



Financed under a specific grant agreement no 2018/402-850 from EU IPA II Multi-Beneficiary Programme for Albania, Bosnia and Herzegovina, North Macedonia, Kosovo*, Montenegro and Serbia

Western Balkans Investment Framework Infrastructure Project Facility Technical Assistance 8 (IPF 8)

TA2018148R0 IPA

Mediterranean Corridor, Bosnia and Herzegovina - Croatia CVc Road Interconnection, Subsection: Konjic (Ovcari) - Prenj Tunnel - Mostar North

Gap Analysis & ESIA Disclosure Pack

WB20-BiH-TRA-02 Component 1

Volume 1: Environmental and Social Impact Assessment Report

Chapter 19 ESMP

December 2025

Western Balkans Investment Framework (WBIF)

Infrastructure Project Facility Technical Assistance 8 (IPF 8)

Infrastructures: Energy, Environment, Social, Transport and Digital Economy

TA2018148 R0 IPA

Volume 1: Environmental and Social Impact Assessment Report

Chapter 19 ESMP

December 2025

The Infrastructure Project Facility (IPF) is a technical assistance instrument of the Western Balkans Investment Framework (WBIF) which is a joint initiative of the European Union, International Financial Institutions, bilateral donors and the governments of the Western Balkans which supports socio-economic development and EU accession across the Western Balkans through the provision of finance and technical assistance for strategic infrastructure investments. This technical assistance operation is financed with EU funds.

Disclaimer: The authors take full responsibility for the contents of this report. The opinions expressed do not necessarily reflect the view of the European Union or the European Investment Bank.

PROJECT NO. DOCUMENT NO.

WB20-BiH-TRA-02

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
1	25/09/2021	ESIA Report	Team of experts	Irem Silajdžić Konstantin Siderovski	Richard Thadani
2	21/11/2022	ESIA Report – Chapter 19 ESMP	Team of experts	Irem Silajdžić	Richard Thadani
3	03/03/2023	ESIA Report – Chapter 19 ESMP	Team of experts	Irem Silajdžić	Richard Thadani
4	18/04/2023	ESIA Report – Chapter 19 ESMP	Team of experts	Irem Silajdžić	Richard Thadani
5	06/01/2025	ESIA Report – Chapter 19 ESMP	Team of experts	Irem Silajdžić	Richard Thadani
6	01/08/2025	ESIA Report – Chapter 19 ESMP	Team of experts	Irem Silajdžić	Richard Thadani
7	26/11/2025	ESIA Report – Chapter 19 ESMP	Team of experts	Irem Silajdžić	Richard Thadani
8	31/12/2025	ESIA Report – Chapter 19 ESMP	Team of experts	Irem Silajdžić	Richard Thadani

CONTENTS

19	Environmental and Social Management Plan	8
19.1	Biodiversity	8
19.2	Groundwater	35
19.3	Surface Water	45
19.4	Climatic Factors	57
19.5	Air Quality	67
19.6	Noise	73
19.7	Vibration	77
19.8	Soil	80
19.9	Landscape	84
19.10	Waste and Materials Management	86
19.11	Community Impacts	98
19.12	Disruption to Public Utility Services (Electricity, Water, Sewage, Telecommunication)	105
19.13	Impacts on water	106
19.14	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	107
19.15	Road Damage and Impacts on Local Traffic	110
19.16	Health and Safety Risks for Workers; Labour and Employment	112
19.17	Cultural, historical, and archaeological heritage	115
19.18	Danger from UXOs	117

List of tables

Table 19-1: Locations on the route where mitigation strategies should be applied	71
Table 19-2: Locations on the route where noise barriers should be applied	76

List of abbreviations

Abbreviation	Meaning
AESR	Annual Environmental and Social Report
BE	Biodiversity Expert
BHMAC	Bosnia and Herzegovina Mine Action Center
BMP	Biodiversity Management Plan
BOP	Biodiversity Offsetting Plan
CESMP	Construction Environmental and Social Management Plan
CH	Critical Habitats
CHA	Critical Habitat Assessment
CSOP	Construction Site Organisation Plan
CWMP	Construction Waste Management Plan
DCWMP	Detailed Construction Waste Management Plan
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EIA	Environmental Impact Assessment
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FBiH	Federation of Bosnia and Herzegovina
GHG	Greenhouse gas
GMP	Groundwater Monitoring Plan
IEC	Information, Education and Communication
ISMP	Invasive Species Management Plan
JPAC	Motorways of the Federation of Bosnia and Herzegovina
LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Plan
LCO	Local Community Office
LHRP	Land and Habitat Restoration Plan
MMP	Materials Management Plan
NGO	Non-governmental Organisation
OEPRP	Operational Emergency Preparedness and Response Plan
OESMP	Operational Environmental and Social Management Plan

Abbreviation	Meaning
OHS	Occupational Health and Safety
PBF	Priority Biodiversity Features
PR	Performance Requirement
RCMP	River Crossing Management Plan
SEP	Stakeholder Engagement Plan
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
TMP	Traffic Management Plan
TSMP	Topsoil Management Plan
UXO	Unexploded Ordnance

19 Environmental and Social Management Plan

19.1 Biodiversity

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Habitats						
19.1.1	Pre-construction	Adverse impacts due to inadequate planning of works and Main Design requirements	<ul style="list-style-type: none"> > During the development of the Main Design for the motorway, include the recommendations given in BMP regarding viaducts over River Neretva. No construction should be allowed in the riparian area due to its sensitivity. > Prior to commencement of construction, select inert waste disposal sites and borrow pits and access roads for them, machinery parking spaces, other access roads, service plateaus, fuel containers, construction worker camps and other (temporary) infrastructure. Selection of these localities must be based on minimal impact on environmental and social receptors, including natural habitats. Infrastructural elements must not be established in critical habitats (CH), within priority biodiversity features (PBF), candidate Emerald sites or potential Natura 2000 sites unless there is no other viable option based on analysis of environmental, social and financial criteria, which must be agreed upon by the Lenders and accompanied by mitigation and compensation (if necessary). Additionally, implement measures protecting 	Designer to include requirements in the Main Design, JPAC to monitor and review	Revision of Main Design. Inclusion of relevant BMP, ISMP design recommendations in Main Design.	Main Design includes the requirement for the motorway viaduct over Neretva and revitalisation of habitats after the construction with planting autochthonous plant species No temporary or permanent structures with potential impact on biodiversity are located within sensitive areas Developed Land and Habitat Restoration Plan and Invasive Species Management Plan

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>the aquatic habitats as given under 19.10.3 and 19.10.4.</p> <ul style="list-style-type: none"> > Permanent structures with potential negative impact on biodiversity such as gas stations and billboards with bright lights must not be planned within PBFs, CHs, candidate Emerald sites or potential Natura 2000 sites. > Design viaducts as passable structures in the Main Design so to keep habitat connectivity. > Include the requirement for reinstatement of habitats along the inert waste disposal sites, access roads and motorway layout, after the construction is finalised with planting autochthonous plant species characteristic for the area (e.g., Dalmatian laburnum, Bosnian pine, oak etc.) and prevent growing and spread of invasive species in the Main Design. The requirements regarding restoration must be outlined within Land and Habitat Restoration Plan (LHRP), while issues regarding invasive species shall be further elaborated in Invasive Species Management Plan (ISMP). 			
19.1.2	Pre-construction	Lack of up-to-date baseline conditions	<ul style="list-style-type: none"> > If the construction phase begins more than five years after the completion of the detailed surveys performed for the ESIA Study (finalised in 2021 for the motorway and 2022 for the Konjic bypass), additional baseline surveys need to be conducted before commencement of works. 	JPAC or JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Expert supervision over the research activities.	Completed habitat surveys if works are set to start later than five years after detailed surveys

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.1.3	Construction	Habitat loss due to preparation of construction site and during the performance of construction works, fragmentation of habitats Potential additional and unplanned disturbance of habitats (habitat loss, pollution)	<ul style="list-style-type: none"> > Develop Land and Habitat Restoration Plan (LHRP) and Invasive Species Management Plan (ISMP) as part of CESMP. Guidelines and recommendations for LRHP and ISMP development are included in the BMP. > Implementation of mitigation measures during the construction stage will be the responsibility of the Contractor in accordance with the contract specifications and loan requirements. JPAC is responsible of including the obligation for implementation of mitigation measures in the Contract with the Contractor and to further ensure their adequate implementation through supervision. As the project is located in ecologically sensitive area, adequate and timely implementation will be ensured by employment of a suitably qualified Biodiversity Expert (BE) specifically to coordinate the implementation and monitoring of the ESMP and BMP. > During the vegetation clearance and earthworks, the disposal of the material is to be well managed in line with CWMP submitted as a part of the 2025 ESIA Disclosure package, in order to prevent the degradation of natural vegetation and invasion of non-native species into the natural habitats. Removed topsoil rich in organic matter must be deposited in controlled way and later used for arrangement of embankments, cuts and for restoration purposes. 	Contractor	<p>The monitoring of cleared vegetation areas is to be regularly performed during the construction phase.</p> <p>Monitoring of implementation of pollution and control measures.</p> <p>Environmental supervision of the contractor's work: weekly visual inspections throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures.</p> <p>Records should be kept of these visual inspections and submitted in the monthly reports prepared by the external</p>	<p>Employed Biodiversity Expert</p> <p>No disturbed habitat outside of the area necessary for construction</p> <p>Decrease in the number of invasive species of the project area where invasive species are found</p> <p>No chemical pollution events noted</p> <p>Reports on regular cleaning of the pollution control equipment</p> <p>Monitoring of effluent quality from the oil separators</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Motorway route only needs to be used for construction activities and organisation of construction site. Should any need for additional areas to be used occur, e.g., access roads to the motorway route, natural areas such as woodland, meadows and grassland shall be avoided and only already modified areas may be used (e.g., existing roads or degraded non-natural habitats). > Implement pollution prevention measures at construction site, e.g., spill containment bunds to prevent any leakage from the oil tanks. Construction site is to be well organised (e.g., inorganic waste that could trigger possible injuries) and organic waste (because of accessible food source, this represents a threat of possible diseases) need to be adequately managed, as given in the Construction Waste Management Plan. > Construction materials must be stored and maintained away from watercourses. Chemicals and fuels must be stored in secure containers located away from watercourses or water bodies. Refuelling of parking of machinery must not take place near the watercourse and must only be carried out in designated areas. > Surface water runoff from the construction sites into the watercourses must be avoided and a system of cut-off ditches, silt fencing and/or bunds should be installed if required. 		supervising engineer.	

