien Invasive Species Control. This includes the provision and implementation of a method statement for habitat clearance that aims to minimise habitat loss to the extent practicable.	Habitat restoration in accordance with the Reinstatement and Landscaping Plan. This will include: clearance of waste, debris and filling of geocells; a planting scheme; and a vascular plant translocation scheme.	Monitoring of habitat restoration and landscaping establishment as specified in the Reinstatement and Landscaping Plan	Medium	Small	Minor	Permanent loss of 5 ha
		Loss of terrestrial habitat arising from habitat clearance within the PDA inside the Buna River Protected Landscape	✓		Medium	Medium	Moderate	Rerouting the road alignment to avoid habitat clearance in core zone (LA) of the Buna River Protected Landscape	Adherence to a Standard Operating Procedure (SOP) 1: Habitat/ Land Clearance, Accidental Vehicle and Machinery Collisions with Fauna, Stockpiling and Alien Invasive Species Control. This includes the provision and implementation of a method statement for habitat clearance that aims to minimise habitat loss to the extent practicable.			Medium	Small	Minor	Permanent loss of 12.8 ha
		Accidental spills of hazardous and non-hazardous substances resulting in habitat loss and degradation	✓		Medium	Medium	Moderate	Adherence to SOP4: Water Quality and Pollution Management.	Adherence to SOP4: Water Quality and Pollution Management. Emergency response procedures will be developed for the Project to effectively manage any accidental spills and leakages of non-hazardous waste and hazardous compounds. Staff and contractors will receive training in spill events management. This will include the development of a spill, incident, accident and response and management plan by the contractor.			Medium	Negligible	Not Significant	
	Habitat Fragmentation and Edge Effects	Habitat fragmentation and edge effects contributing to project-related degradation of remnant habitat areas.	✓		Medium	Medium	Moderate	N/A	Adherence to a Standard Operating Procedure (SOP) 1: Habitat/ Land Clearance, Accidental Vehicle and Machinery Collisions with Fauna, Stockpiling and Alien Invasive Species Control. This includes the provision and implementation of a method statement for habitat clearance that aims to minimise habitat loss to the extent practicable.			Medium	Negligible	Not Significant	Assuming successful establishment
	Loss of nationally endemic, rare and threatened plant species	Habitat clearance resulting in the loss of nationally endemic, rare and threatened plant species from within the PDA	✓		Medium	Medium	Moderate	Pre-clearance checks of trees for roosting bats, with translocation of any detected bats.	Nationally endemic, rare and threatened plant species will be translocated from within the PDA to a suitable receptor site under supervision of a botanist in accordance with a method statement.		Monitoring nationally endemic, rare and threatened plant species establishment	Medium	Negligible	Not Significant	Assuming successful establishment
	Invasive Alien Species Introduction	Habitat loss and degradation and species loss arising from invasive alien species encroachment	✓		Medium	Medium	Moderate	Alien species prevention protocol will be implemented. A record will be kept of all affected areas to avoid transfer. Only non-invasive plant species used for revegetation.	An invasive species prevention protocol will be implemented to prevent the introduction and transfer of invasive 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.	N/A	Anecdotal observations	Medium	Negligible	Not Significant	
				✓	Medium	Negligible	Not Significant	Alien species prevention protocol will be implemented. A record will be kept of all affected areas to avoid transfer. Only non-invasive plant species used for revegetation.	Actively monitor and eradicate invasive vascular plant species along the right of way			Medium	Negligible	Not Significant	
	Hydrology and Water Quality	Impacts to terrestrial habitats and vascular plant species from changes in surface water hydrology from redirection or culverting of small creeks	✓		Medium	Small to negligible	minor to negligible		Adherence to SOP4: Water Quality and Pollution Management; SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control; and SOP 1: Habitat/ Land Clearance, Accidental Vehicle and Machinery Collisions with Fauna, Stockpiling and Alien Invasive Species Control.	Undertake progressive habitat restoration and rehabilitation of impacted areas in accordance with the Reinstatement and Landscaping Plan.	Monitoring of habitat restoration and landscaping establishment as specified in the Reinstatement and Landscaping Plan	Medium	Negligible	Not Significant	
			✓		Medium	Medium	Moderate	N/A	Adherence to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control	Surface water management infrastructure (e.g. cut-off / diversion drains, velocity dissipation devices, culverts) will be constructed in appropriate locations to minimise and control surface water flow over disturbed areas and to minimise impacts to habitats and plants. Sediment control dams and traps will be installed in suitable locations, particularly along higher elevations above ecologically sensitive areas to further minimise the risk of sediment loading impacts Preparatory works (i.e. habitat clearance, grading and stockpiling etc) will be undertaken during the dry season to minimise impacts from erosion and suspended sediments on habitats and plants Erosion prevention measures will be employed (i.e. terramesh,) to stabilise exposed soil and unstable surfaces. Vegetation located on the steep slopes of Mount Renci within the project area will also be preserved where possible to minimise the risk of erosion.		Medium	Negligible	Minor	
			✓		Medium	Small	Minor	N/A	Surface water management infrastructure (e.g. drains and culverts) designed to control surface water flow and runoff from the road will be fully operational and regularly maintained to ensure that they are fit for purpose.			Medium	Negligible	Not Significant	
Air Quality	Fugitive dust emissions smothering plants and habitats adversely impacting the biological fitness of plants and habitat quality	✓		Medium	Large	Major	Ban open-burning of general wastes and vegetation	Adherence to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control to minimise impacts to habitats and species arising from fugitive dust emissions. To minimise smothering impacts to plants and habitats arising from fugitive dust emissions, the project will use dust controls (e.g. dust suppression watering, gravel application) on unsealed access tracks and exposed surfaces heavily trafficked by machinery and vehicles (e.g. site entry/exit points, loading and unloading areas, etc.) during the dry season or when excessive dust generation is evident. Stabilisation of landforms (using geotextiles) to minimise wind erosion where appropriate Sediment controls and dams installed in suitable locations, i.e. high elevations above ecologically sensitive areas	Undertake progressive habitat restoration and rehabilitation of impacted areas in accordance with the Reinstatement and Landscaping Plan.	Continued air quality monitoring to inform adaptive management	Medium	Medium	Moderate		

