Montenegro: Main Roads Reconstruction Project, M-2 Tivat-Jaz Road Section

Supplementary Environmental and Social Impact Assessment Report

Prepared for: European Bank of Reconstruction and Development

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List of Acronyms

Acronym	Explanation
AAWT	Annual Average Weekday Traffic
AoA	Area of Analysis
AQ	Air Quality
AQMP	Air Quality Management Plan
BMP	Biodiversity Management Plan
CESMP	Construction Environmental and Social Management Plan
CHS	Community Health and Safety
CNVMP	Construction Noise and Vibration Management Plan
CR	Critically Endangered
CTMP	Construction Traffic Management Plan
dB	Decibel
E&S	Environmental and Social
EBRD	European Bank of Reconstruction and Development
EC	European Commission
EIA	Environmental Impact Assessment
EN	Endangered
EPC	Engineering, Procurement and Construction
EPRP	Emergency Preparedness and Response Plan
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
EU	European Union
EUNIS	European Nature Information System
GIP	Good International Practice
GN	Guidance Note
H&S	Health and Safety
HGV	Heavy Goods Vehicle
HR	Human Resources
HSSE	Health, Safety, Social and Environment
HSSE-MS	Health, Safety, Social and Environment Management System
IBA	International Bird Area
IFC	International Finance Corporation
ISO	International Organisation for Standardisation
IUCN	International Union for the Conservation of Nature
Kg	Kilogram
Kph	Kilometres per hour

LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Plan
LWCMP	Labour and Working Conditions Management Plan
MCS	Mercalli Intensity Scale
Mph	Miles per hour
NEPA	Nature and Environment Protection Agency
NGO	Non-Governmental Organisation
NT	Near Threatened
OHS	Occupational Health and Safety
PAA	Project Affected Area
PAP	Project Affected People
PBF	Priority Biodiversity Features
PM	Particulate Matter
PR	Performance Requirement
PS	Performance Standard
RoW	Right of Way
RSA	Road Safety Audit
S-ESIA	Supplementary Environmental and Social Impact Assessment
SEA	Strategic Environmental Impact Assessment
SEP	Stakeholder Engagement Plan
SPA	Special Protection Area
SPM	Spatial Plan of Montenegro
TA	Transport Administration (TA) of Montenegro
UNESCO	United Nations Educational, Scientific and Cultural Organization
VU	Vulnerable
WRMP	Water Resources Management Plan
WQ	Water Quality
WQMP	Water Quality Management Plan

Executive Summary

The European Bank for Reconstruction and Development (EBRD) is considering provision of finance to support the Transport Administration of Montenegro (TA) with the rehabilitation and upgrade of three sections of the country's main road network. The associated "Main Roads Reconstruction Project" involves work on the following road sections:

- Rožaje - Špiljani
- Podgorica – Danilovgrad
- Tivat - Jaz

This Report presents the results of the Supplementary Environmental and Social Impact Assessment (the ESIA) for the proposed rehabilitation and expansion of the Tivat to Jaz section of the M-2 road (the 'Project'). It addresses potential Environmental and Social (E&S) impacts associated with both the construction and operation of the Project and is intended to build on the regulatory EIA (henceforth, 'national EIA') submitted to the national regulatory authorities in October 2019 as part of the construction permitting process.

This Report provides an assessment of the likely significant E&S impacts associated with the Project construction and operation and also outlines a suite of mitigation measures needed to avoid or reduce any associated impacts. All measures may be subject to change due to restrictions imposed by the Covid-19 pandemic.

Supplementary ESIA

As the Project is being considered for financing by the EBRD, it is required to demonstrate that, in addition to meeting national regulatory requirements, it will be constructed and operated in a manner which is consistent with the requirements of the EBRD's Environmental and Social Policy (2014). Under this Policy, the Project has been Categorised as a "Category A"[1] project by the Bank, which reflects the intention to widen the road from 2 to 4 lanes over a greater than 10 km continuous length and the requirement for land acquisition, with associated potential for economic and physical displacement. Given this categorisation the Bank requires a formalised and participatory Environmental and Social Impact Assessment (ESIA) to be undertaken, with the resulting Report and associated documents disclosed for public consultation for a minimum 120 days.

Project Overview

The Project comprises the rehabilitation and expansion of the Tivat to Jaz main road (the M-2) from approximately 100m before the entrance to Tivat Airport to the end of the existing intersection at Jaz, north of Budva. The Project involves widening the existing two-lane road to create a four-lane

[1] Could result in potentially significant adverse future environmental and/or social impacts which, at the time of categorisation, cannot readily be identified or assessed, and which, therefore, require a formalised and participatory environmental and social impact assessment process.

road with two-lanes in each direction (each lane being 3.25 m wide). The upgraded road will include a 2m wide central reservation as well as 2m wide sidewalks and a vegetated verge. In addition, seven road bridges, four culverts and one footbridge will be (re) constructed, 11 new roundabout junctions will be constructed, and 2 existing roundabout junctions will be reconstructed. The total width of the upgraded road corridor will be around 20 m (less at bridges). A number of additional works also form part of the Project including the provision of:

- a replacement underpass beneath the M-2 road for the Nikola Djurkovic Elementary school;
- bus stops in both directions at all local road junctions in the vicinity of settlements;
- pedestrian crossings principally at roundabouts and intersections;
- road lighting along the entire route; and
- an upgraded stormwater drainage system along the Budva-Tivat road section.

The road camber will also be improved and the road resurfaced. Given the extent of these works and the condition of the existing road, this will require the total reconstruction of the road. In the section between Tivat airport and Radanovici a small section of the road will deviate from the existing road. This will pass through government owned land as outlined in the ESIA itself.

Key Project Benefits

The current capacity of the road is insufficient for existing traffic volumes during the peak tourism times of the summer period, when vehicle numbers more than double those of the winter and significant queues often develop. Congestion in the area is expected to worsen with tourism in Montenegro expected to grow.[2] The situation is made worse by multiple minor accesses onto the road, a lack of left turn lanes and uncontrolled parking along the edge of the road.

A Road Safety Audit[3] undertaken in 2018 also identified a number of safety concerns including inappropriate/inadequate guardrails and restraints, the proliferation of uncontrolled advertising resulting in driver distraction, and the absence of signage, lighting and marking at bus stops.

The existing road is also subject to regular and extensive flooding in the winter months rendering the road impassable at times, and this is expected to worsen with predicted climate change implications.

There have been no major upgrades or improvements to this section of the M-2 road in recent years and only minor repairs have been undertaken to short stretches of the road during regular maintenance. As such, the entire section of road now requires rehabilitation / reconstruction.

[2] SWECO (2019) Climate Resilience in the Montenegrin Road Network: Climate Resilience Strategy and Action Plan. Client: EBRD

[3] IMC Worldwide (2018) Preliminary Design Stage Road Safety Audit Rehabilitation and upgrade of the Tivat - Jaz Road Client: EBRD

Key Findings for each of the EBRD Performance Requirements

No significant E&S impacts have been identified in the ESIA that cannot be managed through the implementation of good international practice (GIP) and the required construction E&S Management Plans (ESMPs) to be completed by the successful contractor once the tender process has been finalised.

PR1: Assessment and Management of Environmental and Social Impacts and Issues

The project has been subject to a national EIA and this ESIA. The impacts identified in this ESIA will be mitigated through the measures outlined in the accompanying Environmental and Social Action Plan (ESAP), including the completion and implementation by the contractors of a range of construction-specific ESMPs as well as development of an appropriate Health, Safety, Social and Environmental (HSSE) Management System (HSSE-MS) by the TA (including reporting and aligned with GIP).

PR2: Labour and Working Conditions

As construction is yet to commence a work force is not in place. Montenegro has national legislation in place aligned with EU legislation which will be used to manage the majority of labour and working condition issues.

Construction will have a positive effect on the local economy and employment through the creation of temporary jobs and the provision of goods and services. However, there is a potential for adverse impacts on the communities' accessibility and connectivity, on the cohesion of the communities due to an influx of workers, on the workforce's occupational health and safety, and on the local communities' health and safety due to increased traffic.

Mitigation measures implemented during the construction phase will therefore include the development and implementation of appropriate Human Resources Policy, Labour and Working Conditions Management Plan, Occupational Health and Safety Plan, Emergency Preparedness and Response Plan, and Stakeholder Engagement Plans. These will outline the Project's commitment to working conditions and good management of relationships with the workers. The Project will also have a local content policy that supports hiring workers from within the local area to the extent practical. Following the effective implementation of the above Plans, no significant effects are predicted.

PR3: Resource Efficiency and Pollution Prevention and Control

Issues relating to resource efficiency and pollution will generally be managed through the application of GIP and no significant impacts are expected requiring additional mitigation. Noise and air emissions during construction and operation are not expected to result in significant impacts and water quality will be protected through upgrades to the road drainage systems. Final arrangements for waste storage and disposal will be confirmed prior to the start of construction. It is expected that all surplus material will be taken to temporary storage locations defined and agreed by the local municipalities prior to disposal.

The TA will require contractors to complete and implement construction phase Management Plans for a range of issues including Resource Efficiency, Air Quality, Noise and Vibration, Water Resources, Pollution Prevention, Emergency Response, Waste and Hazardous Waste. These Management Plans will include GIP and the mitigation measures outlined in this ESIA.

PR4: Health and Safety

Health and Safety (H&S) considerations have been integral to the design of the road upgrade. Construction of the road will expose workers to a range of Operational Health & Safety (OHS) risks, the nature and magnitude of which will vary with tasks and circumstances. It does not, however, present any exceptional risks that cannot be managed through an effective OHS Management Plan and GIP. Contractors must develop appropriate management plans to address H&S issues during construction, including issues regarding OHS, community health, and emergency response. The Project has been designed to improve road safety and with community H&S in mind. This is reflected in the road design and layout (including crossing points), proposed speed limits, and proposed construction approach. An independent safety review has been undertaken and has resulted in improvements to project design.

PR5: Land Acquisition, Involuntary Resettlement and Economic Displacement

The road has been designed to avoid where possible, and where not, minimise, the extent of any physical or economic displacement. As the widening of the existing road will require additional land, varied levels of land expropriation will be encountered in the following 20 Cadastral Municipalities (CMs): Prijevor I and Prijevor II (Municipality of Budva), Dub, Glavati, Gorovici, Kavac, Kovaci, Kubasi, Ljesevici, Naljezici, Pelinovo, Pobrdje, Prijeradi, Sisici, Sutvara, Vranovici, Lastva, Privredna zona (Municipality of Kotor), and Mrcevac and Djurasevici (Municipality of Tivat).

The TA is required to develop and implement a PR5 compliant Land Acquisition Resettlement Plan (LARP) in line with the Project Land Acquisition and Resettlement Framework (LARF) and addressing any outstanding legacy related to land acquisition. Extensive consultation has been undertaken for the project in general, and further consultation has been carried out as part of the LARF process. Further specific household and business consultation, including a detailed census and asset inventory, is required as the LARP is developed. A compensation process has been developed as part of the LARF and will be completed as part of the Project LARP.

A grievance response mechanism has been designed for the project.

PR6: Biodiversity and Living Natural Resources

The project involves an upgrade to an existing road and ecological sensitivities are considered to be generally low. The exception is local watercourses which support a number of uncommon species (including the critically endangered, European Eel) and the Tivat Saline Ramsar site and Special Nature Reserve, located some 300m from the road at its closest point. These will be protected through mitigation measures designed to avoid pollution of watercourses, including upgrade to the road drainage systems.

Impacts during construction will be reduced through the use of GIP and contractors will be required to develop and implement a construction phase Biodiversity Management Plan. Operational impacts, such as habitat fragmentation, will be reduced by the provision of appropriate crossing points for fauna (e.g. culverts). Overall residual impacts are not expected to be significant.

PR8: Cultural Heritage

The nearby town of Kotor is a World Heritage Site, however consultations with the local municipalities have confirmed that there are no assets of cultural heritage value present within the Project Affected Area (PAA). Contractors will however be required to develop and implement a Chance Finds Procedure in line with EBRD PR8 and national legislative requirements.

PR10: Information Disclosure and Stakeholder Engagement

A PR10 compliant stakeholder engagement plan (SEP) has been developed for the project. This SEP describes the engagement activities being undertaken for the Project during planning, construction and operation. It has been prepared alongside the ESIA for the Project. Stakeholder engagement is ongoing, and transparent communication with the communities will continue as outlined in the SEP. The Project will continue to engage with local communities, businesses and other key road users to ensure that the design is appropriately tailored to maximise accessibility for local and regional stakeholders. Restrictions associated with Covid-19 in Montenegro, including social distancing measures, may rule out some traditional stakeholder engagement and consultation approaches in the short term, which may exclude some stakeholders such as vulnerable people and/or those without internet and mobile phones. The TA is taking protective measures concerning Covid-19, and as the pandemic evolves on a daily basis, it will seek advice from local and international health authorities while implementing stakeholder engagement and consultations required by national laws and EBRD.

Summary of ESAP Requirements

As construction has not commenced and the contractor has not been appointed, the focus of the ESAP is predominantly around ensuring the TA has a system in place to manage project E&S issues, contractor requirements for construction phase ESMPs, and additional survey work to be completed to supplement the findings of this ESIA.

Due to the Covid-19 pandemic commencement of the additional surveys required will have to be postponed until movement restrictions are sufficiently lifted in Montenegro to allow access for the relevant experts.

The TA (through its contractors) will develop detailed Environmental and Social Management and Monitoring Plans (ESMMPs) for the Project construction, operation and decommissioning. These will demonstrate how the Project intends to fulfil the requirements presented in the EBRD Performance Requirements (including PR 1). They will take into account the required management, mitigation and monitoring measures as identified in this ESIA, and the other Project Standards and Commitments.

A number of topic-specific ESMPs will be prepared by the TA and its chosen contractor(s) prior to the commencement of construction. Some of these plans may be combined where appropriate, but as a minimum these are expected to include the following

- Biodiversity Management Plan
- Land Acquisition and Livelihood Restoration Plan (LARP)
- Water Resources and Water Quality Management Plan
- Soil Quality and Erosion Management Plan
- Air Quality Management Plan

- Waste Management Plan
- Hazardous Materials Management and Spill Prevention Plan
- Working near water procedure
- Construction Traffic Management Plan
- Construction Noise and Vibration Management Plan
- Chance Finds Procedure
- Labour and Working Conditions Management Plan
- Human Resources Policy
- Emergency Preparedness and Response Plan

1 Introduction

The European Bank for Reconstruction and Development (EBRD) is considering provision of finance to support the Transport Administration of Montenegro (TA) with the rehabilitation and upgrade of three sections of the country's main road network. The associated "Main Roads Reconstruction Project" involves work on the following road sections:

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This Report presents the results of the Supplementary Environmental and Social Impact Assessment (henceforth the "ESIA") for the proposed rehabilitation and expansion of the Tivat to Jaz section of the M-2 road (the 'Project'). It addresses potential Environmental and Social (E&S) impacts associated with both the construction and operation of the Project and is intended to supplement, rather than duplicate the regulatory EIA (henceforth, 'national EIA') submitted to the national regulatory authorities in October 2019 as part of the construction permitting process.

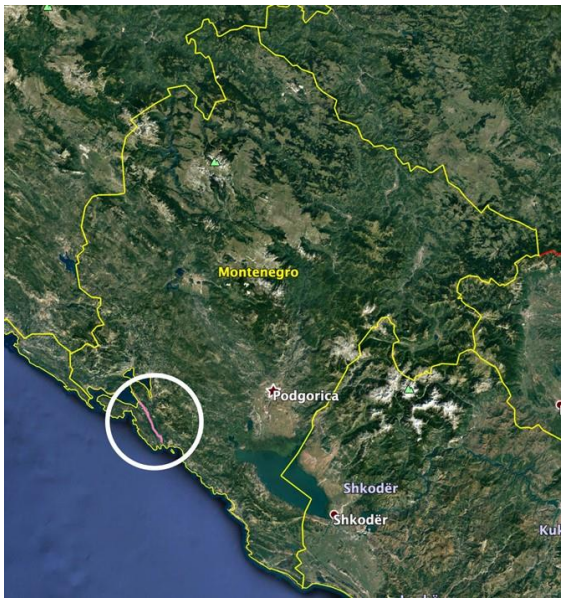


Figure 1: Location of Project Road

This Report provides an assessment of the likely significant E&S impacts associated with the Project construction and operation and also outlines a suite of mitigation measures needed to avoid or reduce any associated impacts. It should be read together with the following Project documents (and accompanying appendices):

- Scoping Report
- Regulatory EIA
- Stakeholder Engagement Plan (SEP)
- E&S Management Plans
- Land Acquisition and Resettlement Framework (LARF)[4]
- Framework Construction Environmental and Social Management Plans
- Framework Biodiversity Action Plan

1.1 Project Overview

The Project comprises the rehabilitation and expansion of the Tivat to Jaz main road (the M-2) from approximately 100m before the entrance to Tivat Airport to the end of the existing intersection at Jaz, north of Budva. The Project involves widening the existing two-lane road to create a four-lane

[4] A LARF has been developed for the ESIA Disclosure Package. The announcement that the Project is in the Public Interest has now been made allowing for a detailed census and asset inventories to be carried out to assess the full resettlement impact of the Project, and the conversion of the LARF into a LARP.

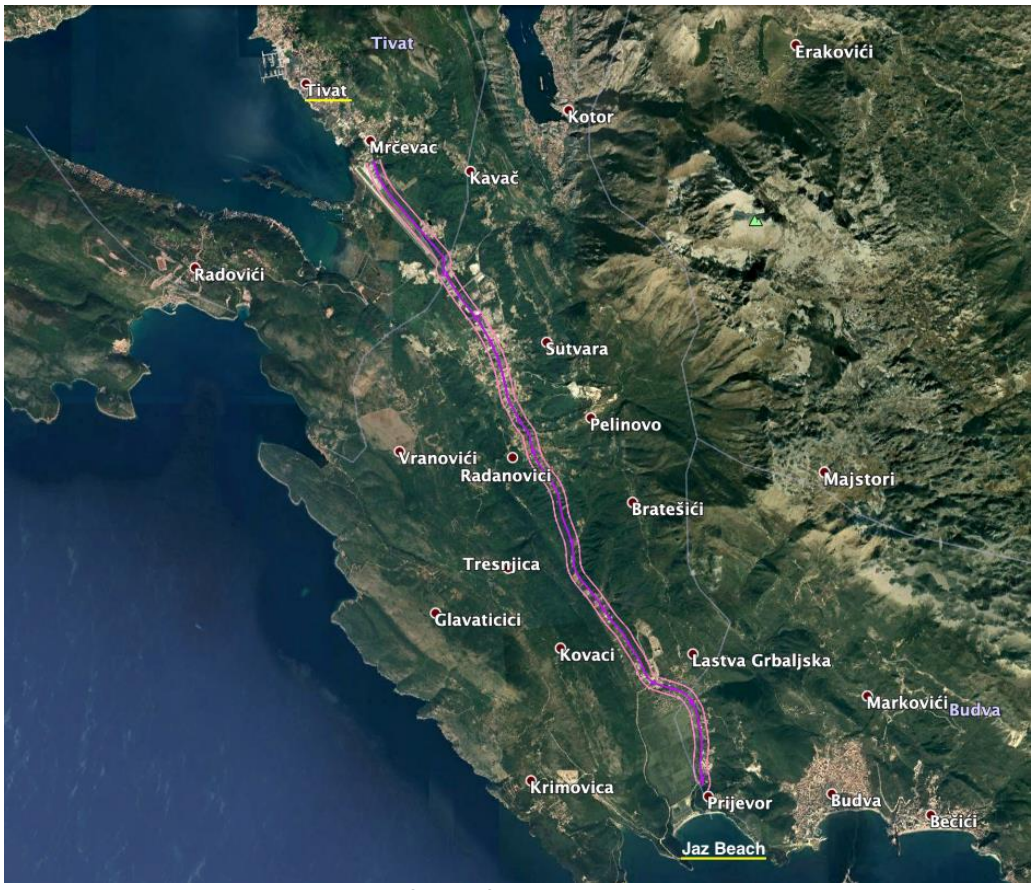
road with two-lanes in each direction (each lane being 3.25 m wide). The upgraded road will include a 2m wide central reservation as well as 2m wide sidewalks and a vegetated verge. In addition, seven road bridges, four culverts and one footbridge will be (re) constructed, 11 new roundabout junctions will be constructed, and 2 existing roundabout junctions will be reconstructed. The total width of the upgraded road corridor will be around 20 m (less at bridges). A number of additional works also form part of the Project including the provision of:

- the relocation of an underpass beneath the M-2 road for the Nikola Djurkovic Elementary school;
- bus stops in both directions at all local road junctions in the vicinity of settlements;
- pedestrian crossings principally at roundabouts and intersections;
- road lighting along the entire route; and
- an upgraded stormwater drainage system along the Budva-Tivat road section.

The road camber will also be improved and the road resurfaced. Given the extent of these works and the condition of the existing road, this will require the total reconstruction of the road. A short section of road between Tivat airport and Radanovici will deviate from the existing road, details are provided in Section 2.

Figure 2 Route of Proposed Project

Materials for the project will be obtained from existing facilities nearby and no "Associated



Facilities" will be developed specifically for the Project. Further project details are provided in Section 2.

1.2 Requirement for an ESIA

As the Project is being considered for financing by the EBRD, it is required to demonstrate that, in addition to meeting national regulatory requirements, it will be constructed and operated in a manner which is consistent with the requirements of the EBRD's Environmental and Social Policy (2014). Under this Policy, the Project has been Categorised as a "Category A"[5] project by the Bank, as it will widen the road from 2 to 4 lanes over a greater than 10 km continuous length with a requirement for land acquisition and associated potential for economic and physical displacement. Given this categorisation the Bank requires a formalised and participatory Environmental and Social Impact Assessment (ESIA) to be undertaken, with the resulting Report and associated documents disclosed for public consultation for a minimum 120 days. The disclosure documents (including this Report) must include:

1. An accurate description and delineation of the project and the client's associated activities;
2. Social and environmental baseline data at an appropriate level of detail;
3. Details of applicable environmental and social laws and regulatory requirements of the jurisdictions in which the project operates, including laws implementing host country obligations under international law; and
4. Applicable requirements under the EBRD Performance Requirements (PRs), including application of the mitigation hierarchy and Good Industry Practice (GIP).

1.3 Need for the Project

The Project is needed because the current capacity of the road is insufficient for existing traffic volumes during the peak tourism times of the summer period, when vehicle numbers more than double those of the winter and significant queues often develop. The road forms part of a major tourism route and this congestion is only expected to worsen as Montenegro is predicted to experience considerable growth in vehicle numbers[6]. The situation is made worse as a result of multiple minor accesses onto the road, a lack of left turn lanes and uncontrolled parking along the edge of the road. A Road Safety Audit[7] undertaken in 2018 also identified a number of safety concerns including inappropriate/inadequate guardrails and restraints, the proliferation of uncontrolled advertising resulting in driver distraction, and the absence of signage, lighting and marking at bus stops. The existing road is also subject to regular and extensive flooding in the winter months rendering the road impassable at times, and this is expected to worsen with predicted climate change implications. There have been no major upgrades or improvements to this section of the M-2 road in recent years and only minor repairs have been undertaken to short stretches of the road during regular maintenance. As such, the entire section of road now requires

[5] Could result in potentially significant adverse future environmental and/or social impacts which, at the time of categorisation, cannot readily be identified or assessed, and which, therefore, require a formalised and participatory environmental and social impact assessment process.

[6] SWECO (2019) Climate Resilience in the Montenegrin Road Network: Climate Resilience Strategy and Action Plan. Client: EBRD

[7] IMC Worldwide (2018) Preliminary Design Stage Road Safety Audit Rehabilitation and upgrade of the Tivat - Jaz Road Client: EBRD

rehabilitation / reconstruction.

1.4 Project Alternatives

The Project was first introduced in 2016 when the preliminary design was presented to the three relevant municipalities (Budva, Kotor and Tivat) as well as representatives of the local communities. Given the need for the Project outlined above, it was agreed that "do nothing" was not considered a viable alternative option. In terms of alternative routes, there are no other roads running between Tivat and Jaz that could be upgraded as an alternative to the Project and the surrounding landscape includes a number of Natura 2000 sites, a UNESCO world heritage site, numerous residential settlements and several hills. A completely new road running through this landscape would be expected to have more significant adverse E&S impacts than upgrading the existing M-2 road. The TA have therefore focused on alternative designs for the road and have adopted a "mitigation by design" approach to the Project. This has included a number of design refinements within the proposed road corridor, many as a direct response of stakeholder engagement. Table 1 below summarises the key design changes that have been incorporated to date:

Table 1: Use of an Adaptive Design Approach for the Project

Initial Proposals	Stakeholder Responses
The TA shared initial Terms of Reference and approved planning documentation (in accordance with the national Spatial Plan provisions) with the Designer in September 2014. A draft of this initial design was shared with the Municipalities of Tivat, Kotor and Budva in 2016. This included the development of roundabouts at Jugodrvo (towards Kotor) to replace existing ones.	The municipalities responded with a number of requests regarding both **Traffic Lanes** (specifically the use of a two-lane/left-turn exit lane road instead of a boulevard-type road) and **Roundabouts (t**he addition of roundabouts at key places to comply with certain traffic and technical conditions eg regarding distances between two roundabouts) These were used to revise the design.
In November 2017 a revised design was presented to the local communities. This included • **Traffic lanes** with reduced widths from 3.5m to 3.25m • **Intersections:** updated to include planned reparations to the intersection between Tivat Airport and the first roundabout (connection of the boulevard and the road from LSL Grbalj II). A left turn lane and removal of the middle island was included. The intersections were also redesigned in line with the reduced width of the road. • **Roundabouts:** New roundabouts were added at Ceren hill, and Ljiljanici/Kavacko polje. Plans were included for retrofitting a geodetic base for each roundabout as well as other community-requested changes to roundabouts. • **Bus Stops:** Amendments to the locations of bus stops. • **Storm water Drainage:** Changes to the storm water drainage in line with the changes in intersections and reduced width of the roadway. • **Retaining Walls:** Changes to positioning of retaining walls. • **Lighting:** New photometric calculations for lighting.	Following review of this plan the local community have further requested that a roundabout be included at Glavatske kuce, which it subsequently is.

These alternatives (and other relevant mitigation) are described further in subsequent sections of this report.

1.5 Scoping of the ESIA

Following updates to the main design the TA appointed local E&S Consultants (E3) to undertake an Environmental Impact Assessment (EIA)[8] of the project in accordance with Montenegrin legislation. This was developed and issued in October 2019 to the relevant competent authority (the Nature and Environmental Protection Agency - NEPA). Public Consultations were held in December 2019, and following two rounds of reviews, NEPA awarded the Ecological permit (a precondition for the construction permit) in April 2020.

The national EIA did not include the full scope of issues required to meet the EBRD PRs 2014. As a result the ESIA reported here has been undertaken to address any potential shortfalls. The scope of this ESIA has been determined through a combination of:

- an in-country scoping exercise (2 – 6 December 2019), which comprised site visits, and meetings with the TA, municipalities and other key stakeholders. The consultants engaged with representatives of Tivat and Kotor municipalities, and representatives from Radanovici and Lastva Gbraljska communities, in order to ensure that key stakeholders were aware of the parallel EIA and ESIA processes. Budva municipality was also contacted with a request for a meeting, however no response was received. Further description on implementation of national EIA and ESIA stakeholder engagement processes can be found in the SEP.
- a detailed review of available information, notably that contained within the National EIA (prepared in Q2/Q3 2019 before being issued in October 2019 to Nature and Environmental Protection Agency – NEPA),) and the Biodiversity Study (prepared by E3 in October 2019). Additional biodiversity survey work was undertaken in December 2019 to supplement to study prepared in October 2019.

The resulting scoping process resulted in a stand-alone Scoping Report which is summarised in Table 2 below. The table records whether a potential impact has been scoped in or out of the ESIA process and the justification for why. 'Scoped in' impacts have been subject to further, detailed assessment during the ESIA process as summarised in subsequent sections of this report.

[8] Projects that require an EIA are determined by the "Decree on determining projects for which an environmental impact assessment shall be carried out" - EIA Decree ("Official Gazette of Montenegro" No. 20/07 and 47/13).

Table 2: Scoping Matrix Summary

Topic	Receptors	Potential impacts	Potential for significant effects?	ESIA Scoped In/Out
Cultural heritage	Historic buildings/ artefacts, subsurface remains	None – no artefacts in project affected area. Project will apply chance find procedure during construction phase	No	Out
	Intangible heritage	Potential for disruption to festivals, community events etc. during construction period. Addressed under social impact section.	Construction only	In
Air quality	Residents, visitors, biodiversity – species, habitats and protected sites	Potential for emissions from additional traffic to affect local air quality. Potential for dust to affect local air quality during construction period.	Construction and operation	In
Biodiversity	Species, habitats, protected sites	Potential effects on protected species and habitats due to habitat disruption / destruction and deaths of animals attempting to cross the widened road. Potential effects on Tivat Saline if contaminated runoff entered into local surface waters.	Construction and operation	In
Climate change	Climate, people, species and habitats	Potential effects include extreme precipitation, flash floods, fires and extreme heat as well as greenhouse gas emissions from vehicles.	Yes	In
Socio-Economic	Residents, community services	Potential for loss of land ownership, loss of residential structures, potential loss of other assets, potential reduction in business activity (during construction) as well as potential disturbance during construction and operation.	Construction and operation	In
Soils & Geology	Residents, species and habitats, groundwater, surface water	No sensitive soils or geological resources in the PAA. Potential contamination of land due to construction / operation will be minimised by of good construction practice. A standalone chapter on soils and geology is not considered required.	No	Out
Land use	Residents, visitors, adjacent industrial sites	Effects on land use / land users will be primarily related to expropriation (addressed in the socio-economic assessment). A dedicated land used chapter is not required however all aspects relating to expropriation will be covered in the Social chapter of the ESIA.	Yes	In
Landscape and visual	Landscape character, residents, visitors	None - project will not result in changes to topography or landscape character, nor will changes to existing views be significant overall.	No	Out
Noise and vibration	Residents, visitors, businesses	Potential for noise and vibration impacts during construction phase; Potential for increase in noise levels above existing due to additional traffic; It is not anticipated that there will be any significant vibration impacts post construction.	Construction and operation	In
Transport and access	Local road network Wider road network Pedestrians, cyclists, residents, visitors	Potential for disruption during construction from vehicle movements and any temporary closures / diversions / signal-controlled sections. Effects could include severance, driver delay, pedestrian delay, pedestrian amenity and accidents and safety.	Construction and operation	In
Water resources	Surface and groundwaters	Potential effects on surface waters during construction both from work near watercourses and accidental spillages. Potential effects on surface waters during operation from runoff both during routine operation and accidents / emergencies. Potential effects on groundwater during both construction and operation. Potential effects on Tivatska Saline Ramsar site during both construction and operation.	Construction and operation	In

1.6 Transboundary effects

The Project is not considered to have any potential transboundary effects.

1.7 Key Project Stakeholders

Table 3 provides a list of key project stakeholders and their connection to the Project. Further details can be found in the stand-alone Stakeholder Engagement Plan (SEP).

Table 3: Key Project Stakeholders

Project Proponent	Role/ Connection to the Project
Transport Administration of Montenegro (TA)	The Montenegrin Transport Directorate used to be part of the Ministry of Transport and Maritime Affairs. In January 2019, its name was changed to the Transport Administration of Montenegro and it became an independent institution responsible for the maintenance and reconstruction of the road network. The TA is under direct supervision of the Government of Montenegro. The TA is the leading institution responsible for the implementation and supervision of the Project and has issued traffic-technical conditions for development of the Main Design for the Project. The TA is also responsible for communication with the local municipalities, communities and businesses during Project design and construction, public consultation meetings related to environmental and social aspects; coordination with the Contractor and supervision of the engineer during construction period.
European Bank for Reconstruction and Development (EBRD)	Proposed Project Lenders
Ministry of Transport and Maritime Affairs (MTMA)	Responsible for transport (road, rail, air) and maritime affairs within Montenegro. MTMA is a leading public institution and responsible for the national road upgrades in Montenegro. TA (Transport Administration of Montenegro) is the department responsible for its implementation.
Ministry of Sustainable Development and Tourism (MSDT)	Responsible for urban planning, construction and environmental aspects of project development. MSDT is the agency responsible for providing construction permits on the request of the TA and for monitoring the Project's compliance with these permits through their Construction inspection
Ministry of Justice (MoJ)	Involved in land ownership/compensation disputes as a part of the land acquisition process through litigation procedures in the Courts, should persons affected by the Project be dissatisfied with the process
Nature and Environmental Protection Agency (NEPA)	NEPA has overall responsibility related to EIA process in accordance to the national legislation and issuance of environmental permits. NEPA review the environmental impact assessment (EIA) reports, organise public consultation meetings and if approved, issue the environmental permits.
Administration for Inspection affairs (AIA)	AIA is responsible for monitoring the Project's compliance with national environmental legislation. AIA is engaged during the Project construction works, and controls implementation of e.g. environmental inspections.
Real Estate Administration of Montenegro (REAM)	Executing agency for the expropriation process, which is implemented in accordance with the national Law on expropriation and the TA's Expropriation Plan. The process includes public consultation meetings with the stakeholders whose land/objects will be subject to land acquisition as per the Project's requirements.
Regional Water Supply Company (RWSC)	The RWSC is separate company in charge for the regional water supply of the Montenegrin coast and other area, that is addressing capture, treatment, transportation and delivery of drinking water from the water source Bolje Sestre through the Regional Water Supply System of the Montenegrin Coast into the water supply networks of the municipalities of Budva, Tivat, Kotor, Hercog Novi, Bar and Ulcinj. RWSC is 100% State owned and defined by the Law (Law on

	Regional Water Supply of the Montenegrin Coast, Official Gazette of Montenegro 56/16). The RWSC is going to install a new regional water supply system along the section from Budva to Tivat, and this design has been aligned with the Main Design for reconstruction of the Tivat-Jaz road. Construction works on these two developments are going to be carried out at the same time.
Municipalities of Budva, Kotor and Tivat	The Project is located within the territories of Budva, Kotor and Tivat municipalities. All three municipalities will be responsible for landscaping along the sections of the route which belong to their respective administrative units.
Representatives of Radanovici, Gornji Grbalj, Savina, Lastva Grbaljska communities	Representatives of these four Local communities have signed a petition and actively communicated with the TA, the Government, local municipalities and EBRD. Some of their requests have been included in the revised version of the Main Design, thus their further engagement in the Project is vital
Land and Business owners who will be affected by the Project	These stakeholders will be directly affected by land acquisition required for the Project. The Project will cause both physical and economic displacement of some landowners, land users and business owners.
Local NGOs	Various NGOs in the area have an interest in issues related to social issues and the environment (environmental protection, conservation of natural resources and implementation of the concept of sustainable development). These are outlined further in the SEP.

1.8 Limitations of this Report

This ESIA has been based on the project design to the extent that it has been developed. Details of the detailed construction approach will be agreed at a later date with the preferred contractor taking account of mitigation presented in this ESIA. This will include further information on construction schedule, workforce numbers, construction traffic and the location of works compounds. Given these limitations a precautionary approach has been taken to the assessment, and specific assumptions have been highlighted where necessary. Table 4 below summaries some key limitations associated with each of the E&S issues assessed in this study.

Table 4: Description of Limitations

ESIA Topic	Description of Limitations
Traffic and Transport	Traffic count information should ideally be recorded in 15 minute intervals so that peaks are easily identifiable – daily totals have been provided. Turning information is lacking and no information is available on vulnerable road users in terms of volumes, where activity is centred, whether provision is suitable in terms of footway widths, crossing types etc. It is not clear where this lost parking will be displaced. An annual growth in traffic of 4% per annum has been assumed; in line with earlier years. The accuracy of this figure in the medium / longer tern is unknown.
Noise & Vibration	In addition to the above, the assessment of road traffic noise is based upon the limited level of traffic data available for the scheme taken solely from the Radanovici settlement area traffic counter which is urbanised in nature.
Air Quality	Given the limited information on construction phasing, methodology, duration, location of laydown areas etc. a precautionary approach has been taken to the assessment whereby eg the potential dust emission magnitude for demolition, earthworks and construction activities has been assumed to be large with track-out assessed as medium. For the operational assessment, in addition to the above very limited data is available on speeds, which have therefore been assumed.
Water Resources	Limited information on construction methodology means impacts can only be presented as a range of significance, with broad mitigation measures identified accordingly. There is limited information provided on drainage design. It is unclear if design incorporates increased surface area of road, climate change effects, remediation of existing flooding issues, storage / attenuation capacity etc.
Ecology and Nature Conservation	Further surveys are needed (e.g. for freshwater invertebrates). Due to Covid-19 these are unable to taken place when initially planned (Spring/Summer 2020) and will be rearranged for a time when restrictions of movement are lifted and water flow volumes are sufficient to gather data. Water flow volumes are at their lowest between 15th June and 15th October so will likely need to take place after October if access is possible. As the final road placement is yet to be confirmed, estimates of habitat

	loss are based on maximum possible right of way width and may be subject to changes. Given the relatively large number of watercourses running alongside and under the road, some small drainage channels may have not been addressed.
Socio-Economic	There was a lack of interest and/or refusal by some households to take part in the socio-economic survey. Business owners, CEOs, and managers were not always available during the surveys. Several business entities requested that the questions be posed to them via phone and/or email which slowed down the process. A lack of interest and/or refusal of some business entities to take part in the survey was also evident. In terms of impact to land and livelihoods – including physical and economic resettlement – the announcement of Public Interest had not yet been made by the time off the assessment. This meant that Persons Affected by the Project had not yet been informed of the expropriation, detailed finalised data was not yet available, and thus it was only possible to make estimations of the potential impact. This is further detailed in the Land Acquisition and Resettlement Framework of the Project.
Covid-19	Due to the Covid-19 pandemic starting in early 2020 plans for the public disclosure process of the ESIA package and the identified additional survey work (traffic and biodiversity related) have had to be amended. Restrictions associated with Covid-19 in Montenegro, including social distancing measures, may rule out some traditional stakeholder engagement measures and consultation approaches in the short term, which may exclude some stakeholders such as vulnerable people and/or those without internet and mobile phones. Plans for public disclosure of the ESIA package were changed in line with the EBRD's Guidance Note for PR10, released to suggest ways of continuing project engagement in a safe and secure manner. The revised approach includes uploading the ESIA documents on the TA, EBRD and municipality websites and contacting the municipality and local community representatives to notify them of their availability (in advance and at the time of release) and ask for written comments and feedback by a certain date. Notification of their availability will also be made in local newspapers and on local radio stations. The TA is taking protective measures concerning Covid-19, and as the pandemic evolves on a daily basis, it will seek advice from local and international health authorities while implementing stakeholder engagement required by national laws and EBRD. Additional surveys are required to study freshwater invertebrates. It was initially recommended that the surveys take place in Spring/Summer 2020 when the water flow volumes were still sufficiently high. Water volumes are at their lowest between 15th June and 15th October and so any revised study date would need to fall outside of these dates. It is tentatively recommended that, as long as movement restrictions have been lifted sufficiently, these surveys are undertaken in Autumn 2020 when the water flow volumes have increased again.Additional survey work is required to assess left-hand turn movements and pedestrian movement along the project road and provide any additional recommendations from the findings. This work has been postponed until movement restrictions have been sufficiently lifted to allow experts to enter the project site and traffic flows have recovered to pre-Covid-19 levels to ensure accurate findings.

1.9 Report Structure

This ESIA Report is composed of 11 main Chapters and a number of supporting Annexes. The remainder of this report is structured as follows:

- **Chapters 2 - 5:** Project and ESIA Overview. This includes information on the project description, ESIA approach, impact methodology and legal context.
- **Chapters 6 - 9**: Environmental Impact Assessment. This addresses PR3 related impacts on (and mitigation for) the physical environment namely traffic and transport, noise & vibration, air quality, water resources.
- **Chapter 10**: Ecology and Nature Conservation. This addresses PR6 related elements associated with sensitive ecological receptors.
- **Chapter 11**: Social Impact Assessment: This includes issues related to PRs 2, 4, 5, & 10.
- **Chapter 12**: Cumulative and Transboundary Effects

2 Project Description

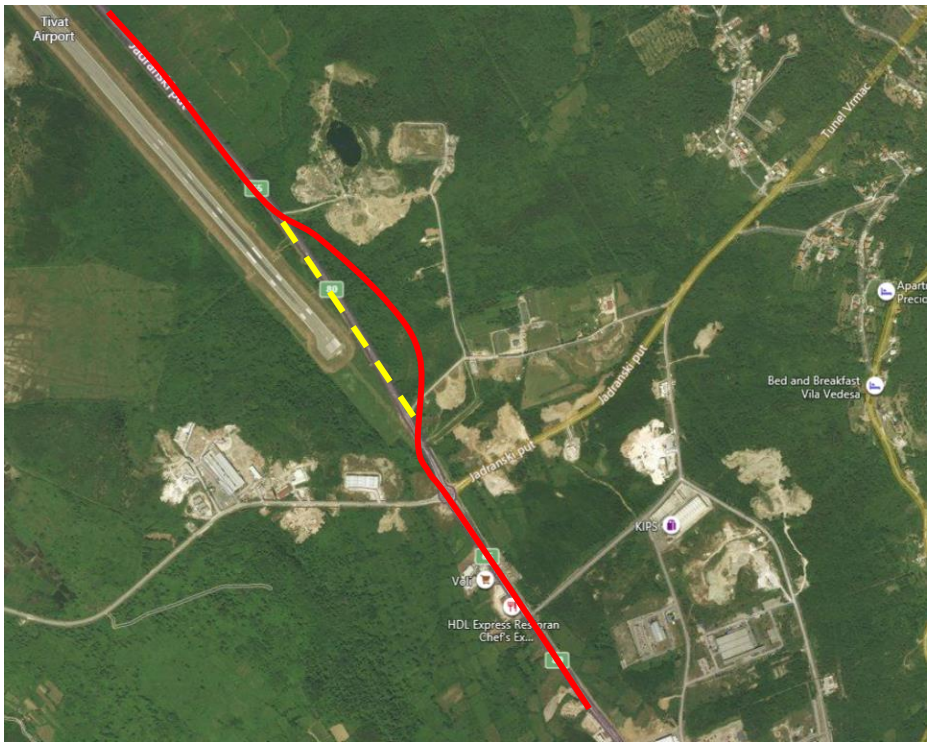
2.1 Overview

This Section provides a brief summary of the Project Further details of the Project are included in the "Main Design document" and final design details will be provided to the EPC Contractor who will determine the additional construction details.

As outlined in Section 1.1 the Project will involve the widening of the existing two-lane road to a four-lane road (two-lanes in each direction, with each lane being 3.25 m wide) with a 2m wide central reservation as well as 2m wide sidewalks and a vegetated verge. The total width of the upgraded road corridor will be around 20 m wide, reduced slightly at bridges. Seven road bridges, four culverts and one footbridge to be (re) constructed along with 11 new roundabout junctions and the reconstruction of 2 existing roundabout junctions. A replacement underpass will be provided for Nikola Djurkovic Elementary school, and bus stops will be provided in both directions at all local road junctions in the vicinity of settlements. Pedestrian crossings will be provided principally at roundabouts and intersections, and there will be installation of road lighting along the entire route. The storm water drainage system will be repaired and upgraded, to prevent flooding and pollution risks, and improvements made to the road camber and resurfacing of the road. This will involve the total reconstruction of the road.

In the section between Tivat airport and Radanovici a section of the road will deviate from the existing road, though this new road section passes through government-owned land, see Figure 3.

Figure 2: Illustrative location of deviation (red) from the existing road alignment (yellow) near Tivat airport.



2.2 Construction Methodology

2.2.1 Phasing and Duration

Construction is expected to commence in 2021 and last for up to 24 months, although the programme may be amended due to the Covid-19 pandemic. No construction work is planned to take place during the summer months (June, July or August) to avoid traffic congestion during peak tourist periods. The final commencement date will be dependent upon completion of the tender process. Construction will begin with enabling works which will include the establishment of works compounds and laydown areas within the proposed 20m construction corridor. Vegetation will be removed, and culverts will be cleared, as required. Construction will take place in 3 phases as shown in Table 5: Construction Phasing ScheduleTable 5 below.

Table 5: Construction Phasing Schedule

Phase 1	Construction of new sections of road, including bridges. Traffic will continue to use the existing road.
Phase 2	Traffic will be switched to the new sections of the road. Due to the limited size of the carriageway and to minimise disruption, traffic flows will alternate and be signal controlled during this phase. Demolition of the existing road and construction of the remaining sections of the road will take place in parallel.
Phase 3	Installation of curbs, barriers and pedestrian fencing. Installation of the final road surface.

2.2.2 Construction Approach

The TA will confirm the final Construction Methodology and provide it to the successful contractor(s) as part of the tender package prior to construction commencing. Construction works will be carried out from 9am until 5 pm (unless otherwise agreed) and access to local businesses will be maintained throughout the entire construction phase, but details of the technical approach that will be taken, construction schedule, workforce numbers, construction traffic and the location of construction camps will be completed following the appointment of the preferred contractor. The following are however understood:

- No blasting will be required.
- No diversions are going to be required
- Raw materials will be sourced only from locations approved by the Construction Supervision Authority and the Project Implementation unit.
- The contractor(s) will be required to define a Traffic Management Plan (TMP) and the traffic will be managed accordingly. The TMP will outline how all vehicle movements will be managed during the works to ensure the safe movement of all road users and construction workers during the construction process. Where footways, pedestrian crossings etc. are disturbed, there will be a clear diversion/alternative facility in place
- The contractor(s) will define the type and number of construction vehicles and plants.
- It is assumed that the contractor(s) is going to have a central location for the offices (storage area and offices).
- Expected quantities of excavated material equal approximately 435,000 m^3 and expected material for embankment is approximately 95,000 m^3 Poor quality excess material will be disposed of at designated disposal sitesRemaining excess material is going to be used for

soil replacement.

Table 6 summaries additional construction elements:

Table 6: Additional Construction Elements

Construction Elements	Description
Bridge Design	The Project will require works to all existing bridges and culverts along the route, which will involve refurbishment of existing, as well as installation of completely new structures. All bridges over watercourses are reinforced concrete single span structures supported on strip foundations. The spans range from 6.50 – 15.20 m with foundation widths ranging from 2.00 – 5.20 m wide respectively. Illustrative cross sections of the bridges are provided in section 3.1.2 of the national EIA for reference.
Surface Water Drainage System	The road currently suffers from flooding, which is at least partly due to the failure of the existing drainage system. With the increased impermeable surface area of the new road, an upgraded drainage system will to be installed to cope with the additional volumes of surface water that will result and to ensure that all road runoff is collected and managed appropriately. The 16km of the Project route has been divided into 47 separate, individually sized road runoff catchments, each with its own drainage network and oil interceptor (the locations of all the interceptors are given in the national EIA)). All drainage will be directed through gravity separators for petroleum products with bypass, sedimentation tanks and coalescent filters providing treatment according to the SIST-EN 858-1:2002 standard. It is understood that each of the 47 drainage networks has been sized according to its catchment area and includes an access point to enable monitoring of effluent prior to discharge.
Construction Workers	It is assumed that construction workers will be hired or housed locally and there is that there is not going to be a dedicated accommodation camp.
Utilities Supply	Water and electricity will be supplied from the existing public supply networks. There is not anticipated to be a need for abstraction from surface or groundwater resources nor any long term requirement for generators.
Cut and Fill	It is intended that the entire existing road surface and sub-surface will be re-used during construction.
Waste Management	Final arrangements for waste storage and disposal will be confirmed prior to the start of construction. It is expected that all surplus material will be taken to temporary storage locations defined and agreed by the local municipalities. Construction wastes will be classified according to the Rulebook on waste classification and waste catalogue (Official Gazette of Montenegro 59/13, 83/16) and handled by the Contractor in accordance with the Law on Waste Management (Official Gazette of Montenegro 64/11, 39/16) and through the use of Construction Non-hazardous and Hazardous Waste Management Plans prior to disposal or recycling by appropriately licensed companies.

2.3 Operation and Maintenance

Information regarding responsibilities and plans for the maintenance of the road will be agreed with the relevant authorities and appropriate operational management plans developed at the time.

3 Project Setting

This section provides a brief overview of the landscape and land use of the Project Affected Area (PAA) - the area directly or indirectly affected by the project. The width of the road when complete will be approximately 20m with a vegetated verge on either side, although this may vary slightly, however the total required Right of Way (RoW) for construction activities is not expected to exceed this. Whilst the PAA may vary somewhat with impact type/ potentially affected receptor attributes[9] it includes all areas within which significant impacts are likely to occur. This includes area affected by the physical extent of the proposed works (i.e. land to be acquired or used, temporarily or permanently, by the Project); and areas in which impacts may be propagated beyond this physical boundary. For the Project the PAA has been set as a 150m corridor either side of the road, selected to included the footprint of all project activities[10]. If appropriate, this general PAA has been amended to ensure the most likely impact zone is assessed for the respective technical discipline.

3.1 Geology, Geomorphology and Seismicity

The Project passes through an area of gentle slopes situated between the plains of Mrčevo Polje and Radanović. Ground elevations along the route range from 5.35 m above sea level in Tivat to over 83.95 m in Radanovici and up to 24.00 m in Jaz. The slopes reach an incline of up to 15 °. The wider area of the study is mainly composed of Upper Eocene flysch complex (E3) sediment. In tectonic terms, this area belongs to the Paraautohton geotectonic unit or the Adriatic-Ionian zone

Montenegro has a history of intense seismic activity, with its coastal areas, including Budva, has been the subject of high magnitude, destructive earthquakes. Figure 3 shows a map of seismic regionalization for the territory of Montenegro with zones of expected maximum earthquake intensity, expressed in the Mercalli intensity scale (MCS). The Project road falls under category 9 (of a total of 12), described as 'Light'. Figure 3 shows a map of expected maximum horizontal ground acceleration across a period of 475 years (EUROCOD 8), in Montenegro, with a probability of realization rate of 70%.

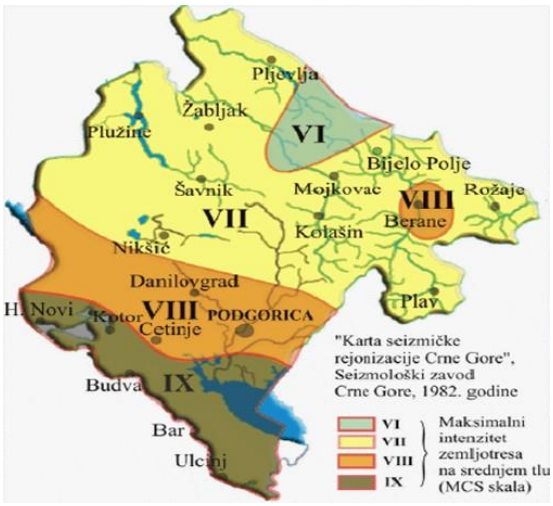


Figure 3: Map of Seismic Intensity in Montenearo

Neither geology, geomorphology or seismicity are expected to affect road design or construction.