OFFICIAL USE

12

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Prevent erosion and minimise washing and leaking of solids from surrounding area by grass plantation, interception and drainage, application of mulch coverage, use of lattice plots, concrete prefabricated panes or gypsum. > Prevent the negative impacts on habitats, especially on aquatic habitats, caused by tunnelling works by implementing measures given under 19.2.2 and 19.3.5 of the ESMP. > Employed BE must monitor all works with potential to harm wildlife and act accordingly if any sensitive biodiversity features have to be removed in line with the BMP requirements. > Employed BE must inform the Contractor about the vulnerability of karst areas, protected cave fauna and the importance of protective measures to preserve drinking water sources. > Appropriate brief training targeted at the need of different construction personnel can help raise awareness of the vulnerability and ecological importance of karst areas (e.g. short karst conservation workshops, leaflets). 			
19.1.4	Construction	Spread of invasive species	<ul style="list-style-type: none"> > Actively manage and maintain vegetation of areas marginal to the construction site to prevent drastic edge effect and spread of invasive species. > Continuously implement measures given in the BMP provided as a part of 2025 ESIA 	Contractor	Monitoring of Invasive Species Management Plan implementation	No new invasive species registered No spread of invasive species

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>package and detailed in Invasive Species Management Plan that is to be developed.</p> <ul style="list-style-type: none"> > Any soil contaminated with invasive species will be stripped and stored separately on plastic or terram. The materials must be fenced. During reinstatement, the material will be placed in the exact location it was taken from, to prevent the spreading. > Depending on the species encountered and if deemed necessary, any surplus material contaminated or suspected of being contaminated with invasive species will be disposed of at an approved and licensed waste facility. > Depending on the species encountered and if deemed necessary, the buckets, blades, tracks and tyres of all plant and machines that have been in contact with invasive species will be sprayed down, to ensure that rhizomes are not transported to uncontaminated areas. > A site-wide ban on workers bringing vegetation or soil from outside the site area must be imposed to prevent dispersion of non-native invasive species. 		Monitoring of invasive species spread	Invasive species eliminated when found
19.1.5	Operation	Habitat fragmentation	<ul style="list-style-type: none"> > Develop and implement Biodiversity Offsetting Plan (BOP). The guidelines and recommendations for development of BOP are given in the BMP. > Implementation of habitat clearance that aims to minimise habitat loss to the extent 	Contractor	Monitoring of habitat restoration	Success of habitat restoration and revegetation efforts Conditions and regular

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			practicable. Clearance must be performed only in areas necessary for adequate workflow and functioning of the construction site – along access roads, road alignment, service plateaus and accompanying objects. Sensitive areas must be avoided as given in maps in Annex D to the ESIA.			maintenance of habitat edges
Vegetation and flora						
19.1.6	Pre-construction	Adverse impacts due to inadequate planning of works and Main Design requirements Lack of up-to-date baseline conditions	<ul style="list-style-type: none"> > Prepare an Invasive Species Management Plan with measures regarding how to control the spreading of invasive species with focus on species with the A2 and A3 invasive codes as given in the Annex A to the ESIA. Guidelines for development of the plan are provided in the BMP. JPAC is obliged to include the Plan requirements in tender documentation. > If the construction of the motorway begins more than five years after the completion of the detailed surveys performed for the ESIA Study (finalised in June 2021), additional baseline surveys need to be conducted before commencement of works in order to account for any occurred changes in the environment. Measure applies to the construction of Konjic bypass as well. As the surveys in the area of Konjic bypass were completed in 2022, if construction works start later than June 2027, additional surveys are needed. 	JPAC or JPAC to transfer the responsibility to the contractor per Contractual Agreement	Quality of the Invasive Species Management Plan	Invasive species Management Plan prepared prior to construction commencing Compliance with timing and undertaking of mitigation measures Conducted surveys along the access roads and motorway if works on the motorway alignment start later than June 2026 Conducted surveys along the Konjic bypass road if works on it start

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
						later than June 2027
19.1.7	Construction	Vegetation removal and clearance of flora species in the phase of preparation of construction site and during the performance of construction works	<ul style="list-style-type: none"> > Develop Land and Habitat Restoration Plan (LHRP) and Invasive Species Management Plan (ISMP) as part of CESMP. Guidelines and recommendations for LRHP and ISMP development are included in the BMP. > Implementation of mitigation measures during the construction stage will be the responsibility of the Contractor in accordance with the contract specifications and loan requirements. As the project is located in ecologically sensitive area, adequate and timely implementation will be ensured by employment of a suitably qualified Biodiversity Expert (BE) specifically to coordinate the implementation and monitoring of the ESMP and BMP. > BE employed by the Contractor to clearly mark areas for vegetation clearance, with biodegradable paint of high visibility, undertake temporary fencing to prevent unnecessary loss of vegetation in the Project area. > There must be no loss of plant species of conservation importance. If they are found, they must be replanted to a suitable undisturbed habitat nearby that is not exposed to risk, e.g. away from roads, construction works and settlements. The relocation must be carried out by an expert, under the supervision of a federal inspector 	<p>Contractor JPAC for large-scale revegetation</p> <p>During the construction phase, the monitoring of the status of invasive species and their spread into natural habitats should be undertaken.</p> <p>Inspection by ecologist during construction.</p> <p>Environmental supervision of the contractor's work: weekly visual inspections throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures.</p> <p>Records should be kept of these visual inspections and submitted in the monthly</p>		<p>Employed Biodiversity Expert</p> <p>No increase in invasive species coverage compared to the level detected in Baseline of the ESIA study</p> <p>Forestation as a part of anti-erosion works, compensated for the woodland that will be directly affected (65.65 ha) by the construction of the motorway</p> <p>Afforested same or larger area than the degraded one in the Project area</p> <p>Success of revegetation: The aim is to have at least 50% vegetation coverage within 3 months of cessation of works. If this is</p>

OFFICIAL USE

16

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>for nature protection and a professional expert for a given species, as prescribed by the <i>Rulebook on protection measures for strictly protected species and subspecies and protected species and subspecies</i> (Official Gazette of FBiH, No. 21/20).</p> <ul style="list-style-type: none"> > Contractor to recultivate the inert waste disposal sites by using autochthonous species in order to preserve the domestic gene pool. > The excess inert construction waste must be re-used to level the road route and the remaining material shall be disposed only at designated disposal sites, in order to prevent degradation of other natural vegetation and no temporary landfills are to be formed elsewhere, as these act as focal points for dispersion of invasive species. > A total of 65.65 ha (58.14 ha of G1 Broadleaved deciduous woodland, 0.9 of G2.1 Mediterranean evergreen <i>Quercus</i> forest, 1.58 ha of G3 Coniferous woodland and 5.03 ha of G4 Mixed deciduous and coniferous woodland) will be directly affected by the project. The same or bigger area needs to be afforested/revegetated within one month upon completion of works and the requirements for the process of afforestation will be included in the Biodiversity Offsetting Plan (BOP). Revegetation must be done with species characteristic for said habitats, species that are common and suitable for the area such as, but not limited to, Dalmatian Laburnum, Bosnian pine, black pine, oaks etc. 		<p>reports prepared by the external supervising engineer.</p>	<p>not achieved remedial actions may be required, such as additional tree planting if after year 1, 2 or 3, there has been a loss of 30% of planted trees or more, or less than 90% coverage of vegetation (not trees). Any dead vascular plants will be replaced as 'like for like' during this timeframe</p> <p>Installed drainage</p> <p>No increase and spread of invasive species caused by construction works</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>The guidelines for development of the BOP, the recommended location and structure is provided in the BMP.</p> <ul style="list-style-type: none"> > It is necessary to establish forest order immediately after cutting the trees along the alignment, i.e., remove the stumps, create, and export all the felled timber (where not required to leave them for saproxylic beetles). At the same time, cut down and repair all damaged trees, so that they do not become a source of disease. This especially applies to black pine cultures in Konjic bypass area, which are particularly sensitive to damage. The establishment of forest order will allow the remaining trees, especially those on the new forest edges, to build a new protective edge more quickly, which will be able to protect the stand from direct and indirect harmful effects. > Install drainage infrastructure to prevent erosion. > Minimise possibility of fire occurrence to preserve vegetation by implementing measures e.g., careful handling of flammable materials and open flame. Follow guidelines regarding protecting forests from forest fires and measures outlined under 19.4.1 and 19.4.2 of the ESMP. > Continuously implement the mitigation measured as given in Invasive Species Management Plan. 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.1.8	Operation	Chemical pollution	<ul style="list-style-type: none"> > Adequate storage location of chemicals used in motorway maintenance must be carefully selected to prevent impact on biodiversity. Selected location must not be in or near sensitive receptors (as given in CHA), including water bodies, candidate Emerald sites, potential Natura 2000 sites, PBFs and CHs. > Avoid the use of herbicides and hazardous substances and materials, as to protect the environment from their potentially harmful impacts. > Undertake regular maintenance and cleaning of the drainage structures and oil separators. > Regular maintenance must include all surfaces adjacent to the motorway and must include elimination and control of weeds and invasive species. 	JPAC Management and Maintenance Department as well as selected Contractors for operation and maintenance activities	Monitoring of adherence to measures.	<p>Decrease in the number of invasive species of the project area where invasive species are found.</p> <p>No chemical pollution events noted.</p> <p>Reports on regular cleaning of the pollution control equipment.</p> <p>Monitoring of effluent quality from the oil separators.</p>
Fauna						
19.1.9	Pre-construction	Adverse impacts due to inadequate planning of works and Main Design requirements	<ul style="list-style-type: none"> > In order to protect fish species and their habitats, including species at risk, from development activities it would be necessary to reduce or eliminate constriction of flow through structure design. No river training of Neretva and its shoreline is allowed, and no interference of the natural flow rates is allowed. > Design and install culverts near streams to prevent creation of barriers to fish movement. 	Designer to include requirements in the Main Design, JPAC to monitor and review	Revision of Main Design	Main Design developed in accordance with the recommendations