								Vegetation located on the steep slopes of Mount Renci within the project area will also be preserved where possible to minimise the risk of wind erosion. Ban open-burning of general wastes and vegetation.								
		✓	✓	Medium	Negligible	Not Significant	N/A	Adherence to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control	N/A	N/A	Medium	Negligible	Not Significant			
	Air quality impacts to habitats and vascular plants arising from combustion emissions (i.e. reduced biological fitness and mortality of vascular plants and habitat degradation)			Medium	Small	Minor	N/A				Medium	Negligible	Not Significant			
			✓	Medium	Small	Minor	N/A				Medium	Negligible	Not Significant			
Facilitated access and Project-related In-migration	Over exploitation of plants, habitat degradation and the potential loss of priority vascular plant species within the Buna River Protected Landscape and surrounding environs	✓		Medium	Small	Minor	N/A	Project staff and contractors will be banned from the collection of timber and non-timber natural resources within the zone of influence to minimise impacts to habitats and plants. This will be communicated to staff and contractors through staff inductions.	N/A	N/A	Medium	Small	Minor			
			✓	High	Large	Major (high)	N/A	Development and implementation of the Sustainability / Eco-tourism Programme	N/A	A biodiversity monitoring and evaluation plan will be developed for the project. This plan will assess the effectiveness of the mitigation measures and to inform the requirement for adaptive management.	High	Negligible	Not Significant	Depending on the success		
Fauna and Their Habitats																
Fauna and Their Habitats	Fauna Habitat Loss and Degradation		✓	Medium	Large	Major		Rerouted road alignment to avoid impacting fauna and their habitats in the core zone (1A) of the Buna River Protected Area. Dead wood from within the oak woodland will be translocated to provide a receptor site for the great Capricorn beetle.	Adherence to a Standard Operating Procedure (SOP) 1: Habitat/ Land Clearance, Accidental Vehicle and Machinery Collisions with Fauna, Stockpiling and Alien Invasive Species Control. This includes the provision of a method statement for habitat clearance to minimise the extent of fauna habitat clearance, ensure that habitats clearance will be undertaken by the contractors in a progressive and sensitive manner and to safeguard the extent of the existing fauna habitat.	Restoration of habitat in accordance with a Reinstatement and Landscaping Plan	Establishment of a remote sensing monitoring programme and avifaunal monitoring. Establishment of a reporting system for anecdotal observations of priority wildlife.	Medium	Negligible	Minor	Permanent loss of 17.8 ha of fauna habitat from within the project footprint	
	Risk of degradation and loss of fauna habitat and impacts to fauna arising from accidental spills of hazardous and non-hazardous compounds	✓		Medium	Large	Major	N/A		Adherence to SOP4: Water Quality and Pollution Management. Emergency response procedures will be developed for the Project to effectively manage any accidental spills and leakages of non-hazardous waste and hazardous compounds. Staff and contractors will receive training in spill events management. This will include the development of a spill, incident, accident and response and management plan by the contractor. The workforce will also be made aware of the importance of priority biodiversity features 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.	Undertake progressive habitat restoration in accordance with a Reinstatement and Landscaping Plan		Medium	Negligible	Not Significant		
Fragmentation of Fauna Habitat / Barriers to Movement	Habitat fragmentation arising during habitat clearance compounded with project-related disturbance (i.e. from noise, vibration, presence of the workforce etc) causing a barrier to movement of priority species	✓		Medium	Medium	Moderate	N/A		Minimised via application of mitigation measures for light-spill, noise, vibration and airblast etc.	Undertake progressive habitat restoration in accordance with a Reinstatement and Landscaping Plan	N/A	Medium	Medium	Moderate		
	Barrier to movement of medium sized fauna in particular golden jackals		✓	Medium	Medium	Moderate	N/A		The establishment of a wildlife crossing point for golden jackals (and other fauna) to facilitate access to habitats	N/A	Monitoring the efficacy of the wildlife crossing point by experienced ecologists	Medium	Small	Minor	Dependent on success	
Air Quality	Impacts to fauna arising from the inhalation and ingestion of fugitive dust emissions (i.e. reduced biological fitness or mortality) and combustion emissions	✓		Medium	Medium	Moderate	N/A		Adherence to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control to include, but not be limited to, the following mitigation measures: Dust control measures (i.e. watering, gravel application and wheel washes) will be used 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 should be taken from suitable recycled water sources. Vegetation on steep slopes of Mount Renci will be preserved where possible to minimise the risk of wind erosion. The project will enforce speed restrictions of mobile plant on roads to minimise dust generation. Exposed areas of soil and scree will be quickly stabilised (i.e. cover with geotextiles), and progressively restore the habitats in accordance with the projects rehabilitation and restoration plan. Open-burning of general wastes and vegetation will be banned Apply dust management measures to minimise fugitive dust emissions from stockpiles (i.e. soil and gravel) in accordance with SOPs.	Undertake progressive habitat restoration in accordance with the Restoration of habitat in accordance with a Reinstatement and Landscaping Plan		Medium	Negligible	Not Significant		

