Environmental and Social Management Plan

Construction of Motorway on Corridor Vc, section Tunnel Prenj

Public Company Motorways of the Federation of Bosnia and Herzegovina

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List of Abbreviations

° ' "	degrees - minutes - seconds
°C	degrees Celsius
%	percent
AESR	Annual Environmental and Social Report
B&H	Bosnia and Herzegovina
BAS	Bosnia and Herzegovina standard
BMP	Biodiversity Management Plan
Cd	cadmium
CEN	European Committee for Standardization
CESMP	Construction Environmental and Social Management Plan
cm	centimetre
CO	carbon monoxide
Co	cobalt
Cr	chromium
CSOP	Construction Site Organisation Plan
Cu	copper
d.d.	dioničko društvo Joint Stock Company
d.o.o.	društvo sa ograničenom odgovornošću Limited Liability Company
dB(A)	decibel with A frequency weighting
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPA	United States Environmental Protection Agency
EPRP	Emergency Preparedness and Response Plan
ES	environmental and social
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
EU	European Union
EUNIS	European Nature Information System
FEMP	Fire and Explosion Management Plan
FMET	Federal Ministry of Environment and Tourism
FBH	Federation of Bosnia and Herzegovina
Fe	iron
FIDIC	Fédération Internationale Des Ingénieurs-Conseils International Federation of Consulting Engineers
g/kg	grams per kilogram
GBVH	Gender-Based Violence and Harassment
GHG	Greenhouse Gas
GRM	Grievance Redress Mechanism
H_2O	dihydrogen oxide (water)

ha	hectare
Hg	mercury
IFI	International Financing Institution
ISMP	Invasive Species Management Plan
ISO	International Standardisation Organisation
KCl	potassium chloride
km	kilometre
km^2	square kilometre
km/h	kilometre per hour
K_I	adjustments to impulsiveness noise
KPI	Key Performance Indicator
K_T	adjustments to tonality noise
$L_{1\%}$	noise level that is exceeded 1% of time
LAx%	sound level with that is exceeded x% of time
LA_{eq}	Equivalent Continuous Sound Pressure Level
LAF_{MAX}	maximum sound level with A frequency weighting and fast time weighting
LAF_{MIN}	minimum sound level with A frequency weighting and fast time weighting
LMP	Labour Management Plan
$L_{R1\%}$	rating level of noise that is exceeded 1% of time
L_{Req}	rating level of noise
L_{eq}	equivalent noise level
L_{rezid}	level of residual noise
m	metre
m^2	square metre
m^3	cubic metre
MFBH	Public Company Motorways of the Federation of Bosnia and Herzegovina
µg/l	microgram per litre
$µg/m^3$	microgram per cubic metre
µS/cm	microsiemens per centimetre
mg/kg	milligrams per kilogram
mg/l	milligrams per litre
mgO_2/l	milligrams of oxygen per litre
mg Pt/l	milligrams of platinum per litre
mm	millimetre
Mn	manganese
MPR	Monthly Progress Report
N	nitrogen
NATM	New Austrian Tunnelling Method
NH_3	ammonia
Ni	nickel
NO_2	nitrogen dioxide, nitrite
NO_3	nitrate
O_3	ozone
OEPRP	Operational Emergency Preparedness and Response Plan
OHS	Occupational Health and Safety

OHSMP	Occupational Health and Safety Management Plan
P	phosphorus
Pb	lead
pH	potential of hydrogen (pH value - acidity or basicity)
PIU	Project Implementation Unit
PM	particulate matter
$PM_{2.5}$	particulate matter with a diameter of 2.5 micrometres or smaller
PM_{10}	particulate matter with a diameter of 10 micrometres or smaller
PR	Performance Requirement
RoW	right-of-way
SEP	Stakeholder Engagement Plan
SO_2	sulphur dioxide
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
TMP	Traffic Management Plan
TOC	Total Organic Carbon
UV	ultraviolet
WMP	Waste Management Plan
Zn	zink

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1. EXECUTIVE SUMMARY

Introduction

The European Bank for Reconstruction and Development (EBRD) as the lead International Financing Institution (IFI) and the European Investment Bank (EIB) as the co-financier are considering providing financing to Public Company Motorways of the Federation of Bosnia and Herzegovina (MFBH) to construct a new motorway section of the Pan-European Corridor Vc. The new motorway section Konjic (Ovčari) - Prenj Tunnel - Mostar North consists of three sub-sections, namely: Konjic (Ovčari) - Prenj Tunnel, Prenj Tunnel and Prenj Tunnel - Mostar North.

Implementation of the Konjic (Ovčari) - Prenj Tunnel - Mostar North section requires compliance with the provisions of relevant Federation of B&H (FBH) legislation on environmental and social (ES) issues, physical planning, construction, construction of the motorway on Corridor Vc, occupational health and safety (OHS), labour, and land acquisition and resettlement, as well as with the specific Performance Requirements (PR) defined under the EBRD's 2019 Environmental and Social Policy (ESP). Based on an assessment review against EBRD criteria and having in mind that the whole section totals approximately 35 km in length and belongs to the 335 km long motorway, the section is classified as Category A. Environmental and Social Impact Assessment (ESIA) for the new motorway section was prepared during 2022 and received a consent from the Federal Ministry of Environment and Tourism (FMET) (issued on January 22, 2024) after the completion of all legal procedures, including public consultations.

An Environmental and Social Management Plan (ESMP) must be carried out for the whole section; however, this document deals only with the Prenj Tunnel sub-section, including the access roads to the tunnel and landfill of excavated material (hereinafter referred to as "the Project"). ESMP documents the Project's risk management strategy for those impacts that are assessed to be significant. It integrates the findings of all studies carried out until now, the plans and other provisions for complying with the requirements of the legislation, regulations and standards that were triggered, as well as country- and site-specific information relevant for the Project's risk management strategy.

Project Description

The section Konjic (Ovčari) - Prenj Tunnel - Mostar North is part of the Pan-European Corridor V linking the North Europe to the Adriatic Sea. This motorway section is further divided and will be designed and constructed under three separate contracts as follows:

- Konjic (Ovčari) - Prenj Tunnel, 10.3 km,
- Prenj Tunnel, 10.9 km, including access roads on the north and south side to the main road M17, and
- Prenj Tunnel - Mostar North, 12.4 km.

Construction of the Prenj Tunnel will be carried out in its full capacity - excavation of both tunnel tubes in the full profile. The adopted carriageway width is 7 m (3.5 + 3.5 m). There is a 1 m wide service path at each side of the carriageway under which cable ducting and drainage are installed. Main drainage pipe is in the axis of each tunnel tube, below the pavement structure. The right tunnel tube, including the portal structure, is 10.94 km in length, while the left tunnel tube is 10.93 m long. Tubes are connected to 33 pedestrian cross-links and 10 passages for emergency vehicles. The

Project also includes open sections of the motorway between km 0+000 and km 1+147,048 (at the north side) and between km 12+073,170 and km 12+240,240 (at the south side).

Tunnel will be designed and built according to the New Austrian Tunnelling Method (NATM) of construction. The estimated quantity of excavation for both tubes and entrance cuts is approximately 1,800,000 m^3, out of which about 1,400,000 m^3 will be utilised for the embankment construction, while the remaining amount will be deposited at the appropriate landfill (Humilišani). Beside the excavation, the most significant works are primary protection by shotcrete (about 450,000 m^3), tunnel waterproofing (about 490,000 m^2), concrete works (about 295,000 m^3), and construction of pavement structure (about 142,000 m^2). Apart from the main tunnel, an access tunnel is designed with the aim to collect data relevant data for tunnel excavation and construction.

Access roads from the north and south sides of the tunnel mostly run along the existing local roads that would require certain widening to reach the required width for construction and regular traffic to the tunnel. Access roads run through the several settlements and near production facilities. Considering the minimum width of the access roads and the extremely steep terrain at certain portions, supporting structures will be necessary in the form of gabion walls, reinforced soil, and reinforced concrete walls. The access roads drainage system shall allow for a closed drainage system, with outlets (after cleaning) at a single or multiple discharge points outside of the relevant water protection zones.

Humilišani landfill, shared with the adjacent motorway contract, will serve as a permanent disposal site for inert materials.

Estimated time for completion is 66-72 months.

Environmental and Social Impacts

During preparation of the Environmental and Social Impact Assessment (ESIA), it has been determined that certain ES risks and impacts may arise through the various phases of construction and during the operation of the motorway. At the same time, the ES risks and impacts associated with the pre-construction phase mostly refer to the inappropriate organization of the construction site. These are briefly summarized below.

Aspect	Risk and/or impact
Pre-construction phase	
Flora	- Inadequate planning of works and Main Design requirements - Lack of up-to-date baseline conditions
Fauna	- Inadequate planning of works and Main Design requirements - Lack of up-to-date baseline conditions
Groundwaters	- Limited information on groundwater quality and quantity in the zone of motorway construction - Pollution risks from works in the proximity of groundwater levels
Surface waters	- Lack of up-to-date baseline conditions - Pollution risks from works within riverbed or in the proximity of surface waters - Changes in the water flow and recharge by cutting or diverting permanent and intermittent streams around road structures - Potential disruption of water supply to consumers and/or deteriorated water quality
Air quality	- Lack of up-to-date baseline conditions - Air pollution at inadequate production capacities

Aspect	Risk and/or impact
Noise	- Lack of up-to-date baseline conditions
Soil	- Lack of up-to-date baseline conditions - Occurrence of landslides and rock falls due to instability of terrain and the nature of construction works - Pollution risks at equipment, machinery and vehicle maintenance and parking areas - Environmental damage caused by opening of quarries and borrow pits
Waste and dangerous materials	- Potential lack of landfill areas - Pollution risks from dangerous spills and accidents
Social	- Changing conditions in local settlements - Risk of accidents at the construction site - Potential collisions with public utility services - Changing conditions to road users
Construction phase	
Flora	- Vegetation removal due to preparation of the construction site and during construction works - Dusting of nearby flora due to performance of construction works - Habitat loss - Spread of invasive species
Fauna	- Disturbance of fauna species due to increased level of noise, vibration, and light in the zone of construction activities - Potential disturbance of nests/roosts of species that have a seasonally variable vulnerability due to breeding, feeding times or seasonal migrations - Habitat loss - Potential fatalities or injuries of fauna species due to vegetation removal and movement of heavy machinery
Groundwaters	- Intrusion of groundwater in tunnel tubes during excavation that can impact stability of the structure and cause the safety risk - Impact on the direction of ground water flow and recharge by cutting the underground voids/streams during tunnel excavation - Pollution or decrease of groundwater quality due to direct release of intercepted tunnel drainage water (which can be loaded with suspended solids and other pollutants) and due to direct release of runoff from access roads and working plateaus without treatment, turbidity caused by erosion and excavation or blasting of the rock mass, accidental spills in the vicinity of springs - Inappropriate disposal of non-inert material in case its appearance in excavation
Surface waters	- Pollution or decrease of water quality of rivers Trešanica, Neretva and Konjička Bijela due to direct release of pollutants (suspended solids and other pollutants) generated by construction activities - Inappropriate disposal of non-inert material in case its appearance in excavation - Change in river flow and recharge by cutting or diverting permanent and intermittent streams around road structures
Air quality	- Reduction in air quality due to emissions of construction dust, emission of exhaust gases from combustion processes in generators and other construction equipment, machinery, and vehicles - Increase of dust in the air due to work and movement of construction equipment, machinery, and vehicles
Noise	- Nuisances and disturbances on workers and residents from increased levels of noise during construction works
Vibrations	- Structural damage from vibrations caused by construction equipment and operation methods employed, including use of explosives during blasting

Aspect	Risk and/or impact
	- Nuisances and disturbances on workers and residents from increased levels of vibrations during construction works
Soil	- Soil erosion because of deforestation, excavations and use of heavy machinery and equipment - Pollution of soil from accidental fuel and oil spills - Direct discharge of wastewater from maintenance of construction vehicles at the site and sanitary waters from construction camp - Direct discharge of construction water from the tunnel during works and of runoff from access roads and working plateaus without treatment - Inappropriate waste/spoil disposal and disposal of non-inert material - Occurrence of landslides and rock falls which can further endanger the stability of terrain that is the basis for the construction of roads, while the wider ecological incident can occur if the watercourse or part of it is buried by a landslide/rock fall
Landscape	- Changes to the existing landscape and visual impacts due to the construction works
Waste and dangerous materials	- Contamination of environment due to inappropriate management of excess excavated material and waste generated during construction - Environmental damage caused by improper materials/chemicals management - Environmental damage caused by inadequate management of disposal sites/landfills
Cultural, historical, and archaeological heritage	- Damage of unknown cultural, historical, and archaeological heritage sites from excavations along access roads
Social	- Influx of workers having potential negative impacts (impacts on community dynamics and potential social tensions, exposure of local population to diseases including communicable diseases and Sexually Transmitted Diseases (STD) or Sexually Transmitted Infections (STI), or possible gender-based violence and harassment (GBVH) issues) - Increased number of grievances - Unauthorised access by the public and exposure to risks such as falls and hazardous materials or interactions with heavy equipment, both within construction site and on roads to active construction site - Traffic safety risks to residents living near the local roads which will be used for construction vehicle, equipment, and machinery movements due to increase in construction-related journeys - Disruption of public utility services - Restricted access to adjacent properties (residential, business, agricultural, etc.) - OHS risks to workers
Operational phase	
Flora	- Chemical pollution due to increased quantity of exhaust gases and heavy metals and chemical utilisation during maintenance
Fauna	- Habitat fragmentation - Chemical pollution - Collision of fauna due to high speed of vehicles (birds, bats, small mammals, herpetofauna) - Negative impacts of pollution, increased light levels on sensitive fauna species such as bats
Groundwaters	- Decrease of ground water quality resulting from release of untreated run-off from the motorway surface in the proximity to the springs and their water protection zones, and accidental spill of hazardous material resulting from traffic accidents - Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation

Aspect	Risk and/or impact
Surface waters	- Reduction in water quality in river system resulting from direct release of intercepted surface run-off, direct release of sanitary water from toll station, accidental spill of hazardous material resulting from traffic accidents, and use of de-icing agents - Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation
Air quality	- Reduction in air quality due to emission from exhaust gases from vehicles using the motorway and access roads
Noise	- Nuisances and disturbances on residents from increased levels of noise from motorway and access roads traffic
Soil	- Soil erosion - Pollution from direct discharge of surface run-off, and accidental fuel and oil spills - Reduction in soil quality resulting from use of de-icing agents - Landslides and rock falls causing physical damage to the infrastructure, vehicle damage, disruption to traffic flow, interruption of technical infrastructure such as power supply, water supply, etc. - Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation
Waste and dangerous materials	- Contamination of environment due to inappropriate waste management, storage, and handling arrangements
Society	- Community health and safety - OHS risks to maintenance workers

Mitigation Measures

During preparation of the ESIA, a number of actions and recommendations have been determined to mitigate ES risks and impacts arising through the various phases of construction and during the operation of the motorway. These are briefly summarized below. Mitigation measures are foreseen and included as part of the typical implementation and as such, their costs are included in the construction or maintenance costs.

Aspect	Mitigation measure
Pre-construction phase	
Flora	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Implement Biodiversity Management Plan (BMP) recommendations and BMP update in case of new species identification
Fauna	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Implement BMP recommendations and BMP update in case of new species identification - Additional survey to determine any additional locations of Golden Eagle (*Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* nesting in the area of Klenova Draga (within the boundaries of the construction site)
Groundwaters	- Contractor to timely establish baseline conditions - Prevent cutting of underground streams and contamination of groundwater during preparatory works - Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection
Surface waters	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA

Aspect	Mitigation measure
	- Ensure that the works do not affect supply of drinking water in any village - Ensure proper dimensioning of ditches and culverts, and maintain temporary ditches - Implement Stakeholder Engagement Plan (SEP), in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity - Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection
Air quality	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Establish production capacities with valid approvals and licenses, including sufficient protection
Noise	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA
Soil	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Pre-construction survey of potentially instable rock slopes and implementing stabilisation measures - Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection - Establish and operate quarries and borrow pits as per the design and permits, or utilise existing ones that hold appropriate permits
Waste and dangerous materials	- Define landfill locations and prepare relevant design, including obtaining approvals and permits - Define waste collection and waste separation locations, including necessary protection
Social	- Organise consultations with local municipalities with the aim to clearly present all activities during construction - Negotiate and sign agreement on friendly environment with local municipalities - Prevent unauthorised access of public to construction site - Establishing register of collisions with public utility services - Establish information on the construction site along roads in the area - Prepare and implement Traffic Management Plan (TMP) within the site area and along supply routes - Provision of information to road users along roads in the area, through media and automobile association
Construction phase	
Flora	- Implement dust suppression measures - Compensate for the vegetation removal - Prevent leakage and accidental spills of dangerous substances - Prevent direct wastewater run-off from the site - Remove soil contaminated with invasive species and reinstate the area
Fauna	- Schedule the works in accordance with the characteristics of local habitats - Visibly mark nesting locations - Avoid works in the area of forest ecosystems, and unnecessary deforestation and ecosystem damage - Prevent leakage and accidental spills of dangerous substances - Prevent direct wastewater run-off from the site - Restrict movement of construction machinery, equipment, and vehicles to designated roads, including speed reduction and work during daylight hours

Aspect	Mitigation measure
	- Daily checks for the presence and removal of species' individuals (fire salamander *(Salamandra salamandra)* and Hermann's tortoise *(Testudo hermanni)*) - Manage site to prevent fauna from entering and in a way to avoid creation of habitat for reptiles - Explore underground cave systems in case of encounter by authorised speleological organisation or expert - In case of inhabited nest(s) of Golden Eagle *(Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* are registered in the area of Klenova Draga (within the boundaries of the construction site), restrict works during the breeding and incubation periods (March-June), establish a feeding site to attract the eagle and the owl to an area away from the construction site - Reduce removal of the forest cover to the required minimum for the machinery movement to avoid disturbance and protect White-backed Woodpecker *(Dendrocopos leucotos)* and Black Woodpecker *(Dryocopus martius)* - Utilise directional, non-UV lighting - Adequately manage waste at the construction site
Groundwaters	- Prevent cutting of underground streams and contamination of groundwater during preparatory works - Do not discharge groundwater that penetrates the tunnel tube to discovered caverns or karst canals - Capture groundwater that penetrates the tunnel tube and drain it out of the tunnel with pipes or channels - Identify areas of fractured/faulty zones in advance with predrilling with preventors and using geophysics in the predrilled horizontal boreholes - Treat the captured groundwater before discharging into the environment - Construct bypass flows in case of cutting off groundwater streams - Underground caverns to be inspected before being filled - Utilise top-down grouting to have the area stable and the inflows manageable (minimised) for construction and operation reasons as well as environmental reasons - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair - Prevent accidental spills during fuelling by installing collection tanks during the operation - Do not drain tunnel runoff from drilling mining holes into open channels or caverns - Ensure continuous presence of hydrogeological engineers on the site - Fully pave access roads and working plateaus with asphalt and equip with closed drainage system - Treat construction water from the tunnel during works, collected wastewater from concrete batch plants and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence - In case non-inert material appears in excavation, landfill for its disposal to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems) - Implement SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity
Surface waters	- Do not discharge excess material, waste and wastewaters into surface waters - Fully pave access roads and working plateaus with asphalt and equip with closed drainage system

Aspect	Mitigation measure
	- Treat construction water from the tunnel during works, collected wastewater from concrete batch plants and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence - Manage the works in or around surface waters to minimise impact to water quality - Avoid stockpiling near watercourses - Avoid works in watercourses during the high flow season and during heavy rainfall - Direct access of vehicles to watercourse to be restricted only to vehicles required for construction works - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair - Concrete mixing and washing areas should be located more than 500 m from any watercourse while wastewater from these areas shall be intercepted and hauled to a licenced disposal facility - Prevent accidental spills during fuelling by installing collection tanks during the operation - Assure sufficient flow through culverts in case of cutting off or controlling the water flow - In case non-inert material appears in excavation, landfill for its disposal to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems) - Implement SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity
Air quality	- Production facilities and equipment to be equipped with filters - Implement dust suppression measures such as wetting the site - Cover truck load - Control speed of construction vehicles - Utilise only construction equipment and vehicles that meet national emission standards - Regularly inspect, maintain, and repair construction equipment and vehicles
Noise	- Implement noise control measures such as: restriction of works to daytime only, speed control of construction vehicles, precise definition of hauling routes, use of noise mufflers, equipment and machinery to be shut down when not in use, limited simultaneous use of machines that generate high noise levels (over 70 dB) - Install temporary noise barriers if necessary - Regular and complete inspection of equipment condition, as well as regular maintenance
Vibrations	- Respect recommended safety distances for tunnel drilling at the identified vibration hotspots - In case of using of explosives for the tunnel mining, limit of 10 mm/s peak particle velocity applies to nearby sensitive receivers - The contractor must prepare blasting plan prior to construction - Before carrying out any inevitable activities that produce vibrations near receptors that are sensitive to noise and vibration, communicate properly with those affected, inform them in advance of the tasks to be performed, and of the expected duration - Regular and complete inspection of equipment condition, as well as regular maintenance - Avoid simultaneous operation of equipment that produces vibrations and its utilisation during quiet hours

Aspect	Mitigation measure
	- The selection of equipment will consider the vibration level - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair
Soil	- Implement topsoil management at stockpiles - Compensate for the vegetation removal to supress erosion - Implement designed slope and erosion protection measures - Install drainage system to prevent erosion - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair - Prevent accidental spills during fuelling by installing collection tanks during the operation - Collect wastewaters and sanitary waters, and deliver to licenced operators for final treatment and discharge - Fully pave access roads and working plateaus with asphalt and equip with closed drainage system - Treat construction water from the tunnel during works and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence - Adequate temporary storage of waste, including collection and treatment - Municipal waste to be collected and treated by licenced waste operator - Hazardous waste to be managed by certified companies/agents - In case non-inert material appears in excavation, landfill for its disposal to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems) - Geotechnical slope monitoring and timely implementing slope stabilisation measures
Landscape	- Compensate for the vegetation removal - Recultivation with autochthonous species characteristic for the area to preserve gene pool and amenity - Regular cleaning of construction site from construction and other waste - Upon completion, areas used as construction compounds will be returned to their original use and condition
Waste and dangerous materials	- Utilise only approved landfill locations - Establish landfills as per the design and permits - Disposal of inert material on designated disposal sites and recultivation afterward - Do not discharge liquid waste and wastewater into drains and sewers - Implement waste separation directly at the construction site - Adequate temporary storage of waste - No burning of waste generated at construction site - Hazardous waste to be managed by certified companies/agents - Use of mobile toilets for site personnel - Municipal waste to be collected and treated by licenced waste operator - Restricted access to dangerous materials - In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)
Cultural, historical, and archaeological heritage	- Develop and implement chance finds procedure

Aspect	Mitigation measure
Social	- Induction of workers with rules and measures related to community interference - Develop and implement workers code of conduct - Full implementation of SEP - Timely registration and resolution of complaints - Implement TMP - Prevent access to site for unauthorised personnel - Specific designation of routes to be used by public at the construction site - Implement measures for identified collision points while also ensuring timely reaction in case of disruption - Implement agreement on friendly environment - Maintain access to all adjacent properties during the construction of access roads and throughout the contract period - Set and implement relevant OHS provisions following the relevant legislation and technical specifications - Provide health surveillance and healthcare access for workers
Operational phase	
Flora	- Regular maintenance of vegetation within the motorway right-of-way (RoW) - Controlled discharge of run-off waters - Avoid utilisation of herbicides and hazardous substances - Adequate storage location of chemicals used in motorway and access roads maintenance
Fauna	- Fencing of the motorway RoW, including its maintenance and repair - Adequate cleaning and maintenance of drainage system - Replacing lighting bulbs with low-pressure sodium lights, high-pressure sodium bulbs or mercury bulbs, and avoiding placing the artificial streetlights and unnecessary illumination - Revegetation
Groundwaters	- Implementation and maintenance of a closed system for controlled collection of storm water, and its treatment in oil and grease separators (for surface run-off) and/or biological treatment units (for sanitary wastewater) to the required quality before discharge into the recipient - Do not discharge treated water in the spring area - Define and implement procedures to prevent contamination of groundwaters from accidental spills - In case landfill for non-inert material will be established, define and implement procedures for its management
Surface waters	- Implementation and maintenance of a closed system for controlled collection of storm water, and its treatment in oil and grease separators (for surface run-off) and/or biological treatment units (for sanitary wastewater) to the required quality before discharge into the recipient - Do not discharge treated water in the spring area - Define and implement procedures to prevent contamination of surface waters from accidental spills - In case landfill for non-inert material will be established, define and implement procedures for its management
Air quality	- If measurement of standard air quality parameters shows that values exceed maximum allowed values prescribed by national regulation, implement protection measures in the form of wide leafed green plants or artificial barriers - Install and operate air filters at the tunnel ventilation system, including their regular maintenance
Noise	- If measurement of noise levels shows that values exceed maximum allowed values defined by national regulations, design and install noise protection barriers

Aspect	Mitigation measure
Soil	- Maintenance of drainage system to prevent erosion impact and pollution - Planting vegetation cover at soil surfaces - Define and implement procedures to prevent contamination of soil from accidental spills - Geotechnical slope monitoring and implementing of slope stabilisation measures - Mark location and set up appropriate traffic signalisation in case of landslide and/or rock fall - In case landfill for non-inert material will be established, define and implement procedures for its management
Waste and dangerous materials	- Regular cleaning of the RoW - Transfer waste to licenced operators for final treatment/disposal
Social	- Identify and address all major hazards for the local community - Timely information to local communities on the extent of works and duration prior to the commencement of maintenance works - Ongoing implementation of the grievance mechanism - Set and implement relevant OHS provisions following the relevant legislation and technical specifications - Provide health surveillance and healthcare access for workers

Monitoring Plan

Monitoring during the implementation of the Project provides information on the key ES aspects of the Project, especially on the effectiveness of the foreseen mitigation measures. Such information would enable the MFBH, at the first instance, and the EBRD to evaluate the success of the mitigation measures and call for corrective actions to be taken if necessary. Monitoring of the effects of the Project will commence during the pre-construction phase, spreading through the construction phase, and will continue during operation of the motorway.

The main components of the monitoring plan include:

- Parameters and activities to be controlled;
- Location of control with a focus on specific location or to construction site in general;
- The method in which the control will be carried out;
- When the control will be carried out;
- Responsibility for exercising control;
- Cost estimate for control activities.

Major monitoring activities are comprised either of visual inspection of Contractor's activities, review of Contractor's documentation and records, and establishing compliance with the requirements. However, at certain times, sampling and testing of environmental parameters (air, water and soil quality, noise levels) would be required to establish the level of compliance and whether any harm has been done to the environment.

During the operation of the motorway the relevant parameters will be monitored and will include noise levels, air, water, and soil quality. The results obtained will determine if additional mitigation/protection measures are necessary, such as provision of additional noise attenuation structures, landscaping, or modifications to carriageway drainage.

Public Consultations and Grievances

Public consultations about the ESIA, organised in Konjic and Mostar, also included presentation and discussion about the framework ESMP that was a part of the ESIA.

The ESMP will be disclosed at the website of MFBH (in both English and local language) while the concerned municipalities and local organisations will be informed on its availability.

In addition to institutionally available regular and extraordinary legal frameworks and existing institutional channels, which also protect the interests of interested parties, MFBH has established a formal procedure or process for management of complaints/grievances of workers and local communities (Grievance Redress Mechanism - GRM). Any person or organization has the right to submit complaints/grievances/comments. Full details on the MFBH GRM are available in the *Guide for applying the complaints mechanism according to the rules of international financial institutions*, accessible through the MFBH web page. The Contractor will also provide a grievance mechanism for workers to raise reasonable workplace concerns. GRM will make all reasonable efforts to resolve the complaint/grievance upon receipt. If the GRM is unable to address the issues raised by immediate corrections, long-term corrective action will be identified. The complainant will be notified of the proposed corrective action and monitoring of its implementation within 14 working days after confirmation of receipt of the complaint/grievance.

Institutional Arrangements

The MFBH is responsible for the overall implementation of the Project, including management of ES issues and compliance with the ESMP. It will also be the contracting authority (Employer/Client) for all contracts within this Project. The Project is foreseen to be implemented by a Project Implementation Unit (PIU) within MFBH which has taken over the obligation to always maintain it during the Project implementation.

After contract signing, the Contractor will prepare its implementation plan (Construction ESMP - CESMP), to be reviewed, commented and approved by the Supervision Consultant, containing the detailed information on meeting the requirements detailed in this ESMP. The Contractor will be responsible for implementing ES mitigation measures during construction.

During the Project implementation, a firm of independent consultants (Supervision Consultant), who will liaise directly and report to MFBH PIU, will monitor whether and how well the Contractor complies with the measures outlined in the ESMP.

Upon completion of the Project's construction phase, MFBH will be responsible for the management, operation, and maintenance of the motorway. Regular and timely monitoring will be carried out in accordance with the monitoring plan, while the Maintenance Contractor and Maintenance Supervision Consultant will be responsible for implementation and overseeing the implementation of the mitigation measures foreseen for the operational phase.

Reporting

The Contractor is required to submit several works management reports before commencement of site works. The Contractor will prepare his compliance reports at regular monthly intervals. These reports shall contain a list and description of the activities performed, as well as recommendations and planned future activities and protection measures.