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > The viaducts along the motorway route must be constructed as open passages for wildlife. > The design requirements are to be included in Main Design by the Designer and JPAC is in charge for ensuring the measures are implemented. 			
19.1.10	Pre-construction	Lack of up-to-date baseline information	<ul style="list-style-type: none"> > Conduct additional research for birds, especially during the spring migration from February to May. An inactive nest of a Golden Eagle (<i>Aquila chrysaetos</i>) was found in the area of Klenova Draga in 2021 and one individual was registered in flight at the same location in 2022. Before construction, it is necessary to conduct additional research in order to determine whether there is another location in the immediate environment where this species nests. Depending on survey results, updating of BMP and ESMP might be required. If inhabited nest(s) of the golden eagle is (are) registered, risk assessment must be performed to identify potential adverse impacts the project might have. If adverse impacts are likely to occur, mitigation measures must be provided and implemented. Measures may include restriction of works, establishing a feeding site in order to attract the eagle to an area away from the project etc. Monitoring of such nests must be performed throughout the construction phase. > Additional baseline surveys with the aim to confirm findings from 2021 (for motorway) 	JPAC or JPAC to transfer the responsibility to the contractor per Contractual Agreement	Monitoring to be done before the beginning of the construction to include all findings from the additional fauna surveys into project planning.	<p>Additional small-scale rapid surveys of birds done</p> <p>BMP section on fauna updated prior to construction</p> <p>CHA updated with new information if necessary</p>

OFFICIAL USE

20

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>and 2022 (for Konjic bypass) should be planned for all fauna if the pre-construction phase begins more than five years after the completion of surveys.</p> <ul style="list-style-type: none"> > Should any other threatened species or species of conservation concern be identified in pre-construction phase, BMP update process must include additional mitigation measures to avoid any impacts and further assessment of possible residual impacts. If residual impacts are expected, no net loss accounting should be updated. BMP needs to be updated prior to finalisation of the Main Design to enable potential additional mitigation measures to be included in the Main Design. The requirement stipulated by the EBRD and EIB for no net loss of priority biodiversity features and net gain of critical habitat must be clearly given in the Main Design documentation. 			
19.1.11	Construction	Disturbance of fauna	<ul style="list-style-type: none"> > Mitigation measures in the construction period regarding fauna are reduced to avoiding works in the area of forest ecosystems within the zone of indirect physical impact, and it should be especially emphasised that it is necessary to plan works in a manner to avoid additional deforestation and ecosystem damage. The planning of works and marking sensitive areas to be avoided must be done by the Biodiversity Expert employed by the Contractor. 	Contractor	<p>Inspection by Biodiversity Expert during construction</p> <p>Environmental supervision of the contractor's work: weekly visual inspections throughout the construction phase to monitor the</p>	Construction site well management reported

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Restrict the movement of construction machinery, mechanisation and means of transport exclusively in the designated roads and construction area for the purpose of maximal habitat protection without any additional disturbance of habitats. > Motorway route can only be used for construction activities and organisation of construction site. Should any need for additional areas to be used occur, e.g., access roads to the motorway route, natural areas such as woodland and dry grassland need to be avoided and only already modified areas may be used (e.g., existing roads or degraded non-natural habitats). Sensitive areas, i.e. CHs, PBFs, candidate Emerald sites and potential Natura 2000 sites are mapped in the CHA and Biodiversity Expert is responsible for marking of such areas. > Special attention must be given to blasting techniques in line with the Blasting Management Plan. > Temporarily cover karstic features to prevent dust ingress, backfilling from construction site or runoff from concrete works. > During the construction period, underground cave systems and caverns with cave organisms may be encountered. In case of encountering underground structures, it is obligatory to suspend the works immediately, as soon as safe to do so. All cases of such 		<p>implementation and effectiveness of prescribed mitigation measures.</p> <p>Records should be kept of these visual inspections and submitted in the monthly reports prepared by the external supervising engineer.</p>	

OFFICIAL USE

22

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>systems opening must be reported to the Lenders.</p> <ul style="list-style-type: none"> > If caverns open biospeleologists must be informed by the Contractor's Geologist upon which biospeleologist will visit the site or inform further activities. Any findings should be included in further planning and, if data on species of conservation importance is gathered, included in BMP and CHA upon EBRD's and EIB's approval. > Sealing must be done following good practice guidelines. Improper closure of such systems by backfilling may cause an unacceptable pressure on valuable and unique underground habitats and animals. > Implement monitoring of physico-chemical parameters (conductivity, pH, oxygen, nitrates, oil residues) of groundwater quality, preferably in cooperation with local water supply companies in the springs covered by the <i>Proteus anguinus</i> eDNA analysis – Gornja Bijela, Salakovac, Bosnjaci, as it could detect any negative impacts on the drinking water quality and subterranean ecosystems. This is to be included in the Groundwater Monitoring Plan. > Prohibit or limit access to banks or areas adjacent to waterbodies, to the extent required to protect the structural integrity of riverbanks. 			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Restrict riparian vegetation removals only to the area necessary for performing construction works and machinery access. > Project construction will not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (i.e., bats) from increased noise and vibration. > Where lighting is required, it will be directional, non-UV and used only when necessary. > Hunting and collection of medicinal plants by workers is strictly prohibited for their safety and prevention of negative impact any exploitation may have. 			
19.1.12	Construction	Potential disturbance of nests/roosts of species that have a seasonally variable vulnerability due to breeding, feeding times or seasonal migrations	<ul style="list-style-type: none"> > Develop Land and Habitat Restoration Plan (LHRP) as a part of CESMP. Guidelines and recommendations for LRHP development are included in the BMP. > Regarding mammals, mitigation measures during the construction period refer to avoiding tunnelling and extensive excavation works in the period from March to May, when the largest number of species give birth to offspring. This ensures peace in the hunting area and a period of wildlife getting used to the new conditions in the habitat. > It is necessary to plan the clearance works on all parts of the Corridor Vc subsection Konjic (Ovcari) - Prenj Tunnel - Mostar North, to begin in the period July - March, i.e., outside 	Contractor	<p>Inspection by Biodiversity Experts during construction.</p> <p>Environmental supervision of the contractor's work: weekly visual inspections throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures.</p>	<p>No nests/roost affected</p> <p>Construction site well management reported</p> <p>Presence of alternative roost sites</p>

OFFICIAL USE

24

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>the bird breeding period. No large-scale works are allowed in June and July.</p> <ul style="list-style-type: none"> > Prohibit work near water bodies during the spawning period and migrations of fish (February to April). > A safety fence shall be placed along construction site near watercourses. > Prohibit works near ponds, streams and canals (reproductive centres) during the reproductive period of amphibians (March and April). > It is necessary to install protective panels on the bridges over the Tresanica River in Ovcari, over the Neretva River and in Mladeskovici. At these localities, a high frequency of birds feeding high in the sky is noticeable, which is why it is possible for them to get hurt due to collisions with moving cars. Protective panels must be placed on both sides of the road at a height of at least 3 m. In order to reduce the collision of birds with protective panels, it is necessary to stick black and white foil over the transparent plexiglass, which increases the visibility of the panels for birds, or silhouettes of birds of prey, which would scare the birds and move them away from the route. > On the part of the route between 9 + 820 km and the Prenj tunnel in the zone of direct impact, one territory of the white-backed woodpecker and two territories of the black 		Records should be kept of these visual inspections and submitted in the monthly reports prepared by the external supervising engineer.	