	Impacts to fauna arising from the inhalation and ingestion of fugitive dust emissions (i.e. reduced biological fitness or mortality) and combustion emissions		✓	Medium	Small	Minor	N/A	Regular road maintenance to prevent degradation	N/A	N/A	Medium	Negligible	Not Significant		
Hydrology and Water Quality	Impacts to fauna and their habitats from sediment-laden runoff	✓		Medium	Large	Major	N/A	Adherence to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control. This will include, but is not limited to, the following mitigating measures: Surface water management infrastructure (e.g. cut-off / diversion drains, velocity dissipation devices, culverts) will be constructed in appropriate locations to minimise and control surface water flow over disturbed areas. Sediment control dams and traps will be installed in suitable locations, particularly along higher elevations above ecologically sensitive areas, to further minimise the risk of sediment loading impacts Preparatory works (i.e. habitat clearance, grading and stockpiling etc) will be undertaken during the dry season to minimise impacts from erosion and suspended sediments on fauna water resources Measures will be employed to stabilise exposed soil and unstable surfaces (i.e. through using terramesh or other geotextiles) where necessary	Restoration of habitat in accordance with a Reinstatement and Landscaping Plan	Monitoring habitat establishment	Medium	Small	Minor		
	Impacts to fauna and their habitats from sediment-laden runoff		✓	Medium	Small	Minor	N/A	Vegetation located on the steep slopes of Mount Renci within the project area will also be preserved where possible to minimise the risk of erosion. The integrity of the road structure and associated drainage system will be maintained on a regular basis whilst the road is in operation to ensure that impacts to fauna and their habitats arising from suspended sediments and runoff continue to be minimised.			Medium	Negligible	Not Significant		
	Accidental spills of hazardous and non-hazardous substances resulting in the loss and degradation of fauna habitats and impacts to priority fauna (i.e. reduced biological fitness or mortality)	✓		Medium	Medium	Major	Adherence to a Standard Operating Procedure for Water Quality and Pollution Management.	Adherence to SOP4: Water Quality and Pollution Management to ensure the handling of diesel fuel, non-hazardous waste and hazardous compounds. This will be communicated to all relevant personnel via staff and site inductions. Emergency response procedures will be prepared for the Project which will include a protocol for responding to accidental spills and leakages of diesel fuel, non-hazardous waste and hazardous compounds. The workforce will also be made aware 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. Staff and contractors will receive training in spill events management.			Medium	Negligible	Not Significant		
Noise, Vibration and Airblast	Noise, vibration and airblast emissions generated by site preparation and construction works (i.e. grubbing, piling, blasting, operating plant vehicles and machinery) resulting in the disturbance and displacement of fauna from within the project area	✓		Medium	Medium	Moderate	Project construction will not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (i.e. bats) from increased noise and vibration. The use of noisy machinery and vehicles will be avoided at dusk, dawn and at night to minimise disturbance to nocturnal and crepuscular fauna from increased noise and vibration. Noise attenuation measures will be utilised (i.e. temporary noise enclosures or barriers) to minimise noise disturbance near biodiversity sensitive areas. Piling/drilling methods will be used which have the lowest noise and vibration impact (i.e. lowering drop heights or impact levels for piling hammers, and using piling shrouds or temporary barriers or hoardings) to minimise impacts to fauna. Machinery (i.e. concrete batching facility, workers facilities, generators, plant equipment etc) which are sources of noise emissions will be situated away sensitive habitats where possible (the coastal lagoon, wetlands, coastal habitats and protected areas). Natural noise buffers (dense vegetation, rocky outcrops and mounds) will be retained to attenuate noise emissions.	The project will develop and adhere to a Standard Operating Procedure for noise, vibration and airblast. Machinery will be regularly maintained. N/A	N/A	Medium	Medium	Moderate			