Independent Supervision Consultant will directly report to the MFBH for the implementation of the Project. These reports shall contain a list and description of the activities performed, an ESMP compliance checklist, as well as the recommendations, instructions and orders issued to the Contractor. A separate section of the report shall deal with the assessment of established environmental quality parameters (water, air and soil quality, noise levels).

The process of reporting in case of unexpected situations or incidents must be immediate. The Contractor is obliged to immediately inform MFBH PIU and the local community after the unexpected event has occurred, while the MFBH shall immediately inform the EBRD on the event and order detail investigation about the unexpected situation or incident.

Annual Environmental and Social Reports (AESR), including all relevant ES issues and monitoring indicators in the pre-defined form, will be prepared by MFBH and submitted for EBRD's review.

2. INTRODUCTION

The European Bank for Reconstruction and Development (EBRD) as the lead International Financing Institution (IFI) and the European Investment Bank (EIB) as the co-financier are considering providing financing to Public Company Motorways of the Federation of Bosnia and Herzegovina (MFBH) to construct a new motorway section of the Pan-European Corridor Vc. The new motorway section Konjic (Ovčari) - Prenj Tunnel - Mostar North is 33.6 km long and consists of three sub-sections, namely: Konjic (Ovčari) - Prenj Tunnel, Prenj Tunnel and Prenj Tunnel - Mostar North.

Environmental and Social Impact Assessment (ESIA) for the new motorway section was prepared during 2022 and received a consent from the Federal Ministry of Environment and Tourism (FMET) (issued on January 22, 2024, and covering the whole section between Konjic (Ovčari) and Mostar North) after the completion of all legal procedures, including public consultations. Following the provisions of the relevant legislation[1], MFBH only needs to obtain a Decision on the approval of the Environmental Impact Study and continue to urban and construction permitting. There are no further requirements regarding the environmental and social (ES) issues. The consent includes the following components: description of the location, details of the project, assessment of the ESIA, summary of mitigation measures, and monitoring program. It is noted that the consent expires in case the construction permit is not obtained within a period of 5 years.

An Environmental and Social Management Plan (ESMP) must be carried out for the whole section; however, this document deals only with the Prenj Tunnel sub-section, including the access roads to the tunnel portals and landfill of excavated material (hereinafter referred to as “the Project”).

ESMP documents the Project’s risk management strategy for those impacts that are assessed to be significant. It integrates the findings of all studies carried out until now, the plans and other provisions for complying with the requirements of the legislation, regulations and standards that were triggered, as well as country- and site-specific information relevant for the Project’s risk management strategy. It includes mitigation measures for all identified potential impacts that are undertaken throughout various Project phases, including pre-construction, construction, and operation of the facility. Specified measures aim to avoid, neutralize, or reduce damage. Finally, it defines the monitoring programme to follow the implementation of mitigation measures, as well as the levels of specific environmental parameters, such as noise levels, air quality, water quality and soil quality.

3. PROJECT DESCRIPTION

3.1. PROJECT LOCATION

The section Konjic (Ovčari) - Prenj Tunnel - Mostar North is part of the Pan-European Corridor V linking the North Europe to the Adriatic Sea. One of its branches, called Corridor Vc, passes through Bosnia and Herzegovina (B&H), ultimately making this country a part of the European international

[1] Regulation on projects for which an environmental impact assessment is mandatory and projects for which a decision on the need for an environmental impact assessment is made (Official Gazette of FBH, No. 51/21, 33/22, and 104/22); Regulation determining plants and facilities that must have an environmental permit (Official Gazette of FBH, No. 51/21)

roads network. The Corridor Vc alignment through B&H is divided into four LOTs, as shown in Figure 3.1 below. The section Konjic (Ovčari) - Prenj Tunnel - Mostar North belongs to LOT 3 (Figure 3.2).

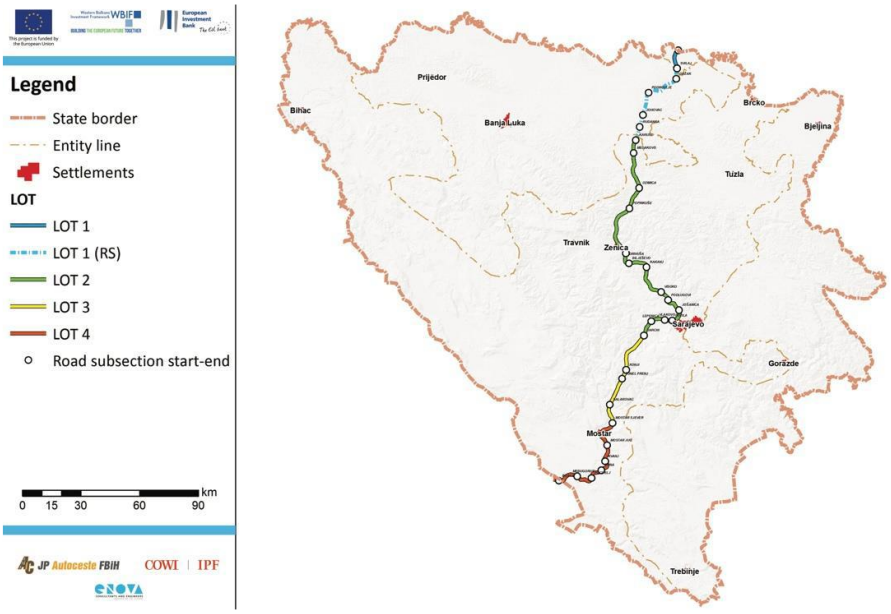

Figure 3.1 LOTs of the Corridor Vc in Bosnia and Herzegovina

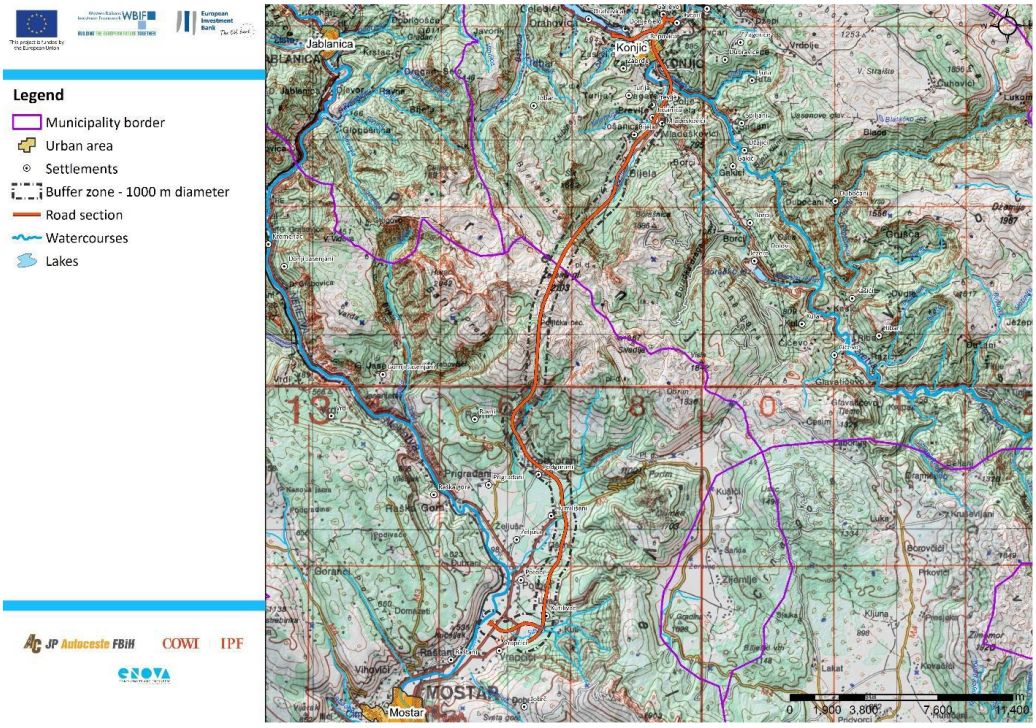

Figure 3.2 Location of the Konjic (Ovčari) - Prenj Tunnel - Mostar North section

This motorway section is further divided and will be designed and constructed under three separate contracts as follows:

- Konjic (Ovčari) - Prenj Tunnel, 10.3 km,
- Prenj Tunnel, 10.9 km, including access roads on the north and south side to the main road M17, and
- Prenj Tunnel - Mostar North, 12.4 km.

3.2. PROJECT DESIGN

3.2.1. Prenj Tunnel

The Prenj Tunnel passes through the Prenj mountain range. The 2016 Preliminary Design proposed two options. Option I foresee construction of a double two-lane tunnel with a minimum axis distance of 25.0 m, while option II envisages construction of one tunnel with two-way traffic. Following the traffic indicators, construction of the Prenj Tunnel will be carried out in its full capacity - excavation of both tunnel tubes in the full profile (Figure 3.3).

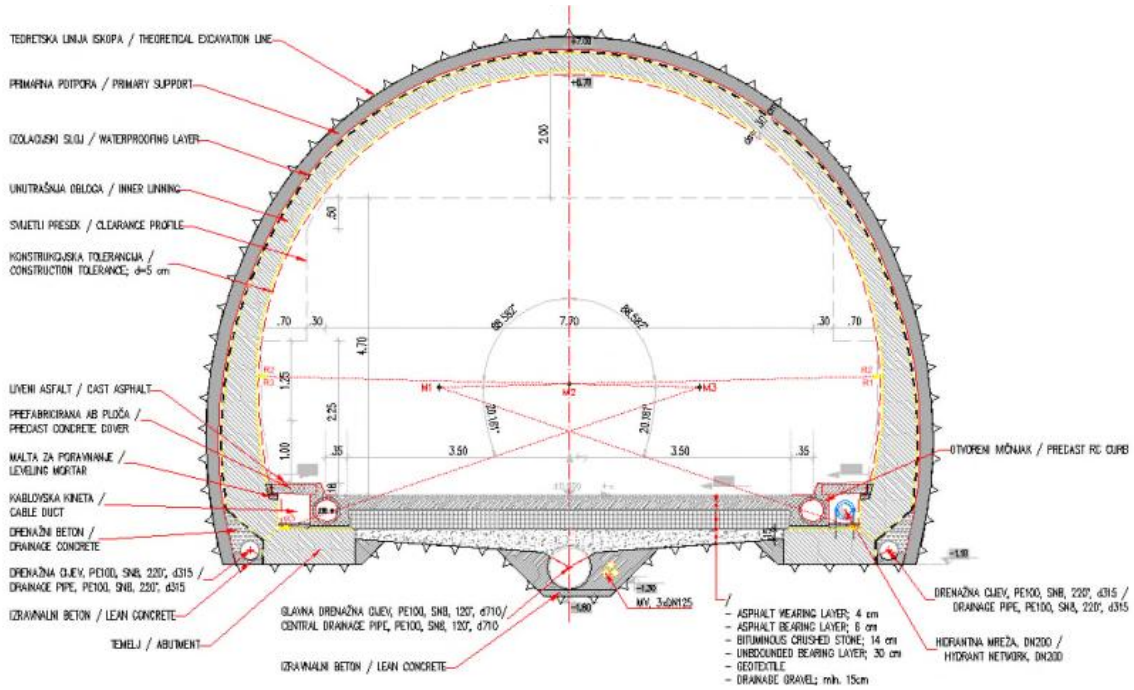

Figure 3.3 Typical cross section of the Prenj Tunnel main tubes

The adopted carriageway width is 7 m (3.5 + 3.5 m). There is a 1 m wide service path at each side of the carriageway under which cable ducting and drainage are installed. Main drainage pipe is in the axis of each tunnel tube, below the pavement structure. The right tunnel tube, including the portal structure, is 10.94 km in length (km 1+143.079 to km 12+079,793), while the left tunnel tube is 10.93 m long (km 1+147.048 to km 12+073,170). Due to its length, the tunnel belongs to long tunnels to which specific safety and security measures following the Directive 2004/54/EC[2] must be applied. Tubes are connected to 33 pedestrian cross-links (Figure 3.4) and 10 passages for emergency vehicles (Figure 3.5). Passages imply Rohbau stage of construction. Both tubes would need to have parking niches (Figure 3.6). The ventilation system for such long tunnels with two-way traffic provides for a transverse or semi-transverse ventilation system. Such a ventilation system requires the construction of ventilation ducts in the dome.

The adopted shape and position of the portals are such that they fit as much as possible into the natural terrain and because of the aesthetics, it is planned to make a set of portal structure.

[2] Directive 2004/54/EC of the European Parliament and of the Council on minimum safety requirements for tunnels in the trans-European road network (Official Journal of the EU, L 167, April 30, 2004, p. 39-91), as may be subsequently amended.

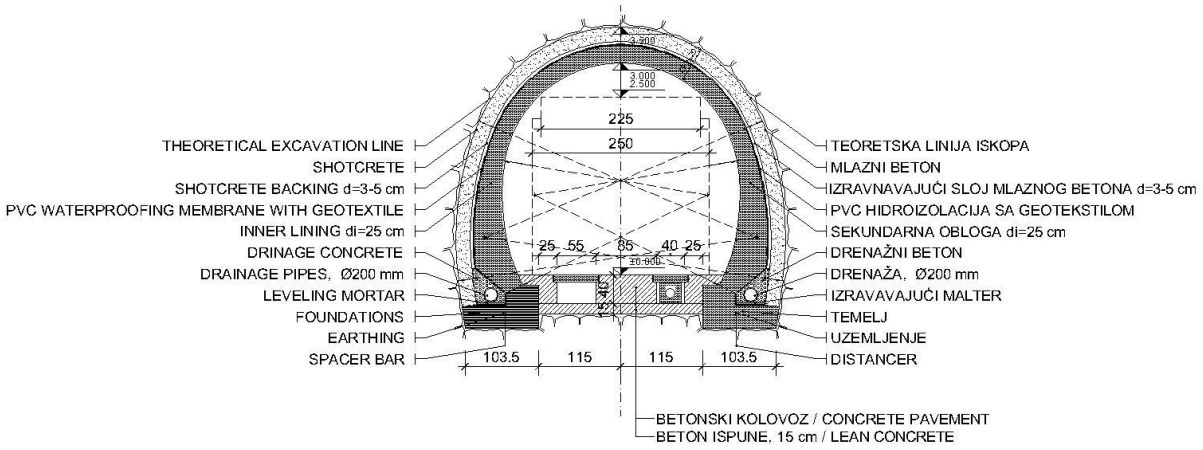

Figure 3.4 Typical cross section of the pedestrian cross-link

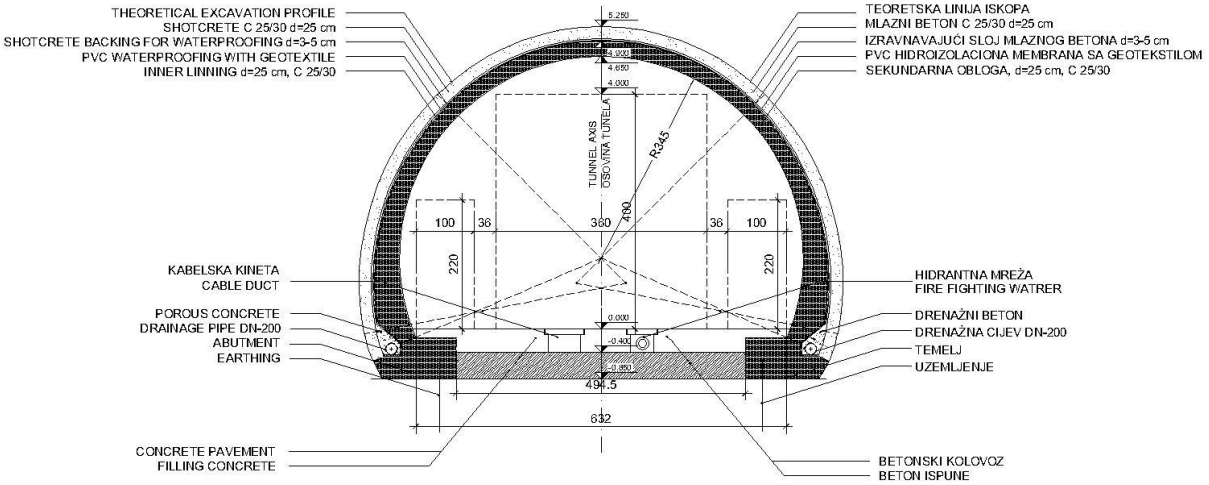

Figure 3.5 Typical cross section of the passages for emergency vehicles

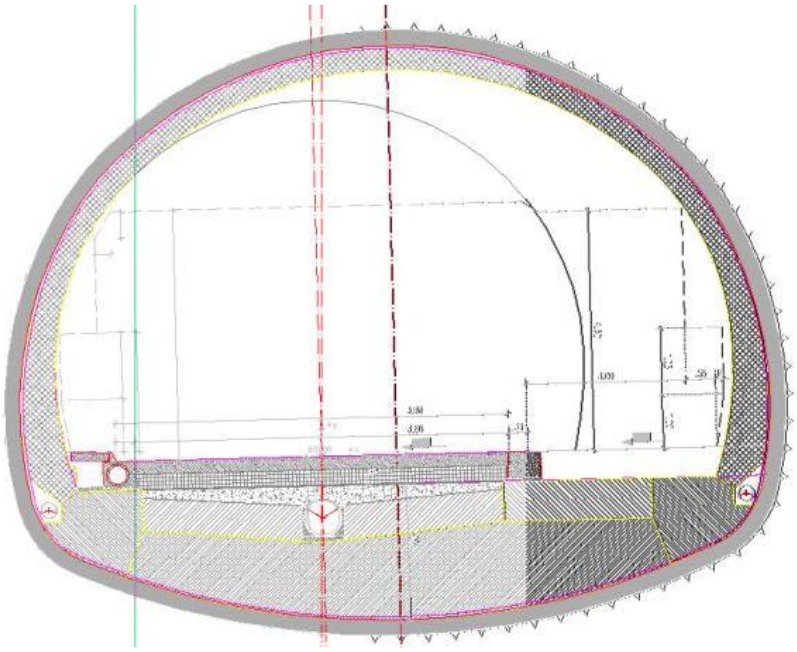

Figure 3.6 Cross section of the of the Prenj Tunnel main tubes at the location of parking niche

Pavement structure in the tunnel is a flexible one and consists of:

- Wearing layer SMA11s, 4.0 cm;
- Bituminous binder layer BD22s PmB, 7.0 cm;
- Bituminous base layer BD32s, 9.0 cm;
- Cement stabilization base layer CS32, 20.0 cm,
- Crushed stone subbase layer of D45, 25.0 cm.

The Project also includes open sections of the motorway between km 0+000 and km 1+147,048 (at the north side) and between km 12+073,170 and km 12+240,240 (at the south side), meaning that the designed route begins at the end of section Interchange Ovčari - Northern portal of the Prenj Tunnel, 1.43 km before the northern portal of the Prenj Tunnel in the Bijela settlement. At the southern portal, it merges with the adjacent section of the motorway Southern portal of the Prenj Tunnel - Interchange Mostar North, 178 m after exiting the Prenj Tunnel.

Tunnel will be designed and built according to the New Austrian Tunnelling Method (NATM) of construction. The estimated quantity of excavation for both tubes and entrance cuts is approximately 1,800,000 m^3, out of which about 1,400,000 m^3 will be utilised for the embankment construction, while the remaining amount will be deposited at the appropriate landfill. Out of the whole tunnel length, following the geological investigations, about 37% belongs to II category rock mass, about 22% to III category, about 13% to IV category and about 28% to V category. Beside the excavation, the most significant works are primary protection by shotcrete (about 450,000 m^3), tunnel waterproofing (about 490,000 m^2), concrete works (about 295,000 m^3), and construction of pavement structure (about 142,000 m^2).

In addition, an access tunnel is designed with the aim to collect geological, geotechnical, and hydrogeological data along the alignment.

3.2.2. Access Roads to the Prenj Tunnel

The northern access road to Prenj Tunnel runs through the Bijela settlement and is divided into two sections - SP1 and SP2. The section SP1 has a total length of 4.75 km and starts at the intersection with the R435 regional road that connects Konjic to Odžaci. This section passes through populated area of Bijela and Gornja Bijela before transitioning into section SP2. At the location of SP1, there is already an existing road that passes through several populated areas. However, the existing road is only 3.5 to 4.5 m wide so it will have to be improved to suit the needs of the Project. The end of the section SR1 is located just before the shooting range of the company Igman d.d. Konjic (defence industry enterprise). Section SP2 begins just before the company's shooting range and runs through an uninhabited forest road until it reaches the planned operational plateau. Section SP2 has a total length of approximately 2.0 km. The layout map (Figure 3.7) shows the northern access road and a plateau for the operation of machinery with a total area of approximately 40,000 m^2. The plateau has a total length of 262 m. Specific details of the alignment for the northern access road are presented in Table 3.1.

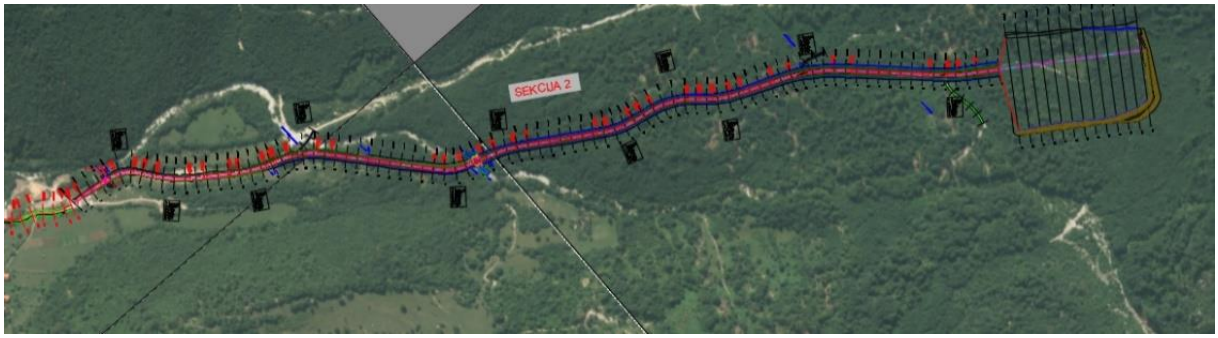

Figure 3.7 Layout of the northern access road

Cross section	
traffic lane width	3 m
shoulder width	0.75 m
gutter width	0.5 m
footpath width	0.5 m
minimum carriageway cross fall	2.5%
embankment slope	1:1.5
cut slope	1:1
Alignment elements	
maximum applied horizontal radius	500 m
minimum applied radius	20 m
maximum longitudinal gradient	14.5%
minimum longitudinal gradient	0.35%
Pavement structure	
wearing layer BC11s	4 cm
upper base layer AGNS	8 cm
base layer	40 cm
Pavement structure for local connections	
upper base layer AHNS16	8 cm
base layer	35-40 cm
Pavement structure for footpaths	
wearing layer BC11k	5 cm

Table 3.1 Technical elements of the northern access road

The southern access road (Figure 3.8) to the Prenj Tunnel is divided into six sections (JP1, 0.6 km; JP2, 1.5 km; JP3, 0.6 km; JP4, 1.6 km; JP5, 1.4 km; JP6, 1.5 km) following the specific alignment and required technical solutions. Specific details of the alignment for the northern access road are presented in Table 3.2.

Figure 3.8 Overview of southern access road

Cross section	
traffic lane width	3 m
shoulder width	0.75 m
gutter width	0.5 m
berm width	1 m
carriageway cross fall	2.5%
embankment slope	1:1.5
cut slope	1:1
Alignment elements	
maximum applied horizontal radius	1,300 m
minimum applied horizontal radius	15 m
maximum longitudinal gradient	14%
minimum longitudinal gradient	1.0%
maximum applied vertical radius	10,000 m
maximum applied vertical radius	300 m
Pavement structure	
wearing layer BC11s	4 cm
upper base layer AGNS	8 cm
base layer	40 cm

Table 3.2 Technical elements of the southern access road

Section JP1 is approximately 0.6 km long and represents an access construction road that connects the existing main road M17 and HP Investing d.o.o. Mostar industrial area. Interventions are not foreseen for this section.

Section JP2 is 1.5 km long, having a 5 m width, and running to the Prigrađani settlement. Section JP3 continues for approximately 0.6 km through Prigrađani with the similar characteristics. The road alignment is roughly in line with the existing road and the surrounding buildings since a part of the section passes through a settlement. Widening to 6 m carriageway is required for these two sections.

Section JP4 is approximately 1.6 km long, passing through the outskirts of the Prigrađani settlement. This part of the road will be widened (current width is approximately 3 m), along with modification of the longitudinal gradient. Section SR4 is the most demanding section for access to the southern portal of the Prenj Tunnel. It is characterised by an existing steep serpentine whose elements do not meet the minimum required width of 6 m. Therefore, it is necessary to reconstruct this section to reduce the longitudinal gradient. Considering the minimum width of the access road and the extremely steep terrain, supporting structures on this part of the road will be necessary in the form of gabion walls, reinforced soil, and reinforced concrete wall.

Section JP5 is in total 1.4 km long and runs to the beginning of Klenova Draga (Čatrnja). Current road has a crushed stone surface and approximate width of 3 m. It is necessary to perform rock excavation works for most of the length of this section.

New section JP6 is 1.5 km long and is situated in a greenfield area. Crushed stone pavement is designed for this section which ends with the operational plateau with an area of approximately 40,000 m^2. The operational plateau is located directly in front of the planned cut for the southern portal of the Prenj Tunnel (Figure 3.9).

In addition to the two mentioned plateaus, another two are located along the southern access road, and the fifth one is located at the entrance to the access tunnel. The dimensions and shape of four main plateaus provide for the construction of the following facilities: workers accommodation, office

premises for the Contractor and supervision, concrete batching plant, space for installing the plant for processing and stockpiling of stone aggregate, a workshop, a warehouse, parking lot, construction water treatment facility, etc. The plateau at the entrance to the access tunnel can be used for facilities as required.

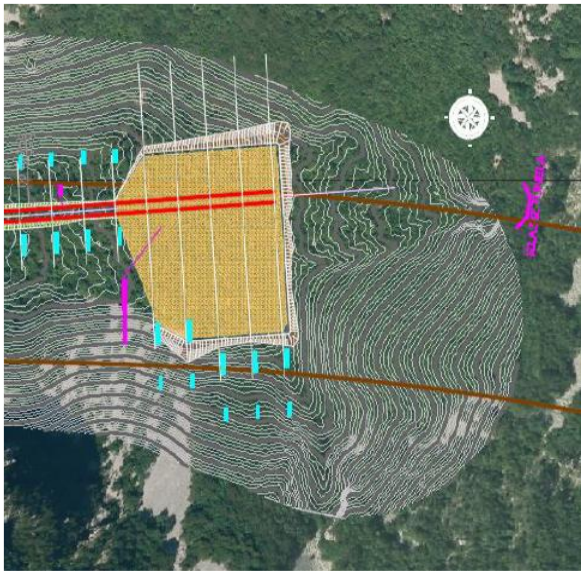

Figure 3.9 Operational plateau at the end of section JP6

It is important to account for drainage of surface water runoff from both access roads which must be discharged beyond the area designated as a third water protection zone. Due to enhanced environmental constraints, the access roads drainage system shall allow for a closed drainage system, with outlets (after cleaning) at a single or multiple discharge points outside of the relevant water protection zones.. The drainage system shall have sufficient capacity to handle not only the surface water runoff from the access road pavement, but also that from the plateaus and groundwater/construction water from the tunnel tubes, and any other water discharge resulting from the Contractor's works, including treated/cleaned faecal water, office and accommodation wastewater, etc.

However, it is noted that there may be no suitable recipient beyond the protection zone and therefore it may be necessary either to:

- Include extension of the drainage from the outlet of the oil separators to discharge the cleaned water into the drainage system of the adjacent project. In the event that this is necessary, the Contractor shall also be responsible for the design and construction of the required section from the connection point to the final discharge point at Neretva River;
- Alternatively, a possible soak away system could be implemented outside of the water protection zones. Any such soak away system would need to include sufficient attenuation to accommodate peak rainfall events to ensure that the system does not surcharge. The attenuation system may include attenuation ponds or oversized pipes and ditches.

3.2.3. Humilišani Landfill

The construction material to be deposited in landfills consists of the excess natural material that is not polluted and can be deposited in the landfill without fear of environmental pollution, such as: soil, crushed rock, and stone (broken rocks), i.e. inert material. Humilišani landfill will serve as a

permanent disposal site for inert materials. The suitable location of the landfill is positioned at station km 6+100, as presented in the following Figure 3.10.