[9] For example, effects on archaeological features are typically confined to those areas physically disturbed by the construction works, whilst the effects of noise or visual intrusion can be experienced at some distance, and air pollution may be dispersed over long distances or even contribute to regional/global impacts (where relevant such changes are described in each section as appropriate)

[10] This includes the road working strip, any access roads, construction yards, laydown areas, work sites and other related facilities.

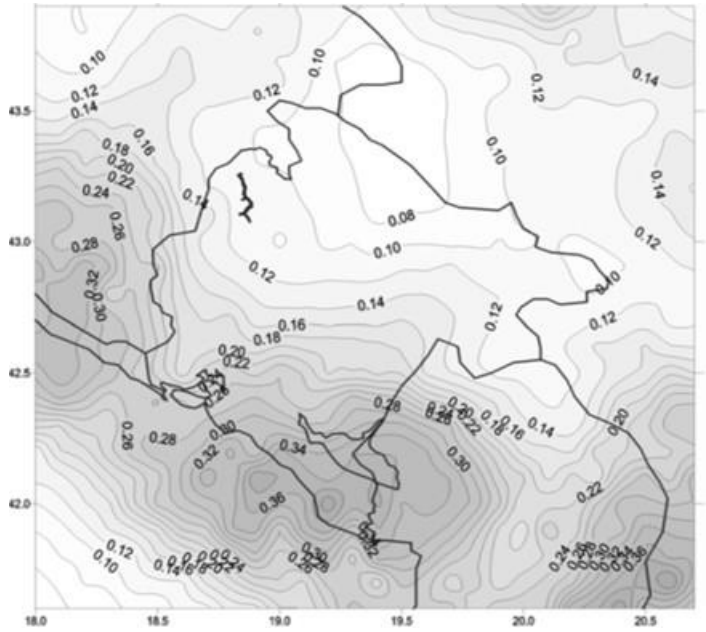


Figure 3: Map of Seismic Hazard in Montenegro across a 475 Year Period

Table 7: Expected Maximum Horizontal Acceleration and Earthquake Intensity

Seismic parameter	Type of earthquake for a return period of 50 year-zone B2	Type of earthquake for a return period of 50 year-zone C_3
I_{max} (EMS98)	7,30 – 7,35	
$a°_{max}$ (%g)	0,14	0,22
Ks	0,035-0,037	0,055

3.2 Hydrology and Hydrogeology

The Flysch sediment of the surrounding landscape is a hydrogeological barrier for surface and groundwater. Surface water therefore flows from the upper parts of the surrounding slopes through watercourses towards the south or towards where the Jaška, Kolozun and Gradišnica rivers flow. Historically, flooding has occurred in both the southern and northern ends of the route. This is discussed further under water resources below.

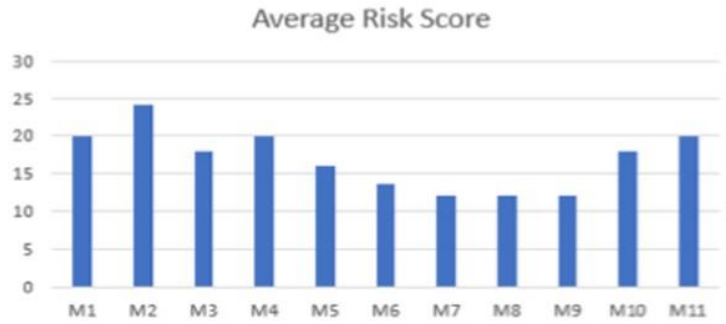
3.3 Climate

The climate is typically Mediterranean, with mild winters and warm, mostly dry summers. Temperature differences are moderate. The humidity in the region is relatively low – in Budva municipality, humidity ranges from 67 to 75%, with the lowest being 67% in July and 69% in August. Average annual rainfall is about 1578 mm precipitation. The maximum precipitation is in November, while the minimum is in July and then in August and June. Snow occurs over 600m above sea level, but due to the proximity of the sea, snow does not settle for long durations. Tivat municipality is under the influence of strong cyclone activities and can experience heavy rain and strong-stormy southern winds. Budva municipality experiences south (150 ‰), southeast (100 ‰) and southwest (70 ‰) winds. Strong winds occur for approximately 7 days a year.

3.4 Climate Change

The "Climate Resilience in the Montenegrin Road Network study (2019)" states that Montenegro is expected to face major climate change over the next 30-70 years with an expected increase in average temperature of 3°C by 2050, associated with frequent droughts, decreased precipitation of -10% by 2050 with frequent and intensive storms and a rise of the level of world seas of +65cm, bringing about soil erosion. Extreme climate events have a direct, immediate and negative effect on transportation and the road infrastructure. They lead to increased transportation time, frequency of accidents and infrastructure damage with the associated costs of maintenance and repairs. Based on an initial climate assessment of 52 road sections - performed by SWECO - it is clear that Montenegro is vulnerable to climate impacts resulting from climate change. Studies identify the M2 road as having an average risk score of 24 - the highest of all the roads assessed. However, the Project is not one of the high-risk sections of the road identified in the study.

Figure 4: Initial Climate Impact Assessment Results (SWECO, 2019)



3.5 Land Use

Approximately 45% of the PAA has been subjected to some form of anthropogenic land use change. Land-use types found in the PAA include garden / yard, orchard, olive yard and forest, and meadows. All land acquisition impacts will begin early in the construction phase and a total of approximately 168875 m² or 16.9 hectares of land is set to be acquired, of which, 36% is privately owned, 36% is owned by businesses and the remainder is owned by the government. A detailed overview of expected impacts to land use can be found in Section 11.

4 Project Policy Framework and Standards

4.1 International Conventions

Montenegro has ratified a number of international treaties and conventions and has an on-going process of transposing EU law into the National legal and policy framework (see below). These include the **Convention on Public Participation, Access to Information and Access to Justice in Environmental Matters (Aarhus, 1998)** The Aarhus convention is part of the national legal system, implemented in 2009. Access to justice in respect of environmental matters is governed by several laws, which fully transpose relevant provisions of the EU legislation. This governs public access to environmental information and public participation in making decisions on environmental matters, whilst aligning with Aarhus Convention. The MSDT and NEPA regularly update their websites to contain all relevant documents for access to information. Other institutions are also active such as local authorities, the Agency for Personal Data Protection and Access to Information and the Administrative Court of Montenegro.

4.2 EU Directives

Horizontal environmental legislation of the EU has been being transposed into the legal system of Montenegro since 2005. Relevant laws and implementing acts transcribed to date include::

- **Directive 2001/42/EC (SEA);** Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA), has been fully implemented through the Law on Strategic Environmental Assessment since 2008 at both national and local levels. Strategic environmental assessment is carried out for all plans and programmes where their implementation may have impacts on the environment. As of 2009, Montenegro is a party of the SEA Protocol.

- **Directive 2011/92/EU (EIA), which codified Directive 85/337/EEC and its amendments by Directive 97/11/EC, Directive 2003/35/EC and Directive 2009/31/EC and as amended by 2014/52/EU (EIA);** Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment is fully implemented through the Law on Environmental Impact Assessment (EIA) and its accompanying implementing acts. Impact assessment is carried out for all new projects and for their amendments. Since 2008, the Law has been implemented at both national and local levels. Two lists of projects have been compiled – List I for which EIA is mandatory and List II for which EIA may be required. Moreover, cross-border procedure is also carried out in order to inform the other states if implementation of a project may have a significant environmental impact. Montenegro is a Party of the Espoo Convention, since 2009.

- **Directive 2003/4/EC (access to environmental information);** Directive 2003/4/EC on public access to environmental information and repealing Council Directive 90/313/EEC is implemented through the Law on Environment and Free Access to Information at a national and local level.

- **Directive 2003/35/EC (public participation and access to justice in EIA procedures and procedures for the issuance of IPPC permits);** Directive 2003/35/EC facilitates public

participation in respect of the drawing up of certain plans and programmes relating to the environment. Regarding public participation and access to justice, Council Directives 85/337 and 96/61 have been fully transposed through the Law on Strategic Environmental Assessment and Law on Environmental Impact Assessment.

- **Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") and Directive 2009/147/EC on the conservation of wild birds ("the Birds Directive").** The *Habitats Directive* prompted a network of Special Areas of Conservation to protect the 220 habitats and approximately 1000 species listed in Annex I and II of the Directive. These are considered to be of European interest. Together with Special Protection Areas which are designated under the *Birds Directive*, these form a network of protected sites across the European Union called Natura 2000.

- **Directive 2008/96/EC Road Infrastructure Safety Management.** The provisions of Directive 2008/96/EC define good practice for national road transport infrastructure. PR4 requires these principles to be closely followed. The Directive imposes road safety responsibilities on Project Sponsors to demonstrate that risks have been considered during the design and delivery of the project. During the initial planning stage, this would comprise the production of a Road Safety Impact Assessment, in line with Annex I of the Directive. Subsequently Road Safety Audits should be undertaken as an integral part of the design in line with the criteria set out in Annex II of the Directive. Annex III of the Directive sets out criteria and requirements for the ranking of high accident concentration sections and network safety ranking during operation.

Other Directives that have been fully or at least partially transposed include the:

- **Waste Framework Directive 2006/12/EC;**
- **Landfill Directive 1999/31/EC;**
- **Hazardous Waste Directive 91/689/EEC, with accessories 94/31/EC, 166/2006;**
- **The Packaging and Waste Directive 94/62/EC, with accessories 2005/20/EC 2004/12/EC, 1882/2003.**

4.3 National Strategy and Spatial Planning Documents

A number of national strategy and spatial planning documents are considered relevant to the Project, including those detailed in Table 8 and Table 9 below:

Table 8: National Strategy Documents

Document	Summary and Project Implications
Transport Development Strategy for Montenegro (2018-2035)	This document summarises national transport conditions and establishes mid -long-term concepts for infrastructure and transport development based on the principles of safety, intramodality, application of modern technologies, complementary use of all modes of transport and rational use of national capacities and resources. *The project directly supports this strategy which includes specific objectives regarding planning of new traffic routes out of sensitive areas and* ***relieving bottlenecks in the tourist season*** *which are directly relevant to the project.*
Transport Development Strategy SEA Report	The Report identifies positive and negative impacts of the Strategy in terms of air quality, climate change, protected goods, biodiversity, landscape, land, water, cultural and historical heritage, agriculture, forestry, hunting, tourism and socio - economic characteristics. It also includes measures to prevent, limit, reduce or eliminate any significant identified impact and monitoring and corrective measures. *The Project has been designed to minimise adverse impacts and maximise project benefits in line with recommendations included within the SEA.*
Road Transport Safety Improvement Strategy (2010-2019)	The Strategy defines national guidelines and measures needed for road transport safety. Serves as the basis for a reform of road transport safety and defines development and functioning of the road transport safety system in Montenegro. *The Strategy includes specific reference to improvement of transport safety through reconstruction of the M-2 Tivat-Jaz road section.*
National Strategy on Climate Change (to 2030)	The Strategy includes recommended climate change measures for the transport sector such as increasing use of ICT (smart urban applications); alternative fuels (including biofuels) and use of electric vehicles.

Table 9: National and Regional Spatial Plans

Plan	Summary and Project Implications
Spatial Plan of Montenegro by 2020	Outlines proposals for the national road infrastructure in Montenegro and includes plans for coastal road upgrades including the Tivat – Budva area. *The Project is highlighted as a corridor for improvement in the SPM*
Special Purpose Spatial Plan for the Coastal Area, 2018	Outlines the route of the Adriatic highway through the coastal area of Montenegro. *The project is included within the spatial plan.*
Spatial Plan of Municipality Tivat with SEA Report, 2010	Stipulates that after a bypass is built, the Adriatic Highway will become the primary city road.- *The Project is included within the Plan which requires the existing highway profile to be expanded to two lanes of 5.5m with green strip, two-way cycle path and footpath, in total of 22m. Roundabouts are envisaged along the road through the city to improve traffic safety and reduce speeds.*
State Location Study, Airport Tivat – Section 24	Stipulates that it will be necessary to relocate part of the existing Tivat - Budva main road to the north to enable long-term development of Tivat airport. *The Project is aligned with this plan.*

4.4 National Legislation

Spatial planning and construction legislation

The key legislation is the **Law on spatial planning and construction (Official Gazette of Montenegro No. 064/17, 044/18, 063/18).** This governs the system of spatial planning and requirements for construction and includes requirements for construction of facilities as well as defining requirements and obligations of the employer (investor), contractor and engineering supervisors, as the main participants in construction. It also prescribes the process for final designs and employer obligation to provide an engineering supervisor during the construction to control the execution of works as per the reviewed final design, this Law and regulations. Under this legislation the supervisor must also control: the compliance of works; quality of materials labour; regular monitoring of progress within contracted limits; undertaking of measures ordered by the contractor to eliminate deficiencies and the compliance of work with environmental protection measures. According to Article 95, the contractor shall execute work in agreement with the reviewed final design, marked boundary and building lines and the elevation points of the structure and terrain alignment. Includes specific requirements to ensure unimpeded traffic access, regarding temporary structures and monitoring and management requirements regarding structural safety, occupational health and safety and environmental protection as well as soil stability and waste (see also waste management plan and regulations). *The Project has been designed to comply with all the above requirements.*

National Environmental Requirements

The key national EIA regulation relevant to the projects is the law "on determining projects for which an environmental impact assessment shall be carried out - Official Gazette of Montenegro No. 20/07 and 47/13). The Project falls under List 1 of the Montenegrin EIA and as such an EIA study is mandatory. Baseline data for the national EIA was gathered in Q2/Q3 of 2019 before being issued in October 2019 to NEPA. Public consultations regarding the national EIA were held in December 2019 and the EIA itself is currently in review stage.

Additional applicable EIA legislation is outlined in Table 10 below.

Other National Legislation

The project is also subject to a range of key national legislation. General legislation is outlined below. Topic-specific legislation is included within each of the relevant chapters.

Table 10: National EIA Legislation

Legislation	Summary
Law on Environment ("Official Gazette of Montenegro", No. 52/16)	Regulates, instruments and measures principles of environmental protection and sustainable development. Article 9 requires rational use of natural resources, incorporation of environmental protection costs within investment and production costs, and implementation of regulations, i.e. undertaking of environmental protection measures in accordance with this Law and other regulations.
Law on the Strategic Environmental Impact Assessment (SEA) ("Official Gazette of Montenegro", No. 80/05, "Official Gazette of Montenegro", No. 40/11, 59/11, 52/16)	Determines the conditions, methods and procedures to assess the impacts of certain plans and programs on the environment. Environmental protection principles are integrated thoroughly into the procedures for preparation, adoption and implementation of plans and programs that have significant environmental impact, including those in the field of transport.
Law on the Environmental Impact Assessment (EIA) ("Official Gazette of Montenegro", No. 75/18).	Prescribes procedures for carrying out EIA studies for projects that may have significant environmental impact. Contents of the EIA study, participation of interested parties, evaluation of EIA studies and issuing approvals, notification of other states on projects with potential transboundary effects, supervision and other relevant issues are also addressed.

Table 11: Additional Environmental Legislation

Legislation	Summary
Law on Liability for Environmental Damage ("Official Gazette of Montenegro", No. 27/14).	Defines responsibility of the legal entity and the entrepreneur (operator) that caused damage or imminent danger to the environment. Environmental damage compensation is based on the polluter pays principle, according to which the legal and physical person who caused damage in the environment or imminent danger of causing damage must compensate by implementing preventive and remediation measures at their own expense. The Law introduces compulsory insurance, according to which the legal and physical person performing activities that pose a risk to human health and / or the environment shall be obliged to ensure liability for environmental damage.
Law on Waste Management (Official Gazette of Montenegro, No. 64/11 and 39/16)	This Law regulates types and classification of waste; planning of waste management; conditions for waste collection transport, treatment, storage and disposal; rights, duties and responsibilities of legal and physical persons involved in waste management; and conditions and procedures for waste management permits. Based on provision of the Law on waste (article 10) and "polluter pays principle" waste producers (legal or non-legal entities) are responsible for management of waste that they produce. Different types of waste should be collected separately, such as metal, plastic, glass and biodegradables (this is obligatory - article 11, Law on Waste). Collection of waste can only be carried out by registered companies or entrepreneurs with adequate equipment and personnel (Law on Waste, article 36). The Law (Article 54) prescribes methods for storing and disposal of construction waste; the need for development of a waste management plan and its content, reuse of construction waste on site, collecting and processing of the construction waste and handling with the cement asbestos waste. Other applicable regulations: • *Rulebook on more detailed content and method of drafting waste management plan for waste producers ("Official Gazette of Montenegro", No. 05/13 dated 23 January 2013);*

	• *Rulebook on methods for testing hazardous waste properties and closer conditions to be fulfilled by an accredited laboratory for hazardous waste testing ("Official Gazette of Montenegro ", No. 21/2014);* • *Rulebook on waste classification and waste catalogue ("Official Gazette of Montenegro", No. 059/13 083/16);* • *Rulebook on construction waste treatment, method and procedure of construction waste processing, conditions and manner of disposal of cement asbestos construction waste ("Official Gazette of Montenegro", No. 050/12).*
Water Law, 2007	This Law regulates the legal status and all necessary standards and requirements for obtaining the integrated water management regarding the waters and related issues on the territory of Montenegro
Law on Air Protection, 2010	This Law prescribes various standards, requirements and methods for the mandatory protection of the air quality on the territory of the Montenegro
Law on Nature Protection, 2017	This Law provides the general conditions and manner of protection and conservation of nature, which as a group of environmental and natural resources and assets enjoys full protection within the territory of Montenegro

Table 12: National Health and Safety Legislation

Legislation	Summary
Law on Safety and Health at Work ("Official Gazette of Montenegro", No. 34/14, 44/18)	The employer is obliged to ensure protective measures by preventing, removing and controlling the risk at work, informing and training employees, along with appropriate organization and the necessary resources. Bearing in mind the changing work environment, the employer is obliged to implement safety measures and select such working and production methods that will ensure improved or higher levels of H&S. While assigning an employee to a position with special working conditions or with increased risk, the employer must take into account the employees' abilities, which may affect their protection and health. In accordance with the Law on Safety and Health at Work, the employer is obliged to provide the employees with a training for safe operation, at the time of concluding employment, assigning him or her to another position, introducing new technology, introducing new or replacing work equipment, making changes in work processes and re-assigning him or her to work after absence of more than one year. Additionally, the employer must inform the employers or employees' representative in writing about: Risks related to health and safety at work, protective measures and activities related to each type of workstation and/or job, the manner of organization and provision of first aid, fire-fighting, evacuation procedure for employees in cases of serious and immediate danger and the persons responsible for implementing these measures.

Table 13: National Cultural Heritage Legislation – see chapter 11.(Social)

Legislation	Summary
Law on Protection of Cultural Properties ("Official Gazette of Montenegro", No. 49/10 and 044/17)	This Law regulates the types and categories of cultural resources, the ways of establishing protection, the regime and measures of protection, the rights and obligations of owners and holders of cultural resources and other issues of importance for protection and preservation of cultural resources. According to Article 87, if an archaeological site is discovered during execution of construction works and activities on land or in water, the contractor is obliged to stop the works and to protect the site or findings from possible damage, destruction and unauthorized access by other people. Additionally, the contractor is obliged to immediately notify the administration about the findings, i.e. the site. According to

	Article 88, the administration is obliged to determine whether the subject site represents an archaeological finding and to secure the site, whereby these activities should be carried out no later than one day from notification about the discovery. After the review, a decision will be issued that will determine whether execution of works will be continued under supervision of an archaeologist, the works will be suspended, or whether appropriate archaeological research will be carried out. Temporary suspension may last up to 30 days.

Construction Permit

On March 14, 2019, the Ministry of Sustainable Development and Tourism (MSDT) issued urban-technical conditions, defining the conditions and measures for the development of technical documentation regarding the project. Along with the request for a construction permit, this requires the TA to submit the following documents:

- Main Design (along with a report on the performed revision);
- Proof of ownership;
- Consent of all owners of construction land;
- Other permits and approvals determined by specific regulations, (including approval to the EIA Study).

Water Permit

If required to the TA must obtain a water consent permit regarding any works in the riverbeds. This requires technical documentation for the facilities and works to be prepared in accordance with water conditions. This ensures that the facilities and installations are built in line with the water consent.

4.5 Lender Requirements

Projects are expected to meet Good International Practice (GIP) related to E&S sustainability. To help clients and/or their projects achieve this, the EBRD has defined specific Performance Requirements (PRs) for key areas of E&S sustainability. PRs 1, 2, 3, 4, 5, 6, 8 & 10 are considered relevant to the Project as listed in Table 14 below.: PR 7 & PR 9 are not considered relevant to this Project since no Indigenous peoples are present within the PAA and no financial intermediaries are being supported by this Project.

Table 14: Relevant EBRD Performance Requirements

Requirement	Summary
PR1: Assessment and Management of Environmental and Social Impacts and Issues –	Establishes the importance of integrated assessment to identify the environmental and social impacts/issues throughout the life of the project.
PR2: Labour and Working Conditions –	Expresses the need for establishing a human resources management system which guarantees respect of workers' rights and provides them with safe and healthy working conditions.
PR3: Resource Efficiency and Pollution Prevention and Control –	Recognizes the need to adopt and adhere to the approach which enables the client to avoid (where possible) or control, the harm to the environment caused by the project.
PR4: Health and Safety –	Recognizes the need to establish a system for managing health and safety of issues related to road users and affected communities, as well as workers and contractors.
PR5: Land Acquisition,	Establishes the need to avoid or minimize involuntary resettlement

Involuntary Resettlement and Economic Displacement	and to ensure fair compensation to affected persons.
PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources –	Establishes the need to assess the risks and impacts on biodiversity alongside the development of biodiversity conservation measures.
PR8: Cultural Heritage –	Establishes the need to identify, as part of the environmental and social assessment process, potential adverse impact on cultural heritage.
PR10: Information Disclosure and Stakeholder Engagement	Recognises the importance of a Stakeholder Engagement and consultation process.

4.6 Applicable Guidance Notes

In the addition the PRs and relevant legislation, the following guidance notes have been followed to inform this assessment:

- Good Practices for the Collection of Biodiversity Baseline Data, EBRD, 2015
- Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning, EBRD, 2014
- World Bank Environmental, Health and Safety Guidelines (EHS Guidelines)[11]
- EBRD protocol for assessment of greenhouse gas emissions
- Methodological Tools of UNFCCC/CCNUC/ "Estimation of GHG emissions related to fossil fuel combustion in A/R CDM project activities"
- Relevant international protocols relating to environmental and social issues
- Guidance Notes on 'Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labour Influx' WB, 2016.
- Good Practice Note on 'Addressing Gender Based Violence in Investment Project Financing Involving Major Civil Works WB, 2018'
- Good Practice Note on 'Managing Contractors Environmental and Social Performance, ICF 2017)

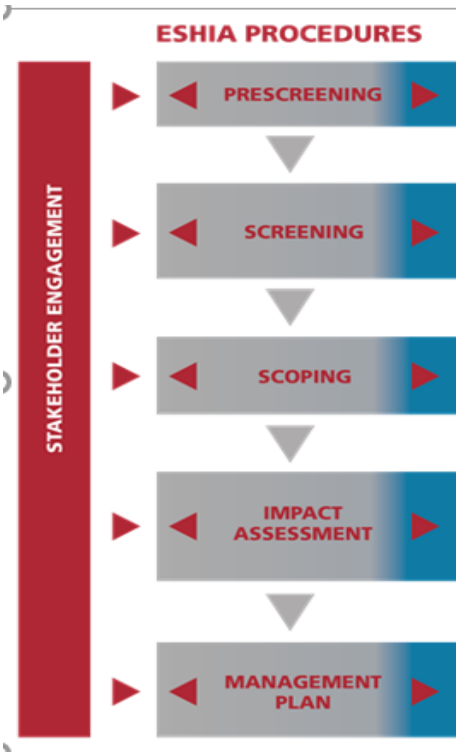
[11]https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

5 ESIA Approach and Assessment Methodology

5.1 Overview

The following generic ESIA process has been applied to the Project:

Figure 5: ESHIA Procedures and Related Activities



As such the work has involved a combination of

- Pre-study activities such as screening, preliminary assessment and scoping to help establish key considerations in advance of detailed studies;
- The impact assessment study, which results in the identification and assessment of impacts and the development of measures to mitigate and reduce or eliminate adverse impacts; and
- The post-study stage, which includes steps undertaken for review and monitoring to ensure that mitigation measures are implemented and are effective during construction and operations. It also includes adaptive management; to modify mitigation measures if they prove to be inadequate or inappropriate.

5.2 Baseline Survey Methodologies

Baseline survey methodologies are described in the relevant assessment chapters in this document.

5.3 Impact Assessment Methodology

5.3.1 General Considerations

The assessment of impacts has been an iterative process that considers several key questions:

- **Identification** – how can the Project interfere with the environment and people, considering both the specific project-related activities that will be carried out, and existing baseline conditions;
- **Prediction** – what will happen to the environment and people as a consequence of the potential impacts associated with the Project?
- **Evaluation** – does this impact matter? How important or significant is it?
- **Mitigation** – if it is significant can anything be done about it?
- **Residual Impact** – is it still significant?

This section describes the general approach followed in the ESIA to address the above-mentioned

questions. Further detailed information on specific methodologies, in particular with regards to the significance criteria (and their derivation) applied for the assessment of impacts, is specified in the "Methodology" section of each technical section. Where significant residual impacts remain, further options for mitigation have been considered and impacts re-assessed until they are as low as is technically and financially feasible for the Project and would be deemed to be within acceptable levels.

5.3.2 Impact Identification

A logical and systematic approach has been undertaken to impact identification, in order to ensure that the key issues are identified and classified into impact categories for further study. It has sought to take account of all of the important environmental / project impacts and interactions, making sure that indirect and cumulative effects, which may be potentially significant, are not inadvertently omitted. The approach has involved the following:

1. Specific project-related activities that will be carried out in order to construct and operate the Project were reviewed and **potential sources of impact** were identified
2. Taking into consideration the existing baseline conditions and the potential presence of sensitive receptors within the project area, an evaluation was carried out of how the Project will be likely to interfere with the environment and people, and a number of potential impacts were identified for each topic;
3. A preliminary assessment, using professional judgement, was undertaken in order to decide, for each potential impact, whether:
    a. It is likely to have significant (or important) consequences for sensitive receptors, in which case such impact was "scoped in" for further assessment; or
    b. It is deemed likely to be insignificant (or have minor consequences), in which case such impact was "scoped out" from further assessment, with an explanation of the reasoning for the "scoping out" provided.

5.3.3 Impact Prediction

For all "scoped in" impacts, the ESIA has sought to predict what changes (impacts) Project-related activities will induce and to assess in further detail the potential scale and characteristics of those impacts. Impacts are classified either as:

- **Negative**: the impact factor causes a worsening of the environmental or socio-economic state or quality; or
- **Positive**: the impact factor causes an improvement of the environmental or socio-economic state or quality.

The ESIA has then described the predicted likely impacts (and as far as practicable quantified them) according to a series of criteria / impact-related features, such as:

- **Magnitude:** Extent of the impact, generally in terms of a quantifiable measure (its size, scale or intensity);
- **Geographic extent and distribution:** Area where the impact exerts its influence (i.e. site specific, local, regional, national, global);
- **Duration:** Length of time when the impact occurs (short term, intermittent, long term,

continuous);

- **Reversibility:** Possibility to restore the qualitative state of the component: reversible (short-, mid-, or long-term) or irreversible;
- **Frequency**: How often the potential impact occurs / how frequently the receptor will experience the impact (rare, infrequent, intermittent, occasional, frequent);
- **Probability of occurrence**: Likelihood of the impact occurring or probability of a specified outcome (chance of something happening): related with the uncertainty or confidence in the prediction.

The sensitivity of the identified receptors has also been considered. **Sensitivity** is the sum of the conditions that characterise the present quality and/or trends of specific environmental and social components and/or of their resources. The sensitivity of environmental and social components / receptors is assessed on the basis of the presence/absence of some features, which define both the current degree of quality, and the component's susceptibility to environmental changes. The quality or importance of a resource or receptor is judged taking into account, for example, its' local, regional, national or international designation, its importance to the local or wider community, its ecosystem function or its economic value.

Finally, the prediction takes account of mitigation measures that are already an integral part of the design of the Project.

5.3.4 Impact Significance

An assessment has then been made of the what the impact means in terms of its importance to the social and environment receptors to help stakeholders understand how much weight should be given to the particular issue in determining their view of the Project.

Table 15: Impact Significance Matrix

Receptor Sensitivity	Impact Intensity/Magnitude/Likelihood				
	Beneficial	Negligible impact	Low impact	Moderate Impact	High Impact
High Sensitivity (eg CH/PBF triggers)		L	M	H	H
Moderate sensitivity (other natural habitat)		N	L	M	H
Low sensitivity (Other modified habitat)		N	N	L	M
Not sensitive (built on)		N	N	N	L

Adverse Impact Significance levels: N = negligible L = low, M = moderate, H = high

Where an impact is judged as 'significant' (in isolation or in combination with other impacts and based on the judgement of the ESIA team, informed by reference to national legal standards, national and regional government policy, EBRD's requirements, current international good practice/standards and the views of stakeholders) specific mitigation is required to reduce that significance as far as practicable. This mitigation should follow the "mitigation hierarchy" or avoid, minimise, restore and offset/compensate . Criteria for assessing the significance of impacts have

generally been defined for each particular "scoped in" impact. Typically, these criteria take into account whether the Project will:

- Cause legal or accepted environmental standards to be exceeded, e.g. air, water or soil quality, noise levels, or make a substantial contribution to the likelihood of exceedance;
- Adversely affect protected areas or features, or valuable resources, e.g. nature conservation areas, rare or protected species, protected landscapes, historic features, high quality agricultural land, important sources of water supply, other key ecosystem services;
- Conflict with established government policy.

Where insufficient quantitative information was available to allow a quantitative classification of the impacts, a qualitative evaluation has been generated aiming to classify impacts in one of the following four categories: "**low**", "**moderate**", "**high**", and "**extreme**", encompassing all of the features of the predicted impacts, as described above. Any negative impacts classified as "Low" or "Moderate" are considered to be '**not significant**'. Any negative impacts classified as "High" or "Extreme" are considered to be '**significant**'.

5.4 Mitigation

Impact assessment is designed to ensure that decisions on projects are made in full knowledge of their likely impacts. A vital step within the process is the identification of measures that will be taken by a project to mitigate its impacts. In some instances, mitigation will be inherent in design and in others mitigation measures will need to be identified during the ESIA process. The ESIA process has therefore involved identifying where negative impacts could occur and then working with the Project team to identify and develop technically and financially feasible and cost-effective means of mitigating those impacts to levels that are deemed acceptable.

5.5 Assessing Residual Impacts

Following agreement on technically and financially feasible and cost-effective mitigation, the ESIA team has, where necessary, re-assessed the impacts taking into account the further mitigation commitments integrated into the design, construction and operation of the Project.

5.6 Decommissioning

Decommissioning has not been considered in this ESIA, given the assumed design life of the Project, and because decommissioning impacts are not expected to be worse than those considered during the construction and operational phases.

6 Traffic and Transport

6.1 Introduction

The Project is part of the M-2 Debeli Brijeg - Tivat – Budva road, one of the busiest and most strategic routes in Montenegro serving the coastal regions and an important tourist link for the country. This section describes the existing and likely future transport infrastructure and road and addresses potential impacts (beneficial and adverse) to them. Mitigation is prescribed to reduce residual adverse impacts to the greatest extent practical.

6.2 Relevant Legislation and Guidance

The following national legislation is considered pertinent to this section:

- ***Law on Roads (Official Gazette of Montenegro No. 42/04, 36/11, 92/17)*** - Governs the legal status, development, maintenance, protection, management and financing of works on public roads. Includes contractor requirements regarding road reconstruction and maintenance (Articles 23 and 26) and requirements to inform the public about commencement of the reconstruction work at least 10 day in advance (Articles 34 and 35).
- ***Law on Road Transport Safety (Official Gazette of Montenegro 33/12, 58/14, 14/17, 66/19)*** - Governs the rules for road transport, obligations of participants in traffic and other actors in transport, traffic restrictions, traffic signalization, markings, signs and commands that all the participants in traffic must adhere to. Also defines driver and vehicle requirements and other traffic rules and measures. Includes requirements for informing the public about closure or traffic restriction and use of traffic signals.

6.3 Methodology

Data for this assessment has been obtained from literature review, remote appraisal and insight from comparable studies. Traffic and speed data have been obtained from the Radanovici traffic counter, located as shown in the figures below. Traffic counters record motorised vehicles only and so there are no records of cyclists or carts etc.

A second counter site has also been introduced on the road at Lovanja, near to the airport but a full set of data from this counter is not yet available. Analysis of the partial data recorded between August 2019 to November 2019 suggests that flows are similar to the Radanovici counter with speed data showing the majority of traffic flows fairly evenly distributed between two bands, 40-60kph and 60-80kph (in both directions) during the summer. The higher speed band (60-80kph) is the most populated speed band in the winter months, which is assumed to be a result of the reduced traffic flows.

Figure 6: Radanovici Traffic Counter Location

The following data limitations apply to the traffic data used from the Radanovici site:

Table 16: Radanovici Traffic Data Limitations[12]

Issue	Detail
24-hour data	Traffic count data has only been made available as total 24hr flow rather than broken out throughout the day (ideally at 15 minute intervals). As a result day and night, peak hours etc cannot be determined.
Specific locations	No traffic count information is available from particular congested or key focus areas, (eg junction locations). No data are available on turning movement counts to and from side roads (which can impact on capacity).
Traffic speeds	The Radanovici counter is located in a more urban environment than other sections of the road (see figure 1 & 2) and the slow average speeds recorded may not be representative of other sections of the road. The proposed road upgrade is also likely to result in increased vehicle speeds so speed data should be used with a degree of caution.
Vulnerable road users	No information is available on vulnerable road user movements (including pedestrian movements). The latter would be useful to confirm the suitability of the proposed pedestrian crossing provision and location. If pedestrian facilities are located where desire lines do not exist, the facilities will not be used.

For future traffic flow growth for the project road an assumed annual growth rate of 4% has been adopted. This figure has been mentioned in the supporting background data provided to the project team and is reflective of the annual increase identified from an analysis of earlier AADT flow counts year on year at Radanovici. Based on traffic growth at 4% per annum for 15 years, the upgraded project road would appear to adequately support the additional increase in flows within the link sections (and based on an assessment of the criteria in the UK the Design Manual for Roads and Bridges – DMRB - TA 79/99 which provides information on predicted maximum vehicle capacities for various road layouts). It should be noted that this is an assessment of link sections only where no turning movements or junctions, or other elements which may disrupt traffic flows are present.

[12] Further traffic count information would enable a better understanding of high turning movements to and from the project road and confirm the suitability of the proposed junction types, and locations.

6.4 Baseline Conditions

6.4.1 Existing Conditions

Traffic Flows

The road is currently characterised by high seasonal variation in traffic flow and high risk of traffic accidents. Passenger cars are considered to represent the most frequent type of vehicles, with heavy trucks having a generally low rate of representation. Peaking traffic flows occur in the summer months with annual average daily traffic flows (AADT) increasing from less than 11,000 vehicles/day in winter (January 2019) to almost 27,000 vehicles/day in summer (August 2019) as shown in the Tables below. There is little difference in flows between the two directions.

Table 17: Seasonal Traffic Flows from Radanovici Traffic Counter 2018 - 19

Date	Direction 1	Direction 2	Total
Winter flows			
November 2018	197,596	196,820	394,416
December 2018	213,609	202,559	416,168
January 2019	165,880	173,798	339,678
Summer flows			
June 2019	326,410	323,730	650,140
July 2019	402,817	379,095	781,912
August 2019	406,635	426,014	832,649

Traffic Speeds

Traffic speed data from the Radanovici traffic counter site is shown in Table 19 and Table 20 overleaf. Given its location within an urban area (with a 50 kph speed limit) unsurprisingly most vehicles were recorded as travelling close to or within this limit. Speeds in more rural areas are expected to be higher. Less traffic was recorded in the 60-70kph range in the summer (down from 21% to 16%). Speed figures calculated in August 2019 were recorded in 20kph speed intervals and therefore were not able to be included in the analysis presented below.

Table 18: Montenegro National Speed Restrictions

Speed limits in built up areas	50 km/h (all vehicles)
All other main roads	80km/h (all vehicles)

Table 19: Traffic Flows by Recorded Speeds and Percentage Nov 18 - Jan 19

Vehicle Speed KMs/Month	< 10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150
Direction 1	167	808	2,737	10,669	52,618	89,168	31,596	6,422	2,126	745	364	89	77	19	4
Direction 2	55	220	2,334	8,083	39,310	89,207	44,638	8,882	2,584	844	398	112	106	32	7
November 2018 Total	222	1,028	5,071	18,752	91,928	178,375	76,234	15,304	4,710	1,589	762	201	183	51	11
Direction 1	133	778	2,519	10,906	56,435	96,191	35,784	7,167	2,367	811	340	92	76	14	6
Direction 2	138	548	2,597	7,890	41,083	92,617	45,093	8,629	2,504	885	389	101	63	24	4
December 2018 Total	271	1,326	5,116	18,796	97,518	188,808	80,877	15,796	4,871	1,696	729	193	139	38	10
Direction 1	120	335	1,139	4,955	32,541	78,588	35,986	8,004	2,672	954	412	95	59	22	6
Direction 2	61	253	1,218	4,107	25,902	78,401	48,246	10,636	3,300	1,070	392	102	83	19	7
January 2019 Total	181	588	2,357	9,062	58,443	156,989	84,232	18,640	5,972	2,024	804	197	142	41	13
Total 3 months	674	2,942	12,544	46,610	247,889	524,172	241,343	49,740	15,553	5,309	2,295	591	464	130	34
Percentage	**0.06**	**0.26**	**1.09**	**4.05**	**21.55**	**45.57**	**20.98**	**4.32**	**1.35**	**0.46**	**0.20**	**0.05**	**0.04**	**0.01**	**0.00**

Table 20: Traffic Flows by Recorded Speeds and Percentage June 18 – July 19

Vehicle Speed KMs/Month	<20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	>150
Direction 1	1,317	2,660	16,017	90,590	151,779	49,330	9,104	3,010	1,239	514	119	77	29	4	9
Direction 2	1,148	3,790	14,210	68,420	149,806	68,294	11,884	3,641	1,392	608	144	129	49	14	24
June 2019 Total	2,465	6,450	30,227	159,010	301,585	117,624	20,988	6,651	2,631	1,122	263	206	78	18	33
Direction 1	962	2,754	22,462	129,072	181,839	50,907	9,112	3,245	1,331	493	141	117	22	3	8
Direction 2	3,312	6,940	20,491	87,330	170,652	71,365	12,280	3,724	1,317	641	151	139	42	18	21
July 2019 Total	4,274	9,694	42,953	216,402	352,491	122,272	21,392	6,969	2,648	1,134	292	256	64	21	29
Total 2 Months	6,739	16,144	73,180	375,412	654,076	239,896	42,380	13,620	5,279	2,256	555	462	142	39	62
Percentage	**0.47**	**1.13**	**5.11**	**26.21**	**45.67**	**16.75**	**2.96**	**0.95**	**0.37**	**0.16**	**0.04**	**0.03**	**0.01**	**0.00**	**0.00**

Non-Traffic Flow Issues

The following non-traffic flow issues have been considered during this impact assessment:

- **Pedestrian Flow:** Pedestrian flow data is not currently available. TA or its Contractor will need to determine key locations where this would be required, in consultation with all relevant organisations, and suitable surveys undertaken. This exercise would assist in identifying the impacts of the project on pedestrians, for example identifying areas where heavy vehicle flows increase by a significant percentage and significant numbers of pedestrians are affected. Appropriate remedial measures may therefore be designed in subsequent stages, e.g. construction logistics plan.
- **Public rights of Way and Cycle routes:** Public rights of way have currently not been identified. This would need to be undertaken as part of detailed construction logistics, to ensure public rights of way are maintained, particularly during the construction phase. Cycle routes have not been explicitly identified at this baselining stage, as construction routes are not yet known.
- **Bus services:** Bus traffic between Tivat and Jaz is organized by private companies with journeys taking between 45 minutes and three hours for bus transport between the two municipalities. The project design plans for 20 bus stops that will be located along the upgraded route. Possible bus traffic changes will be further elaborated in the Construction Traffic Management Plans to be prepared by the contractor and coordinated with TA.
- **Personal Injury Accidents:** A review of personal injury accidents in key locations where construction traffic is predicted to interact with general traffic should be undertaken. Ideally this would cover a five-year period, and would be undertaken in consultation with local government agencies, local police, and other relevant organisations. This would allow specific areas or intersections to be identified, and may reveal locations where remedial measures would be required/recommended.

6.5 Impact Assessment

6.5.1 Construction Phase Impacts

Table 21 below sets out the key sources of potential construction phase impact that were considered.

Table 21: Scoping Matrix - Project Construction Phase

Source of Impact	Receptor(s)	Impact	Key Receptor Sensitivities	In/Out and Justification
Increased vehicle traffic to and from the active construction sites	Road Users (including local residents); Biodiversity*, Air Quality*, Noise and Vibration*	Vehicular access to active construction sites may result in localised traffic delay and congestion	Driver delays, pedestrian delays and a reduction in pedestrian amenity value (i.e. the pleasantness of the journey) and an increased risk of accidents, especially around site access points.	IN - Disruption caused by the construction of the road.
Partial road closures or diversions	Road Users (including local residents)	Alternative routes may result in Increased journey lengths and times; and localised congestion.	Driver and Pedestrian delays.	OUT - This will be covered under the Social Report
Increased vehicle traffic/construction plant levels	Existing Road Network Users	The quality of access roads may reduce	There may be deterioration of roads, an increase in potholes, muddy roads etc.	OUT - Scoped out with regard to additional studies,

* Potential impacts due to an increase in vehicle traffic/fixed and mobile constriction plant levels on noise, air quality and biodiversity are covered in the relevant other Topic Sections within this S-ESIA Report. Following a further assessment of the potential impacts of the project during the construction phase, it become clear that, apart from "Traffic delay and congestion", other impacts should be further analysed in the S-ESIA, namely Road Safety; Vulnerable Road Users; and Public Transport.

The significance criteria for the assessment of construction impacts on traffic and transport are defined in the table below:

Table 22: Significance Criteria for the Classification of Impacts Associated with Delay and Congestion

Negligible	Low	Medium	High	Very High
Delay and Congestion				
Very minor increase in construction traffic, good highway infrastructure, and no existing congestion.	Very minor increase in construction traffic, poor highway infrastructure, and difficult terrain to overtake HGVs.	Small increase in construction traffic, good highway infrastructure, and some existing congestion at junctions.	Small increase in construction traffic, poor highway infrastructure, and difficult terrain to overtake HGVs or existing congestion at junctions.	Major increase in construction traffic, poor highway infrastructure or congested urban environment.
Road Safety				
Very minor increase in	Very minor increase in construction traffic.	Small increase in construction traffic.	Small increase in construction traffic.	Major increase in construction traffic.

Negligible	Low	Medium	High	Very High
construction traffic. No existing road safety issues, sufficient width and visibility to overtake HGV's, no vulnerable road users	No/low existing road safety issues, difficult terrain to overtake HGVs, some vulnerable road users	Existing road safety issues, difficult terrain to overtake HGVs, some vulnerable road users	Significant existing road safety issues, difficult terrain to overtake HGVs, some vulnerable road users	Significant existing road safety issues, difficult terrain to overtake HGVs, high numbers of vulnerable road users
Vulnerable Road Users				
Very minor increase in construction traffic. No vulnerable road users	Very minor increase in construction traffic. Some vulnerable road users. Good facilities for vulnerable road users	Small increase in construction traffic. Some vulnerable road users. Good facilities for vulnerable road users	Small increase in construction traffic. Some vulnerable road users. Poor facilities for vulnerable road users	Major increase in construction traffic. High numbers of vulnerable road users. Poor facilities for vulnerable road users
Public Transport				
Very minor increase in construction traffic. No public transport provided	Very minor increase in construction traffic. No or very infrequent public transport services provided. No diversions / suspensions of services	Small increase in construction traffic. No or infrequent public transport services provided. Minor effect on services, e.g. temporary traffic signals	Small increase in construction traffic. Multiple public transport services provided. Diversions / suspensions of services	Major increase in construction traffic. Significant number of public transport services provided. Significant diversions / suspensions of services

The following activities are expected to represent sources of impact:

- movement of construction vehicles and heavy plant to and from sites,
- transportation of materials, goods and workers to and from sites,
- partial road closures to enable works to take place.

Construction activities will change existing traffic flows and create additional pressures on existing pinch points (with associated increased risk of accidents) that will affect other road users as well as local populations along the proposed road footprint and any associated haul routes. (Impacts on other receptors such as biodiversity are covered in Section 9). The significance of such impacts is affected by the existing road size (capacity) and conditions as well as existing vehicle movement numbers, road user delay, traffic bottlenecks and road safety hot-spots. Numbers of vulnerable road users and existing public transport provision are also important. .

Additional numbers of vehicle movements generated by the works are expected to be relatively small, when compared to volumes of existing traffic using the road network (even in winter) and the existing highway capacity:

- Road construction projects typically require a significant amount of heavy machinery and therefore labour input is reduced, resulting in a low number of workers travelling to and

from the site each day.

- There will be a site project office throughout the construction phase with various engineering staff and support staff present. There are expected to be no more than 15 staff located in the office, resulting in a low number of vehicle trips which are likely to be dispersed over the day.
- Recycling old road materials, using balanced cut and fill during construction as far as possible and minimising haul distances for materials etc, will all help to reduce traffic impact from construction traffic.

The appointed Contractor will prepare a travel plan which will include the requirement to minimise staff trips to site and will include agreed haul routes for trucks which minimises impact on local communities. Vehicle movements will be planned off-peak, and advanced information will be provided to local communities to minimise disruption.

Impacts of Construction Vehicles

Such impacts are expected to be of **low significance** only. Of greater importance are impacts associated with the nature of construction traffic and works. These include the following:

- **Road User Delay** as a result of activities, especially should simultaneous construction happen at more than one site.
- **Road Safety Issues:** Increased delays (including those associated low moving vehicles) may increase levels of overtaking with associated safety issues.
- **Vulnerable Road Users**: Vulnerable road users and pedestrians can be at particular risk of increased accidents.
- **Public Transport**: Construction logistics may affect public transport routes including re-routing of bus services;

Such impacts are generally considered to be of **low to medium significance** overall with key impacts described further below**. (**Impacts associated with increased levels of Noise, Vibration and Air Pollution are addressed in separate sections).

Table 23: Construction Traffic Risk Assessment

Factor	Phase	Receptor Sensitivity	Timeframe	Consequence	Probability	**Significance**
Delay and Congestion	C & O	Medium	S-T	Moderate	Likely	**Moderate Adverse**
Road Safety	C	Low	S-T	Serious	Possible	**Moderate Adverse**

Insufficient information is available at present to assess the significance of impacts on vulnerable groups and public transport. Impacts may also result from roadway infrastructure degradation, in particular as heavy vehicles can damage the roadway surface, kerbs and pavements but this is not considered a significant adverse impact as the entire road is to be replaced.

6.5.2 Operational Phase Impacts

Studies by the national RTA indicate that traffic volumes are expected to grow at a rate of around 4% per annum over the next 15 years as shown in the table below. These demonstrate estimated monthly traffic numbers doubling over that time from around 383k (winter) - 754k (summer) in 2019 to 691k to 1.36M in 2034.

Table 24: Expected Seasonal Traffic Flows (Winter and Summer) Based on Annual Traffic Growth of 4% per Annum

Traffic Flows	Nov-Jan	Jun-August
Base Year (2018-2019)*	1,150,263	2,264,701
2020	1,196,274	2,355,289
2021	1,244,124	2,449,501
2022	1,293,889	2,547,481
2023	1,345,645	2,649,380
2024	1,399,471	2,755,355
2025	1,455,450	2,865,569
2026	1,513,668	2,980,192
2027	1,574,214	3,099,400
2028	1,637,183	3,223,376
2029	1,702,670	3,352,311
2030	1,770,777	3,486,403
2031	1,841,608	3,625,859
2032	1,915,272	3,770,894
2033	1,991,883	3,921,729
2034	2,071,559	4,078,599
*Based on 3 months traffic flow		

Road users

This increase in numbers means that operational benefits are likely to erode over time as traffic figures numbers grow, in the short term the following benefits are expected:

- **Reduced Journey times** for most travellers as there will be less congestion particularly during the peak summer months. This is considered a **significant beneficial impact**. The introduction of the median may however result in some additional journey time for local road users who currently use left turn movements and who will need to be conducted through the nearest roundabout/junction. This is considered a low adverse impact (see connectivity below).
- **Improved road safety:** the divided road will improve road safety in terms of a reduced likelihood of head-on type crashes. This is considered a **moderate beneficial impact** as it may also encourage higher vehicle speeds. (Drivers typically feel more comfortable and safer driving faster on a divided road layout and this may represent a risk to road users, including vulnerable users within settlements).
- **Reduced connectivity and access:** The proposed road upgrade will result in a reduction in the levels of connectivity with each side of the project road. The introduction of the

central dividing median will prevent left in and out movements from premises along the roadside and drivers will need to proceed to the nearest junction or roundabout. This is considered a **moderate adverse** impact.

Pedestrians

The upgraded road will provide a more challenging environment for pedestrians as they will need to cross 4 lanes of traffic rather than 2 (although the central median will provide a refuge area). Increased traffic speeds may also be a concern and the proposed pedestrian crossings should consider the introduction of bridges/underpasses or push button, signalised operation; the current design allows for at-grade uncontrolled pedestrian crossings only, apart from the replacement of the existing underpass. Pedestrian crossing type should normally be determined by vehicle speeds, vehicle volumes, pedestrian numbers etc.; No analysis pedestrian activity has been undertaken to date.

Others

Issues associated with opportunities and impacts for residents and commercial businesses are addressed in a separate section.

6.6 Proposed Mitigation

6.6.1 Construction Phase

The primary mitigation for through traffic will be the scheduling of the works which will not be carried out during the peak summer months. During all times when works are ongoing a robust Construction Traffic Management Plan (CTMP) will be put in place to reduce potential impacts to road users, pedestrians, cyclists and local communities associated with delay, connectivity and safety. Contractors will be required to develop and implement a set of construction ESMPs in line with the framework ESMPs detailed in the accompanying documents of the disclosure package. The CTMP will specifically enable vehicle and pedestrian access to be maintained through work areas and will help the project to create a safe working environment for roadside workers. Access to local businesses, homes, schools, and bus stops will be maintained and transport to and from site offices, and work compounds (location yet to be determined) will be managed including to avoid debris and mud being introduced onto the road network.

The CTMP will be developed in consultation with relevant national and local authorities and agencies, (including the police) as well as local communities and other stakeholders. The CTMP is intended to be a 'live' document and the Contractor shall regularly update it as the construction methodology is developed and vehicle movement requirements are identified in detail. The Contractor shall consult with all relevant government agencies to identify where the project plans can complement existing road development plans at the district and provincial level. The Contractor will also consult with the principal representative of any communities that will suffer a significant increase in traffic in order to develop awareness of the mitigation measures within the CTMP.