	Noise and vibration emissions generated by vehicle traffic, resulting in the disturbance and displacement of fauna from within the project area		✓	Medium	Small	Minor	Speed restrictions within the Buna River Protected Landscape. Use of natural and artificial sound barriers near biodiversity sensitive habitats. Ongoing monitoring.				Medium	Negligible	Not Significant		
Artificial lighting	Light-spill arising from artificial lighting resulting in adverse impacts to fauna (i.e. disturbance to fauna, reduced biological fitness and displacement)	✓		Medium	Small	Minor	Night working will not be permitted to avoid impacts to priority nocturnal, crepuscular fauna. Project vehicles will not be used at night within project area.	Artificial lighting will be used at the site offices and storage areas (i.e. for tools, machinery and material). Impacts to fauna caused by disturbance from artificial lighting will be minimised through the use of capped and directional lighting from ecologically sensitive habitats (i.e. the coastal habitats and wetlands of the Buna River Protected Landscape) and the use of office blinds / curtains.	N/A	N/A	Medium	Negligible	Not Significant		
	Light-spill arising from artificial lighting resulting in adverse impacts to fauna (i.e. disturbance to fauna, reduced biological fitness and displacement)		✓	Medium	Small	Minor	Impacts to fauna caused by disturbance from artificial lighting will be minimised through the use of capped and directional lighting from ecologically sensitive habitats (i.e. the coastal habitats and wetlands of the Buna River Protected Landscape). Retention of natural barriers to minimise light spill artificial light, particularly near the Buna River Protected Landscape (i.e. woodland canopy, earth bund etc.).				Medium	Negligible	Not Significant		
Vehicle / Machinery Collisions	Accidental vehicle / machinery collisions with fauna (i.e. nesting birds, badgers, roosting bats, golden jackals and great Capricorn beetles) resulting in injury or mortality.	✓		Medium	Medium	Moderate	Vehicle operation will be restricted to daylight hours. Pre-clearance checks for trees suitable for bats, nesting birds and badger setts and establishment of a 'no-go' area around any potential active nesting sites. The risk of accidental injury and mortality to fauna from vehicle collisions will be minimised by enforcing reduced speed limits within the construction site and drivers will be expected to adhere to the Highway Code at all times. This will be communicated to all relevant personnel through staff and site inductions. Driving training will be provided for key staff members. Access to project roads will be restricted to authorised people only. Habitats clearance will be undertaken in a progressive and sensitive manner to minimise the risk of collisions and 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 designated receptor sites (as identified by an ecologist) during the clearance works. Where possible, habitat clearance will be undertaken outside of the breeding bird season. Where this is not possible, pre-clearance checks will be undertaken to identify active nesting sites. These will be retained until the young have fledged. An Injured Wildlife Protocol will be developed for the project by an experienced ecologist which will be 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 should include encounters of wildlife and observation of natural resource collection, illegal hunting and wildlife trade. The protocol will also include procedures for the safe management of injured and dead wildlife.	N/A	Reporting of vehicle/machinery collisions.	Medium	Small	Minor			