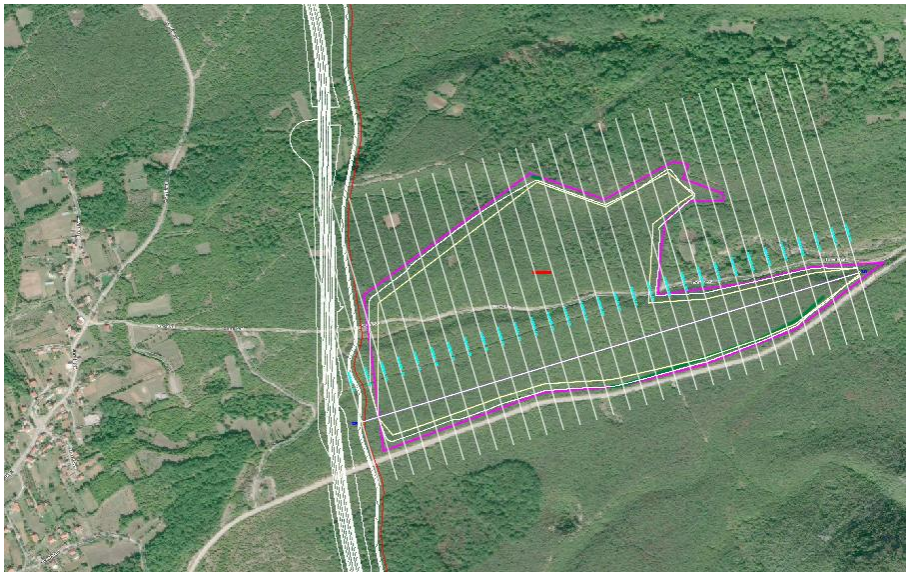

Figure 3.10 General location and layout of Humilišani landfill

The landfill has a maximum theoretical capacity of 3,270,472.35 m^3. However, the landfill will be also shared/used with by the adjacent motorway contract. The Contractor is entitled to use half of the landfill site with a capacity of approximately 1,500,000 m^3. The part of the landfill to be used by the Contractor shall be agreed with the Supervision Consultant and MFBH prior to depositing material. The Contractor will be responsible for managing and securing his section of the landfill. The landfill needs to be treated to integrate into the environment as soon as possible and stabilize its settling and erosion, through topsoiling of the entire area and planting of low-rise vegetation.

The access road to the Humilišani landfill, begins in Klenovik. The road was designed with a carriageway of 8 m and includes widening in the curves for the passing of 2 trucks. The maximum designed longitudinal grade is 12%. The road is designed as a macadam road. The total length of the road is 6.0 km from the connection with the southern portal access road.

3.3. CONSTRUCTION ACTIVITIES

All construction activities will be planned in accordance with technical elements of the motorway and other parts of the road which are defined according to the Rulebook on the basic conditions that public roads, their elements, and facilities on them must meet in terms of traffic safety (Official Gazette of B&H, No. 13/07). The works contract will be executed in accordance with FIDIC Conditions of Contract for Plant and Design-Build (Edition 2017) - Yellow Book, or FIDIC Conditions of Contract for Underground Works (Edition 2019) - Emerald Book.

Workers' accommodation (camps) will be required for the Project, which will need to be set up in line with EBRD Guidance Note "Workers' accommodation: Processes and Standards" (2009). Currently, there are no estimates on the number of workers needed for the construction of this motorway sub-section as this will be defined by the Contractor prior to the start of construction works. Some key personnel positions might include Project Manager, Site Manager, Earthworks Manager, Electrical Manager, Occupational Health and Safety (OHS) Manager, Environmental

Specialist, Responsible Designer for Tunnel, etc. After the contract award, the selected Contractor is solely responsible to ensure and select enough employees needed for construction works.

The most significant works are summarised below:

- Preparatory works: clearing the terrain (removal of bushes and trees, demolition and removal of structures), opening the access roads, building of construction camp and associated facilities;
- Execution of earthworks: mechanical excavation of a wide excavation of materials for making incisions for a covered tunnel, mechanical excavation of soil for foundations and drainage pipes, mining;
- Execution of concrete works: primary protection by shotcrete, installation of reinforced cement concrete in foundation strips, installation of reinforced cement concrete in the retaining walls, foundations and supports of the tunnel, installation of reinforced cement concrete into the tunnel slab;
- Reinforcement works: installation of ribbed bars made of high-quality steel, installation of ropes made of smooth steel wires of round cross-section, high tensile strength in the tunnel;
- Construction of pavement structure: production and installation of mechanically stabilized base, production and installation of cement stabilization, production of and installation of bituminized materials, installation of prefabricated curb made of concrete, installation of prefabricated slabs for inspection tracks;
- Additional tunnel works: execution of tunnel waterproofing, execution of tunnel drainage, execution of tunnel signalisation and surveillance system, execution of mechanical installations.

Estimated time for completion is 66-72 months.

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

Implementation of the Project requires compliance with the provisions of relevant Federation of B&H (FBH) legislation on ES issues, physical planning, construction, construction of the motorway on Corridor Vc, OHS, labour, and land acquisition and resettlement. Table 4.1 presents the summary of relevant FBH legislation and regulations in the ES field.

Issue	FBiH legislation and regulations
Environmental impact assessment (EIA) and environmental permitting	- Law on environmental protection (Official Gazette of FBH, No. 15/21) - Regulation on projects for which an EIA is mandatory and projects for which the need for EIA is decided (Official Gazette of FBH, No. 51/21, 33/22 and 104/22) - Regulation determining plants and facilities that must have an environmental permit (Official Gazette of FBH, No. 51/21)
Water permits	- Law on waters (Official Gazette of FBH, No. 70/06) - Regulation on content, scope, conditions, ways of issuing and archiving of water documents (Official Gazette of FBH, No. 31/15, 55/19 and 41/20)
Air quality	- Regulation on the monitoring of air quality and defining pollutant types, limit values and other standards (Official Gazette of FBH, No. 1/12, 50/19 and 3/21)
Noise	- Law on noise protection (Official Gazette of FBH, No. 110/12)
Waste management	- Law on waste management (Official Gazette of FBH, No. 33/03, 72/09 and 92/17) - Rulebook on waste categories with lists (Official Gazette of FBH, No. 9/05) - Rulebook on the content of the waste management adjustment plan for existing waste treatment and disposal facilities and activities undertaken by the competent authority (Official Gazette of FBH, No. 9/05) - Rulebook determining the treatment of dangerous waste that is not on the waste list or whose content is unknown (Official Gazette of FBH, No. 9/05)

Issue	FBiH legislation and regulations
	- Regulation on regulating the reporting obligation of waste operators and producers on the implementation of programmes for supervision, monitoring and keeping records according to the conditions of the permit (Official Gazette of FBH, No. 31/06) - Regulation on construction waste (Official Gazette of FBH, No. 93/19)
Water and wastewater management	- Law on waters (Official Gazette of FBH, No. 70/06) - Regulation on hazardous and harmful substances in water (Official Gazette of FBH, No. 43/07) - Rulebook on limit values of hazardous and harmful substances, before being discharged into watercourse (Official Gazette of FBH, No. 50/07) - Rulebook on procedures and measures in cases of accidents on water and coastal water land (Official Gazette of FBH, No. 71/09) - Rulebook on method of determining the environmentally acceptable flow (Official Gazette of FBH, No. 4/13) - Decision on characterization of surface and ground water, reference conditions and parameters for evaluation of water and monitoring of water (Official Gazette of FBH, No. 1/14) - Decree on conditions for discharge of wastewater into environment and into the public sewerage system (Official Gazette of FBH, No. 26/20, 96/20 and 1/24)
Nature protection	- Law on nature protection of FBH (Official Gazette of FBH, No. 66/13) - Regulation on protection measures for strictly protected species and subspecies and protected species and subspecies (Official Gazette of FBH, No. 21/20)
Labour and employment	- Law on labour of FBH (Official Gazette of FBH, No. 22/16, 89/18, 23/20 and 49/21) - Law on safety at work (Official Gazette of FBH, No. 79/20) - Law on the protection against fires and protection of fire-fighters (Official Gazette of FBH, No. 64/09)
Land acquisition	- Law on expropriation of FBH (Official Gazette of FBH, No. 70/07, 36/10, 25/12 and 34/16)
Cultural heritage	- Law on protection and use of cultural, historical, and natural heritage (Official Gazette of B&H, No. 20/85, 12/87 and 3/93)
Public consultations	- Law on free access to information in FBH (Official Gazette of FBiH, No. 32/01 and 48/11) - Law on environmental protection (Official Gazette of FBH, No. 15/21)

Table 4.1 Overview of FBH legislation and regulations relevant to the Project

The 2019 Environmental and Social Policy (ESP) is a key EBRD document which details the commitments of the EBRD's Funding Agreement to promote in the full range of its activities, environmentally sound and sustainable development. EBRD-financed projects are expected to meet good international practice related to sustainable development. Specific Performance Requirements (PR) for key areas of ES issues and impacts are defined through the ESP. The EBRD PRs and their applicability to this Project are presented in Table 4.2, including the indication which of the PRs are triggered in this case. New facilities or business activities to be financed by EBRD should be designed to meet PRs from the outset, which is the case with the sub-section Prenj Tunnel. Funding Agreement will also include an Environmental and Social Action Plan (ESAP), agreed between the EBRD and the MFBH, to translate triggered PRs into a series of actions that the MFBH (as a beneficiary) needs to implement.

Performance requirement	Applicable to the Project
PR1: Assessment and Management of Environmental and Social Risks and Impacts	Yes
PR2: Labour and Working Conditions	Yes
PR3: Resource Efficiency and Pollution Prevention and Control	Yes
PR4: Health, Safety and Security	Yes
PR5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Yes
PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes
PR7: Indigenous Peoples	No
PR8: Cultural Heritage	Yes
PR9: Financial Intermediaries	No
PR10: Information Disclosure and Stakeholder Engagement	Yes

Table 4.2 EBRD PRs applicable to the Project

Under the ESP, EBRD categorises each project to determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required. The categorisation of each project depends on the nature, location, sensitivity and scale of the project, and the significance of its potential adverse future environmental and social impacts.

Based on an assessment review of the Project against EBRD criteria and having in mind that the whole section totals approximately 35 km in length and belongs to the 335 km long motorway, the Project is classified as Category A.

EBRD, as a signatory to the European Principles for the environment[3], is committed to promoting the adoption of European Union (EU) environmental principles, practices, and substantive standards[4] by EBRD financed projects, where these can be applied at the project level, regardless of their geographic location. When host country regulations differ from EU substantive environmental standards, projects are expected to meet whichever is more stringent. Therefore, EU requirements relevant to the Project are presented in the following list:

- Habitat Directive - Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora;
- Urban Wastewater Treatment Directive - Directive 98/15/EC amending Directive 91/271/EEC on urban wastewater treatment;
- Water Framework Directive - Directive 2000/60/EC establishing a framework for community action in the field of water policy;
- Environmental Noise Directive - Directive 2002/49/EC on the assessment and management of environmental noise;
- Flood Directive - Directive 2007/60/EC on the assessment and management of flood risks;
- Waste Framework Directive - Directive 2008/98/EC on waste;
- Birds Directive - Directive 2009/147/EC on the conservation of wild birds;
- EIA Directive - Directive 2014/52/EU on the assessment of the effects of certain plans and programmes on the environment;
- Directive 2019/1936 amending Directive 2008/96/EC on road infrastructure safety management.

[3] https://www.nib.int/filebank/a/1521315365/9ae732ab406cefafa3525b7bd10ad134/7215-European_principles_for_the_environment.pdf

[4] Substantive environmental standards of the EU are comprised in EU secondary legislation, e.g. regulations, directives, and decisions.

5. DESCRIPTION OF EXISTING CONDITIONS

5.1. DESCRIPTION OF THE PHYSICAL ENVIRONMENT

Prenj Mountain represents an exceptional natural value and belongs to the group of natural rarities and localities that are of special interest. Geomorphological characteristics, glacial phenomena, hydrogeological specifics, hydrological specifics, represented flora and fauna, with a number of endemic species, are part of the natural values that rank this area high on the scale of natural and visual heritage.

The natural component of the landscape along the route is characterized by the terrain structure with hilly, hilly-mountainous, and mountainous zones. About 40% of the area belongs to the hilly-mountainous terrain at the altitudes over 500 m (e.g., Prenj, Čvrsnica, Čabulja mountains) and only about one-third of the terrain is located at the altitudes from 200 to 500 m. The rest is slightly hilly and flat terrain. Parts of the route outside the tunnels, especially in the canyon area and in the areas covered in screes, are characterized by landslides.

The Project area belongs to the carbonate platform of the outer Dinarides (Figure 5.1), except for the northernmost part of Konjic that belongs to the Bosnian flysch zone, a younger group of formations from the carbonate platform of the outer Dinarides.

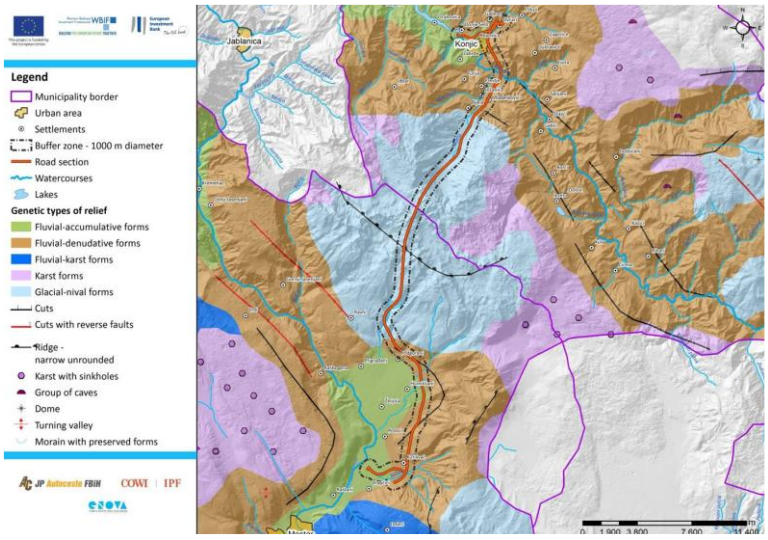

Figure 5.1 Genetic types of the terrain in the Project area

Geological map of the terrain with the marked position of the motorway is presented on Figure 5.2. The rocks of Mesozoic and Cenozoic age, i.e. Triassic, Jurassic, Cretaceous, Paleogene, Neogene and Quaternary deposits, participate in the geological structure of the terrain that belongs to the Project area.

To determine the geotechnical conditions for the construction of the Prenj Tunnel, the geophysical research of the terrain was carried out. The aim was to identify and define the karstification zones per depth of the Prenj massif, as well as significant fault zones that may cause the water intrusion in the tunnel construction zone. Four seismic reflection profiles with a total length of 3,000 m were identified and defined (Figure 5.3).

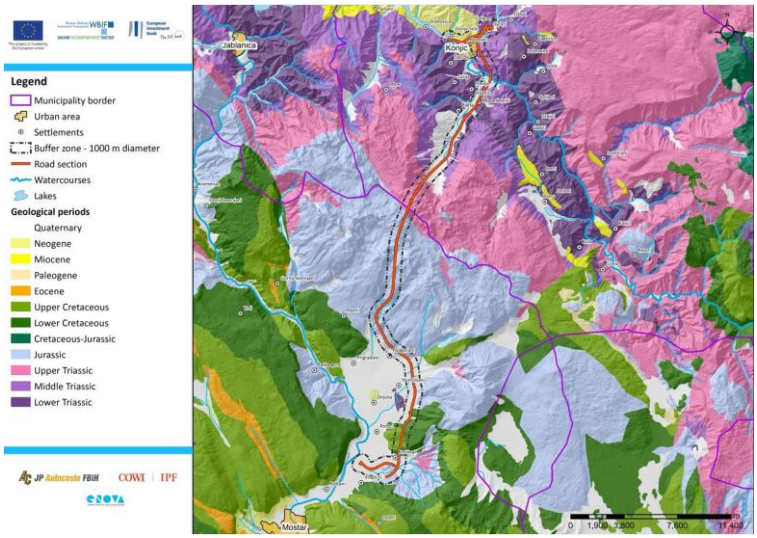

Figure 5.2 Geological map of the Project area

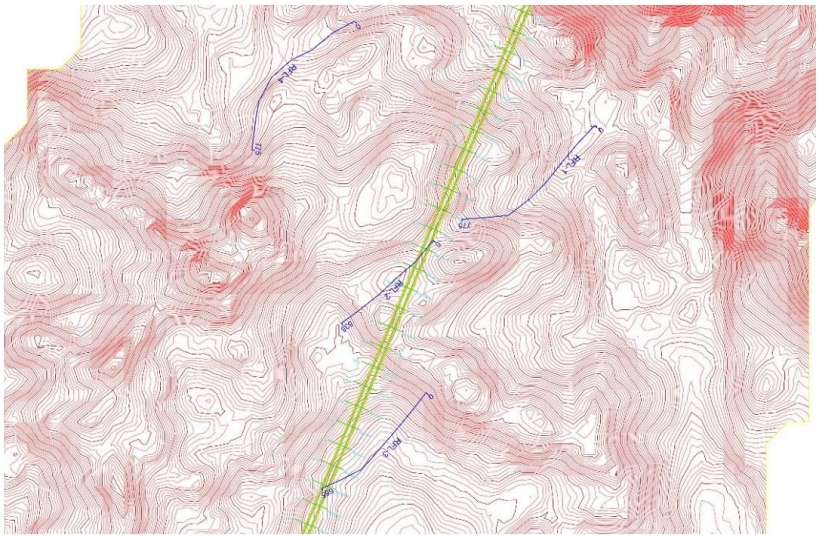

Figure 5.3 Position of geophysical profiles relevant to the alignment of the Prenj Tunnel

There is no indication of presence of unfavourable lower Triassic clastic sediments in the tunnel zone. Absence of these waterproof, but weak clastic rocks deeper under the tunnel level means that the tunnel excavation will be dominantly in compact and solid non-karstified limestones and dolomites with an overlayer, which is in places deeper than 1,000 m.

5.2. CLIMATE

The nearest meteorological station of the Federal Hydrometeorological Institute is in the area of Ivan Sedlo, 17 km north of Konjic. However, data from this meteorological station cannot be taken as relevant because the significant difference in their altitudes (about 700 m).

The City of Konjic has a Mediterranean climate, characterized by hot and warm days. According to the available data for the period 1961-1990, the average air temperature in Konjic was 10.8°C. The warmest month was August with an average temperature of 20.1°C, and the coldest was January with a temperature slightly above 0°C.

Area of the Prenj Mountain is characterised by a subalpine Mediterranean climate before the motorway enters the Prenj Tunnel at around 717 m altitude. The climate is very changeable and capricious, so snow can also fall in the summer. There is no meteorological station in the area where air temperatures would be measured. The estimated average annual temperature in this area is about 14°C. Monthly air temperatures in January and February range between -1.5 and 8°C. The average temperature decreases with the increasing altitude, so the possibility of frost on the road increases proportionally. For six "cold" months of the year, the average monthly air temperature is below 0°C. During the coldest months on Prenj, the temperature drops to -30°C. The warmest months on Prenj are July and August, but the average monthly air temperature in the highlands is between 10 and 18°C.

The intensity and amount of precipitation in the Prenj area is above the B&H average level - up to 2,000 mm per year in central part. The annual distribution of precipitation is uneven, so that from March to September the average is from 600 to 800 mm, and in July and August only 40 to 70 mm. Therefore, climatic influences result in heavy precipitation, which from October (sometimes from September) turns into snowfall, which is up to 3 m high. Winter winds often blow snow off cliffs and ridges, filling depressions and sinkholes with deep snowdrift. The snow on Prenj Mountain usually melts by the end of May, while snow patches on the northern slopes can remain until the end of summer.

The most pronounced winds are those blowing from the north. The bora and northerly wind blow all year round, but in winter they are more frequent reaching speeds up to 200 km/h. On the southern slopes of the Prenj Mountain, the south wind in significantly pronounced. When the south wind blows, the humidity is very high, and the temperature rises with heavy rainfall.

5.3. AIR

The nearest operational air quality monitoring station is located at Ivan Sedlo, about 17 km from Konjic at the altitude of 967 m, whose data cannot be considered relevant for the Project area. To overcome this, a one-time air quality measurement was performed at three measuring points along the planned access roads to Prenj Tunnel during June 2022 (Table 5.1 and Figure 5.4 to Figure 5.6).

Name	Description	Location
MP1 - Donje Selo	settlement Donje Selo	N: 43°37'23.69" E: 17°58'2.75"
MP2 - HP Investing	near the HP Investing industrial site	N: 43°26'35.79" E: 17°51'42.82"
MP3 - Prigrađani	in the vicinity of houses at Prigrađani settlement	N: 43°27'37.65" E: 17°52'22.04"

Table 5.1 Description of air quality measuring points near planned access roads

Measurements showed that all measured parameters are within the limit values stipulated by Rulebook on the manner of monitoring air quality and defining the types of pollutants, limit values and other air quality standards. Measurement of air quality at the Project location indicates a normal condition and the presence of pollutants is withing legally defined limit values. The results are presented in Annex 3: Summary of Air Quality Measurements.

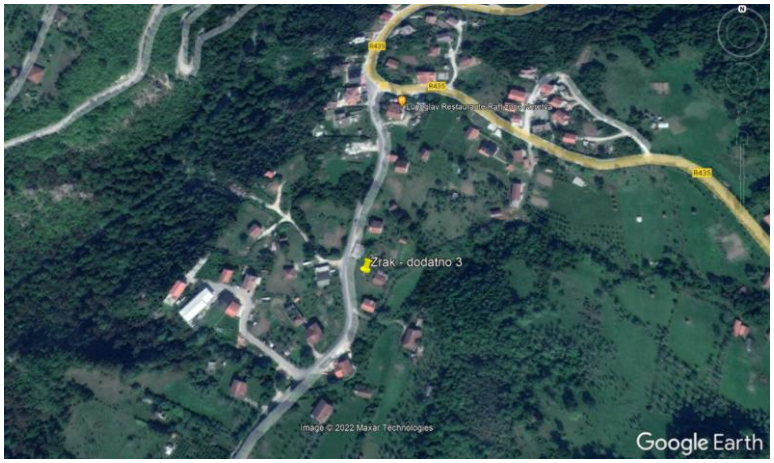

Figure 5.4 Air quality measuring point at Donje Selo (MP1)

Figure 5.5 Air quality measuring point near HP Investing industrial site (MP2)

Figure 5.6 Air quality measuring point at Prigrađani (MP3)

5.4. WATERS

5.4.1. Surface Waters

Three rivers are identified to be of the importance for the project as main surface water receptors - rivers Neretva, Trešanica and Konjička Bijela (Figure 5.7). All three watercourses in the Project area

belong to the Adriatic Sea basin. The largest and most important river is Neretva, while Trešanica and Konjička Bijela are its right and left tributaries.

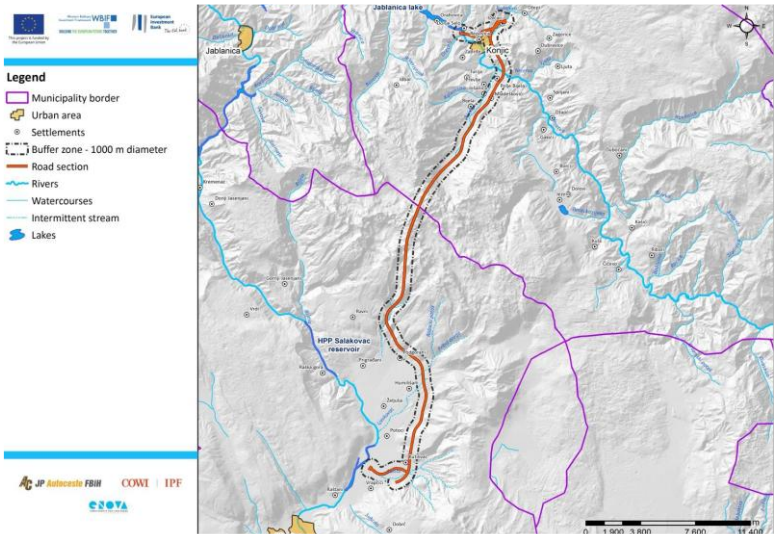

Figure 5.7 Surface waters in the Project area

Number of smaller intermittent streams of seasonal character are identified in the project area. On the Konjic side, Suhi potok creek forms the upper stream of Konjička Bijela. On the Mostar side Sušica, Pribiz draga, Rozački Potok, Ljeskovac are identified in the Kuti area. During the site visits, none of these watercourses were active.

According to the Study on Preliminary Flood Risk Assessment for the Category I Watercourses[5] there is no flood risk from the Neretva River in the subject area due to the control of the river from hydroelectric dams. On the other hand, historical floods are recorded on the Trešanica river in the industrial area of Repovica settlement in Konjic which indicate moderately significant flood risk in this area. Motorway will cross Trešanica river via viaduct No. 3 at height of 30 m so there is no flooding risk for the motorway structures in this area.

The latest report on the chemical and ecological status of surface waters in FBH was published in 2021[6]. However, monitoring performed for the Neretva River (Neretva 9 at Konjic and Neretva 10 upstream from Konjic), where monitoring of phytobenthos, zoobenthos, macrophytes, and ichthyofauna (at profile Neretva 10 only) was conducted, are not of interest for the Project. Monitoring was not performed on the Trešanica and Konjička Bijela rivers.

Surface waters quality monitoring was performed for three surface water bodies determined to be in the Project area of influence: river Neretva, river Trešanica and river Konjička Bijela (Table 5.2 and Figure 5.8 to Figure 5.11). Monitoring was performed during the wet season in March 2021 and during the dry season in July 2021.

The results of surface waters quality measurements are presented in Annex 4: Summary of Surface Waters Quality Measurements. The results indicate seasonal increase of heavy metals concentrations in surface waters (mercury and lead) of which the most significant is the increase of mercury

[5] Hydro-Engineering Institute Sarajevo (2013)
[6] Report on the state of surface and groundwater quality in the water area of the Adriatic Sea in the FBH for year 2020, Agency for Watershed of the Adriatic Sea, Mostar (2021)

concentration in high flow season in Konjička Bijela River. The value exceeds the upper limit several times. On the other hand, the mercury concentration at SP3 in low flow season are much lower and within the limits for III-IV class waters. The cause of elevated mercury concentrations is not easily identified. The existing polluters in the catchment areas are one active quarry, potential activities within the shooting range and sewage pollution from individual households. All of them are located upstream from the sampling location where the monitoring results at SP4 indicated that mercury concentrations are inside the permissible limits. Therefore, these polluters cannot be taken as a source of mercury contamination. Moreover, the results of soil quality testing presented in section 5.6 do not indicate increased concentration of heavy metals. All these uncertainties lead to a conclusion that it is mandatory to repeat baseline measurements before the commencement of construction works.

Name	Description	Location
SP1 - Neretva	downstream the viaduct No. 4	N: 43°38'16.53" E: 17°58'45.07"
SP2 - Trešanica	downstream the viaduct No. 3	N: 43°39'32.17" E: 17°58'4.94"
SP3 - Konjička Bijela	before the confluence with Neretva River	N: 43°38'20.24" E: 17°58'25.23"
SP4 - Konjička Bijela	near settlement Mladeškovići	N: 43°37'12.20" E: 17°57'40.14"

Table 5.2 Description of surface waters quality measuring points within the influence area

Figure 5.8 Neretva River water quality measuring point downstream the viaduct No. 4 (SP1)

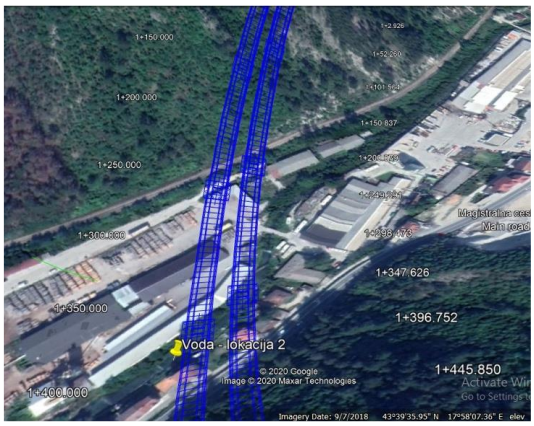

Figure 5.9 Trešanica River water quality measuring point downstream the viaduct No. 3 (SP2)

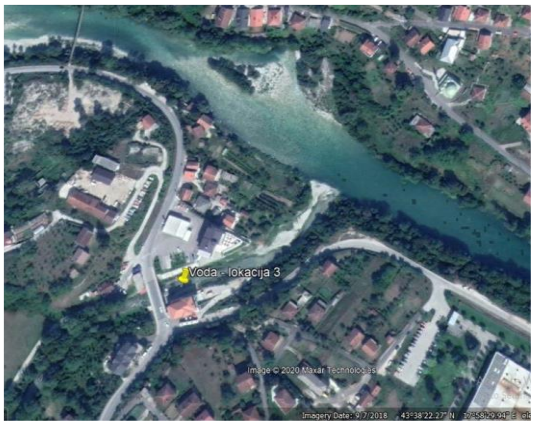

Figure 5.10 Konjička Bijela River water quality measuring point before the confluence with Neretva River (SP3)

Figure 5.11 Konjička Bijela River water quality measuring point near settlement Mladeškovići (SP4)

5.4.2. Groundwaters

It is very difficult in karst, sometimes impossible, to determine the exact distribution of caverns, karst channels and cracks that govern the direction of groundwater flow. The most recent dye-tracer tests were carried out by Winner Project d.o.o. Sarajevo in the period 2021-2022 to determine possibility of groundwater impact on the construction of the Prenj Tunnel as well as the impact of tunnel construction on the water sources used for the public water supply of Konjic, Jablanica and Mostar.