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>woodpecker have been registered. Both species are indicators of forests with a lot of rotten trees on the ground. In order to protect these species, it is necessary to reduce removal of the forest cover to the required minimum for the machinery movement. Designation of the required minimum is to be marked by the employed Biodiversity Expert.</p> <ul style="list-style-type: none"> > In the area of Klenova Draga, an abandoned nest of a Golden Eagle has been registered. If it is established that in the following seasons the couple is active at the given locality, it is necessary to apply a number of protective measures: > Continuously monitor the nest through the construction phase. > It is necessary to break through the access roads and work on the Tunnel Klenova Draga (T3A) in the off-breeding period from July to February, i.e., to suspend the works from the beginning of incubation to the take-off of the fledglings (beginning of March-end of June). > Remove trees from access roads only to the width of the road. The existence of a living barrier made of trees will significantly absorb noise, and tree canopies will reduce the visibility of machines, which could reduce the negative impact of disturbance. > Potential roost sites are one of the most important features for the bat species conservation, therefore shall be preserved 			

OFFICIAL USE

26

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>and not to be disturbed. Pre-clearance checks of trees to support roosting bats must be undertaken by Biodiversity Expert prior to the commencement of works to avoid causing disturbance or injury to roosting bats. The expert will initially walk the alignment and mark trees with features that may potentially support roosting bats (i.e., holes and crevices, over 100 mm in diameter). The detected bats will be translocated to a receptor roost following a method statement prepared by the BE.</p> <p>> If not in use during construction activities, and if adequate alternative natural roost sites are available in the wider area, then no further action will be required. If not in use during construction activities, and if no other roost sites are available, then it will be necessary to provide artificial roost sites. The artificial roost should be suitable for the species/number of bats that use the roost that will be lost; expert input should be provided to inform this. If the roost is in use during construction works, and if these works cannot be delayed long-term until the bats have vacated the roost, then a suitably experienced bat worker should be consulted to attend site and remove the bats prior to work. In advance of this an alternative roost site should be identified (whether natural or artificial). The bats should be moved to a suitable new roost site. It is important than</p>			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>an experienced bat worker is engaged to complete this work.</p> <ul style="list-style-type: none"> > Should any roosts be accidentally disturbed by negligence of the Contractor or as the result of an accidental situation, habitat restoration shall be done after the construction phase is finished. Alternative roost sites in the vicinity shall be built in case of any being destroyed by the construction works. > Employed BE must monitor all works with potential to harm wildlife and act accordingly if any sensitive biodiversity features have to be removed in line with the BMP requirements. > Appropriate education targeted at the needs of different construction personnel can help to achieve minimal impact on species occupying areas of construction, as well as to ensure safety of the construction personnel in case of encounter with reptiles. 			
19.1.13	Construction	Potential fatalities or injuries to fauna species due to vegetation removal and movement of heavy machinery	<ul style="list-style-type: none"> > On-site speed limits must be enforced to avoid direct mortality of animals. > Habitat clearance will be undertaken by the contractors in a progressive and sensitive manner to enable fauna to move away from the area of works, disperse into surrounding habitats and to avoid fauna from being isolated in fragmented areas of habitat. 	Contractor	<p>Inspection by ecologist during construction.</p> <p>Environmental supervision of the contractor's work: weekly visual inspections throughout the construction phase</p>	<p>No fatalities of fauna recorded on site.</p> <p>Construction site well management reported.</p>

OFFICIAL USE

28

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > In the time frame from 48h to 24h before commencing vegetation clearing, BE shall do a walkover of the site. > Machinery operation should be restricted to daylight hours to minimise the risk of vehicle collisions with nocturnal and crepuscular wildlife. > Avoid unnecessary cutting of older trees and removal of dead wood in the zone of project area of influence, particularly oak, from habitats as they are important for saproxylic species. > Fragmented and small habitats suitable for amphibians found in the area of Ovcari, Mladeskovici, Klenova draga, Zelenika and Bosnjaci must not be disturbed by heavy machinery during construction. > In order to prevent fauna from entering, all construction sites within candidate Emerald sites and potential Natura 2000 site must be fenced with a wire fence at least 1,5 m tall, the bottom 30 cm of the fence must be made of preformed metal sheets, recycled plastic lumber or (perforated) scored plastic and will prevent smaller fauna from entering the site. > It is necessary to perform daily checks for the presence and removal of individuals of the species fire salamander (<i>Salamandra salamandra</i>) and Hermann's tortoise (<i>Testudo hermanni</i>) within the motorway subsection under construction, and, if species are found, 		<p>to monitor the implementation and effectiveness of prescribed mitigation measures.</p> <p>Records should be kept of these visual inspections and submitted in the monthly reports prepared by the external supervising engineer.</p>	

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>the commissioned BE must safely remove them from the area to the adjacent habitat of the same type away from machines, local roads and other dangers. If tortoise nests with eggs are found during construction, it is necessary to ensure they are not disturbed or destroyed, and BE must safely remove them from the location.</p> <ul style="list-style-type: none"> > Construction site is to be well organised (e.g., inorganic waste that could trigger possible injuries) and organic waste (because of accessible food source, this represents a threat of possible diseases) need to be adequately managed, as given in Waste Management Plan and Construction Waste Management Plan. > During the construction period sites will be managed so that they do not provide suitable habitat for reptiles (shelter and hibernation). Measures would involve not stockpiling rubble and only undertaking works to move rubble when temperatures are above 7 degrees Celsius, i.e., when reptiles are not in hibernation. > During the construction phase, significant construction work such as excavation and trenching works will be carried out in the area of physical and direct area of influence of the motorway. It is expected that in the conditions of disturbed habitat structure and fauna movement, there will be fauna mortality. It is recommended that the contractor fences all parts of the area where 			

OFFICIAL USE

30

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>significant earthworks and excavations will be carried out, with focus on forested areas and area near watercourses.</p> <ul style="list-style-type: none"> > All surplus material that will not be used in construction works must be stored on previously planned disposal sites and construction waste must be systematically transported to disposal sites to prevent fatalities of fauna due to inadequate material management. > Regarding mammals, mitigation measures during the construction period refer to avoiding tunnelling and excavation works in the period from March to May, when the largest number of species give birth to offspring. This ensures peace in the hunting area and a period of wildlife getting used to the new conditions in the habitat. The fence along the motorway should be constructed properly (1m-high wire fence which in the lower parts (at least 50 cm from the ground) has a diameter of 2cm or less), to ensure there would be no collision of these species during operation phase. The use of a dense net in the lower part of the fence will prevent the passage of small fauna to the motorway route. This measure is to be constructed during construction phase, however, will act as a mitigation measure during operation phase. > During the construction period, whenever possible, and after completion of the construction of the Prenj tunnel, it is 			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			necessary to recultivate the inert material disposal sites, which will compensate for the loss of habitats that will be buried in landfills. Recultivation should be done with indigenous species including Dalmatian laburnum (<i>Petteria ramentacea</i>), hornbeam (<i>Carpinus orientalis</i>) and oak (different species of the genus <i>Quercus</i> found in the Project area).			
19.1.14	Operation	Habitat fragmentation	<ul style="list-style-type: none"> > Develop and implement Biodiversity Offsetting Plan (BOP). The guidelines and recommendations for development of BOP are given in the BMP. > Revegetation must be done as stated in the mitigation measures regarding habitats. > The viaducts along the motorway route, which are constructed as open passages for wildlife, should be kept passable during operation phase via adequate maintenance. > In locations Streams no. 1 and 2 in Ovcari, artificial pond in Zelenika and artificial pond in Bosnjaci (maps and coordinates provided in BMP, CHA), due to identification of a large number of amphibians and potential habitat fragmentation, tunnels should be set up to allow the unimpeded passage of animals. To encourage use by amphibians and reptiles, all terrestrial crossings should have a natural substrate on the tunnel floor that consists of soil, sand, branches and other natural materials. The precise design, dimensions, and factors that may affect tunnel placement are listed in the <i>Guidelines for Amphibian and</i> 	<p>JPAC Management and Maintenance Department as well as selected Contractors for operation and maintenance activities</p>	<p>Monitoring of revegetation success</p> <p>Status and maintenance of buffer zones during motorway observation in the first three years of operation</p> <p>Status and maintenance of passages under the viaducts and tunnels for amphibians</p>	<p>Success of revegetation as given in the BMP</p> <p>Records of amphibians using the tunnels and other fauna using the passages under the viaducts</p>

OFFICIAL USE

32

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p><i>Reptile Conservation During Road Building and Management Activities in British Columbia</i>¹ and should be taken into consideration when designing and planning.</p> <ul style="list-style-type: none"> > Plant high trees on chainage 10+580.00 in the form of hop-overs for bats. The aim with hop-overs is to reduce the mortality risk by guiding the bats across the roads above the traffic. The chosen locality is placed in forested area where bats are present, and where embankments narrow down and the road cuts into the slope. This will be utilised as a natural guidance for bats along with trees. 			
19.1.15	Operation	Potential collision of fauna species due to high speed of vehicles	<ul style="list-style-type: none"> > Possible negative pressure on the invertebrate species caused by the construction of the Prenj Tunnel comes down to the aggregation of insects in the lighting and the death of insects when in contact with cars moving at high speed. The ecotone along the motorway can play a significant role in the expansion of the habitats of butterflies and other insect species that inhabit marginal habitats. The importance of the ecotone along the motorway will be reflected through the increase of the habitat area of indigenous species of open habitats, such as the species <i>Euplagia quadripunctaria</i>. However, the effects of ecotones and habitat fragmentation are much more significant for forest species 	JPAC Management and Maintenance Department as well as selected Contractors for operation and maintenance activities	Monitoring of adherence to measures.	<p>Bird panels and protective fence with no observed damages</p> <p>Register in place for registering of potential roadkill.</p> <p>No fatalities of species registered, zero roadkill.</p>