		Accidental vehicle / machinery collisions with fauna (i.e. badgers, roosting bats and golden jackals) resulting in injury or mortality.		✓	Medium	Medium	Moderate		Reduced speed limits will be signposted during operation to minimise the risk of accidental injury and mortality to fauna arising from vehicle collisions. Rumble strips or speedbumps will also be installed on the approach to Rjollil to slow vehicle traffic near sensitive fauna habitats in the Buna River Protected Landscape. Driving training will be provided for key staff members.	N/A	Monitoring the efficacy of the wildlife crossing point by experienced ecologists	Medium	Negligible	Not Significant	Assuming successful	
									The establishment of a wildlife crossing point for golden jackals (and other fauna) to facilitate access to habitats							
	Induced Access and Project-related In-migration	Adverse impacts to priority fauna and their habitat arising from facilitated access and project related in-migration	✓		Medium	Medium	Moderate		Project staff and contractors will be banned from hunting and collecting natural resources within the project area and River Buna Protected Landscape to minimise impacts to fauna and their habitats. This	N/A	N/A	Medium	Negligible	Not Significant		
		Adverse impacts to priority fauna and their habitat arising from facilitated access and project related in-migration e.g. fauna habitat loss and degradation, disturbance to fauna and injury or harm to fauna within the Buna River Protected Landscape and surrounding environs.		✓	High	Large	Major (high)		Development and implementation of the Sustainability / Eco-tourism Programme	N/A	N/A	High	Negligible	Not Significant	Depending on the success	
Aquatic Habitats and Species																
Aquatic habitats and Species	Hydrology and Water Quality	Adverse impacts to priority aquatic species and habitats arising from suspended sediment loading (i.e. habitat degradation, habitat loss and reduced biological fitness mortality to species)	✓		High	Large	Major (high)	N/A	Adherence to SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control. This will include, but is not limited to, the following mitigation measures: Surface water management infrastructure (e.g. cut-off / diversion drains, velocity dissipation devices, culverts) will be constructed in appropriate locations to minimise and control surface water flow over disturbed areas. Sediment control dams and traps will be installed in suitable locations, particularly along higher elevations above ecologically sensitive areas, to further minimise the risk of sediment loading impacts Preparatory works (i.e. habitat clearance, grading and stockpiling etc) will be undertaken during the dry season to minimise impacts from erosion and suspended sediments on fauna water resources Measures will be employed to stabilise exposed soil and unstable surfaces (i.e. through using terramesh or other geotextiles) where necessary	N/A	N/A	High	Small	Minor		
				✓	High	Small	Minor	N/A	Vegetation located on the steep slopes of Mount Renci within the project area will also be preserved where possible to minimise the risk of erosion. Surface water management infrastructure - use and maintenance of an effective draining system to minimise the risk of suspended sediment loading and runoff.	N/A	N/A	High	Negligible	Not Significant		
		Accidental spills of hazardous and non-hazardous substances resulting in the loss and degradation of aquatic habitats and impacts to priority aquatic species (i.e. reduced biological fitness or mortality)	✓		High	Large	Major (high)	Adherence to SOP4: Water Quality and Pollution Management	Adherence to SOP4: Water Quality and Pollution Management. Emergency response procedures will be developed for the Project to effectively manage any accidental spills and leakages of non-hazardous waste and hazardous compounds. Staff and contractors will receive training in spill events management. This will include the development of a spill, incident, accident and response and management plan by the contractor. The workforce will also be made aware 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.			High	Negligible	Not Significant		
				✓	High	Small	Minor		Use and maintenance of appropriate drainage facilities.			High	Negligible	Not Significant		
	Habitat Loss and Degradation	Culverting 10 ephemeral creeks	✓		Low	Small	Minor	N/A	Adherence to a Standard Operating Procedure (SOP) 1: Habitat/ Land Clearance, Accidental Vehicle and Machinery Collisions with Fauna, Stockpiling and Alien Invasive Species Control; SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control and SOP4: Water Quality and Pollution Management.	N/A	N/A	Low	Negligible	Not Significant		
	Noise, Vibration and airblast	Vibration and airblast emissions are not predicted to impact aquatic species	✓	✓	High	Negligible	Not Significant		N/A			High	Negligible	Not Significant		
	Induced Access and Project-related In-migration	Adverse impacts to priority aquatic species and their habitat arising from facilitated access and project related in-migration	✓		High	Small	Moderate		Project staff and contractors will be banned from fishing and collecting aquatic natural resources (e.g. shellfish, macrophytes) within the project area and River Buna Protected Landscape to minimise impacts to fauna and their habitats. This will be communicated to staff and contractors through staff inductions.	N/A	N/A	High	Negligible	Not Significant		
		Adverse impacts to priority aquatic species and their habitat arising from facilitated access and project related in-migration		✓	High	Large	Major (high)		Development and implementation of the Sustainability / Eco-tourism Programme	N/A	N/A	High	Negligible	Not Significant		