The general direction of groundwater flow (Figure 5.12) on the Prenj mountain (the wider area around motorway alignment) is conditioned by the position of the main Dinaric fault that extends in the direction northwest-southeast and secondary faults that are perpendicular to the main one. This fault zone in the northeast wing is represented by Upper Triassic limestones, and dolomites ($T_{2,3}$) and Middle Jurassic limestone (J_2) in the south-west wing. Thus, groundwaters of the north-east wing mainly gravitate towards Konjička Bijela, Buk and Sanica in the direction of northwest, north and northeast, and not in the direction of the Prenj Tunnel. Groundwaters of the southwest wing gravitate toward Salakovac and Crno Vrelo in the direction of southwest, and not in the direction of the Prenj Tunnel. Therefore, this fault zone cause groundwaters on the Prenj mountain to generally move toward Konjička Bijela and Salakovac springs. Since the groundwaters flow in this area is under

direct influence of hydrological situation, possibility of groundwater overflows from one basin to another and moving toward the Prenj Tunnel in the period of high flows cannot be excluded.

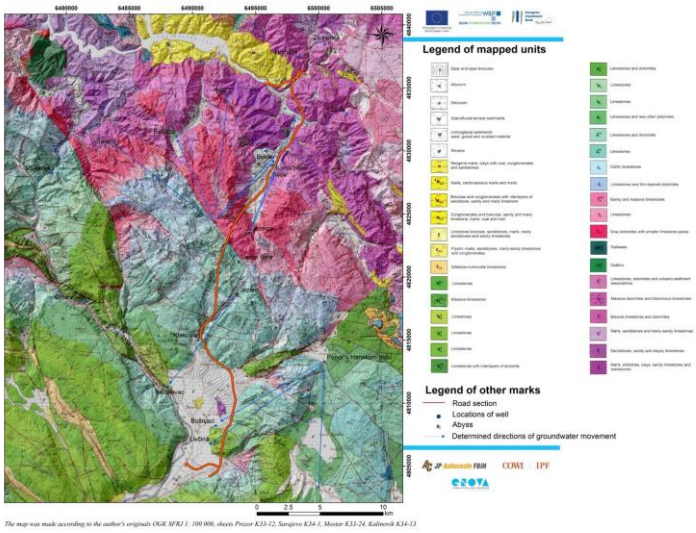

Figure 5.12 Determined direction of groundwater movement

Based on the available design documents and results of engineering and geological research carried out so far for the purpose of designing the Prenj Tunnel, which were limited to portal zones and surface mapping of the terrain (without exploratory boreholes along the tunnel route), it can be concluded that the elevation of the tunnel will be above the impermeable subgrade represented by Lower Triassic flysch sediments, which is a barrier to the movement of groundwater. A conditional barrier to the movement of groundwater along the route of the tunnel is represented by dolomites of the Middle and Lower Triassic, especially in the zone of the entrance portal.

One third of the Prenj Tunnel excavation (entrance on the Konjic side) will be carried out in the north-eastern wing of the large fault whose groundwater gravitates towards the springs of Konjička Bijela, Idbar and Sanica. The remaining two-thirds of the tunnel excavation will be carried out in the southwestern wing of the large fault, whose groundwaters are dominantly gravitating to Salakovac springs and probably Crno Vrelo spring.

5.5. NOISE

Regular monitoring of noise levels for the Project area does not exist. Therefore, environmental noise measurements along planned access roads were performed at three locations during June 2022 (Table 5.3 and Figure 5.13 to Figure 5.15).

Name	Description	Location
MP1 - Bijela	settlement Bijela	N: 43°36'27.03" E: 17°56'49.64"
MP2 - HP Investing	near the HP Investing industrial site	N: 43°26'38.73" E: 17°51'46.13"
MP3 - Prigrađani	in the vicinity of houses at Prigrađani settlement	N: 43°27'37.65" E: 17°52'22.04"
MP4	near Neretva River at the beginning of southern access road	N: 43°39'41.63" E: 17°56'54.21"

Table 5.3 Description of noise levels measuring points near access roads

Figure 5.13 Noise levels measuring point at Bijela (MP1)

Figure 5.14 Noise levels measuring point near HP Investing industrial site (MP2)

Figure 5.15 Noise levels measuring point near river Neretva at the beginning of southern access road (MP4)

Based on the compiled and analysed data from the field during both winter (March) and summer (July) period, it can be stated that the results of measurements correspond to the acoustic requirements defined by the Law on noise protection. The results of outdoor baseline noise measurements are presented in Annex 5: Summary of Noise Measurements.

5.6. SOIL

According to the Spatial Plan of the Republic of B&H (1981-2000), the land is classified according to three categories:

- Agro-zone I - highly valuable agricultural land,

- Agro-zone II - medium valuable agricultural land, and
- Agro-zone III - least valuable agricultural land.

Based on the information obtained from the 2018 Corine Land Cover for B&H[7], the main alignment of the motorway, Konjic Bypass and access roads pass mainly through urban, agricultural, and natural areas (forest). The southern section, after the Prenj Tunnel, is passing close to the area with agricultural land (mostly vineyards). Data presented in Annex 6: Summary of Land Type Survey and Soil Quality Measurements refers to the land occupied by the footprint of access roads. The land occupied by the two footprints is under direct impact and will be permanently lost due to the motorway construction.

Soil quality monitoring was performed in May 2022, at three locations along the access roads to Prenj Tunnel (Table 5.4 and Figure 5.16 to Figure 5.18). The monitoring was performed in accordance with the Rulebook on determining the permitted quantities of harmful and dangerous substances in the soil and the methods of their testing.

Name	Description	Location
SP1 - Bijela	access road in settlement Bijela	N: 43°36'16.86" E: 17°56'43.92"
SP2 - HP Investing	access road near the HP Investing industrial site	N: 43°26'40.13" E: 17°51'49.45"
SP3 - Prigrađani	access road in Prigrađani settlement	N: 43°27'39.68" E: 17°52'25.22"

Table 5.4 Description of soil quality sampling points along the access roads

Figure 5.16 Soil quality sampling point at the access road in Bijela (SP1)

Based on the test locations and surrounding environment, all sampling points can be considered as agricultural land. According to the structure of the soil samples, the soil is sandy and is evaluated against the limit values given in the Rulebook on determining the permitted quantities of harmful and dangerous substances in the soil and the methods of their testing. The results are presented in Annex 6: Summary of Land Type Survey and Soil Quality Measurements. All parameters for all three analysed soil samples meet the limit values stipulated by the Rulebook on determination of

[7] https://land.copernicus.eu/pan-european/corine-land-cover/clc2018

permitted amounts of harmful and dangerous substances in soil and their testing methods, except for zinc which level is higher than the limit values in soil samples at SP1 and SP2.

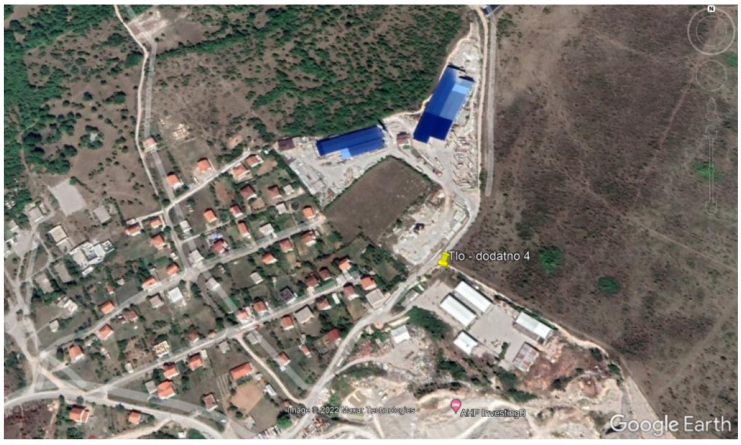

Figure 5.17 Soil quality sampling point at the access road near the HP Investing industrial site (SP2)

Figure 5.18 Soil quality sampling point at the access road in Prigrađani (SP3)

5.7. BIODIVERSITY

Motorway passing through the nature via tunnels avoids negative impacts and is the optimal solution regarding biodiversity issues. That is the case with this Project as well. Tunnel is planned through the most valuable features avoiding negative impact on their integrity and conservation objectives (qualifying features).

Habitat diversity in the Project area was determined based on information provided in the Field Guide to Natura 2000 habitat types in B&H[8], as well as on the results of conducted field surveys. The vegetation surveys were undertaken on 58 sample points (Annex 7: Summary of Habitat Surveys) in September and October 2020, on multiple occasions in the period from March to June 2021, as well as in June 2022.

[8] Milanović, D., Brujić, J., Dug, S., Muratović, E., Lukić Bilela, L. (2015). Vodic kroz tipove staništa BiH prema Direktivi o staništima EU. Saradnja za Naturu. Natura 2000, Podrska za provođenje Direktive o pticama i Direktive o staništima u Bosni i Hercegovini, Prospect C&S s.a., Brussels

Based on the available literature data and field research, 20 EUNIS (European Nature Information System) habitat types have been identified within the surveyed area around motorway route (Annex 7: Summary of Habitat Surveys). Concerning the Prenj Tunnel, the habitats found 500 m south of the northern portal and north of the southern portal of the tunnel were included on the list (Figure 5.19 and Figure 5.20). Data in Annex 7: Summary of Habitat Surveys shows area under specific habitat types directly and indirectly affected by the Project.

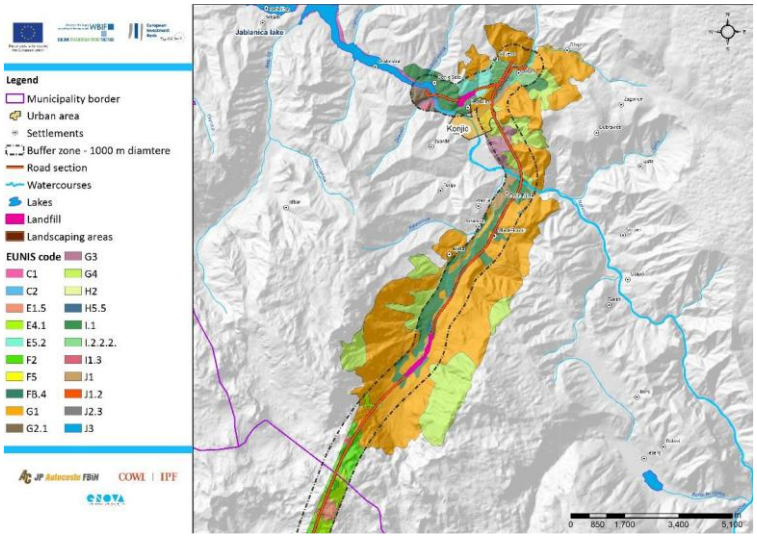

Figure 5.19 Map of EUNIS habitat types in the surveyed area north of Prenj Tunnel

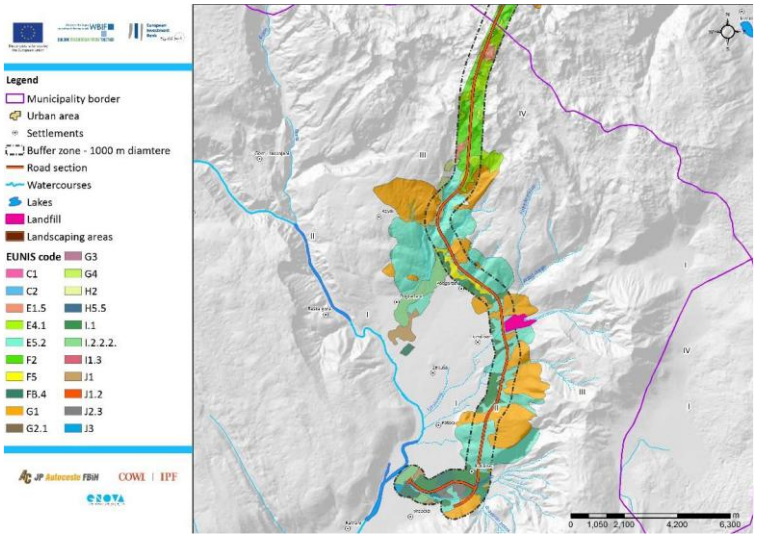

Figure 5.20 Map of EUNIS habitat types in the surveyed area south of Prenj Tunnel

Based on the comprehensive analysis of available literature data and field research, possible presence of a total of 19 Annex I habitat types in the Project area is established (Annex 7: Summary of Habitat Surveys).

Forest habitat type 95A0 High oro-Mediterranean pine forests - valuable forests of Bosnian pine (*Pinus heldreichii*) is present at higher altitudes of the Prenj Mountain but has marginal presence east of the section prior to Prenj Tunnel. Spatial coverage of this habitat type is approximately 17.30 km^2 in surveyed area (Figure 5.21).

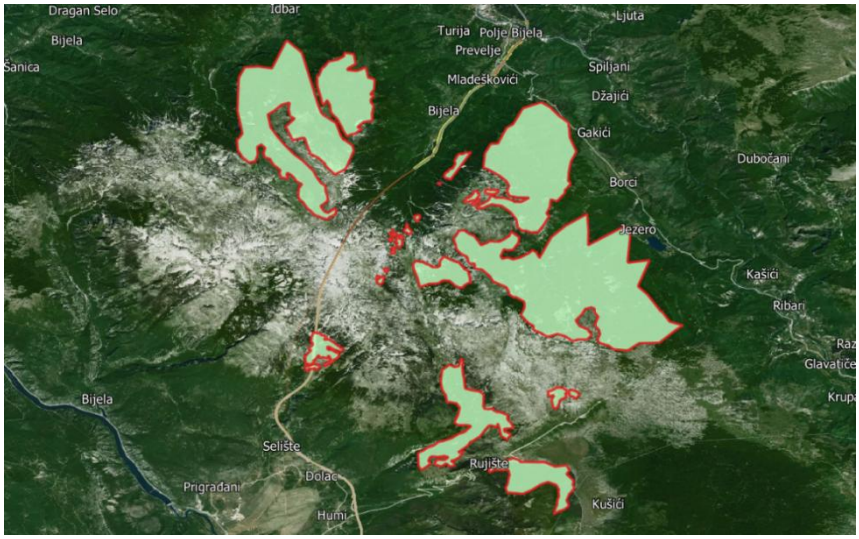

Figure 5.21 Habitat type 95A0 on Prenj Mountain

The local EIA[9] from 2016 provides information on the dominant species that can be found in the general area of Konjic and Mostar. Data in Annex 7: Summary of Habitat Surveys presents an overview of invasive plant species within the study area.

5.8. PROTECTED AREAS

There are no officially designated protected areas in the Project area, as can be seen on Figure 5.22. The closest officially established protected area to the Project site is Blidinje Nature Park, which is located 13 km of air distance west of the motorway route.

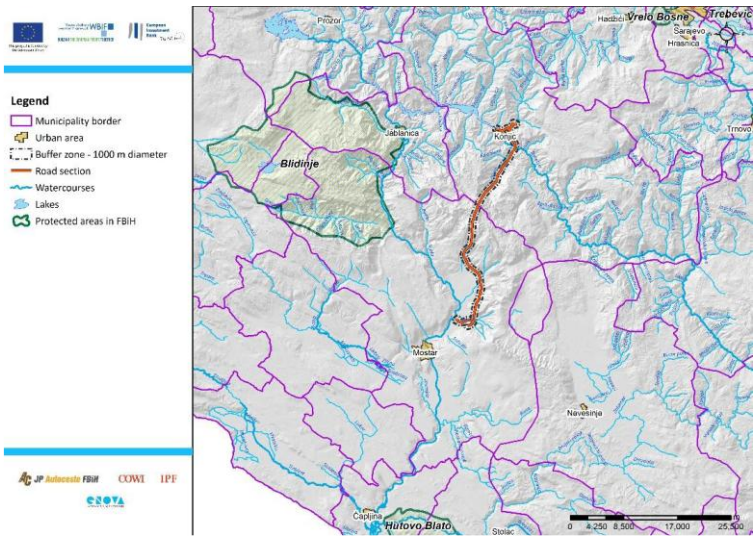

Figure 5.22 Spatial distribution of existing protected areas in relation to the motorway route

[9] Environmental Impact Study, Section: Konjic (loop Ovčari) - Mostar North, L=36.50 km, Zagrebinspekt d.o.o. Mostar (2016)

5.9. POPULATION AND ECONOMY

According to the 2013 Census, BiH has 3.531.159 inhabitants, of which 50.1% declared as Bosniaks, 30.8% as Serbs, 15.4% as Croats and 3.7% as others. Out of the total population in B&H, 2.219.220 (63%) live on the territory of FBH. Within FBiH, majority (70.4%) of population are declared as Bosniaks, 22.4% as Croats, 4.6% as others and 2.5% as Serbs. Out of the total number of inhabitants living on the territory of FBH, 10% are living on the territory of Herzegovina-Neretva Canton (222.007 inhabitants) - 53.3% declared as Croats, 41.4% as Bosniaks, 2.9% as Serbs and 2.4% as others.

In 2013, the total number of households in Herzegovina-Neretva Canton was 68,121, and the average number of members in one household was 3.24. The largest number of people live in households with two members (14,958 or 21.96%), four members (14,116 or 20.72%) and three members (13,109 or 19.24%). With 222,278 inhabitants (2013) and 50.45 inhabitants/km^2, Herzegovina-Neretva Canton is the sixth in population density and eighth in population size among cantons of FBH. The area of the Canton is 4,372 km^2, which is 16.85% of the area of FBH and 8.59% of the territory of B&H.

The Project location lays between the two centres in the Herzegovina-Neretva Canton. Mostar is the administrative and economic centre of the Canton. The strongest economic activities in the Canton are wholesale and retail trade, processing industry, and hotel and catering. The strongest processing industries are the military, metal processing and food industries. In addition, electricity production is also an important economic activity in this Canton. It mostly takes place in hydroelectric power plants on the Neretva River and its tributaries. The economy of Konjic relies on agricultural production, beekeeping, animal husbandry, wooden and metal industry, and the tourism sector, whereas the economy of Mostar area relies on the production of aluminium and metal industries, agricultural production, stone processing, electricity production from renewable sources of energy, and the tourism sector.

The local economy of the Project area is based mainly on agriculture and tourism related activities, as well as some metal processing and construction.

5.10. EXISTING TRAFFIC INFRASTRUCTURE

Within the area of the future motorway, there are several existing roads in use:

- Main road M17: northern border with Croatia-Doboj-Zenica-Sarajevo-Mostar-Capljina-southern border with Croatia,
- Regional road R435: Konjic-Borci-Glavatičevo-Odžaci, and
- Regional road R435a: Potoci-Rujište-Ćesim-Borci.

According to data presented in the Study of Traffic Count Locations on the Main Roads of FBH (2019), it can be noted that the section of M17 from Konjic to Mostar has moderate traffic intensity. Main road M17 passes through populated areas with relatively intensive pedestrian traffic, high side friction and speed limit 40-50 km/h.

The rest of the road network is made up of access roads, local roads, unpaved roads, and footpaths, which connect local settlements with the above listed three roads. The local roads are used by local inhabitants to reach their houses and land plots, as well as by local businesses during their business activities.

Major railway line running from the northern border with Croatia through Doboj, Sarajevo and Mostar to the Port of Ploče in Croatia, is the equivalent of the road Corridor Vc. However, there is no interference between the Project and railway.

5.11. CULTURAL, HISTORICAL AND ARCHAEOLOGICAL HERITAGE

Several assets (one in Konjic and 13 in Mostar) were registered as the cultural and historical heritage in the wider zone of the motorway (within 500-1,000 m or more, none closer than 500 m). According to the list provided by the Commission for Preservation of National Monuments, most of the listed monuments belong to III or IV category (which means they are of low or medium value). These assets are listed in Annex 8: Summary of Cultural and Historical Assets Survey. Out of all the registered sites, only two are in operation (mosque in Podgorani and mosque in Potoci) whereas the remaining are ruins.

In addition to the above assets, six additional assets were identified during the development of ESIA - four near the motorway section and two near the Konjic Bypass. The proposed alignment does not affect access to any of these six and does not create any risk.

However, it is noted, that none of the assets are in the vicinity of the Project, i.e. Prenj Tunnel and access roads.

6. SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACTS

During preparation of the ESIA, it has been determined that certain ES risks and impacts may arise through the various phases of construction and during the operation of the motorway. At the same time, the ES risks and impacts associated with the pre-construction phase mostly refer to the inappropriate organization of the construction site. These are briefly summarized below (Table 6.1 to Table 6.3).

Aspect	Risk and/or impact
Flora	- Inadequate planning of works and Main Design requirements - Lack of up-to-date baseline conditions
Fauna	- Inadequate planning of works and Main Design requirements - Lack of up-to-date baseline conditions
Groundwaters	- Limited information on groundwater quality and quantity in the zone of motorway construction - Pollution risks from works in the proximity of groundwater levels
Surface waters	- Lack of up-to-date baseline conditions - Pollution risks from works within riverbed or in the proximity of surface waters - Changes in the water flow and recharge by cutting or diverting permanent and intermittent streams around road structures - Potential disruption of water supply to consumers and/or deteriorated water quality
Air quality	- Lack of up-to-date baseline conditions - Air pollution at inadequate production capacities
Noise	- Lack of up-to-date baseline conditions
Soil	- Lack of up-to-date baseline conditions - Occurrence of landslides and rock falls due to instability of terrain and the nature of construction works - Pollution risks at equipment, machinery and vehicle maintenance and parking areas

Aspect	Risk and/or impact
	- Environmental damage caused by opening of quarries and borrow pits
Waste and dangerous materials	- Potential lack of landfill areas - Pollution risks from dangerous spills and accidents
Social	- Changing conditions in local settlements - Risk of accidents at the construction site - Potential collisions with public utility services - Changing conditions to road users

Table 6.1 Summary of ES risks and impacts during the pre-construction phase

Aspect	Risk and/or impact
Flora	- Vegetation removal due to preparation of the construction site and during construction works - Dusting of nearby flora due to performance of construction works - Habitat loss - Spread of invasive species
Fauna	- Disturbance of fauna species due to increased level of noise, vibration, and light in the zone of construction activities - Potential disturbance of nests/roosts of species that have a seasonally variable vulnerability due to breeding, feeding times or seasonal migrations - Habitat loss - Potential fatalities or injuries of fauna species due to vegetation removal and movement of heavy machinery
Groundwaters	- Intrusion of groundwater in tunnel tubes during excavation that can impact stability of the structure and cause the safety risk - Impact on the direction of ground water flow and recharge by cutting the underground voids/streams during tunnel excavation - Pollution or decrease of groundwater quality due to direct release of intercepted tunnel drainage water (which can be loaded with suspended solids and other pollutants) and due to direct release of runoff from access roads and working plateaus without treatment, turbidity caused by erosion and excavation or blasting of the rock mass, accidental spills in the vicinity of springs - Inappropriate disposal of non-inert material in case its appearance in excavation
Surface waters	- Pollution or decrease of water quality of rivers Trešanica, Neretva and Konjička Bijela due to direct release of pollutants (suspended solids and other pollutants) generated by construction activities - Inappropriate disposal of non-inert material in case its appearance in excavationChange in river flow and recharge by cutting or diverting permanent and intermittent streams around road structures
Air quality	- Reduction in air quality due to emissions of construction dust, emission of exhaust gases from combustion processes in generators and other construction equipment, machinery, and vehicles - Increase of dust in the air due to work and movement of construction equipment, machinery, and vehicles
Noise	- Nuisances and disturbances on workers and residents from increased levels of noise during construction works
Vibrations	- Structural damage from vibrations caused by construction equipment and operation methods employed, including use of explosives during blasting - Nuisances and disturbances on workers and residents from increased levels of vibrations during construction works
Soil	- Soil erosion because of deforestation, excavations and use of heavy machinery and equipment

Aspect	Risk and/or impact
	- Pollution of soil from accidental fuel and oil spills - Direct discharge of wastewater from maintenance of construction vehicles at the site and sanitary waters from construction camp - Direct discharge of construction water from the tunnel during works and of runoff from access roads and working plateaus without treatment - Inappropriate waste/spoil disposal and disposal of non-inert material - Occurrence of landslides and rock falls which can further endanger the stability of terrain that is the basis for the construction of roads, while the wider ecological incident can occur if the watercourse or part of it is buried by a landslide/rock fall
Landscape	- Changes to the existing landscape and visual impacts due to the construction works
Waste and dangerous materials	- Contamination of environment due to inappropriate management of excess excavated material and waste generated during construction - Environmental damage caused by improper materials/chemicals management - Environmental damage caused by inadequate management of disposal sites/landfills
Cultural, historical, and archaeological heritage	- Damage of unknown cultural, historical, and archaeological heritage sites from excavations along access roads
Social	- Influx of workers having potential negative impacts (impacts on community dynamics and potential social tensions, exposure of local population to diseases including communicable diseases and Sexually Transmitted Diseases (STD) or Sexually Transmitted Infections (STI), or possible gender-based violence and harassment (GBVH) issues) - Increased number of grievances - Unauthorised access by the public and exposure to risks such as falls and hazardous materials or interactions with heavy equipment, both within construction site and on roads to active construction site - Traffic safety risks to residents living near the local roads which will be used for construction vehicle, equipment, and machinery movements due to increase in construction-related journeys - Disruption of public utility services - Restricted access to adjacent properties (residential, business, agricultural, etc.) - OHS risks to workers

Table 6.2 Summary of ES risks and impacts during the construction phase

Aspect	Risk and/or impact
Flora	- Chemical pollution due to increased quantity of exhaust gases and heavy metals and chemical utilisation during maintenance
Fauna	- Habitat fragmentation - Chemical pollution - Collision of fauna due to high speed of vehicles (birds, bats, small mammals, herpetofauna) - Negative impacts of pollution, increased light levels on sensitive fauna species such as bats
Groundwaters	- Decrease of ground water quality resulting from release of untreated run-off from the motorway surface in the proximity to the springs and their water protection zones, and accidental spill of hazardous material resulting from traffic accidents - Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation
Surface waters	- Reduction in water quality in river system resulting from direct release of intercepted surface run-off, direct release of sanitary water from toll station,

Aspect	Risk and/or impact
	accidental spill of hazardous material resulting from traffic accidents, and use of de-icing agents - Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation
Air quality	- Reduction in air quality due to emission from exhaust gases from vehicles using the motorway and access roads
Noise	- Nuisances and disturbances on residents from increased levels of noise from motorway and access roads traffic
Soil	- Soil erosion - Pollution from direct discharge of surface run-off, and accidental fuel and oil spills - Reduction in soil quality resulting from use of de-icing agents - Landslides and rock falls causing physical damage to the infrastructure, vehicle damage, disruption to traffic flow, interruption of technical infrastructure such as power supply, water supply, etc. - Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation
Waste and dangerous materials	- Contamination of environment due to inappropriate waste management, storage, and handling arrangements
Society	- Community health and safety - OHS risks to maintenance workers

Table 6.3 Summary of ES risks and impacts during the operational phase

7. SUMMARY OF MITIGATION MEASURES

During preparation of the ESIA, a number of actions and recommendations have been determined to mitigate ES risks and impacts arising through the various phases of construction and during the operation of the motorway. These are briefly summarized below (Table 7.1 to Table 7.3) while the full ES mitigation plan is presented in Annex 1: Environmental and Social Mitigation Plan. Mitigation measures are foreseen and included as part of the typical implementation and as such, their costs are included in the construction or maintenance costs.