¹ <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=15141>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>(such as <i>Lucanus cervus</i>) that fly from forest to open habitats, thus increasing the likelihood of individuals being killed by cars. If monitoring in operation phase determines that the frequency of dead individuals is high, the installation of high barriers (mesh materials) is necessary.</p> <ul style="list-style-type: none"> > Undertake regular maintenance of protective bird panels. > The motorway needs to be fenced and the fence maintained properly throughout the operation phase. The fence must be fixed to the ground. All damage to the fence is to be promptly repaired, therefore regular inspections are required. > Should any fatalities of birds be observed during regular maintenance of the road in operation phase, protective barriers should be placed at such locations in consultation with the local ornithological society. > The motorway maintenance service is obliged to record mammal's injury cases in order to respond timely with additional protection measures, during first three years as given in the BMP. > The fence along the motorway should be constructed properly (1m-high wire fence which in the lower parts (at least 50 cm from the ground) has a diameter of 2 cm or less), to ensure there would be no collision of these species during operation phase. The use of a 			

OFFICIAL USE

34

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			dense net in the lower part of the fence will prevent the passage of reptiles to the motorway route. This measure is to be constructed during construction phase, however, will act as a mitigation measure during operation phase.			
19.1.16	Operation	Negative impacts of pollution, increased light and noise levels on sensitive fauna species such as bats	<ul style="list-style-type: none"> > Adequate cleaning and maintenance of drainage structures and oil separators (EN 858-1 and 858-2) to ensure their efficiency regarding the pollution prevention by engaging an authorised third party to ensure their efficiency regarding the pollution control. > All species of bats are nocturnal animals. The light near the colony will affect their behaviour and reduce the amount of outings intended for hunting. Strong light will reduce social flight and cause the species to move to another darker location. Illumination of the bat litter leads to disturbances that cause the bats to leave the litter. Also, light causes insects to accumulate allowing bats to aggregate in those places. As mitigation measures replacement bulbs may be used such as low-pressure sodium lights, high-pressure sodium bulbs or mercury bulbs as elaborated in the BMP. These bulbs must meet the technical parameters outlined by the <i>Set of instructions for design, purchase, installation and maintenance of elements, objects or parts of objects on the motorway</i>. The instructions give minimal requirements that can be improved upon if the Project 	JPAC Management and Maintenance Department as well as selected Contractors for operation and maintenance activities	Monitoring of adherence to measures.	No auxiliary facilities, such as gas stations, resting places, billboards etc. in sensitive areas

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>allows, taking into consideration the cost and environmental impact of alternative options.</p> <ul style="list-style-type: none"> > Avoid placing the artificial streetlights and unnecessary lightened traffic signs, auxiliary facilities, such as gas stations, resting places, billboards etc. Preferably use only red lights for signalisation which will not attract insects. > Motor vehicle noise is a constant but not limiting factor. Adapting to noise and conditioning to emerging conditions is a phase in adaptation for local populations of mammal species. It is not necessary to implement mitigation measures. 			

19.2 Groundwater

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
		Groundwater ²				

² The protection measures in the III protection zone of the Bosnjaci and Salakovac springs are formulated on the basis of the measures prescribed in the Studies on the protection of the Salakovac and Bosnjaci springs and the Decision on sanitary protection zones and protective measures for the Salakovac spring, which are harmonised with the *Rulebook on the method of establishing conditions for determining sanitary protection zones and protective measures for water sources for public water supply* (Official Gazette of the FBiH, No. 88/12), as well as conditions from the Preliminary Water Consent for the Konjic-Mostar North section issued by the Adriatic Sea Watershed Agency (UP/40-1/21-2-129/21 from March 15, 2022).

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.2.1	Pre-construction	Limited information on groundwater quality and quantity in the zone of motorway construction	<ul style="list-style-type: none"> > Conduct a detailed inventory to identify all wells for public water supply, wells for individual water supply (drinking or other purposes), newly built wells for supplying construction locations with drinking or technical water, and piezometers installed at the referenced locations related to motorway construction. During the detailed list of wells, use data from the Groundwater cadastre of FBiH.³ <p><i>Note: Possible locations of piezometers are (i) in the area of the entrance portal of the Prenj Tunnel, in the valley of the Konjicka Bijela, at location of Rakov laz (700-750m a.s.l.), (ii) in the zone of the exit portal of the tunnel Prenj - Podgorani region (400 m a.s.l.), and (iii) on the axis of the motorway in the hinterland of the spring "Bosnjaci" in Potoci. The predicted depth of the piezometer on the portals of the Prenj Tunnel is approximately 100 m, and in the hinterland of the source "Bosnjaci" approximately 60 m.</i></p> > Prepare a Groundwater Monitoring Plan (GMP) to cover baseline monitoring and monitoring in the construction phase. The GMP shall include: <ul style="list-style-type: none"> > inventory of the wells with information on name, location, type and other available information on each well. 	JPAC in cooperation with the selected Contractor	Engineering supervision over the investigation activities and preparation of the GMP. Licenced laboratory to perform baseline groundwater sampling and testing. The groundwater testing should be performed for drinking water parameters defined in the <i>Rulebook on Safety of Drinking Water</i> ⁴ .	GMP revision report. Baseline groundwater monitoring reports. Recommendations for the designers and contractors based on the results of groundwater monitoring during construction.

³ Groundwater cadaster of FBiH is available at the Adriatic Sea Watershed Agency, Mostar

⁴ Official Gazette of BiH, No. 40/10, 43/10, 30/12, 62/17

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > monitoring protocol including information on the frequency and method of sampling, sampling parameters, methods of analysis and reporting > response plan in case of contamination > risk management and remediation plan. <p>The GMP shall be prepared in line with the rules set in the Rulebook on drinking water safety (Official Gazette of BiH 40/10, 43/10, 30/12, 62/17). The monitoring programme during the construction shall include the construction period and the warranty period. Monitoring shall include both quality and groundwater level in the wells/piezometers.</p> <ul style="list-style-type: none"> > Conduct the baseline monitoring of water quality and levels in the wells/piezometers at all identified wells according to the GMP. > Note: The frequency of sampling during the construction will depend on the dynamics of works progression. 			
19.2.2	Construction	Intrusion of groundwater in tunnel tubes during excavation that can impact stability of the structure and cause the safety risk	<ul style="list-style-type: none"> > Establish systematic monitoring of water levels throughout tunnel lifetime (as in 19.2.1) > Do not discharge groundwater that penetrates the tunnel tube to discovered caverns or karst canals as this may lead to groundwater pollution. > Capture the groundwater that penetrates the tunnel tube and drained it out of the tunnel 	JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Engineering supervision during the construction works. Testing of tunnel drainage quality to be performed by a licenced and	Monthly engineering supervision reports. Photographs from the site.

OFFICIAL USE

38

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>with pipes or channels. Horizontal passages and passages with smaller slopes are drained by ditches or channels, if necessary, also with use of pumps. The ditches or channels must be deep enough and positioned in a way not to endanger the safety of workers. Passages with larger longitudinal slopes are drained with pipes. Ditches, channels with pumps, and drainage pipes must be regularly cleaned and maintained in good condition. Drainage of the tunnel is performed in a way that it does not undermine the supports of protective structures, does not erode the tunnel walls or tunnel lining, does not wash away rock material in the excavation and does not damage devices and auxiliary traffic signals. The workplace, movement of workers, and traffic areas must stay dry and not under water.</p> <ul style="list-style-type: none"> ➢ Treat the captured groundwater before discharging into the environment (usually settling only; to be decided based on results of water testing as stipulated by the <i>Regulation on the conditions for the discharge of wastewater into the environment and public sewage systems Official Gazette of the FBiH, No, 26/20 and 96/20</i>). The water from the tunnel may be loaded with suspended solids and other pollutants so the special attention should be paid that it is not discharged untreated anywhere upstream of the spring Bijela or in the water protection zones of the Salakovac and Bosnjaci springs. 		accredited laboratory.	<p>Results of tunnel drainage quality testing.</p> <p>Inspection reports, if any.</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > The tunnel can be sealed only after the tunnel has been built and all safety measures are taken so that the sealing of the penetration does not cause dangerous or harmful consequences for the workers in the tunnel and the environment. > Areas of fractured/faulty zones will be identified in advance with predrilling with preventors and using geophysics in the predrilled horizontal boreholes. > Areas which will be identified as aquifers will have temporary reduction of ground water pressure. > Top down grouting will be used in order to have the area stable and the inflows manageable (minimised) for construction and operation reasons as well as environmental reasons. 			
19.2.3	Construction	Impact on the direction of ground flow and recharge by cutting the underground streams by tunnelling	<ul style="list-style-type: none"> > In case of cutting off underground streams (karst channels or caverns with water) during tunnel excavation, construct a bypass (migration flowpath) to its extension so that the groundwater continues to move and at the same time reduce the pressure on the tunnel tube and prevent damage to the tunnel lining. > If the tunnel tube cuts through a cavern of larger dimensions, build a supporting structure (bridge in the tunnel) to bridge the cavern. > When large caverns appear, avoid filling the caverns with any material as this will decrease permeability. Caverns and caves shall not be 	JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Inspection of caverns and underground channels by a hydrogeologist, karstologist or speleologist.	Monthly engineering supervision reports. Expert report on investigation results. Photographs from the site.