The use of an appropriate CTMP will enable traffic flows to be managed through application of appropriate traffic management techniques, including traffic signal operation. Through this approach road safety will be maximised detrimental impacts on journey time and inconvenience to

road users will be minimised. The Plans will outline specific approaches to minimise impacts including sourcing of materials locally where possible to reduce haul distances; routing of vehicle movements to and from site to have minimal detrimental impact on local residents; prohibiting construction vehicles from entering and exiting the site during peak traffic flow periods and training all operatives in the GIP-aligned use of plant and machinery and in the potential impact of their actions may have on other road users and work force members and act accordingly.

In addition to the CMTP, the following mitigation will also be put in place:

Table 25: Mitigation Measures for Traffic Impacts

Issue	Mitigation	Responsibility
Design and Road Safety	Road Safety Audits have been completed at the preliminary design stage and of detailed design drawings. Design standards will apply GIP where it can be incorporated in existing road design legislation.	Executing Agency
Further Public Consultation	Regular public consultation will be held with the local community and road users throughout the project cycle. These will report the results of additional studies as they are completed. A website/freephone telephone number will be provided so interested parties can access up to date information on the project and raise any concerns. During the construction phase local residents will be provided with details and timings of traffic management plans.	Executing Agency
Timing of works and Journey times	Timings for diversions, closures, and other measures which may have a detrimental impact on traffic flows will be programmed to occur where the least impact on traffic will occur. This may necessitate completing some works overnight, or during weekends in the winter period. Journey time analysis will be completed to determine impact proposed works may have on road users. This is a result of some road users needing to complete U turn movements as a result of the introduced central median.	Executing Agency
Traffic Speeds	Effective speed management will be implemented throughout the project with clearly posted speed limits to be adhered to during works. Signs will be clearly marked and visible to road users and speeds will be appropriate for the conditions. Old, unneeded signs will be covered or removed. Upon completion of works clear and concise signage will be put in place to ensure road users are aware of the applicable speed limit and where changes in the posted speed occur.	Executing Agency
Access to site compound	The Contractor will be required to carefully plan site access and put in place relevant H&S warning signage and provisions to minimise any risks to workers, local communities, users of the route/areas etc. The proposed location of the site should be selected on the basis that turning movements to and from the site can be conducted safely and without creating disadvantages to other roads users and local communities. Access to the site should be paved and wheel cleaning facilities installed so that debris is not taken from site vehicles onto the public roads.	Contractor

6.6.2 Operational Phase

Impacts related to the operation of the road are implicitly linked to the safety aspects factored into the final design. These will be based on updated traffic modelling and predicted impact on 'pressure' points such as junction, layby areas and access/egress roads as well as the needs of vulnerable users including those using slow moving vehicles, cyclists and pedestrians. The work will also take into account the movements associated with the existing residential area and business operations and factor in any predicted business growth (and the movement of vehicles to facilitate

goods transfer). The ultimate responsibility of the road safety will be with the TA.

6.7 Residual Impacts

The production of and adherence to a detailed Construction Traffic Management Plan will minimise as far as practical the impacts of the project on the highway network and surrounding environment. However, it is inevitable that some residual impacts will remain. On-going dialogue with communities and other stakeholders together with management of change should keep these risks down to low level of significance.

The existing road experiences high levels of congestion in the summer months and with forecast traffic growth of around 4% per annum these congestion levels will only increase if no action is taken. Crash statistics also demonstrate that in Montenegro there is a high proportion of head-on type crashes and the introduction of a road design which includes a central median will help to reduce the likelihood of these types of crashes providing a positive benefit in terms of road safety. The introduction of a central median does have some disadvantages regarding accessibility to each side of the carriageway for both traffic and pedestrians and this will be minimised by the incorporation of a number of roundabouts, junctions and crossing points throughout the length of the project. Given this, residual operational impacts are expected to be beneficial once safety and connectivity issues and have been addressed, although further information is needed on additional journey times, predicted turning movements, and whether the junctions/crossings are best placed to serve the majority of road users. These areas may also address some of the concerns raised by local residents who will be directed affected by the project.

6.8 Contractor's Commitments

The following commitments will be included into the Contractor's commitments list;

- Traffic data and predictive modelling of the expected volume of traffic to use the road should be completed and the results fed into the final design
- The Contractor is to complete a Construction Traffic Management Plan to include the following (as detailed in the C-ESMP)
    - The CTMP will be developed and implemented in accordance with the project framework ESMP, and will cover inter alia:
    - The risks assessment that which clearly identifies all risks from the construction works to the travellers, drivers, workers will need to be developed,
    - Identification of the new access roads for construction vehicles and safety measures used for pedestrian access and crossings minimizing,
    - Identification of all public roads and paths that will be affected and proposed for the transport routes during the construction (which sections will be closed and till when, where the traffic will be diverted),
    - Minimization of the traffic disturbance,
    - Public notification of any traffic-related concerns, such as road closures.
    - The traffic flow through the site and within the urban areas will be coordinated with the responsible traffic authorities (Traffic Police)
    - CTMP will be developed by the contractors, in line with the framework ESMP, for

the safe use of vehicles on and off-site; safe access to construction sites with the minimum negative impact on the existing roads and in parallel for ensuring community safety and easy access to their properties (homes, land, etc).

- For traffic control and safety, the information about the project activities and driving standards will be announced through the local radio/TV. The Engineer and the Contractor/s will openly and transparently inform residents of the affected places and villages as a minimum on a weekly basis regarding the planned activities and safety measures to be employed.

7 Noise and Vibration

7.1 Introduction

This chapter considers the potential temporary and permanent impacts of noise and vibration resulting from the Project as follows:

- Temporary Construction Noise and Vibration impacts during the construction phase of the scheme on the basis of a qualitative/quantitative assessment considering information available relating to the construction of the Project; and,
- Permanent operational Road Traffic Noise impacts resulting from the proposed upgrade works associated with the Project.

As stated in the Scoping Report, operational road traffic generated vibration is only of concern where surface irregularities in excess of 20mm exist causing an excitation of the ground as vehicles pass over at speed. As the project is that of "re-alignment and upgrade" and will involve the widening of the existing road, and include full resurfacing, it is highly unlikely that surface irregularities of this magnitude would exist following opening, and maintenance programmes would ensure this remains the case. As such, the issue of operational ground borne vibration from road traffic is **scoped out** and is not considered further.

7.2 Relevant Legislation and Guidance

The following national legislation and guidance is considered pertinent to this section:

- ***Law on Protection from Noise in the Environment (Official Gazette of MN, No. 28/11, 28/12 and 01/14)*** - This Law determines preventative measures on the harmful effects of noise and other important issues for the protection of the environment and human health. The Law deals with noise, particularly in built-up areas, city parks, quiet areas in the countryside and agglomerations, schools, hospitals and other facilities. There is an emphasis on vulnerable groups where noise may have harmful effects on people such as children, the elderly and patients. On the basis of the Law on protection from environmental noise, the Ministry of Sustainable Development and Tourism adopted the *Ordinance on limit values of environmental noise, the method of determining the noise indicators and acoustic zones and methods of assessment of adverse effects* ("Official Gazette of Montenegro ", No. 60/11). Based on the aforementioned legislation, municipalities in Montenegro have adopted the acoustic zoning of their territories, which is a basic requirement for the implementation of this Ordinance. By determining the acoustic zones, the limit values (Lday, Levening, Lnight) are set for the established parts of the municipal territory (silent zone and zone under strong noise), which is important for protection against noise in the environment, and for future planning of the construction of facilities.
- *Rulebook on the methods of calculation and measurement of the environmental noise level ("Official Gazette of Montenegro", No. 27/14, 17/17);*

The methodologies and relevant guidance referred to in this assessment of construction and operational noise are set out below.

7.3 Methodology

7.3.1 Construction Phase Noise and Vibration

As a result of the level of detail currently available relating to the construction of the Project and the ambiguities associated with the prediction of noise and vibration from construction activities, a qualitative consideration of the potential for construction noise and vibration impacts has been presented in the ESIA, in line with the requirements of:

- British Standard BS5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites; Part 1 Noise.
- British Standard BS5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites; Part 2 Vibration

The assessment will consider noise limits and control measures that could be implemented at the closest residential properties should it be necessary.

Montenegrin guidance does not present methodologies for the consideration of construction noise and vibration; hence the reference to the comprehensive UK guidance of BS5228 in accordance with GIP, Article 3 of the Rulebook on *Limit Values of Environmental Noise, Noise Indicators and Acoustic Zones and Methods of Noise Effects Evaluation*[13] presents the following with regard to construction noise:

> "*Exempted from Paragraph 1 of this Article, regardless of the acoustic zone and the corresponding limit value, noise which originates from open-air construction works for which a permit has been issued by the competent authority, may exceed the prescribed limit value by 5dB(A), at a time when construction works can be performed in accordance with the law*".

Table 26 below presents the appropriate values for each acoustic setting with the construction period correction applied appropriately for the day, evening and night levels accordingly.

Consideration and control of construction noise and vibration will therefore be undertaken through the use of both UK and Montenegrin guidance and legislation to present a robust consideration of the topic; with the potential for a significant impacts deemed to have occurred where construction noise associated with the Project breaches the appropriately defined limit for the specific acoustic area (Table 26).

7.3.2 Operational Road Traffic Noise

The consideration of road traffic noise associated with the Project has been undertaken in accordance with Article 7 of Section V; *Method of Determination of Acoustic Zones; Acoustic Zoning* of the Rule book referred to above, which sets out a methodology for the identification of "acoustic

[13] *Official Gazette of Montenegro No. 060/11 dated 16/12/2019) Section II, Environmental Noise Limits*

zones" based upon the purpose of the activities undertaken within. Appropriate noise limits are determined within identified zones as identified within Article 8 (Acoustic Zones) and stipulated within Appendix 1 *Noise limit Values in Acoustic Zones*. The definition of specific Acoustic Zones is outlined within *Annex 4: Acoustic Zone Determination Criteria* of the Rulebook. The specifics of the acoustic zoning are presented below within Table 26.

Table 26: Noise Limit Values in Acoustic Zones

Ref.	Acoustic Zone	L_{day} Noise Level in dB(A)	L_{eve} Noise Level in dB(A)	L_{night} Noise Level in dB(A)
1	Quiet zone in nature	35	35	30
2	Quiet zone in agglomeration	40	40	35
3	Zone of elevated noise protection regime	50	50	40
4	Residential area	55	55	45
5	Mixed purpose zone	60	60	50
6a	Zone heavily influenced by noise emanating from air traffic	55	55	50
6b	Zone heavily influenced by noise emanating from road traffic	60	60	55
6c	Zone heavily influenced by noise emanating from railway traffic	65	65	60
7	Industrial zone	At the boundary of this zone, the noise shall not exceed the limits of the acoustic zone at which it is bounded		
8	Mineral exploitation zone	At the boundary of this zone, the noise shall not exceed the limits of the acoustic zone at which it is bounded		

Additionally, the Rulebook outlines a methodology for the determination of the harmful effects of noise associated with road schemes on the basis of human health, considered through a "dose effect" methodology. The methodology considers "risk of effect" during the daytime and "sleep disturbance" during the overnight period.

Annex 3 of the Rulebook (*Official Gazette of Montenegro No. 060/11 dated 16/12/2011*) requires the predicted noise from road traffic source to be considered on the basis of "*harmful effects of noise on human health and the environment*". The Standard provides formulae for the calculation of the percentage of the population affected by traffic noise; looking at the "*percentage of the population at risk*", the "*percentage of the very vulnerable population*" at risk, the "*percentage of sleep deprived population*", the "*percentage of population at high risk of sleep deprivation*" and the "*percentage of population at low risk of sleep deprivation*".

Additionally, consideration has been given to the impacts of the Project on the basis of "noise change" relative to road traffic. This has broadly followed the UK methodology of the Design Manual for Roads and Bridges (DMRB – LA111, Rev 0) and considers change in both the short term (the opening year), and the longer term. The DMRB noise change methodology allows the magnitude of any impacts to be defined based around a semantic rating scheme presented within

Table 27.

Table 27: Semantic Rating Scheme 'Short Term' and 'Long Term' Comparisons

Short Term Magnitude	Noise Change	Long Term Magnitude
Negligible	Less than 1dB	Negligible
Minor	1.0 – 2.9 dB	
Moderate	3.0 – 4.9dB	Minor
Major	5.0 – 9.9 dB	Moderate
	Greater than 10dB	Major

It is reiterated, that, throughout the scope of this ESIA, impacts classified as Negligible or Minor are considered to be '**not significant**'. Any impacts classified as Moderate or Major are considered to be '**significant**' whether adverse or beneficial.

As there is no Montenegrin methodology for the prediction of road traffic noise, the United Kingdom methodology of The Calculation of road Traffic Noise (CRTN) 1988 has been used to calculate levels of road traffic noise at a number of representative receptors along the Project road, based upon the predicted traffic flows. The CRTN predictions have also been converted to the L_{den} statistical parameters following the methodology of the UK DEFRA (Department for Environment, Food and Rural Affairs) document PR/SE/451/02 dated 2002; "*Converting the UK Traffic Noise Index $L_{A10,18hr}$ to EU Noise Indices for Noise Mapping*" for consideration against the local Montenegrin guidance as follows:

- $L_{den} = (0.92 \times L_{A10,\ 18hr}) + 4.20\ dB$
- $L_{day} = (0.95 \times L_{A10,\ 18hr}) + 1.44\ dB$
- $L_{night} = (0.90 \times L_{A10,\ 18hr}) - 3.77\ dB$

It is noted within the DEFRA report that there is a high degree of correlation between the $L_{A10,18hr}$ and the L_{den} values used to derive the above conversion formulae. For the scenario of the E80 the "non-motorway" conversion factors have been used.

7.4 Baseline Conditions

This section of the Chapter presents a description of both the existing and future baseline noise climate along the route of the Project, based upon both measured and predicted road traffic noise values. The current "existing" 2020 as measured and assumed "future" 2031 noise climates will be discussed separately below.

7.4.1 Existing Baseline

The ESIA is supported by a specific baseline noise assessment undertaken for E3 Consulting entitled "*Environmental Noise from Road Traffic – Baseline Conditions, ref: 00-45/3/B dated 7th February 2020*", (see Appendices)

7.4.2 Noise Monitoring Survey

A desktop study of the Project indicated that potential noise sources currently in the area are associated with traffic using the road, along with local roads branching off at key junctions; and the Tivat International Airport at the northern end of the PAA. In addition to these specifically identified features, there is likely to be a general noise environment across the area that is influenced by general human activities including the above key sources, as well as agriculture and other activities.

Following the desktop study of the area, a baseline noise survey regime was concluded, and short-term daytime, night-time and weekend monitoring undertaken over the period 22nd - 23rd January 2020, and 2nd - 4th February 2020. These noise monitoring locations are shown in Figure 1 of the Appendix; and summarised below:

- Tivat 1: Lastva Grbaljska; short term day and night-time, weekday and weekend monitoring at the entrance terrace of a private residence approximately 40m from the main road.
- Tivat 2: Elementary school Radanovici; short term day and night-time, weekday monitoring in the grounds of the school approximately 20 m away from the road.
- Tivat 3: "Hipokrat"; short term day and night-time, weekday and weekend monitoring in front of the "Hipokrat"medical institution, approximately 25 m from the road.
- Tivat 4: In the Vicinity of Tivat International Airport; short term day and night-time, weekday and weekend monitoring adjacent to a private residence approximately 25m from the main road, with the airport located beyond. Furthermore, in the vicinity of the monitoring position was a "paint and varnish shop" and associated private parking which were noted to have an effect on the measured levels.

Noise measurements were undertaken in accordance with relevant methodologies[14] using IEC 61672-1: 2013 Class 1 compliant sound level analysers, and the baseline noise surveys were carried out in accordance with the methodologies set-out in. The dataset obtained from the baseline survey was used to support the noise assessments within this Chapter of the ESIA.

[14] MEST ISO 1996-1:2018 "*Acoustics - Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures*" and MEST ISO 1996-2:2018 "*Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*"

7.4.3 Noise Monitoring Results

The following table summarises the survey results for each of the survey locations, separated into daytime and night-time periods. Survey locations are as summarised above and shown in Figure 1 of the Appendix.

Table 28: Summary Baseline Survey Data

Location	Date	L_{day} dB	L_{eve} dB	L_{night} dB	L_{den} dB
Tivat 1	03/02/2020 Monday	60.5	-	50.9	-
	02/02/2020 Sunday	61.2	-	49.0	-
Tivat 2	22/01/2020 Wednesday	58.5	56.0	51.0	59.9
Tivat 3	22/01/2020 Wednesday	62.3	-	54.6	-
	01/02/2020 Saturday	61.7	-	51.1	-
Tivat 4	23/01/2020 Thursday	64.3	61.0	54.6	64.7
	01/02/2020 Saturday	61.4	60.1	53.5	63.0

The noise levels monitored along the Project were subjectively noted by the field engineer to be dominated by noise associated with the M-2 road. The information presented in Table 29 below details how the measured L_{day} and L_{night} levels compare with the appropriately defined acoustic zones (defined in accordance with the Official Gazette of Montenegro No. 060/11). Typically, the levels in all cases breach the L_{day} limits, but are in accordance with the L_{night} limits, demonstrating a noisier daytime environment governed by a busy main road that is not carried through to the overnight when traffic flows reduce.

Table 29: Consideration of Measured Levels against Acoustic Zone Limits

Location	Date	Acoustic Zone Definition (Official Gazette of Montenegro No. 060/11)	L_{day} dB Measured	L_{day} dB Limit	L_{night} dB Measured	L_{night} dB Limit
Tivat 1	03/02/2020 Monday	Zone heavily influenced by noise emanating from road traffic	60.5	60	50.9	55
	02/02/2020 Sunday		61.2		49.0	
Tivat 2	22/01/2020 Wednesday	Zone of elevated noise protection regime	58.5	50	51.0	40
Tivat 3	22/01/2020 Wednesday	Zone heavily influenced by noise emanating from	62.3	60	54.6	55

	01/02/2020 Saturday	road traffic	61.7		51.1	
Tivat 4	23/01/2020 Thursday	Zone heavily influenced by noise emanating from road traffic	64.3	60	54.6	55
	01/02/2020 Saturday		61.4		53.5	

7.4.4 Future Baseline

Even without the proposed Project, the future baseline situation in the locality of the M-2 road is expected to change. The traffic flows will continue to increase at 4% year on year composite growth (Section 5.4), which will effectively increase the contribution of road traffic noise within the area. The assessment of operational noise is therefore based on a predicted future baseline, derived upon traffic flow forecasts which have been obtained through the transport assessment (Section 5), referred to as the "do-min" scenario. These projections have been used to consider changes in traffic on the road during both the short and long terms with and without the Project.

7.5 Impact Assessment

7.5.1 Approach and Methodology

This section sets out the approach to the assessment and consideration of construction and operational noise, drawing on the guidance and policies outlined in Section 6.2 above. The approach adopted for the assessment has considered the following phases of the proposed Project.

- **Construction Phase:** The likely effects caused by construction activity on dwellings and sensitive receptors along the Project.

- **Operational Phase:** The likely effects due to changes in road traffic flow, speed, composition and separation distance along the M-2 Tivat-Jaz road as a result of the proposed Project. The Opening year has been taken as 2021, with the future assessment year categorised as 10years hence; 2031. The Project has been considered on the basis of comparisons between the "do-min" (no Project) and "do-some" (with Project) comparisons, considering the traffic forecasts provided (as set out in Section 5).

The noise and vibration assessments for the above aspects of the Project have been based upon the Policies, Standards and Guidance documents listed previously within this Chapter. The assessment includes consideration of the following activities:

- Consideration and identification of appropriate Guidance and Methodology documents applicable to transportation schemes within Montenegro;

- Quantification of the baseline and ambient noise climate in the vicinity of key sensitive areas along the Project;

- Qualitative/quantitative assessment and consideration of construction noise impacts;

- Consideration of the potential changes in road traffic noise at identified representative receptors along the M-2 between Tivat and Jaz Beach as a result of the Project. Further consideration of operational effects based upon acoustic zoning and dose-based health and sleep effects;
- Consideration of mitigation measures where necessary and appropriate; and,
- Consideration and assessment of residual effects following the implementation of identified mitigation strategies.

7.5.2 Project Affected Area

For the purposes of this assessment, the PAA has been defined to include identified sensitive dwellings and receptors that are representative of wider areas and are located adjacent to the Project as detailed within Table . Specifically, with regard to operational road traffic noise the study area is limited to sensitive acoustic areas along the M-2 road link corridor between Tivat and Jaz Beach, where there is the potential for changes in noise as a result of changes to traffic flows and patterns resulting from the Project. The representative receptors identified within this study represent areas along the Project where multiple sensitivities occur. As such, whilst the receptor is identified by a single property name below the levels and changes discussed at each are representative of all receptors in the vicinity. These are considered to represent a robust consideration of noise along the Project length based upon the information available:

- Hotel Opera Budva; Servisna Zona Jaz, 85310, Montenegro: 42°17'32.7"N 18°48'29.6"E;
- M&D Apartments; Prijevor bb, Budva 85317, Montenegro: 42°17'42.6"N 18°48'27.8"E;
- Residential Dwelling (House); 42°17'44.7"N 18°48'26.1"E;
- Avanti Hotel and Spa; Poljice bb, Jaz, 85310, Montenegro: 42°17'57.9"N 18°48'27.6"E;
- Apartmani Skanata (Poljice); Jaz bb, Lastva Grbaljska, Budva 85310, Montenegro 42°18'03.8"N 18°48'28.4"E;
- Apartmani Konte; Prijevor, 2, Budva 85317, Montenegro: 42°18'09.4"N 18°48'27.0"E;
- Lastva Grbaljska; Budva 85317, Montenegro: 42°18'30.4"N 18°48'02.8"E;
- Radanovici 85330: 42°21'20.2"N 18°45'42.7"E;and,
- Residential Property near Tivat International Airport: 42°24'51.6"N 18°43'07.0"E.

7.5.3 Construction Phase Impacts

Construction works are expected to commence in 2020 and be completed by 2022. However, construction activities would **not be constant through this period at any given receptor** due to the transient nature of linear construction schemes such as this. Works would only occur in discrete

areas and for discrete, temporary short duration periods as the Project progresses from one end to the other.

7.5.4 Construction Noise

Impacts to specific identified receptors during the construction phase are expected to be relatively short-term and transient in nature as the Project progresses along the route. However, the exact duration over which the construction phase will occur is not yet known. As such, construction noise should be covered within the scope of a Construction Noise and Vibration Management Plan (CNVMP) once the specifics of the program and working methodology are known and understood.

Whilst BS5228 presents methodologies for the definition of the potential for construction noise impacts, localised Montenegrin guidance has been used in preference. This guidance relates the acoustic zone to an appropriate construction noise limit above which there is a potential for significant effects, which would be dependent upon context. A breach of these limits would therefore dictate a need to implement mitigation to reduce noise to within acceptable levels.

General practice dictates that construction operations of this type normally only occur during the daytime hours. For the purposes of the consideration presented within the scope of this chapter, these are taken as being no more than 07:00 to 19:00hrs Monday to Friday and 07:00 to 13:00hrs on Saturday. No construction works have been assumed to occur during Sundays or on public holidays as is normal practice with construction works.

As such, only daytime limits are directly applicable to the construction of the Project, however, for completeness evening and night-time limits are also presented within Table 30 below should circumstances arise where they are necessary.

Table 30: Construction Noise Limits by Acoustic Zone

Acoustic Zone	Period	Construction Noise Limit (Official Gazette of Montenegro No. 060/11 - 16/12/2019)
Residential Area	Daytime	60 dB(A) L_{day}
	Evening	60dB(A) $L_{evening}$
	Night	50dB(A) L_{night}
Mixed Purpose Zone	Daytime	65 dB(A) L_{day}
	Evening	65dB(A) $L_{evening}$
	Night	55dB(A) L_{night}
Zone heavily influenced by noise emanating from air traffic	Daytime	60 dB(A) L_{day}
	Evening	60dB(A) $L_{evening}$
	Night	55dB(A) L_{night}
Zone heavily influenced by noise emanating from road traffic	Daytime	65 dB(A) L_{day}
	Evening	65dB(A) $L_{evening}$
	Night	60dB(A) L_{night}

Based upon the information contained within Table 30, it is apparent that construction noise limits

along the route would be between 60 – 65dB(A) depending upon the acoustic zone definition during the daytime period.

7.5.5 Construction Vibration

Certain activities that could be required during the construction phase present the potential to generate ground borne vibration. However, whether this vibration becomes perceptible or even detrimental to amenity in the surrounding area depends not only upon the magnitude and duration of the source but also the ground type and the separation distances between the source and receptor.

The main construction-based operations which have the potential to generate discernible vibration, and could be required on a development such as this, is piling or dynamic ground stabilisation. Aside from these activities, typical construction techniques would not generally give rise to significant vibratory issues discernible outside of the immediate vicinity of the operation.

However, as with noise, ground borne vibration effects should be considered and evaluated within the scope of the CNVMP once the specifics of the construction phase are known, and the exact techniques necessary to realise the Project are concluded.

However, in order to give some level of understanding relating to the potential for construction noise impacts it is considered useful to present potential worst-case noise levels from a selection of typical construction plant sources which may be used within a development of this type; and to calculate noise levels from these back to different distances which may reflect noise levels at sensitive receptors.

It is noted that the noise levels presented within Table 31 below do not take into account any attenuation due to screening and have been based upon hard reflective ground between the source and receiver (water, concrete, bituminous surfaces). Given the mixed nature of the existing ground cover along the Project, these predicted noise levels should be similar, and in most cases slightly higher, than those that would be experienced in practice. The figures presented are based upon a 100% on-time which is unlikely to occur in practice.

All predicted noise levels have been based on typical plant source noise levels taken from the appendices of BS 5228: 2009 (+A1: 2014) and have been predicted in accordance with the propagation model contained within the same document. It is noted that whilst in Table 31 predictions are presented at 600m and 1km, these levels are to be used with caution as the methodology of BS5228-1 is noted to be accurate at up to distances of 300m, beyond which meteorological and other factors become prominent and the prediction methodology less accurate: therefore beyond 300m the levels in Table 31 should be taken with caution.

Table 31: General Plant Noise Levels

Plant	Sound Pressure Level in dB(A) at 10m	Sound pressure level (dB L_{Aeq})						
		20m	50m	100m	200m	300m	600m	1km
Tubular Steel Piling Hydraulic Hammer Rig	88	82	74	68	62	58	52	48
Vibratory Sheet Piling rig	88	82	74	68	62	58	52	48
44tn Tracked 360° Excavator	85	79	71	65	59	55	49	45
Grab hopper dredging ship dredging harbour	82	76	68	62	56	52	46	42
Articulated Dump Truck	80	74	66	60	54	50	44	40
14tn Tracked 360° Excavator	83	77	69	63	57	53	47	43
Wheeled 360° Excavator	68	62	54	48	42	38	32	28
Telescopic Handlers	71	65	57	51	45	41	35	31
Water Pump	62	56	48	42	36	32	26	22
Concrete Pump	78	72	64	58	52	48	42	38
Generators	57	51	43	37	31	27	21	17
Cement Mixers	75	69	61	55	49	45	39	35
Crane	78	72	64	58	52	48	42	38
Road lorry (Drive by)	80*	74*	66*	60*	54*	50*	44*	40*

*Drive by maximum sound pressure level, LpA (max), at speed in km/h as shown in BS5228

It is considered that the potentially worst affected properties due to construction noise would be as defined below. However, the identified areas relate to sections with receptors within 50-100m of the works; other receptors are present along the Project length just outside this distance and as such, the measures detailed below should be investigated and considered along the entire length with active control of impacts policed through the CNVMP:

- At the northern end of the Project within the southern extent of Tivat: receptors within 50m of the Project and associated works;
- Within the town of Radanovici which runs laterally along the M-2 for approximately 2km: receptors within 50m of the Project and associated works;
- Properties within Poljice which runs laterally along the M-2 for approximately 4km: receptors within 50m of the Project and associated works; and,
- Hotels (Hotel Odissey, Hotel Opera Budva and other hotels/guest houses in the vicinity) in Jaz Budva to the south of Poljice: receptors within 50m of the Project and associated works.

Consideration of these levels against the criteria defined for each acoustic zone (Table 30) identifies where there is a potential for significant effects, dependent upon context. It is concluded that

generally a breach of the levels presented in Table 30 would dictate a need to put in place mitigation to reduce noise to within acceptable levels.

Based upon the information contained within Table 30 it is apparent that daytime construction noise limits along the route would be between 60 – 65dB(A) depending upon the acoustic zone definition. Reference to the estimates of construction noise presented within Table 31 demonstrate that where construction activities are within 100m of sensitive receptors there is a potential for significant effects should appropriate mitigation not be implemented; example mitigation measures that could be implemented through the scope of the CNVMP are discussed in Section 6.5.

In addition, as a result of the potential for disturbance, construction traffic and routeing would also require to be considered within the scope of the CNVMP. Unfortunately, at this time insufficient information is available to robustly predict or consider this aspect of the construction works with any level of confidence; therefore, control can only be enforced through the CNVMP.

7.5.6 Operational Phase Impacts

As the road is a key tourist route there is a significant variance in road usage between the summer and winter months. Therefore, consideration of noise will look at both seasons to identify impacts.

Noise associated with road traffic sources has been calculated in accordance with the CRTN methodology with the assessment methodology following that contained in the DMRB as appropriate, which is considered to provide robust, proven, guidance that can be adopted for the assessment of changes in road traffic noise in both the short and long terms, resulting directly from major road schemes.

Traffic flow information provided in Section 5 considers road traffic noise in the opening year, and future assessment year (assumed to be 10years hence in this case) along the M-2. The information supplied included both "do-min" and "do-some" flows and allowed changes in road traffic noise as a result of the Project to be considered. The traffic information is based upon Annual Average Weekday Traffic (AAWT) flow numbers and the percentage of heavy vehicles (greater than 3.5 tonnes) over an 18hr period between 06:00 and 00:00. This has been used to predict the required $L_{A10,\ 18hr}$ noise levels along the M-2. Which has in turn been considered in terms of both short and long term changes in road traffic noise; with the smallest perceptible changes defined as 1dB(A) in the short term and 3dB(A) in the long term comparisons.

Changes in road traffic noise are referenced to the semantic magnitude of change criteria detailed earlier in this chapter (Table 27). The comparisons undertaken also allow for the consideration of seasonal variations (summer and winter) of the Project; along with consideration of year on year traffic growth without the Project.

7.5.7 Road Traffic Noise Change

Within the consideration of the changes in road traffic noise levels along the Project, the following comparisons have been made:

- Summer Comparisons:

  - Opening year (2021) "do-min" vs. Design year (2031) "do-min";
  - Opening year (2021) "do-min" vs. Opening year (2021) "do-some"; and,
  - Opening year (2021) "do-min" vs. Design year (2031) "do-some".
- Winter Comparisons:
  - Opening year (2021) "do-min" vs. Design year (2031) "do-min";
  - Opening year (2021) "do-min" vs. Opening year (2021) "do-some"; and,
  - Opening year (2021) "do-min" vs. Design year (2031) "do-some".

The consideration of the "do-min" in the opening year against the "do-min" in the design year allows for the consideration of long term noise increases in the absence of the Project, associated with year on year traffic growth at a compound rate of 4% yearly; the future baseline climate. This approach enables a conclusion to be drawn as to whether impacts are as a direct result of the Project or whether they would occur regardless. The consideration of the "do-min" scenarios against the "do-some" scenarios allows the quantification of the impacts related to the Project.

Speeds have been advised by the traffic consultant to the project and have been implemented where appropriate within the assessment on the basis of the following criteria:

- Winter "do-min" speed – 60kmph (however, in urban areas along the Project the speed is limited to 50kmph);
- Winter "do-some" speed – 70kmph (however, in urban areas along the Project the speed is limited to 50kmph);
- Summer "do-min" speed – 25kmph; and,
- Summer "do-some" speed – 60kmph (however, in urban areas along the Project the speed is limited to 50kmph);

Impacts have been determined using the semantic rating Project defined in Section 6.2.2 for both short term and long term impacts. Furthermore, the predicted road traffic noise levels have been converted to the L_{den} parameter as defined within Section 6.4.4 for the consideration of "risk of affect" during the daytime and "sleep disturbance" during the overnight, in accordance with the *Official Gazette of Montenegro No. 060/11 dated 16/12/2019*.

The changes in road traffic noise levels based upon the supplied traffic data and Project design are presented within Table 32 below.

As a result of the available information a number of representative receptors have been selected along the Project where sensitive receptors or clusters of sensitive receptors occur at varying distances from the road. These have been taken as representative of the Project as a whole to allow

the consideration of changes in road traffic noise, and health-based effects.

Table 32: Consideration of Changes in Road Traffic Noise

Receptor locality	Opening Year "do-min" $L_{A10, 18hr}$	Design Year "do-min" $L_{A10, 18hr}$	Opening Year "do-some" $L_{A10, 18hr}$	Design Year "do-some" $L_{A10, 18hr}$	Long term Year on year (no Scheme)	Short Term Change	Long Term Change
Winter Months							
Hotel Opera Budva	59.5	61.2	58.3	60.0	+1.7	-1.2	+0.5
M&D Apartments	64.5	66.2	63.8	65.6	+1.7	-0.6	+1.1
House	56.5	58.2	55.2	56.9	+1.7	-1.3	+0.4
Avanti Hotel and Spa	63.2	64.9	61.5	63.2	+1.7	-1.7	0.0
Apartmani Skanata (Poljice)	59.8	61.5	58.7	60.4	+1.7	-1.1	+0.6
Apartmani Konte	62.0	63.7	60.2	61.9	+1.7	-1.8	-0.1
Lastva Gibaljska	68.4	70.1	65.9	67.6	+1.7	-2.5	-0.8
Radanovici 85330	68.4	70.1	65.9	67.6	+1.7	-2.5	-0.8
Property near Tivat Airport	68.4	70.1	65.9	67.6	+1.7	-2.5	-0.8
Summer Months							
Hotel Opera Budva	59.3	61.0	59.9	61.7	+1.7	+0.6	+2.3
M&D Apartments	64.3	66.0	65.5	67.2	+1.7	+1.2	+2.9
House	56.4	58.1	56.8	58.5	+1.7	+0.5	+2.2
Avanti Hotel and Spa	64.0	65.7	64.1	65.8	+1.7	+0.1	+1.8
Apartmani Skanata (Poljice)	59.7	61.4	60.3	62.0	+1.7	+0.6	+2.3
Apartmani Konte	62.9	64.6	62.8	64.5	+1.7	-0.1	+1.6
Lastva Gibaljska	69.3	71.0	68.5	70.2	+1.7	-0.8	+0.9
Radanovici 85330	69.3	71.0	68.5	70.2	+1.7	-0.8	+0.9
Property near Tivat Airport	69.3	71.0	68.5	70.2	+1.7	-0.8	+0.9

Consideration of the data presented within Table 32 above details the following.

7.5.8 Winter Months

No Project Long Term:

The comparison of the 2021 "do-min" to the 2031 "do-min" has been undertaken to present an account of the change in road traffic noise should the improvement works not be undertaken. This has been deemed necessary as the advice relating to year on year traffic growth along the route was based upon compound 4% year on year growth, whether the Project occurred or not. Over the 10 years between the opening year and the design year this alone would account for an approximate 70% increase in flow along the road regardless of the Project. It was considered prudent to initially quantify the change in road traffic noise along the road as a result of this factor, to provide a long term baseline against which to consider the Project. Essentially traffic growth alone would result in a long term **increase in road traffic noise of +1.7dB**. Consideration against the long term semantic rating criteria would conclude this to represent a **Negligible** impact in the long term.

With Project Short Term:

The short term assessment is achieved by the comparison of the 2021 "do-min" to the 2021 "do-some", and accounts for changes in the geography as a result of the Project. With the implementation of the Project in the short term, there would be a **reduction in road traffic noise of between -0.6dB and -2.5dB**; as such, the Project would represent a beneficial impact as the level of road traffic noise contribution at each receptor would reduce. In the short term, reductions in road traffic noise would be classified as between **Negligible and Minor Beneficial** depending upon receptor; but in any event, would not be considered as significant. This beneficial effect of the Project is primarily as a result of the implementation of low noise surfacing/thin wearing course in the design directly reducing the source noise.

With Project Long Term:

The long term assessment is achieved by the comparison of the 2021 "do-min" to the 2031 "do-some" and accounts for changes in the geography, and traffic growth. With the implementation of the Project in the long term the **change in road traffic noise would be between -0.8dB and +1.1dB**; changes of this magnitude would be classified as **Negligible**; and in such case, would not be considered as significant. The effects of the Project are primarily mitigated, over those reported for the long term without Project comparison, by the implementation of low noise surfacing/thin wearing course in the design directly reducing the source noise.

7.5.9 Summer Months

No Project Long Term:

The comparison of the 2021 "do-min" to the 2031 "do-min" has been undertaken to present an account of the change in road traffic noise should the improvement works not be undertaken. This has been deemed necessary due to the compound 4% year on year growth regardless of the Project development. Essentially, traffic growth alone would result in a long term **increase in road traffic noise of +1.7dB**. Consideration against the long term semantic rating criteria would conclude this

to represent a **Negligible** impact in the long term. The variance remains constant in this "do-min" to "do-min" scenario as there is no change to either the speed or other parameters, only a variation in the total flow accounting for the year on year growth.

With Project Short Term:

The short term assessment is achieved by the comparison of the 2021 "do-min" to the 2021 "do-some" and accounts for changes in the geography as a result of the Project. With the implementation of the Project in the short term, the change in road traffic noise would be between **+1.2dB and -0.8dB**; In the short term, changes in road traffic noise of this magnitude would be classified as between **Negligible and Minor Adverse** depending upon receptor; but in any event would not be considered as significant. The changes in road traffic noise in the short term as a result of the Project are primarily due to an significant increase in speed between the "do-min" and the "do-some" scenarios; however, an amount of this increase is mitigated by the implementation of low noise surfacing/thin wearing course in the design directly reducing the noise at source

With Project Long Term:

The long term assessment is achieved by the comparison of the 2021 "do-min" to the 2031 "do-some" and accounts for changes in the geography, and traffic growth. The primary increase in noise is attributable to the significant change in speed expected as a result of the increased capacity of the road under the with Project option. With the implementation of the Project in the long term, the change in road traffic noise would be between **+0.9dB and +2.9dB**; changes of this magnitude would be classified as **Negligible** in the long term; and in such cases would not be considered as significant.

The effects of the Project are primarily affected by the significant change in summer speed attributable to the higher capacity of the road and the freer flowing conditions significantly increasing generated noise; the full effect of this is however mitigated by the implementation of low noise surfacing/thin wearing course in the design directly reducing the noise at source.

Official Gazette of Montenegro No. 060/11 Health Based Effects and Sleep Disturbance assessment

The $L_{A10,\,18hr}$ road traffic noise levels calculated and presented in Table 32 above have been used as the basis of the "dose response" consideration of the daytime and night-time health and sleep effects, in accordance with Montenegrin guidance. This is presented below in Table 33 for the "do-min" and "do-some" scenarios in the opening and design years.

The following abbreviations, referenced in Table 33 , are taken directly from the guidance:

- %A Day: Percentage of population at risk;
- %HA Day: Percentage of very vulnerable population at risk;
- %SD Night: Percentage of sleep deprived population;
- %HSD Night: Percentage of population at high risk of sleep deprivation; and,
- %LSD Night: Percentage of population at Low risk of sleep deprivation.

Table 33: Health Based and Sleep Deprivation Effects by Percentage Risk

	Opening Year 2021 "do-min"	Design Year 2031 "do-min"	Opening Year 2021 "do-some"	Design Year 2031 "do-some"	Long term Year on year (no Scheme)	Short Term Change	Long Term Change
Winter Months							
%A Day	13.9%	14.8%	13.1%	14.0%	+0.90%	-0.80%	+0.10%
%HA Day	10.7%	11.5%	9.9%	10.7%	+0.80%	-0.80%	0.00%
%SD Night	16.5%	17.9%	15.0%	16.4%	+1.40%	-1.50%	-0.10%
%HSD Night	7.4%	8.3%	6.6%	7.4%	+0.90%	-0.80%	0.00%
%LSD Night	31.4%	33.4%	29.4%	31.3%	+2.00%	-2.00%	-0.10%
Summer Months							
%A Day	14.2%	15.0%	14.2%	15.0%	+0.80%	0.00%	+0.80%
%HA Day	10.9%	11.7%	10.9%	11.7%	+0.80%	0.00%	+0.80%
%SD Night	16.9%	18.4%	16.9%	18.4%	+1.50%	0.00%	+1.50%
%HSD Night	7.7%	8.6%	7.7%	8.5%	+0.90%	0.00%	+0.80%
%LSD Night	31.9%	34.0%	31.9%	34.0%	+2.10%	0.00%	+2.10%

In general, across all of the health based effects identified, the percentage of people affected in the long term without the Project will increase as a result of increased levels of road traffic noise resulting from increased traffic flows. With the implementation of the Project in the short term, the health-based effects will either improve slightly, or remain constant with the current situation; however there is a less than 5% variance in all cases which is typically taken as not significant. However, in the long term whilst the health based effects increase slightly they are reported to increase by less, or at worse the same, as they would without the Project over the same 10 year time period; as such the Project can be concluded to be broadly beneficial in the long term.

It is concluded therefore that implementation of the Project would not materially adversely affect the percentage of people affected by road traffic noise and the associated risk of health based or sleep deprivation effects. However, the Project would present a beneficial effect relating to the flow of traffic along the route and the travel times between Jaz Beach and Tivat; which would not be evident without.

7.5.10 Acoustic Zoning

The final comparison to consider the impacts of the Project is to consider the absolute predicted L_{day} and L_{night} values against the Acoustic Zoning areas along the Project as detailed within Table 26.

Essentially the impacts are likely to be within acoustic zones defined as:

- Zone of Elevated Noise Protection: L_{day}: 50dB, L_{night}: 40dB;

- Residential Area: L_{day}: 55dB, L_{night}: 45dB; and,
- Zone heavily influenced by noise emanating from road traffic: L_{day}: 60dB, L_{night}: 55dB.

Table 34: Predicted L_{den} and L_{night} Levels from Road Traffic Noise

Receptor locality	Opening Year "do-min" L_{day}	Opening Year "do-min" L_{night}	Design Year "do-min" L_{day}	Design Year "do-min" L_{night}	Opening Year "do-some" L_{day}	Opening Year "do-some" L_{night}	Design Year"do-some" L_{day}	Design Year"do-some" L_{night}
Winter Months								
Hotel Opera Budva	58.1	50.0	59.7	51.6	57.0	49.0	58.6	50.5
M&D Apartments	62.8	54.5	64.4	56.1	62.2	54.0	63.9	55.5
House	55.3	47.4	56.9	48.9	54.0	46.2	55.6	47.7
Avanti Hotel and Spa	61.6	53.4	63.2	54.9	60.0	51.9	61.6	53.4
Apartmani Skanata (Poljice)	58.4	50.4	60.0	51.9	57.3	49.3	58.9	50.9
Apartmani Konte	60.5	52.4	62.1	53.9	58.8	50.7	60.4	52.2
Lastva Gibaljska	66.6	58.1	68.2	59.7	64.2	55.9	65.8	57.4
Radanovici 85330	66.6	58.1	68.2	59.7	64.2	55.9	65.8	57.4
Property near Tivat Airport	66.6	58.1	68.2	59.7	64.2	55.9	65.8	57.4
Summer Months								
Hotel Opera Budva	58.0	49.9	59.6	51.5	58.5	50.5	60.2	52.0
M&D Apartments	62.7	54.4	64.3	56.0	63.8	55.5	65.4	57.0
House	55.1	47.3	56.8	48.8	55.6	47.7	57.2	49.2
Avanti Hotel and Spa	62.4	54.1	64.0	55.7	62.5	54.2	64.1	55.7
Apartmani Skanata (Poljice)	58.3	50.2	59.9	51.8	58.9	50.8	60.5	52.3
Apartmani Konte	61.4	53.1	63.0	54.7	61.3	53.1	62.9	54.6
Lastva Gibaljska	67.4	58.9	69.0	60.4	66.7	58.2	68.3	59.7
Radanovici 85330	67.4	58.9	69.0	60.4	66.7	58.2	68.3	59.7
Property near Tivat Airport	67.4	58.9	69.0	60.4	66.7	58.2	68.3	59.7

Consideration of the noise levels predicted at the selected receptors along the Project concludes the

following.

In the situation where the Project does not occur (do-min), the noise levels at the predicted receptor locations along the route would already be in breach of the levels presented for "zones heavily influenced by noise emanating from road traffic"; this is confirmed by reference to Table 27. Table 29 which details the current measured noise climate to already be in breach of these limits. This is also the case with the Project in the future but it is concluded that the breaches are not solely as a result of the influence of the Project, and are more related to the projected increases in traffic flows between the opening year (2021) and the future assessment year (2031) which would occur regardless.

It is concluded that with regard to acoustic zones along the route the Project itself does not materially affect the noise levels. Therefore breaches of the limits in identified zones occur whether the Project is developed or not; with the Project not significantly affecting this but vastly improving the flow and travel time along the route.

7.6 Proposed Mitigation

The mitigation measures necessary to ameliorate adverse effects of Noise and Vibration within each phase of the Project are set out below.

7.6.1 Construction Phase

Specific details relating to construction activities and programme are not currently available for the Project. However, the main mitigation measure associated with construction noise and vibration would be the production of a specific Construction Noise and Vibration Monitoring Plan (CNVMP) which would cover control measures relating to all aspects of the construction of the Project; including noise and vibration. The CNVMP will be produced by the successful construction contractor and may form part of the Construction Environmental and Social Management Plan (CESMP). These plans will be produced in accordance with the framework ESMP accompanying this document as part of the disclosure package

The key aspects of the CNVMP are commitments for active control of construction noise and vibration including issues such as detailed complaint procedures, community liaison, compliance survey requirements and a Risk based mitigation scheme to control noise and vibration on an ongoing basis. As such, within the CNVMP, mitigation strategies will be presented and considered, formulated on the basis of "Best Practicable Means". These measures would be implemented where necessary to minimise construction noise and vibration impacts at source.

A primary control of construction noise and vibration impacts would be through allowable construction hours, these would be clearly set out in the CNVMP. Activities would therefore be constrained to within appropriate core hours derived in accordance with local guidance. Suitable construction hours should be agreed with each municipality as part of the CNVMP. The following bullet points identify typical mitigation measures which could be considered to reduce the impact of noise and vibration associated with construction works; however, it is noted that the list is by no means exhaustive and measures should be considered to ameliorate issues identified at the time.

- Modern, silenced and well-maintained plant would be used at all times, conforming to appropriate standards set out in adopted Directives or replacement legislation of Montenegro;
- Machinery, including vehicles, would be shut down or throttled back when not in use;
- Engine compartments would be closed when equipment is in use and the resonance of body panels and cover plates reduced by the addition of suitable dampening materials. Any rattling noise would be addressed by the tightening of loose parts or the addition of resilient materials;
- Semi-static and static equipment would be sited and orientated as far as is reasonably practicable away from noise-sensitive receptors and have localised screening where deemed necessary;
- Static plant known to generate significant vibration levels would be isolated or fitted with appropriate dampening to reduce transmission into the ground;
- Generators and water pumps required for 24-hour operation would be super-silenced or screened as appropriate; and their location carefully considered to minimise disturbance;
- Crane spindles, pulley wheels, telescopic sections and moving parts of working platforms would be adequately lubricated in order to prevent undue screeching and squealing; and
- Where possible, mains electricity would be used rather than generators where it is safe to do so.

In addition, as a result of the potential for disturbance, construction traffic and routeing, and ground borne vibration would also require to be a key consideration within the scope of the CNVMP.

7.6.2 Operational Phase

The assessment of impacts has demonstrated that the effects of the Project are Minor Adverse at most and therefore specific mitigation is not required. However, in accordance with good practice, the assessment has considered the potential for the incorporation of mitigation measures into the design of the Project that could reduce noise as follows:

- **Positioning of the Project Alignment:** Within the design of the Project, limited land is available to move the alignment significantly from that of the current route; meaning much of the Project is that of on-line widening. However, where possible the alignment has been designed in such a way as to maintain the maximum level of separation distance possible to sensitive receptors, within the confines of the application boundary and required minimum land take.
- **Elevation of the Project Alignment:** the elevation of the Project has remained relatively constant with that of the current road due to site constraints;

- **Surfacing Provision:** the new surface would be that of either low noise surfacing or a thin wearing course which provides similar acoustic enhancement. This is the primary mitigation option available to the Project as a result of confines associated with the on-line nature of the works. This measure has been included within the predictions along the entire length of the route;

- **Environmental barriers:** these can be in the form of earth mounding or acoustic fencing of various types, or a combination of the two. However, as the Project is an on-line project, the potential to implement these features is limited due to the confined nature of the road relative to receptors through certain sections; and/or

- **Noise Insulation:** mitigating the impact within buildings through noise insulation of the building envelope. This is primarily a measure considered post opening of the Project and supported by actual measurement of road traffic noise levels. As such it has not been included within the mitigation inherent within the Project at this point.

The implementation of low noise surfacing as proposed within the design, is therefore the only feasible control measure as a result of the on-line widening of the Project, and the confined nature of the route. Moreover, further measures are not required given the impacts of the Project, which range from Minor Beneficial to Minor Adverse.

7.7 Residual Impacts

7.7.1 Residual Construction Phase Impacts

The conclusion of the qualitative consideration of the potential for construction noise impacts undertaken within this Chapter, based upon limited information and in the absence of mitigation; is that with the inclusion of standard noise mitigation enforced through the CNVMP, residual impacts from construction activities could be controlled to within acceptable levels. As such, they would **not present a Significant Impact**. The re-assessment of residual effects from construction would be carried out as part of the CNVMP and ongoing compliance control through the construction period, completed by the specific construction contractor when sufficient information is available.

7.7.2 Residual Operational Phase Impacts

The assessment has shown that the impact of the Project is at most minor adverse when compared with the do-min situation. Current noise is already in breach of the levels for the relevant acoustic zone ("zones heavily influenced by noise emanating from road traffic"). This is also the case in future both with and without the Project, but the breaches related to the projected increases in traffic flows between the opening year (2021) and the future assessment year (2031) which would occur irrespective of the Project. Therefore, there **are not considered to be any significant residual operational phase impacts** as a result of the Project.

7.8 Cumulative Impacts

There are not considered to be any developments in the area that have the potential to result in cumulative effects on the basis of noise and vibration. The noise assessment is based on existing noise levels in the vicinity of identified sensitive receptors and therefore includes consideration of other existing developments and projects and ongoing activities. Future levels are predicted on the basis of annual compounded growth in traffic flows which will therefore include other developments. As such, no assessment of noise-related cumulative impacts would be necessary to support this Project.