Aspect	Mitigation measure
Flora	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Implement Biodiversity Management Plan (BMP) recommendations and BMP update in case of new species identification
Fauna	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Implement BMP recommendations and BMP update in case of new species identification - Additional survey to determine any additional locations of Golden Eagle (*Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* nesting in the area of Klenova Draga (within the boundaries of the construction site)
Groundwaters	- Contractor to timely establish baseline conditions - Prevent cutting of underground streams and contamination of groundwater during preparatory works - Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection

Aspect	Mitigation measure
Surface waters	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Ensure that the works do not affect supply of drinking water in any village - Ensure proper dimensioning of ditches and culverts, and maintain temporary ditches - Implement Stakeholder Engagement Plan (SEP), in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity - Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection
Air quality	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Establish production capacities with valid approvals and licenses, including sufficient protection
Noise	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA
Soil	- Contractor to timely establish baseline conditions in case the construction begins more than 5 years after ESIA - Pre-construction survey of potentially instable rock slopes and implementing stabilisation measures - Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection - Establish and operate quarries and borrow pits as per the design and permits, or utilise existing ones that hold appropriate permits
Waste and dangerous materials	- Define landfill locations and prepare relevant design, including obtaining approvals and permits - Define waste collection and waste separation locations, including necessary protection
Social	- Organise consultations with local municipalities with the aim to clearly present all activities during construction - Negotiate and sign agreement on friendly environment with local municipalities - Prevent unauthorised access of public to construction site - Establishing register of collisions with public utility services - Establish information on the construction site along roads in the area - Prepare and implement Traffic Management Plan (TMP) within the site area and along supply routes - Provision of information to road users along roads in the area, through media and automobile association

Table 7.1 Summary of mitigation measures during the pre-construction phase

Aspect	Mitigation measure
Flora	- Implement dust suppression measures - Compensate for the vegetation removal - Prevent leakage and accidental spills of dangerous substances - Prevent direct wastewater run-off from the site - Remove soil contaminated with invasive species and reinstate the area
Fauna	- Schedule the works in accordance with the characteristics of local habitats - Visibly mark nesting locations - Avoid works in the area of forest ecosystems, and unnecessary deforestation and ecosystem damage - Prevent leakage and accidental spills of dangerous substances

Aspect	Mitigation measure
	- Prevent direct wastewater run-off from the site - Restrict movement of construction machinery, equipment, and vehicles to designated roads, including speed reduction and work during daylight hours - Daily checks for the presence and removal of species' individuals (fire salamander *(Salamandra salamandra)* and Hermann's tortoise *(Testudo hermanni)*) - Manage site to prevent fauna from entering and in a way to avoid creation of habitat for reptiles - Explore underground cave systems in case of encounter by authorised speleological organisation or expert - In case of inhabited nest(s) of Golden Eagle *(Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* are registered in the area of Klenova Draga (within the boundaries of the construction site), restrict works during the breeding and incubation periods (March-June), establish a feeding site to attract the eagle and the owl to an area away from the construction site - Reduce removal of the forest cover to the required minimum for the machinery movement to avoid disturbance and protect White-backed Woodpecker *(Dendrocopos leucotos)* and Black Woodpecker *(Dryocopus martius)* - Utilise directional, non-UV lighting - Adequately manage waste at the construction site
Groundwaters	- Prevent cutting of underground streams and contamination of groundwater during preparatory works - Do not discharge groundwater that penetrates the tunnel tube to discovered caverns or karst canals - Capture groundwater that penetrates the tunnel tube and drain it out of the tunnel with pipes or channels - Identify areas of fractured/faulty zones in advance with predrilling with preventors and using geophysics in the predrilled horizontal boreholes - Treat the captured groundwater before discharging into the environment - Construct bypass flows in case of cutting off groundwater streams - Underground caverns to be inspected before being filled - Utilise top-down grouting to have the area stable and the inflows manageable (minimised) for construction and operation reasons as well as environmental reasons - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair - Prevent accidental spills during fuelling by installing collection tanks during the operation - Do not drain tunnel runoff from drilling mining holes into open channels or caverns - Ensure continuous presence of hydrogeological engineers on the site - Fully pave access roads and working plateaus with asphalt and equip with closed drainage system - Treat construction water from the tunnel during works, collected wastewater from concrete batch plants and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence - In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems) - Implement SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity

Aspect	Mitigation measure
Surface waters	- Do not discharge excess material, waste and wastewaters into surface waters - Fully pave access roads and working plateaus with asphalt and equip with closed drainage system - Treat construction water from the tunnel during works, collected wastewater from concrete batch plants and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence - Manage the works in or around surface waters to minimise impact to water quality - Avoid stockpiling near watercourses - Avoid works in watercourses during the high flow season and during heavy rainfall - Direct access of vehicles to watercourse to be restricted only to vehicles required for construction works - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair - Concrete mixing and washing areas should be located more than 500 m from any watercourse while wastewater from these areas shall be intercepted and hauled to a licenced disposal facility - Prevent accidental spills during fuelling by installing collection tanks during the operation - Assure sufficient flow through culverts in case of cutting off or controlling the water flow - In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems) - Implement SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity
Air quality	- Production facilities and equipment to be equipped with filters - Implement dust suppression measures such as wetting the site - Cover truck load - Control speed of construction vehicles - Utilise only construction equipment and vehicles that meet national emission standards - Regularly inspect, maintain, and repair construction equipment and vehicles
Noise	- Implement noise control measures such as: restriction of works to daytime only, speed control of construction vehicles, precise definition of hauling routes, use of noise mufflers, equipment and machinery to be shut down when not in use, limited simultaneous use of machines that generate high noise levels (over 70 dB) - Install temporary noise barriers if necessary - Regular and complete inspection of equipment condition, as well as regular maintenance
Vibrations	- Respect recommended safety distances for tunnel drilling at the identified vibration hotspots - In case of using of explosives for the tunnel mining, limit of 10 mm/s peak particle velocity applies to nearby sensitive receivers - The contractor must prepare blasting plan prior to construction - Before carrying out any inevitable activities that produce vibrations near receptors that are sensitive to noise and vibration, communicate properly with those affected, inform them in advance of the tasks to be performed, and of the expected duration

Aspect	Mitigation measure
	- Regular and complete inspection of equipment condition, as well as regular maintenance - Avoid simultaneous operation of equipment that produces vibrations and its utilisation during quiet hours - The selection of equipment will consider the vibration level - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair
Soil	- Implement topsoil management at stockpiles - Compensate for the vegetation removal to supress erosion - Implement designed slope and erosion protection measures - Install drainage system to prevent erosion - Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair - Prevent accidental spills during fuelling by installing collection tanks during the operation - Collect wastewaters and sanitary waters, and deliver to licenced operators for final treatment and discharge - Fully pave access roads and working plateaus with asphalt and equip with closed drainage system - Treat construction water from the tunnel during works and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence - Adequate temporary storage of waste, including collection and treatment - Municipal waste to be collected and treated by licenced waste operator - Hazardous waste to be managed by certified companies/agents - In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems) - Geotechnical slope monitoring and timely implementing slope stabilisation measures
Landscape	- Compensate for the vegetation removal - Recultivation with autochthonous species characteristic for the area to preserve gene pool and amenity - Regular cleaning of construction site from construction and other waste - Upon completion, areas used as construction compounds will be returned to their original use and condition
Waste and dangerous materials	- Utilise only approved landfill locations - Establish landfills as per the design and permits - Disposal of inert material on designated disposal sites and recultivation afterward - Do not discharge liquid waste and wastewater into drains and sewers - Implement waste separation directly at the construction site - Adequate temporary storage of waste - No burning of waste generated at construction site - Hazardous waste to be managed by certified companies/agents - Use of mobile toilets for site personnel - Municipal waste to be collected and treated by licenced waste operator - Restricted access to dangerous materials - In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)

Aspect	Mitigation measure
Cultural, historical, and archaeological heritage	- Develop and implement chance finds procedure
Social	- Induction of workers with rules and measures related to community interference - Develop and implement workers code of conduct - Full implementation of SEP - Timely registration and resolution of complaints - Implement TMP - Prevent access to site for unauthorised personnel - Specific designation of routes to be used by public at the construction site - Implement measures for identified collision points while also ensuring timely reaction in case of disruption - Implement agreement on friendly environment - Maintain access to all adjacent properties during the construction of access roads and throughout the contract period - Set and implement relevant OHS provisions following the relevant legislation and technical specifications - Provide health surveillance and healthcare access for workers

Table 7.2 Summary of mitigation measures during the construction phase

Aspect	Mitigation measure
Flora	- Regular maintenance of vegetation within the motorway right-of-way (RoW) - Controlled discharge of run-off waters - Avoid utilisation of herbicides and hazardous substances - Adequate storage location of chemicals used in motorway and access roads maintenance
Fauna	- Fencing of the motorway RoW, including its maintenance and repair - Adequate cleaning and maintenance of drainage system - Replacing lighting bulbs with low-pressure sodium lights, high-pressure sodium bulbs or mercury bulbs, and avoiding placing the artificial streetlights and unnecessary illumination - Revegetation
Groundwaters	- Implementation and maintenance of a closed system for controlled collection of storm water, and its treatment in oil and grease separators (for surface run-off) and/or biological treatment units (for sanitary wastewater) to the required quality before discharge into the recipient - Do not discharge treated water in the spring area - Define and implement procedures to prevent contamination of groundwaters from accidental spills - In case landfill for non-inert material will be established, define and implement procedures for its management
Surface waters	- Implementation and maintenance of a closed system for controlled collection of storm water, and its treatment in oil and grease separators (for surface run-off) and/or biological treatment units (for sanitary wastewater) to the required quality before discharge into the recipient - Do not discharge treated water in the spring area - Define and implement procedures to prevent contamination of surface waters from accidental spills - In case landfill for non-inert material will be established, define and implement procedures for its management

Aspect	Mitigation measure
Air quality	- If measurement of standard air quality parameters shows that values exceed maximum allowed values prescribed by national regulation, implement protection measures in the form of wide leafed green plants or artificial barriers - Install and operate air filters at the tunnel ventilation system, including their regular maintenance
Noise	- If measurement of noise levels shows that values exceed maximum allowed values defined by national regulations, design and install noise protection barriers
Soil	- Maintenance of drainage system to prevent erosion impact and pollution - Planting vegetation cover at soil surfaces - Define and implement procedures to prevent contamination of soil from accidental spills - Geotechnical slope monitoring and implementing of slope stabilisation measures - Mark location and set up appropriate traffic signalisation in case of landslide and/or rock fall - In case landfill for non-inert material will be established, define and implement procedures for its management
Waste and dangerous materials	- Regular cleaning of the RoW - Transfer waste to licenced operators for final treatment/disposal
Social	- Identify and address all major hazards for the local community - Timely information to local communities on the extent of works and duration prior to the commencement of maintenance works - Ongoing implementation of the grievance mechanism - Set and implement relevant OHS provisions following the relevant legislation and technical specifications - Provide health surveillance and healthcare access for workers

Table 7.3 Summary of mitigation measures during the operational phase

8. SUMMARY OF MONITORING PLAN

Monitoring during the implementation of the Project provides information on the key ES aspects of the Project, especially on the effectiveness of the foreseen mitigation measures. Such information would enable the MFBH, at the first instance, and the EBRD to evaluate the success of the mitigation measures and call for corrective actions to be taken if necessary. Monitoring of the effects of the Project will commence during the pre-construction phase, spreading through the construction phase, and will continue during operation of the motorway. Therefore, the monitoring plan (Annex 2: Environmental and Social Monitoring Plan) specifies the types of controls linking them to the identified risks and impacts and mitigation measures described in the mitigation plan.

The main components of the monitoring plan include:

- Parameters and activities to be controlled;
- Location of control with a focus on specific location or to construction site in general;
- The method in which the control will be carried out;
- When the control will be carried out;
- Responsibility for exercising control;
- Cost estimate for control activities.

Major monitoring activities are comprised either of visual inspection of Contractor's activities, review of Contractor's documentation and records, and establishing compliance with the requirements.

However, at certain times, sampling and testing of environmental parameters would be required to establish the level of compliance and whether any harm has been done to the environment.

Following the award of the contract, Contractor will be required to develop a detailed plan for sampling and testing of water, soil and air quality, and noise level measurements, in accordance with the conditions listed in the developed monitoring plan, including specification of targets/limits for each parameter. The monitoring results will be compared to data on baseline conditions established through the ESIA. However, in case the construction will begin more than 5 years after completion of the ESIA, the Contractor is obliged to establish new baseline conditions.

Based on the mitigation and monitoring plans, a checklist for field monitoring will be prepared and used by supervising engineers who are tasked with monitoring the implementation of the mitigation measures, as well as of the works implementation in general.

During the operation of the motorway the relevant parameters will be monitored and will include noise levels, air, water, and soil quality. The results obtained will determine if additional mitigation/protection measures are necessary, such as provision of additional noise attenuation structures, landscaping, or modifications to carriageway drainage.

9. PUBLIC CONSULTATIONS AND GRIEVANCES

The public has the right to participate directly or indirectly, with the possibility of expressing their interests and opinions in the decision-making process during all Project activities.

9.1. PUBLIC CONSULTATIONS

In respect to ES issues, MFBH has completed ESIA. The national consultation and disclosure procedure was completed during September 2023, and the process resulted by issuance of the consent to the ESIA by the FMET (January 22, 2024). Public consultations organised in Konjic and Mostar, also included presentation and discussion about the framework ESMP that was a part of the ESIA.

The ESMP will be disclosed at the website of MFBH[10] (in both English and local language) while the concerned municipalities and local organisations will be informed on its availability.

9.2. GRIEVANCE REDRESS MECHANISM

Effective and timely resolution of complaints is important for any organization, as this ensures a good relationship with all interested parties. In the context of the project, complaint management is an integral part of a sound stakeholder engagement strategy, which is necessary for the successful execution of the project.

In addition to institutionally available regular and extraordinary legal frameworks and existing institutional channels, which also protect the interests of interested parties, MFBH has established a formal procedure or process for management of complaints/grievances of workers and local communities (Grievance Redress Mechanism - GRM). Any person or organization has the right to submit complaints/grievances/comments. The use of this mechanism must not at any time constitute an obstacle for the complainant to refer his complaint to the national legal system or through

[10] https://www.jpautoceste.ba/okolisno-drustvena-dokumentacija/

another available mechanism. Conversely, resolving a complaint through a legal or other mechanism must not prevent friendly negotiations, arbitration, or mediation.

Full details on the MFBH GRM are available in the *Guide for applying the complaints mechanism according to the rules of international financial institutions*, accessible through the MFBH web page[11].

Complaint/grievance/comment may be submitted online[12] or by submitting a grievance form (Annex 9: Grievance Form). All complaints/grievances/comments, as well as questions, can also be placed directly to the Contractor or Supervision Consultant.

An information leaflet regarding the GRM will be always available at the site, whether the site is closed or open. The information leaflet will be laminated and placed on the information board of the construction site so that it is always available to users. Information on the GRM will also be posted on the notice board within the premises of both municipalities as well as in local communities.

The Contractor will also provide a grievance mechanism for workers to raise reasonable workplace concerns and provide evidence that such a mechanism/system has been established and is functional. The Contractor will inform the workers of the grievance mechanism at the time of hiring and make it easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides feedback to those concerned, without any retribution. The mechanism should not impede access to other judicial or administrative remedies that might be available under law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

All complaints/grievances will be archived in the register and will be assigned a number. Their receipt will be confirmed within 3 working days.

GRM will make all reasonable efforts to resolve the complaint/grievance upon receipt. If the GRM is unable to address the issues raised by immediate corrections, long-term corrective action will be identified. The complainant will be notified of the proposed corrective action and monitoring of its implementation within 14 working days after confirmation of receipt of the complaint/grievance.

If the specific issue raised by the GRM procedure cannot be resolved or if no action is required, a detailed explanation/justification will be provided to the complainant as to why the issue was not addressed. The response will also include an explanation of how the person/organization who initiated the complaint/grievance can proceed if the response is not satisfactory.

At any time, complainants can seek other legal remedies in accordance with the legal framework of FBH.

10. INSTITUTIONAL ARRANGEMENTS

The MFBH is responsible for the overall implementation of the Project, including management of ES issues and compliance with the ESMP. It will also be the contracting authority (Employer/Client) for all contracts within this Project.

[11] https://www.jpautoceste.ba/wp-content/uploads/2021/01/Mehanizam-za-%c5%bealbe_FINAL-BOS.pdf
[12] https://www.jpautoceste.ba/obrazac-za-ulaganje-prituzbe-2/

The MFBH is staffed with engineers of various expertise having long track experience in implementation of the contracts financed by the International Financing Institutions (IFIs), but also of those financed by other donors and through the domestic funds. The MFBH team also includes financial management and procurement specialists familiar with IFIs procedures, land acquisition and resettlement specialists having a significant track record in social safeguards, as well as other expertise required for the implementation of projects with national, as well as international importance.

The Project is foreseen to be implemented by a Project Implementation Unit (PIU) within MFBH which has taken over the obligation to always maintain it during the Project implementation. PIU will be assisted by other staff members of the MFBH, from the technical, financial, and ES field of expertise, beside their regular duties. The PIUs tasks can be summarized as follows:

- Management and administration of the Project implementation;
- Project financial management;
- Quality assurance;
- Management of the procurement process;
- Ensuring compliance with ES requirements;
- Ensuring all necessary permits and satisfying all local regulations;
- Monitoring and evaluation of the Project, including regular monitoring and evaluation of outcomes;
- Taking the necessary corrective actions needed to sustain or improve progress;
- Coordination with all relevant stakeholders at local and national level;
- Reporting to the EBRD using data from their established monitoring practices with contributions from contractors and consultants, municipalities, and the feedback mechanism established for the Project.

The implementation of all foreseen ES mitigation and protection measures, as well as the monitoring program, will be ensured.

After contract signing, the Contractor will prepare its implementation plan (Construction ESMP - CESMP), to be reviewed, commented and approved by the Supervision Consultant, containing the detailed information on meeting the requirements detailed in this ESMP. The Contractor will be responsible for implementing ES mitigation measures during construction. The Contractor shall take all necessary steps and measures to protect the human and natural environment (both on and off the construction site) and shall not cause damage and nuisance to people and properties resulting from any of its activities. The Contractor will employ ES experts to manage and supervise the implementation of the Contractor’s responsibilities and will be in communication with the Supervision Consultant and MFBH PIU.

During the Project implementation, a firm of independent consultants (Supervision Consultant), who will liaise directly and report to MFBH PIU, will monitor whether and how well the Contractor complies with the measures outlined in the ESMP.

Any non-compliance with the ESMP or any other impact will require immediate remediation. Contractor vis-à-vis the MFBH, and the MFBH vis-à-vis the EBRD will need to present reasons for non-compliance, propose a detailed and timebound action plan to achieve compliance, and obtain the no objection of the EBRD for the action plan. The cost of proposed corrective measures will be borne by the responsible party.

Upon completion of the Project’s construction phase, MFBH will be responsible for the management, operation, and maintenance of the motorway. Regular and timely monitoring will be carried out in accordance with the monitoring plan, while the Maintenance Contractor and Maintenance

Supervision Consultant will be responsible for implementation and overseeing the implementation of the mitigation measures foreseen for the operational phase.

11. REPORTING

The following Table 11.1 details reporting procedures and schedules, as well as works management documents. All reports shall be submitted only in electronic form (original files and compiled as one pdf document).

The Contractor is required to submit several works management reports before commencement of site works, as specified in the **Error! Reference source not found.** below. The Contractor will prepare his compliance reports at regular monthly intervals. These reports shall contain a list and description of the activities performed, as well as recommendations and planned future activities and protection measures. A separate section of the report shall deal with reporting on the environmental quality parameters (water, air and soil quality, noise levels) at the agreed schedule.

Independent Supervision Consultant will directly report to the MFBH for the implementation of the Project. These reports shall contain a list and description of the activities performed, an ESMP compliance checklist, as well as the recommendations, instructions and orders issued to the Contractor. A separate section of the report shall deal with the assessment of established environmental quality parameters (water, air and soil quality, noise levels).

The process of reporting in case of unexpected situations or incidents must be immediate. The Contractor is obliged to immediately inform MFBH PIU and the local community after the unexpected event has occurred, while the MFBH shall immediately inform the EBRD on the event and order detail investigation about the unexpected situation or incident.

Annual Environmental and Social Reports (AESR), including all relevant ES issues and monitoring indicators in the pre-defined form, will be prepared by MFBH and submitted for EBRD's review.

Management document/report	Schedule	Language	Recipient
Contractor			
Topsoil Management Plan	before commencement of works	local, English	Supervision Consultant
Baseline Survey Report	before commencement of works	local, English	Supervision Consultant
BMP - update in case the baseline survey identifies new species in the Project area	before commencement of works	local, English	Supervision Consultant
Invasive Species Management Plan (ISMP)	before commencement of works	local, English	Supervision Consultant
CESMP	before commencement of works	local, English	Supervision Consultant
Construction Site Organisation Plan (CSOP)	before mobilisation	local, English	Supervision Consultant
Fire and Explosion Management Plan (FEMP)	before commencement of works	local, English	Supervision Consultant
Emergency Preparedness and Response Plan (EPRP)	before commencement of works	local, English	Supervision Consultant
Occupational Health and Safety Management Plan (OHSMP)	before commencement of works	local, English	Supervision Consultant

Management document/report	Schedule	Language	Recipient
Labour Management Plan (LMP)	before commencement of works	local, English	Supervision Consultant
TMP	before commencement of works	local, English	Supervision Consultant Traffic Police
Waste Management Plan (WMP)	before commencement of works	local, English	Supervision Consultant
Method Statements, including specific details on management of ES issues	before commencement of works or at least before commencing specific work item	local, English	Supervision Consultant
Monthly Progress Report (MPR)	monthly	local, English	Supervision Consultant
Works Completion Report	within one month after completion of works	local, English	Supervision Consultant
Incident Notification	immediate	local, English	Supervision Consultant MFBH PIU
Incident Report	within one month after the incident	local, English	Supervision Consultant MFBH PIU
Ad-hoc reports	within the time specified in the request for reporting	local, English	Supervision Consultant MFBH PIU
AESR (supporting information)	annually	English	Supervision Consultant MFBH PIU
Supervision Consultant			
Inception Report	one month after commencement of services	local, English	MFBH PIU
MPR	monthly	local, English	MFBH PIU
Construction Completion Report	within one month after completion of works	local, English	MFBH PIU
Defect Notification Report	quarterly during the defect notification period	local, English	MFBH PIU
Ad-hoc reports	within the time specified in the request for reporting	local, English	MFBH PIU
MFBH			
AESR	annually	English	EBRD
Incident Notification	immediate	English	EBRD
Incident Report	within one month after the incident	English	EBRD
Ad-hoc reports	within the time specified in the request for reporting	English	EBRD
Operational ESMP	before opening the section for operation	local, English	EBRD

Table 11.1 Reporting

Vienna, 18.02.2025

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12. ANNEXES

Annex 1	Environmental and Social Mitigation Plan
Annex 2	Environmental and Social Monitoring Plan
Annex 3	Summary of Air Quality Measurements
Annex 4	Summary of Surface Waters Quality Measurements
Annex 5	Summary of Noise Measurements
Annex 6	Summary of Land Type Survey and Soil Quality Measurements
Annex 7	Summary of Habitat Surveys
Annex 8	Summary of Cultural and Historical Assets Survey
Annex 9	Minutes of Public Consultations and List of Participants
Annex 10	Grievance Form

12.1. ANNEX 1: ENVIRONMENTAL AND SOCIAL MITIGATION PLAN

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
PRE-CONSTRUCTION PHASE							
Flora	Inadequate planning of works and Main Design requirements	Implement BMP recommendations, including preparation of ISMP to control spreading of invasive species (details provided in the ESIA)	Contractor	Contractor	included in contract cost	included in contract cost	- BMP implemented - ISMP developed and approved
		Update BMP in case the baseline survey identifies new species in the Project area	Contractor	Contractor	included in contract cost	included in contract cost	- BMP updated
	Lack of up-to-date baseline conditions	Timely establish baseline conditions in case the construction begins more than 5 years after ESIA	Contractor	Contractor	included in contract cost	included in contract cost	- Baseline survey completed and reported
Fauna	Inadequate planning of works and Main Design requirements	Implement BMP recommendations	Contractor	Contractor	included in contract cost	included in contract cost	- BMP implemented
		Update BMP in case the baseline survey identifies new species in the Project area	Contractor	Contractor	included in contract cost	included in contract cost	- BMP updated
	Lack of up-to-date baseline conditions	Timely establish baseline conditions in case the construction begins more than 5 years after ESIA	Contractor	Contractor	included in contract cost	included in contract cost	- Baseline survey completed and reported
		Additional survey to determine any additional locations of Golden Eagle (*Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* nesting in the area of Klenova Draga (within the boundaries of the construction site), including risk assessment and updating the BMP	Contractor	Contractor	included in contract cost	included in contract cost	- Additional survey completed and reported - Risk assessment completed - BMP updated

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
Groundwaters	Limited information on groundwater quality and quantity in the zone of motorway construction	Timely establish baseline conditions, including detailed inventory of all wells for public and/or individual water supply	Contractor	Contractor	included in contract cost	included in contract cost	- Baseline survey completed and reported
	Pollution risks from works in the proximity of groundwater levels	Prevent cutting of underground streams and contamination of groundwater during preparatory works	Contractor	Contractor	included in contract cost	included in contract cost	- Works organisation plan defines relevant conditions of operation
		Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection	Contractor	Contractor	included in contract cost	included in contract cost	- Relevant areas completed by commencement of works
Surface waters	Lack of up-to-date baseline conditions	Timely establish baseline conditions in case the construction begins more than 5 years after ESIA	Contractor	Contractor	included in contract cost	included in contract cost	- Baseline survey completed and reported
	Pollution risks from works within riverbed	Ensure that the works do not affect supply of drinking water in any village	Contractor	Contractor	included in contract cost	included in contract cost	- Works organisation plan defines relevant conditions of operation
	Pollution risks from works in the proximity of surface waters	Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection	Contractor	Contractor	included in contract cost	included in contract cost	- Relevant areas completed by commencement of works

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Changes in the water flow and recharge by cutting or diverting permanent and intermittent streams around road structures	Ensure appropriate dimensioning of ditches and culverts for all identified intermittent streams	Contractor	Contractor	included in contract cost	included in contract cost	- Appropriate design completed
		In case any watercourse diversion is required maintain a temporary ditch to maintain flow and connectivity whilst the permanent ditch is prepared	Contractor	Contractor	included in contract cost	included in contract cost	- Temporary ditches completed
	Disruption of water supply to consumers and/or deteriorated water quality	Implement SEP provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity	Contractor	Contractor	included in contract cost	included in contract cost	- Water utilities regularly informed on water supply cuts and deteriorated water quality
Air quality	Lack of up-to-date baseline conditions	Timely establish baseline conditions in case the construction begins more than 5 years after ESIA	Contractor	Contractor	included in contract cost	included in contract cost	- Baseline survey completed and reported
	Air pollution resulting from inadequate production capacities	Establish production capacities with valid approvals and licenses, including sufficient protection	Contractor	Contractor	included in contract cost	included in contract cost	- Production facilities in compliance with legislation
Noise	Lack of up-to-date baseline conditions	Timely establish baseline conditions in case the construction begins more than 5 years after ESIA	Contractor	Contractor	included in contract cost	included in contract cost	- Baseline survey completed and reported
Soil	Lack of up-to-date baseline conditions	Timely establish baseline conditions in case the construction begins more than 5 years after ESIA	Contractor	Contractor	included in contract cost	included in contract cost	- Baseline survey completed and reported
	Occurrence of landslides and rock falls due to instability of terrain and the nature of construction works	Pre-construction survey of potentially unstable rock slopes and implementing precautionary stabilisation measures	Contractor	Contractor	included in contract cost	included in contract cost	- Survey completed and high-risk slopes stabilised

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Pollution risks at equipment, machinery and vehicle maintenance and parking areas	Prepare equipment, machinery and vehicle maintenance and parking areas having sufficient protection	Contractor	Contractor	included in contract cost	included in contract cost	- Relevant areas completed by commencement of works
	Environmental damage caused by opening of quarries and borrow pits	Establish and operate quarries and borrow pits as per the design and permits, or utilise existing ones that hold appropriate permits	Contractor	Contractor	included in contract cost	included in contract cost	- Quarries and borrow pits possess valid permits and licences
Waste and dangerous materials	Potential lack of landfill areas	Define landfill locations and prepare relevant design, including obtaining approvals and permits	Contractor Employer	Contractor Employer	included in contract cost	included in contract cost	- Landfill areas identified and permitting procedures completed or (at least) commenced
	Pollution risks from dangerous spills and accidents	Organise construction site and define waste collection and waste separation locations, including necessary protection	Contractor	Contractor	included in contract cost	included in contract cost	- All waste collection and waste separation location established with necessary protection
Social	Changing conditions in local settlements	Organise consultations with local municipalities with the aim to clearly present all activities during construction	Contractor Supervision Employer	Contractor Supervision	included in contract cost	included in contract cost	- Initial meetings with local municipalities completed
		Negotiate and sign agreement on friendly environment with local municipalities	Contractor Employer	Contractor	Employer's resources	included in contract cost	- Completed negotiations on friendly environment

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Risk of accidents at the construction site	Prevent access of public to construction site by clearly marking the site, including warning messages and information on the grievance mechanism	Contractor	Contractor	included in contract cost	included in contract cost	- Construction site marked, including sufficient information
	Collisions with public utility services	Communicate with public utility managers and establish register of collision locations	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- Collisions with public utilities identified and register established
	Changing conditions to road users	Establish information on the construction site along roads in the area	Contractor	Contractor	included in contract cost	included in contract cost	- Road users regularly and timely informed about works and conditions within the area of works
		Regular provision of information to road users through media and automobile association	Employer	Employer	Employer's resources	Employer's resources	
		Prepare and implement TMP to establish traffic management instruction and rules within the site area and along supply routes	Contractor	Contractor	included in contract cost	included in contract cost	- TMP completed and approved by the relevant authority
CONSTRUCTION PHASE							
Flora	Vegetation removal due to preparation of the construction site and during construction works	Compensate for the vegetation removal	Contractor	Contractor	included in contract cost	included in contract cost	- Vegetation cover reinstated
	Dusting of nearby flora	Implement dust suppression measures such as wetting the site	Contractor	Contractor	included in contract cost	included in contract cost	- No disturbance to habitats
	Habitat loss	Prevent leakage and accidental spills of dangerous substances	Contractor	Contractor	included in contract cost	included in contract cost	- No disturbed habitat outside of the area