APPENDIX 3 STANDARD OPERATING PROCEDURES

Table 6.1: Standard Operating Procedure (SOP) 1: Habitat/ Land Clearance, Accidental Vehicle and Machinery Collisions with Fauna, Stockpiling and Alien Invasive Species Control

Action Number	Measures for habitat/ land clearance and stockpiling management	Project Phase	
		Pre-construction / Construction	Operation
Minimisation of Habitat Clearance Areas to The Extent Practicable:			
SOP1.1	<p>Development and implementation of a method statement for habitat clearance (prepared by an experienced ecologist) which will be communicated to all relevant personnel (i.e. staff and contractors). This will include the following mitigation measures:</p> <ul style="list-style-type: none"> • 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. • Environmentally sensitive areas will be clearly marked and mapped as ‘No Go Areas’ (i.e. Wooded areas, wetlands, the beach and dune system at the foot of Mount Renci) and access by staff and contractors will be strictly forbidden. • A land disturbance permit system will be established and any necessary habitat and land clearance permits to be obtained in advance from ADF's Environment Department • Habitats 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. • Herbicide and fire will not be permitted as a means to clear vegetation to ensure a minimal impact footprint during habitat clearance and to reduce the risk of poisoning fauna and avifauna. • Salvage stripped topsoil and subsoil, where feasible, in stockpiles for future reuse 	✓	



	<ul style="list-style-type: none"> • Where possible, soil seed bank in the topsoil will be preserved for future rehabilitation, to maintain local genetic diversity 		
	<ul style="list-style-type: none"> • Storage areas will be located in areas away from existing trees, hedgerows and drainage 		
	<ul style="list-style-type: none"> • An ecologist will be on hand to supervise the habitat clearance works and provide advice to the workforce. 		
	<ul style="list-style-type: none"> • Routine checks will be undertaken to ensure vegetation clearance is confined to defined areas of disturbance; 		
SOP1.2	The National Agency of Protected Areas has recommended that the width of the road is kept to the minimum accepted standard, 7 m width for a two-lane road to minimise habitat loss. However, the existing road for the project wide is 9 m. This recommendation will be taken into consideration.	✓	
SOP1.3	Pre-habitat clearance checks will be undertaken by an experienced botanist to identify the location of any rare, threatened or protected vascular plants within the areas designated for clearance.	✓	
Minimisation of Accidental Vehicle and Machinery Collisions with Fauna:			
SOP1.4	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.	✓	
SOP1.5	Slow moving fauna will be translocated to designated receptor sites (as identified by an ecologist) during the clearance works.	✓	
SOP1.6	Reduced speed limits of project vehicles will be enforced in the construction site and all staff will adhere to the highway code to minimise the risk of accidental fauna collisions. To be communicated to all relevant personnel during staff inductions.	✓	
SOP1.7	Reduced speed limits will be signposted during operation to minimise the risk of accidental injury and mortality to fauna during operation.	✓	✓
	Where possible, habitat clearance will be undertaken outside of the breeding bird season. Where this is not possible, pre-clearances checks will be undertaken to identify active nesting sites. These will be retained until the young have fledged.	✓	
	Driver training will be provided	✓	
	Restricted access to Project roads (where appropriate) to authorised people only.	✓	