7.9 Contractor Commitments

The contractor will be required to produce a specific CNVMP which would cover control measures relating to all aspects of the construction of the project; including noise and vibration. The CNVMP should be produced by the successful construction contractor and may form part of the Construction Environmental and Social Management Plan (CESMP).

8 Air Quality

8.1 Introduction

This chapter assesses the likely significant impacts on ambient air quality during both construction and operation of the upgraded M-2 road between Tivat and Jaz. Construction works are likely to generate dust (generally defined as particulate matter of 1 – 75 µm diameter[15]), which can result in temporary adverse effects on air quality. Emissions from vehicles using the upgraded M-2 road could affect air quality at residential properties and other sensitive receptors in the PAA.

8.2 Relevant Legislation and Guidance

The following national legislation is considered of relevance to this assessment:

- ***Law on Air Protection ("Official Gazette of Montenegro", No. 25/10, 40/11, 43/15)*** - The Law regulates the way of monitoring air quality, protection measures, assessment and improvement of air quality, as well as air quality planning and management. Air, as a natural value of general interest, is part of the environment and has special protection in Montenegro. Protection of air from pollution by radioactive substances, genetically modified organisms, noise and natural disasters is regulated by specific regulations. The Law prescribes that in zones where concentrations of pollutants exceed any established marginal or target value, taking into account the tolerance limits, the Ministry in charge of environmental issues, in cooperation with the NEPA and local government authorities is obliged to pass the Air Quality Plan to reach the values as determined by the *Decree on the Determination of Types of Pollutants, Limits and Other Air Quality Standards ("Official Gazette of Montenegro", No. 25/12).*
- On the basis of the available data, the territory of Montenegro was divided in three air quality zones in 2011. The network for air quality monitoring was expanded to include seven automatic stations in order to meet minimum requirements set out in Directives 2008/50/EC and 2004/107/EC. All pollutants regulated in the legislation of Montenegro are monitored regularly. Air Quality data are available on-line in real time (http://www.epa.org.me/vazduh/) and annually reported to the EU through EIONET. By adopting the *Rulebook on the Manner and Conditions for Monitoring of the Air Quality (Official Gazette of Montenegro No. 21/2011 and 32/16),* the methods of measuring/ monitoring and data collection, followed by data quality and its validation were addressed. In the field of Air Quality, the compatibility of national regulations with European legislation has been achieved almost fully by the adoption of regulations in 2012. Primarily the *Regulation on Determination of the Types of Pollutants, Threshold Values and other Air Quality Standards ("Official Gazette of Montenegro", No. 45/08, 25/2012)* and the *Rulebook on the content and method of developing of annual air quality information (" Official Gazette of Montenegro ", No. 27/2012).*

  The following are also considered relevant:

  - Rulebook on the manner and conditions for monitoring the quality of air ("Official Gazette of Montenegro", No. 21/11 of 21 April 2011, No. 32/2016 dated 20 May 2016);

[15] British Standards Institution. (1994) "Characterisation of Air Quality. Glossary", BS6069-2:1994, ISO4225:1994

- Rulebook on the emission of pollutants in the air ("Official Gazette of the Republic of Montenegro", No. 25/01);
- Rulebook on the methodology of testing, deadlines and manner of notification of the results of monitoring and determination of harmful substances in the air on sources of pollution ("Official Gazette of the Republic of Montenegro", No. 4/82);
- Regulation on Establishing a Network of Measuring Points for Monitoring Air Quality ("Official Gazette of Montenegro", No. 44/10 and 13/11);

The construction phase air quality assessment has also been undertaken in accordance with the principles and advice set out in the UK Institute of Air Quality Management (IAQM) guidance on the assessment of dust from demolition and construction[16]. The operational phase air quality assessment has been undertaken in accordance with the methodology set out in the UK Design Manual for Roads and Bridges guidance on air quality issued by Highways England[17]. The impact descriptors for the operational assessment are also taken from guidance issued by the IAQM[18]. Limits used in the assessments are those set out in the air quality directive (as amended)[19] and reproduced below.

Table 35: EU Air Quality Standards Used in the Assessment

Pollutant	Assessment criterion (µg /m^3)	Averaging period / Permitted exceedances each year
Nitrogen dioxide (NO_2)	40	1 year / n.a.
Nitrogen dioxide (NO_2)	200	1 hour / 18
Particulate matter (PM_{10})	40	1 year / n.a.
Particulate matter (PM_{10})	50	24 hours / 35
Particulate matter ($PM_{2.5}$)	20	3 years average / n.a.

8.3 Baseline Conditions

For the purposes of air quality monitoring and assessment, Montenegro is divided into three zones – the Project lies in the southern zone, which comprises the Municipalities of Bar, Budva, Kotor, Tivat, Ulcinj and Herceg Novi. Monitoring locations are defined at a national level and undertaken by the Centre for Ecotoxicological Research (CETI http://eng.ceti.me).

The nearest monitoring stations to the Project are at Bar and Tivat. The most recent results from Bar (2018 data) show results below the relevant air quality limits / values for the majority of pollutants monitored (PM_{10}, $PM_{2.5}$, NO_x, CO, SO_2, O_3 and heavy metals). Levels of polyaromatic hydrocarbons (PAH - expressed as benzo(a)pyrene) were slightly above the relevant target value

[16] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London

[17] Highways England (2019). Design Manual for Roads and Bridges - Sustainability & Environment Appraisal LA 105 Air quality

[18] Environmental Protection UK/IAQM (January 2017) Land-Use Planning& Development Control: Planning for Air Quality

[19] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

(1.15 ng/m^3 compared with the target value of 1 ng/m^3). $PM_{2.5}$ is the only pollutant monitored at the Tivat site – 2018 levels were below the relevant limit value at 16.88 µg /m^3.

There are no existing or known proposed industrial facilities along the alignment of the Project that could significantly affect ambient air quality. Although Tivat airport is located adjacent to the Project, studies at Amsterdam's Schiphol airport[20] found that the airport contributes less than 5% to ambient concentrations of NO_x and PM_{10}. Furthermore, UK data indicate that airports contribute 1% of UK NO_x emissions and 0.1% of UK PM_{10} emissions[21] compared with some 32% of NO_x and 11% of PM_{10} emissions for road transport[22]. UK guidance further states that there is no need to consider PM_{10} in relation to airports and that there is only a need to consider NO_x where there are more than 10 million passengers / year[23]. The lack of significant industrial land-uses in the PAA, and the relatively small contribution of the airport, means that road traffic can be considered the principal source of atmospheric pollution in the PAA.

Given the lack of monitoring data for the PAA, baseline monitoring was undertaken in January 2020 at three locations. Results are summarised in the table below with the full monitoring report included in the Appendix. It should be noted that the Rulebook on the manner and conditions for monitoring the quality of air[24] requires that air quality measurements be evenly distributed throughout the year to ensure that results are representative; the baseline results below, which were recorded over a period of seven days should therefore be regarded as a snapshot and supplemented with a longer term monitoring programme.

Table 36: Baseline Air Quality Monitoring Results

Monitoring location	Average concentration (24 hour values) recorded over seven days (g/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
1: Nikola Djurkovic school < 5 m from road	21.56	16.55	11.86
2: Roadside – Radanovici < 5 m from road	24.41	20.06	13.79
3: Background - 220 m from road	9.37	12.87	9.85

Table 36 shows that all results are below the relevant limit values.

[20] Keuken et al., 2015, Total and size-resolved particle number and black carbon concentrations in urban areas near Schiphol airport (the Netherlands), Atmospheric Environment 104 (2015), p. 132-142.
[21] https://www.greenaironline.com/news.php?viewStory=2323
[22] Defra (2019). National statistics release - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/778483/Emissions_of_air_pollutants_1990_2017.pdf
[23] https://uk-air.defra.gov.uk/assets/documents/reports/cat06/0810291343_Screening_Criteria_for_Airports_Final_27-10-08.pdf
[24] Official Gazette of Montenegro", No. 21/11, 32/16

8.4 Impact Assessment

8.4.1 Approach and Methodology

Construction

The most common air quality impacts that may arise during construction activities are dust deposition, resulting in the soiling of surfaces and elevated PM_{10} concentrations, as a result of dust generating activities on site. Dust soiling will arise from the deposition of dust in all size fractions i.e. up to PM_{75}. The ambient dust relevant to health outcomes will be that measured as PM_{10}, although the majority (some 85-90% by weight) will be in the coarse ($PM_{2.5}$ - PM_{10}) fraction, rather than the smaller $PM_{2.5}$ fraction. The IAQM assessment process considers impacts on human and ecological receptors and is summarised below with further information provided in the Appendix. Human and ecological receptors are defined as follows:

- Human receptor: any location where a person or property may experience the adverse effects of airborne dust, or dust soiling, or exposure to PM_{10} over a time period relevant to air quality objectives[25].
- Ecological receptor: any sensitive habitat affected by dust soiling, including direct impacts on vegetation or aquatic ecosystems and indirect impacts on fauna.

Assessment is normally required where there is:

- a human receptor within 350 m of the boundary of the site or 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).
- an ecological receptor within 50 m of the boundary of the site or 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

Construction activities are divided into four categories – demolition, earthworks, construction and trackout to reflect their different potential impacts. The potential for dust emissions is then assessed for each activity that is likely to take place and considers three separate dust impacts:

- annoyance due to dust soiling
- risk of health effects due to an increase in exposure to PM_{10}
- harm to ecological receptors

Sensitivity of the area is determined by a combination of both the number of receptors and their sensitivity and their distance from the source e.g. when considering dust soiling, more than 100 high sensitivity receptors less than 50 m from the source would result in a classification of high, whereas more than 100 high sensitivity receptors all located more than 100 m from the source would result in a classification of low. Examples of the criteria used to classify the sensitivity of receptors are given in the Appendix. The dust emission magnitude is based on the scale of the proposed works

[25] For example, in the case of a 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more in a day.

and is classified as Small, Medium, or Large. Examples of the dust emission magnitude for the different construction activities are given in the Appendix. The dust emission magnitude is then combined with the sensitivity of the area to determine the risk of impacts in the absence of mitigation. Mitigation measures appropriate to the level of impact can then be developed.

Operation

Section 5.4 sets out the baseline traffic flows and assumptions related to future growth and speeds that will be used in the assessment. The project itself is not considered to generate additional vehicle movements; there is no alternative for vehicles travelling between Tivat and Jaz in either direction. Instead, the project will improve traffic flows, reduce journey times, particularly during the summer months and improve safety as described in Section 5.5. The very strong seasonality in the measured, and predicted future, traffic flows means that there is the potential for air quality in the vicinity of the road to vary throughout the year. The assessment of the potential impacts of the project on air quality during operation therefore considers the following scenarios:

- Current (2018) winter months
- Current (2018) summer months
- Future (2021) winter months – assumed year of opening
- Future (2021) summer months – assumed year of opening
- Future (2031) winter months – 10 years after opening
- Future (2031) summer months – 10 years after opening

The assessment is undertaken in two stages to predict ambient concentrations of key pollutants at a local level, expressed as µg/m^3, resulting from traffic using the M2 road and a regional level assessment to estimate gross amounts of key pollutant expressed as kg/year. The local air quality assessment considers the effect of the project in 50 m bands up to a maximum of 200 m from the road. The assessment takes vehicle flows, composition (i.e. % LDVs and HDVs), speed and background concentrations into account and provides estimated concentrations at specified distances from the road.

The regional assessment considers vehicle flows, composition (i.e. % LDVs and HDVs) and speed and provides an estimate of the total amounts of carbon monoxide (CO), total hydrocarbons (THC), NO_x, PM_{10} and carbon dioxide (expressed as carbon (C)) resulting from traffic using the M2 road. Impact descriptors used in this assessment are given in Table 37 below. It should be noted that the descriptors refer to permanent changes in air quality brought about by a development and not short term or temporary changes. They also refer to locations where there is relevant exposure (e.g. for annual concentrations at residential receptors) and not therefore necessarily the location of the maximum impact.

Table 37: IAQM / EPUK Air Quality Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% change in concentration relative to air quality assessment level (AQAL)			
	1	2 - 5	6 – 10	> 10
≤ 75% AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
102 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
> 110% AQAL	Moderate	Substantial	Substantial	Substantial
Note: Changes less than 0.5% are negligible				

8.4.2 Construction Phase Impacts

Identification of sensitive receptors (screening)

Along the entire stretch of the M-2 to be upgraded, there are more than 100 residential receptors within 50 m of the road as shown in Table 38 below.

Table 38: Number of Residential Properties at Specified Distances from the Road

Location	Number of residential properties in each distance band				
	< 20m	20 – 50 m	50 – 100 m	100 – 150 m	150 – 200 m
North of road	6	55	2	73	22
South of road	13	58	9	95	48
Total	19	113	11	168	70

For the purposes of the assessment of sensitivity to dust soiling, > 100 receptors within 50 m results in a classification of high sensitivity. It is assumed that construction activities will not be taking place along the entire stretch of road at any one time, however, in the absence of detailed information on construction methodology, phasing and location of construction compounds, and given that there are also a number of properties within 20 m of the road, a precautionary approach has been taken.

There are no designated sensitive ecological receptors (see Appendix) within 50 m of construction activities. However, given the proximity of surface watercourses and habitats (Section 9.5), a precautionary approach has been taken and so impacts on ecological receptors have been considered but assigned a low sensitivity.

Table 39: Sensitivity of the Area to the Potential Impacts During Construction Activities

Potential impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	High	High	High	Medium
Human health	Low	Low	Low	Low
Ecological	Low	Low	Low	Low

Identification of potential magnitude of dust emissions

The dust emission magnitude is assessed based on the scale of the proposed works and is classified as Small, Medium, or Large. Examples of the dust emission magnitude for the different activities are given in the Appendix. As information on construction methodology and approach is lacking at this time, a precautionary approach has been taken with the dust emission magnitude for demolition, earthworks and construction assessed as large and trackout as medium.

Summary of dust risks

Combining the sensitivity of the area with the magnitude of dust emissions, results in an assessment of risk in the absence of mitigation as shown below.

Table 40: Risk Assessment of Dust Impacts

Potential impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	High risk	High risk	High risk	Medium risk
Human health	Medium risk	Medium risk	Medium risk	Low risk
Ecological	Medium risk	Low risk	Low risk	Low risk

8.4.3 Operational Phase Impacts

Results of the local assessment are given in Table 42 below. Predicted concentrations increase over time, as would be expected given the assumed 4% annual growth in traffic flows. The assumed increased speeds as a result of the Project generally result in a small reduction in predicted concentrations within 50 m of the road, although in all scenarios considered, the contribution from the road is significantly less than the prevailing background. The greatest effect of the Project is seen for levels of PM_{10}, particularly during the summer months when traffic volumes are higher and the magnitude of the assumed change in speed is also higher (i.e. an increase from 25 – 60 km / h compared with 60 – 70 km / h in winter). However, the magnitude of impact according to the descriptors given in Table 40 is at most **negligible**, given the relatively low recorded background concentrations and the change in predicted concentrations as a result of the Project.

An estimate of the total amounts of pollutants produced each year has also been made based on an annual average speed of 60 km/h along the entire route. The assumed increase in average speed as a result of the Project means that total annual emissions are predicted to be lower than in the absence of the Project (calculations have also been undertaken for an annual average speed of 40 km/h for comparison) although given the limitations in available traffic data (Section 1.8), the actual estimates should be treated with caution and have been rounded to the nearest hundred.

Table 41: Annual Quantities of Pollutants

Assumed speed	Annual quantities of pollutants produced				
	CO (kg/year)	Total hydrocarbons (kg/year)	NOx (kg/year)	PM10 (kg/year)	Carbon (tonnes / year)
60 km/h	107,000	12,300	38,500	1,300	6,300
40 km/h	143,400	16,800	39,100	1,600	7,400

Table 42: Predicted Pollutant Concentrations at Specified Distances from the Road

Receptor – distance from road and season		Pollutant concentrations in µg/m³									
		NO_2					PM_{10}				
		2018 baseline	2021		2031		2018 baseline	2021		2031	
			without Project	with Project	without Project	with Project		without Project	with Project	without Project	with Project
20m	Winter	11.5	11.6	11.7	12.1	12.1	13.4	13.4	13.5	13.6	13.6
	Summer	12.4	12.4	12.2	12.8	12.5	14.0	14.1	13.7	14.3	13.8
50m	Winter	10.5	10.6	10.6	10.8	10.8	13.1	13.1	13.1	13.2	13.2
	Summer	11.0	11.0	10.9	11.2	11.0	13.4	13.4	13.4	13.5	13.3
100m	Winter	9.8	9.8	9.8	9.9	9.9	12.9	13.0	13.0	13.0	13.0
	Summer	9.9	9.9	9.9	10.0	10.0	13.0	13.0	13.0	13.1	13.0
150m	Winter	9.5	9.5	9.5	9.6	9.6	12.9	12.9	12.9	12.9	12.9
	Summer	9.6	9.6	9.6	9.6	9.6	12.9	12.9	12.9	12.9	12.9
Background		9.4					12.9				

8.5 Proposed Mitigation

Baseline air quality monitoring has been undertaken in January 2020 (Section 7.3). However, given the strong seasonality in traffic flows (Section 5.4) and to ensure compliance with the Rulebook on air quality monitoring it is recommended that further monitoring be undertaken in summer 2020, prior to the commencement of construction. The additional monitoring will enable the identification of a seasonal baseline for air quality during both summer and winter months against which construction and operation phase effects can be monitored in the short and longer term respectively.

8.5.1 Construction Phase

The dust risk categories assigned for the four classes of construction activity (Table 40) have been used to define appropriate mitigation measures to be adopted during the construction phase All mitigation measures set out below will be detailed further in a construction phase Air Quality Management Plan (AQMP) to be developed by the Principal Contractor in consultation with the competent authority and EBRD and in accordance with GIP.

The AQMP will include all the mitigation measures developed below and will additionally include the results of the monitoring programme used to establish baseline air quality. Outline mitigation measures are set out below and are grouped into general good practice mitigation measures as well as those specific to demolition, earthworks, construction and trackout. Table 43 outlines additional mitigation required to manage impacts related to Air Quality.

Table 43: Additional Air Quality Mitigation

Issue	Mitigation Measures
Site management	• Maintain records of dust and air quality complaints in the Air Quality Management Plan. Identify causes and measures taken to reduce emissions. • Record any exceptional incidents that cause dust or air emissions.
Monitoring	• Undertake regular off-site inspections, where sensitive receptors are nearby (within 100m of site boundary). • Increase frequency of inspections when activities with a high potential to produce dust are being undertaken and during prolonged windy or dry conditions.
Site preparation and maintenance	• Plan site layout so that machinery and dusty activities are located away from receptors where possible • Erect solid screens or barriers around dusty activities or site boundary that are at least as high as any stockpiles. • Keep site fencing, barriers etc. clean using wet methods. • Cover stockpiles with the potential to produce dust.
Site vehicles and equipment	• Vehicle loading and movements to be optimised, with backfilling where possible, to minimise the number of journeys • Journeys to be planned to avoid peak hours • Maximum speed limits on surfaced and un-surfaced haul route and work areas to be specified • Ensure all vehicles switch off engines when stationary. • All onsite and onroad vehicles and machinery to be appropriately maintained and to comply with relevant emission standards.
General construction	• Cutting, grinding or sawing equipment should be fitted with, or used in conjunction with, suitable dust suppression techniques such as water sprays or

activities	local extraction. • Drop heights to be minimised and fine water sprays to be used when appropriate. • Ensure an adequate water supply on site for effective dust suppression / mitigation using non-potable water where possible
Demolition	• Ensure effective water suppression during demolition operations. • Soft-strip inside buildings before demolition, retaining walls and windows to contain dust.
Earthworks	• Re-vegetate exposed areas / soil stockpiles as soon as practicable to stabilise surfaces
Construction	• Ensure sand and aggregates are stored in bunded areas and not allowed to dry out. • Bulk cement and other fine powder materials to be delivered in enclosed tankers and stored in silos with suitable control systems to prevent overfill.
Trackout	• Haul routes and construction site to be damped down to minimise dust generation • Vehicles leaving the site to be covered. • Dry sweeping of large areas to be avoided.

8.5.2 Operational Phase

Given that the Project is not considered to generate any additional vehicle movements itself, any impact is a result of changed speeds, which has been shown to be negligible and so no mitigation is required for the operational phase of the Project based on the results of the modelling undertaken.

8.6 Residual Impacts

With the implementation of the mitigation measures identified above, it is not considered that there will be any significant residual construction phase effects. There are no residual operational phase effects.

8.7 Cumulative Impacts

The most significant proposed development in the vicinity of the Project is the expansion of Tivat Airport (Section 8.3. However, in accordance with the Guidance cited in Section 8.3 the contribution to ambient air quality from the expansion of the Airport will not be significant in comparison with the contribution from the road and so there will be no cumulative AQ-related impacts with the Project.

8.8 Project Commitments

- Implementation of additional baseline air quality monitoring for NO_2, PM_{10} and $PM_{2.5}$ in accordance with the Rulebook on the manner and conditions for monitoring the quality of air (Official Gazette of Montenegro No 21/11, 32/16).

- Development of a Construction Phase Air Quality Management Plan incorporating all mitigation measures specified in Section 7.5.1

- Construction phase air quality risk assessment to be reviewed, and amended as necessary, once details of construction phasing and methodology and location of construction compounds are known.

9 Water Resources

9.1 Introduction

This section identifies and assesses the likely significant Project impacts on water resources. The existing road crosses seven named watercourses – Dreovistica, Gradiosnica, Kolozun, Kovacki, Luckovac, Mocali and Vodoljeznica as shown in Figure 9. Additionally, there are a number of unnamed drainage channels running parallel to the road. The Gradiosnica splits into two branches, one of which joins the Vodoljeznica. The Kolozun and Vodoljeznica rivers ultimately flow into the Tivat Saline Ramsar site (Figure 9) although the points where the road crosses the Kolozun and Vodoljeznica are some 4km and 1.2 km respectively upstream of the Ramsar site. Baseline water quality analysis has been undertaken for the Gradiosnica, Kolozun and Vodoljeznica rivers in January 2020 with the full results contained in the Appendix and summarised in this section. The rivers are strongly seasonal and all dry out to a large extent, if not completely, during the summer months.

The proposed Project will require new bridges and culverts to be built across all watercourses, as well as works to the existing crossings. Construction works therefore have the potential to affect water quality due to direct activities in the watercourses themselves as well as indirect impacts from spillages and runoff. Runoff from traffic using the road, both during routine operation and any discrete events such as a major accident, could also adversely affect water quality. Climate change effects such as heavy rainfall events and flooding also have the potential to affect water resources. Decommissioning has not been considered given the design life of the Project, and because decommissioning effects are not expected to be worse than the impacts considered during the construction and operational phases. The effects of the Project on biodiversity, including aquatic species, are addressed in Section 9 below although it should be noted that impacts on water quality, and the mitigation measures set out in this chapter are relevant to aquatic flora and fauna and the classification of sensitivity of the water resources draws on the findings of Section 9.

9.2 Relevant Legislation and Guidance

The following national legislation is considered relevant to this assessment:

- ***Law on Waters ("Official Gazette of Montenegro", No. 27/2007, 32/2011, 47/2011 48/2015 and 52/2016, 55/16, 02/17)*** - The Law regulates the legal status of water related resources and management. According to Article 114, the investor is obliged to prepare technical documentation for the construction/reconstruction of new and existing facilities. This involves carrying out hydrogeological research that can permanently, occasionally or temporarily influence the changes in the water regime. According to Article 118, the investor is obliged to obtain a Water consent before the construction or reconstruction of facilities where water related issues are evident. As such, technical documentation for the facilities and works is executed in accordance with the established Water conditions. According to Article 120, the investor is obliged, prior to the use of facilities and installations for which Water consent is required, to obtain a Water Permit that determines that the facilities and installations have been built in accordance with the Water consent. The Law requires wastewater treatment

which is to be performed by the polluter. Pollutants must be partially or completely removed before the water is discharged into the public sewage system or another recipient. Additionally, the removal process should be carried out in compliance with the regulations on effluents (*emissions*). Article 84 of this Law prescribes that companies, other legal entities and persons discharging wastewater, shall install the measuring equipment to measure volumes and test the quality of wastewater and the impacts on the recipient. Relevant data shall be submitted to the competent authority. Regular functioning of equipment must be ensured with a journal kept to record historic usage and operation.

- ***Regulation on the classification and categorization of surface and groundwater ("Official Gazette of Montenegro", No. 2/07)*** - has established Environmental Quality Standard (EQS) values for all main rivers in Montenegro, in the format AnSnKn where code A is a category for water representing basic physicochemical standards, S, Š or C is the assessment for fisheries water and K is the assessment for bathing water. The classification is set out in table 44 below according to the levels of particular determinands in the water (see Appendix).

Table 44: Classification of Montenegrin Surface Waters

Class	Description
A	Waters that are in natural condition and can be used for drinking, with possible disinfection.
A1	Waters that can be used for drinking after simple physical treatment and disinfection.
A2	Waters that can be used for drinking after proper conditioning (coagulation, filtration and disinfection).
A3	Waters that can be used for drinking after treatment requiring intensive physical, chemical and biological treatment with prolonged disinfection and chlorination, ie coagulation, flocculation, decantation, filtration, active carbon absorption and ozone or chlorine disinfection.

The Rulebook on the quality and sanitary technical conditions for wastewater disposal and the method and procedure of wastewater quality testing and the content of wastewater quality report (*"**Official Gazette of Montenegro" No. 56/19**).*are also considered relevant. The assessment has also incorporated guidance contained in the Road drainage and the water environment section of the UK Design Manual for Roads and Bridges[26]. The requirements of the Water Framework Directive ("WFD") (as amended)[27] are implemented in Montenegro by the Water Act[28] . Work is ongoing[29] with respect to characterisation and analysis of river basin districts and development of monitoring programmes to enable classification of surface water and ground waters in

[26] Highways England (2019). Design Manual for Roads and Bridges - Sustainability & Environment Appraisal LA 113 Road drainage and the water environment and the previous version of this volume reference HD45/06

[27] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

[28] Official Gazette of Montenegro no 48/15

[29] Strengthening the Capacities for Implementation of the Water Framework Directive in Montenegro http://www.euwfd.me

Montenegro. Under the WFD, surface waters are assigned to one of five classes (high – good – moderate – poor – bad) and groundwater to one of two classes (good – poor).

9.3 Baseline Conditions

9.3.1 Flood risk

The existing highway, although raised on an embankment in places, suffers from flooding each Spring and Autumn. At the northern end, adjacent to the airport, the flooding is understood to be as a result of the existing culvert being too small and poorly maintained. At the southern, lower, end of the Project, there is regular surface flooding, particularly in the vicinity of Grbaljsko and Radanovici. Feedback from the KIIs (See Stakeholder Engagement Plan) indicates that the existing drainage network along the entire route is too small and, in general, poorly maintained.

9.3.2 Groundwater

The underlying geology is primarily Middle Eocene flysch complex sediment (E_3) containing marls, sandstones and clay conglomerates, with quaternary alluvial deposits at the surface. Flysch is a hydrogeological barrier for surface and groundwater. There are no abstraction points or groundwater protection zones for public water supply sources in the PAA; the aquifers are principally located in the higher limestone areas to the north and east of the PAA. There is one aquifer 'Mrčevo polje' in the alluvial plain adjacent to the southern end of the Project. There is no abstraction from this aquifer, which suffers from saline intrusion.

9.3.3 Water quality

A targeted water quality baseline sampling exercise was undertaken in January 2020 at eight locations upstream and downstream of the project (surface waters and monitoring locations are shown in the Appendix) The purpose of the sampling was to characterise the existing condition of the watercourses into which runoff may drain from the upgraded road, especially those with the potential to affect the Tivat Saline Ramsar site. Samples for the following determinands were taken upstream and downstream of the road to both establish a winter baseline and attempt to identify if the existing road has any effect on water quality.

- General condition (DO, COD, pH, TSS)
- Metals (Cd, Cu, Zn)
- Hydrocarbons (TPH) BaP
- Nutrients (NH_4, NO_2, NO_3, Total P)

Results of the analyses are summarised in Table 45 below.

Table 45: Surface Water Quality - Results of Jan 2019 Sampling

Determinand (all mg/l except COD and DO mg/lO2)	Sample location (river name, upstream / downstream, grid reference)							
	Kolozun		Vodolijeznica		Gradiosnica			
	upstream 42° 21'34.241" 018° 45' 40.983"	downstream towards Tivat Saline 42° 23'27.571" 018° 43' 39.744"	upstream 42° 23'40.506" 018° 44' 25.072"	downstream towards Tivat Saline 42° 23'39.936" 018° 44' 5.110"	upstream – towards sea 42° 24' 50.651" 018° 43' 4.483"	downstream – towards sea 42° 24'51.109" 018° 43' 3.576"	upstream – towards Tivat Saline 42° 24'4.330" 018° 43' 48.064"	downstream – towards Tivat Saline 42° 23' 41.118" 018° 43' 32.588"
TSS	1.8	2.8	68.9	11.4	1.9	<0.02	2.2	14.7
pH	7.8 ± 0.3	7.5 ± 0.3	7.4 ± 0.3	7.5 ± 0.3	7.8 ± 0.3	7.9 ± 0.3	7.6 ± 0.3	7.7 ± 0.3
Nitrates	0.60 ± 0.04	0.77 ± 0.05	1.11 ± 0.08	1.15 ± 0.08	4.5 ± 0.3	4.7 ± 0.3	0.51 ± 0.03	1.5 ± 0.1
Nitrites	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	<0.001	<0.001	0.050 ± 0.003	0.0020 ± 0.0001	0.0020±0.0001	0.011 ± 0.001	0.0020 ± 0.0001	0.0020 ± 0.0001
Zinc	<0.001	<0.001	0.015 ± 0.001	0.0020 ± 0.0001	<0.001	0.023 ± 0.001	0.022 ± 0.0001	0.0030 ± 0.0001
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001
Total P	0.072 ± 0.005	0.065 ± 0.005	0.101 ± 0.008	0.12 ± 0.01	0.11 ± 0.01	0.13 ± 0.01	0.11 ± 0.01	0.82 ± 0.007
COD	3.5 ± 0.2	1.9 ± 0.1	27.2 ± 1.6	5.4 ± 0.3	4.3 ± 0.2	7.7 ± 0.4	4.6 ± 0.3	5.8 ± 0.3
Dissolved O	12.1	10.0	9.9	7.7	11.8	11.7	9.3	10.4
Ammonium	0.06 ± 0.01	0.13 ± 0.02	0.35 ± 0.05	0.21 ± 0.03	0.11 ± 0.01	0.11 ± 0.02	0.16 ± 0.02	0.24 ± 0.03
PAH	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Total mineral oil	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Water class	A2	A3	Fail	A3	A3	A3	A3	A3

1: Colours shown in the table correspond to the relevant class A, A1, A2 or A3.

Results have been compared against the limits given in the Regulation on the classification and categorization of surface and groundwater (see Appendix) to obtain an overall classification for each sample. Of the eight samples, one – the river Vodolijeznica upstream of the road fails to meet the standard. Field notes from this sample recorded the presence of flytipped waste, and a 'wild' settlement as well as the Lovanja landill further upstream. Six of the samples meet class A3, with one sample meeting class A2. There is no significant difference between samples upstream or downstream of the road. As set out in section 8.2 above, work is currently ongoing with respect to formal classification of Montenegrin surface and groundwaters against the WFD requirements.

9.4 Impact Assessment

9.4.1 Approach and Methodology

The 'mitigation by design' approach (Section 1.4) means that measures to reduce potential impacts on water resources, have been incorporated into the design of the project. e.g. the division of the route into 47 catchment areas, each equipped with its own sedimentation tanks and coalescent filters providing treatment according to the SIST-EN 858-1:2002 standard. This section therefore focuses on construction phase activities and maintenance requirements during operation. It assesses the likely impacts of the Project on water resources and identifies the need for mitigation both through design and effective environmental management during construction and operational phases.

Receptors vary in their sensitivity / value and have been classified and ranked on a scale from very high – low as set out in Table 46 below.

Table 46: Classification of Receptor Sensitivity for Assessment of Impacts on Water Resources

Sensitivity / value	Descriptor	Example
Very high	Attribute has a high quality and rarity on a regional / national scale	Surface waters: Site protected under national or international legislation / Designated Salmonid / Cyprinid fishery Groundwater: Major aquifer providing regionally important resource or supporting a site protected under wildlife legislation
High	Attribute has a high quality and rarity on a local scale	Surface waters: Species protected under national or international legislation / Major Cyprinid fishery Groundwater: Major aquifer providing locally important resource or supporting a river ecosystem
Medium	Attribute has a medium quality and rarity on a local scale	Surface waters: Locally designated site Groundwater: Aquifer providing water for agricultural or industrial use
Low	Attribute has a low quality and rarity on a local scale	Surface waters: No designation for either habitats or species Groundwater: Non-aquifer

The assessment of the magnitude of an impact is undertaken with reference to the criteria given in Table 47 below for both positive and negative impacts. Finally, the significance of an impact, which is a function of the sensitivity / value of the receptor and the magnitude of the impact has been identified using the matrix set out in Table 48.

Table 47: Magnitude of Impact Definitions

Magnitude	Example criteria
Major adverse	Surface Water: Compliance failure with WFD Environmental Quality Standard (EQS) values. Groundwater: Loss of, or extensive change to, an aquifer. Potential high risk of pollution to groundwater from routine runoff.
Moderate adverse	Surface water: Compliance failure according to the Regulation on classification and categorisation of water. Groundwater: Partial loss or change to an aquifer. Potential medium risk of pollution to groundwater from routine runoff.
Minor adverse	Surface water: Decrease in one class according to the Regulation on classification and categorisation of water Groundwater: Potential low risk of pollution to groundwater from routine runoff.
No change	Surface water: No risk identified Groundwater: No measurable change
Minor beneficial	Surface Water: Increase in one class according to Regulation on classification and categorisation of water Groundwater: Low reduction in existing spillage risk to an aquifer.
Moderate beneficial	Surface Water: Removal of compliance failure according to Regulation on classification and categorisation of water Groundwater: Medium reduction in existing spillage risk to an aquifer.
Major beneficial	Surface Water: Removal of an existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse. Groundwater: Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer.

Table 48: Significance Matrix for Impacts on Water Resources

Sensitivity / value of receptor	Magnitude			
	No change	Minor	Moderate	Major
Very high	Neutral	Moderate – **Large**	**Large – Very Large**	**Very large**
High	Neutral	Slight – moderate	Moderate – **Large**	**Large – Very Large**
Medium	Neutral	Slight	Moderate	**Large**
Low	Neutral	Neutral	Slight	Slight - moderate

Note that impacts can be both positive and negative and that bold entries in Table 48 are those impacts that are considered to be significant in the context of this assessment.

The key receptors considered in this assessment and their sensitivity / value are set out in the table below. More detail can be found on these in the biodiversity assessment chapter in Section 9.

Table 49: Key Receptors and Sensitivity

Receptor	Sensitivity / value	Reason
Tivatska Saline	Very high	International designation (Ramsar)
Drenovštica	High	Contains critically endangered (IUCN Red List) European eel (*Anguilla anguilla*)
Gradiosnica	Medium	No specific interest but connectivity with Vodoljeznica and thus Tivat Saline means a precautionary approach taken to sensitivity.
Kolozun	High	Contains critically endangered (IUCN Red List) European eel (*Anguilla anguilla) and* Greek Stream frog (Rana graeca), which is protected under Annex IV of the Habitats Directive.
Kovacki	High	Contains critically endangered (IUCN Red List) European eel (*Anguilla anguilla*)
Luckovac	High	Contains critically endangered (IUCN Red List) European eel (*Anguilla anguilla*)
Mocali	Medium	No specific interest but connectivity with Kolozun and thus Tivat Saline means a precautionary approach taken to sensitivity.
Vodoljeznica	Medium	No specific interest but connectivity with Vodoljeznica and thus Tivat Saline means a precautionary approach taken to sensitivity.
Other streams	Medium	Potential for connectivity with named rivers containing *A. anuguilla* means a precautionary approach taken to sensitivity.
Roadside drainage channels	High	Contain Greek Stream frog (Rana graeca), which is protected under Annex IV of the Habitats Directive
Groundwater	Low	Mrčevo polje aquifer is adjacent to southern end of road but there is saline intrusion and no abstraction.

9.4.2 Construction Phase Impacts

Potential construction phase impacts can be broadly divided into two categories:

- Changes in the hydrological regime
- Changes in water quality

Changes in the hydrological regime, particularly increased flow rates and increased sedimentation downstream could arise as a result of:

- **In-channel works:** The upgraded bridges proposed are all single span structures and will therefore not require foundations in the riverbed itself although it is likely that in-channel / embankment works will be required to create the new bridges and culverts; the magnitude of temporary construction phase impacts are expected to be Minor - Moderate adverse.

- **Altered surface runoff rates and direction**: Ground clearance and earthworks will alter site levels and gradients and soils can become compacted leading to reduced permeability; the magnitude of any temporary construction phase impacts are expected to be Minor – Moderate adverse.

- **Abstraction from rivers to provide water for construction activities**: It is understood that construction water demand will be provided by existing utilities and so there will be no abstraction and no impact.

Changes in water quality during construction could arise as a result of:

- **Site clearance and groundworks**: Removal of topsoil and vegetation and general construction activities causing dusts, leading to increased turbidity, sedimentation, and potentially nutrient load, in watercourses. Sediment loads and nutrient levels in watercourses vary naturally and aquatic biota can cope with a range of concentrations. However, prolonged periods of elevated levels of sediment concentrations can exert serious stresses on watercourses and associated habitats. The magnitude of any temporary construction phase impacts are expected to be Minor – Moderate adverse depending on the duration of the construction activities and the prevailing flow regime of the river.

- **Construction of bridge crossings / culverts**: As well as the impacts on the hydrological regime, in-channel works can adversely affect water quality through increased turbidity / sediment loads. It is understood that in-channel works are proposed to take place either side of the peak summer tourist season, when river levels will be lower, although not completely dry. It is assumed that any foundations / structures required will be constructed from poured concrete; liquid cement is strongly alkaline and highly toxic in aquatic environments and could result in a Major impact.

- **Spillages of chemicals, fuels, materials**: Impacts from spillages of incorrectly stored materials or from accidents on site will vary according to the amount spilled and its location in relation to water resources. Impacts could therefore range from Minor – Major in magnitude.

In the absence of a detailed construction methodology, including locations of construction compounds, it is not possible at this stage to refine the magnitude of potential impacts from the categories given above. In the absence of mitigation, significant impacts (Large – Very Large) on the High sensitivity receptors e.g. the Rivers Drenovistica, Kolozun, Kovacki and Luckovac could result. Given the Very High sensitivity of Tivat Saline Ramsar site, Very Large impacts could in theory also result although this is considered less likely given its distance from the Project and so a maximum impact of Large is deemed more appropriate. Impacts on other identified receptors range from Neutral – Large.

Mitigation measures set out in Section below therefore cover the range of potential impacts that may arise. It is recommended that the assessment of impacts, and therefore associated mitigation measures, be revisited once the detailed construction methodology is available.

9.4.3 Operational Phase Impacts

Runoff and drainage

Routine run-off from roads contains a variety of vehicle-derived pollutants, which could adversely affect water resources including:

- Hydrocarbon combustion products
- Fuel and fuel additives
- Lubricants
- Particulate contaminants including carbon, rubber, and metals, including rust.

The detailed design of the drainage system needs to ensure that water will not be discharged without adequate treatment. The increased impermeable surface area of the widened road means that discharge rates may need to be restricted, with increased attenuation incorporated into the system to avoid overload. It is understood that 47 interceptors will be provided, each with its own discharge point and that interceptors will discharge to surface waters, culverts and potentially to land. Monthly monitoring will be undertaken at each interceptor prior to discharge. Provided that the drainage system is appropriately designed, installed and maintained, the impacts would be expected to be Neutral. In the absence of maintenance, a Moderate adverse impact could result.

Flood risk

The increased impermeable surface area will result in larger runoff volumes and the introduction of any new structures within the river channel could impede or alter the path of floodwaters, thereby changing the shape and / or extent of the floodplain. Increased discharge flow rates could lead to scouring, which in time could also affect the floodplain. The design will need to incorporate an appropriate return period, including an allowance for climate change for elevated flood discharges. It is understood that flood risk has been considered in the design of the road with the finished road level being at least as high as existing. However, the Main Design does not provide a longitudinal profile of the route so the actual levels are unknown as is the impact of any increase on flood risk of the surrounding area. It is also understood that potential climate change effects i.e. the provision of adequate storage capacity to cope with storm and rainfall events, have not been incorporated into the drainage design. Given these uncertainties a Moderate adverse impact has been assumed.

De-icing agents

The use of de-icing agents (salts) could also have an adverse effect on water resources although its use is expected to be temporary and infrequent given the very few days / year when frost is experienced (Table 10 National EIA). De-icing salts would also obviously be used in the winter months when river flows are high and the dilution factor is therefore also high. The use of de-icing agents is therefore predicted to have a neutral impact and no specific mitigation measures are required.

Accidents

On all operational roads, there is the risk that spillages will occur from vehicles following a traffic accident. As well as minor spillages of oils and fuels from cars, there is also the potential for major spillages from HDVs carrying bulk chemicals or fuel, which may result in an acute pollution incident. The stormwater drainage system will be designed to intercept routine spills, however there is the potential that, particularly following a major incident close to a bridge or culvert, spillages of chemicals or fuels could flow directly into surface waters. The severity of any pollution incident will

depend on the volume and nature of the chemicals spilled as well as the time of year, given the seasonal variability in flow velocities and volumes; the potential impact could therefore be Major Adverse for a large scale incident close to the Kolozun .

9.5 Proposed Mitigation

Baseline water quality

The baseline water quality analysis undertaken provides a snapshot of conditions during the winter months. Given the extreme variation in flows in the three rivers sampled, it is recommended that analysis be repeated at the same locations at other times of year and before construction commences; levels of several of the determinands could vary considerably dependent on flow rates etc. The development of seasonal baseline datasets will enable impacts throughout the year to be correctly identified.

9.5.1 Construction Phase

All mitigation measures set out below will be detailed further in a construction phase Water Resources and Water Quality Management Plan to be developed by the Principal Contractor in consultation with the competent authority and EBRD and in accordance with GIP. The plan will include all the mitigation measures developed below and will additionally include the results of the additional water quality analyses used to establish baseline water quality as well as the WFD classification of the watercourses when they are available.

General GIP construction mitigation measures

The following measures should be implemented in accordance with GIP:

- Handling of fuel, lubricants, oils and chemicals should take place in secure, bunded areas.
- Spill kits, including booms, should be provided to clean up any minor spills of fuel, lubricants, oils or chemicals.
- Secondary containment devices (drop cloths, drain pans) should be used to catch leaks or spill while removing or changing oils from vehicles or equipment. For small spills, absorbent materials must be used.
- Drip trays should be used under compressors, pumps, motors and any redundant plant and during refuelling. Drip trays should be emptied at regular intervals to prevent overflow.
- Fuel, oil or hazardous materials required to be stored, should be stored within secondary containment (designed to contain at least 110% of the total capacity of the storage containers) located greater than 100m from a watercourse or waterbody. Walls and floors should be constructed of concrete or other suitably impermeable material. No drains from the storage area should be installed.
- No more than 100 litres of fuel, lubricant or any other hazardous material stored at any one place
- On-site vehicles and equipment should be inspected regularly for leaks and all leaks shall be immediately repaired. Incoming vehicles and equipment should be checked for leaks. Leaking vehicles/equipment should not be allowed on-site.
- When plant maintenance is carried out on site, used oil should be stored in a bunded area for

collection. Oil and fuel filters should also be stored in a designated bin in a bunded area for separate collection.

- Construction equipment and vehicles should not be re-fuelled within 100m of a watercourse and re-fuelling should be undertaken on an impermeable surface.
- Pant and wheel washing to be carried out on an area of hardstanding at least 10 m from any watercourse or surface water drain.
- All exposed soil and any soil stockpiles should be covered to prevent erosion run-off of mobilised suspended solids, or turfed with grass. Soil stockpiles should not be higher than 2m or have slopes greater than 25° to prevent run-off of sediment.
- Stockpiles of construction materials (e.g. aggregates sand and fill materials) should be covered with tarpaulin or a silt fence constructed using a suitable geotextile, as a matter of course, but particularly during rainstorms.
- Identify, and clear any existing drains or gullies that are blocked or not functioning correctly.
- Where practicable, local perimeter drains should be constructed around working areas to collect suspended run-off.
- The discharge of any untreated wastewater into surface waters should be prohibited.
- Sediment laden water from the work sites will be filtered through the ground or settlement lagoons prior to controlled release to a watercourse.
- Earth bunds should be created to prevent an accidental spill of hydrocarbons or other chemicals escaping from the work sites reaching the watercourse.
- Water quality should be monitored throughout the duration of the works and treated wastewater discharges should comply with specified water quality standards (including Project and national standards).
- All materials should be stored above flood level.
- No waste materials, including cement contaminated water and any concrete debris, to be disposed of in any surface waters.
- Portable toilets should be provided at bridge construction sites.
- Washing of construction equipment or vehicles should be forbidden within 100m of watercourse.
- Generators should be located more than 20 meters from the river on impermeable surfaces.
- Areas where concrete mixers can wash out leftover concrete should be provided; this may be in the form of a lined settling pond at each site.

Bridge / culvert-specific mitigation measures

The following mitigation measures should be implemented specifically in relation to the construction / refurbishment of bridges and culverts:

- Foundation works for bridges, culverts, retaining walls and other structures in or close to surface water resources to take place when river levels are low I.e. either side of the main tourist season to minimise the potential for silt pollution.
- If bridge construction works cannot be avoided when there are flows in the river, appropriate isolation techniques should be employed i.e. the installation of a coffer dam, to keep water out of the works area and controls installed downstream of the works to trap sediments such as silt fences, rock groynes, geo-fabric barriers and hay bales. In addition, turbidity should be

monitored daily if sensitive biodiversity or human receptors are present, immediately upstream and downstream of the work site. If turbidity levels are shown to exceed specified standards, operations in the river should cease until the river is flowing more clearly again.
- Where technically feasible, work on crossings should be carried out from the banks above the channel, avoiding direct intervention in the watercourse, unless the existing bank needs to be reinforced.
- Sensitive areas of watercourses should be protected from vehicles and other construction activities via fencing or other appropriate means.
- Method statements to be produced for works adjacent / in the following watercourses - Dreovistica, Kolozun, Kovacki, Luckovac.

9.5.2 Operational Phase

The principal mechanism by which potential operational phase impacts will be mitigated is through the design of the drainage system itself. However, it is essential that the system is appropriately inspected and maintained to ensure its continued function. An Operational phase Water Resources and Water Quality Management Plan should therefore be developed that includes the following commitments:

- The integrity and capacity of the storm water drainage system should be regularly maintained to avoid blockages, overflow and the direct discharge of untreated runoff into receiving rivers.
- The use of pesticides and herbicides for verge maintenance should be avoided.
- Wastewater in each of the 47 interceptors should be analysed monthly, before final discharge in accordance with the relevant Rulebook[30]
- Water quality in key sensitive watercourses in the PAA (Dreovistica, Kolozun, Kovacki, Luckovac) should be monitored monthly during periods of river flows for *inter alia* total petroleum hydrocarbons, benz(a)pyrene, heavy metals (cadmium, copper and zinc), biological and chemical oxygen demand, turbidity, suspended solids, pH, ammonium ions, nitrites, nitrates and total phosphorous.
- Maintenance of the road and bridge decks should only be performed during dry weather to minimise the risk of contaminated runoff.

Accidents

An Emergency Preparedness and Response Plan should be developed in collaboration with the local emergency services and the maintenance contractor, to ensure that any spillages that do occur are effectively controlled and impacts on watercourses are limited as far as possible. The Plan should provide a full list of protocols and communication channels that will be applied in the event of a major pollution incident.

[30] Official Gazette of Montenegro 45/08, 09/10, 26/12, 52/12 and 59/13

9.6 Residual Impacts

9.6.1 Residual Construction Phase Impacts

- **Water resources** Construction will occur adjacent to, and within, watercourses, and will also involve works to the drainage network, providing potential pathways for pollutants to reach watercourses. Key sources of pollutants could include storage and management of fuels and oils, use of cement-based products, sediment releases, including entrainment of fine sediment in runoff, and loss of material during storm events. Provided that all mitigation measures set out above are implemented fully throughout the construction phase, then no significant residual construction phase effects on water resources are expected and a temporary neutral – moderate adverse effect on the characteristics of the receptors listed in Table 49 is expected during construction with neutral residual effect.

- **Flood risk** Heavy rainfall events during construction may result in flooding, as runoff may be unable to drain away quickly, potentially resulting in flooding of working areas, excavations and the carriageway. During the initial earthworks phases, when topsoil and subsoil will be exposed, waterlogging and ponding may occur more frequently, leading to blockages of drains and gullies due to entrained sediment in runoff. Good site management practices, as set out in the mitigation measures will enable the early identification of any blocked drains or gullies resulting in at worst a **temporary slight - moderate adverse** impact with a **neutral residual effect**.

9.6.2 Residual Operational Phase Impacts

Any residual effects during operation are expected to be long term with the potential for effects to occur throughout the operational phase.

- **Water quality:** If the relevant mitigation measures outlined above are implemented during the operational phase, there will be no deterioration in water quality from current levels as a result of the Project and so the residual impact on surface and groundwater will be **neutral**.

- **Flood risk:** As discussed above, information on the measures through which the Project includes adequate mitigation of flood risk, both due to the increased impermeable surface area of the widened road as well as climate change effects, has not been provided at the time of writing. A precautionary approach has therefore been taken and a **moderate** residual impact has been assumed.

- **Accidents:** The Project is anticipated to reduce the number of accidents (section 6.5.2) during operation, and therefore the risk of pollution incidents as a result of road accidents will also decrease. It is considered that the magnitude of impact compared with the existing situation will be **neutral**.

9.7 Cumulative Impacts

The proposed expansion to Tivat Airport is assumed to result in increased runoff volumes from the airport and potentially major effects on the watercourses in the vicinity of the airport although detailed design proposals are not yet available. However, provided that the drainage design for the Project is appropriately designed and maintained, there should be little / no change from the existing baseline in terms of water quality and flows upstream of the airport and therefore no significant cumulative impacts.

9.8 Contractors Commitments

- Development of a Construction Phase Water Resources and Water Quality Management Plan incorporating all mitigation measures set out in section 8.5.1 and pre-construction water quality monitoring.
- Development of an Operation Phase Water Resources and Water Quality Management Plan incorporating all mitigation measures set out in section 8.5.2 and pre and post discharge water quality monitoring.
- Development of an Emergency Preparedness and Response Plan.