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			infilled without prior inspection and approval by an expert (hydrogeologist, karstologist or speleologist).			
19.2.4	Construction	<p>Impact on groundwater quality due to:</p> <ul style="list-style-type: none"> > direct release of intercepted tunnel drainage water without treatment > turbidity caused by erosion and excavation or blasting of the rock mass > accidental spills in the springs area 	<ul style="list-style-type: none"> > Ensure presence of hydrogeological engineers every day on the site, preferably with experience in similar projects, in order to take execution of works and groundwater monitoring under strict control and anticipate and prevent negative impact of motorway construction (excavation or blasting of the rock mass, erosion of material from cuts and embankments, accidental spills) on groundwater quality. This is particularly related to drilling of the tunnels Prenj, Klenova Draga, Gradina and Orlov Kuk, which are located in catchment areas of Konjicka Bijela, Salakovac and Bosnjaci springs. > Provide a special method of blasting so as not to disrupt the water flow regime in sections where the route passes through the areas of water pumping stations or near water facilities and according to the conditions of the Preliminary Water Consent. The following measures are proposed: <ul style="list-style-type: none"> > In accordance with the actual situation on the ground where the works will be carried out and the available data on the working environment, it is necessary to create a 	<p>JPAC to transfer the responsibility to the Contractor as per Contractual Agreement</p>	<p>Daily inspection of works by hydrogeological supervision engineer.</p> <p>Licenced laboratory to perform baseline groundwater sampling and testing. The groundwater testing should be performed for drinking water parameters defined in the <i>Rulebook on Safety of Drinking Water</i>⁵</p>	<p>Monthly engineering supervision reports.</p> <p>Photographs from the site.</p> <p>Inspection reports, if any.</p> <p>Groundwater monitoring reports.</p>

⁵ Official Gazette BiH, No. 40/10, 43/10, 30/12, 62/17

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>detailed Blasting Plan (Contractor of drilling and mining works),</p> <ul style="list-style-type: none"> > Work on drilling mine holes and blasting should be planned in such a way that the diameter, depth, and geometric arrangement of the mine holes are carried out in a selective (gradual excavation) manner in the smallest possible volume up to the excavation depth provided for in the project (more frequent drilling and blasting within a certain period), > The filling of mine holes must be carried out with a system of millisecond non-electric detonators and connectors for surface blasting (DUAL MS), so that each mine charge - borehole has a separate detonation effect in the minefield activation system and with the minimum possible amount of explosives per mine hole, which prevents seismic (earthquake) reduces the effect to a minimum. In this connection, and against the planned depths of the mine holes, discontinuous filling can also be used (multiple detonators in one mining hole with intermediate plugs made of inflated material). > It is mandatory for the authorised company to apply measurement of the seismic impact with certified instruments for every blasting, with the preparation of a report after the measurement. 			

OFFICIAL USE

42

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Install waterproof foils before the formation of embankments to prevent further penetration of any spills of harmful substances into the ground both during the construction phase and later during the operation of the motorway. > Do not drain tunnel runoff (water used for drilling mining holes) into open channels or caverns in order to avoid jeopardising the quality of groundwater. Instead, evacuate tunnel run-off outside the tunnel using a piping system and discharge it into the recipient after treating in sedimentation basins. > Apply the same measures as under 19.2.2. > Monitor the quality of groundwater as per the GMP (see measures under 19.2.1). > Save and protect the locally sourced capture point for the needs of up to 30 households in Gornja Bijela by building a supporting structure in line with the solution proposed in Preliminary Design. In case of unforeseen circumstances, provide an alternative source of drinking water to households that use this source by connecting to the Gornja Bijela reservoir. > Regulate the natural course of the Bijela river for a length of approx. 600 m to further ensure that the Crno Vrelo catchment is not endangered. > In the area of local spring captured for the need of up to 30 households in Gornja Bijela, provide the households using this source with 			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>an alternative source of drinking water by connecting them to the Gornja Bijela reservoir.</p> <ul style="list-style-type: none"> > To protect the Konjicka Bijela and Salakovac springs, fully pave the access roads with asphalt and equip with stormwater collection systems (gutters, drains, manholes). Treat the collected run-off in oil and grease separators up to the quality defined by the law. Discharge the treated run-off outside the zone of influence, downstream from the Konjicka Bijela spring, and outside of the III water protection zone of the Salakovac spring. > Implement collection and treatment measures for tunnel run-off and captured groundwater from the Orlov Kuk tunnel (as described under item 19.2.2) and discharge treated water outside the III water protection zone of this spring. > Ensure regular contacts with water utilities and agree on the option of temporary disconnection of the source from the water supply network in the event of an accidental pollution or temporary turbidity until the quality returns into the legally prescribed limits. > To prevent accidental releases of oil and grease during construction of viaducts install oil collection tanks under the machines. To prevent material washing away during construction of viaduct pillar foundation install anti-erosion barriers. In case of groundwater being pumped from foundation pits, ensure 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>that these waters are treated in oil and water separators before discharge to the environment.</p> <ul style="list-style-type: none"> > Treat collected wastewater from concrete batch plants up to the quality defined by the law. 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. > Apply all mitigation measures for surface waters defined in section 19.3. 			
19.2.5	Operation	Impact on groundwater quality resulting from release of treated run-off from the motorway surface in the proximity to the springs and their water protection zones	<ul style="list-style-type: none"> > Design and construct closed system for controlled collection of storm water from the motorway surface, toll and rest areas, 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. The water should be taken out of the influence zone so that there is no impact on the quality of the water from these sources. The water shall be discharged downstream from the zone of influence of Konjicka Bijela spring and outside the III sanitary protection zone of Salakovac and Bosnjaci springs. In case any new wells are identified during the pre-construction phase, treated water should not be discharged in their vicinity. 	<p>JPAC to transfer the design and construction responsibility to the Contractor as per Contractual Agreement</p> <p>JPAC to perform monitoring activities in the operational phase</p>	<p>Engineering supervision during the design and construction.</p> <p>Licenced laboratory to perform quality testing of treated storm water.</p>	<p>Design revision report.</p> <p>Monthly engineering supervision reports.</p> <p>Photographs from the site.</p> <p>Reports on technical acceptability and readiness to use of installed oil and grease separators.</p> <p>Treated storm water quality monitoring reports.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Perform regular testing of treated storm water quality (before its discharge) in line with the Water Permit obtained for the Project. > According to the conditions specified in the Preliminary Water Consent, it is envisaged to install warning signs for passage through the high-risk water zone, as well as signs indicating speed limits for vehicles and signs prohibiting stopping for vehicles carrying hazardous and water-damaging substances in high-risk zones⁶. 			Inspection reports, if any.

19.3 Surface Water

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Surface water						
19.3.1	Pre-construction	Perform the pre-construction water quality measurements from which change can be assessed as	Due to the timespan between preparation of this Study and start of construction works, up-to-date information on water quality in the Project area will be needed to determine baseline conditions. The following actions must be implemented:	JPAC or JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Refer to results of water quality monitoring described in Chapter 5.3.3 to check for locations and	Environmental baseline report on water quality

⁶ According to the definition in the Preliminary Water Consent, the area located within the III protection zone of the source falls within the high-risk zone where the implementation of standard and additional protective measures is required, while the area within the IV protection zone of the source is in the moderate-risk zone where the implementation of standard protective measures is necessary.

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
		construction works progress	<ul style="list-style-type: none"> > Carry out pre-construction water quality analysis of Tresanica, Neretva and Konjicka Bijela before construction starts. > Use the same monitoring parameters and points as described in this ESIA. > Carry out water quality analysis in at least two hydrological cycles (low and high flows). <p><i>Note: The measure is in line with the Preliminary Water Consent.</i></p>		parameters to be analysed	
19.3.2	Pre-construction/Construction	Increased pollution risks to surface water bodies from works within riverbed	<ul style="list-style-type: none"> > Prepare a River Crossing Management Plan (RCMP) that includes a Specific Method Statement. This statement shall provide details of the methods proposed to ensure dry working conditions and minimise risks to water quality as well as to aquatic flora and fauna, during works conducted in the riverbeds and on the banks. <p>Include the following measures in the RCMP:</p> <ul style="list-style-type: none"> > Limit the clearance of vegetation on the channel banks. Where works are required on the watercourse banks, or in-water, vegetation clearance should be restricted to the working area and should be undertaken only immediately prior to the commencement of those works. Vegetation should be re-established as soon as practicable following construction. Use seeded biodegradable fibre matting to 	JPAC to transfer the responsibility to the Contractor through Contractual Agreement	Revision of the RCMP by the Supervision Engineer	Revision report Design adopted

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>encourage re-vegetation after works on, or near, the banks.</p> <ul style="list-style-type: none"> > Until the beginning of the in-water works (applicable to the Neretva River on the Konjic bypass), preserve at least 20m depth of bankside vegetation from the channel bank to protect bank stability. > Avoid works to watercourses during high flow season and during heavy rainfall to reduce the risk of fine sediment release, watercourse erosion and increased flood risk. > Create a dry-working area for works within a watercourse channel or within the floodplain wherever possible using structures such as cofferdams. > Use in-channel coffer dams where appropriate and or silt management systems such as silt curtains within watercourses that require diversion or in-channel construction works. > Direct access of vehicles to watercourses and banks should restricted to those vehicles required as part of the construction activities. If it is necessary for any vehicle to enter a watercourse, it should be inspected in advance and, if required, remedial action taken to prevent contamination from oil/fuel leakages. All drivers 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>should be instructed in the use and safe disposal of clean up equipment and carry absorbent materials in their vehicles and be trained for spill response.</p> <ul style="list-style-type: none"> > In accordance with the conditions specified in the Preliminary Water Consent, in locations where the route is closely situated next to watercourses or intersects them, on sections that pass through areas of moderate and high risk, it is mandatory to design vertical barriers to prevent vehicles from veering off the highway corridor (such as guardrails, blocks, New Jersey barriers, etc.). 			
19.3.3	Pre-construction/Construction	Change in the river flow and recharge by cutting or diverting permanent and intermittent streams around the motorway structures	<ul style="list-style-type: none"> > Hydraulic connectivity of all surface water bodies must be maintained. > When cutting off or otherwise controlling the water flow, ensure appropriate dimensioning of culverts for all identified intermittent streams that are crossed by motorway on embankment. > When watercourse diversion is required maintain a temporary channel to maintain flow and connectivity whilst the permanent channel is prepared. Preserve the natural characteristics of the riverbed morphology. Avoid to a degree possible: (1) changes in the planned and realised length of intervention; (2) spatial and temporal variation in channel morphology; (3) changes in cross-section 	JPAC to transfer the responsibility to the Contractor through Contractual Agreement	Revision of the Main Design for drainage systems	Revision report Design adopted