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Prevent direct wastewater run-off from the site	Contractor	Contractor	included in contract cost	included in contract cost	necessary for construction - No chemical pollution events noted
	Spread of invasive species	Remove soil contaminated with invasive species and reinstate the area	Contractor	Contractor	included in contract cost	included in contract cost	- No invasive species registered - No spread of invasive species - Invasive species eliminated when found
Fauna	Disturbance of fauna species due to increased level of noise, vibration, and light in the zone of construction activities	Avoid works in the area of forest ecosystems	Contractor	Contractor	included in contract cost	included in contract cost	- No disturbance to fauna species outside of the area necessary for construction
		Restrict movement of construction machinery, equipment, and vehicles to designated roads, including speed reduction and work during daylight hours	Contractor	Contractor	included in contract cost	included in contract cost	
		Explore underground cave systems in case of encounter by authorised speleological organisation or expert	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		In case of inhabited nest(s) of Golden Eagle *(Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* are registered in the area of Klenova Draga, (within the boundaries of the construction site) measures may include restriction of works during the breeding and incubation periods (March-June), establishing a feeding site to attract the eagle and the owl to an area away from the construction site	Contractor	Contractor	included in contract cost	included in contract cost	
		Reduce removal of the forest cover to the required minimum for the machinery movement (designation of the required minimum to be marked by the Biodiversity Expert) to avoid disturbance and protect White-backed Woodpecker *(Dendrocopos leucotos)* and Black Woodpecker *(Dryocopus martius)*	Contractor	Contractor	included in contract cost	included in contract cost	
		Utilise directional, non-UV lighting	Contractor	Contractor	included in contract cost	included in contract cost	
	Potential disturbance of nests/roosts of species that have a seasonally variable vulnerability due to breeding, feeding times or seasonal migrations	Schedule the works in accordance with the characteristics of local habitats	Contractor	Contractor	included in contract cost	included in contract cost	- No disturbance to nesting locations
		Visibly mark nesting locations by signs and fencing	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Habitat loss	Prevent leakage and accidental spills of dangerous substances	Contractor	Contractor	included in contract cost	included in contract cost	- No pollution events noted
		Prevent direct wastewater run-off from the site	Contractor	Contractor	included in contract cost	included in contract cost	
		Adequately manage waste at the construction site	Contractor	Contractor	included in contract cost	included in contract cost	
		Avoid unnecessary deforestation and ecosystem damage	Contractor	Contractor	included in contract cost	included in contract cost	- No disturbance to fauna species outside of the area necessary for construction
	Potential fatalities or injuries of fauna species due to vegetation removal and movement of heavy machinery	Restrict movement of construction machinery, equipment, and vehicles to designated roads, including speed reduction and work during daylight hours	Contractor	Contractor	included in contract cost	included in contract cost	- No fatalities of fauna recorded on site
		Perform daily checks for the presence and removal of species' individuals (fire salamander *(Salamandra salamandra)* and Hermann's tortoise *(Testudo hermanni)*)	Contractor	Contractor	included in contract cost	included in contract cost	
		Manage construction site to prevent fauna from entering and in way that it does not provide suitable habitat for reptiles	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
Groundwaters	Intrusion of groundwater in tunnel tubes during excavation that can impact stability of the structure and cause the safety risk	Prevent cutting of underground streams and contamination of groundwater during preparatory works	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Groundwaters well managed
		Do not discharge groundwater that penetrates the tunnel tube to discovered caverns or karst canals	Contractor	Contractor	included in contract cost	included in contract cost	
		Capture groundwater that penetrates the tunnel tube and drain it out of the tunnel with pipes or channels; if necessary, utilise pumps (drain elements must be sufficiently deep and regularly cleaned and maintained in good condition, while drainage must not undermine supports of protection structures, erode tunnel walls or lining, wash away rock material in excavation and auxiliary traffic signals; the workplace, movement of workers, and traffic areas must stay dry and not under water)	Contractor	Contractor	included in contract cost	included in contract cost	
		Identify areas of fractured/faulty zones in advance with predrilling with preventors and using geophysics in the predrilled horizontal boreholes	Contractor	Contractor	included in contract cost	included in contract cost	
		Utilise top-down grouting to have the area stable and the inflows manageable (minimised) for construction and operation reasons as well as environmental reasons	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Impact on the direction of ground water flow and recharge by cutting the underground voids/streams during tunnel excavation	Construct bypass flows in case of cutting off groundwater streams to allow groundwater flow, as well as reduce pressure to the tunnel tube and prevent damage to the tunnel lining	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Groundwaters well managed
		Underground caverns to be inspected before being filled; supporting structures to be constructed for large caverns	Contractor	Contractor	included in contract cost	included in contract cost	- Caverns inspected and managed appropriately
	Pollution or decrease of groundwater quality due to direct release of intercepted tunnel drainage water (which can be loaded with suspended solids and other pollutants) and due to direct release of runoff from access roads and working plateaus without treatment, turbidity caused by erosion and excavation or blasting of the rock mass, accidental spills in the vicinity of springs	Do not drain tunnel runoff from drilling mining holes into open channels or caverns	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Tunnel runoff, runoff from access roads working plateaus, and groundwaters, well managed - Groundwaters quality report
		Treat the captured groundwater before discharging into the environment (untreated groundwater cannot be discharged anywhere upstream of the Bijela spring or in the water protection zones of the Salakovac and Bošnjaci springs)	Contractor	Contractor	included in contract cost	included in contract cost	
		Ensure continuous presence of hydrogeological engineers on the site, preferably with experience in similar projects, to monitor and manage execution of works and groundwater monitoring under strict control and anticipate and prevent negative impact of construction (excavation or blasting of the rock mass, erosion of material from cuts and embankments, accidental spills) on groundwater quality	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Fully pave access roads and working plateaus with asphalt and equip with closed drainage system	Contractor	Contractor	included in contract cost	included in contract cost	
		Treat construction water from the tunnel during works, collected wastewater from concrete batch plants and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence (downstream from the Bijela and Gornja Bijela springs, and outside of the III water protection zone of the Salakovac spring)	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Wastewater and groundwaters well managed - Construction and operation of treatment facilities - Treatment facility wastewater quality report - Groundwaters quality report
	Pollution or decrease of groundwater quality due to accidental spills in the vicinity of springs	Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed
		Prevent accidental spills during fuelling by installing collection tanks during the operation	Contractor	Contractor	included in contract cost	included in contract cost	- No chemical pollution events noted
		Prepare EPRP	Contractor	Contractor	included in contract cost	included in contract cost	- EPRP prepared and approved

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Implement SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- SEP implemented - No grievances raised - Grievances timely resolved
	Inappropriate disposal of non-inert material in case its appearance in excavation	In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Landfill site well managed - No records of contamination - Groundwaters quality report
Surface waters	Pollution or decrease of water quality of rivers Trešanica, Neretva and Konjička Bijela due to direct release of pollutants (suspended solids and other pollutants) generated by construction activities	Do not discharge excess material, waste, and wastewaters into surface waters	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed
		Fully pave access roads and working plateaus with asphalt and equip with closed drainage system	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Treat construction water from the tunnel during works, collected wastewater from concrete batch plants and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence (downstream from the Bijela and Gornja Bijela springs, and outside of the III water protection zone of the Salakovac spring).	Contractor	Contractor	included in contract cost	included in contract cost	- No pollution events noted - Construction and operation of treatment facilities - Treatment facility wastewater quality report - Surface waters quality report
		Manage the works in or around surface waters to minimise impact to water quality	Contractor	Contractor	included in contract cost	included in contract cost	
		Avoid stockpiling near watercourses (minimum 50 m distance recommended) and ensure they are located outside areas at fluvial flood risk	Contractor	Contractor	included in contract cost	included in contract cost	
		Avoid works in watercourses during the high flow season and during heavy rainfall	Contractor	Contractor	included in contract cost	included in contract cost	
		Direct access of vehicles to watercourse to be restricted only to vehicles required for construction works	Contractor	Contractor	included in contract cost	included in contract cost	
		Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Concrete mixing and washing areas should be located more than 500 m from any watercourse while wastewater from these areas shall be intercepted and hauled to a licenced disposal facility	Contractor	Contractor	included in contract cost	included in contract cost	
		Prevent accidental spills during fuelling by installing collection tanks during the operation	Contractor	Contractor	included in contract cost	included in contract cost	
		Prepare EPRP	Contractor	Contractor	included in contract cost	included in contract cost	- EPRP prepared and approved
		Implement SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- SEP implemented - No grievances raised - Grievances timely resolved
	Change in river flow and recharge by cutting or diverting permanent and intermittent streams around road structures	Assure sufficient flow through culverts in case of cutting off or controlling the water flow	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Inappropriate disposal of non-inert material in case its appearance in excavation	In case non-inert material appears in excavation, landfill for non-inert material equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Landfill site well managed - No records of contamination - Surface waters quality report
Air quality	Reduction in air quality due to emissions of construction dust, emission of exhaust gases from combustion processes in generators and other construction equipment, machinery, and vehicles	Production facilities and equipment to be equipped with filters	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - All plant, equipment, and vehicles possess valid operating licences - No grievances raised - Grievances timely resolved - Air quality report
		Utilise only construction equipment and vehicles that meet national emission standards	Contractor	Contractor	included in contract cost	included in contract cost	
		Regularly inspect, maintain, and repair construction equipment and vehicles	Contractor	Contractor	included in contract cost	included in contract cost	
	Increase of dust in the air due to work and movement of	Implement dust suppression measures such as wetting the site	Contractor	Contractor	included in contract cost	included in contract cost	- Construction site well managed

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	construction equipment, machinery, and vehicles	Control speed of construction vehicles	Contractor	Contractor	included in contract cost	included in contract cost	- No grievances raised - Grievances timely resolved
		Cover truck load	Contractor	Contractor	included in contract cost	included in contract cost	
Noise	Nuisances and disturbances on workers and residents from increased levels of noise during construction works	Restriction of works to daytime only, speed control of construction vehicles	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - All plant, equipment, and vehicles possess valid operating licences - No grievances raised - Grievances timely resolved - Noise levels report
		Precise definition of hauling routes	Contractor	Contractor	included in contract cost	included in contract cost	
		Fit and maintain appropriate noise mufflers on earth-moving and other vehicles on the site	Contractor	Contractor	included in contract cost	included in contract cost	
		Equipment and machinery to be shut down when not in use	Contractor	Contractor	included in contract cost	included in contract cost	
		Limited simultaneous use of machines that generate high noise levels (over 70 dB)	Contractor	Contractor	included in contract cost	included in contract cost	
		Install temporary noise barriers if necessary	Contractor	Contractor	included in contract cost	included in contract cost	- Temporary noise barriers installed
		Regular and complete inspection of equipment condition, as well as regular maintenance	Contractor	Contractor	included in contract cost	included in contract cost	- All plant, equipment, and vehicles possess valid operating

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
Vibrations	Structural damage from vibrations caused by construction equipment and operation methods employed, including use of explosives during blasting	Respect recommended safety distances for tunnel drilling at the identified vibration hotspots	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - No grievances raised - Grievances timely resolved
		In case of using of explosives for the tunnel mining, limit of 10 mm/s peak particle velocity applies to nearby sensitive receivers	Contractor	Contractor	included in contract cost	included in contract cost	
		The contractor must prepare blasting plan prior to construction	Contractor	Contractor	included in contract cost	included in contract cost	- Blasting plan prepared and approved
	Nuisances and disturbances on workers and residents from increased levels of vibrations during construction works	Before carrying out any inevitable activities that produce vibrations near receptors that are sensitive to noise and vibration, communicate properly with those affected, inform them in advance of the tasks to be performed, and of the expected duration	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - No grievances raised - Grievances timely resolved
		Regular and complete inspection of equipment condition	Contractor	Contractor	included in contract cost	included in contract cost	
		Avoid simultaneous operation of equipment that produces vibrations and its utilisation during quiet	Contractor	Contractor	included in contract cost	included in contract cost	
		The selection of equipment will consider the vibration level	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	Contractor	Contractor	included in contract cost	included in contract cost	
Soil	Soil erosion because of deforestation, excavations and use of heavy machinery and equipment	Implement topsoil management at stockpiles	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed
		Compensate for the vegetation removal to supress erosion	Contractor	Contractor	included in contract cost	included in contract cost	- Vegetation cover reinstated
		Implement designed slope and erosion protection measures	Contractor	Contractor	included in contract cost	included in contract cost	- Measures implemented - Slopes stable - Erosion does not occur
		Install drainage system to prevent erosion	Contractor	Contractor	included in contract cost	included in contract cost	- Drainage system implemented - Erosion does not occur
	Pollution of soil from accidental fuel and oil spills	Utilise specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - No records of contamination - Soil quality report
		Prevent accidental spills during fuelling by installing collection tanks during the operation	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Prepare EPRP	Contractor	Contractor	included in contract cost	included in contract cost	- EPRP prepared and approved
	Direct discharge of wastewater from maintenance of construction vehicles at the site and sanitary waters from construction camp	Collect wastewaters and sanitary waters, and deliver to licenced operators for final treatment and discharge	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed
	Direct discharge of construction water from the tunnel during works and of runoff from access roads and working plateaus without treatment	Fully pave access roads and working plateaus with asphalt and equip with closed drainage system	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Runoff from access roads working plateaus well managed - Soil quality report

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Treat construction water from the tunnel during works and runoff from access roads and working plateaus up to the quality defined by the law and discharge the treated runoff outside the zone of influence (downstream from the Bijela and Gornja Bijela springs, and outside of the III water protection zone of the Salakovac spring)	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - Construction and operation of treatment facilities - Treatment facility wastewater quality report - Soil quality report
	Inappropriate waste/spoil disposal and disposal of non-inert material	Adequate temporary storage of waste	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - Waste operators possess valid licences and certificates
		Municipal waste to be collected and treated by licenced waste operator	Contractor	Contractor	included in contract cost	included in contract cost	
		Hazardous waste to be managed by certified companies/agents	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Landfill site well managed - No records of contamination - Soil quality report
	Occurrence of landslides and rock falls which can further endanger the stability of terrain that is the basis for the construction of roads, while the wider ecological incident can occur if the watercourse or part of it is buried by a landslide/rock fall	Geotechnical slope monitoring and timely implementing slope stabilisation measures	Contractor	Contractor	included in contract cost	included in contract cost	- No incidents noted - All slopes stable
		Mark location and set up appropriate traffic signalisation in case of landslide and/or rock fall, until completing restoration measures	Contractor	Contractor	included in contract cost	included in contract cost	- Incident locations timely marked
Landscape	Changes to the existing landscape and visual impacts due to the construction works	Compensate for the vegetation removal	Contractor	Contractor	included in contract cost	included in contract cost	- Vegetation cover reinstated
		Recultivation with autochthonous species characteristic for the area to preserve gene pool and amenity	Contractor	Contractor	included in contract cost	included in contract cost	- Recultivation appropriately performed
		Regular cleaning of construction site from construction and other waste	Contractor	Contractor	included in contract cost	included in contract cost	- Construction site well managed
		Upon completion, areas used as construction compounds will be returned to their original use and condition	Contractor	Contractor	included in contract cost	included in contract cost	- Construction compounds appropriately recultivated

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
Waste and dangerous materials	Contamination of environment due to inappropriate management of excess excavated material and waste generated during construction	Do not discharge liquid waste and wastewater into drains and sewers	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - Waste operators possess valid licences and certificates
		Implement waste separation directly at the construction site	Contractor	Contractor	included in contract cost	included in contract cost	
		Adequate temporary storage of waste	Contractor	Contractor	included in contract cost	included in contract cost	
		Do not burn waste generated at construction site	Contractor	Contractor	included in contract cost	included in contract cost	
		Use of mobile toilets for site personnel, including their regular maintenance and service	Contractor	Contractor	included in contract cost	included in contract cost	
		Municipal waste to be collected and treated by licenced waste operator	Contractor	Contractor	included in contract cost	included in contract cost	
	Environmental damage caused by improper materials/chemicals management	Hazardous waste to be managed by certified companies/agents	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - No incidents
		Restricted access to dangerous materials	Contractor	Contractor	included in contract cost	included in contract cost	
		Prepare EPRP	Contractor	Contractor	included in contract cost	included in contract cost	- EPRP prepared and approved

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Avoid construction related traffic through Konjic	Contractor	Contractor	included in contract cost	included in contract cost	- No construction related traffic through Konjic - No grievances raised - Grievances timely resolved
	Environmental damage caused by inadequate management of disposal sites/landfills	Utilise only approved landfill locations	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - No grievances raised - Grievances timely resolved
		Establish landfills as per the design and permits	Contractor	Contractor	included in contract cost	included in contract cost	- Appropriately established landfills
		Disposal of inert material on designated disposal sites and recultivation afterward by using autochthonous species	Contractor	Contractor	included in contract cost	included in contract cost	- Appropriate disposal of inert material - Recultivation appropriately completed

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		In case non-inert material appears in excavation, landfill for non-inert material to be equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Landfill site well managed - No records of contamination - Soil quality report
Cultural, historical, and archaeological heritage	Damage of unknown cultural, historical, and archaeological heritage sites from excavations along the access roads	Develop and implement chance finds procedure	Contractor	Contractor	included in contract cost	included in contract cost	- Chance finds procedure developed and approved
Social	Influx of workers having potential negative impacts (impacts on community dynamics and potential social tensions, exposure of local population to diseases including communicable diseases and STDs or STIs, or possible GBVH issues)	Induction of workers with rules and measures related to community interference	Contractor	Contractor	included in contract cost	included in contract cost	- LMP prepared and approved - Induction completed successfully - Established records on induction
		Develop and implement workers Code of Conduct	Contractor	Contractor	included in contract cost	included in contract cost	- LMP prepared and approved - Code of Conduct developed and implemented
	Increased number of grievances	Full implementation of SEP	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- SEP implemented - Regular coordination

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Timely registration and resolution of complaints	Contractor Supervision Employer	Contractor Supervision Employer	included in contract cost	included in contract cost	meetings with local communities - GRM in operation - No grievances raised - Grievances timely resolved
	Unauthorised access by the public and exposure to risks such as falls and hazardous materials or interactions with heavy equipment, both within construction site and on roads to active construction site	Prevent access to site for unauthorised personnel	Contractor	Contractor	included in contract cost	included in contract cost	- Plans and method statements prepared and approved - Construction site well managed - No incidents noted - Incidents investigated and recovery measures implemented
		Specific designation of routes to be used by public at the construction site	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Traffic safety risks to residents living near the local roads which will be used for construction vehicle, equipment, and machinery movements due to increase in construction-related journeys	Implement TMP	Contractor	Contractor	included in contract cost	included in contract cost	- TMP implemented - Regular coordination with traffic police - No incidents noted - Incidents investigated and recovery measures implemented
	Disruption of public utility services	Implement measures for identified collision points while also ensuring timely reaction in case of disruption	Contractor	Contractor	included in contract cost	included in contract cost	- All collision points identified and marked - Timely relocation of public utility services - Timely notification on any disruption and provision of alternative (re)sources
		Full implementation of SEP	Contractor Supervision	Contractor Supervision	included in contract cost	included in contract cost	- SEP implemented - No grievances raised - Grievances timely resolved

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Implement agreement on friendly environment	Contractor Employer	Contractor Employer	included in contract cost	included in contract cost	- Agreement on friendly environment implemented
	Restricted access to adjacent properties (residential, business, agricultural, etc.)	Maintain access to all adjacent properties during the construction of access roads and throughout the contract period	Contractor	Contractor	included in contract cost	included in contract cost	- All accesses identified and maintained - TMP implemented - No restricted access noted - Problems investigated and recovery measures implemented
	OHS risks to workers, including those related to working with plant and machinery, formation of asphalt, use of cement, working near utilities, at height, etc.	Set and implement relevant OHS provisions following the relevant legislation and technical specifications	Contractor	Contractor	included in contract cost	included in contract cost	- Good workforce management - Implemented code of conduct - Healthcare service available at site - No grievances raised - Grievances timely resolved
		Provision of health surveillance and healthcare access for workers	Contractor	Contractor	included in contract cost	included in contract cost	

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
OPERATIONAL PHASE							
Flora	Chemical pollution	Adequate storage location of chemicals used in motorway and access roads maintenance; selected location must not be in or near sensitive receptors, including water bodies, priority biodiversity features and critical habitats	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Adequate storage location set up
		Avoid using of herbicides and hazardous substances and materials	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- No chemical pollution events
		Undertake routine maintenance and cleaning of all drainage structures and oil separators	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations
		Routine maintenance must include all surfaces adjacent to the motorway and access roads, and must include elimination and control of weeds and invasive species	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations - Decrease in the number of invasive species
Fauna	Habitat fragmentation	Revegetation must be done as stated in the mitigation measures regarding habitats	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Success revegetation as defined by the BMP
	Chemical pollution	Adequate cleaning and maintenance of drainage structures and oil separators to ensure their efficiency regarding the pollution prevention	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations - No chemical pollution events

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Collision of fauna species due to high speed of vehicles	Properly maintain and repair motorway fence	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- No fatalities of species registered
	Increased artificial light levels	Use replacement lighting bulbs such as low-pressure sodium lights, high-pressure sodium bulbs or mercury bulbs	Employer Maintenan. Contractor	Maintenan. Contractor	Employer's resources	included in contract cost	- No fatalities of species registered
		Avoid placing the artificial streetlights and unnecessary illumination of traffic signs, auxiliary facilities, such as gas stations, rest areas, billboards, etc.	Employer Maintenan. Contractor	Maintenan. Contractor	Employer's resources	included in contract cost	- Minimum utilisation of artificial streetlights and unnecessary illumination
Groundwaters	Pollution of groundwaters from release of untreated run-off in the proximity of springs and their water protection zones	Treatment of storm water in oil and grease separators (for surface run-off) and/or biological treatment units (for sanitary wastewater) to the required quality before discharging into the recipient	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on operation of treatment facilities
		Regular maintenance of oil and grease separators and/or biological treatment units	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations
		Do not discharge treated water in the spring area and around any new wells identified during the pre-construction phase; instead, water shall be discharged downstream from the zone of influence of Konjička Bijela spring and outside the III sanitary protection zone of Salakovac and Bošnjaci springs	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Decrease of groundwater quality resulting from accidental spill of hazardous materials	Prepare Operational Emergency Preparedness and Response Plan (OEPRP), including procedures to prevent contamination of waters from accidental spills	Employer Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- OEPRP prepared and approved
	Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation	In case landfill for non-inert material will be established, define and implement procedures for management of landfill for non-inert material	Employer Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations - No records of land contamination
Surface waters	Decrease of water quality in river system resulting from direct release of intercepted surface run-off including de-icing agents	Regular maintenance of separators and sanitary and drainage facilities	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations
	Decrease of water quality in river system resulting from accidental spill of hazardous materials	Prepare OEPRP, including procedures to prevent contamination of waters from accidental spills	Employer Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- OEPRP prepared and approved
	Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation	In case landfill for non-inert material will be established, define and implement procedures for management of landfill for non-inert material	Employer Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations - No records of land contamination
Air quality	Emission of exhaust gases from vehicles using the motorway and access roads	If measurement of standard air quality parameters shows that values exceed maximum allowed values prescribed by national regulation, implement protection measures in the form of wide leafed green plants or artificial barriers	Employer	Maintenan. Contractor	Employer's resources	included in contract cost	- Air quality report

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Install and operate air filters at the tunnel ventilation system, including their regular maintenance	Employer	Maintenan. Contractor	Employer's resources	included in contract cost	- Air quality report - Reports on maintenance operations
Noise	Nuisances and disturbances on residents from increased levels of noise from motorway and access roads traffic	If measurement of noise levels shows that values exceed maximum allowed values defined by national regulations, design and install noise protection barriers	Employer	Maintenan. Contractor	Employer's resources	included in contract cost	- Noise measurement report - Implemented noise protection barriers
Soil	Soil erosion	Maintenance of drainage system to prevent direct surface run-off an erosion impact	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations
		Planting vegetation cover at soil surfaces	Employer Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Soil surfaces covered by vegetation
	Pollution of soil from direct discharge of surface run-off, and reduction of soil quality resulting from use of de-icing agents	Regular maintenance of drainage system to prevent pollution	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations - No records of land contamination
	Pollution of soil from accidental fuel and oil spills	Prepare OEPRP, including defining and implementing procedures to prevent contamination of soil from accidental spills	Employer Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- OEPRP prepared and approved

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
	Landslides and rock falls causing physical damage to the infrastructure, vehicle damage, disruption to traffic flow, interruption of technical infrastructure such as power supply, water supply, etc.	Geotechnical slope monitoring and timely implementing slope stabilisation measures	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on geotechnical monitoring
		Mark location and set up appropriate traffic signalisation in case of landslide and/or rock fall, until completing restoration measures	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Traffic management in operation
	Acidification due to uncontrolled leakage from non-inert material landfill in case this material appears in excavation	In case landfill for non-inert material will be established, define and implement procedures for management of landfill for non-inert material	Employer Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations - No records of land contamination
Waste and dangerous materials	Contamination of environment due to inappropriate waste management, storage, and handling arrangements	Regular cleaning of the RoW	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Reports on maintenance operations
		Transfer waste to licenced operators for final treatment/disposal	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Contract with waste collection companies - Proofs of waste transfer - No negative inspection reports
Social	Community health and safety	Develop and implement an OEPRP to identify and address all major hazards for the local community during the motorway and access roads operation	Employer	Maintenan. Contractor	Employer's resources	included in contract cost	- OEPRP prepared and approved

Aspect	Risk and/or impact	Mitigation measure	Responsibility		Cost estimate [EUR]		Key Performance Indicator (KPI)
			install	operate	install	operate	
		Implement SEP, in particular provisions on providing timely information to local communities on the extent of works and duration prior to the commencement of maintenance works, as well as provisions on ongoing implementation of the grievance mechanism	Employer	Employer Maintenan. Contractor	Employer's resources	included in contract cost	- SEP prepared and approved - GRM in operation
	OHS risks to maintenance workers	Set and implement relevant OHS provisions following the relevant legislation and technical specifications	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	- Good workforce management - Implemented code of conduct - Healthcare service available at site - No grievances raised - Grievances timely resolved
		Provision of health surveillance and healthcare access for workers	Maintenan. Contractor	Maintenan. Contractor	included in contract cost	included in contract cost	