10 Ecology and Nature Conservation

10.1 Introduction

This Section describes the biodiversity of the PAA and includes a biodiversity impact assessment guided by EBRD PR 6 and its associated Guidance Note and the *Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning*[31] prepared by the Multilateral Financing Institutions Biodiversity Working Group (2015), including the EBRD. Figure 7 shows how the biodiversity impact assessment process has fit within the wider ESIA process. This study includes a characterisation of the baseline conditions and identification and characterisation of project-related opportunities, risks and impacts on biodiversity. The assessment considers direct, indirect and cumulative impacts, and includes measures to manage identified risks and impacts in accordance with the mitigation hierarchy and GIP. A precautionary approach has also been taken to the assessment, so if a species has been recorded in the wider area, and the habitat is considered suitable for that species, it is presumed that the species is present in the site unless surveys demonstrate otherwise. A specific assessment has also been conducted to identify whether any PAAs qualify as either Critical Habitat (CH)[32] of Priority Biodiversity Features (PBFs)[33] , as has an Appropriate Assessment in line with the requirements of relevant EU Directives.

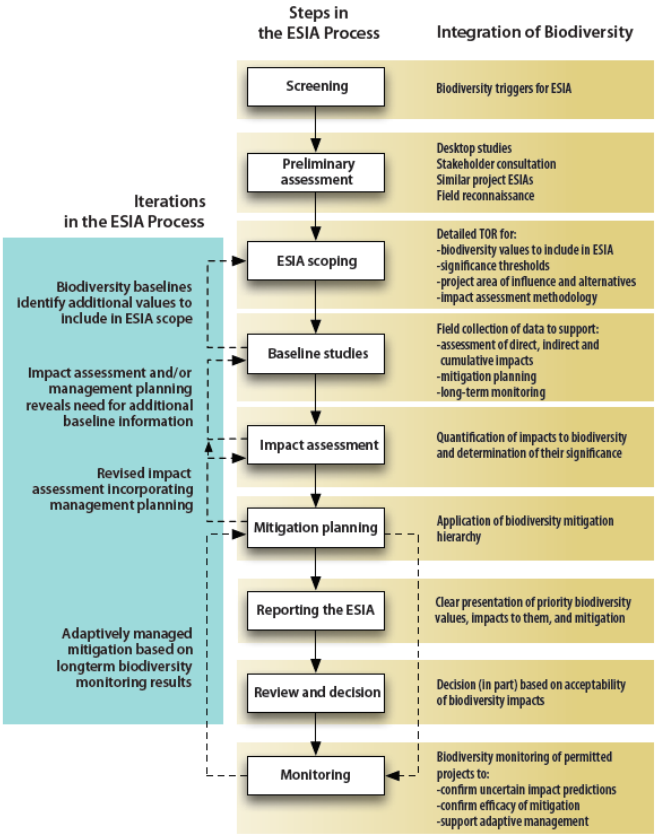


Figure 7: Outline of the Approach to Biodiversity Impact Assessment into ESIA

[31] Hardner, J., R.E. Gullison, S. Anstee, M. Meyer. 2015. Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning. Prepared for the Multilateral Financing Institutions Biodiversity Working Group https://publications.iadb.org/en/good-practices-biodiversity-inclusive-impact-assessment-and-management-planning

[32] Critical habitat, defined as comprising one of the following: (i) highly threatened or unique ecosystems; (ii) habitats of significant importance to endangered8 or critically endangered species; (iii) habitats of significant importance to endemic or geographically restricted species; (iv) habitats supporting globally significant migratory or congregatory species; (iv) areas associated with key evolutionary processes; or (v) ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph.

[33] Priority biodiversity features are a subset of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats

10.2 Relevant Legislation and Guidance

The following EU Legislation is considered particularly relevant to this this assessment:

Council Directive 92/43/EEC of 21 May 1992 – Habitats Directive

The Habitats Directive was adopted in 1992 to help maintain biodiversity. It protects over 1000 animals and plant species and over 200 types of habitat. It also established the EU-wide Natura 2000 network of protected areas, which include any special areas of conservation designated due to the habitats directive annexes.

- **Annex I** - Natural habitat types of community interest whose conservation requires the designation of special areas of conservation.
- **Annex II** - Animal and plant species of community interest whose conservation requires the designation of special areas of conservation.
- **Annex III** - Criteria for selecting sites eligible for identification as sites of community importance and designation as special areas of conservation.
- **Annex IV** - Animal and plant species of community interest in need of strict protection.
- **Annex V** - Animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures.

Directive 2009/147/EC – Birds Directive

Initially adopted in April 1979. It provides comprehensive protection to all wild bird species naturally occurring in the Union.

- **Annex I**: 194 species and sub-species are particularly threatened. Member States must designate Special Protection Areas (SPAs) for their survival and all migratory bird species.
- **Annex II**: 82 bird species can be hunted. However, the hunting periods are limited and hunting is forbidden when birds are at their most vulnerable: during their return migration to nesting areas, reproduction and the raising of their chicks.
- **Annex III**: overall, activities that directly threaten birds, such as their deliberate killing, capture or trade, or the destruction of their nests, are banned. With certain restrictions, Member States can allow some of these activities for 26 species listed here.
- **Annex IV**: the directive provides for the sustainable management of hunting but Member States must outlaw all forms of non-selective and large scale killing of birds, especially the methods listed in this annex.
- **Annex V**: the directive promotes research to underpin the protection, management and use of all species of birds covered by the Directive, which are listed in this annex.

EU Regulation 1143/2014 on Invasive Alien Species

In the wake of the EU Biodiversity Strategy to 2020, committed to protect native biodiversity and ecosystem services against invasive alien species

The following national legislation is also considered relevant to this assessment:

Law on Nature Protection ("Official Gazette of Montenegro", No. 54/16)

This Law prescribes the general measures of protection and conservation of nature; protection of natural goods; sustainable use of natural resources and natural goods and the control of their use; conservation of ecological networks and corridors; implementation of strategies, plans, programs, bases and other documents; mitigating harmful consequences caused by activities in the nature, by exploitation of natural resources or natural hazards; stimulating measures for the protection and conservation of natural resources.

Article 76 states that public roads, other roads and other facilities must be built in such a way as to reduce the negative effect on the migratory wildlife pathways and enable the safe passage of wild animals at appropriate distances. These measures shall be provided by the application of specific construction and technical-technological solutions (ecological bridges, built passes and passages, tunnels, culverts, channels, safety facilities, facilities for regulating movement direction, fish pass, elevators) on the facilities and in their environment.

The Rulebook on measures of protection and way to maintain the passes for wildlife ("Official Gazette of Montenegro", No. 80/10) determines the protection measures and the manner of maintaining special technical and technological solutions, which enable the unhindered and safe passage of wild animals. The following articles are relevant for the Project:

Article 4: Amphibian and reptile crossings have the form of tunnels, with direction markers towards the openings at both ends. Openings which are provided at each end of the wildlife crossing, stipulated in Paragraph 1 of this Article, may have circular, rectangular or elliptical shape, whereby their diameter may vary, based on the length of the tunnel. Consequently, minimal diameter may range from 0.4 to 1.2 m, i.e. from 0,4 x 0,4 m to 1,2 x 1,0 m (width times height), in case the wildlife crossing has the length between 10 and 40 m. Direction markers shall be placed vertically along the edge of the tunnel, whereby they should be placed at the minimal height of 50 cm.

Article 5: Crossings for smaller wildlife species (weasel, hedgehog, otter, badger, fox, rabbit, etc.) may only have the form of underground crossings, whereby they may have round or rectangle shape and their dimensions should be adapted to the animal species for which the crossings have been constructed. Protective fencing will be placed at both sides of the crossing defined in Paragraph 1 of this article. This fence will be used for preventing animals from reaching the road, whereby it will have the minimal length of 100 m.

Article 8: Fish ladders are used for re-establishing communication between river watercourses, or between lakes and rivers, in case the natural crossing path is interrupted by construction of the dam. Fish ladder consists of a series of short steps (in the cascade form), whereby the end point of the fish ladder is located on the other side of the dam. Length of the fish ladder depends on the type and height of the dam which is to be bypassed. Fish ladders are equipped with resting areas, i.e. with several deep pools in which fish rest for a certain period of time before continuing migration. Barriers between the cascades must have zigzag openings, which will be used by fish so that it can

continue its movement.

10.3 Approach to the Biodiversity Impact Assessment

The assessment has involved a combination of desk studies, stakeholder meetings, walkover surveys and more detailed field surveys as follows:

- **Desktop studies:** Literature review of project area and areas with similar habitat in Montenegro (Karaman 1997; Cakovic & Milosevic 2013; Petrovic et al. 2012), and Croatia (Official Gazette 88/14). Project Screening using the International Biodiversity Assessment Tool (IBAT) screening tool.
- **Summer Field surveys.** Field surveys were carried out in June (06/23 and 06/24) and July (07/13 and 07/14) 2019. These involved setting of camera traps for large vertebrates at sites along the project road, surveys for bats using both ultrasonic detectors and trapping methods, fish sampling using trapping and electrofishing and birds surveys involving walking of time - limited transects and using playback techniques with identification by song or visually with binoculars. Reptiles and amphibians were also surveyed using mainly visual techniques, with an emphasis on watercourses and roadkill.
- Winter surveys. An additional walkover survey was conducted in December 2019 covering with transects of all accessible areas (10 150m from the scheme) and with a particular focus on sites around rivers, streams and channels.

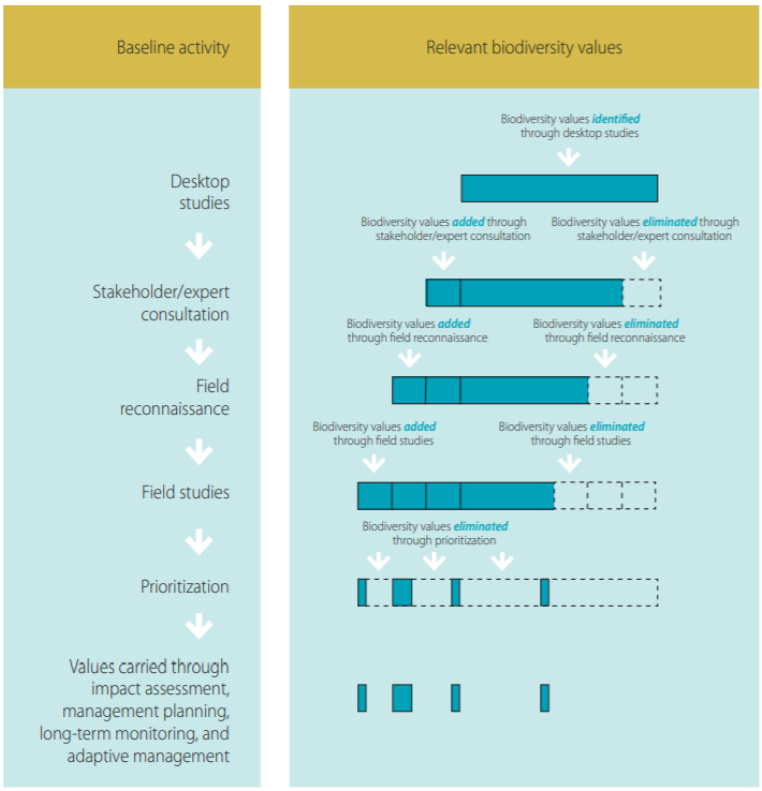
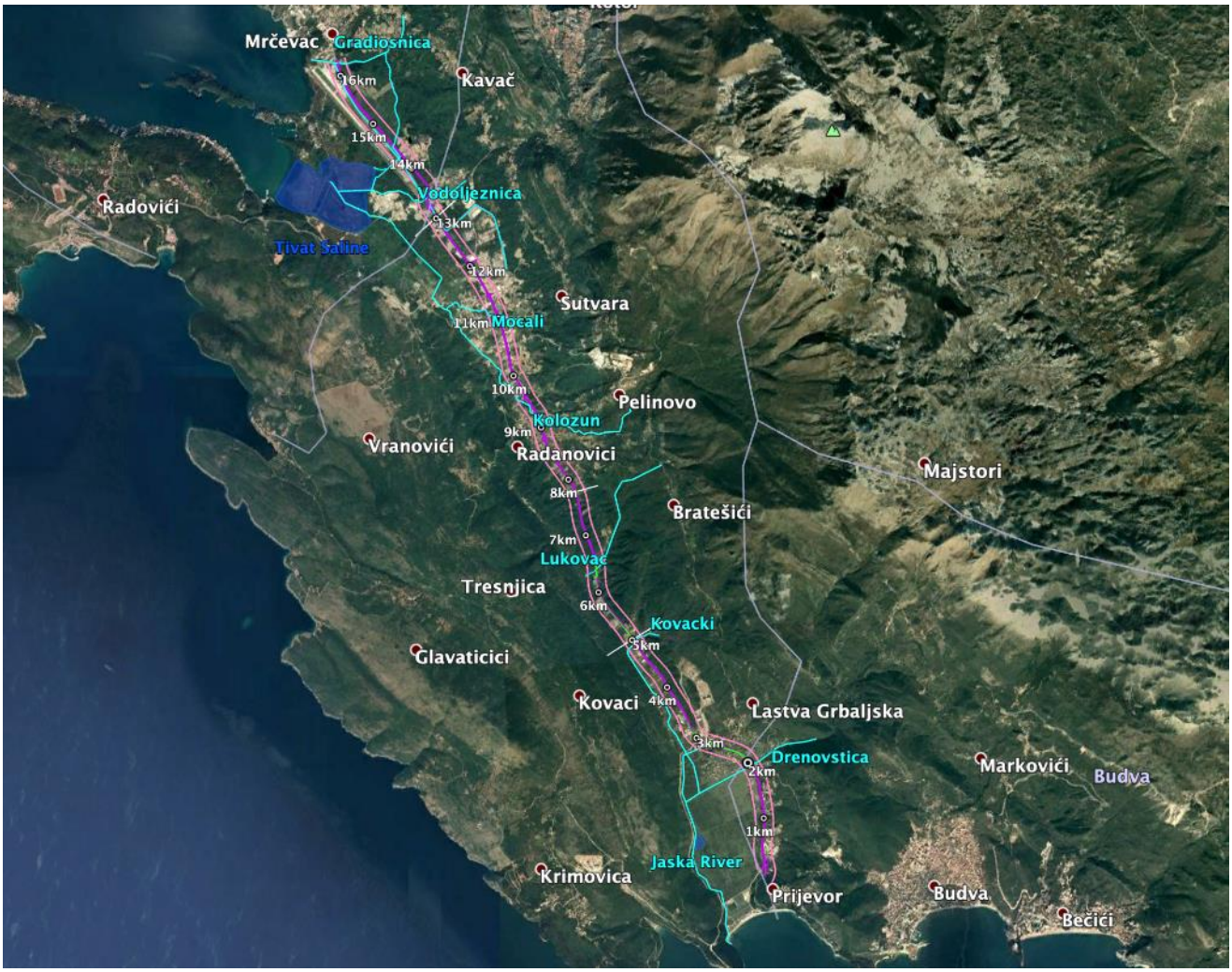


Figure 8: Identifying Biodiversity Values that will Proceed through Impact Assessment

10.4 Project Affected Area

A corridor of 150m on either side of the road has been set as the direct project PAA, the area considered most significantly at risk from direct impacts from the Project. An extended PAA of 2km downstream from the road, only along watercourses, was also considered to account for impacts related to run-off during construction and operation (see water quality section).

Figure 9: Project Road with PAA, Watercourses, and Tivat Saline (blue)



10.5 Baseline Conditions

10.5.1 Protected and Designated Areas

Whilst a number of protected areas are found in the wider project area, only the Tivat Saline (shown in orange) in Figure 10 is located within the PAA, some 300m to the west of the northernmost point of the road (shown in blue). As well as a coastal protected area in orange, the Tivat Saline also encompasses a marine Key Biodiversity area, which is shown in green in Figure 11.

Figure 10: Protected Areas

Tivat Saline

The Tivat Saline protected area is a wetland on Tivat Bay. It is a nationally designated as a Special Flora and Fauna Reserve, and is also a **Ramsar site, Important Bird Area (IBA)** and **Emerald site (Bern convention)**. The site also includes a historic former salt works. The dominant habitat of the site is Mediterranean salt meadow, a NATURA 2000 Habitat (1410). The area consists of shallow pools and channels, with complex types of halophyte vegetation growing on sludge-clay ground, a vegetation type which has largely disappeared, not just from Montenegro, but from the eastern coast of the Adriatic. (RAMSAR website). Although this type of habitat is still found in a few other localities in Montenegro, Tivat Saline represents the best example in the country. Plant species that are found here in high abundance, and which are the main representatives of this habitat type, are *Juncus maritimus* and *Juncus acutus*. The following plant species are also found in this habitat *Limonium angustifolium*, *Cyperus longus*, *Atriplex portulacoides*, *Inula crithmoides*.

Table 50: Species Present in the Tivat Saline

Species present in Tivat Saline
Birds The reserve supports a wide range of bird species but is of most significance to waterbirds. During 16 counts carried out between June 2003 and March 2006, 111 species of birds were recorded, inlcluding 47 waterbird species Sackl (2006). The most frequent species in the counts from Sackl (2006) were the yellow-legged gull, black -headed gull, eurasion wigeon and common coot, all migrant visitors . Evidence of nesting was found only for the little ringed plover and kentish plover. The Ramsar Sites Information Service also lists it as an important resting and feeding area for migratory birds such as the Black-tailed godwit, Eurasian Curlew, and ferruginous duck, as well as the regional population of Pygmy Cormorants. Only one globally threatened species is known to occur at the reserve, the common pochard (IUCN vulnerable) and this seems to be a rare visitor (Sackl 2006). **Mammals** A survey in April 2018 by the Dutch mammal society identified seven mammal species in the reserve. Wood mouse, House mouse, Lesser white-toothed shrew, Small Indian mongoose, Red fox, Golden jackal, Kuhl's pipistrelle and Long-fingered bat. Of these, only one is globally threatened (IUCN), the long fingered bat (*Myotis capaccinii*) which is listed as vulnerable. **Reptiles and Amphibians** As a wetland site, Tivat Saline is hosts an abundance of amphibian species, potentially including the Globally Endangered Albanian Water Frog. However, this species was not identified during recent amphibian monitoring at Tivat Saline (Ljubisavljevic, 2018). The site also supports a range of reptiles including marine species such as the Loggerhead turtle (Vulnerable IUCN), although this species does not nest here

10.5.2 Habitats Present

Around 45% of the habitats present within the project PAA (i.e. 150m each side of the road) have been subject to heavy anthropogenic modification (industrial buildings, arable land, orchards etc.). The remainder is mainly maquis (Mediterranean shrubland), with areas of deciduous thicket, coastal forest and Riparian vegetation along watercourses.

The habitats present within the project PAA have been mapped (see Appendix 5) and described using the EUNIS habitat classification system.[34] The most common habitat is **Eastern Mediterranean High Maquis** - This is a scrubland vegetation composed primarily of leathery, broad-leaved evergreen shrubs or small trees which occurs primarily on the lower slopes of mountains bordering the Mediterranean Sea. Many of the shrubs are aromatic, such as mints, laurels, and myrtles. Small trees are scattered throughout the area and often form open forests if undisturbed by humans. Eastern Mediterranean high Maquis is characterised specifically by shrub and small tree species including tree heath (*Erica arborea*), strawberry tree species (*Arbutus unedo* and *Arbutus andrachne*), Common Myrtle (*Myrtus communis*), turpenine tree (*Pistacia terebinthus*),

[34] A comprehensive pan-European system to facilitate the harmonised description and collection of data across Europe through the use of criteria for habitat identification.

Privet (*Phillyrea latifolia*), Cade juniper (*Juniperus oxycedrus*) and Kermes oak (*Quercus coccifera*) as well as the larger tree species Evergreen oak (*Quercus ilex*). Other, less common, habitats recorded were:

- F3.22 Wet deciduous Mediterranean thickets
- G1.3 Mediterranean riparian woodland
- G2.92 Citrus orchards
- E3.11 Mediterranean tall humid grassland of lowlands
- E1.DE1.D Unmanaged xeric grassland
- E1.3 Mediterranean xeric grassland
- E3 Seasonally wet and wet grasslands
- G1.73, Eastern Quercus pubescens woods
- G3 Coniferous woodland

Threatened habitats

The Tivat Saline Special Nature Reserve is located approximately 300m from the road at its closest point and includes a number of Natura 2000 habitats. In total 5 Natura 2000 habitats have been identified in the wider project area:

- Natura 2000: 1310; EUNIS: A2.5, A2.551, A2.552 - Salicornia and other annuals colonising mud and sand 11
- Natura 2000: 1410; EUNIS: A2.5, A2.551, A2.552, A2.5, A2.513, A2.522, A2.523, A2.524, A2.532, A2.543 - Mediterranean salt meadows (Juncetalia maritimi)
- Natura 2000: 6420; EUNIS: E3.1, E3.1 - Mediterranean tall humid herb grasslands of the MolinioHoloschoenion
- Natura 2000: 92A0; EUNIS: G1.1, G1.112, G1.3, G1.31 - Salix alba and Populus alba galleries
- Natura 2000: 9340; EUNIS: G2.1, G2.12, G2.121 - Quercus ilex and Quercus rotundifolia forests

None of these are anticipated to be impacted by the project.

10.5.3 Watercourses

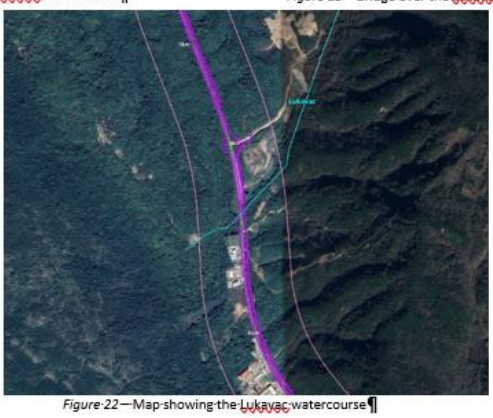
The project crosses seven watercourses, two of which run into the Tivat Saline Ramsar Site (and then the Mediterannean sea), whilst the remainder join other watercourses, disappear or run directly to the sea. The Koluzon (joined by the Mocali stream) and Vodoljeznica (joined by part of the Gradodiosnica) run downstream into the Tivat Saline Nature Reserve. The watercourses, and their aquatic vegetation, support a range of species including amphibians (Common toad, European tree frog, Marsh frog and Greek river newt), turtles (European pond turtle, Balkan pond turtle and Pond slider), and fish (including the critically endangered European eel). They are also likely hunting grounds for bat species. Further details on the watercourses present are included in Table 51 below, whilst further details of the fauna recorded is provided later in Section 10.5.4.

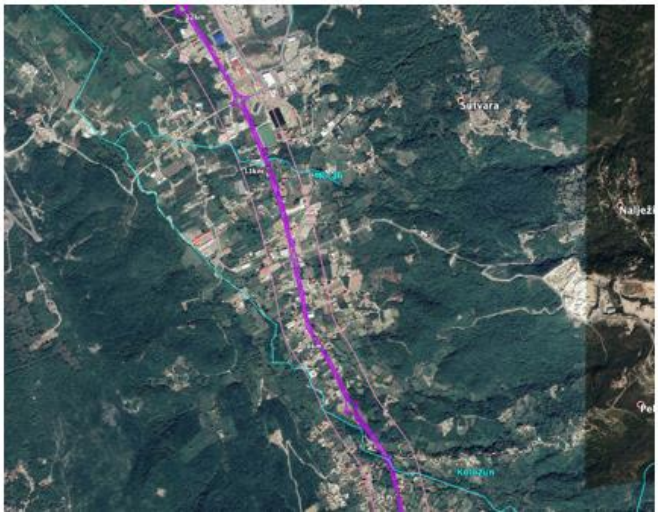
Table 51: Watercourses Present in the PAA

Watercourse	Km	Description
Dreovistica watercourse;	2 from start	Flows through the settlement Lastva Grbaljaska,then through Mrcevo field area and joins with the Lukavci watercourse to form the river Jaska which flows into the sea near Jaz beach. This is a semi- permanent stream but dries up considerably towards the end of June although some areas of standing water remain.
Kovacki stream;	5	The Kovacki stream flows through the settlement Ljiljanic, about 5km from the start of the proposed route. This watercourse flows in a roughly southerly direction, eventually joining with others to form the Jaska river, and flowing into the sea near Jaz beach. In June this watercourse is dries up almost completely.
Lukavac	6.4	The Lukavac (Lukovac) flows under the road around 6.4km
Kolozun watercourse;	9.2	The Koluzan watercourse flows under the road around Kolozun, around 9.2km along the proposed route. The Koluzan watercourse flows directly into the Tivat Saline protected area, however it enters the protected area approximately 4km after crossing under the proposed route.
Mocali stream	11	The Mocali stream is a small watercourse that flows under the road around 11km along the proposed route. It is a torrential, intermittent watercourse, which flows into the Kolozun watercourse (which flows into Tivat Saline).
Vodoljeznica watercourses	13.4	The watercourse Vodoljeznica flows into the canal along the main road and crosses the road at around 13.4km from the start of the route. This then flows into the Tivat Saline protected area, 1.2km after crossing the project road.
Gradiosnica watercourse	16.3	Gradiosnica watercourse is located to the right of Tivat airport and branches in two parts. The left part connects to the watercourse Vodoljeznica and together these flow into the canal along the main road and which eventually flows into the Tivat saline protected area. The second part of Gradiosnica flows under the road just 50m before the end of the proposed route and goes on to flow directly into the sea.
Drainage channels		4 drainage channels are reported to run alongside the road. The first runs along the left side of the main road between Jaz and Lastva (along Mrcevo field), the second is found in in the settlement Lastva (next to the billboard for Hotel "Aruba"), the third runs along the main road in Donja Sutvara all the way to the turn to KIPS, and the final channel runs along the main road by the airport, connecting the Gradiosnica and Vodoljeznica watercourses. There may be a certain degree of degradation and/or loss of habitats used by aquatic reptiles and amphibians at these locations.

Illustrations of the watercourses

Dreovistica watercourse;	 *Figure 16—Dreovistica watercourse*  *Figure 17—Bridge over the Dreovistica watercourse*  *Figure 15—Map showing the Dreovistica watercourse*
Kovacki stream;	 *Figure 19—Kovacki stream*  *Figure 20—Bridge over the Kovacki stream*  *Figure 18—Map showing the Kovacki stream*

Lukavac	 *Figure 21 — Lukavac watercourse*  *Figure 23 — Bridge over the Lukavac watercourse*  *Figure 22 — Map showing the Lukavac watercourse*
Kolozun watercourse;	 Figure 26 — Kolozun watercourse  *Figure 25 — Bridge over the Kolozun watercourse* 

Mocali stream	Figure 27: Map of Mocali Stream 
Vodoljeznica watercourses	 Figure 29—Vodoljeznica watercourse  Figure 28—Bridge over the Vodoljeznica watercourse 

Gradiosnica watercourse	 *Figure 31—Bridge over the Gradiosnica watercourse*  *Figure 30—Map showing the Gradiosnica watercourse*
Drainage channels	 *Figure 32: Drainage Channels at KIPS*
	 *Figure 33: Drainage Channels near to the Airport*

10.5.4 Birds

Montenegro is located within the Adriatic Flyway and many birds pass over it on annual migration between breeding and wintering grounds. Whilst a number of important stopover location are found in southern Montenegro, none are within the PAA. Some 103 bird species have been recorded from PAA, with the Lovanja landfill and Tivat Saline Nature Reserve supporting the largest number of species. Threatened or protected species present, identified by IBAT, literature review and surveys, include the IUCN VU Common Pochard *(Aythya farina)* and Turtle Dove *(Streptopelia turtur)* as well as 13 species listed under Annex 1 of the EU Birds Directive (i.e. they have an unfavourable status in Europe, primarily due to the loss of natural habitat). No birds of prey were recorded during the surveys, although Saker Falcon was identified by IBAT as potentially present.

Table 52: IUCN Threatened Species and Species Listed in EUBD Annex I

Bird	IUCN status	EU Bird Directive status	Description
Common pochard *Aythya farina*	VU	II III	Only appears in the project area during winter migrations, and thus was not identified in the summer surveys. It is listed as Vulnerable by the IUCN due declining numbers globally. During the winter the species frequents similar habitats to those it breeds in, including large lakes, slow-flowing rivers, reservoirs, brackish waters and marshes. This species is likely restricted to the Tivat Saline wetland area, where it is known to occur in the winter. Although possible, it is deemed very unlikely that it would be found on the waterways within the project PAA as it prefers larger, deeper and more open waterbodies.
Turtle Dove *Streptopelia turtur*	VU	II	Threatened particularly by hunting throughout each range. One individual was recorded in the surveys, however this was well outside of the project PAA, at least 1km from the road. Still it suggests this species is likely to interact with the road, although likely in low numbers.

Two more common but EU Birds Directive Annex 1 species were recorded during the site visits namely Chaffinch (*Fringilla coelebs*) and Red-backed Shrike (*Lanius collurio*) – the latter was common in the Mrcevo field area (first 2 km of the road) A number of other Annex 1 species are also recorded in IBAT but were not seen in the surveys. These include Eurasian Sparrowhawk *Accipiter nisus* , Rock partridge *Alectoris graeca* , Eagle owl *Bubo bubo,* Nightjar *Caprimulgus europaeus,* Great Spotted woodpecker *Dendrocopus major,* Ortolan Bunting *Emberiza hortulana,* Booted Eagle *Hieraaetus pennatus* , Lesser Grey Shrike *Lanius minor,* Wood Lark *Lullula arborea,* Coal tit *Periparus ater* and Wren *Troglodytes troglodytes.* A number of wetland associated Annex 1 species are also recorded in IBAT (but not seen in the field surveys). These include Kingfisher *Alcedo atthis,* Dunlin *Calidris alpine,* Great White Egret *Egretta alba,* Marsh Harrier *Circus aeruginosus* , Little White Egret *Egretta garzetta,* Little gull *Hidrocoelus minutus* and Pygmy Cormorant *Microcarbo pygmeus* - Tivat Saline is known to be host a large breeding population of this species.

10.5.5 Mammals

Thirteen species of terrestrial mammals are recorded as potentially present in the PAA. These include the Hedgehog *Erinaceus roumanicus*, Lesser Shrew *Crocidura suaveolens,* Long-tailed Field mouse *Apodemus sylvaticus,* House Rat *Rattus rattus*, Brown Rat *Rattus norvegicus*, Eurasian Red Squirrel *Sciurus vulgaris,* Golden Jackal *Canis aureus* , Beech Martin *Martes foina,* European badger *Meles meles,* Red Fox *Vulpes vulpes*;, European wildcat *Felis silvestris* (Annex VI);, European wild Boar *Sus scrofa* and the invasive Small Indian Mongoose. *Herpestes auropunctatus* None of these species are listed as threatened on the IUCN red list (ie CR, EN or VU), although the **European wildcat** is listed under Annex VI of the EU habitat directive as a 'species in need of strict protection[35]'. European wildcats are primarily associated with forest and are found in highest numbers in broad-leaved or mixed forests with low population densities of humans. They are also found in Mediterranean maquis scrubland, riparian forest, marsh boundaries and along coasts (IUCN). This makes the subject area, which consists of Maquis scrubland and some forest, attractive habitat for this species. Tivat Saline is likely to be most attractive, as it is a coastal marsh and is least disturbed by humans.

Figure 12 - A wildcat recorded by a camera trap near the Tivat Saline area.

The field surveys identified a number of areas along the road supporting habitats that are likely to be more important to terrestrial mammal species than others, and where mammals are likeliest to cross the road. These included the following:

All bat species in the suborder Microchiroptera (microbats) are listed under Annex IV of the EU habitat directive, and this includes all 6 species identified as present in the study area. Eight other species maybe also be present according to the literature but were not identified specifically during the surveys.

[35] Two IUCN vulnerable species were reported on the IBAT list, the Balkan snow vole and the Marbled polecat, however both were discounted due to habitat unsuitability. The Balkan snow vole inhabits exclusively rocky karst limestone areas and is typically found in stone-piles in meadows above the tree line, whilst the Marbled polecat inhabits desert, semi-desert and steppe habitats. None of these habitat types are present in the wider project area.

Table 53: Important Areas for Mammals

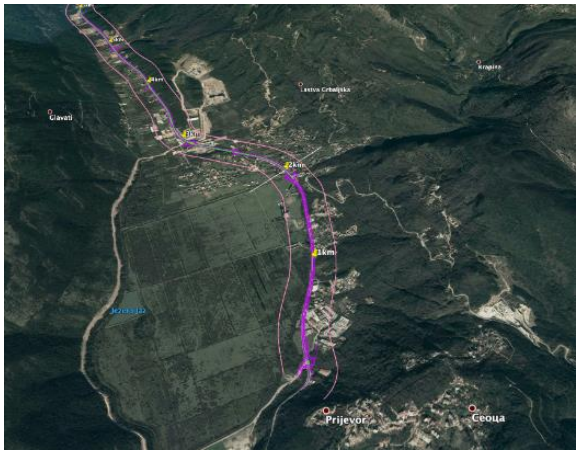
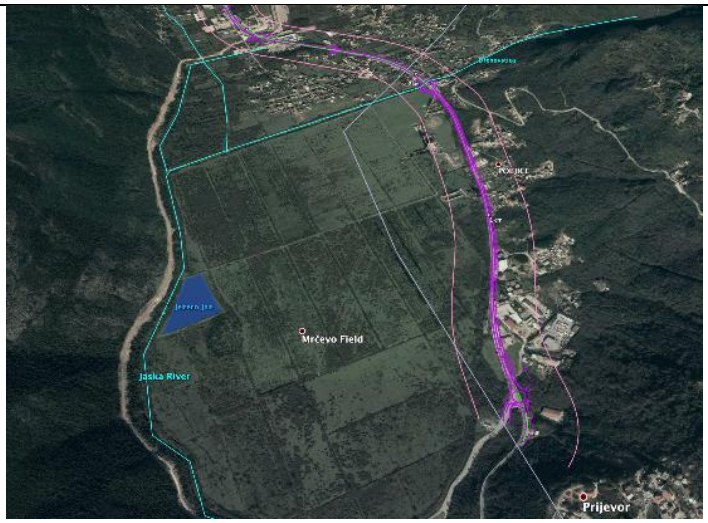
Km 0-2 The hunting association "Primorje" identified that the first two kilometres of the road, before Lastva Grbaljska, is a key crossing for wild boar and other mammals. *Figure 13: Key Boar Crossing Location*	
Km 5 – 7.7 The hunting association Kotor identified the area between 5km and 7.7km as the main crossing area for wild boar, as well as other mammal species (jackals, foxes, marten, badgers). The wild boar and other mammals use the passage under the Lukavac bridge to some extent, but they also make frequent crossings over the main road, which is known to result in collisions with vehicles (jackal, fox, hedgehog). **Camera traps placed here during survey work recorded wild boar, jackal, badger and squirrel species.** *Figure 14: Key Mammal Crossing Location*	
Km 13-16 The area from 13km to the end of the road, particularly near Tivat Saline, is thought to be significant for terrestrial mammals. During Surveys, the **European wildcat** (Strictly protected under Annex IV of the EU habitat directive) was recorded by camera traps in this area. Most species recorded here were close to the Tivat saline protected area, which was identified as a valuable habitat for mammal species both from the surveys and relevant literature. *Figure 15: Airport-end of the Road*	

Table 54: Bats Potentially Present in the Project Area

Species Recorded During Surveys	Species listed in literature but not recorded in field
Rhinolophus hipposideros, Lesser horseshoe bat *Pipistrelus kuhlii* , Kuhl's pipistrelle *Pipistrellus pygmaeus,* Soprano pipistrelle *Myotis nattereri,* Natterer's Bat *Nictalus noctula/leislerii,* Noctule/Lesser Noctule *Hypsugo savii* , Savi's Pipistrelle	*Rhinolphus ferumequinum,* Greater horseshoe bat *Myotis myotis,* Greater mouse-eared bat. *Myotis blythii,* Lesser mouse-eared bat *Myotis capaccinii,* Long-fingered bat (VU IUCN) *Myotis oxygnathus* *Miniopterus schreibersii,* Large bent-wing bat *Pipistrellus pipistrellus,* Common Pipistrelle *Tadarida teniotis,* European Free-tailed Bat

Two areas along the road are considered to be more important to bat species than others. These were the Mrcevo field area, alongside the first 2km of the project road, and the area around Tivat saline, from 13km to the end of the alignment. Throughout the rest of the alignment, no bats were caught in nets and bats were either not recorded on ultrasound detectors or were recorded at low intensity only.

Table 55: Important Areas for Bats

<u>Km 0-2</u> Three species of bats were captured in a net set up next to a small lake in the Mrcevo field area (outside the project PAA): *Hypsugo savii*, *Pipistrellus pygmaeus and Myotis nattereri.* The ultrasound detector registered *Myotis* and *Pipistrellus* species, but findings were mainly recorded around the small lake. During walk transects towards the main road from the Mrcevo area, species from the genus *Pipistrellus* were registered on the ultrasound. No bat shelters were found on the surveyed area.	
<u>Km 13-16</u> The area from 13km to the end of the road is thought to be of particular importance to bat species present. Presence of the following species was determined by the means of an ultrasonic detector: *Nyctalus, Pipistrellus* and *Myotis*). *Pipistrellus kuhlii* and *Nyctalus nocutla* were both identified in the vicinity of the Kotor roundabout (See fig. X). A *Pipistrellus kuhlii* specimen was caught in a	

net, which was placed near the Tivat Saline area. The surveys suggest that the Tivat Saline is a valuable habitat for bats.	

10.5.6 Amphibians

Five species of amphibians have been identified in the surveys. Two of these, *Hyla arborea*m (European tree frog) and *Rana graeca*, *(*Greek stream frog) are listed in Annex IV Habitat Directive, but none are listed as threatened by the IUCN red list. The other species were *Lissotriton graecus*, Greek smooth newt; *Bufo bufo*, common toad and *Pelophylax ridibundus*, marsh frog. The IBAT report also reports that the endangered Albanian water frog (*Pelophylax shqipericus - EN*), may be present in the area. This species was not identified in surveys, and was also not identified in the most recent survey of the Tivat Saline protected area (2018), although it was previously recorded at this site.

Amphibians were identified in watercourses all along the route as shown in the table below:

Table 56: Amphibians Identified from Biodiversity Surveys

Watercourse	Survey Results
Drenovstica stream	Three species were identified in this stream, namely the common toad (tadpoles), European tree frog and marsh frog. Additionally, several dead adult common toad specimens were found on the road near to the bridge. The stream and the channel serve as reproductive centres for the amphibians. Population of the marsh frog is very numerous, and it is represented at the subject location
Kovacki stream	Two species were identified in this watercourse, the common toad (tadpoles) and the marsh frog.
Lukavac stream	Two species were identified in this watercourse, the common toad (adult specimens and tadpoles) and the marsh frog.
Kolozun	Four amphibian species were identified in the Kolozunj River - Greek smooth newt, common toad's tadpoles, marsh frog and Greek stream frog
Mocali stream	Two species were identified in this watercourse, the common toad and the marsh frog.
Vodoljeznica	Three frog species were identified, the common toad (tadpoles), European tree frog and marsh frog. It is estimated that population of marsh frog at the subject location is numerous.
Drainage channels	Channels running along the road were found to host a number of amphibian species, and are also likely to be most affected by the project. All 5 species identified, including the protected European tree frog and Greek stream frog (Annex IV) were found in channels, alongside the route, which are thought to be reproductive centres for these species. European Tree Frog identified near KIPS.

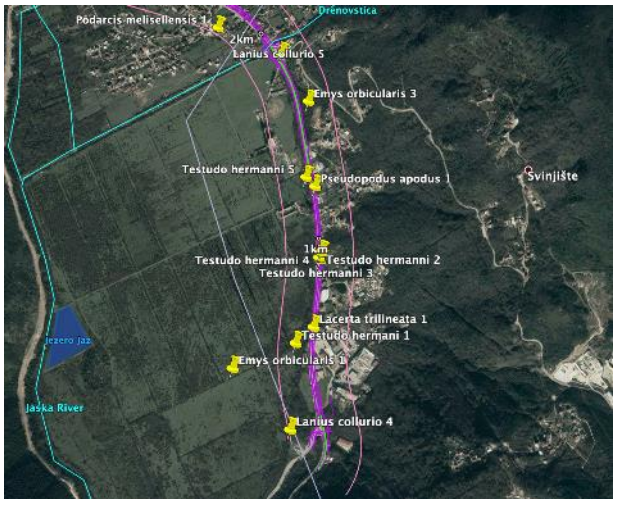
10.5.7 Reptiles

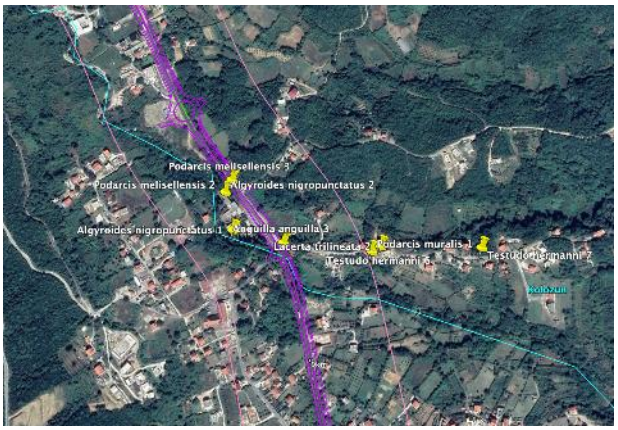
13 species of reptiles were identified in surveys as shown below. None of these are listed as threatened by the IUCN red list, although 7 are listed under Annex IV of the EU Habitat Directive. The pond slider, or yellow-bellied pond turtle, is native to the Americas and an invasive species in the area.

- *Emys orbicularis*, European pond turtle (Annex II and IV Habitat Directive)
- *Mauremys rivulata*, Balkan pond turtle
- *Trachemys scripta*, pond slider
- *Testudo hermanni*, Hermann's tortoise (Annex II and IV Habitat Directive)
- *Anguis fragilis*, slow worm
- *Pseudopus apodus*, European glass lizard (Annex IV Habitat Directive)
- *Algyroides nigropunctatus*, blue-throated keeled lizard (Annex IV Habitat Directive)
- *Lacerta trilineata*, Balkan green lizard (Annex IV Habitat Directive)
- *Podarcis muralis*, common wall lizard (Annex IV Habitat Directive)
- *Podarcis melisellensis*, Dalmatian wall lizard (Annex IV Habitat Directive)
- *Hierophis gemonensis*, Balkan whip snake
- *Natrix natrix*, grass snake
- *Natrix tessellata*, dice snake (Annex IV Habitat Directive)

The IBAT report also suggested that two vulnerable (IUCN) species may be present in the area, namely the Mosor rock lizard (*Dinarolacerta mosorensis*) and the Meadow viper (*Vipera ursinii*). The Meadow viper is also listed in Annex IV of the habitat directive. Neither of these species were identified in surveys, however some of the habitats present within the PAA are deemed suitable for these species. Thus, a precautionary approach will be taken, and both species will be assumed to be potentially present, although further surveys may suggest otherwise in future. During the field survey reptiles were recorded along the majority of the road layout, but the following areas were considered the most important:

Table 57: Important Areas for Reptiles

<u>0-2km</u> In the summer survey Hermann's tortoise was particularly recorded in the first 2km of the route, with 5 individuals recorded in this area, although they were seen along the entirety of the road.	 *Figure 16: Important Reptile Area 1*

Watercourses All six watercourses seemed to host a greater and diversity and abundance of terrestrial lizards. For example, the Common wall lizard, Dalmation wall lizard, Blue-throated keeled lizard, Balkan green lizard and Hermann's tortoise were all found in the area around Kolozun watercourse. The watercourses themselves host turtle species.	 *Figure 17: Important Reptile Area 2*

10.5.8 Fish

During the summer survey, only one species of fish was found in the, the IUCN critically endangered European Eel (*Anguilla anguilla*). The literature review revealed that the Ohrid minnow (*Pelasgus minutus*), endemic to Montenegro, Albania and Macedonia, also has a significant population in the river Jaska. This species has not yet been reviewed by the IUCN. IBAT also flagged a number of other threatened species as potentially present, but the literature review showed that these were all restricted to other river systems. Whilst other fish species are likely be present outside of the summer (when water levels are low) none are expected to be threatened or restricted in range.

The European Eel is a highly migratory species, that spawns and is born at sea, and then migrates into inland waters to eat and grow. In European eel, spawning is thought to take place somewhere in the Sargasso Sea (Feunteun 1999) the hatched larvae using the Gulf Stream to migrate towards the European and North African coasts where they metamorphose into glass eels which colonize coastal and inland waters. After around 8 years a second metamorphosis occurs and they change into silver eels and emigrate to the Atlantic where sexual maturation occurs. Very little is known about this second transoceanic migration which occurs deep in the sea.

The IUCN classifies the European Eel as critically endangered under A2bd+4bd. There have been substantial declines (90-95%) in recruitment of the European Eel across wide areas of its geographic range during the period of the last 45 years (three generations) due to a range of threats facing them at multiple life history stages. Despite increases in recruitment during the last few years, it is currently just 1-10% the recruitment of the 1980s (Feunteun 1999). Current threats include barriers

to migration (eg damage by hydropower turbines; climate change and/or changes in oceanic currents); disease and parasites; exploitation and trade, changing hydrology; habitat loss; pollutants; and predation. European eels can live for an extended time out of water and can also crawl on land if the soil is moist. Adult eels may move across land on their migration back towards the sea. During the summer surveys European Eels were found in three of the six watercourses. Further information on important areas for fish is provided in Table 58 below:

Table 58: Important Areas for Fish

Watercourse	Details
The Drenovstica watercourse	This flows through the settlement Mrcevo polje and is located about 2km from the start of the proposed route, dries out in the summer, and indeed had dried out by the second half of June when sampling took place. No fish were found sampling here. However, the local population confirms that eels are present in the stream in the months when the stream water level rises.
Kovacki stream	The Kovacki stream flows through the settlement of Ljiljanic, about 5km from the start of the proposed route. By the end of July, this stream had not dried out, although the water level was low. A trap was laid on the June 15th, which caught two immature eels, around 40 cm in length.
Lukavac watercourse	The Lukavac watercourse flows under the road about 6.4km from the start of the proposed route. Sampling was carried out on the 22nd of June using an electrofishing techniques, and extended to 200 metres both upstream and downstream of the bridge. One mature eel was found (Figure 18).
Kolozun watercourse	The Koluzan watercourse flows under the road around 9.2km from the start of the proposed route. The Koluzan watercourse flows directly into the Tivat Saline protected area. Even in June, when sampling took place, the water level was relatively high, although small waterfalls made upstream movement difficult. Upon inspection, the habitat suggested the presence of fish in the watercourse. The water is pretty clean, with a clear flow. Sampling was done on June 23rd downstream from the bridge, using the electrofishing techniques, covering a distance of around 500 m. 5 mature eel were sampled. The eel was photographed and returned to the stream's ecosystem. Assessed to be the most important watercourse on the route for eels and other fish species.

10.5.9 Freshwater invertebrates

The IBAT identified a number of threatened freshwater invertebrates that could be present in the PAA as follows:

Gastropoda

- Vinodolia hadouphylax (CR IUCN)
- Plagigeyeria montenigrina (CR IUCN)
- Saxurinator orthodoxus (CR IUCN)
- Plagigeyeria tribunicae (CR IUCN)
- Radomaniola elongate (CR IUCN)
- Vinodolia matjasici (CR IUCN)
- Radomaniola lacustris (CR IUCN)
- Saxurinator labiatus (CR IUCN)
- Gyraulus ioanis (CR IUCN)
- Gyraulus shasi (CR IUCN)
- Vinodolia fluviatilis (EN IUCN)
- Vinodolia gluhodolica (EN IUCN)
- Plagigeyeria zetaprotogona (EN IUCN)

- Iglica bagliviaeformis (EN IUCN)
- Narentiana vjetrenicae (EN IUCN)
- Bracenica spiridoni (EN IUCN)
- Saxurinator sketi (EN IUCN)
- Vinodolia scutarica (EN IUCN)
- Saxurinator montenegrinus (EN IUCN)
- Valvata montenegrina (EN IUCN)
- Radix skutaris (EN IUCN)
- Gyraulus meierbrooki (EN IUCN)
- Bithynia skadarskii (EN IUCN)
- Bithynia zeta (EN IUCN)
- Belgrandia torifera (VU IUCN)
- Lanzaia vjetrenicae (VU IUCN)
- Emmericia ventricosa (VU IUCN)
- Emmericia expansilabris (VU IUCN)
- Saxurinator brandti (VU IUCN)
- Plagigeyeria gladilini (VU IUCN)
- Platyla procax (VU IUCN)
- Cochlostoma Erika (VU IUCN)

Bivalvia *Congeria kusceri* (VU IUCN)

Malacostraca *Austropotamobius pallipes* – White-clawed Crayfish (EN IUCN); *Astacus astacus* – Noble Crayfish (VU IUCN)

Surveys have not been conducted for freshwater invertebrates to date, and so all species listed will be considered to be potentially present, until further surveys are conducted. A precautionary approach will be taken in our mitigation section to prevent negative impacts on these species.

10.6 Critical Habitat and Priority Biodiversity Feature Assessment

10.6.1 Critical Habitat

Critical habitat encompasses the highest priority areas of the planet for biodiversity conservation. It takes into account both global and national priority setting systems and builds on the conservation biology principles of 'vulnerability' (degree of threat) and 'irreplaceability' (rarity or uniqueness). There is no universally accepted or automatic formula for making determinations on critical habitat and the involvement of external experts and project specific assessments is of utmost importance, especially when data are limited. EBRD PR6 (para 14) defines Critical Habitat as "the most sensitive biodiversity features" that typically comprises one or more of the following:

(i) highly threatened or unique ecosystems;

(ii) habitats of significant importance to "endangered" or critically endangered species;

(iii) habitats of significant importance to endemic or geographically restricted species;

(iv) habitats supporting globally significant migratory or congregatory species;

(v) areas associated with key evolutionary processes;

(vi) ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph.

As the EBRD guidelines do not give quantitative thresholds for these criteria, potential CH triggers have been assessed using those proved in the IFC Guidance Note 6. These thresholds are provided in the CH Annex.