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>measurements; (4) changes in hydraulic parameters.</p> <ul style="list-style-type: none"> > In case of Suhı potok and Bijela river, construction of training structure shall be performed in the low flow season when the creek bed is dry. 			
19.3.4	Pre-construction/Construction	Reduction in water quality of the Tresanica and Neretva rivers due to discharge of surface-runoff from the asphalt surfaces in the operational phase	<ul style="list-style-type: none"> > Design and construct a closed surface drainage collection and treatment system. > Treatment units (oil and grease separators) to specifically cover the two viaducts over Tresanica and Neretva and the bridge over Neretva in Donje Selo. > Design and construct connections between toll stations/rest areas and local water supply and sewerage systems, wherever they are available. > If local water supply and sewerage systems are not available, design and construct a collection and treatment system for sanitary wastewater that uses biological treatment units before discharging the treated water into the environment. > The treated wastewater shall meet the standards specified in the Regulation on the conditions for the discharge of wastewater into the environment and public sewage systems (Official Gazette of FBiH, No. 26/20 and 96/20). > Treated wastewater shall not be discharged in the III protection zone of the Salakovac and 	JPAC to transfer the responsibility to the Contractor through Contractual Agreement	Revision of the Main Design for drainage and sanitary systems.	Revision report Design adopted Facilities constructed and certified for use

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			Bosnjaci springs, as well as in the direct influence zone of the unprotected Bijela spring			
19.3.5	Construction	<p>Reduction in water quality in river systems due to:</p> <ul style="list-style-type: none"> > sediment release during bridge construction in riverbed and on the banks > accidental pollution by hydrocarbons or other substances from the construction site including concrete batching plant and asphalt mixing plant > localised discharge of wastewater from construction site and worker's camp 	<p>> In accordance with the conditions specified in the Previous Water Consent, prepare a construction site organisation project and construction technology and schedule that should include:</p> <ul style="list-style-type: none"> > Site boundaries that should take into account, among other things, the need to protect sensitive areas from erosion, oil spills, water pollution, etc. > A system for the drainage of wastewater and stormwater from the construction site. > The most suitable locations for workshops, machinery bases, fuel and lubricant storage, and asphalt bases. Placing these facilities in high-risk water pollution zones is prohibited. > The construction work plan and construction technology must completely avoid the possibility of partially or fully filling up watercourses that the route intersects with or is located alongside. <p>Sediment release</p> <ul style="list-style-type: none"> > Avoid the positioning of stockpiles near to watercourses (minimum 50m recommended) and ensure they are located outside areas at fluvial flood risk. > Contain stockpiles with bunds or sediment fences and cover stockpiles when not in use. 	<p>Contractor</p>	<p>Engineering supervision of the contractor's work based on CSOP, RCMP, CESMP, CWMP, DCWMP: visual supervision of (a) sanitary and drainage facilities and (b) work of concrete batching plant (c) waste management practices (d) construction works on Tresanica and Neretva (e) disposal of spoil on designated landfills.</p> <p>Records should be kept of these visual inspections and submitted in the monthly reports prepared by the external</p>	<p>Plans and method statements prepared, reviewed, and approved by the Supervising Engineer.</p> <p>Completion of weekly inspections.</p> <p>Quality of water in Tresanica, Neretva and Bijela.</p> <p>No direct discharge of untreated wastewater to rivers</p> <p>No inappropriately disposed waste in and around the site</p> <p>No works on the banks</p> <p>Disposal of spoil on designated landfills</p> <p>Proofs of waste delivery to licenced operators</p> <p>No community grievances raised</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
		<ul style="list-style-type: none"> > depositing of waste such as construction waste, municipal waste, and other special waste categories near or into the surface waters 	<ul style="list-style-type: none"> > Control runoff during construction. Provide sediment barriers between earthworks and the watercourse to prevent sediment from washing into the river. Use of silt fences, silt traps, filter bunds, settlement basins and/or proprietary units such as a "siltbuster" to treat sediment laden water generated on site before discharge should also be implemented. > Pass any water generated by dewatering processes through silt busters or sediment tanks, prior to discharging this water to the any watercourse. Additional treatment may be required if other pollutants are present or if these measures are not effective. > Additional measures and pre-treatment required prior to discharging potentially polluted water from tunnel dewatering to include use of non-ecotoxic additives and oil separator. Sampling may be required prior to discharge to evaluate effluent quality in line with the conditions prescribed in the Regulation on the conditions for the discharge of wastewater into the environment and public sewage systems (Official Gazette of the FBiH, No, 26/20 and 96/20). > Access roads inside the construction camp should be located 60m from watercourses as far as practicable. Site roads and approaches to watercourse crossings should be kept free from mud and cleaning water should not be discharged to the watercourse. 		<p>supervising engineer.</p> <p>Monitoring of water quality of Tresanica, Neretva and Konjicka Bijela in line with the Decision on the Approval of the EIA Study.</p> <p>Reports to be checked by engineer supervision.</p>	<p>relating to water pollution or waste disposal.</p>

OFFICIAL USE

52

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > It is necessary to anticipate the use of only clean material for embankments near watercourses, in accordance with the conditions specified in the Preliminary Water Consent. Accidental pollution > Prepare Operational Plan of Intervention measures in case of different accidental situations (e.g. oil spills), as given in the Preliminary Water Consent. > Fuels and potentially hazardous construction materials should be stored in bunded areas with external cut-off drainage and fuel should be stored in double skinned tanks with 110% capacity. No materials should be stored within 50m of a watercourse. > Waste fuels and other fluid contaminants should be collected in leak-proof containers prior to removal from site to an approved processing facility authorised by the Cantonal ministry responsible for environmental protection in accordance with the <i>Rulebook on issuing a permit for small business activities in waste management (Official Gazette of the FBiH, No. 9/05)</i>. > Machine repairs and oil replacement must not be carried out on the construction site but in designated areas outside the zones defined as high-risk pollution zones. Oily waters must be treated to the level prescribed by the <i>Regulation on the Conditions for Discharging</i> 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p><i>Wastewater into Natural Recipients and the Public Sewerage System</i> (Official Gazette of FBiH, No. 26/20, 96/20), in accordance with the conditions specified in the Preliminary Water Consent. Fuelling and maintenance of construction vehicles and plant (including washdown) shall be done on hard standing or on haul roads, with appropriate cut-off drainage and located away from watercourses. Drip trays should be placed beneath static plant such as generators and plant not in use. No plant should be stored within 50 m of a watercourse and no maintenance should be undertaken within 50m of a watercourse.</p> <ul style="list-style-type: none"> ➢ Spill kits in the form of oil absorbent booms and other spill containment equipment to be kept on site to be deployed in the event of a spillage, and site staff trained in their use. ➢ Concrete mixing and washing areas should be located more than 500m from any watercourse. Wastewater from these areas shall be intercepted and hauled to a licenced disposal facility authorised by the Cantonal ministry responsible for environmental protection in accordance with the Rulebook on issuing a permit for small business activities in waste management (Official Gazette of the FBiH, No. 9/05). ➢ Set up settling tanks at the concrete batching plant to treat the wastewater before discharging it. Treated wastewater shall meet the standards specified in the Regulation on the conditions for the discharge of wastewater 			