SOP1.8	An Injured Wildlife Protocol be also developed for the project by an experienced ecologist which will be 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 should include encounters of wildlife and observation of natural resource collection, illegal hunting and wildlife trade. The protocol will also include procedures for the safe management of injured and dead wildlife.	✓	
Stockpile Management:			
SOP1.9	Soil stockpiles will be constructed and managed following the below procedure, as appropriate:	✓	
	<ul style="list-style-type: none"> • Stockpiles will be located within designated soil stockpile areas where movement of vehicles and equipment are excluded and up-slope (at least 20 m away) from local waterways and flood inundation areas to minimise the risk of erosion and sediment run-off. 		
	<ul style="list-style-type: none"> • Stockpiles will be stabilised with matting or other appropriate controls if they are to remain bare for more than 3 months, particularly during the winter in the rainy season. 		
	<ul style="list-style-type: none"> • Slope ratios will be no more than 2:1 (horizontal/vertical). 		
	<ul style="list-style-type: none"> • Compaction of stockpiles will be avoided as this will hinder establishment of vegetation during rehabilitation / restoration 		
	<ul style="list-style-type: none"> • Location of soil stockpiles and batters will be geo-referenced and mapped in a GIS database with details on type of material and duration of stockpiling recorded. 		
	<ul style="list-style-type: none"> • Diversion structures will be installed up-slope of stockpiles and sediment controls (e.g. silt fence) located downslope, to minimise erosion and sediment loading (refer to SOP: Erosion and Sediment Control for further details). 		
Alien Invasive Species Control:			
SOP1.10	An alien invasive species protocol will be developed (by an experienced ecologist) and implemented to minimise the risk of transferring and introducing alien invasive species into the project area. This will include:	✓	
	<ul style="list-style-type: none"> •A washdown procedure will be employed to prevent invasive weed spread and potential contamination of the project area from the receiving environment. 		

	<ul style="list-style-type: none"> • Pre-clearance checks for alien invasive species of areas designated for clearance and the site access / egress routes will be undertaken prior to the commencement of site preparation works. 		
	<ul style="list-style-type: none"> • Uncontaminated soil will be used for construction, restoration and rehabilitation. 		

Table 6.2: SOP2: Emission and Dust Control, Erosion and Suspended Sediment Control

Action Number	Measures for the Management of Air Quality, Dust Control, Erosion and Suspended Sediment Control	Project Phase	
		Pre-construction / Construction	Operation
Air Quality Controls:			
SOP2.1	Fuel efficient vehicles, machinery and equipment used during project construction and maintenance works will comply with industry standards.	✓	✓
SOP2.2	The project will integrate energy efficiency principles in the road design where feasible e.g. optimised lighting system (i.e. solar powered or fluorescent lamps on timers).	✓	✓
SOP2.3	Ensure contractors comply with relevant measures for greenhouse gas management and energy conservation.	✓	✓
SOP2.4	Conduct awareness training on energy conservation and greenhouse gas reduction for staff and contractors.	✓	✓
Dust Controls:			
SOP2.5	Use 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 should be taken from suitable recycled water sources.	✓	
SOP2.6	Enforce speed restrictions of mobile plant on roads to minimise dust generation.	✓	
SOP2.7	Quickly stabilise exposed areas of soil and scree (i.e. cover with geotextiles), and progressively restore the habitats in accordance with the project's rehabilitation and restoration plan.	✓	



SOP2.8	The following dust management measures will be employed for soil and gravel stockpiling:	✓	
	• Locate stockpiles in areas naturally sheltered from wind, if feasible.		
	• Install temporary wind fences, if required.		
	• Stabilise long-term topsoil stockpiles (more than three months).		
	• Spray water on stockpiles in the event of excessive fugitive dust emissions.		
	• Stockpiles will be protected against vandalism (ESIA p29)		
SOP2.9	Avoid undertaking primary dust generating activities during dry and windy conditions.	✓	
SOP2.10	Open-burning of general wastes and vegetation will be banned	✓	✓
Erosion and Suspended Sediment Control			
SOP2.11	Surface water management infrastructure (e.g. cut-off / diversion drains, velocity dissipation devices, culverts) will be constructed in appropriate locations to minimise and control surface water flow over disturbed areas and hard surfaces.	✓	✓
SOP2.12	Excavation and stockpiling will cease during prolonged periods of wet weather.	✓	
SOP2.13	Sediment control dams and traps will be mapped and installed in suitable locations, particularly along higher elevations above ecologically sensitive areas to further minimise the risk of sediment loading impacts.	✓	
SOP2.14	Preparatory works (i.e. habitat clearance, grading and stockpiling etc) will be undertaken during the dry season and periods of high intensity rainfall to minimise erosion and the generation of suspended sediments	✓	
SOP2.15	Measures will be employed to stabilise exposed soil and unstable surfaces (i.e. through using terramesh or other geotextiles) where necessary	✓	✓
SOP2.16	Vegetation located on the steep slopes of Mount Renci within the project area will also be preserved where possible to minimise the risk of erosion.	✓	✓
SOP2.17	Habitat clearance will be minimised to the extent practicable;	✓	
SOP2.18	Preparatory works causing ground disturbance (i.e. habitat clearance, grubbing, grading etc) will be avoided within 50m of sensitive water bodies (i.e. the coastal lagoon, wetlands and other bodies of standing water)	✓	
SOP2.19	Schedule major earthworks and grading operations for early in the dry season. Avoid the wet / rainy season or periods of high intensity rainfall wherever possible;	✓	