10.6.2 Defining Areas of Analysis

In accordance with IFC GN6 the Project should identify an ecologically appropriate Area of Analysis (AoA) to determine the presence of critical habitat for each potential trigger with regular occurrence in the Project's PAA, or ecosystem. The extent of this area will depend on the biodiversity features of interest and the ecological functions required to maintain them. Where it can be shown that multiple values have largely overlapping ecological requirements and distributions, a common or aggregated area of critical habitat may be appropriate. Paragraphs 58 and 59 of the IFC GN6 provides further detail on best practice for demarcating an AoA. AoAs were defined per species, unless multiple values were shown to have largely overlapping features and distributions, when an aggregated AoA was used (e.g. resident birds). Based on this initial species list, the following AoAs were developed for the Critical Habitat and Priority Biodiversity Feature assessments:

Table 59: Ecologically Appropriate Areas of Analysis

Group	AoA	Reasoning
Freshwater vertebrates	100m corridor centred on waterways	Species – **European pond turtle, European Eel** These species are restricted to close to water, although both are able to survive out of water for reasonable periods, and the eel has been known to migrate over land for short distances. Therefore, a 50m buffer each side of all watercourses was selected to account for this.
Frogs	300m corridor centred on road – 4.89km²	Species - **European tree frog, Greek stream frog** These species are partially reliant on waterways, however they can survive without them for long periods, particularly in wetter areas. They tend to have small home ranges, which are normally in relatively close proximity to water sources. As waterways are common in the PAA, the ECAoA for frogs is a 300m wide corridor encompassing the whole of the project road.
Terrestrial Reptiles	600m corridor centred on road – 4.89km²	Species – **Hermann's tortoise European glass lizard, *Blue*-throated keeled lizard, Balkan green lizard , common wall lizard, Dalmatian wall lizard, dice snake**. Terrestrial reptiles tend to have fairly small home ranges, and so don't move over large areas. For example, a study on Hermann's tortoise in Italy suggested a maximum home range size of 7.4 hectares or 0.074km² (272 by 272m). Thus, an individual 300m from either side of the road could interact with the project. Therefore, the EcAoA has been set as a 600m corridor centred on the road.
Terrestrial Mammals	10km corridor centred on road	Species – **Wildcat** European wildcats can have large territories, and so individuals found even a km away from the road have the potential to interact with it. Et al. found that throughout Europe male wildcats home ranges are between 1.95 and 50.17km² (larger than for females). The average home range is thus 26km² (approximately 5 by 5km). Thus, an individual 5km from either side of the road could interact with the project. Therefore, the EcAoA has been set as a 10km corridor centred on the road, excluding the sea.
Bats	2km corridor centred on road	Species – All bat species present All bat species identified are resident and not migratory. Bats can have medium sized home ranges. Home range sizes could not be found for the exact species present, however a study [36]was found for a related species *Myotis septentrionalis*. The study showed that female bats had average home ranges of 65ha, (around 800 by 800 metres). A precautionary AoA for bats has thus been set as a 2km corridor centred on the road, as

[36] Sheldon F. Owen, Michael A. Menzel, W. Mark Ford, Brian R. Chapman, Karl V. Miller, John W. Edwards, Petra Bohall Wood "Home-range Size and Habitat Used by the Northern Myotis (Myotis septentrionalis)," The American Midland Naturalist, 150(2), 352-359, (1 October 2003)

		bats 1km or less from either side of the road are thought to have the potential to interact with it.
Birds	N/A	Species – Common Pochard, European Turtle dove

10.6.3 Critical Habitat Assessment

A CHA was undertaken for the project, and is summarised here and provided in full in Section 5.3 of Appendix 5. The CHA commenced with an initial review of the IBAT screening tool. A number of threatened species were identified by IBAT but were discounted before the Critical Habitat assessment. These include the Egyptian Vulture (EN), European Mink (CR), Adriatic Sturgeon (CR) and Atlantic Sturgeon (CR) which were historically present but are now locally extinct in the area. The Soft-mouthed trout (EN), Imotski chub (EN) and Scadar gudgeon (EN) were also identified, but these fish species are known to be restricted to other river and lake systems away from the PAA. Finally, the Balearic shearwater (CR) was identified in by IBAT, however a literature review could find no record of this species ever being recorded in Montenegro.

An initial review of species and habitats present produced the following results:

Table 6o: Critical Habitat Potential Triggers

Criteria	Description	Thresholds (IFC GN6)	Potential triggers
(i) Highly threatened or unique ecosystems	Ecosystems that are at risk of significantly decreasing in area or quality; have a small spatial extent; and/or contain concentrations of biome- restricted species. For example: • Ecosystems listed as, or meeting criteria for, Endangered or Critically Endangered by the IUCN Red List of Ecosystems • Areas recognised as priorities in official regional or national plans, such as National Biodiversity Strategy and Action Plans • Areas determined to be of high priority/significance based on systematic conservation planning carried out by government bodies, recognised academic institutions and/or other relevant qualified organisations (including internationally-recognised NGOs).		The Tivat Saline is a national special area and a RAMSAR site.
(ii) Habitats of significant importance to endangered or critically endangered species	Areas supporting species at high risk of extinction (Critically Endangered or Endangered) on the IUCN Red List of Threatened species (or equivalent national/regional systems. For example: • Alliance for Zero Extinction sites • Animal and plants species of community interest in need of strict protection as listed in the EU habitat directive Annex IV.	*Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species). This criterion will also be applied to species listed under Annex IV of the habitat directive.*	*Falco cherrug* Saker Falcon (EN IUCN) *Anguilla Anguilla*, European Eel (EN IUCN) *Pelophylax shqipericus* Albanian water frog (EN IUCN) *Felis silvestris* Wild cat (Annex IV) *All bat species* *Emys* orbicularis, European pond turtle (Annex II and IV) *Testudo hermanni*, Hermann's tortoise (Annex II and IV) *Pseudopus apodus*, European glass lizard (Annex IV) *Algyroides nigropunctatus*, blue-throated keeled lizard (Annex IV) *Lacerta trilineata*, Balkan green lizard (Annex IV) *Podarcis muralis*, Common wall lizard (Annex IV) *Podarcis melisellensis*, Dalmatian wall lizard (Annex IV) *Natrix tessellata*, Dice snake (Annex IV) *Hyla arborea*, European tree frog (Annex IV) *Rana graeca*, Greek stream frog (Annex IV)
iii) Habitats of significant Importance to endemic or restricted-range species	Areas holding a significant proportion of the global range or population of a species qualifying as restricted-range under Birdlife or IUCN criteria. For example: • Alliance for Zero Extinction sites • Global-level Key Biodiversity areas and Important Bird and Biodiversity areas identified for restricted-range	For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres. For restricted	*Pelophylax shqipericus* Albanian water frog *Podarcis melisellensis*, Dalmatian wall lizard

	species	range species the threshold is as follows: *Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species.*	
iv) Habitats supporting globally significant (concentrations of) migratory and/or congregatory species	Areas that support a significant proportion of a species population, where that species predictably moves from on geographical area to another (including within the same ecosystem), or areas that support large groups of a species population that gather on a cyclical or otherwise regular and/or predictable basis. For example: • Global-level Key Biodiversity areas and Important Bird and Biodiversity areas identified for congregatory species. • Wetlands of International Importance designated under criteria 5 or 6 of the Ramsar convention.	(a) *Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.* (b) *Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress*	The Tivat saline is a designated as RAMSAR site under criteria 1,2,3,4 and 6. It is designated under criteria 6 as it regularly supports 1.7% of the regional population of *Phalacrocorax pygmeus* between November and February. It is a significant site for migratory waterbird species, which congregate there in large numbers. Excluding the Tivat Saline site, the rest of the project area is not known, or suspected owing to topography or habitat, to constitute a significant flyway for migratory birds. It is also not thought to be a significant stop-over
v) Areas associated with key evolutionary processes	Areas with landscape features that might be associated with particular evolutionary processes or populations of species that are especially distinct and may be of special conservation concern given their distinct evolutionary history. For example: • Isolated lakes or mountaintops • Populations of species listed as priorities by the Edge of Existence programme		None identified
vi) Ecological functions that are vital to maintaining the viability of biodiversity features described as critical habitat above.	Ecological functions without which critical biodiversity features could not persist. For example: • Where essential for critical biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat forming species.		Waterways upstream of the Tivat Saline protected area (potential Critical habitat) are important in maintaining its ecological functionality.

The full critical habitat assessment can be found in the Annex. The assessment concluded that the only **Critical Habitat for this project is the Tivat Saline protected area,** as it is within the PAA for downstream impacts. Excluding Tivat Saline, the Project Affected Area is not thought to be critical habitat for any of the species assessed. However, the EBRD Guidance Note 6 states that "in current practice some [priority biodiversity] features are often identified as species or issues that do not merit critical habitat status but remain a concern from a conservation perspective". Therefore, all species that were assessed in the CHA but were not found to merit critical habitat status will automatically qualify for assessment as potential Priority Biodiversity Features.

10.6.4 Priority Biodiversity Features

The EBRD Performance Requirement 6 defines **Priority Biodiversity Features** (PBFs) as those which have a high, but not the highest, degree of irreplaceability and/or vulnerability. Although a level below critical habitat in sensitivity, they still require careful consideration during project assessment and impact mitigation. EBRD PR6 (paragraph 12) states that Priority Biodiversity Features typically comprise of one or more of the following:

i) Threatened habitats
ii) Vulnerable species
iii) Significant biodiversity features identified by a broad set of stakeholders or governments
iv) Ecological structure and functions needed to maintain the viability of priority biodiversity features

10.6.5 Priority Biodiversity Feature Assessment

These requirements are shown again in Table 61, along with more detailed descriptions from the EBRD PR6 Guidance note and potential trigger features. As well as features identified below, all species that did not qualify for critical habitat status have automatically been considered for PBF status.

Table 61: Priority Biodiversity Feature Triggers

Criteria	Description	Trigger/receptor
Threatened habitats	Habitats considered under pressure by national, regional or international assessments. These include natural and priority habitats identified under the EU Habitats Directive (Annex I).	Tivat Saline protected area represents Mediterranean salt meadows, which is listed under Annex I of the habitat directive (NATURA 2000 Habitat 1410).
Vulnerable species	Vulnerable species Species listed by the International Union for Conservation of Nature (IUCN) or any other national/regional lists (such as national Red Lists) as Vulnerable (VU) or equivalent. These include animal and plant species of community interest identified under the EU Habitats Directive (Annex II)	a) Common Pochard (VU IUCN) b) European Turtle Dove (VU IUCN) Mosor Rock Lizard (VU IUCN) Meadow Viper (VU IUCN)
Significant biodiversity features identified by a broad set of	Significant biodiversity features identified by a broad set of stakeholders or governments Key Biodiversity Areas and Important Bird and Biodiversity Areas; nationally and internationally	None

stakeholders or governments	important species or sites for conservation of biodiversity; many areas meeting natural habitat definitions of other international financial institutions.	
Ecological structure and functions needed to maintain the viability of priority biodiversity features	Ecological structure and functions needed to maintain the viability of priority biodiversity features Where essential for priority biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, seasonal refuges or food sources, keystone or habitat-forming species.	None

The full priority biodiversity feature assessment can be found in the Appendix. A total of **6 species of bat, 8 species of reptile, 2 species of amphibian, the European Wildcat and the European eel are considered priority biodiversity features**.

10.7 Impact Assessment

10.7.1 Approach and Methodology

Biodiversity impacts have been assessed based on an evaluation of consequence and likelihood. For this purpose "consequence" was taken to mean "how impacts alter the viability of a biodiversity feature" - itself is a function of its "irreplaceability" (i.e. number of sites or geographic extent where the value is present) and "vulnerability" (which relates to the impact and likelihood of existing and future threats). Highly irreplaceable biodiversity values occur only at a few sites. Vulnerable biodiversity values include those that have experienced rapid loss over recent history and/or are faced by current threats that could lead to rapid loss." Vulnerability and irreplaceability also reflected in the IUCN's conservation status categorization. This uses the categories of Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW), and Extinct. Likelihood was determined based on probability of occurrence as shown in the table below.

Table 62: Definitions of Impact Consequence and Likelihood based on IUCN Conservation Status

Definition	Description
Consequence	
Negligible	No net loss in biodiversity value, regardless of conservation status
Low	Net loss in value with status of LC, NT or VU
Moderate	Net loss in value with status of EN, or status of a value changes to EN to project impacts
High	Net loss in value with a status of CR, or status of a value changes to CR due to project impacts
Likelihood	
Almost certain:	expected to occur in the project
Likely:	probably will occur in the project
Possible:	might occur in some circumstances
Unlikely:	may occur at some time
Rare:	Will only occur in exceptional circumstances

These parameters can be incorporated into a multicriteria matrix as shown in the Table 63. Impact consequence encompasses both the Intensity of the impact, and the sensitivity of the receptor. Impact likelihood represents the likelihood of an impact occurring if no mitigation was put in place.

Table 63: Unmitigated Impact Significance Matrix for Biodiversity Impact Assessment

Likelihood	Impact Consequence			
	Negligible	Low	Moderate	High
Almost certain: expected to occur in project	L	M	H	H
Likely: probably will occur in project	N	L	M	H
Possible: might occur in some circumstances	N	N	L	M
Rarely: only in exceptional circumstances	N	N	N	L

Adverse Impact Significance levels: N = negligible L = low, M = moderate, H = high

10.7.2 General Impacts - Construction Phase (CP)

CP.1 - Loss of Terrestrial Habitat

Preparation of the working corridor, and associated supporting infrastructure (construction camps, laydown areas etc) will result in clearance of vegetation. Approximately 45% of the working corridor will be on already modified habitat, but 55% will occur on areas that have not been modified and represent more natural habitat. The majority of vegetation loss will be temporary, for example, clearance for a working corridor, access tracks and laydown areas. However, some of it (approximately 9.3 hectares) will be permanently lost as it will be replaced by the wider road layout. There is also a risk of wildfire, which is relatively common in Montenegro. Wildfires caused as a result of construction would cause large scale habitat loss, with devastating impacts on local flora and fauna. Table 64 shows an estimate of the permanent habitat loss for each habitat type present. Temporary losses have yet to be calculated as the detailed project design, and width of the working corridor, has not been finalised. All permanent and temporary habitat loss will be to non-Priority Biodiversity Feature habitat.

These habitats host a range of species, including some qualifying as Priority Biodiversity Features. Therefore, its removal represents habitat loss for these species. This vegetation also represents potential nesting sites for birds, and potential roosts by bats. Habitats of particular value are the Quercus Pubescens woodlands and Riparian Woodlands, which are both rarer in the project area and important habitats for a number of PBF species.

Vegetation loss in already modified habitat, although almost certain to occur, is of negligible consequence and so is only a **low adverse impact**. Vegetation loss on habitats supporting PBF species is also almost certain to occur, is of moderate consequence, and so is considered to be a

high adverse impact.

Table 64: Estimated Habitat Losses

Habitat type	Vegetation loss (hectares)	
	Permanent	Temporary[37]
F5.213 Eastern Mediterranean high maquis	6.43	
F3.22 Wet deciduous Mediterranean thickets	1.76	
E1.3 Mediterranean xeric grassland	0.33	
G1.3 Mediterranean riparian woodland	0.30	
G1.73, Eastern Quercus pubescens woods	0.16	
E3 Seasonally wet and wet grasslands	0.15	
G3 Coniferous woodland	0.14	
E3.11 Mediterranean tall humid grassland of lowlands	0	
c) Total Habitat Loss	**d) 9.27**	

CP.2 Degradation of Terrestrial Habitat

Construction has the potential to produce air pollution, including dust, which can negatively affect terrestrial vegetation. Dust produced during construction can impact on vegetation and affect productivity and/or change local soil PH levels. Construction works can cause soil degradation from compaction and erosion and dust. Construction Dust can impact on vegetation and affect productivity. Soil disposal and/or mismanagement can cause degradation of habitats, for example soil storage areas are placed in natural habitats. Mismanagement of soil, for example improper separation of topsoil from lower soil layers, can reduce the efficacy of habitat restoration, leading to more permanent impacts. Whilst considered likely, at least to some extent, such impacts are likely to have a low consequence if international best practice is followed and are thus considered **low adverse impacts**.

CP.3 Loss of Aquatic Habitat

Channels running alongside the road may have to be removed (exact degree of widening tbc). Loss of drainage channels represents habitat loss for three PBF species. This impact is considered likely and of high consequence, and thus is a **high adverse impact.**

[37] At the time of writing information regarding the width of the construction right of way (RoW) was unavailable. Therefore estimates for temporary losses of native habitat were not possible.

Cp.4 Degradation of Aquatic Habitat

Construction in and around watercourses can cause pollution and sedimentation, which can have downstream effects. If not properly mitigated, downstream effects in the Kolozun, Gradiosnica and Vodoljeznica watercourses could negatively impact the Tivat Saline protected area, which is designated as Critical Habitat. In addition, watercourses are known to host 4 PBF species, including the critically endangered European Eel. They are also likely to host a number of threatened including freshwater snails and potentially crayfish. Although surveys have yet to confirm the presence of threatened invertebrates, a precautionary approach will be taken, and so potential impacts on freshwater invertebrates will be considered and the necessary mitigation recommended. These impacts are detailed below, although further detail can be found in the "water resources" section (Section 8.)

The upgraded bridges proposed are all single span structures and will therefore not require foundations in the riverbed itself, although it is likely that in-channel works will be required to create the new bridges and culverts. In-channel works could result in subsequent impacts:

- Changes to the morphology of the watercourses e.g. altered embankments and alignments, depths etc due to works associated with bridges and culverts. Removal of vegetation along the banks of watercourses can cause bank erosion, causing sedimentation in the watercourse and degradation of the habitat as a whole.
- Altered surface runoff rates and direction: Ground clearance and earthworks will alter site levels and gradients and soils can become compacted leading to reduced permeability, however these effects are thought to be temporary.

Changes in water quality during construction could also arise as a result of:

- Site clearance and groundworks: Removal of topsoil and vegetation and general construction activities causing dusts, leading to increased turbidity, sedimentation, and potentially nutrient load, in watercourses. Sediment loads and nutrient levels in watercourses vary naturally and aquatic biota can cope with a range of concentrations. However, prolonged periods of elevated levels of sediment concentrations can exert serious stresses on watercourses and associated habitats. Removal of vegetation along the banks of watercourses can cause bank erosion, causing further sedimentation in the watercourse.
- Construction of bridge crossings / culverts: As well as the impacts on the hydrological regime, in-channel works can adversely affect water quality through increased turbidity / sediment loads. It is assumed that any foundations / structures required will be constructed from poured concrete; liquid cement is strongly alkaline and highly toxic in aquatic environments.
- Spillages of chemicals, fuels, or other materials can cause pollution to waterways, which could be toxic to aquatic fauna and flora in the affected area (both at the bridge site and downstream).

Such impacts are considered to have a possible likelihood but a high consequence, as the waterways are considered highly sensitive, and are thus considered **moderate adverse impacts**.

CP.5 Disturbance to Fauna

Movements of people and equipment to and around the construction sites, and use of plant machinery and equipment will result in both disturbance impacts (including lighting) and emissions (including dust production). This can result in short term, localized effects, although many animals will become habituated to the noise. There is also the potential for direct mortality due to collisions with machines and equipment. This impact is considered to have a possible likelihood but only a moderate consequence and thus is considered a **low adverse impact.**

CP.6 Habitat Fragmentation

Construction works, for example the use of temporary fencing, can cause barriers to general fauna movement through the landscape (physical and disturbance), potentially causing population isolation. However, as the road already exists, construction is not thought to cause significant increases in habitat fragmentation, and indeed the habitat fragmentation caused by operation of the road (OP.4) is likely to be much more significant. This impact is considered to have a possible likelihood but only a moderate consequence and thus is considered a **low adverse impact.**

CP.7 Worker Impacts

Influxes of workers can lead to increased disturbance of fauna, degradation and pollution of habitats, and illegal hunting or trapping. Generation of waste (notably food waste) can also affect fauna. Such impacts are expected to be possible, but only of low consequence if best international practice is followed, resulting in a **low adverse impact**.

CP.8 Spread of non-native / invasive species

Non-native and Invasive species can be spread accidentally by workers during the construction process, e.g. on vehicles or clothing. This applies in this project only to plants species. Native species identified include: *Xanthium strumarium, Robinia pseudoaccacia, Alianthus altissima, Ambrosia sp., Erigeron sp.* The ECoW will pay special attention to the presence of any invasive plant species in the direct project area, especially in watercourses, and, if present, remove them immediately. Following GIP should minimise the chance of spreading invasive species and so, in the project context, this is considered a **low significance impact.**

10.7.3 General Impacts - Operational Phase (OP)

Operation of the upgraded road will also have a number of impacts. Although these impacts are already present for the original road, an increase in traffic density and road width will increase many of them. These impacts include increased disturbance, roadkill and pollution to terrestrial habitats and watercourses. Impacts are detailed below:

OP.1 Direct mortality of fauna due to collision with vehicles.

There will be an increased risk of roadkill given the ability of the road to have more and faster traffic. This is especially the case for slow moving species (e.g. Hermann's tortoise, a PBF) or large mammals (e.g. wild boar in the forested areas). Vehicle collision is considered one of the key threats

to Hermann's tortoise in Montenegro[38] whilst collisions between cars and larger mammals, can cause severe injury to humans as well as the animals. These impacts are considered likely and of high consequence and are considered a **high adverse impact.**

OP.2 Degradation of Terrestrial Habitats

During road operation, Air pollution from vehicles, road-run off (including any de-icing salt) and dust may affect terrestrial habitats. Nitrogen deposition from vehicles can affect sensitive habitats (woodland, grasslands and riparian areas). Dust can impact on vegetation and affect productivity and/or change local soil PH levels, although as a tarmacked road dust production should be minimal. Pollution (including salt) from road run off and de-icing may affect habitats and can create surface water films. Whilst considered likely, at least to some extent, such impacts are likely to have a low consequence if international best practice is followed and are thus considered **low adverse impacts.**

OP.3 Degradation of Aquatic Habitats

Routine run-off from roads contains a variety of vehicle-derived pollutants, which could adversely affect aquatic habitats. Pollutants include Hydrocarbon combustion products, Fuel and fuel additives, lubricants, and particulate contaminants including carbon, rubber, metals, rust. Such impacts are considered to have a possible likelihood but a high consequence, as the waterways are considered highly sensitive, and are thus considered **moderate adverse impacts**.

OP.4 Habitat fragmentation

Traffic is projected to increase by 4% annually. The width of the road will increase significantly, from around 8m wide (this varies along the road) to 19m wide plus vegetated verges on either side. Increased traffic, as well as a wider road layout, will mean that the road poses a more significant barrier to animals looking to cross, causing increased isolation of local populations. If isolated populations are too small they can suffer from inbreeding and low viability, and thus not be sustainable long term. A greater barrier affect also affects species looking to cross the road on migration, which may either prevent migration, or cause greater direct mortality if crossing does occur. These impacts are likely and of high consequence and are thus considered a **high adverse impact.**

OP.5 Disturbance to Fauna

Noise impacts are addressed previously, but fauna are generally considered likely to habituate to noise so no significant impacts are expected. Street lighting is planned along the whole road alignment. Bats, which have been listed as PBFs for this project, are known to be adversely affected by streetlighting. Some species are deterred by streetlights, increasing the barrier effect of the road. However, lighting can also attract insects at night, which in turn can attract some species of

[38] Vujović, Ana & Vuk, Iković & Golubović, Ana & Nikolić, Sonja & Pešić, Vladimir & Tomović, Ljiljana. (2015). Effects of Fires and Roadkills on the Isolated Population of Testudo hermanni Gmelin, 1789 (Reptilia: Testudinidae) in Central Montenegro. Acta Zoologica Bulgarica. 67. 75-84.

bats, subjecting them to threats from the road, for example collision with tall vehicles. However, lighting is already present along built up areas of the existing road, so additional impacts are not expected to be large. Different bat species are affected by roads in different (generally dependent on flight patterns) and examples of potential impacts on bats are provided in the Table below.

10.7.4 Specific impacts – Critical habitat

Tivat Saline has been designated as Critical Habitat for this project, as it is within the PAA for downstream impacts, meaning that impacts on waterways that run into Tivat Saline have the potential to negatively impact the wetland site. Construction of the road could cause both pollution and sedimentation, which could have downstream affects. It is assumed that any foundations / structures required will be constructed from poured concrete, and liquid cement is strongly alkaline and highly toxic in aquatic environments. Spillages of chemicals, fuels, or other materials can cause pollution to waterways, which could be toxic to aquatic fauna and flora in downstream of the crossing point in the Tivat Saline. The operation of the road will result in routine run-off, which contains a variety of vehicle-derived pollutants, which could be carried downstream and adversely affect aquatic habitats in the Tivat Saline. These include Hydrocarbon combustion products, fuel and fuel additives, lubricants, and particulate contaminants. However, appropriate mitigation for watercourses as suggested in Section 8.5 is expected to prevent the project having any negative impacts on the Tivat Saline.

10.7.5 Specific impacts - Priority Biodiversity features

Table 65 Impacts to Priority Biodiversity Features - Reptiles

Habitat Loss	Loss of drainage channels, which are known to support the European Pond Turtle listed as priority biodiversity features, represents habitat loss for these species.
Habitat degradation	Degradation of aquatic habitats (CP.3 and OP.3) due to run-off during construction and operation can affect aquatic reptiles such as the European pond turtle, both directly due to pollutant toxicity, and indirectly through habitat degradation, making survival in the waterways more difficult.
Habitat Fragmentation	Increased traffic, as well as a wider road layout, will mean that the road poses a more significant barrier to amphibia looking to cross, causing increased isolation of local populations. If isolated populations are too small, they can suffer from inbreeding and low viability, and thus not be sustainable long term Hermann's tortoise is known to be at risk from habitat fragmentation particularly when barriers prevent individuals escaping from fires. A study[39] showed that fences along roads could prevent tortoises escaping from wildfire, or even trap them, causing mortality.
Direct Mortality	Aquatic reptiles like the European pond turtle could be killed during the removal of drainage channels which they are known to reside in. Reptiles are known to be killed by the existing road. The summer survey found multiple examples of roadkill, including PBF species such as Hermann's tortoise and the Balkan Green lizard. It has been suggested that road collisions, along with fire, are the key threat to Hermann's tortoise in Montenegro[40]. As a slow-moving species, they are particularly vulnerable to vehicle collision. Snakes are often killed if found by construction workers, even if they are not dangerous. The Meadow Viper, although not confirmed in surveys and so not a PBF

[39] ibid.

[40] ibid.

	species, is potentially present and is globally vulnerable (IUCN) as well as strictly protected under Annex IV of the EUHD . The venom of this species is not harmful to humans since it eats crickets and grasshoppers, however like many snake species it suffers from persecution. There is therefore a risk of this species being killed by construction workers if found.

Table 66: Impacts to Priority Biodiversity Features - Fish

Habitat degradation	Degradation of aquatic habitats due to (CP.3 and OP.3) due to run-off during construction and operation could affect the European Eel, both directly due to pollutant toxicity, and indirectly through habitat degradation, making survival in the waterways more difficult. As a critically endangered species, this should be of serious concern.
Habitat Fragmentation	The European Eel is a migratory species and is therefore at risk from blockages in watercourses that prevent its migration. Young eels migrate from the sea into freshwater courses and spend a number of years maturing. After they reach sexual maturity they then must migrate back down the watercourses into the sea. If blockages have occurred in the watercourse since their original migration, eels are prevented from carrying out their natural reproductive cycle, and their breeding success is highly reduced. Habitat fragmentation from blockages in watercourses is one of the greatest risks to this species, as unhindered migration is key to its reproductive success.

Table 67: Impacts to Priority Biodiversity Features - Amphibians

Habitat Loss	Loss of drainage channels, which are known to contain amphibians listed as priority biodiversity features, represents habitat loss for these species.
Habitat degradation	Degradation of aquatic habitats due to (CP.3 and OP.3) due to run-off during construction and operation. 2 species of amphibian, the European tree frog and the Greek stream frog are listed as PBFs. Frog species are thought to be particularly sensitive to aquatic pollution[41] . Adult frogs have permeable skin that can absorb toxic compounds. These toxins are concentrated and stored in the frogs' fat cells. Frogspawn, due to its soft jellylike nature, readily takes up pollutants as eggs absorb moisture during development. Therefore any impacts from pollutants on aquatic habitats are likely to affect amphibian species particularly badly.
Habitat Fragmentation	Increased traffic, as well as a wider road layout, will mean that the road poses a more significant barrier to amphibia looking to cross, causing increased isolation of local populations. If isolated populations are too small, they can suffer from inbreeding and low viability, and thus not be sustainable long term.
Direct Mortality	Amphibians could be killed during the removal of drainage channels which they are known to reside in. They also could be killed by machinery and vehicle operation during construction. Amphibians are known to be killed by the existing road, as the summer surveys found multiple examples of roadkill, for example of the common toad.

Table 68: Impacts to Priority Biodiversity Features - Terrestrial Mammals

Habitat Fragmentation	Increased traffic, as well as a wider road layout, will mean that the road poses a more significant barrier to amphibia looking to cross, causing increased isolation of local

[41] Laurie J. Vitt, Janalee P. Caldwell, Henry M. Wilbur, David C. Smith, Amphibians as harbingers of decay, *BioScience*, Volume 40, Issue 6, June 1990, Page 418

	populations. If isolated populations are too small, they can suffer from inbreeding and low viability, and thus not be sustainable long term
Direct Mortality	Large mammals are known to be killed by the existing road and this could be exacerbated by the increased width and speed of the road .

Table 69: Impacts to Priority Biodiversity Features - Bats

Habitat Loss	The removal of trees and buildings may affect bat roosts. The removal of trees, hedges, scrub and water bodies also reduces available foraging habitat.
Habitat Fragmentation	Roads are potential barriers to flight between roosts and foraging sites and between summer, mating and winter roosts. Bats have been shown to make major detours (with associated energy costs) to avoid roads or to find appropriate crossing points. This can also deny bats access to parts of their habitat which can reduce home range size and quality and restrict migration. Roads may act as barriers because they interrupt existing linear flight lines, because some species are reluctant to cross open ground, because some species avoid lit areas (road and vehicle lights) and, at least initially, because they represent sudden changes in the bats' familiar landscape. Roads may also fragment habitat, decreasing its area and quality. Impacts are however species specific. Small bats will tend to avoid crossing roads, whilst larger species will fly over at heights above 20 m. making them less susceptible to both barrier effects and collision mortality. Others may use underpasses.
Direct Mortality	Bats that attempt to cross roads also risk collision, and hotspots for mortality have been found where there is favourable habitat for bats and flyways cross roads. Although agile and manoeuvrable in flight, most bat species fly at low speeds (< 20 km/h) and many fly close to the ground (0-4 m) particularly when crossing open spaces. These behavioural traits make bats highly vulnerable to moving vehicles when either foraging along roads or when attempting to cross roads on commuting flights. Being small, bats can probably be pulled easily into the slipstream of passing vehicles.
Light	Lighting tends to deter many bat species, notably slow-flying, woodland-adapted species such as *Rhinolophus* and *Myotis*, from approaching roads and probably exacerbates the barrier effect. Both high-pressure sodium and white LED light deter **woodland-adapted** species, even at low intensity.[42] As light intensity drops rapidly away from the source, effects of isolated sources are not likely to be far reaching, but large arrays of high intensity lights will have a significant effect. Light of short wavelength, especially containing UV radiation, can also attract some bat species, in particular open-air foragers such as *Nyctalus* and generalists like *Pipistrellus*, since short wavelength light attracts insect prey, concentrating them around lights and increasing bat foraging efficiency, although they may also be at greater risk of collision with traffic.
Noise	Most insectivorous bats rely on echolocation calls to orientate, detect prey and communicate. Some also locate and capture prey by listening for sounds they generate. (e.g. wing movements or mating calls). Traffic noise may mask all of these sounds and reduce the feeding efficiency of bats (eg *Myotis myotis*). It is likely that habitats adjacent to noisy roads would be unattractive as feeding areas for such species. Vehicle noise may also exacerbate the barrier effect, although noise effects are unlikely further than 60m away.
Intra-project impacts	Most of the factors discussed above are also cumulative. The effects of each individually need not therefore be great for the combination to have a profound effect on a bat population. Full effects, however may not be seen for several decades and this has important implications for monitoring the effects of roads and assessing the effectiveness of mitigation. Data[43] indicates that the decline in diversity and abundance of bats extended

[42] (Stone et al. 2009, 2012).
[43] Berthinussen & Altringham (2012a, 2013

	to at least 1.6 km from a motorway.

10.8 Mitigation

The following section proposes mitigation for significant adverse impacts in line with the "mitigation hierarchy". General and specific mitigation to be applied is shown in the tables below.

Table 70: Proposed General Biodiversity Mitigation

General Construction Mitigation
CP.1 - Loss of Native Habitat
• Areas for vegetation clearance will be clearly marked out and laydown areas and compounds will be sited to avoid unnecessary clearance of vegetation. • The workforce will adhere to working corridors and existing tracks or natural gaps in vegetation will be used as preferred access routes where practical. • Workers will be educated on preventing bush fires and this will not be used as a land clearance method • Tree/ scrub clearance will be undertaken outside of the bird breeding season (March to August inclusive) where practical. If this is not practical, a pre-clearance nesting bird check will be undertaken of the vegetation to be cleared by an Ecological Clerk of Works (ECoW). Should nests be found, clearance will be deferred until after the season is over. • A pre-clearance survey will also be done for roosting bats, and any trees found with roosting bats will not be removed unless absolutely necessary, and if necessary, only removed after bats have vacated. • Where vegetation has been cleared, it will be restored by reseeding or replanting using locally collected seed mixes and saplings.
CP.2 – Degradation of Terrestrial Habitat
• Any topsoil and subsoils will be removed and stored separately for subsequent restoration. Topsoil piles will be no more than 3m high and protected from works activities. Top soil will be monitored to ensure there is no compaction or waterlogging. • Areas temporarily used during construction to be filled with soil (same as removed) to allow the resettlement of native vegetation, and replanted if necessary. • Use of GIIP to minimize impacts associated with dust and pollution (e.g. use of drip trays understanding equipment, designated refuelling areas with hardstanding).
CP.3 – Loss of Aquatic Habitat
• The removal of any channels will occur outside of the frog reproductive season (March to August) to avoid disturbing breeding and destroying spawn or larvae. (Two frog species found in these channels are recognised as Priority Biodiversity features). • A pre-clearance survey will be conducted by the ECoW of any channels that will be removed as part of the project. If any adult reptiles or amphibians are found, they are to be safely captured and relocated to suitable nearby habitats. There is the potential for threatened freshwater invertebrates to also be found in these channels. Pre – clearance surveys will also look out for freshwater invertebrates, and if any PBF they are to be safely captured and relocated to suitable nearby habitats.
CP.4 – Degradation of Aquatic Habitat
• Any execution of works in watercourses will occur from 15 June to 15 October, when the water level is low and some of the watercourses have dried up completely. • Use of GIIP to minimize impacts associated with dust and pollution (e.g. use of drip trays understanding equipment, designated refuelling areas with hardstanding).

- Detail of specific mitigation to prevent degradation of waterways is provided in the Water Quality section (Section 8) and must be strictly adhered to avoid degradation of aquatic habitats and thus negative impacts on aquatic PBF species.

CP.5 – Disturbance of Fauna

- Pre-clearance site surveys will be conducted before the commencement of all works to prevent animals present within the working area being killed or injured during works. Checks will be for all vertebrate species and will specifically include ground nesting birds and reptiles.
- Off-road travel will be prohibited where practical. The workforce will adhere to working corridors. Appropriate speed limits will be applied, and traffic will be restricted to existing and/or dedicated haul routes to reduce direct mortality and disturbance from vehicles during construction. Penalties for violation will apply.
- Works will not be lit where this is practical. Where lighting is required it will be directional and non-UV lighting sources will be employed.

CP.6- Habitat Fragmentation

- Fencing will be restricted to work compounds and associated areas including waste disposal areas to ensure that habitats are not fragmented by workforce activities, unless this is for species protection measures as deemed by the EcoW.

CP.7 Worker Impacts

- Contractors will be required to conduct regular debris clean-up activities upon possession of the work site and to maintain the assigned sections throughout project construction including by regular collection and hauling of wastes to government-approved landfill locations.
- Temporary barriers will be used to prevent wildlife from accessing waste disposal areas and similar areas.
- Biodiversity awareness will be included within the contractor's site induction training. This will include an inventory of all species either legally protected or listed as a Priority Biodiversity Features, using photographs, and bans on hunting, foraging, and trapping. The workforce will be educated on national regulatory requirements, as well as activities that should/shouldn't be observed in specific periods (e.g. bird nesting period) to avoid or minimize the risk of disturbance, injury, or death of PBF or protected species.
- Biodiversity awareness training will have a specific emphasis on snakes, especially on the strictly protected Meadow viper. Killing of any snake by workers will be prohibited, if snakes need to be removed from site the EcoW will be informed.
- Workers will report encounters with PBF species if in the working corridor to the EcoW

CP.8 Spread of non-native / invasive species

- The ECoW will pay special attention to invasive species in their surveys. Any invasive species (as listed in impacts section) identified will be removed.
- GIIP (e.g. cleaning of equipment before transport to site) will be applied to prevent accidental introduction of non-native species.

General Operational Mitigation

OP.1 Direct mortality of fauna due to collision with vehicles.

- Culverts allowing animals to cross under the road will be installed in the recommended locations. See below for more details.
- Culverts and bridges for watercourses will also incorporate ledges for small animal passage, see below for recommended designs.
- Fencing will be installed in areas known to be used for animals for crossing (or the whole alignment, not sure what is feasible). These will be designed to prevent both large mammals and small amphibians

from accessing the road.
OP.2 Degradation of Terrestrial Habitats
• As detailed in the air quality section (Section 7), as speeds on the road are not expected to increase the increase in air pollution in road operation should be negligible. • The impacts of road runoff should be mitigated by following mitigation in the water quality section.
OP.3 Degradation of Aquatic Habitats
• Detail of specific mitigation to prevent degradation of waterways during road operation is provided in the Water Quality section and must be strictly adhered to avoid degradation of aquatic habitats and thus negative impacts on aquatic PBF species.
Op.4 Habitat fragmentation
• Culverts allowing animals to cross under the road will be installed in the recommended locations. • Culverts and bridges for watercourses will also incorporate ledges for small animal passage
OP.5 Disturbance of Fauna
• For lighting along the main road, it is recommended to use sodium lamps and directed light-shaded lamps that emit light to the horizontal level, and which are relatively unattractive to insects. The use of mercury and halogen lamps is not recommended. • Native vegetation, especially trees, should be preserved along the road as much as possible, as this helps to shield potential bat habitat from lighting. Replanting efforts should focus on planting trees along roadside.

Table 71: Specific Biodiversity Mitigation Proposals

Proposed Mitigation
Impacts on Tivat Saline CH
• Application of CP.4 and OP.3 above should be sufficient to prevent any negative impacts on Tivat Saline due to downstream effects, if properly adhered to. This includes adherence to all mitigation detailed in the Water Quality Section.
Loss of Native Habitat
• Where vegetation has been cleared, from preparation of the working corridor, and associated supporting infrastructure (construction camps, laydown areas etc, it will be restored by reseeding or replanting using locally collected seed mixes and saplings. This will ensure no net loss to habitat known to support priority biodiversity features. An estimated 9.27 ha is anticipated to be lost from the widening of the road. However as no construction design is currently available, losses resulting from the working corridor and other associated construction activities in unclear. The TA will be required to ensure an environmental specialist (Ecological Clerk of Works) is hired who will be responsible for monitoring and measurement of all vegetation loss required for restoration. Where restoration of habitat is not possible due to permanent losses (approximately 9.27 ha) resulting from the widening of the paved road, these losses will be offset by restoration of identified important areas supporting priority biodiversity species in the PAA, specifically sections: 0 – 2km; 5 – 7.7km; and 13 – 16km of the road.
Terrestrial fauna (rep, amp, mammals)
• Pre-clearance surveys will be conducted by the ECoW, and if any PBF species are identified they will be safely captured and relocated to suitable habitat. • Fences should be installed at all areas known for mammal crossings (further surveys are planned to decide key crossing points but this is likely to include sections 0-2 km, 5-7.7km and 13-16km). Fencing should be designed to prevent both small amphibian species and large mammals from crossing.

- Underpasses for small mammals, amphibians and reptiles should consist of pipes or rectangular tunnels with a diameter/width of 0.4-2 m. The distance between two appropriate and available passages must not exceed 200 meters in natural areas or 500 in agricultural areas[44].
- All culverts present in the current road will be replaced with wildlife friendly culverts. If these culverts have seasonal or permanent waterways passing through them they will be designed with ledges to allow passage of terrestrial as well as aquatic species, an example of this is shown in Figures X and Y.
- Additional culverts may need to be installed to allow animal to pass under the road at key crossing points to be identified in future surveys.
- All culverts will have guiding fencing installed, to direct animals away from the road and under the culverts.
- All bridges will have ledges to the sides to allow passage by terrestrial species.
- Particular will be given to the known animal crossing points identified as part of the national EIA, namely 42 20 50.61 N 18 467.04 E; 42 20 12.40 N 18 4620.83 E (existing bridge Lukavac); 42 19 32.01 N 18 4648.92 E (existing bridge on Kovački potok); 42 17 51.99 N 18 4826.29 E.
- During construction, amphibian fencing will be erected to form a barrier between the work site and any habitat, especially rivers, ditches, flood meadows and wet grassland, where reptiles, amphibians and small mammals could gain access. For a 2-metrestrip alongside the fence the vegetation will be strimmed very short to create an open and therefore unattractive habitat for these small animals, further deterring them from the work site. Bucket traps for translocation will be installed at specific locations determined by the specialist and these will be emptied very early every morning. In addition, a specialist will inspect suitable habitat prior to enabling works and set translocation traps in these areas.
- During periods of toad migration a specialist will be on site with a watching brief and work may be curtailed during the evenings for the duration of the migration. The Community engagement team will explain the purpose of the fencing to the local population. Information leaflets will be prepared.

Bats

- Tree felling: Any tree above 100mm in diameter to be checked by the EcoW for the potential of roosting bats prior to removal. If bats are found, the roost will be left undisturbed until vacated by bats All felled trees with potential to support bats (i.e. with suitable cavities) to be left in situ (on the ground) for 24 hours to allow any bats to move. Avoid felling trees between April-August.
- Use of non-UV sources of lighting at working sites, deposits and permanent facilities to avoid attracting nocturnal insects and the bats that feed on them.
- Installing of bat boxes within appropriate habitat to mitigate for loss of roost sites.
- If habitat corridors are severed, identify key locations for replanting to retain commuting routes and if appropriate raise the height of the planting so that crossings are above traffic.
- Use down lighters as standard given the very undeveloped nature of the project area.
- Replanting trees along the sides of the roads particularly in key bat areas (0-2km, 13-6km)

Fish

- The Mitigation proposed to prevent the degradation of aquatic habitat during both construction and operation (CP.4 and OP.3) will be important to prevent any negative impacts on Fish species, namely the Critically Endangered European Eel.
- To prevent negative impacts on the European Eel avoid blockages in the watercourses during construction. Depending on in-channel works, this may involve digging bypass channels to allow water

[44] Iuell, B., Bekker, G.J., Cuperus, R., Dufek, J., Fry, G., Hicks, C., Hlavaˇc, V., Keller, V., B., Rosell, C., Sangwine, T., Torslov, N., Wandall, B. le Maire, (Eds.) 2003. Wildlife and Traffic: A European Handbook for Identifying Conflicts and Designing Solutions)

flow, or installing temporary pool fish ladders to allow continued passage on watercourses that have not fully dried up during the time of construction (15 June to 15 October).
Freshwater invertebrates
• The Mitigation proposed to prevent the degradation of aquatic habitat during both construction and operation (CP.4 and OP.3) will be sufficient to prevent any negative impacts on freshwater invertebrates.

Figure 19:reptile/large mammal fence

Figure 20: Box Culverts Modified with Ledge for Small Animal Passage

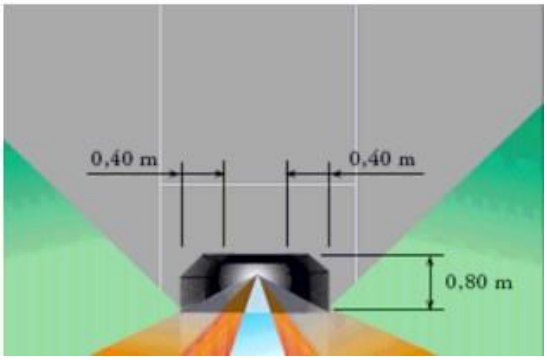


Figure 21: Potential Design for a Culvert for Amphibians, Reptiles and other Small Animals

10.9 Residual Impacts

There are expected to be no significant residual impacts to biodiversity during construction and operation as long as the full package of mitigation measures outlined in this ESIA are followed.

Loss of habitat supporting PBFs is identified as having a high adverse impact but will be mitigated through a number of measures including daily pre-construction surveys and restoration of any temporary habitat loss and offsets targeted in important habitats for species along the PAA (see biodiversity mitigation measures for details). With these applied a moderate residual impact is assumed.

Impacts to sensitive waterways in the PAA during construction and operation phases, including the critical habitat feature Tivat Saline, will be mitigated through the measures outlined in the water quality section and biodiversity section. A neutral residual impact is assumed.

The loss of aquatic habitats during construction, especially the removal of drainage channels either side of the road which support PBF amphibian species, is identified as having potentially high adverse impact. Mitigation described in CP.3 including conducting works outside of reproductive seasons, pre-clearance surveys, and safe capture and relocation of any species found mean a moderate residual impact is assumed.

The road when operational is identified has having potential high adverse impact regarding vehicle collisions and habitat fragmentation. A requirement of the ESAP will be that a study is conducted prior to construction by a suitably qualified environmental specialist to identify locations for key animal crossing points which will need to be included into the road design. Should this be completed effectively a moderate residual impact is assumed.

10.10 Cumulative Impacts

Cumulative impacts have been incorporated into the biodiversity impact assessment where relevant e.g. In the consideration of the potential effects on bats. The upgrade to the Tivat Airport could potentially impact aquatic biodiversity features in the northern end of the PAA although there is no information publicly available at the time of writing. However, the implementation of the mitigation measures specified in the water resources chapter for the project and the fact that the project road is upstream to the airport mean that potential impacts to aquatic habitats and species supported by aquatic habitats will be largely mitigated and no significant cumulative effects will result.

10.11 Contractor Commitments

The following commitments will be included into the contractor requirements:

- Production of a Biodiversity Management (and Monitoring) Plan. This will include all mitigation presented in this section. The contractors will take an approach in line with the mitigation hierarchy, meaning that avoidance of impacts will be prioritised above all other mitigation.

- An Ecological Clerk of Works (or equivalent), accompanied by an appropriate specialist where relevant, will inspect the works area on a daily basis and be on site to advise in times of unforeseen circumstances or incident recovery. This person will review all documented Management of Change procedures.

11 Socio-Economic

11.1 Introduction

This section presents the methodology and assessment of potential socio-economic impacts associated with the construction and operation of the Project.

11.2 Relevant Legislation and Guidance

The following legislation is considered applicable to the Project:

Table 72: National Resettlement and Expropriation Legislation

The Constitution of Montenegro ("Official Gazette of Montenegro", No. 01/07, 38/13) -	The Constitution of Montenegro defines the legal basis for expropriation of land and protection of property rights, while it only exceptionally allows the possibility of limiting these property rights in cases when it is imposed by public interest and established by or based on the law.
Law on Expropriation ("Official Gazette of the Republic of Montenegro ", No. 55/00, 28/06 and "Official Gazette of Montenegro "No. 21/08, 30/17, 75/18) -	The Law guides the land/property management and serves as a general framework for the land/property expropriation on the territory of Montenegro. It defines the processes and procedures related to property expropriation in the public interest, compensation mechanism, grievance mechanism as well as other issues related to the expropriation process. The Law provides the right to make appeals at many stages of the expropriation procedure, such as administrative and judicial appeals (i.e. against the decision on public interest, the decision on expropriation, and regarding compensation), among other rights of affected citizens (those with formal legal rights).
Law on Property-Legal Relations ("Official Gazette of Montenegro", No. 19/09) -	The Law regulates ownership rights and other property rights. According to the Law, no person may be deprived of his/her property or of the rights deriving from it, except in cases concerning the public interest determined by the law. In case of deprivation (complete expropriation) or restriction (partial expropriation), rightful compensation for the property, which is not lower than its market value at the time of expropriation, is guaranteed. The beneficiary of expropriation may submit the expropriation proposal only after determining the public interest in expropriation.
Law on State Surveying and Cadastre of Immovable Property (Official Gazette of Montenegro No. 29/07, 32/11,40/11, 43/15) -	The Law establishes the Real Property Cadastre as a single public record, which contains, inter alia, data on expropriation. According to the article 45 of the Law, all land suitable for agricultural and forest production shall be divided into eight land quality classes. Within each land quality class, one or more land quality sub-classes can be determined. The most common are the classes III and IV, on karst areas IV, V and VI class, while hilly-mountainous areas are characterized by classes V to VII.

11.3 Assessment Objective

This assessment has been undertaken to identify aspects of the Project (during construction and operation) that are likely to result in significant impacts on socio-economic resources or receptors;

and define appropriate mitigation/enhancement measures to manage these impacts, detailing them as commitments in the Project's Framework Environmental and Social Management Plan (ESMP). It should be read alongside the Project Stakeholder Engagement Plan (SEP) and Project Land Acquisition and Resettlement Framework (LARF)

11.3.1 Scope of the assessment

The scope of work for this social impact assessment has included the:

- Identification of the Project Affected Area (PAA) with respect to social receptors;
- Characterisation of the existing socio-economic baseline conditions for the Project Affected Area;
- Identification of socio-economic impacts that are likely to occur as a result of the Project;
- Identification of appropriate mitigation and/or enhancement measures;
- Incorporation of the Project's commitments, related to socio-economic impacts, within the Framework ESMP.

11.3.2 Project Affected Area

The Project Affected Area (PAA) has been delineated based on the guidance of EBRD PR1 and includes all the Project activities and facilities that are directly owned or managed under the Project (including by subcontractors) that are likely to generate social risks and impacts. The PAA includes the areas and communities likely to be most affected by Project activities during construction and operation, comprising housing and businesses along the main road and some extensions into small off-road communities. Direct impacts will only occur in the footprint of the construction area, which comprises two properties. Further, the air quality and noise impacts are not significant beyond 50m. Significant impacts on households and businesses are therefore likely to occur within 50m of the road. The PAA for the social assessments is therefore 50m from the centre line of the road.

11.3.3 Overview

The social baseline for the ESIA was informed by socio-economic studies undertaken in February 2020 along the M-2 road (the Project) and supplemented with desk-based research. The ESIA study phase consisted of 13 meetings with key informants (10-21 February), one focus group discussion with youth from Radanovici school, one community meeting in Radanovici, and one-to-one interviews (5-12 February) with 98 households and 72 businesses in the PAA. Ahead of the individual engagement, preparatory activities for the survey included a number of additional scoping visits and drives along the road by the consultants to get an even deeper understanding of the structures, livelihoods and businesses in the PAA, and the design of the survey tools. The questionnaires used in the individual surveys covered questions related to all potential social impacts, including detailed questions related to land use and ownership, in order to simultaneously collect baseline information for the Project LARF.

Five days before the survey was due to begin, information notices were posted in different locations

along the road informing local residents about the Project, the ESIA process, and that the survey team was coming to the area. All businesses located along the Road were sent information notices out by email informing them of the start of the survey. Furthermore, every respondent to the survey questionnaire was given a leaflet explaining the process as reference material to ensure that they were fully informed. The announcements of the studies, the leaflets shared, and photographs showing the locations of the posters are included in the Annexes of the Project's Stakeholder Engagement Plan. The data collected during the surveys was analysed using SPSS data processing software. The data most relevant for an informed baseline has been presented in this Chapter, and the survey questionnaires are included in the Annexes of this ESIA.