12.2. ANNEX 2: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
PRE-CONSTRUCTION PHASE								
Flora	BMP implementation	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Prepared Invasive Species Management Plan to control spreading of invasive species	- construction site	- document review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	BMP update in case the baseline survey identifies new species in the Project area	- construction site	- document review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Baseline conditions	- construction site	- baseline condition report review	- before site works, but only in case the construction begins more than 5 years after ESIA	Contractor	Contractor Supervision	EUR 2,500	included in contract cost
Fauna	BMP implementation	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	BMP update in case the baseline survey identifies new species in the Project area	- construction site	- document review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Baseline conditions	- construction site	- baseline condition report review	- before site works, but only in case the construction begins more than 5 years after ESIA	Contractor	Contractor Supervision	EUR 2,500	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Additional survey of Golden Eagle *(Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* nesting locations in the area of Klenova Draga	- construction site (Klenova Draga)	- additional survey and risk assessment report review	- before site works	Contractor	Contractor Supervision	EUR 500	included in contract cost
Groundwaters	Baseline conditions, including detailed inventory of all wells for public and/or individual water supply (mandatory parameters - pH, odour, colour, dissolved oxygen, electrical conductivity, suspended solids, chemical oxygen demand, biochemical oxygen demand, NH_3, NO_3, NO_2, N according to Kjedahl, total N, total P, sulphates; specific parameters - Cd, Cu, Cr, Zn, Ni, Fe, Pb, Mn, TOC, oils and fats, mineral oils, phenolic index, Hg, anthracene, acenaphthylene, fluorene, phenanthrene, pyrene, benzo (a) anthracene, chrysene, benzo (k) fluoranthene, benzo (g.h.i) perylene, indeno [1,2,3-cd] pyrene, benzo (a) pyrene, di benzo (a.h) anthracene, naphthalene, acenaphthene, fluoranthene)	- construction site and surrounding area within the distance of 250 m of the site boundaries - sampling at identified wells	- sampling and testing of water quality as per the local regulations, by the accredited methods and laboratory - baseline condition report review	- before site works	Contractor	Contractor Supervision	EUR 250 per sample	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Prevent cutting of underground streams and contamination of groundwater during preparatory works	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Prepared equipment, machinery and vehicle maintenance and parking areas having sufficient protection	- construction site	- visual inspection	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
Surface waters	Baseline conditions (mandatory parameters - pH, odour, colour, dissolved oxygen, electrical conductivity, suspended solids, chemical oxygen demand, biochemical oxygen demand, NH_3, NO_3, NO_2, N according to Kjedahl, total N, total P, sulphates; specific parameters - Cd, Cu, Cr, Zn, Ni, Fe, Pb, Mn, TOC, oils and fats, mineral oils, phenolic index, Hg, anthracene, acenaphthylene, fluorene, phenanthrene, pyrene, benzo (a) anthracene, chrysene, benzo (k) fluoranthene, benzo (g.h.i) perylene, indeno [1,2,3-cd] pyrene, benzo (a) pyrene, di benzo (a.h) anthracene, naphthalene, acenaphthene, fluoranthene)	- SP3 and SP4 (Table 5.2) - water streams along the construction site	- sampling and testing of water quality as per the local regulations, by the accredited methods and laboratory - baseline condition report review	- before site works	Contractor	Contractor Supervision	EUR 250 per sample	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Works do not affect supply of drinking water in any village	- construction site and surrounding villages	- visual inspection - grievance records review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Prepared equipment, machinery and vehicle maintenance and parking areas having sufficient protection	- construction site	- visual inspection	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Appropriate dimensioning of ditches and culverts for all identified intermittent streams	- construction site	- documentation review	- before site works - as necessary during site works when new ditches and culverts are proposed	Contractor	Supervision	included in contract cost	included in contract cost
	In case any watercourse diversion is required maintain a temporary ditch to maintain flow and connectivity whilst the permanent ditch is prepared	- construction site	- visual inspection	- before site works - as necessary during site works when new temporary ditches are proposed	Contractor	Supervision	included in contract cost	included in contract cost
	Implement SEP provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity	- construction site and local communities	- documentation and records review - grievance records review	- weekly	Contractor Supervision Employer	Contractor Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Air quality	Baseline conditions (SO_2, NO_2, CO, O_3, PM_{10}, $PM_{2.5}$, total PM)	- MP1, MP2 and MP3 (Table 5.1)	- sampling and testing of air quality as per the local regulations, by the accredited methods and laboratory - baseline condition report review	- before site works, but only in case the construction begins more than 5 years after ESIA	Contractor	Contractor Supervision	EUR 500 per sample	included in contract cost
	Production capacities established with valid approvals and licenses, including sufficient protection	- construction site	- verification of approvals and licenses - visual inspection	- before site works - as necessary during site works when new production capacities are proposed	Contractor	Supervision	included in contract cost	included in contract cost
Noise	Baseline conditions (L_{eq}, $L_{1\%}$, L_{Req}, $L_{R1\%}$, LA_{eq}, LAF_{MAX}, LAF_{MIN}, LA1%, LA5%, LA10%, LA50%, LA90%, LA95%, LA99%)	- MP1, MP2, MP3 and MP4 (Table 5.3)	- measuring of noise levels as per the local regulations, by the accredited methods and laboratory - baseline condition report review	- before site works, but only in case the construction begins more than 5 years after ESIA	Contractor	Contractor Supervision	EUR 150 per sample	included in contract cost
Vibrations	Baseline conditions for structures (buildings, houses, stables, production facilities, etc.)	- structures in surrounding area within the distance of 50 m of the site boundaries	- baseline condition report review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Soil	Baseline conditions (pH (H2O), pH (1.0 M KCl), organic content - humus, dry matter content, total N, total P, Cu, Zn, Pb, Cd, Ni, Mn, Fe, Co, Cr, Hg, total petrolatum hydrocarbons)	- SP1, SP2 and SP3 (Table 5.4)	- sampling and testing of soil quality as per the local regulations, by the accredited methods and laboratory - baseline condition report review	- before site works, but only in case the construction begins more than 5 years after ESIA	Contractor	Contractor Supervision	EUR 250 per sample	included in contract cost
	Pre-construction survey of potentially unstable rock slopes and implemented precautionary stabilisation measures	- construction site	- documentation and records review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Prepared equipment, machinery and vehicle maintenance and parking areas having sufficient protection	- construction site	- visual inspection	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Quarries and borrow pits established and operating as per the design and permits, or utilising existing ones that hold appropriate permits	- construction site	- verification of approvals and licenses	- before site works - as necessary during site works when new quarries and borrow pits are proposed	Contractor	Supervision	included in contract cost	included in contract cost
Waste and dangerous materials	Landfill locations defined, including preparation of relevant design, obtaining approvals and permits	- construction site and landfill locations	- visual inspection - verification of design, approvals, and licenses	- before site works - as necessary during site works when new landfills are proposed	Contractor Employer	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Organised construction site and defined waste collection and waste separation locations, including necessary protection	- construction site	- visual inspection	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
Social	Consultations with local municipalities organised with the aim to clearly present all activities during construction	- construction site and local municipalities	- documentation and records review	- before site works	Contractor Supervision Employer	Contractor Supervision	included in contract cost	included in contract cost
	Agreement on friendly environment with local municipalities negotiated and signed	- construction site and local municipalities	- documentation and records review	- before or soon after commencement of site works	Employer	Supervision	included in contract cost	included in contract cost
	Prevented access of public to construction site by clearly marking the site, including warning messages	- construction site	- visual inspection	- continuous	Contractor	Supervision	included in contract cost	included in contract cost
	Notification, detailed description and publicly available information on GRM for citizens	- construction site - local municipalities and local communities	- visual inspection	- continuous	Contractor	Supervision	included in contract cost	included in contract cost
	Communication with public utility managers and established register of collision locations	- construction site	- documentation and records review	- before site works	Contractor Supervision	Supervision	included in contract cost	included in contract cost
	Established information on the construction site along roads in the area	- construction site	- visual inspection	- before site works - weekly during site works	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Regular provision of information to road users through media and automobile association	- construction site, media, and automobile association	- documentation and records review - media review	- before site works - weekly during site works	Employer	Supervision	Employer's resources	included in contract cost
	Prepared and implemented TMP to establish traffic management instruction and rules within the site area and along supply routes	- construction site and supply routes	- documentation review - verification of approval by the relevant authority	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
CONSTRUCTION PHASE								
Flora	Compensation for the vegetation removal	- construction site	- visual inspection - documentation review	- 3-6 months after the vegetation removal at critical locations	Contractor	Supervision	included in contract cost	included in contract cost
	Implemented dust suppression measures such as wetting the site	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Prevented leakage and accidental spills of dangerous substances	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Prevented direct wastewater run-off from the site	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Removed soil contaminated with invasive species and area reinstated	- construction site	- visual inspection - documentation review	- 2 months after the identification of contamination	Contractor	Supervision	included in contract cost	included in contract cost
Fauna	Avoided works in the area of forest ecosystems	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Restricted movement of construction machinery, equipment, and vehicles to designated roads, including speed reduction and work during daylight hours	- construction site	- visual inspection	- weekly - unannounced inspections before and/or after daylight hours	Contractor	Supervision	included in contract cost	included in contract cost
	Underground cave systems explored in case of encounter by authorised speleological organisation or expert	- construction site	- exploration report review	- 15 days after completion of exploration	Contractor	Supervision	included in contract cost	included in contract cost
	Utilised directional, non-UV lighting	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Works scheduled in accordance with the characteristics of local habitats	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Visibly marked nesting locations by signs and fencing	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Prevented leakage and accidental spills of dangerous substances	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	In case of inhabited nest(s) of Golden Eagle *(Aquila chrysaetos)* and Eurasian eagle-owl *(Bubo bubo)* are registered, monitor nest(s) for presence and activity of eagles	- construction site (Klenova Draga)	- visual inspection	- bi-weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Potential habitat of Peregrine Falcon *(Falco peregrinus)* and Eurasian eagle-owl *(Bubo bubo)* (if presence confirmed these must be brought for critical habitat assessment)	- construction site (Klenova Draga)	- visual inspection	- monthly	Contractor	Supervision	included in contract cost	included in contract cost
	Prevented direct wastewater run-off from the site	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Adequately managed waste at the construction site	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Avoided unnecessary deforestation and ecosystem damage	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Checks for the presence and removal of species' individuals performed	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Construction site managed to prevent fauna from entering and in a way that it does not provide suitable habitat for reptiles (shelter and hibernation)	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
Groundwaters	Prevented cutting of underground streams and contamination of groundwater during works	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Groundwater that penetrates the tunnel tube not discharged to discovered caverns or karst canals	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Groundwater that penetrates the tunnel tube captured and drained it out of the tunnel with pipes or channels	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Utilised top-down grouting to have the area stable and the inflows manageable (minimised) for construction and operation reasons as well as environmental reasons	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Constructed bypass flows in case of cutting off groundwater streams	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Underground caverns inspected before being filled; supporting structures constructed for large caverns	- construction site	- inspection report review - visual inspection - documentation review	- weekly between identification of cavern until being filled or structure completed	Contractor	Supervision	included in contract cost	included in contract cost
	Tunnel runoff from drilling mining holes not drained into open channels or caverns	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Captured groundwater treated before discharging into the environment	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Construction water from the tunnel during works and collected wastewater from concrete batch plants treated up to the quality defined by the law and discharge the treated runoff outside the zone of influence	- construction site	- visual inspection - documentation review - wastewater quality report	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Utilisation of specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Prevented accidental spills during fuelling by installing collection tanks during the operation	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	EPRP prepared	- construction site	- document review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Implemented SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity	- construction site and local communities	- documentation and records review - grievance records	- weekly	Contractor Supervision Employer	Contractor Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	In case non-inert material appears in excavation, landfill for its disposal equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)	- landfill for non-inert material	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Groundwater quality measurement (mandatory parameters - pH, odour, colour, dissolved oxygen, electrical conductivity, suspended solids, chemical oxygen demand, biochemical oxygen demand, NH_3, NO_3, NO_2, N according to Kjedahl, total N, total P, sulphates; specific parameters - Cd, Cu, Cr, Zn, Ni, Fe, Pb, Mn, TOC, oils and fats, mineral oils, phenolic index, Hg, anthracene, acenaphthylene, fluorene, phenanthrene, pyrene, benzo (a) anthracene, chrysene, benzo (k) fluoranthene, benzo (g.h.i) perylene, indeno [1,2,3-cd] pyrene, benzo (a) pyrene, di benzo (a.h) anthracene, naphthalene, acenaphthene, fluoranthene)	- construction site and surrounding area within the distance of 250 m of the site boundaries - sampling at identified wells	- sampling and testing of water quality as per the local regulations, by the accredited methods and laboratory - report review	- twice a year (spring and autumn) - on complaint - at completion of works to establish baseline for operational phase	Contractor	Contractor Supervision	EUR 250 per sample	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Surface waters	Excess material, waste, and wastewaters not discharged into surface waters	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Construction water from the tunnel during works treated up to the quality defined by the law and discharge the treated runoff outside the zone of influence	- construction site	- visual inspection - documentation review - wastewater quality report	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Works in or around surface waters managed to minimise impact to water quality	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Avoided stockpiling near watercourses (minimum 50 m distance recommended) and ensuring they are located outside areas at fluvial flood risk	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Avoided works in watercourses during the high flow season and during heavy rainfall	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Assured sufficient flow through culverts in case of cutting off or controlling the water flow	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Direct access of vehicles to watercourse restricted only to vehicles required for construction works	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Utilisation of specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Concrete mixing and washing areas located more than 500 m from any watercourse while wastewater from these areas intercepted and hauled to a licenced disposal facility	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Accidental spills during fuelling prevented by installing collection tanks during the operation	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	EPRP prepared	- construction site	- document review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Implemented SEP, in particular the provisions on communicating with water utilities and providing timely information to local communities on planned water supply cuts and deteriorated water quality in case of an accidental pollution or temporary turbidity	- construction site and local communities	- documentation and records review - grievance records	- weekly	Contractor Supervision Employer	Contractor Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	In case non-inert material appears in excavation, landfill equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)	- landfill for non-inert material	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Surface water quality measurement (mandatory parameters - pH, odour, colour, dissolved oxygen, electrical conductivity, suspended solids, chemical oxygen demand, biochemical oxygen demand, NH_3, NO_3, NO_2, N according to Kjedahl, total N, total P, sulphates; specific parameters - Cd, Cu, Cr, Zn, Ni, Fe, Pb, Mn, TOC, oils and fats, mineral oils, phenolic index, Hg, anthracene, acenaphthylene, fluorene, phenanthrene, pyrene, benzo (a) anthracene, chrysene, benzo (k) fluoranthene, benzo (g.h.i) perylene, indeno [1,2,3-cd] pyrene, benzo (a) pyrene, di benzo (a.h) anthracene, naphthalene, acenaphthene, fluoranthene)	- SP3 and SP4 (Table 5.2) - water streams along access roads (upstream and downstream the location)	- sampling and testing of water quality as per the local regulations, by the accredited methods and laboratory - report review	- twice in a year (during low and high flow periods) - at completion of works to establish baseline for operational phase	Contractor	Contractor Supervision	EUR 250 per sample	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Air quality	Production facilities and equipment equipped with filters	- construction site	- visual inspection - documentation review	- monthly	Contractor	Supervision	included in contract cost	included in contract cost
	Only construction equipment and vehicles that meet national emission standards utilised	- construction site	- visual inspection - documentation review	- monthly	Contractor	Supervision	included in contract cost	included in contract cost
	Regular inspection, maintenance, and repair of construction equipment and vehicles	- construction site	- visual inspection - documentation review	- monthly	Contractor	Supervision	included in contract cost	included in contract cost
	Implemented dust suppression measures such as wetting the site	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Controlled speed of construction vehicles	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Truck load covered	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Air quality measurement (SO_2, NO_2, CO, O_3, PM_{10}, $PM_{2.5}$, total PM)	- MP1, MP2 and MP3 (Table 5.1)	- sampling and testing of air quality as per the local regulations, by the accredited methods and laboratory - report review	- on complaint - at completion of works to establish baseline for operational phase	Contractor	Contractor Supervision	EUR 500 per sample	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Noise	Works restricted to daytime only	- construction site	- visual inspection	- unannounced inspections before and/or after daylight hours	Contractor	Supervision	included in contract cost	included in contract cost
	Controlled speed of construction vehicles	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Hauling routes precisely defined	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Appropriate noise mufflers fitted and maintained on earth-moving and other vehicles on the site	- construction site	- visual inspection - documentation review	- monthly	Contractor	Supervision	included in contract cost	included in contract cost
	Equipment and machinery shut down when not in use	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Limited simultaneous use of machines that generate high noise levels (over 70 dB)	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Installed temporary noise barriers if necessary	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Regular and complete inspection of equipment condition, as well as regular maintenance	- construction site	- visual inspection - documentation review	- monthly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Noise levels measurement (L_{eq}, $L_{1\%}$, L_{Req}, $L_{R1\%}$, LA_{eq}, LAF_{MAX}, LAF_{MIN}, LA1%, LA5%, LA10%, LA50%, LA90%, LA95%, LA99%)	- MP1, MP2, MP3 and MP4 (Table 5.3)	- measuring of noise levels as per the local regulations, by the accredited methods and laboratory - report review	- monthly during peak times of site activities - on complaint - at completion of works to establish baseline for operational phase	Contractor	Contractor Supervision	EUR 150 per sample	included in contract cost
Vibrations	Recommended safety distances for tunnel drilling at the identified vibration hotspots respected	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	In case of using of explosives for the tunnel mining, limit of 10 mm/s peak particle velocity applies to nearby sensitive receivers	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Blasting plan prepared prior to construction	- construction site	- documentation review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Before carrying out any inevitable activities that produce vibrations near receptors that are sensitive to noise and vibration, performed proper communication with those affected, informed in advance of the tasks to be performed, and of the expected duration	- construction site	- visual inspection - documentation and records review - grievance records review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Regular and complete inspection of equipment condition performed	- construction site	- documentation review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Avoided simultaneous operation of equipment that produces vibrations and its utilisation during quiet	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Selection of equipment took into consideration the vibration level	- construction site	- documentation review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Utilisation of specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Vibration levels measurement (acceleration, frequency, displacement)	- construction site	- measuring of vibration levels as per the local regulations, by the accredited methods and laboratory - report review	- on complaint	Contractor	Contractor Supervision	EUR 250 per sample	included in contract cost
Soil	Implemented topsoil management at stockpiles	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Vegetation removal compensated to supress erosion	- construction site	- visual inspection	- 3-6 months after the vegetation removal at critical locations	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Implemented designed slope and erosion protection measures	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Installed drainage system to prevent erosion	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Utilisation of specifically arranged areas for equipment, machinery and vehicle maintenance, parking, and repair	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Accidental spills during fuelling prevented by installing collection tanks during the operation	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	EPRP prepared	- construction site	- document review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Wastewaters and sanitary waters collected, and delivered to licenced operators for final treatment and discharge	- construction site	- visual inspection - transport documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Construction water from the tunnel during works treated up to the quality defined by the law and discharge the treated runoff outside the zone of influence	- construction site	- visual inspection - documentation review - wastewater quality report	- weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Adequate temporary storage of waste	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Municipal waste collected and treated by licenced waste operator	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Hazardous waste managed by certified companies/agents	- construction site	- transport documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	In case non-inert material appears in excavation, landfill equipped with full waterproofing and devices to collect and control leachate (geological barriers, sealing system by geomembranes and leachate management systems)	- landfill for non-inert material	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Geotechnical slope monitoring and timely implementation of slope stabilisation measures	- construction site	- visual inspection - documentation review	- weekly - within 3 months after the established need for slope stabilisation measures	Contractor	Supervision	included in contract cost	included in contract cost
	Location marked and appropriate traffic signalisation set up in case of landslide and/or rock fall, until completing restoration measures	- construction site	- visual inspection - documentation review	- weekly for the period during which marking and signalisation is required	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Soil quality measurement (pH (H2O), pH (1.0 M KCl), organic content - humus, dry matter content, total N, total P, Cu, Zn, Pb, Cd, Ni, Mn, Fe, Co, Cr, Hg, total petrolatum hydrocarbons)	- SP1, SP2 and SP3 (Table 5.4)	- sampling and testing of soil quality as per the local regulations, by the accredited methods and - laboratory - report review	- quarterly - on complaint - at completion of works to establish baseline for operational phase	Contractor	Contractor Supervision	EUR 250 per sample	included in contract cost
Landscape	Compensation for the vegetation removal	- construction site	- visual inspection - documentation review	- 3-6 months after the vegetation removal at critical locations	Contractor	Supervision	included in contract cost	included in contract cost
	Recultivation with autochthonous species characteristic for the area to preserve gene pool and amenity	- construction site	- visual inspection - documentation review	- at completion of works	Contractor	Supervision	included in contract cost	included in contract cost
	Regular cleaning of construction site from construction and other waste	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Upon completion, areas used as construction compounds returned to their original use and condition	- construction site	- visual inspection - documentation review	- at completion of works	Contractor	Supervision	included in contract cost	included in contract cost
Waste and dangerous materials	Liquid waste and wastewater not discharged into drains and sewers	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Implemented waste separation directly at the construction site	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Adequate temporary storage of waste	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Waste generated not burned at construction site	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Use of mobile toilets for site personnel, including their regular maintenance and service	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Municipal waste collected and treated by licenced waste operator	- construction site	- visual inspection - transport documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Hazardous waste managed by certified companies/agents	- construction site	- visual inspection - transport documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Restricted access to dangerous materials	- construction site	- visual inspection	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	EPRP prepared	- construction site	- document review	- before site works	Contractor	Supervision	included in contract cost	included in contract cost
	Construction related traffic does not run through Konjic	- construction site	- visual inspection - TMP review	- continuous - unannounced inspection outside working hours	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Utilisation of only approved landfill locations	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Landfills established as per the design and permits	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Disposal of inert material on designated disposal sites and recultivation afterward by using autochthonous species	- construction site	- visual inspection - documentation review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
Cultural, historical, and archaeological heritage	Chance finds procedure developed and implemented	- construction site	- document - review - visual inspection - records review	- before site works - continuous after identification of potential heritage location until completion of exploration	Contractor	Supervision	included in contract cost	included in contract cost
Social	Workers inducted with rules and measures related to community interference	- construction site	- documents and records review	- at induction of new workers at site - semi-annually for the induction update	Contractor	Supervision	included in contract cost	included in contract cost
	Developed and implemented workers Code of Conduct	- construction site	- documents and records review - visual inspection - grievance records	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Full implementation of SEP	- construction site	- documents and records review - grievance records	- weekly	Contractor Supervision Employer	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Timely registration and resolution of complaints through the GRM	- construction site	- documents and records review - grievance records	- weekly	Contractor Supervision Employer	Supervision	included in contract cost	included in contract cost
	Access to site prevented for unauthorised personnel	- construction site	- visual inspection - documents and records review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Specifically designated routes to be used by public at the construction site	- construction site	- visual inspection - documents and records review - grievance records	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	TMP implemented	- construction site	- visual inspection - grievance records	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Implemented measures for identified collision points while timely reaction in case of disruption also ensured	- construction site	- visual inspection - documents and records review - grievance records	- upon identification - on complaint	Contractor Employer	Supervision	included in contract cost	included in contract cost
	Implemented agreement on friendly environment	- construction site	- visual inspection - documents and records review - grievance records	- continuous or within the time specified for implementation in the agreement	Contractor Employer	Supervision	included in contract cost	included in contract cost
	Maintained access to all adjacent properties during the construction of access roads and throughout the contract period	- construction site	- visual inspection - documents and records review - grievance records	- continuous	Contractor	Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Relevant OHS provisions set and implemented following the relevant legislation and technical specifications	- construction site	- documentation and records review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
	Health surveillance and healthcare access for workers provided	- construction site	- documentation and records review	- weekly	Contractor	Supervision	included in contract cost	included in contract cost
OPERATIONAL PHASE								
Flora	Adequate storage location of chemicals used in motorway and access roads maintenance; selected location must not be in or near sensitive receptors, including water bodies, priority biodiversity features and critical habitats	- maintenance depot	- visual inspection	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Avoided using of herbicides and hazardous substances and materials	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Routine maintenance and cleaning of all drainage structures and oil separators performed	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Routine maintenance includes all surfaces adjacent to the motorway and access roads, and includes elimination and control of weeds and invasive species	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Fauna	Revegetation performed as stated in the mitigation measures regarding habitats	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Adequate cleaning and maintenance of drainage structures and oil separators performed to ensure their efficiency regarding the pollution prevention	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Properly maintained and repaired motorway fence	- motorway section	- visual inspection - documentation review	- weekly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Usage of replacement lighting bulbs such as low-pressure sodium lights, high-pressure sodium bulbs or mercury bulbs	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Avoided placing the artificial streetlights and unnecessary illumination of traffic signs, auxiliary facilities, such as gas stations, rest areas, billboards, etc.	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
Groundwaters	Treatment of storm water in oil and grease separators (for surface run-off) and/or biological treatment units (for sanitary wastewater) to the required quality before discharging into the recipient	- motorway section	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Regular maintenance of oil and grease separators and/or biological treatment units	- motorway section	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Treated water not discharged in the spring area and around any new wells identified during the pre-construction phase; instead, water discharged downstream from the zone of influence of Konjička Bijela spring and outside the III sanitary protection zone of Salakovac and Bošnjaci springs	- motorway section	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Prepared OEPRP, including procedures to prevent contamination of waters from accidental spills	- motorway section and access roads	- document review	- before commencement of maintenance works	Employer Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	In case landfill for non-inert material will be established, defined procedures for its management	- landfill for non-inert material	- document review	- before commencement of maintenance works	Employer Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	In case landfill for non-inert material will be established, implemented procedures for its management	- landfill for non-inert material	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Groundwater quality measurement (mandatory parameters - pH, odour, colour, dissolved oxygen, electrical conductivity, suspended solids, chemical oxygen demand, biochemical oxygen demand, NH_3, NO_3, NO_2, N according to Kjedahl, total N, total P, sulphates; specific parameters - Cd, Cu, Cr, Zn, Ni, Fe, Pb, Mn, TOC, oils and fats, mineral oils, phenolic index, Hg, anthracene, acenaphthylene, fluorene, phenanthrene, pyrene, benzo (a) anthracene, chrysene, benzo (k) fluoranthene, benzo (g.h.i) perylene, indeno [1,2,3-cd] pyrene, benzo (a) pyrene, di benzo (a.h) anthracene, naphthalene, acenaphthene, fluoranthene)	- surrounding area within the distance of 250 m of the site boundaries - sampling at identified wells	- sampling and testing of water quality as per the local regulations, by the accredited methods and laboratory	- on complaint	Maintenan. Contractor	Maintenan. Contractor Maintenan. Supervision	EUR 250 per sample	included in contract cost
Surface waters	Regular maintenance of separators and sanitary and drainage facilities	- motorway section	- visual inspection - document review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Prepared OEPRP, including procedures to prevent contamination of waters from accidental spills	- motorway section and access roads	- document review	- before commencement of maintenance works	Employer Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	In case landfill for non-inert material will be established, defined procedures for its management	- landfill for non-inert material	- document review	- before commencement of maintenance works	Employer Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	In case landfill for non-inert material will be established, implemented procedures for its management	- landfill for non-inert material	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Surface waters quality measurement (mandatory parameters - pH, odour, colour, dissolved oxygen, electrical conductivity, suspended solids, chemical oxygen demand, biochemical oxygen demand, NH_3, NO_3, NO_2, N according to Kjedahl, total N, total P, sulphates; specific parameters - Cd, Cu, Cr, Zn, Ni, Fe, Pb, Mn, TOC, oils and fats, mineral oils, phenolic index, Hg, anthracene, acenaphthylene, fluorene, phenanthrene, pyrene, benzo (a) anthracene, chrysene, benzo (k) fluoranthene, benzo (g.h.i) perylene, indeno [1,2,3-cd] pyrene, benzo (a) pyrene, di benzo (a.h) anthracene, naphthalene, acenaphthene, fluoranthene)	- water streams along access roads (upstream and downstream the location)	- sampling and testing of water quality as per the local regulations, by the accredited methods and laboratory	- twice in a year (during low and high flow periods)	Maintenan. Contractor	Maintenan. Contractor Maintenan. Supervision	EUR 250 per sample	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Air quality	If measurement of standard air quality parameters shows that values exceed maximum allowed values prescribed by national regulation, implement protection measures in the form of wide leafed green plants or artificial barriers	- motorway section and access roads	- visual inspection	- within 6 months after the established need for measures	Employer Maintenan. Contractor	Maintenan. Supervision	Employer's resources	included in contract cost
	Installed and operating air filters at the tunnel ventilation system, including their regular maintenance	- motorway section	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Air quality measurement (SO_2, NO_2, CO, O_3, PM_{10}, $PM_{2.5}$, total PM)	- motorway section (tunnel portals) - access roads (at the location of complaint)	- sampling and testing of air quality as per the local regulations, by the accredited methods and laboratory	- on complaint	Maintenan. Contractor	Maintenan. Contractor Maintenan. Supervision	EUR 500 per sample	included in contract cost
Noise	If measurement of noise levels shows that values exceed maximum allowed values defined by national regulations, design and install noise protection barriers	- motorway section and access roads	- visual inspection	- within 6 months after the established need for measures	Employer Maintenan. Contractor	Maintenan. Supervision	Employer's resources	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Noise levels measurement (L_{eq}, $L_{1\%}$, L_{Req}, $L_{R1\%}$, LA_{eq}, LAF_{MAX}, LAF_{MIN}, LA1%, LA5%, LA10%, LA50%, LA90%, LA95%, LA99%)	- motorway section (tunnel portals) - access roads (MP1, MP2, MP3 and MP4 (Table 5.3))	- measuring of noise levels as per the local regulations, by the accredited methods and laboratory	- quarterly	Maintenan. Contractor	Maintenan. Contractor Maintenan. Supervision	EUR 150 per sample	included in contract cost
Soil	Drainage system maintained to prevent direct surface run-off an erosion impact	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Planting vegetation cover at soil surfaces	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Regular maintenance of drainage system to prevent pollution	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Prepared OEPRP, including defining and implementing procedures to prevent contamination of soil from accidental spills	- motorway section and access roads	- document review	- before commencement of maintenance works	Employer Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Geotechnical slope monitoring performed, including timely implementation of slope stabilisation measures	- motorway section and access roads	- visual inspection - documentation review	- monthly - within 3 months after the established need for slope stabilisation measures	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
	Location marked and appropriate traffic signalisation set up in case of landslide and/or rock fall, until completing restoration measures	- motorway section and access roads	- visual inspection - documentation review	- continuous for the period during which marking and signalisation is required	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	In case landfill for non-inert material will be established, defined procedures for its management	- landfill for non-inert material	- document review	- before commencement of maintenance works	Employer Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	In case landfill for non-inert material will be established, implemented procedures for its management	- landfill for non-inert material	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Soil quality measurement (pH (H2O), pH (1.0 M KCl), organic content - humus, dry matter content, total N, total P, Cu, Zn, Pb, Cd, Ni, Mn, Fe, Co, Cr, Hg, total petrolatum hydrocarbons)	- SP1, SP2 and SP3 (Table 5.4)	- sampling and testing of soil quality as per the local regulations, by the accredited methods and laboratory	- twice in a year	Maintenan. Contractor	Maintenan. Contractor Maintenan. Supervision	EUR 250 per sample	included in contract cost
Waste and dangerous materials	Regular cleaning of the RoW	- motorway section and access roads	- visual inspection - documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Waste transferred to licenced operators for final treatment/disposal	- motorway section and access roads	- visual inspection - transport documentation review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost

Aspect	Parameter to be monitored	Monitoring location	Monitoring method	Monitoring frequency	Responsibility		Cost estimate [EUR]	
					install and operate	monitor	install and operate	monitor
Social	Developed and implemented an OEPRP to identify and address all major hazards for the local community during the motorway and access roads operation	- motorway section and access roads	- document review	- before commencement of maintenance works	Employer Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Implemented SEP, in particular provisions on providing timely information to local communities on the extent of works and duration prior to the commencement of maintenance works, as well as provisions on ongoing implementation of the grievance mechanism	- motorway section and access roads, local municipalities	- documentation and records review - grievance records	- monthly	Maintenan. Contractor Maintenan. Supervision Employer	Maintenan. Supervision	included in contract cost	included in contract cost
	Relevant OHS provisions set and implemented following the relevant legislation and technical specifications	- motorway section and access roads	- documentation and records review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost
	Health surveillance and healthcare access for workers provided	- maintenance depot and maintenance contractor headquarters	- documentation and records review	- monthly	Maintenan. Contractor	Maintenan. Supervision	included in contract cost	included in contract cost

12.3. ANNEX 3: SUMMARY OF AIR QUALITY MEASUREMENTS

Pollutant	Sampling period	Marginal average value [µg/m^3]	Average measured value [µg/m^3]		
			MP1	MP2	MP3
SO_2	June 9, 2022	350	10.00	19.00	19.24
NO_2		200	0.34	0.81	0.98
CO		10	0.48	1.14	0.66
O_3		120	12.00	16.00	19.00
PM_{10}		50	11.54	25.04	19.24
$PM_{2.5}$		/	2.52	2.87	2.48
Total PM		250	18.85	34.58	24.01