SOP2.20	Project vehicles and machinery will be restricted to designated access / egress routes and excluded from operating in areas outside of construction and operation sites.	✓	✓
SOP2.20	The integrity of the road structure and associated drainage system will be maintained on a regular basis whilst the road is in operation to ensure that impacts to fauna and their habitats arising from suspended sediments and runoff continue to be minimised.		✓

Table 6.3: SOP3: Noise and Vibration Control

Action Number	Measures for the Management of noise and vibration	Project Phase	
		Pre-construction / Construction	Operation
Minimisation of noise and vibration:			
SOP3.1	The use of noisy machinery and vehicles will be avoided at dusk, dawn and at night to minimise disturbance to nocturnal and crepuscular fauna from increased noise and vibration.	✓	
SOP3.2	Machinery (i.e. concrete batching facility, workers facilities, generators, plant equipment etc) which are sources of noise emissions will be situated away from sensitive habitats. Natural noise buffers (dense vegetation, rocky outcrops and mounds) will be retained to attenuate noise emissions	✓	
SOP3.3	All vehicles and plant will be fitted with effective exhaust silencers to minimise noise emissions.	✓	
SOP3.4	All project-generated noise and vibration will be assessed and comply with relevant legislative requirements and noise and vibration guidelines including World Health Organisation Guidance.	✓	✓
SOP3.5	Plant, vehicles, equipment and machinery will comply with industry standards for operation.	✓	✓
SOP3.6	Plant, vehicles, equipment and machinery will be regularly checked and maintained to ensure that they are in good working order and within industry standards for noise and vibration emissions.	✓	✓



SOP3.7	Noise attenuation measures will be utilised (i.e. temporary noise enclosures or barriers) to minimise noise disturbance near sensitive habitats	✓	✓
SOP3.8	Piling/drilling methods will be used which have the lowest noise and vibration impact (i.e. lowering drop heights or impact levels for piling hammers and using piling shrouds or temporary barriers or hoardings).	✓	
SOP3.9	Noise reduction, sound insulation and absorption measures will be applied to different equipment where feasible (e.g. mufflers on engine exhausts and compressor components; impedance mufflers/silencers and vibration insulating on air compressors, blowers and fans; installing sound barriers around generators etc).	✓	
SOP3.10	Compressors will be fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use.	✓	
SOP3.11	All ancillary pneumatic tools will be fitted with suitable silencers.	✓	
SOP3.12	Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.	✓	
SOP3.13	Any plant (i.e. generators or pumps) that is required to operate before and after legal working hours will be surrounded by acoustic enclosures or portable screening.	✓	
SOP3.14	Working hours during construction will be limited between 7am and 7pm to avoid disturbance to fauna at night.	✓	

Table 6.4: SOP4: Water Quality and Pollution Management

Action Number	Measures for the Management of Water Quality and Pollution events	Project Phase	
		Pre-construction / Construction	Operation
Pollution Controls:			
SOP4.1	Pollution controls will be put in place during the construction process. These will be fully defined by the project prior to the construction	✓	
SOP4.2	Stockpiles of materials and hazardous compounds (including asphalt, oil, diesel and chemicals) will not be located near any surface watercourses and standing water bodies (i.e. lagoons, wetlands, ponds, creeks, tributaries etc) or near wells.	✓	
SOP4.3	Stockpiles will be located on a sealed surface and covered (i.e. with a canvas, sheets or more permanent casing) and surrounded by a bund to minimise the risk of impacts arising from accidental leakages and spills.	✓	
SOP4.4	Stockpiles will be protected against vandalism and theft that can lead to spills.	✓	
SOP4.5	Water discharge from facilities (i.e. wheel washes, vehicle washing points, equipment washing points etc) will be captured by a combination of drainage systems, settling tanks and oil interceptors. The waste will then be responsibly disposed.	✓	
SOP4.5	Clearly communicate to all employees and contractors that any dumping or discharging of potentially contaminated water (e.g. oily water, raw sewage, untreated waste water, etc.) into the receiving environment is strictly prohibited: through employee training, mandatory induction, specific contract requirements, and procedures in place.	✓	✓
SOP4.6	Emergency response procedures will be prepared for the Project which will include a protocol for responding to accidental spills and leakages of diesel fuel, non-hazardous waste and hazardous compounds.	✓	
SOP4.8	Only licenced operators will be used to clean-up solid waste.	✓	