11.3.4 Sample size

The ESIA team estimated that there were approximately 144 residential structures located within 50m of either side of the centre line of the existing road. The ESIA team visited all of these structures during the SES studies, and processed the survey with 98 households within this predefined corridor. Some households owned up to 5 structures and thus the figure of 144 was an accurate number for structures but not for the amount of households. Twenty-two (22) structures were found to be either abandoned or uninhabited, and 24 households did not wish to take part in the survey, meaning therefore that the estimated amount of households within 50m of the road is 106. In order to secure a larger sample of respondents, the survey team expanded the survey to 16 households who were located between 50 and 100m away from the road, and thus the baseline data is based on information from a total of 98 households who took part in the survey[45] [46].

Table 73: Sample Overview - Households

Category	Number
Abandoned buildings / do not live there	22
Refused to take part in the survey	24
Total number of surveyed HH within 50m from the centre line of the road	82
Total number of surveyed HH within 50m-100m from the centre line of the road	16
Total number of surveyed households	**98**

Similarly, ahead of the start of the surveys, the ESIA team had during site visits identified 110 businesses located within 50m of either side of the centre line of the existing road. The team

[45] Please see Section 1.4.4. Limitations of the methodology for more information.

[46] NB During the surveys, some households did not wish to answer all the questions and for those questions, the answers are presented with the number of responses and in both percent and valid percent to indicate the share of maximum responses.

conducted the survey with 72 businesses, 30 businesses were unwilling to take part in the survey, and found that 8 businesses previously identified were out of business.

Table 74: Sample Overview - Businesses

Category	Number
Out of business	8
Refused to take part in the survey	30
Total number of interviewed business entities	72
Total outreach	**110**

Quantitative data for the study area was obtained from the following main secondary sources:

- MONSTAT (Statistical Office of Montenegro) data (including both 2011 National Census and 2019 Statistical Yearbook) viewed online (http://www.monstat.org);
- United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2017 Revision (https://www.worldometers.info/world-population/montenegro-population/);
- Labour market transitions of young women and men in Montenegro. ILO, Geneva, 2016;
- Employment Agency of Montenegro, Annual report 2018.
- Main Design (Technical Description) for the Main Roads Reconstruction Project M-2 Tivat-Jaz Section. Government of Montenegro, Transportation Administration of Montenegro, and
- Expropriation studies for the Main Roads Reconstruction Project M-2 Tivat-Jaz Section. 2019-2020.

11.3.5 Impact Assessment Methodology

The social impact assessment follows the methodology described in Section 5. Magnitude and vulnerability/sensitivity designations have been combined to evaluate impact significance. **Error! R eference source not found.**, 74 and 75 present the definitions used for magnitude, vulnerability/sensitivity and impact significance, in the social assessment.

Table 75: Magnitude Definitions

Value	Definition
Large	Change dominates over the baseline conditions. Impact affects the majority of the project area and/or is long-term.
Medium	Clearly evident difference from baseline conditions. Impact affects a substantial area of the project area and/or is medium-term in duration.
Small	Perceptible difference from baseline conditions. Impact is local and/or short-term in duration.
Negligible	Changes remain with the range normally experienced in the project area.

Table 76: Vulnerability/Sensitivity Definitions

Value	Definition
High	Multiple levels of vulnerability. Project Affected People (PAP)s are unable to adapt to the changes experienced as a result of the Project.
Medium	Some areas of vulnerability. PAPs are mostly able to adapt to the changes experienced as a result of the Project.
Low	Very low vulnerability. PAPs are able to adapt to the changes experienced as a result of the Project.

Table 77: Impact Significance Definitions

Value	Definition
Very High	Adverse impacts that are diverse and impossible to reverse. Potential for long-term impoverishment and health consequences.
High	Adverse impacts that may be reversible, but have long-term effects on livelihoods, health or quality of life.
Medium	Adverse impacts that are short-term and do not result in long-term consequences to livelihoods, health or quality of life.
Low	Potential aggravation caused, but no consequences to livelihoods, health or quality of life.
Very Low	Effects are imperceptible to PAPs.

11.3.6 Limitations to the Methodology

The most significant limitation during the socio-economic survey among the households was lack of interest and/or refusal of some households to take part in the survey. This could partly be explained by the timing of the survey: the Montenegrin government recently adopted the Montenegrin Law on religious freedom which has proved controversial in some areas. Gatherings have been organised country-wide by those opposing the law, and this could potentially have influenced the households' sensitivity and willingness to take part in the survey[47]. This sensitivity context was also the background reason for why questions related to ethnicity and religion were removed from the questionnaire.

In terms of the businesses, the team aimed at completing the survey with persons in leading positions in the companies, i.e. business owners, CEOs, and managers, who were not always available. Additionally, a number of business entities requested that the questions be posed to

[47] Some respondents view the Project as a government project, and therefore, given their opposition to legislation recently adopted by the government, they did not wish to cooperate with the Project as they are opposed to all government initiatives for the moment.

them via phone and/or email which also slowed down the process. However, the most significant constraint and limitation encountered was the lack of interest and/or refusal of some business entities to take part in the survey. Furthermore, given that the EIA and ESIA processes have been conducted in parallel and, in order not to cause confusion or fatigue amongst stakeholders, some of the public consultation meetings initially planned for the ESIA study phase were pushed forward to draft ESIA disclosure phase instead.

In terms of impact to land and livelihoods – including physical and economic resettlement – the assessment was limited by the fact that the decision of Public Interest had not yet been announced by the time of assessment in Q1 2020, and hence no cut-off date had been communicated to the Persons affected by the Project. Data collection and analysis on resettlement impacts was thus incomplete, and individual stakeholders had not yet been informed of the land acquisition process. As part of the ESIA Disclosure package, a Land Acquisition and Resettlement Framework (LARF) has been developed based on the land-related socio-economic data gathered during the ESIA study phase. The announcement of Public Interest has subsequently been made, and detailed census and asset inventories will be carried out to assess the full resettlement impact of the Project. The information gathered will inform the development of the LARF into a Land Acquisition and Resettlement Plan (LARP).

11.4 Baseline Conditions

This baseline presents an overview of the current socio-economic conditions prior to development of the Project. The aim of the social baseline is to identify receptors that might be significantly impacted by the Project. The key socio-economic factors identified as relevant to this Project are: population demographics economy and livelihoods (Section 11.5.3), and infrastructure

11.4.1 Project Affected People (PAP): Demographics

Coastal region

The Project passes through the three municipalities of Budva, Kotor and Tivat located in the Coastal region. The southernmost region of Montenegro makes up approximately 11.5% of the total territory of Montenegro and includes the municipalities of Bar, Budva, Herceg Novi, Kotor, Tivat and Ulcinj, which all have access to the Adriatic Sea. Approximately 24% of the Montenegrin population lives in the area. The highest population density in Montenegro is concentrated in these coastal municipalities, with Kotor at 67 people/km^2, Budva at 158 people/km^2, and Tivat at 305 people/km^2[48] , compared to the national average of approximately 47 people per km^2[49] (which represents less than half the European Union (EU) average).

[48] MONSTAT, National Census 2011

[49] United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2017 Revision. https://www.worldometers.info/world-population/montenegro-population/

The Municipality of Kotor covers an area of 335 km² over 56 settlements. According to the 2011 National census, the population was 22.601 inhabitants, estimated to have grown to 22.683 by year 2018[50]. It borders with Bosnia and Herzegovina and the municipalities of Herceg Novi, Tivat, Budva, Cetinje and Niksic. The municipality is administratively divided into 21 local communities: Municipality of Stari grad Kotor, MZ Dobrota I, MZ Dobrota II, MZ Orahovac, MZ Perast, MZ Risan, Morinj Municipality, MZ Donje Krivosije, Gornje Krivosije, MZ Skaljari, MZ Muo, Prcanj Municipality, MZ Stoliv, MZ Kavac, MZ Mirac, MZ Gornji Grbalj, MZ Radanovići, MZ Lastva Grbaljska, MZ Vranovići, MZ Savina, MZ Glavaticici-Bigova.

The Municipality of Tivat is the smallest municipality in Montenegro covering an area of 46 km² over 12 settlements. According to the 2011 National census, the population was 14.031 inhabitants, estimated to have grown to 14.923 by year 2018. It is bordered by the Municipality of Herceg Novi and the Municipality of Kotor. It is administratively divided into 5 local communities: MZ Tivat-centre, MZ Krtoli, MZ Krasici, MZ Lepetane, and MZ Gradiosnica.

The Municipality of Budva covers an area of 122 km² over 33 settlements. According to the 2011 National Census, the population was 19.218 inhabitants, estimated to have grown to 21.553 by year 2018. It is bordered by the municipalities of Kotor, Cetinje and Bar. The municipality is administratively divided into 14 local communities: MZ Bijeli do, MZ Babin do, MZ Bečići, MZ Brajići, MZ Buljarica, MZ Donji Pobori, MZ Gornji Pobori, MZ Jaz, MZ Markovici, MZ Petrovac, MZ Podostrog, MZ Rezevici, MZ Stari grad, MZ Svinjista.

According to the data presented in the Main Design[51] and Expropriation studies underway or completed by end February 2020[52], the total number of Cadastral Municipalities (CM) traversed by the Project is 20. Figure 22 and **Error! Reference source not found.** illustrates the CMs per Municipality in the PAA.

[50] Data related to population estimates for all three municipalities is from MONSTAT, National Census 2011 and MONSTAT, Statistical Yearbook 2019.

[51] *Main Design (Technical Description) for the Main Roads Reconstruction Project M-2 Tivat-Jaz Section*. Government of Montenegro, Transportation Administration.

[52] *Expropriation studies for the Main Roads Reconstruction Project M-2 Tivat-Jaz Section*, 2019-2020.

Figure 22: Cadastral Municipalities

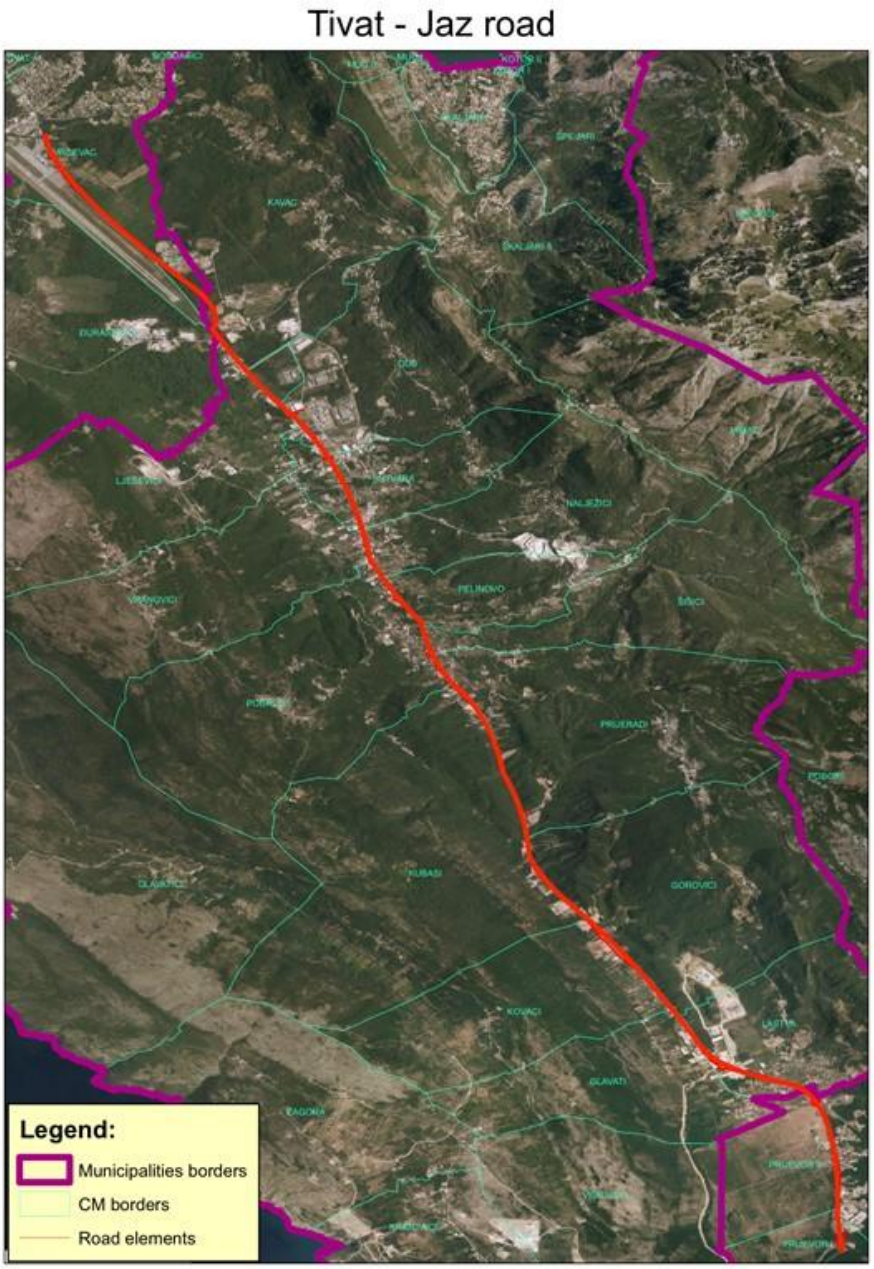


Table 78: Municipalities and Cadastral Municipalities in the PAA

Municipality	Cadastral Municipalities in the Project Affected Area
Budva	CM Prijevor I
	CM Prijevor II
Kotor	CM Dub
	CM Glavati
	CM Gorovici
	CM Kavac
	CM Kovaci
	CM Kubasi
	CM Ljesevici
	CM Naljezici
	CM Pelinovo
	CM Pobrdje
	CM Prijeradi
	CM Sisici
	CM Sutvara
	CM Vranovici
	CM Lastva
	CM Privredna zona
Tivat	CM Mrcevac
	CM Djurasevici

Demographics along the Right of Way (RoW)

The socio-economic survey was conducted with 98 households with a total of 391 household members. The survey determined that the average (mean) household size in the PAA is 3.98 people.

Table 79: Number of People per Household

Number of People per HH	Frequency	Percentage
1	10	10.2
2	16	16.3
3	14	14.3
4	19	19.4
5	20	20.4
6	9	9.2
7	6	6.1
8	2	2.0
9	1	1.0
10	1	1.0
Total	**98**	**100.0**

Source: Socio-economic survey, E3 Consulting, 2020.

In terms of housing, more than half of the houses (66.6%) were built in the period between 1970 and to 1989, and 50.5% have surface from 101 m² to 200 m² with properties ranging from 28 m² to 2000 m² in size. The majority of houses consist of one floor (63.7%), divided mainly into 2-4 rooms. The vast majority (91.7%) of respondents stated that the house they live in is in their ownership, and only very few of the respondents (4.1%) had lived in their houses for less than 11 years indicating that the population in the PAA is very stable.

Table 80: Year Houses were Built

Year house was built	Frequency	Percent	Valid Percent
After 2010	1	1.0	1.0
From 2000 and 2009	6	6.1	6.3
From 1990 and 1999	9	9.2	9.4
From 1980 and 1989	32	32.7	33.3
From 1970 and 1979	32	32.7	33.3
From 1960 and 1969	12	12.2	12.5
Before 1959	4	4.1	4.2
Total	**96**	**98.0**	**100.0**
Total	**98**	**100.0**	

Source: Socio-economic survey, E3 Consulting, 2020.

Table 81; Size of Houses

Size of house	Frequency	Percent	Valid Percent
Up to 30m²	1	1.0	1.1
From 31m2 to 50m²	3	3.1	3.2
From 51m2 to 100m²	27	27.6	28.4
From 101m2 to 200m²	48	49.0	50.5
More than 201m²	16	16.3	16.8
Total	**95**	**96.9**	**100.0**
Total	**98**	**100.0**	

Source: Socio-economic survey, E3 Consulting, 2020.

Table 82: Number of Floors in the House

	Frequency	Percent	Valid Percent
One floor	58	59.2	63.7
Two floors	28	28.6	30.8
Three floors	5	5.1	5.5
Total	**91**	**92.9**	**100.0**
Total	**98**	**100.0**	

Source: Socio-economic survey, E3 Consulting, 2020.

Table 83: Number of Bedrooms

Number of bedrooms	Frequency	Percent	Valid Percent
1.00	5	5.1	6.2
2.00	16	16.3	19.8
3.00	24	24.5	29.6
4.00	14	14.3	17.3
5.00	8	8.2	9.9
6.00	6	6.1	7.4
7.00	2	2.0	2.5
8.00	1	1.0	1.2
9.00	1	1.0	1.2
10.00	3	3.1	3.7
12.00	1	1.0	1.2
Total	**81**	**82.7**	**100.0**
Total	**98**	**100.0**	

Source: Socio-economic survey, E3 Consulting, 2020.

Table 84: Ownership of House Respondents

Ownership of house	Frequency	Percent	Valid Percent
In my/ our ownership	88	89.8	91.7
Rented	2	2.0	2.1
Belongs to relatives	1	1.0	1.0
Other (state)	5	5.1	5.2
Total	**96**	**98.0**	**100.0**
Total	**98**	**100.0**	

Source: Socio-economic survey, E3 Consulting, 2020.

Table 85: Years Lived in House

Years lived in the house	Frequency	Percent	Valid Percent
Up to 5	3	3.1	3.1
From 6 to 10	1	1.0	1.0
From 11 to 20	14	14.3	14.6
From 21 to 30	13	13.3	13.5
From 31 to 40	35	35.7	36.5
From 41 to 50	21	21.4	21.9
More than 51	9	9.2	9.4
Total	**96**	**98.0**	**100.0**
Total	**98**	**100.0**	

Source: Socio-economic survey, E3 Consulting, 2020.

Figure 23: Example Houses from the PAA

The gender ratio amongst surveyed households was 50,5% males and 49.5% females, which is very close to the national average.[53] The age profile of those surveyed is presented in Table 86 and indicates an aging population. Around 38.8% of those surveyed were retired (see Section 10.5.3 Economy and Livelihoods).

Table 86: Age Profile of Households Surveyed[54]

Age	Frequency	Percent
Up to 6	15	4.0
From 7 to 17	39	10.5
From 18 to 29	70	18.9
From 30 to 39	43	11.6
From 40 to 49	42	11.3
From 50 to 59	57	15.4
From 60 to 69	57	15.4
More than 70	48	12.9
Total	**371**	**100.0**

Source: Socio-economic survey, E3 Consulting,2020.

The majority of interviewed households are located in Radanovici (58.2%), Lastva Grbaljska (15.3%), and Kovacko Polje (9.2m), and these three are the most densely populated areas in the PAA.

Table 87: Settlements

Settlement	Frequency	Percent
Donja Sutvara	7	7.1
Gorovici	2	2.0
Kovacko polje	9	9.2
Lastva Grbaljska	15	15.3
Lovanja	2	2.0
Poljice	2	2.0
Prijevor	2	2.0
Prijevor 2	2	2.0
Radanovici	57	58.2
Total	**98**	**100.0**

Source: Socio-economic survey, E3 Consulting, 2020.

[53] Out of the total Montenegrin population, 50.6 per cent or 313,793 are women and 49.4 per cent or 306,236 are men. *Labour market transitions of young women and men in Montenegro*. ILO, Geneva, 2016

[54] During the surveys, responses for this question was recorded for 371 persons (household members) out of 391 household persons.

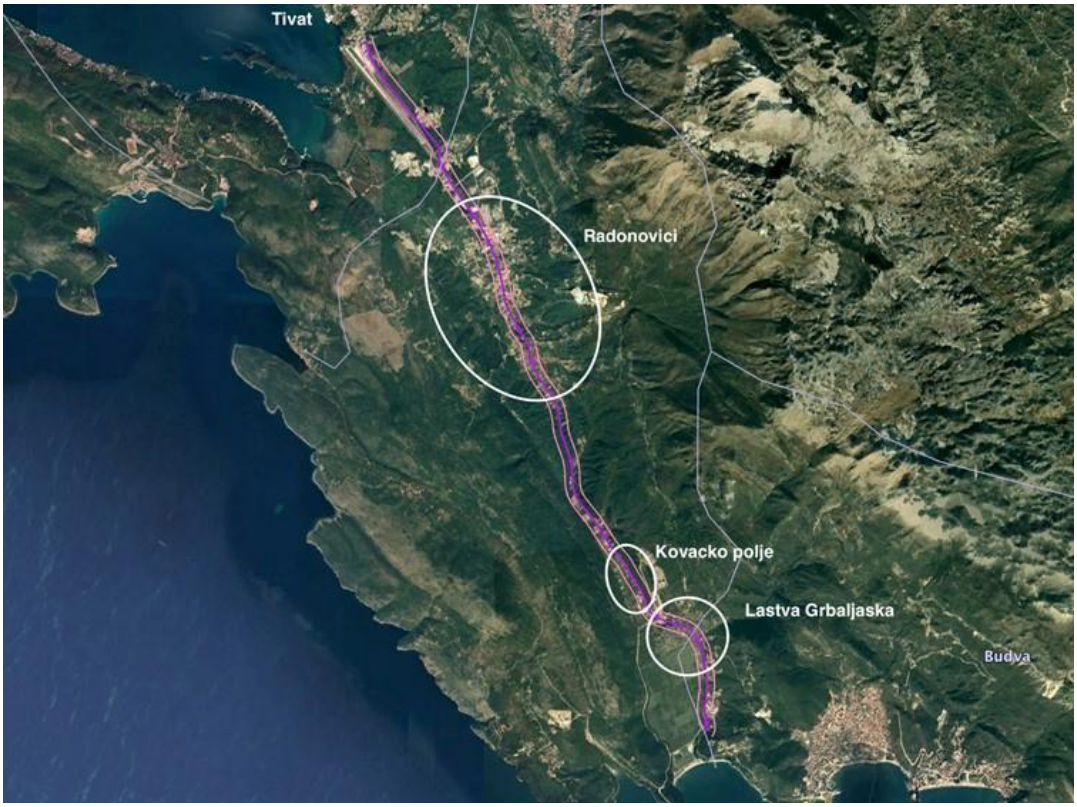


Figure 24: Most Populated Areas in the PAA

In terms of distance from the road of the interviewed households, the data shows that most are located between 41m to 50m (22.4%) away, followed by the distance of 11m to 20m (20.4%) while only 14.3% of households are located closer than 10m from the road. It should be noted that these figures were given as estimates by the interviewees during the interviews and were not verified for accuracy.

Table 88: Distance from the Road

Distance	Frequency	Percent
Up to 10m	14	14.3
From 11m to 20m	20	20.4
From 21m to 30m	11	11.2
From 31m to 40m	15	15.3
From 41m to 50m	22	22.4
More than 51m	16	16.3
Total	**98**	**100.0**

Source: Socio-economic survey, E3 Consulting, 2020.

Ethnicity, Religion and Language

Montenegrins and Serbians make up about 75% of the total population in Montenegro.[55] Table 89 presents the 2011 National Census data for the main ethnic groups in Budva, Kotor and Tivat municipalities.[56] The official language in Montenegro is Montenegrin, with Serbian, Bosnian, Albanian and Croatian also spoken.

Table 89: Ethnic Groups in Budva, Kotor and Tivat

Municipality	Montenegrin	Serbian	Croats	Albanian	Muslim	Bosnian	Does not want to declare
Budva	9262	7247	167	100	113	42	1150
Kotor	11047	6910	1553	102	64	22	1946
Tivat	4666	4435	2304	97	114	35	1275

Source: MONSTAT (2011).

Educational Attainment

Literacy levels in Montenegro are high with 99.5% of men and 98% of women (over the age of 15) able to read and write.[57] Almost half (49.2%)% of households surveyed had completed high school education and 12.2% had graduated from university.

Table 90:Education Level of APs in AHs Surveyed

Education	No. of APs surveyed	%
Uncompleted or elementary only	92	24.5
High school	185	49.2
College	31	8.2
University graduate	46	12.2
Postgraduate/Doctorate	5	1.3
Pre-school age child	13	3.5
Prefer not to provide response	4	1.1
Total	**376**	**100.0**

Source: Socio-economic survey, E3 Consulting, 2020.

[55] MONSTAT, Census 2011

[56] As noted in the limitations to the methodology section, questions related to ethnicity and religion were removed from the SES questionnaire by the SES survey team due to existing political sensitivities.

[57] https://www.cia.gov/library/publications/the-world-factbook/geos/mj.html

While the country benefits from a highly educated population, the large number of graduates emerging from higher education institutions is not easily absorbed into the limited number of available jobs. Youth unemployment in the country is high at around 41 per cent.[58]

Table 91: Education Level of APs in AHs Surveyed

Age of HH member	% Employed	% Business Owners	% Pensioner	% Farmer	% Housewife	% Unemployed	% Student/pupil	% Under six years	% Prefer to not answer	% Other
< 6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.9	0.0	0.0
7 to 17	0.0	0.0	0.0	0.0	0.0	0.0	9.4	0.3	0.0	0.0
18 to 29	6.6	0.6	0.0	0.0	0.0	2.5	8.6	0.0	0.0	0.6
30 to 39	8.8	1.1	0.0	0.0	2.5	1.7	0.3	0.0	0.0	0.0
40 to 49	7.5	1.7	0.0	0.0	1.7	1.1	0.0	0.0	0.0	0.0
50 to 59	7.2	1.7	1.1	0.3	1.1	2.8	0.0	0.0	0.0	0.3
60 to 69	3.6	1.4	7.7	0.0	2.8	0.3	0.0	0.0	0.0	0.0
> 70	0.0	0.3	11.0	0.0	1.4	0.3	0.0	0.0	0.0	0.0
Total	**33.7**	**6.6**	**19.9**	**0.3**	**7.5**	**8.6**	**18.5**	**4.1**	**0.0**	**0.8**

Source: Socio-economic survey, E3 Consulting, 2020.

Differentially Impacted Groups [59]

Groups of people which may be differentially impacted by land acquisition as a result of distinct socio-economic characteristics that make them more vulnerable to impacts were identified in the SES. These included:

- Households receiving social transfers from the government (5%)
- Female headed households (1%)
- Roma households living opposite the airport (2%)
- Households receiving pensions (33%)
- Households with > 7 members (6%)
- Households where the Head of Household did not start secondary school (25%)

[58] *Labour market transitions of young women and men in Montenegro*. ILO, Geneva, 2016.
[59] *Differentially affected group is a term used to describe vulnerability*

- Households which are living in rented houses/apartments _(2%) or who live on family-owned land (6%)
- Households with informal housing (1%)
- Households with members who are ill or having bad health conditions (2%)

11.4.2 Economy and Livelihoods

National and Regional Economy Overview

Montenegro's economy is based on the concept of an open-market system. Around 90% of Montenegrin state-owned companies have been privatized, including 100% of banking, telecommunications, and oil distribution. Tourism, which accounts for more than 20% of Montenegro's GDP, brings in three times as many visitors as Montenegro's total population every year. Energy and agriculture are also considered two distinct pillars of the economy.[60] Employment data for 2017 indicates that unemployment is decreasing at a national level, from 22.1% in 2017 to 17.8% in 2018.[61]

Regional history and economy

The Montenegrin economy was mainly agricultural with some secondary industries (wood mills, breweries, salt works, tobacco factories, power plants) until the end of the second world war. The post war period saw rapid industrialisation and urbanisation, development of international shipping trade and through the late 20th century an increasingly important tourism sector. After the break-up of Yugoslavia there was a period of privatisation of state industries and since Montenegrin independence there has been a focus on large infrastructure projects and large greenfield tourism investments to consolidate development of tourism, resulting in rapid economic development.

Founded towards the end of the Middle Ages, Tivat is located in a fertile farming area that was part of the Republic of Venice until the late 18th Century. In the second half of the 19th Century the town developed rapidly as a maritime arsenal for the Austrian empire, with many small industries, later becoming a base for the Italian, Yugoslav and finally Montenegrin Navy. The former Naval base has now been developed into a superyacht marina, situated on the UNESCO world heritage Kotor Bay and benefiting from luxury hotels, houses and associated shops and services. The Tivat airport was built in 1957 with expansions in 1971 and 2006, which served 1.25 million passengers in 2018 with the busiest routes from Russia.

Archaeological evidence suggests that Budva was inhabited by Illyrians in the 4th Century BC and

[60] *Labour market transitions of young women and men in Montenegro*. ILO, Geneva, 2016.

[61] Employment Agency of Montenegro, 2018.

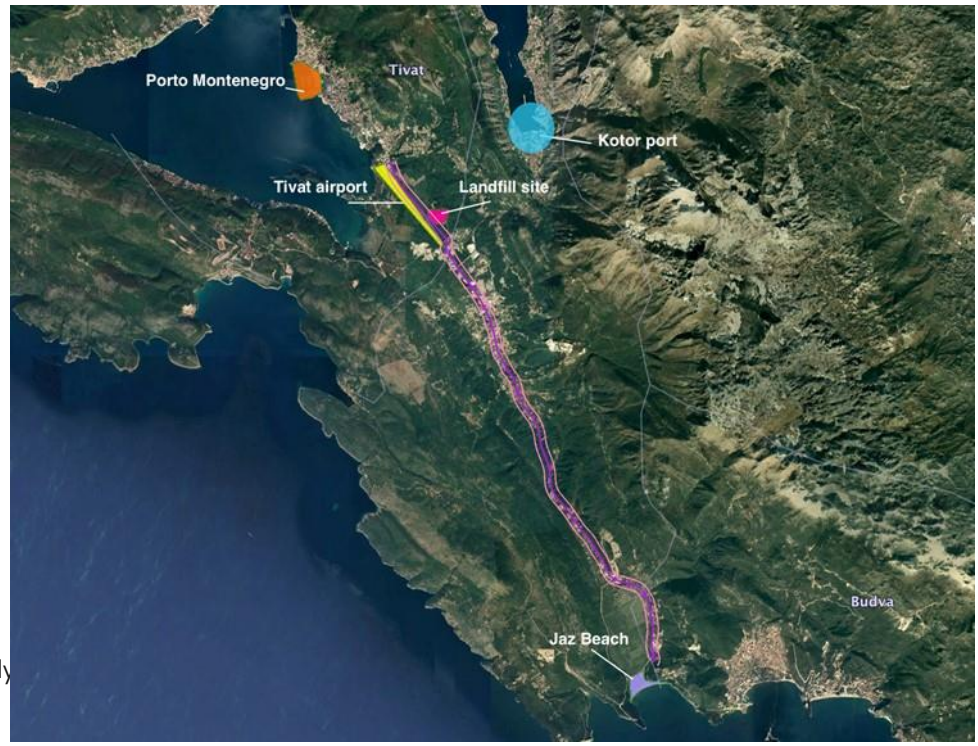
has been permanently settled since Roman times. Most of its buildings date from Venetian rule from the 16th to late 18th centuries and finished during the Austro-Hungarian empire. Outside the old town, tourism led to significant expansion from the 1930s onwards, first in an orderly manner under the SFRY and later in a more chaotic manner, as real estate prices increased following Serbian and later Montenegrin independence. The lack of planning in development has led to inadequate infrastructure and especially problems with water, flooding and sewage.

The majority of the PAPs are in Kotor municipality in Radanovici a community close to the southern edge of the municipality, with Kotor 12 kilometres away. Like Budva, it is a historic settlement, founded in Roman times, later becoming a Venetian port and is now a UNESCO World Heritage site. It has a cruise ship terminal, which has stimulated tourism, with almost 700,000 passengers in 2019. Tourism is increasingly important to the regional economy, with a focus on luxury tourism, and cruise ship tourism. This trend has also been seen outside the towns, where the previous agricultural economy is waning and more households depend on tourism, although the incomes it brings are mainly seasonal between April and October.

Local Economy

The PAPs for the Tivat – Jaz road expansion are mainly situated in the outskirts of Tivat in the area close to the airport, in the village of Radanovici half way along the road or in the outskirts of Jaz-beach / Budva. Living in more rural areas and on the outskirts of the cities, these communities maintain a mixed economy including some agricultural production and increasingly also tourism rentals and services. The proximity to important tourist sites means that many are employed in tourism. The Tivat – Jaz road was considered to be important economically to households with approximately half of respondents using the road to commute to work and just under half using the road for other business activities.

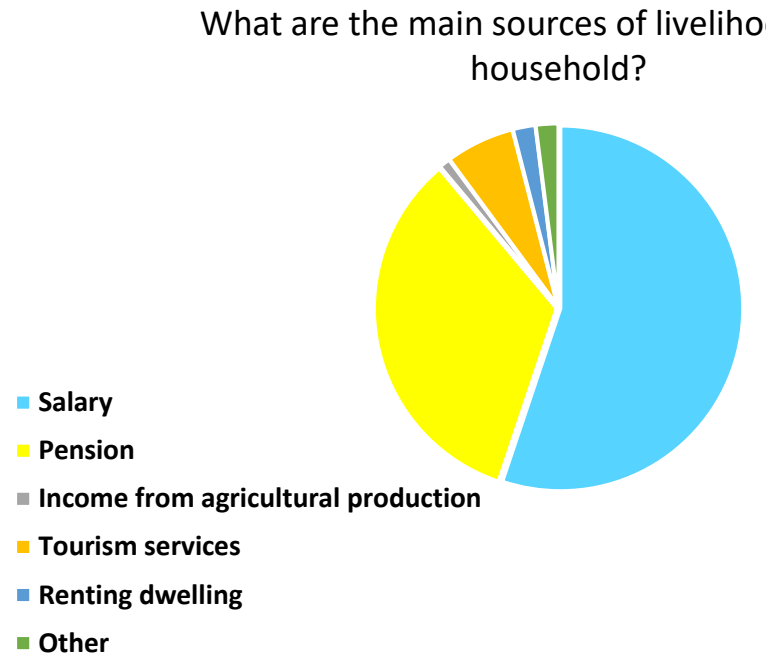
Figure 25: Economically Important Sites in the Wider Project Area



Approximately 65% of survey respondents agreed that tourism was the most important income generating activity in the area, with almost 20% mentioning agriculture and 10% mentioning work in cities. Views on the most important economic sectors in the region varied with just over 30% stating that tourism was either important or the most important and almost 25% stating the same for agriculture. The next most important sectors noted were (in decreasing order) motor vehicle sale and services, traffic and storage and construction. In terms of employment the best occupations were considered tourism (30%) and agriculture (28%), followed again by motor vehicle sale and services, traffic and storage and construction.

Among the PAPs most people have salaried employment (55%), followed by 34% who live off a pension. Tourism accounted for 6% of livelihoods, with 2% living from rental income or from companies or businesses and 1% living from agriculture. Despite this, 64% of respondents to broader questions on the local economy considered tourism to be an important source of income for the area and 67% qualifying the increase in significance of tourism for generating income in the area as somewhat significant or significant and 36% agreeing that their household was benefitted by tourism. Of these 62.5% gained income by renting to tourists and 31% had a household member working in tourism.

Figure 26: Main Sources of Livelihood



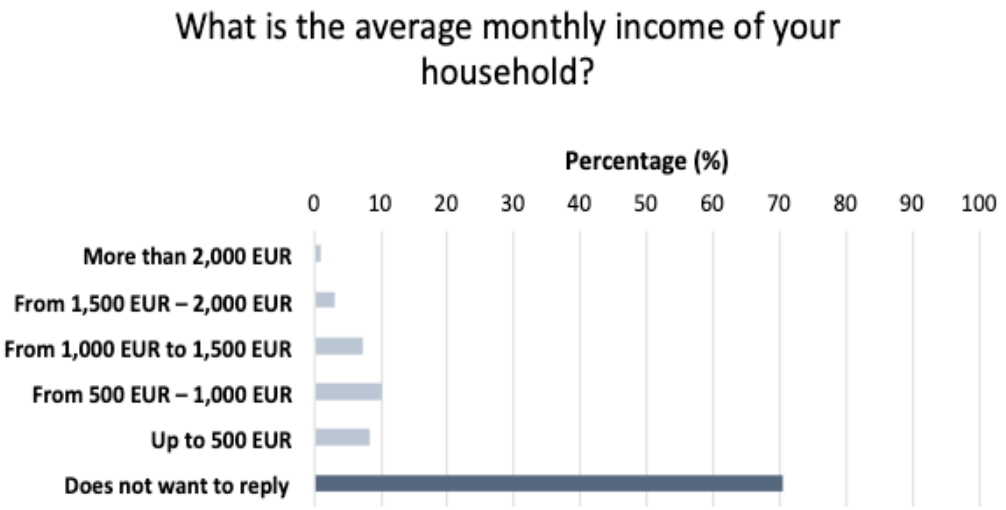
Source: Socio-economic survey, E3 Consulting, 2020.

Rentals included renting dwellings, business premises and agricultural land. Other income sources mentioned included interest from savings, waste collection, beekeeping and compensation for mothers. Around 8% noted that their employment was seasonal, 6% stated that land development was an important source of income and 3% noted a home-based businesses.

As is often the case, a high proportion of survey respondents were unwilling to provide information about their income (over 70%). Of the 30% of respondents providing information almost a third earned less than 500 EUR a month a third earned 500-1000EUR a month and the remaining third earned mainly 1000 – 1500 EUR a month. Just over 5% of respondents stated that they received some sort of state support in the form of social protection payments. 2% of these were for child support or as a female-headed household, the other 3% did not provide details. One household that declined to respond to the survey did so because they needed a translator for deafness, so although no households reported social transfers for disability, some level of disability is present.

65% of households were not facing difficulties in achieving an adequate livelihood, suggesting that most of the households that did not provide information are in the higher income brackets.

Figure 27: Monthly Household Income



Source: Socio-economic survey, E3 Consulting, 2020.

Of those facing difficulties in achieving an adequate income 45% said this was due to difficulties in finding adequately paid employment. Based on 2018 data, the unemployment rate for Budva municipality is 9.1% (or 801 people, of whom 504 are women and 297 are men), 3.6% for Kotor (or 532 people, of whom 298 are women and 234 are men) and 10.7% for Tivat (or 576 people, of whom

350 are women and 226 are men).[62] 6% commented on disorganised agricultural markets and (e.g. product placement) and 9% noted that delays in payments for goods might an issue. Another 9% noted that pensions were either inadequate or they did not qualify for them.

Road-side businesses

Most of the roadside businesses are located in Radanovici (54%) followed by Lastva Grbaljska (15%) and Prijevor (8.3%), both towards Jaz Beach.

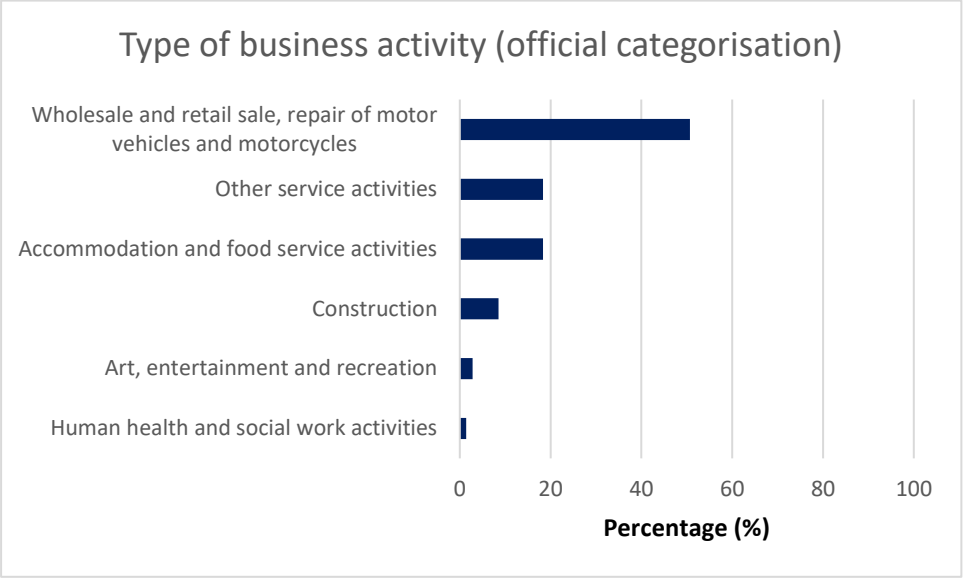
Figure 28: Example Roadside Businesses

Source: Socio-economic survey, E3 Consulting, 2020.

Using official categories the majority of businesses (50.7%) are in the category of wholesale and retail sale and repair of motor vehicles and motorcycles. The next most common categories were accommodation and food services (18.1%) and other service activities (also 18.1%). Other categories included construction, art, entertainment and recreation and human health and social work. Over 90% of businesses are seasonal. For most there is an increase during the April to October tourist season, although approximately 10% of businesses are counter cyclical and increase during the off-season. Several of these are businesses in the construction sector, where a ban operates on activity during the tourist season.

[62] Employment Agency of Montenegro, Annual report 2018.

Figure 29: Type of Business Activity

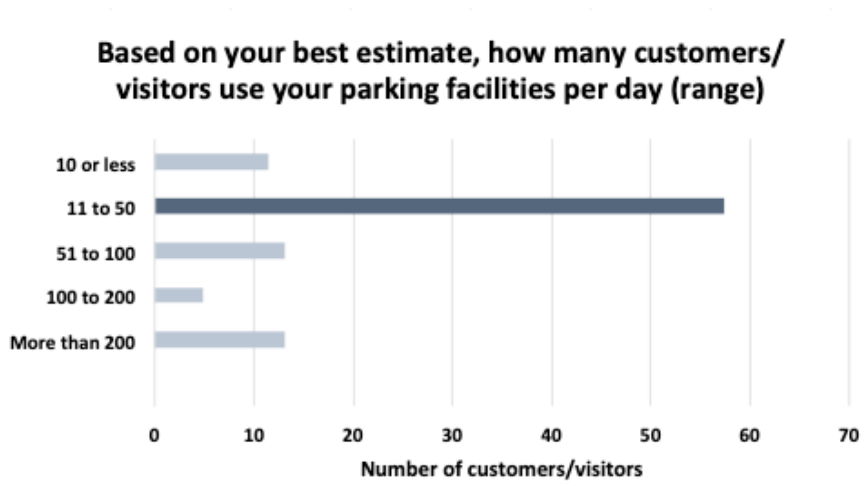


Source: Socio-economic survey, E3 Consulting, 2020.

Ninety two percent (92%) of the businesses depend on proximity to the Tivat – Jaz road for their business and 81% rated their dependency as great or very great in extent. Visibility, access to customers and suppliers and numbers of potential customers on the road were the main reasons cited for this dependency on the road.

Parking facilities were considered the most important business facilities that support their activities by 85% of businesses. Other important business structures included warehouses, business spaces, garages, sports hall, greenhouse, access road and restaurants. Ninety seven percent (97%) of business owners stated that their facilities were properly permitted. Only 10% of the businesses estimated that less than 10 customers or visitors use their parking facilities each day, 11% estimated that over 200 customers used their parking and almost 50% estimated that 11 to 50 customers park in their lots each day. Supplier access is also important with all businesses requiring access at least once a day and 58 % requiring access more than twice a day. At the higher end 12.5% of businesses required supplier access more than 10 times each day.

Figure 30: Parking Facilities Usage

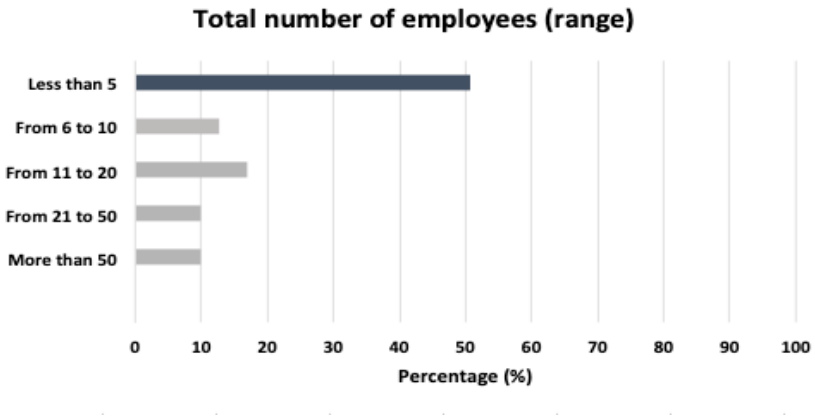


Source: Socio-economic

survey, E3 Consulting, 2020.

Most of the companies operate locally (51.4%), 33% operate nationally and almost 40% operate internationally[63]. Almost a quarter of the businesses have been in operation for over 20 years, and a fifth have operated for between 16 and 20 years. A quarter had started in the last 5 years. Over 90% of the businesses operate as limited companies. 60% of businesses operate in premises that are owned by the business, while 39% rent the business premises and 14% of owners sublet part of their business to someone else. Half of the businesses are small, employing less than 5 people, with the next most common numbers of employees being 11 to 20 (17%) and 6 to 10 (13%). Almost 20% of businesses are larger with 10% having 21 to 50 and 10% having over 50 employees. Employees are employed under a variety of different contracts, with most having fixed term (57%) and/or permanent (72%) employees. The next most common category of employment was employment of a foreigner (24%) with small numbers of people on trainee or agency contracts. 18% of businesses have some employees who live on the business premises.

Figure 31: Total Number of Employees



***Source**: Socio-economic survey, E3 Consulting, 2020.*

Land-based household livelihoods

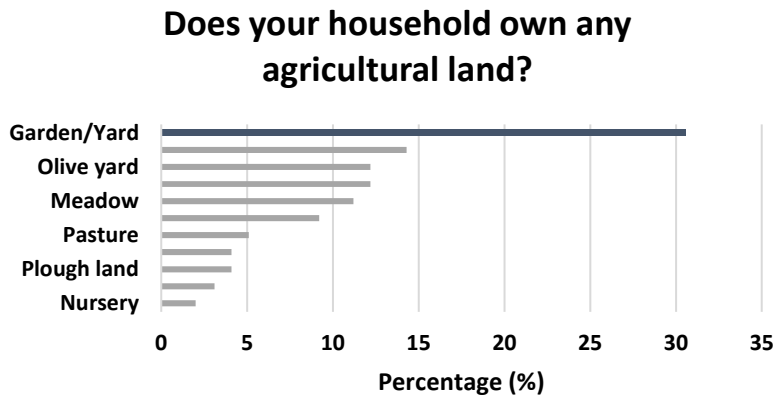
Land use

Respondents indicated that their households owned a variety of different types of land. The most common land-use types were garden / yard (30%), orchard (14%), olive yard and forest (12%) and meadow (11%). Most orchards were very small, but some included up to 500 tangerine, peach or apple trees. Orchard areas are generally located behind the house in the back yard area and so are distant from the road, protecting them from impacts. Other land uses included vineyard, pasture,

[63] Note: Possibility of providing multiple answers.

plough land, field and nursery. Almost 40% of respondents stated that their land was valuable for agriculture due to its fertility and their success in crop production, other positive land attributes included proximity to the road, and the availability of large areas of flat land. All agricultural land had been improved to enable production, including 2 cases of building stalls for animals and one case of installing irrigation.

Figure 32: Ownership of Agricultural Land

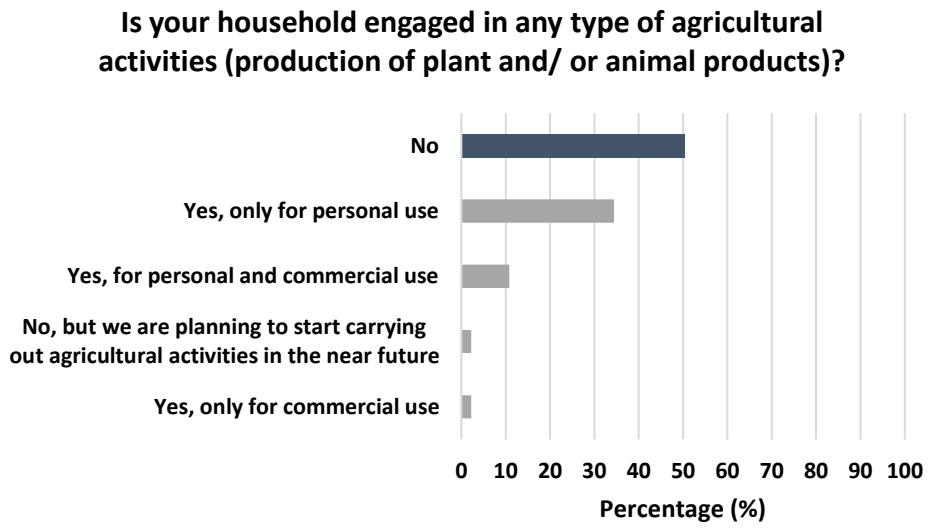


Source: Socio-economic survey, E3 Consulting, 2020.

Although only 2% of households reported carrying out agricultural activities only for commercial purposes, an additional 10% reported that they produced for both subsistence and commercial sale, while 33% reported growing food for their own use. Most of these households produced vegetables (50%) and/or fruit (47.8%), which were also the most important economic contributors to livelihood. Other livelihoods mentioned included olive production (20%), grape production and land development (both 11%), livestock breeding (9%) beekeeping (4.3%) and nurseries (2.2%). Only 7% reported being registered agricultural producers. A further 2% of households planned to carry out agricultural activities in the near future and to register as agricultural producers.

On average households had been involved in agricultural production for over 25 years, with nursery production and beekeeping relatively recent with averages of just over a decade in production. Approximately 60% of producers consumed the crops and products that they produced while 40% combined subsistence agriculture with commercial production. Grapes and livestock all produced for subsistence and commerce and nurseries were the only activity producing only for the market.

Figure 33: Agricultural Production



Source: Socio-economic survey, E3 Consulting, 2020.

Incomes from agriculture were up to 50,000 EUR (for 2 respondents) per year for vegetables and fruits in some cases though more typically incomes from agricultural production were around 1000 EUR per year. Three business clusters generating income from agriculture were identified in the survey including two beekeeping associations and one olive growers' association.

Building plots

A total of 35.7% of households state that they have building plots on their land, with approximately half having one building plot, 6% with 2 plots, 9% with 3 plots and 3% (one household) with 6 plots. 34% of households, who had a plot, provided no information on their building plots. Plots averaged almost 4700 m^2, with most being between 1000 and 3000 m^2. Most plots were permitted and were under development or in the final stages of construction, though 17% were in early construction phases. Almost half of respondents noted that their building plots had significant economic importance to them.

11.4.3 Infrastructure

Governance overview

National roads fall under the jurisdiction of the TA. The TA is responsible for inter-municipal roads (main roads), while the local and connecting roads are under the jurisdiction of the relevant municipality. Construction, maintenance, protection, use and management of municipal roads, falls under the responsibility of the municipality. Each municipality has its own local authorities which are responsible for providing municipal services, including water supply and sanitation. Healthcare provision is governed by the Ministry of Health and education by the Ministry of Education, both at the national level.

Figure 34: Sensitive Receptors in the PAA

Educational Facilities

Educational facilities in the PAA consist of one kindergarten (in Radanovici), one elementary school with two units (Radanovici and Lastva Grbaljska) and Arcadia Academy – a British International School providing education on pre-school, primary and secondary levels. The nearest higher education facilities (universities) are located in the capital city Podgorica. The education facilities closest to the M-2 road are included in

on sensitive receptors, and listed in the Table 92.