Results of air quality measurements

12.4. ANNEX 4: SUMMARY OF SURFACE WATERS QUALITY MEASUREMENTS

Parameter	Unit	Method	Sampling period	Limit value		SP1	SP2	SP3	SP4
				I-II class	III-IV class				
Mandatory parameters									
pH		BAS EN ISO 10523:2013	March 16, 2021	6.8-8.5/ 5.8-8.5	6.0-9.0/ 6.0-9.0	7.7	7.7	7.9	7.9
Odour		RU-7.2/OV-1-31	March 16, 2021	without/ without	barely noticeable/-	without	without	without	without
Colour	mg Pt/l	BAS EN ISO 7887:2013	March 17, 2021	-	-	2	3	2	4
Dissolved oxygen	mg/l	BAS EN ISO 5814:2014	March 16, 2021	8/6	4/3	8.2	8.7	8.1	8.3
Electrical conductivity	µS/cm	BAS EN 2788:2002	March 16, 2021	-	-	312	491	368	392
Suspended solids	mg/l	BAS ISO 11932:2002	March 17, 2021	10/30	80/100	< 2	5	2	4
Chemical oxygen demand (COD)	mgO_2/l	BAS ISO 15705:2005	March 17, 2021	10/12	20/40	< 15	< 15	< 15	< 15
Biochemical oxygen demand (BOD)	mgO_2/l	BAS ISO 5815-1,2:2004	March 23, 2021	2/4	7/20	0.79	1.29	1.40	1.11
Ammonia	mg/l	BAS ISO 7150-1:2002	March 22, 2021	0.1-0.25	0.25-1.50	< 0.050	< 0.050	< 0.050	< 0.050
Nitrates (NO_3)	mg/l	BAS ISO 7890-3:2002	March 22, 2021	0.5-1.5	1.5-10	0.15	0.48	0.35	0.35
Nitrites (NO_2)	mg/l	BAS EN 26777:2000	March 17, 2021	0.01-0.03	0.03-0.2	< 0.013	< 0.013	< 0.013	< 0.013
Nitrogen according to Kjeldahl	mg/l	BAS EN 25663:2000	March 23, 2021	-	-	< 1	< 1	< 1	< 1
Total nitrogen (N)	mg/l	Calculated from the concentrations of nitrite, nitrate and nitrogen according to Kjeldahl	March 23, 2021	-	-	< 1	< 1	< 1	< 1
Total phosphorus (P)	mg/l	BAS EN ISO 6878:2006	March 22, 2021	0.1-0.25	0.25-1.50	0.034	0.049	0.050	0.045
Sulphates	mg/l	Standard methods 4500-SO_4 C, APHA-AWWA-2-WEF 2012	March 19, 2021	-	-	< 10	99	16	8

Parameter	Unit	Method	Sampling period	Limit value		SP1	SP2	SP3	SP4
				I-II class	III-IV class				
Specific parameters									
Cadmium (Cd)	µg/l	BAS ISO 8288:2002	March 24, 2021	0.5	5.0	< 0.5	< 0.5	< 0.5	< 0.5
Copper (Cu)	µg/l	BAS ISO 8288:2002	March 24, 2021	2-10	10-20	< 1	< 1	< 1	< 1
Chrome (Cr)	µg/l	Standard methods 3111B	March 24, 2021	1-6	6-20	< 1	< 1	< 1	< 1
Zinc (Zn)	µg/l	BAS ISO 8288:2002	March 24, 2021	50-80	80.200	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (Ni)	µg/l	BAS ISO 8288:2002	March 24, 2021	15-30	30-200	< 1	2.26	< 1	1.21
Iron (Fe)	µg/l	Standard methods 3111B	March 24, 2021	100	1,000	< 1	< 1	< 1	< 1
Lead (Pb)	µg/l	BAS ISO 8288:2002	March 24, 2021	2	80	< 1	< 0.10	< 0.10	< 0.10
Manganese (Mn)	µg/l	Standard methods 3111B	March 24, 2021	50	1,000	< 1	< 1	< 1	< 1
Total Organic Carbon (TOC)	mg/l	Macherey-Nagel, Nanocolour Test	March 17, 2021	-	-	4.0	6.6	3.5	4.5
Oils and fats	mg/l	BAS ISO 11349:2019	March 17, 2021	-	-	<10	< 10	< 10	< 10
Mineral oils	mg/l	Standard methods 5520 (F) APHA-AWWA- WEF2017	-	-	-	< 0.02	< 0.02	< 0.02	< 0.02
Phenolic index	mg/l	ISO 6439:2000	-	-	-	< 0.10	< 0.10	< 0.10	< 0.10
Mercury (Hg)	µg/l	AMA 254, Advanced Mercury Analyser, Operation Manual	-	0.02	1.00	< 0.10	< 0.10	**67.36**	< 0.10
Anthracene	µg/l	EPA 610:1984	-	0.2	1	< 0.012	< 0.012	< 0.012	< 0.012
Acenaphthylene	µg/l	EPA 610:1984	-	-	-	< 0.009	< 0.009	< 0.009	< 0.009
Fluorene	µg/l	EPA 610:1984	-	-	-	< 0.009	< 0.009	< 0.009	< 0.009
Phenanthrene	µg/l	EPA 610:1984	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010
Pyrene	µg/l	EPA 610:1984	-	-	-	< 0.016	< 0.016	< 0.016	< 0.016
Benzo (a) anthracene	µg/l	EPA 610:1984	-	-	-	< 0.015	< 0.015	< 0.015	< 0.015
Chrysene	µg/l	EPA 610:1984	-	-	-	< 0.014	< 0.014	< 0.014	< 0.014
Benzo (b) fluoranthene	µg/l	EPA 610:1984	-	0.005	0.01	< 0.007	< 0.007	< 0.007	< 0.007

Parameter	Unit	Method	Sampling period	Limit value		SP1	SP2	SP3	SP4
				I-II class	III-IV class				
Benzo (k) fluoranthene	µg/l	EPA 610:1984	-	-	-	< 0.008	< 0.008	< 0.008	< 0.008
Benzo (g.h.i) perylene	µg/l	EPA 610:1984	-	-	-	0.080	0.099	0.080	0.108
Indeno (1,2,3-cd) pyrene	µg/l	EPA 610:1984	-	-	-	0.006	0.010	0.006	0.005
Benzo (a) pyrene	µg/l	EPA 610:1984	-	0.005	0.01	< 0.009	< 0.009	< 0.009	< 0.009
Di benzo (a, h) anthracene	µg/l	EPA 610:1984	-	-	-	< 0.015	< 0.015	< 0.015	< 0.015
Naphthalene	µg/l	EPA 610:1984	-	-	-	< 0.018	< 0.018	< 0.018	< 0.018
Acenaphthene	µg/l	EPA 610:1984	-	-	-	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	µg/l	EPA 610:1984	-	-	-	< 0.013	< 0.013	< 0.013	< 0.013

Results of water quality analysis along the main alignment in the high flow season

Parameter	Unit	Method	Sampling period	Limit value		SP1	SP2	SP3	SP4
				I-II class	III-IV class				
Mandatory parameters									
pH		BAS EN ISO 10523:2013	July 1, 2021	6.8-8.5/ 5.8-8.5	6.0-9.0/ 6.0-9.0	7.8	7.1	7.2	7.5
Odour		RU-7.2/OV-1-31	July 1, 2021	without/ without	barely noticeable/-	without	without	without	without
Colour	mg Pt/l	BAS EN ISO 7887:2013	July 1, 2021	-	-	2	4	3	5
Dissolved oxygen	mg/l	BAS EN ISO 5814:2014	July 1, 2021	8/6	4/3	8.4	8.5	8.4	8.5
Electrical conductivity	µS/cm	BAS EN 2788:2002	July 1, 2021	-	-	318	452	325	314
Suspended solids	mg/l	BAS ISO 11932:2002	July 2, 2021	10/30	80/100	<2	<2	<2	2
Chemical oxygen demand (COD)	mgO2/l	BAS ISO 15705:2005	July 2, 2021	10/12	20/40	<15	<15	<15	<15
Biochemical oxygen demand (BOD)	mgO2/l	BAS ISO 5815-1,2:2004	July 7, 2021	2/4	7/20	0.87	1.34	1.87	1.79

Parameter	Unit	Method	Sampling period	Limit value		SP1	SP2	SP3	SP4
				I-II class	III-IV class				
Ammonia	mg/l	BAS ISO 7150-1:2002	July 5, 2021	0.1-0.25	0.25-1.50	<0.050	0.063	<0.050	<0.050
Nitrates (NO_3)	mg/l	BAS ISO 7890-3:2002	July 5, 2021	0.5-1.5	1.5-10	0.18	0.44	0.34	0.31
Nitrites (NO_2)	mg/l	BAS EN 26777:2000	July 2, 2021	0.01-0.03	0.03-0.2	<0.013	0.013	<0.013	<0.013
Nitrogen according to Kjeldahl	mg/l	BAS EN 25663:2000	July 5, 2021	-	-	<1	<1	<1	<1
Total nitrogen (N)	mg/l	Calculated from the concentrations of nitrite, nitrate and nitrogen according to Kjeldahl	July 5, 2021	-	-	<1	<1	<1	<1
Total phosphorus (P)	mg/l	BAS EN ISO 6878:2006	July 5, 2021	0.1-0.25	0.25-1.50	<0.025	<0.025	<0.025	0.096
Sulphates	mg/l	Standard methods 4500-SO_4 C, APHA-AWWA-2-WEF 2012	July 6, 2021	-	-	<10	124	28	24
Specific parameters									
Cadmium (Cd)	µg/l	BAS ISO 8288:2002	July 5, 2021	0.5	5.0	<0.5	<0.5	<0.5	<0.5
Copper (Cu)	µg/l	BAS ISO 8288:2002	July 5, 2021	2-10	10-20	1.40	3.74	<1	<0,40
Chrome (Cr)	µg/l	Standard methods 3111B	July 5, 2021	1-6	6-20	<0.5	<0.5	<0.5	<0.50
Zinc (Zn)	µg/l	BAS ISO 8288:2002	July 5, 2021	50-80	80.200	<0.5	<0.5	<0.5	<0.50
Nickel (Ni)	µg/l	BAS ISO 8288:2002	July 5, 2021	15-30	30-200	<1	<1	<1	<0.10
Iron (Fe)	µg/l	Standard methods 3111B	July 5, 2021	100	1,000	<0.03	<0.03	<0.03	<0.03
Lead (Pb)	µg/l	BAS ISO 8288:2002	July 5, 2021	2	80	2.96	<0.10	4.03	<0.10
Manganese (Mn)	µg/l	Standard methods 3111B	July 5, 2021	50	1,000	<0.01	<0.01	<0.01	<0.01
Total Organic Carbon (TOC)	mg/l	Macherey-Nagel, Nanocolour Test	July 2, 2021	-	-	3.9	8.6	5.7	4.2
Oils and fats	mg/l	BAS ISO 11349:2019	July 2, 2021	-	-	<10	<10	<10	<10
Mineral oils	mg/l	Standard methods 5520 (F) APHA-AWWA- WEF2017	-	-	-	<0.02	<0.02	<0.02	<0.02
Phenolic index	mg/l	ISO 6439:2000	-	-	-	<0.10	<0.10	<0.10	<0.10

Parameter	Unit	Method	Sampling period	Limit value		SP1	SP2	SP3	SP4
				I-II class	III-IV class				
Mercury (Hg)	µg/l	AMA 254, Advanced Mercury Analyser, Operation Manual	-	0.02	1.00	<0.10	0.16	<0.10	<0.10
Anthracene	µg/l	EPA 610:1984	-	0.2	1	<0.012	<0.012	<0.012	<0.012
Acenaphthylene	µg/l	EPA 610:1984	-	-	-	<0.009	<0.009	<0.009	<0.009
Fluorene	µg/l	EPA 610:1984	-	-	-	<0.009	<0.009	<0.009	<0.009
Phenanthrene	µg/l	EPA 610:1984	-	-	-	<0.010	<0.010	<0.010	<0.010
Pyrene	µg/l	EPA 610:1984	-	-	-	<0.016	<0.016	<0.016	<0.016
Benzo (a) anthracene	µg/l	EPA 610:1984	-	-	-	<0.015	<0.015	<0.015	<0.015
Chrysene	µg/l	EPA 610:1984	-	-	-	<0.014	<0.014	<0.014	<0.014
Benzo (b) fluoranthene	µg/l	EPA 610:1984	-	0.005	0.01	<0.007	<0.007	<0.007	<0.007
Benzo (k) fluoranthene	µg/l	EPA 610:1984	-	-	-	<0.008	<0.008	<0.008	<0.008
Benzo (g.h.i) perylene	µg/l	EPA 610:1984	-	-	-	<0.004	<0.004	<0.004	<0.004
Indeno (1,2,3-cd) pyrene	µg/l	EPA 610:1984	-	-	-	<0.005	<0.005	<0.005	<0.005
Benzo (a) pyrene	µg/l	EPA 610:1984	-	0.005	0.01	<0.009	<0.009	<0.009	<0.009
Di benzo (a.h) anthracene	µg/l	EPA 610:1984	-	-	-	<0.015	<0.015	<0.015	<0.015
Naphthalene	µg/l	EPA 610:1984	-	-	-	<0.018	<0.018	<0.018	<0.018
Acenaphthene	µg/l	EPA 610:1984	-	-	-	<0.010	<0.010	<0.010	<0.010
Fluoranthene	µg/l	EPA 610:1984	-	-	-	<0.013	<0.013	<0.013	<0.013

Results of water quality analysis along the main alignment in the low flow season

12.5. ANNEX 5: SUMMARY OF NOISE MEASUREMENTS

Measuring point	Energy average value			Adjustment		Rating level		Limit value*		Survey period
	L_{rezid}	L_{eq}	$L_{1\%}$	K_T	K_I	L_{Req}	$L_{R1\%}$	L_{Req}	$L_{R1\%}$	
MP1	-	50.3	63.4	-	-	50.3	63.4	60.0	75.0	6:09 June 24, 2022 to 6:09 June 25, 2022
								50.0	75.0	
MP2	-	57.4	66.8	-	-	57.4	66.8	65.0	80.0	11:00 June 26, 2022 to 11:00 June 27, 2022
								60.0	80.0	
MP3	-	57.9	63.5	-	-	57.9	63.5	60.0	75.0	8:10 June 25, 2022 to 8:10 June 26, 2022
								50.0	75.0	
MP4	-	53.3	62.6	-	-	53.3	62.6	65.0	80.0	11:19 June 20, 2022 to 11:19 June 21, 2022
								60.0	80.0	

* Limit values presented for day and night periods.

Noise measurement results [dB(A)]

Measuring point	LA_{eq}	LAF_{MAX}	LAF_{MIN}	LA1%	LA5%	LA10%	LA50%	LA90%	LA95%	LA99%
MP1	50.3	74.1	33.9	63.4	53.4	50.6	43.0	38.0	37.3	36.2
MP2	57.4	87.6	39.0	66.8	63.2	58.8	53.1	47.1	45.9	43.4
MP3	57.9	93.0	29.7	63.5	60.1	58.5	50.6	38.8	37.3	34.9
MP4	53.3	81.5	31.8	62.6	57.1	54.8	42.1	37.4	36.4	34.9

Detailed presentation of acoustic parameters [dB(A)]

12.6. ANNEX 6: SUMMARY OF LAND TYPE SURVEY AND SOIL QUALITY MEASUREMENTS

Code	Category	Area [ha]	%
112	Discontinuous urban fabric	1.33	8.96
Artificial surfaces		1.33	8.96
221	Vineyards	0.73	4.91
242	Complex cultivation patterns	1.88	12.69
243	Land principally occupied by agriculture	7.05	47.55
Agricultural land		9.66	65.14
311	Broad-leaved forest	3.58	24.12
324	Transitional woodland-shrub	0.17	1.16
333	Sparsely vegetated areas	0.09	0.62
Forest		3.84	25.90
	Total	14.83	100

Type of land directly occupied by the 30 m wide access roads

Parameters	Method	Unit of measure	Measuring point		
			SP1	SP2	SP3
pH (H_2O)	BAS ISO 10390:2009	-	8.23	7.99	8.13
pH (1.0 M KCl)	BAS ISO 10390:2009	-	7.88	7.50	7.79
Organic content - humus	BAS ISO 14235:2003	g/kg	12.2	56.5	21.5
Dry matter content	BAS ISO 11465:2000	%	99.3	96.0	98.8
Total nitrogen (N)	Modified Kjeldah method BAS ISO 11261:200	mg/kg	0.08	0.09	0.07
Total phosphorus (P)	BAS ISO 11263:2002	mg/kg	9.7	9.5	7.6
Copper (Cu)	BAS ISO 11047:2000	mg/kg	< 5	17.8	9.5
Zinc (Zn)	BAS ISO 11047:2000	mg/kg	107	138	94.3
Lead (Pb)	BAS ISO 11047:2000	mg/kg	< 15	36.0	< 15
Cadmium (Cd)	BAS ISO 11047:2000	mg/kg	< 2	< 2	< 2
Nickel (Ni)	BAS ISO 11047:2000	mg/kg	< 12	26.8	16.8
Manganese (Mn)	BAS ISO 11047:2000	mg/kg	257	1,180	206
Iron (Fe)	EPA 7000 B:2007	mg/kg	8,074	26,289	10,776
Cobalt (Co)	BAS ISO 11047:2000	mg/kg	< 12	< 12	< 12
Chromium (Cm)	BAS ISO 11047:2000	mg/kg	< 12	23.8	< 12
Mercury (Hg)*	EPA 7474:2007	mg/kg	< 0.001	< 0.001	< 0.001
Total petrolatum hydrocarbons*	BAS CEN ISO7TS 16558.2:2018	mg/kg	< 100	< 100	< 100

* Method is not covered by accreditation

Results of soil quality measurements

12.7. ANNEX 7: SUMMARY OF HABITAT SURVEYS

Wider locality	Narrow locality	Coordinates [N / E]
Kuti-Livac	Dubrava	43º23'12.23" / 17º53’7.00"
	Dubrava 2	43º23'19.66" / 17º52'37.04"
	Komic	43º22'51.79" / 17º53'43.17"
	Buđevci	43º22'56.75" / 17º53'26.37"
	Sušica	43º23'9.90" / 17º53'36.95"
	Kuti	43º23'17.51" / 17º54'18.64"
	Kuti 1	43º23'26.17" / 17º53'57.87"
	Kuti 3	43º23'3.77" / 17º54'8.72"
	Kutilivac	43º23'41.53" / 17º53'45.98"
	Livac	43º24'11.60" / 17º53'26.72"
	Orlov kuk	43º24'4.56" / 17º53'35.69"
	Orlov kuk 2	43º24'47.91" / 17º53'48.07"
Koritna Draga	Koritna Draga	43º23'22.56" / 17º54'42.32"
	Orlinka	43º23'10.89" / 17º54'34.94"
	Dobruša	43º23'39.39" / 17º54'44.95"
	Dobruša 2	43º23'51.11" / 17º54'51.32"
	Kuti 2	43º23'35.71" / 17º54'26.74"
	Dobruša 3	43º23'28.11" / 17º54'54.83"
	Dobruša 4	43º23'46.15" / 17º54'42.90"
Humi	Lišani	43º25'29.40" / 17º54'1.86"
	Lišani 2	43º25'6.15" / 17º54'38.46"
	Lišani 3	43º25'26.69" / 17º54'27.95"
	Lišani 4	43º25'39.85" / 17º54'56.20"
	Lišani 5	43º25'43.99" / 17º54'23.48"
	Humi	43º26'7.13" / 17º53'49.68"
	Humi 2	43º26'30.84" / 17º54'2.85"
	Humi 3	43º26'9.90" / 17º54'32.64"
	Humi 4	43º26'6.12" / 17º54'54.02"
	Humi 5	43º26'21.12" / 17º54'45.37"
	Humi 6	43º26'39.65" / 17º54'47.16"
	Humi 7	43º26'47.87" / 17º54'25.54"
Podgorani	Dolac	43º27'26.05" / 17º54'23.79"
	Dolac 2	43º27'14.55" / 17º54'2.50"
	Dolac 3	43º27'33.70" / 17º54'2.55"
	Podgorani	43º27'34.23" / 17º53'20.29"
	Podgorani 2	43º27'39.50" / 17º53'34.03"
	Podgorani 3	43º27'46.95" / 17º53'45.20"
	Podgorani 4	43º27'52.48" / 17º53'43.47"
	Podgorani 5	43º27'54.06" / 17º53'11.79"
	Podgorani 6	43º28'4.82" / 17º52'58.37"
	Podgorani 7	43º28'22.39" / 17º52'59.06"

Wider locality	Narrow locality	Coordinates [N / E]
	Podgorani 8	43º28'4.42" / 17º53'18.78"
	Podgorani 9	43º28'4.99" / 17º53'34.78"
Ovčari	Ovčari 1	43º40'1.35" / 17º59'11.77"
	Ovčari 2	43º40'11.43" / 17º58'49.51"
	Ovčari 3	43º40'2.52" / 17º58'58.34"
	Ovčari 4	43º39'42.07" / 17º58'26.06"
Polje Bijela	Polje Bijela 1	43º38'5.64" / 17º58'55.69"
	Polje Bijela 2	43º38'7.04" / 17º58'23.60
	Polje Bijela 3	43º37'43.89" / 17º58'16.12"
	Polje Bijela 4	43º37'17.71" / 17º58'22.78"
	Rakov Laz	43º34'14.25" / 17º55'38.71"
Zlatar	Zlatar 1	43º38'55.67" / 17º58'13.09"
	Zlatar 2	43º38'55.82" / 17º58'57.09"
Konjic bypass	Repovica 1	43º39'54.18" / 17º58'9.18"
	Repovica 2	43º39'45.39" / 17º57'36.19"
	Donje Selo	43º39'39.44" / 17º57'4.55"
	Drecelj	43º39'43.85" / 17º56'35.58"

Overview and coordinates of the vegetation survey sites

EUNIS code	Description
C1	Surface standing waters
C2	Surface running waters
E1.5	Eastern sub-Mediterranean dry grassland
E4.1	Vegetated snow-patch
E5.2	Thermophile woodland fringes
F5	Maquis, arborescent matorral and thermo-Mediterranean brushes
FB.4	Vineyards
G1	Broadleaved deciduous woodland
G2.1	Mediterranean evergreen *Quercus* forest
G3	Coniferous woodland
G4	Mixed deciduous and coniferous woodland
H2	Screes
H5.5	Burnt areas with very sparse or no vegetation
I1	Arable land and market gardens
I1.3	Arable land with unmixed crops grown by low-intensity agricultural methods
I2.2.2.	Subsistence garden areas
J1	Buildings of cities, towns, and villages
J1.2	Residential buildings of villages and urban peripheries
J2.3	Rural industrial and commercial sites still in active use
J3	Extractive industrial sites

Habitat types identified in the surveyed area

EUNIS code	Direct [ha]	Indirect [ha]	Total [ha]
C1	0.52	1,271.18	1,271.7
C2	0.00	20.47	20.47
E1.5	2.44	23.74	58.82
E4.1	8.19	116.04	298.56
E5.2	56.04	1,808.98	1,865.02
F5	0.97	60.17	61.14
FB.4	1.23	78.59	79.82
G1	58.14	3,858.52	3,916.66
G2.1	0.90	28.27	29.17
G3	1.58	60.03	61.61
G4	5.03	747.59	752.62
H2	2.60	67.14	69.2
H5.5	0.00	1.36	1.36
I1	17.28	789.14	806.42
I1.3	0.00	13.81	13.81
I2.2.2.	6.46	309.19	315.65
J1	5.45	160.91	166.36
J1.2	0.00	0.41	0.41
J2.3	0.99	45.35	46.34
J3	2.68	22.57	25.25
Total	170.50	9,483.46	9,653.96

Area under specific habitat types directly and indirectly affected by the Project

Code	Habitat name
3240	Alpine rivers and their ligneous vegetation with *Salix elaeagnos*
4030	European dry heaths
5130	*Juniperus communis* formations on heaths or calcareous grasslands
*6220	Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*
*6110	Rupicolous calcareous or basophilic grasslands of the *Alysso-Sedion albi*
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)
62A0	Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*)
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
8140	Eastern Mediterranean screes *Drypidetalia spinosae*
8210	Calcareous rocky slopes with chasmophytic vegetation
8310	Caves not open to the public
9140	Medio-European subalpine beech woods with *Acer* and *Rumex arifolius*
9180	*Tilio-Acerion* forests of slopes, screes and ravines
91K0	Illyrian *Fagus sylvatica* forests (*Aremonio-Fagion*)
91R0	Dinaric dolomite Scots pine forests (*Genisto januensis-Pinetum*)

Code	Habitat name
*91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)
9250	*Quercus trojana* woods
95A0	High oro-Mediterranean pine forests
*9530	(Sub-) Mediterranean pine forests with endemic black pines

Overview of habitats of European importance possibly present in the Project area

English name	Scientific name	Family	Origin
Boxelder maple	*Acer negundo* L.	Compositae	Am-C&N
Tree of heaven	*Ailanthus altissima* (Mill.) Sw.	Simaroubaceae	As-E
Redroot pigweed	*Amaranthus retroflexus* L.	Amaranthaceae	Am-N
Annual ragweed	*Ambrosia artemisifolia* L.	Amaranthaceae	Am-N
Annual saltmarsh aster	*Aster squamatus* (Spreng.) Heiron	Compositae	Am-S
Greater Beggar's Ticks	*Bidens subalternans* DC.	Compositae	Am-S
Paper mulberry	*Broussonetia papyrifera* L`Herit ex Vent.	Moraceae	As-E
Flax-leaf fleabane	*Conyza bonariensis* (L.) Cronquist	Compositae	Am-C
Horseweed	*Conyza canadensis* (L.) Cronq.	Compositae	Am-N
Jimsonweed	*Datura stramonium* L.	Solanaceae	Am-N
Indian goosegrass	*Eleusine indica* (L.) Gaertn.	Poaceae	As
Annual fleabane	*Erigeron annuus* (L.) Pers. Subsp. *Annuus*	Compositae	Am-N
Jerusalem artichoke	*Helianthus tuberosus* L.	Compositae	Am-N
Alfalfa	*Medicago sativa* L.	Fabaceae	As
Virginia creeper	*Parthenocissus quinquefolia* (L.) Planchon	Vitaceae	Am-N
Knotgrass	*Paspalum distichum* L.	Poaceae	Am-N
Black locust	*Robinia pseudoacacia* L.	Fabaceae	Am-N
Persian speedwell	*Veronica persica* Poir.	Plantaginaceae	As-W
Rough cocklebur	*Xanthium strumarium* L. subsp. *Italicum* (Moretti) D. Löve	Compositae	As-W
Spiny cocklebur	*Xanthium spinosum* L.	Compositae	Am-S

Overview of invasive plant species within the Project area

12.8. ANNEX 8: SUMMARY OF CULTURAL AND HISTORICAL ASSETS SURVEY

Location	Description	Distance from the motorway [m]
Vrabac, Bijela, Konjic	remains of medieval fortress	1,379
Mesdžid, Podgorani, Mostar	Ottoman mosque	521
Karađoz Bey Mosque, Potoci, Mostar	Ottoman mosque	1,445
Humilišani, Mostar	medieval necropolis and graveyards	1,082
Milavina cemetery, Humilišani, Mostar	necropolis and medieval tombs	1,241
Bošnjaci, Potoci-Bošnjaci, Mostar	medieval necropolis	549
Bara, Potoci, Mostar	prehistoric graveyards	2,464
Antelj fence, Potoci, Mostar	medieval monuments and tombs	2,425
Grčine, Potoci, Mostar	Roman settlement, Mithras, and early Christian church	2,189
Kratine, Humilišani, Mostar	Roman settlement, shrine, and early Christian church	1,383
Gradina, Podgorani, Mostar	Roman fortress and middle-aged quarry	621
Crkvina, Kuti, Mostar	remains of the late antique church	481
Karaula, Lišani, Mostar	prehistoric tumulus	821
Gradina, Potoci, Mostar	prehistoric hillfort	823

List of assets of cultural and historical heritage

12.9. ANNEX 9: GRIEVANCE FORM

Oznaka:	
Ime i prezime (nije obavezno) ☐ **Želim anonimno riješiti pritužbu.** ☐ **Molim da se moj identitet ne objavljuje bez mog pristanka.**	
Podaci za kontakt **Naznačite željeni način kontakta (pošta, telefon, e-pošta).**	☐ **Poštom (navedite adresu za dostavu pošte):** _____ _____ _____ ☐ **Putem telefona:** _____ ☐ **Putem e-pošte:** _____
Željeni jezik komunikacije	☐ **bošnjački / srpski / hrvatski** ☐ **engleski (ukoliko je moguće)**
Opis događaja na koji se pritužba odnosi	Šta se desilo? Mjesto dešavanja? Osoba kojoj se desilo? Šta je posljedica problema?
Datum događaja / pritužbe	
	☐ **Događaj koji se desio jednom/pritužba (datum _____)** ☐ **Desilo se više od jednom (koliko puta? _____)** ☐ **U toku (problem koji trenutno postoji)**
Šta biste željeli da se poduzme?	

Potpis: _____

Datum: _____

Obrazac pošaljite na adresu:
Javno preduzeće Autoceste Federacije Bosne i Hercegovine
N/P Kontakt osoba mehanizma pritužbi (Mr. Ivan Rebac)
Adresa: Adema Buća 20, 88000 Mostar
Hamdije Kreševljakovića 19, 71000 Sarajevo
Tel: +387 36 512 300
Fax: +387 36 512 301
E-mail: prituzbe@jpautoceste.ba