Table 92: Educational Facilities in the PAA

Institution	Settlement	Coordinates	Distance from the road (m)
Elementary school "Nikola Djurkovic" (250 pupils)	Radanovici (Kotor)	42°22'47.7''N 18°45'33.5''E	18.34
Elementary school "Nikola Djurkovic" (second unit) (70 pupils)	Lastva Grbaljska (Kotor)	42° 18' 23.729" N 18° 48' 20.145" E	75
Radanovici kindergarten	Radanovici (Kotor)	42°21'33.5"N 18°45'34.1"E	90
Arcadia Academy (138 pupils)	Ljesevici (Kotor)	42°23'17.1''N 18°44'18.9''E	171.84

Source: Socio-economic survey, E3 Consulting, 2020.

According to the survey respondents, just under half of the pupils travel to school by bus. Representatives of Arcadia Academy, during consultation meetings, noted that this was also the case at their school, whilst the other half of pupils came to school driven by the parents with no one coming by foot. A Focus Group Discussion with 7th grade pupils at Radanovici school revealed that out of the 22 pupils present, 17 are driven to school by their parents, and five come by foot (of whom one uses public transport one-way to arrive at school in the morning). An underpass located near the school to facilitate safer access has reportedly not been frequently used by pupils due to it being deemed unsafe and untidy, however efforts have been made to make it tidier and safer through the installation of lights, and clearing up of the area. The pupils also reported that there had been traffic accidents in the area, with a car once breaking through the protective fence by the underpass, and landing at the entrance of it. The pupils noted that many of them of would prefer to walk if the conditions were safer, and welcomed the idea that the Project would include a sidewalk and potentially a moving of the underpass from its current location.

Table 93: Journey to School

Travel to school	Frequency	Percent	Valid Percent
On foot	10	10.2	22.7
Car (parents, taxi)	13	13.3	29.5
Bus	20	20.4	45.5
Other (state)	1	1.0	2.3
Total	**44**	**44.9**	**100.0**
Total	**98**	**100.0**	

Source: Socio-economic survey, E3 Consulting, 2020

Figure 35: Photos of the Underpass at Radanovici Elementary School

Health Facilities

The health care system in Montenegro consists of state-run and privately-owned institutions. Data gathered during the SES studies indicate that there are two health facilities in the PAA – Polyclinic 'Hipokrat' and 'Fidami Medica', with the nearest hospital located in Kotor. According to information received from Kotor Hsopital during the SES studies, the most common reasons for registration at the hospital are: respiratory diseases, cardio-vascular diseases and trauma. On a yearly basis, the hospital receives approximately 7,000 patients, with approximately 54,000 outpatients.[64] The hospital noted that the current capacity is sufficient to meet the needs of both locals and tourists, even if the patient numbers increase significantly during the summer tourist season. The management at Polyclic 'Hipokrat', a private clinic specialising in radiological diagnostics, orthopaedics and neurology, estimated that the number of patients increases by approx. 20% during the tourist season.[65] All three facilities engaged during the SES studies emphasised the need

[64] Key Informant Interview with General Hospital Kotor, information received by email from Mirjana Ivanovic, Deputy Director on 14 February 2020.

[65] Key Informant Interview with Management of Polyclinic 'Hipokrat' on 20 February 2020.

for continued access to their facilities during the construction, and welcomed the Project as they viewed an improved road as with high expectations for less accidents, improved access overall due to less traffic jams, including less missed appointments.

Table 94: Health Facilities in the PAA

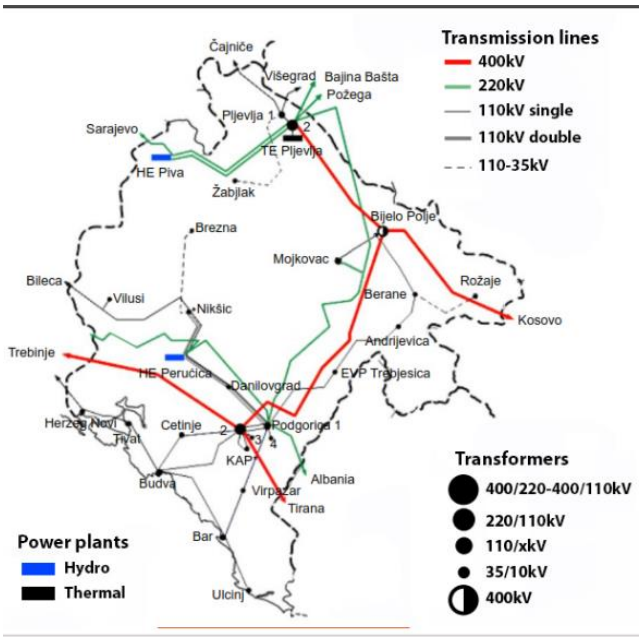
Institution	Settlement	Coordinates	Distance from the road (m)
Polyclinic "Hipokrat"	Radanovici (Kotor)	42°22'47.7"N 18°45'00.4"E	57.24
"Fidami" Medica	Radanovići (Kotor)	42°22'05.8"N 18°45'14.7"E	22.98
Kotor hospital	Skaljari (Kotor)	42°25'13.9"N 18°45'50.3"E	3,511.76
Emergency service Budva	4 Filipa Kovacevica St, Budva (Budva)	42°17'23.7"N 18°50'24.8"E	2,856.21
Emergeny service Tivat	(City centre) Tivat	42°26'01.4"N 18°41'51.8"E	2,703.17

Source: Socio-economic survey, E3 Consulting, 2020.

Public Supply Services: Power, Water and Sanitation

There are no electricity sources along the Montenegrin coast, and the electricity is supplied from the 110-kV electricity transmission network of Montenegro. The coastal area is supplied from the TS 400/110 kV Podgorica 2 (transmission lines Podgorica 2 - Bar and Podgorica 2 - Budva, Podgorica 2 - Cetinje - Budva) and by the TS 110 / x kV Trebinje (110 kV Trebinje - Herceg Novi transmission line)[66].

Figure 36: Electricity Transmission System, Montenegro



Source: Montenegrin transmission system a.d. (www.cges.me)

[66] Concept of Spatial Plan of Kotor, p.151

During the socio-economic survey, respondents were asked about their utility connections. All respondents noted that they were connected to the electricity supply, while none of the respondents were connected to a sewerage system. Table 95 presents the results of the socio-economic survey and provision of water and sanitation services in the households surveyed. A majority of the respondents (73.9%) noted that the public supply systems did not function well: that there are power outages during storms and that the power level overall is low, that water levels are low and that there is a lack of sewerage systems in the area.

Table 95: Electricity, Water Supply and Wastewater System of Surveyed Households

Connection to utility		Count	Table Valid N %
Electricity	Yes	46	100.0
	No	0	0.0
	Total	**46**	**100.0**
Water supply	Yes	29	63.0
	No	17	37.0
	Total	**46**	**100.0**
Sewerage system	Yes	0	0.0
	No	44	100.0
	Total	**44**	**100.0**

Source: Socio-economic survey, E3 Consulting, 2020.

Community Facilities

There are some sports facilities available to the local communities living in the PAA. These include a horse riding centre, an indoor sports hall and two stadiums as listed in Table 96.

Table 96: Distance of Closest Sports Facilities to the M-2 Road

Facility	Settlement	Coordinates	Distance from the road (m)
Horse riding "Budva"	Prijevor (Budva)	42°18'06.0"N 18°48'21.3"E	47.56
FC "Grbalj" Stadium	Radanovići (Kotor)	42°22'39.2"N 18°45'08.4"E	120
Stadium "Donja Sutvara"	Radanovići (Kotor)	42°22'36.3"N 18°45'07.2"E	30.69
Indoor Sports Hall "Tango"	Radanovići (Kotor)	42°22'03.0"N 18°45'18.2"E	10.20

Source: Socio-economic survey, E3 Consulting, 2020.

Road conditions

As noted above, national roads fall under the jurisdiction of the Transport Administration of Montenegro (TA). The TA is responsible for inter-municipal roads (main roads), while the local and connecting roads are under the jurisdiction of the relevant municipality. During the SES surveys, a majority of almost 60% deemed the road condition of the existing road as bad, with approximately 39% finding the road satisfactory, and only 2% deeming the road to be in good condition. Similarly, over half of the respondents (54.5%) noted that the traffic levels were bad, with only approximately 7% viewing the levels as good, and the remainder as satisfactory. Almost all respondents commented that there are more traffic jams and queues during the summer months. A vast majority (86.7%) use their own cars for transportation, while 6.7% report to be using buses. Over three-quarters (77.8%) of the survey respondents noted that they use the M-2 road on a daily basis, 11% reportedly using it weekly, and 11% using it only on a monthly basis.

11.5 Impact Assessment

This section presents the assessment of potential socio-economic impacts associated with the construction and operation of the Project. Aspects that are likely to result in significant impacts on socio-economic resources or receptors during construction and/or operation are identified, and appropriate mitigation and/or enhancement measures are listed to manage these impacts. These are then captured as Project commitments in the Project's Framework Environmental and Social Management Plan (ESMP).

11.5.1 Construction Phase Impacts

Potential Impacts on Land

All land acquisition and resettlement should be completed prior to construction and are thus permanent impacts. The Project involves widening the road from the existing two lanes to two lanes in each direction, a central reservation, sidewalks and a green belt. In addition, roundabouts and bridges will require additional land take. The additional land will be acquired from land-owners and occupiers on either side of the road. The land areas to be acquired from each land-owner have been determined in the expropriation study.

The Expropriation studies covering all 20 cadastral municipalities in Budva, Kotor and Tivat municipalities have been finalised as of March 2020. The completed Municipal Cadaster studies have identified 661 land plots to be expropriated of which 424 are owned by private people and 112 are owned by business entities. In addition, government agencies and municipalities own 125 plots. Overall the studies show a total of approximately 168875 m^2 or 16.89 hectares of land to be acquired, of which 36% is privately owned, 36% is owned by businesses and the remainder is owned by the government.

Table 97: Overview of Land to be Expropriated and Ownership Structure

Ownership status	Number of parcels	Affected area (m²)
Private individuals	366	40909
Legal entities (Private Companies)	52	6066
Government entities	87	33832
Total in Kotor Municipality	**505**	**80807**
Private individuals	15	5089
Legal entities (Private Companies)	58	50274
Government entities	19	9242
Total in Tivat Municipality	**92**	**64605**
Private individuals	43	14921
Legal entities (Private Companies)	2	3878
Government entities	19	4664
Total in Budva Municipality	**64**	**23463**
Total in all municipalities (private + business + government)	**661**	**168875**
Total in all municipalities (private + business)	**536**	**121137**

Source: *Expropriation studies for the Main Roads Reconstruction Project M-2 Tivat-Jaz Section*, 2019-2020.

Physical Resettlement

- Two (2) private houses will be physically resettled by the Project.
    - Despite this, 7% of households stated that they intended to ask the government to expropriate their entire land parcel, because the area left after land acquisition would no longer fulfil their needs and a further 13% were considering this option.
    - In an FGD in Radanovici two HH indicated that they would ask to be resettled to the opposite side of the new road onto government-owned land. This would involve physical resettlement.
    - 49% of households surveyed expected that their house would be expropriated, indicating a high level of concern that is not founded on a realistic understanding of impacts. This suggests that less HH are likely to ask for expropriation of their entire land parcel (including their house), once they have more complete information, though some additional HH may request physical resettlement.
    - It is still unclear whether any of the HH to be physically resettled will qualify as differentially impacted HH.

- No closure of businesses is currently anticipated, although 17% of business owners expected that they would have to close their business due to the Project, in relation to land acquisition.

- In most cases, moving a business would constitute economic rather than physical resettlement. However, given that 18% of businesses have employees who live at the

business, businesses that shut may also trigger physical resettlement of resident employees.

Economic Resettlement

Households

The main household livelihoods that are land or asset based are:

- Rentals for tourism, business or housing.
- Agriculture for commerce, especially vegetable growing, orchards, olives and viniculture, beekeeping and animal raising.
- Land development for construction.
- A few households also have small businesses operating from their homes.

In addition, many households supplement their diet with food that they grow in their gardens.

The overall land take from households averages around 4.6% of household assets in Kotor, so overall impacts on livelihoods are not expected to be very significant. However, the significance will depend on the % land take and the particular land uses and structures that need to be taken from each household. Because the Announcement of Public Interest had not been made at the time of the assessment, and the full details of the expropriation study were not yet published, it was not possible to ascertain the amounts of different types of land that will be acquired. Orchards are generally positioned on land away from the road, so livelihood impacts to orchards should be limited.

Businesses

No closure of businesses is currently anticipated, although 17% of business owners expected that they would have to close their business due to the road project, in relation to land acquisition. The most common concerns related to the loss of parking infrastructure by businesses and the proximity of the final road to the businesses. Additional concerns related to access to the business by customers and suppliers and also to loss of other key auxiliary infrastructure. Both business owners and business space renters will need to be involved.

Temporary Impacts

Temporary support compensates and mitigates temporary impacts from resettlement, while physical resettlement is completed and livelihoods are restored. HH may require temporary assistance if replacement housing is not ready when expropriation is completed and where livelihood restoration cannot be completed before current livelihood assets are lost. Temporary losses will include compensation and/or support while orchard crops etc. mature and while home-based livelihoods are restored. Businesses may require temporary assistance, while business

premises are reconfigured and new parking lots are developed. Businesses that will close will need tailored livelihood restoration for business owners so that they can reopen elsewhere or develop replacement livelihoods. In addition, employees may need temporary salaries while businesses are temporarily closed and live-in employees may need additional support to transition to new employment.

Transitional Impacts

Transitional support compensates and mitigates transaction costs and any additional requirements to facilitate resettlement and access, including support for the participation of differentially impacted groups. It is expected to include transaction costs linked to moving house for physically resettled HH and for purchase of replacement land and assets and permitting for economic assets. In addition, it may include support for differentially impacted groups to access meetings and hearings for people with mobility issues, assistance with legal processes for HH with literacy or language issues.

Sensitive Receptors / Differentially impacted HH

The following vulnerable groups have the potential to be impacted differentially by the Project:

- Households receiving social transfers from the government (5%)
- Female headed households (1%)
- Roma households living opposite the airport (2%)
- Households receiving pensions (33%)
- Households with > 7 members (6%)
- Households where the Head of Household did not start secondary school (25%)
- Households which are living in rented houses/apartments _(2%) or who live on family-owned land (6%)
- Households with informal housing (1%)
- Households with members who are ill or having bad health conditions (2%)

In addition, households assessed the following difficulties for participating fully in the resettlement process:

- Infirmity or poor health (2%)
- Challenges due to work obligations (6%)
- Likely to be absent during expropriation (1%)
- Previous poor experience (1%)

Households renting property, using property belonging to family members or to the state may not be included in the expropriation process and may need additional resettlement impact mitigation measures.

Overall, unmitigated land acquisition impacts will be **adverse** in nature, (see mitigation recommendations in Section 11.6).

For physically resettled HH, although the impact will occur over a small area, it will have a long-term duration so they are considered to have a **Medium** magnitude. sensitivity of the HH to be physically resettled is currently unknown will be determined during LARP asset inventory studies.

Economic resettlement impacts for businesses and HH will occur over a substantial part of the Project area and will have effects that vary from transitory to long term. They are considered to have a **Moderate** magnitude. In terms of significance, economic resettlement impacts will vary widely in significance.

For some HH they could be **positive** or **very low significance** impacts, if the land that is acquired was unused land and the affected HH will receive cash compensation for the land.

However, 17% of the businesses that took part in the SES anticipated that they would have to close their business as a result of the Project and 25% of HH in the 50 metre road corridor believed that it would be particularly difficult to maintain their current standard of living after losing the expropriated land. Many businesses were concerned about losing critical parking areas and a few HH mentioned critical livelihood resources that they believed that they would lose. Many HH will lose garden areas that are used for subsistence and 12% may lose some commercially productive agricultural land. These HH and businesses will suffer impacts ranging from **medium significance** to **very high significance** due to risks of long-term impoverishment.

Employees of affected businesses and businesses and HH renting property will be differentially impacted and without mitigation some of them would be **highly vulnerable** and potentially unable to adapt to changes created by the project.

Some poor, female-headed HH, elderly and or infirm HoH, HH with low levels of formal education, and HH who may struggle with language or literacy issues are likely to be among the economically resettled HH. These differential impacts will vary with some creating **small vulnerabilities**, while a few HH may experience multiple differences and be unable to adapt to changes creating **high vulnerabilities.**

Potential Impacts on the Local Economy and Local Employment

The jobs to be generated by the Project is not yet known, as recruitment will be undertaken by the Construction Contractor and its subcontractors, once commissioned. It is anticipated, however, that direct jobs will be available locally (through local contractors) over the 24-month construction period, with different levels of qualification required at different stages of the construction process

e.g. land clearance, earthworks, civil works (construction of bridges, culverts, drainage structures), utility and electrical installations, landscaping etc.

Indirect employment opportunities are also expected during this phase, through the provision of goods and services (construction material supplies, transportation services, catering, cleaning, security, etc.). The International Finance Corporation (IFC) (2015) reports from a number of sources that the employment multiplier (number of direct, indirect and induced jobs for each direct job created) for infrastructure projects often exceeds two.[67] Those who secure jobs will have access to regular income during their employment and the opportunity to develop new skills.

At the end of the construction phase there will be a significant reduction in the workforce, but it is expected that terms of employment (including length of contract) will be clearly communicated to Project workers to carefully manage this. The skills base in the project affected area is high and the local population is mostly employed or retired. However, approximately 8% of those surveyed during the SES studies stated they were unemployed, and jobs (direct or indirect) generated by the Project during the construction phase will therefore provide additional opportunities to local communities for employment, income, skills enhancement and work experience. The presence of a construction workforce and demand for local goods and services will also boost the local economy. This is a **positive** impact of the Project.

Potential Impacts on Local Communities from an Influx of Workers

Influx of construction workers and opportunists seeking economic opportunities may lead to demographic change and reduce social cohesion in the PAA. There may also be tension if those living in the PAA do not feel like that there has been an appropriate level of local recruitment. Whilst the Project will have targets for local hiring, it is expected that most of the workforce will be employed from outside of the PAA. Considering the relatively close proximity to the capital city Podgorica, the Construction Contractor and its subcontractors are expected to have well-established workforces available for this work. It is likely there will be gender imbalance as male workers are predominantly engaged in civil construction work. This has the potential for increased grievances and tension within communities. There is also the potential for harassment of residents, particularly women, if construction workers do not behave appropriately.

There is also the potential for increased pressure on local infrastructure, community facilities and health services if these aspects are not well managed by the Contractor. There are, however, no plans to erect temporary or longer-term worker accommodation for the Project. Workers are mainly expected to be accommodated in hotels and guesthouses in the PAA and vicinity, with buses

[67] Pfeifenberger, et al. (2010); Labovitz School (2010); IFC (2012); CH2MHILL (2009); Estache et al.; Atkinson et al (2009); Bekhet, H.A. (2011) cited in IFC: http://www.ifc.org/wps/wcm/connect/83affa004f7ce00bb812fe0098cb14b9/chapter6.pdf?MOD=AJPERES

in place to transport workers to site.

The Contractor will be guided by:

- The World Bank Guidance Notes on 'Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labour Influx', 2016.
- The World Bank Good Practice Note on 'Addressing Gender Based Violence in Investment Project Financing Involving Major Civil Works', 2018.
- The International Finance Cooperation Good Practice Note on 'Managing Contractors Environmental and Social Performance', 2017.

The effect is adverse in nature. The sensitivity of receptors is overall assessed as low due to the already relatively busy location of the Project with plenty of thoroughfare by visitors to the area; retired or more elderly people living in the PAA may be more sensitive to the impacts, as they are more likely to be home during the day when construction is underway. The magnitude of the impact is rated as small – the impact is local, short-term and affects a small proportion of households. Without any controls, there is a low-medium likelihood of occurrence. This results in a significance level of **low** to **medium** during construction, prior to the application of any mitigation or management measures.

Potential Impacts on Local Communities' Health and Safety from Increased Traffic

Construction related traffic increases will increase the risk of traffic accidents and injury. Further details are included in the traffic section (6) of this report. There may also be disturbance to local communities through the generation of construction noise, dust and air quality impacts. Further details are provided in the noise (7) and air quality (8) sections of this report.

Potential Impacts on Accessibility and Connectivity

The expansion of the M-2 road will result in temporary disruption to road users over the 24-month construction period. Unmitigated construction of additional lanes, junctions, underpasses, roundabouts and bridges, will also result in temporary reduced access around the works (e.g. to driveways or side roads). Effects will include extended travel times and subsequent impacts on livelihoods, if not well managed. The current plan is pause construction during the busiest times of the year, namely the summer tourist season, with no construction slated for the time period 15 June – 15 September. Furthermore, information given by the TA indicates that construction in the populated areas should finish daily by 19:00h, but can continue throughout the night in locations where there are no residents. Those people living in the three settlements closest to the road will likely have reduced accessibility and connectivity during the construction works. Local businesses may also be impacted by the potential congestion caused, with potential delays in supplies and reduced access for suppliers and clients. Disruption to the existing lanes will be minimised as far as possible; construction will be undertaken adjacent to the existing road/bridges, before transferring

traffic across to the newly constructed lanes whilst the existing road is upgraded. There are also not expected to be any disruptions to utilities provision, including water and electricity supply.[68] It will important for them to remain operational throughout the construction period.

This effect is adverse in nature. The magnitude is considered **low** as the impact is reversible, localised and short-term during the construction period. The sensitivity of local receptors is considered **low**, as there are alternative route options available and no known receptors that would be unable to adapt to these road changes during the construction period. This results in a significance level of **low** to **medium**, prior to the application of any mitigation or management measures.

Potential Impacts Associated with Occupational Health and Safety

Construction activities associated with the Project have the potential to put the workforce (including contractors and subcontractors) at risk of exposure to health and safety risks. These include working at height, manual handling, vehicles and driving, contact with hazardous materials, and noise and vibration exposure, amongst others. In the absence of adherence to appropriate standards, the health and safety of workers would not be adequately protected. Impacts could be of major significance with the potential for injury or fatalities. The effect is adverse in nature. The magnitude of this impact is assessed as **medium** to **large** due to the likelihood of accidents on large construction sites, and the potential severity of any incidents. The vulnerability of workers is assessed as **low** as the workforce is likely to be well-established and appropriately skilled for the work. This results in a significance level of **medium** to **high**, prior to the application of any mitigation or management measures.

11.5.2 Operational Phase Impacts

Potential Impacts on Land

Operational Phase impacts on land will be ongoing impacts from the construction phase and they are addressed under Construction Phase impacts.

Potential Impacts on the Local Economy and Local Employment

Employment through direct jobs during the operation phase of the Project will be minimal, mainly related to maintenance activities. Indirect job creation is however expected as a result of increased

[68] As per discussions with TA and experience on other similar road upgrades.

road capacity and improved connectivity, with increased demand for services such as food and fuel provision. Additionally, investment in facilities related to tourism is expected to increase following the end of the construction phase: the Touristic organisations of Budva, Kotor and Tivat all noted that the main negative feedback given by tourists to the area related to the road conditions including traffic jams, and thus improved road conditions are expected to increase tourism investments and tourism numbers even further. Jobs secured during the operational phase will offer longer-term employment opportunities and income generation. As during the construction phase, this is a **positive** impact of the Project.

Potential Impacts on Local Communities' Health and Safety from Increased Traffic

As elaborated under Traffic impacts, studies indicate that traffic volumes are expected to grow at a rate of around 4% per annum over the next 15 years. These studies show estimated monthly traffic numbers doubling over that time from around 383k (winter) - 754k (summer) in 2019 to 691k to 1.36M in 2034. Whilst traffic loads will increase, the provision of roundabouts, additional lanes and road surface upgrades, and a central reservation will improve road conditions and safety for road users. Pedestrian crossings have also been planned into the design so that there are designated crossing points where vehicles are required to give way to pedestrians, to improve safety. Nonetheless, this effect is adverse in nature. Considering the potential severity and irreversibility of traffic-related accidents, the magnitude of this impact is considered **large.** The sensitivity of local receptors is assessed as **medium**, due to the proximity of Radanovici school, and the relatively high number of retired residents along the route. This results in a significance level of **high**, prior to the application of any mitigation or management measures.

Potential Impacts on Accessibility and Connectivity

The expansion of the road is expected to result in improved connectivity for the transport of goods, services and people in the region, during operation. Travel times will be significantly reduced, and public transport links improved through the addition of new bus stops. The road improvements will facilitate better access to medical and educational infrastructure, with safer and faster access. However, there are concerns amongst some residents and businesses in the PAA regarding increased travel times due to the location of round-abouts, and loss of turning opportunities due to the upgrading of the road and introduction of the central reservation.

11.6 Proposed Mitigation

11.6.1 Construction Phase

Potential Impacts on Land

A Land Acquisition and Resettlement Framework (LARF) has been prepared to guide the development of a comprehensive EBRD compliant Land Acquisition and Resettlement Plan (LARP). following the Announcement of Public Interest, and communication of the cut-off date. Implementation of this Plan aims to mitigate all of the land acquisition and involuntary resettlement impacts of the Project. The overarching aim is that, at minimum, standards of living and livelihoods are maintained in a sustainable manner, as a result of Project implementation. Key aspects of an EBRD-compliant LARP that ensure that standards of living and livelihoods are maintained include:

- Compensation for all assets will be at replacement cost, including consideration of all improvements and the characteristics of the land and assets;
- Compensation will be provided for both formally owned or occupied and informally occupied and used assets;
- Livelihoods and businesses will be restored to pre-Project levels through targeted compensation and support programs;
- Physically resettled HH will be provided with either replacement housing or compensation adequate to acquire an analogous property with secure title;
- Compensation will include temporary assistance while housing and livelihoods are restored and transitional assistance to pay for transaction costs and moving expenses;
- Compensation and support will address differential impacts experienced by specific groups, e.g. poorer HH, HH with low levels of formal education or language issues, HH with mobility issues etc.

- Engagement processes will be implemented to disclose EBRD resettlement principles, entitlements and affected HH and business will participate in the development of acceptable compensation and support measures to mitigate resettlement impacts;

- An accessible and effective grievance process will be disclosed and will be available to all affected HH and businesses;

- Resettlement inputs, outputs, and outcomes will be monitored throughout the Project and an external evaluation will identify any outstanding non-compliance once the resettlement is complete. The evaluation will lead to an action plan to close any remaining non-compliances in the resettlement.

Potential Impacts on the Local Economy and Local Employment

While the employment-related measures will be the responsibility of the Construction Contractor, the Project commits to implementing the following measures to ensure that the overall impact of the Project on the local economy and local employment will remain positive.

- The Project will implement a Human Resources (HR) Policy, outlining the Project's commitment to working conditions and good management of relationships with the workers, referencing non-discrimination and equal opportunity, prevention of child labour, and prevention of forced labour, in accordance with EBRD Performance Requirement (PR) 2 on Labour and Working Conditions.
- The Project commits to ensuring competitive and fair remuneration. Terms of employment and working conditions will be clearly communicated to employees, including length of contracts, hours of work, overtime, wages and benefits, compensation, breaks, and provisions for leave.
- The Project's HR policy will have clear details about workers' contract periods so that they (particularly construction workers) can prepare appropriately for termination of their employment. Contracts will clearly detail workers' rights and contain information on how to access the grievance response mechanism.
- The Project will take commercially reasonable measures to ensure that contractors are reputable enterprises, with management systems in place to ensure they operate in line with the Project's HR Policy.
- The Project will develop a Labour and Working Conditions Management Plan which will include the contractor's local content policy, local procurement and hiring policies, including requirements and targets around the hiring of workers from within the local area to the extent possible. Requirements to seek opportunities to source goods and services from local businesses will also be detailed under the policy.
- Local communities will be kept informed of upcoming recruitment for the Project, and this will also be captured in the Project's Stakeholder Engagement Plan (SEP).

Potential Impacts on Local Communities from an Influx of Workers

- A Code of Conduct, training and a disciplinary procedure for workers will be implemented, governing their behaviour and interactions with local communities.
- The Project's Grievance Response Mechanism will ensure the Project is aware of any complaints, so that appropriate mitigation and management measures can be put in place, as necessary.
- The Project will implement a local content policy and hiring process to maximise local employment.
- The Construction Contractor will ensure all relevant permits are in place for water and power supply, to ensure there is no interruption to local supplies.
- The Construction Contractor will undertake an assessment of local health care facilities (in coordination with the relevant health authorities), to ensure no exceedances in capacity, and develop a plan for their use in the event of an accident/emergency. These details will be captured in the Project's Emergency Preparedness and Response Plan (EPRP).

Potential Impacts on Local Communities' Health and Safety from Increased Traffic

- The Project will implement a Construction Traffic Management Plan (TMP). The Plan will cover vehicle safety, signalling, driver and passenger behaviour, hours of operation and accident reporting and investigation etc. All drivers will be trained, and strict speed limits will be enforced.
- Local stakeholders will also be engaged to discuss road safety and incident reporting. This will be particularly important for any school children in Radanovici or Lastva Grbaljska using the buses or walking on the road to reach school. Details will be contained in the Project's Stakeholder Engagement Plan (SEP).
- The Project's Grievance Response Mechanism will capture any concerns or complaints about construction-related traffic.
- An Emergency Preparedness and Response Plan (EPRP) will be in place for the Project, prior to construction. This will include measures and procedures to manage any traffic and transport related emergencies. Appropriate details will be shared and discussed with local communities and local service providers, as appropriate.
- The Project will ensure that there is adequate provision for road crossings close to bus stops for the safety of bus users, particularly school children.
- The Project will implement a programme of awareness raising with the local community, especially schools. Details will be captured in the Project's SEP, once the most appropriate method(s) has been defined.

Potential Impacts on Accessibility and Connectivity

- The TA will be required to ensure contractors will develop and implement a Construction Traffic Management Plan (CTMP) in line with the framework ESMP developed for the project, providing a clear plan for traffic movements during each stage of construction. Routes for

construction vehicles will be carefully planned to minimise disruption to local residents and any damage to local roads (further impacting connectivity). The movement of construction vehicles on local roads will be minimised. All necessary detours for road users will also be carefully planned and detailed in the CTMP.

- All drivers will be trained on the details of the CTMP, which will include specified routes, working hours and speed limits, etc.
- Relevant details of the CTMP will be shared with local stakeholders, the process of which will be detailed in the Project's Stakeholder Engagement Plan (SEP). This will include advance details of construction works, and any road closures/diversions etc. Notices will be erected in local towns and posted on the TA's website, so that road users can plan their travel appropriately.
- Grievances will be carefully monitored, and where necessary, additional traffic management measures implemented in response to issues raised by stakeholders.

Potential Impacts on Associated with Occupational Health and Safety

- The Project will comply with all national labour, social and occupational health and safety laws, as well as the requirements of EBRD PR2 on Labour and Working Conditions. The contractor will prepare a Labour Management Plan to action this. Emphasis will also be placed on measures to ensure that workers are free of any discrimination, regardless of race, religion or belief, gender, disability, age, nationality, sexual orientation or ethnicity.
- The Construction Contractor will prepare and implement an Occupational Health and Safety (OHS) Plan for the works, based on the identification of key hazards, and ensure appropriate emergency preparedness and response planning.
- There will be clear OHS terms and conditions in subcontractor and worker contracts, and regular audits will be undertaken of all construction sites to verify the effectiveness of prevention and control strategies.
- All workers will be appropriately trained, and provided with appropriate personal protective equipment (PPE) for their job.
- A formal workers' Grievance Response Mechanism will be established for workers to raise any concerns for resolution.

11.6.2 Operational Phase

Potential Impacts on Land

Operational Phase impacts on land will be ongoing impacts from the construction phase and they are addressed under Construction Phase impacts and mitigation measures. The operational road is not expected to have any additional impacts.

Potential Impacts on the Local Economy and Local Employment

Please see enhancement measures detailed for the Construction phase.

Potential Impacts on Local Communities' Health and Safety from Increased Traffic

- In the design, the Project will ensure that there is adequate provision for road crossings close to bus stops for the safety of bus users, particularly school children, and signalling and speed limits in the most populated areas, including the vicinity of schools.
- The Project will implement an awareness-raising programme with the local community, especially the Radanovici school. Details will be captured in the Project's SEP, once the most appropriate method(s) has been defined.

Potential Impacts on Accessibility and Connectivity

- The Project will continue to engage with local communities, businesses and other key road users to ensure that the design is appropriately tailored to maximise accessibility for local and regional stakeholders. This will include consultation regarding the appropriateness of crossing point locations to maximise safety of pedestrians wishing to cross the road. Specific attention will be given to school children in Radanovici to ensure safe access. This will be captured in the Project's SEP.

11.7 Residual Impacts

11.7.1 Residual Construction Phase Impacts

The following residual impacts are expected associated with construction:

Impact	Residual Significance
Land	Following implementation of the LARP, including the external end-evaluation of LARP implementation and the implementation of any remedial actions to close gaps the impacts of Land Acquisition **should be at minimum neutral.** Realistically they will probably range from **mildly positive** to **minor negative impacts**.
Local Economy & Employment	Following effective implementation of the prescribed enhancement measures (under the mitigation measures section), the overall impact on the local economy and local employment is considered to be **positive,** but it is difficult to quantify this at present.
Local Communities (Worker Influx)	Following effective implementation of the prescribed mitigation measures, the impacts on local communities from an influx of workers are assessed as **low** during construction and therefore **not significant**.
Local Communities' (Health and Safety from Increased Traffic)	Considering the severity of impacts associated with accidents, and the mitigation measures to be put in place, the significance of this impact following mitigation is assessed as **medium** to **high** during construction and therefore **significant**.
Accessibility and Connectivity	Following effective implementation of the prescribed mitigation measures, the impact on access and connectivity is assessed as **low** and therefore **not significant**.
Occupational Health and Safety	Following effective implementation of the prescribed mitigation measures, the impacts associated with occupational health and safety of workers are assessed as **low** to **medium** and therefore **not significant**.

Residual Operational Phase Impacts

The following residual impacts are expected associated with operation:

Impact	Residual Significance
Land	While most land acquisition impacts will occur in construction phase, LARP implementation, external evaluation and (if required) remedial actions to close gaps identified during the evaluation will continue during the Operational Phase. Following implementation of the LARP, including the external end-evaluation of LARP implementation and the implementation of any remedial actions to close gaps the impacts of Land Acquisition **should be at minimum neutral.** Realistically they will probably range from **mildly positive** to **minor negative impacts**.
Local Economy & Employment	Following effective implementation of the prescribed enhancement measures (under the mitigation measures section), the overall impact on the local economy and local employment is considered to be **positive,** but it is difficult to quantify this at present.
Communities' Health and Safety (Increased Traffic)	Considering the severity of impacts associated with accidents, and the mitigation measures to be put in place, the significance of this impact following mitigation is assessed as **medium** during operation (**not significant**).
Accessibility and Connectivity	Following effective implementation of the prescribed enhancement measures (under the mitigation measures), the impact on accessibility and connectivity is **positive**.

11.8 Project Commitments

To summarise, the implementation of all of the above listed mitigation (and enhancement) measures constitute the following list of 'Project Commitments' which should be accepted:

- Identify and hire a qualified TA social manager to guide PR compliant consultation, disclosure, data collection, impact identification, design of entitlements, implementation of resettlement plan, monitoring and grievance management.
- Implementation of the Land Acquisition and Resettlement Action Plan
- Continuous Stakeholder Engagement as per the Project's Stakeholder Engagement Plan, including the Grievance Mechanism
- Ensuring that the Construction Contractor implements a Labour and Working Conditions Management Plan, including a Human Resources Policy
- Ensuring that the Construction Contractor implements a Construction Traffic Management Plan
- Development of an Emergency Preparedness and Response Plan

These policies and their contents are further detailed in the Project's F-ESMP.

11.9 Cultural Heritage

There are two churches in the PAA, as identified during the SES studies as shown in the table below.

Table 98: Distance of Closest Cultural Resources (churches) to the M-2 Road

Church	Settlement	Coordinates	Distance from the road (m)
Podlastva Monastery – "Rođenje presvete Bogorodice"	Prijevor (Budva)	42°18'25.0"N 18°48'28.7"E	257.72
Church "Sveta gospođa"	Radanovići (Kotor)	42°21'34.4"N 18°45'25.3"E	267.22

Source: Socio-economic survey, E3 Consulting, 2020.

Consultation with regional administrative authorities (Municipality Kotor) has confirmed that the project will not impact upon these or any areas or assets of known cultural heritage. However, and in accordance with the requirements of the Law on Protection of Cultural Properties ("Official Gazette of Montenegro", No. 49/10 and 044/17) and EBRD Performance Requirement 8, a Chance Finds Procedure will be developed prior to construction that will outline the process for managing any cultural heritage that is encountered unexpectedly during the construction process (including notifying relevant competent bodies and securing the area to avoid further disturbance or destruction until an assessment has been completed by a qualified specialist).

12 Cumulative effects

12.1 Introduction

Cumulative effects can be defined as those effects that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the proposed project itself and synergistic effects (in-combination) that arise from the reaction between the effects of a proposed project on different aspects of the environment. Two broad categories of cumulative effect have therefore been identified for the purposes of this assessment:

- Those that result from the combination of individual effects on a particular receptor e.g. noise, dust and traffic (sometimes referred to as intra-project effects).

- Those resulting from the combination of several proposed developments, which may be insignificant when considered on their own but combine to have a significant impact on a particular receptor (sometimes referred to as inter-project effects).

Inter-project effects are considered in the individual topic chapters where relevant.

12.2 Approach

Formal requests were submitted to the three Municipalities of Budva, Kotor and Tivat to obtain information on proposed schemes in their areas. Schemes or proposals identified by the municipalities were then reviewed to determine whether they could have the potential for cumulative effects with the Project. To date limited information has been provided on proposed developments in the area. Two key projects have been identified however, namely the proposed expansion of Tivat Airport and the Regional Water Supply Upgrade. Given the potential significance of these developments, they are discussed in some detail below.

12.3 Potential Sources of Cumulative Impact

Tivat Airport Expansion Project

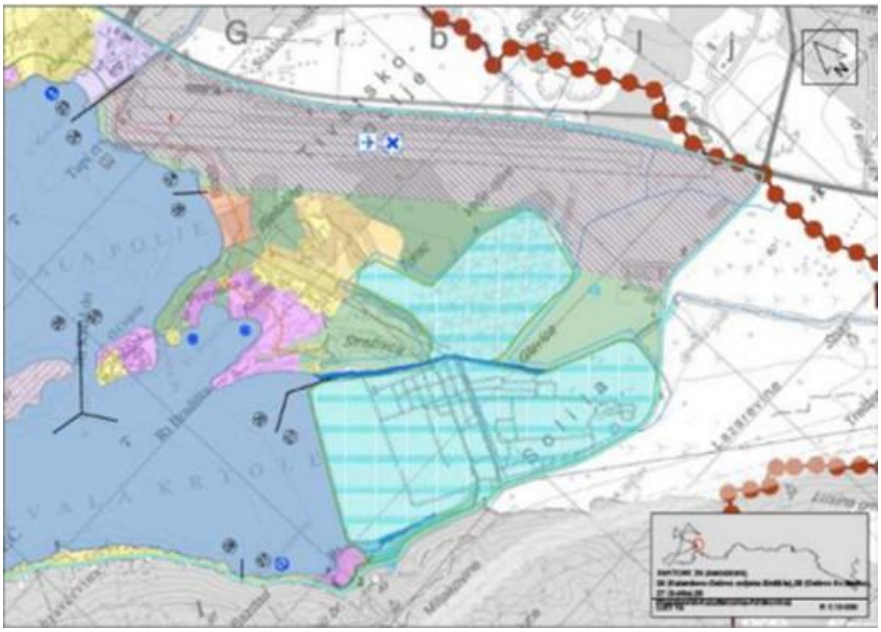
Tivat Airport, which is located to the northern end of the proposed Project, is the busier of the two international airports in Montenegro and traffic at the airport follows the highly seasonal nature of the tourism industry in coastal Montenegro, with 75% of the total volume of passengers being handled during the peak season (May – September). It has been one of the fastest growing airports in the region, doubling passenger flow between 2006–2016 and generally seeing around 10% growth in passengers p.a to 1,367,282 in 2019, and ~4 % in flights, up to 7,049 flights. Future air traffic at Montenegro airports is expected to increase in-line with economic growth in source markets both in Eastern and Western Europe as well as in Russia. However, airfield constraints at Tivat Airport are expected to limit its traffic, with some of the overflow being gained by Podgorica. Annual passenger volumes through Tivat Airport are predicted to increase

to approximately 2,000,000 by 2025 and 3,000,000 by 2047.

The Coastal Area Special-Purpose Spatial Plan (CASPSP)[69] sets out the requirements for expansion at Tivat Airport and a Bid Commission was formed in July 2019 by the Ministry of Transport and Maritime Affairs to begin the process of selecting a private partner for the expansion. In October 2019 the Ministry issued a Public Announcement for the submission of applications for pre-qualification for the award of a 30-year concession for the expansion and operation of the Airports of Montenegro (Tivat Airport and Podgorica Airport). The pre-qualification phase was planned to last 45 days, with financial close in Q3 2020.

The total area to be developed at the airport is around 174 hectares with the expansion focussed on the west and south of the existing infrastructure as shown in **Error! Reference source not found.**8 below. Plans over the first three years include the relocation of the existing road to Ostrvo cvijeća, which lies to the north west of the airport, and its construction at a new location envisaged by the State Location Study, as an urban road with protective screens toward the runway.

Figure 37: Proposed Expansion of Tivat Airport



Access to the airport is directly off the existing Tivat – Jaz road (project road) and consists of an initial section of 2 lanes – 2 ways road followed by a one way-circular road. Airport expansion at Tivat Airport will result in significant impacts to the Vodoljeznica watercourse which currently runs past the south east tip of the airport runway and under the project road at Km 13.4 (see Section 8

[69] Official document ref 56/18

for more detail on watercourses). Construction activities for the airport expansion are planned directly over the watercourse.

Studies at Amsterdam's Schiphol airport[10] found that the airport contributes less than 5% to ambient concentrations of NO_x and PM_{10}. Furthermore, UK data indicate that airports contribute 1% of UK NO_x emissions and 0.1% of UK PM_{10} emissions compared with some 32% of NO_x and 11% of PM_{10} emissions for road transport. UK guidance[11] further states that there is no need to consider PM_{10} in relation to airports and that there is only a need to consider NO_x where there are more than 10 million passengers / year.

Regional water supply systems expansion project

The Regional Water Supply Systems Expansion Project is planned by the Regional Water Supply Company (RWSC) of Montenegro, which owns and operates the Regional Water Supply System (RWSS) delivering bulk water to the coastal towns and settlements. The expansion consists of three sub-components, one of which is relevant to the Project: Sub-component 2 - laying a duplicate strategic water main between Jaz and Tivat at a length of 16 km, including a smaller connection to a reservoir / surge station. A Construction Permit for the pipeline was issued to the Regional Water Supply Company (RWSC) in August 2017. Most of the pipeline will follow the Project route and the designs of the pipeline and the Project have been coordinated so that the pipeline will be laid in the pavement. Approximately 2 km of the pipeline route, the southern section from Prijevor to Lastva Grbaljska, does not follow the Project alignment. Construction is due to commence in December 2020 and take four months and may coincide with the initial phases of construction of the Project.

Other proposed developments within the Municipalities of Kotor and Tivat

Within the Municipality of Kotor there are a number of tourism projects planned including Bigova Bay Resort, which is permitted, but some distance away from the Project and proposals for an Ethno village in Grblaj, which is outside the PAA, and which is not identified in the Spatial Plan and has no permit. A hotel is currently under construction near the Department Store "Zecanka", which is within the PAA. There are also proposals for an extension to Kotor itself, which again is not identified in the Spatial Plan and has no permit.

Within the Municipality of Tivat, works are currently ongoing with respect to the upgrade to the Tivat Boulevard. Three roundabouts are currently under construction; the locations of the roundabouts have been developed in accordance with the alignment of the water supply upgrade project and construction will be complete this Spring, i.e. before any enabling works commence in relation to the Project with the construction of the Boulevard itself. Works are also planned to the approximately 15km long local access road running between Lastva Grbaljska and Stara Fortica.

A new sports centre is planned adjacent to the Project in Zupa, although the timescale for completion is unknown.

12.4 Cumulative Impact Assessment

The ESIA process has identified a number of residual effects that are expected to remain during the construction and operation of the proposed Project. Several effects on one receptor could theoretically combine or interact to result in an effect of higher significance. This section reviews these residual effects against the receptors / receptor groups that they affect. Where a receptor is affected by more than one impact, the potential for a cumulative effect is considered. Only impacts of moderate / medium significance or greater (whether adverse or beneficial) have been included; negligible or low impacts have been excluded as by definition they will have an imperceptible effect.

Error! Reference source not found. below identifies key receptors / receptor groups and the r esidual effects which may affect those groups once the Project is complete. Residual effects are described according to the individual assessment topic headings for ease of cross-reference. Where there is more than one impact on a particular receptor group, the potential for cumulative effects to occur has been considered.

Table 99: Identification of potential cumulative impacts

Receptor group	Residual effects	Potential for cumulative effect
Local residents / communities	**Water resources**: Potential moderate adverse effect on flood risk **Traffic and transport**: Moderate adverse effect on connectivity and access; Significant beneficial effect on journey times during operation; Moderate beneficial effect on road safety during operation; Traffic and transport: Moderate adverse effect on road safety during construction	Yes
Tourists	**Traffic and transport:** Significant beneficial effect on journey times; Moderate beneficial effect on road safety during operation	No
Habitats / species / designated sites	**Biodiversity:** Moderate adverse effect on loss of habitat supporting PBF; Moderate adverse effect on loss of aquatic habitats during construction; Moderate adverse effect on animal – vehicle collisions	Yes

The potential for intra-project cumulative effects for each of the receptor groups identified in **Error! R eference source not found.** is considered in turn below for the receptors where at least one residual effect has been identified.

- Local residents / communities: The majority of the residual effects of moderate or greater significance on local residents / communities have been identified in the traffic and transport assessment, with a single effect arising out of water resources. The effects of flooding could adversely affect connectivity and access, journey times and road safety and therefore it is considered that there is a potential for a cumulative effect to occur.
- Tourists: The identified positive residual effects on tourists are not considered to result in any cumulative effect that would change the identified significance level; all the residual impacts have been identified in the traffic and transport assessment and there are therefore no intra-project effects.
- Habitats / species / designated sites: The identified residual impacts of moderate significance are not considered to result in a cumulative effect that would change the identified significance;

all the residual impacts have been identified in the biodiversity assessment and there are therefore no intra-project effects.

12.5 Inter-project effects

Inter-project effects have been considered in the individual topic chapters where relevant and the findings are summarised in this section for each of the topics assessed.

12.5.1 Air quality

The air quality assessment takes into account current background levels in the area when considering the impact of the Project and assumes annual compounded growth in traffic flows, which will therefore accommodate other developments. The only known but unimplemented or reasonably foreseeable plan / project, which could affect air quality in the long term is the Tivat Aiport expansion; the current size of the airport and the magnitude of development proposed means that the airport expansion can be discounted from consideration for the reasons set out in section 8.

12.5.2 Noise and vibration

The noise assessment is based on existing noise levels in the vicinity of identified sensitive receptors and therefore includes consideration of other existing developments and projects and ongoing activities. Future levels are predicted on the basis of annual compounded growth in traffic flows which will therefore include other developments.

12.5.3 Traffic and transport

The assessment considers impacts on all road users and the local road network. Future levels are predicted on the basis of annual compounded growth in traffic flows which will therefore include other developments; the assessment demonstrates that the proposed design is appropriate for the flows predicted.

12.5.4 Biodiversity

Cumulative impacts have been incorporated into the biodiversity impact assessment where relevant e.g. In the consideration of the potential effects on bats. The upgrade to the Tivat Airport could potentially impact aquatic biodiversity features in the northern end of the PAA although there is no information publicly available at the time of writing. However, the implementation of the mitigation measures specified in the water resource chapter for the project and the fact that the project road is upstream to the airport mean that potential impacts to aquatic habitats and species supported by aquatic habitats will be largely mitigated and no significant cumulative effects will result.

12.5.5 Water resources

The proposed expansion to Tivat Airport has the potential to significantly impact water resources in the area due to run-off of wastewater and contaminated water from operational procedures, spillage of de-icing agents, maintenance and painting chemicals and spillage from refuelling and storage. There is no available public information however to plans for the airport available at the time of writing. Provided that the drainage design for the Project is appropriately designed and maintained, there should be a negligible effect on the existing baseline in terms of water quality and flows upstream of the airport and therefore no significant cumulative effects will result.

12.5.6 Social

The cumulative impact of upgrading the water supply pipeline in conjunction with the road construction is positive, and would cause less disruption to the local residents than if not done simultaneously. It is recommended that the road construction be done prior to the proposed expansion of Tivat Airport, to avoid causing further traffic pressure on the area. The cumulative impact of the proposed Tivat Airport expansion and improved road infrastructure may hasten land price increases in the area, which will be an advantage to households and businesses who own land, however a disadvantage to those who would wish to purchase more land in the area. The cumulative impact in terms of worker influx into the area is not likely to be significant, given the availability of accommodation in the area (assuming all construction is done off-season as planned).

Mitigation measures

A potential cumulative effect has been identified whereby flooding could adversely affect connectivity and access, journey times and road safety. The ESAP includes for a further review of the measures proposed for mitigation of flood risk, both due to the increased impermeable surface area of the widened road as well as climate change effects, has not been provided at the time of writing. A precautionary approach has therefore been taken and a moderate residual impact for flood risk has been assumed. The requirement for a technical review / design audit of the drainage design, prior to the appointment of a contractor, has been specified in the ESAP; this review / audit will enable changed to be made to the design to reduce flood risk if necessary and so it is not considered that any additional mitigation measures are required.

12.6 Residual effects and conclusions

Whilst some receptor groups may be subject to more than one effect, the nature of these effects is such that in combination or cumulative effects will not generally occur. The exception is the risk of flooding, which could adversely affect journey times, safety, connectivity and access. Further review of the drainage design will help avoid any potential cumulative adverse effects prior to construction commencing .Where there is the potential for a cumulative effect between different aspects, the topic-specific assessments have already taken this potential into account. No additional cumulative effects have been identified that need to be considered.

Appendices

The appendices to this ESIA are available and disclosed in separate documents. The full list of accompanying appendices to this ESIA are as follows:

Annex A: Social

Appendix 1: Socio-economic surveys
- Appendix 1.1: Socio-economic surveys: businesses
- Appendix 1.2: Socio-economic surveys: households

Annex B: Environmental

Appendix 2: Noise
- Appendix 2.1: Noise monitoring methodology

Appendix 3: Air
- Appendix 3.1: Air quality monitoring methodology
- Appendix 3.2: Air quality monitoring locations
- Appendix 3.3: Air quality monitoring executive summary
- Appendix 3.4: Air quality monitoring results

Appendix 4: Water
- Appendix 4.1: Water quality assessment methodology
- Appendix 4.2: Water quality monitoring results

Appendix 5: Biodiversity
- Appendix 5.1: Habitat mapping and fauna survey methodology
- Appendix 5.2: Habitat map
- Appendix 5.3: Critical habitat assessment