OFFICIAL USE

54

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>into the environment and public sewage systems (Official Gazette of the FBiH, No. 26/20 and 96/20).</p> <ul style="list-style-type: none"> > No surface water runoff from construction working areas or sites that may contain fuels or other harmful substances shall be discharged to surface water receptors unless first subject to robust pre-treatment (physical and chemical treatment of harmful substances). <p>Wastewater from construction site and worker's camps</p> <p>Used water from the construction site must be safely managed through a sewage system, collected in appropriate reservoirs, and treated either on-site or at remote facilities in accordance with the <i>Regulation on the Conditions for Discharging Wastewater into Natural Receivers and the Public Sewerage System</i> (Official Gazette of FBiH, No. 26/21, 96/20) as specified in the Previous Water Consent. This includes, among other things:</p> <ul style="list-style-type: none"> > Design and construct a system for collection and treatment of drainage water and sanitary wastewater inside the camps capable of treating water to national and project standards. > No surface water runoff from construction compounds should be discharged to surface water receptors unless first subject to 			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>pre-treatment (physical and chemical treatment of harmful substances).</p> <ul style="list-style-type: none"> > Provide portable toilets at construction site outside the worker's camp. > For the locations of construction bases, maintenance operations, and asphalt bases, separate water permits must be requested in accordance with the conditions specified in the Preliminary Water Consent. <p>Waste disposal</p> <ul style="list-style-type: none"> > Develop and implement a Detailed Construction Waste Management Plan (DCWMP) and put in operation waste management procedures to avoid inappropriate deposition of construction waste in and around the construction site. The content of a DCWMP is prescribed by the Rulebook on construction waste (Official Gazette of the FBiH, No. 93/19). > Implement measures for waste management specified under section 0. This includes the measure of prohibiting the disposal of excavation materials within the water pollution risk zones (along the banks of watercourses, sanitary protection zones), as specified in the issued Preliminary Water Consent. > All measures to be included in the Construction Environmental and Social Management Plan (CESMP) and implemented accordingly. 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Daily visual monitoring of surface waters during the construction phase shall be maintained. The monitoring will visually detect inappropriate waste disposal and any visible changes in water colour or appearance, caused by increased release of suspended solids or accidental material spillage into the water. 			
19.3.6	Operation	<p>Reduction in water quality in river system resulting from:</p> <ul style="list-style-type: none"> > direct release of intercepted surface run-off including de-icing agents > direct release of sanitary water from toll station > accidental spill of hazardous material resulting from traffic accidents 	<ul style="list-style-type: none"> > Include in the Operational Environmental and Social Management Plan (OESMP)⁷ operational maintenance plan which will include the measures to properly operate and regularly maintain sanitary and drainage facilities. This includes regular cleaning of the separators, and regular monitoring of effluent quality in line with the requirements from the water permit. Operational Maintenance Plan also must contain the measures for mowing/herbicide treatment of neglected areas and their impact on water (if used), in line with the Preliminary Water Consent. > In accordance with the Preliminary Water Consent, the OESMP should also include a plan for winter maintenance procedures, taking into account the type of de-icing agents that must be compatible with the designated treatment facilities. The plans should define the locations of chemical storage facilities, which need to be outside high-risk zones. 	JPAC	<p>Procedures for operation of the sanitary and drainage facilities.</p> <p>Monitoring of effluent discharge in line with the OESMP and the Water Permit.</p> <p>Setting up preparedness and response procedures in line with the EPRP.</p>	<p>Procedures for operation and maintenance of sanitary and drainage facilities set up.</p> <p>Procedures for emergency preparedness and response set up.</p> <p>Effluent quality in line with the Federal regulations for effluent discharge.</p> <p>Annual report on effluent quality to be submitted to relevant ministry/agency at federal level in line</p>

⁷ The purpose of the OESMP is to ensure compliance with the EBRD's Performance Requirements (PRs) and relevant national and EU legislation during the operational phase. The minimum content is stipulated in the ESAP.

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > In the Operational Emergency Preparedness and Response Plan (OEPRP)⁸ prepared for the motorway include procedures to prevent contamination of waters from accidental spills. 			<p>with issued Decision on the Approval of the EIA Study and Water Permit.</p> <p>No spills affecting water quality.</p>

19.4 Climatic Factors

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Climatic factors						
19.4.1	Pre-construction/ construction	Inadequate consideration of climate changes/parameters, risk of terrain instability, landslides, soil erosion, and negative impacts on surface and groundwater	<ul style="list-style-type: none"> > During the Main Design development, the latest available climate and hydrological data from the Agency for the Watershed of the Adriatic Sea and the Federal Hydrometeorological Institute to be incorporated. > Main Design to be developed following standards and parameters specified in the <i>Guidelines for Design, Construction, Maintenance and Supervision of Roads developed by the FBiH Road Directorate and Public Company "Putevi Republike Srpske"</i> (2005) and the accompanying <i>Instructions for</i> 	JPAC to transfer responsibility to external consultancy for conducting analysis/ investigations, and the development of design	Source of climate and hydrological datasets incorporated in the Main Design Development of Main Design in line with the <i>Guidelines (2005)</i> and <i>Instructions (2015)</i>	<p>100% of climate and hydrological data from relevant agencies incorporated into the Main Design</p> <p>Full compliance of Main Design with the specified national guidelines and instructions</p>

⁸ The EPRP sets out policies, laws, and standards related to emergency response in order to reduce harm to society or the environment. The minimum content is stipulated in the ESAP.

OFFICIAL USE

58

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p><i>the Design, Procurement, Installation and Maintenance of Motorway Elements developed by JPAC (2015).</i></p> <ul style="list-style-type: none"> ➢ Conduct pre-construction rockfall analysis and implement mitigation measures to prevent soil erosion and dewatering, as stipulated under item <i>Soil</i> below (19.8). Implement the same mitigation measures to prevent negative impacts on terrain stability by intrusion of groundwater and change of surface and groundwater flows, as stipulated above under <i>Groundwater</i> (19.2) and <i>Surface water</i> (19.3). ➢ In line with the <i>FBiH Rulebook on geotechnical research and testing and the organisation and content of geotechnical engineering missions</i>, complete geotechnical investigations (mission G21) for the entire motorway section. If conditionally stable terrain is identified, additional investigations (landslide monitoring) to be conducted to determine slope movements and implement appropriate structural measures, adapting the Project design to local terrain conditions. Special attention to be placed on Section 12, where potentially unstable terrain prone to landslides has been identified. 		Contracted pre-construction rockfall analysis and geotechnical investigations	Rockfall analysis and geotechnical investigations (mission G21) completed
19.4.2	Pre-construction/ Construction	Floods, landslides and rock falls can endanger the stability of the terrain, with harmful consequences for water quality, people	<ul style="list-style-type: none"> ➢ In line with the <i>FBiH Rulebook on geotechnical research and testing and the organisation and content of geotechnical engineering missions</i>, the Contractor to prepare a geotechnical implementation study (mission G31) and carry out monitoring of geotechnical works (mission G32), ensuring timely adaptation and 	JPAC or JPAC to transfer the responsibility to the contractor per Contractual Agreement	Conducted geotechnical implementation study (mission G31) Reforested surfaces as targeted in BMP.	Completion of the geotechnical implementation study (mission G31) and geotechnical works monitoring (mission G32)

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
		and construction equipment	<p>optimisation of the Main Design to actual field conditions and the Contractor's methodology.</p> <ul style="list-style-type: none"> > Implement recultivation and restoration as stipulated by BMP and where possible reforest land within the Project area of influence. > Prepare and implement Emergency Preparedness and Response Plan (EPRP) as part of CESMP for the construction phase. The Plan: <ul style="list-style-type: none"> > Sets out key national and EU policies, laws and standards related to emergency response to reduce negative climate-related impacts on society or the environment > Defines roles and responsibilities > Identifies and classifies potential climate-related emergencies in the construction phase, including floods, landslides, extreme heat and droughts, fires and heavy snow/ice events, as well as spill management > Lists the activities, measures and equipment needed to respond to emergencies > Defines the implementation of trainings for emergency preparedness > Defines media ways of communication in emergency situations 	<p>Main Design to include measures to increase climate resilience</p> <p>Engineer supervision to review Construction Management Plan for resilience increasing measures</p> <p>Prepared EPRP</p> <p>Installed culverts to drain accumulated waters</p> <p>Installed temporary or permanent channels and pipelines</p> <p>Number and location of temporary structures, equipment, and machinery on site</p> <p>Functionality and visibility of traffic signals in affected areas</p>	<p>within the scheduled timeframe</p> <p>Field reports on implementation of activities defined by the Preliminary Design and Main Design</p> <p>Reports on conducted landslide assessment, geotechnical test, and monitoring, with positive results</p> <p>Percentage of reforested and recultivated area</p> <p>Inspection reports</p> <p>Regular reports of the supervising engineer on the implemented landslide protection activities</p> <p>Zero incidents or accidents caused</p>	

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Defines the procedure of mitigation and recovery after emergency situations > Defines the maintenance and control of this plan. > In case of noticeable wetting of the terrain in the lowest zones, make culverts in places to drain the accumulated waters. > In case of noticeable torrential flow of water from larger catchment areas on the construction site, collect and channel water through temporary or permanent channels and pipelines. > Ensure that all temporary structures, equipment, and machinery are located in areas that are not prone to flooding or in flood-prone zones with proper drainage systems in place. > In case of floods, landslides, erosion, or rockfall, mark affected areas and set up appropriate traffic signals. 			<p>by temporary structures, equipment, or machinery</p> <p>100% of affected areas are marked and traffic signals installed</p>
19.4.3	Construction	Extreme heat, droughts, and fires may lead to health and safety risks for workers, ignition of equipment containing hazardous substances, land subsidence	<ul style="list-style-type: none"> > Regularly control the state of fires in the project area by visual inspection and monitoring of news in local media, including monitoring of the index of danger from the occurrence and spread of forest fires on the website of Federal Hydrometeorological Institute⁹. > Store flammable materials in special heat-resistance containers. 	JPAC or JPAC to transfer the responsibility to the contractor per Contractual Agreement	Periodical visual inspection of construction site Engineer supervision to review Construction Management Plan for resilience	<p>Reports on the periodical visual inspection of construction site</p> <p>Reports on the delivery and storage of</p>

⁹ <https://www.fhmzbih.gov.ba/latinica/AGRO/pozar.php>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
		(especially when combined with heavy rainfall), damage or melting of construction equipment, dense smoke, and increased GHG emissions	<ul style="list-style-type: none"> > Establish an effective fire detection and suppression system on-site, including fire extinguishers and sprinklers, particularly in areas where flammable materials and hazardous substances are stored. > In case of least fire danger, suspend works. > Prepare and implement Emergency Preparedness and Response Plan (EPRP), as specified under item above. > Schedule work during cooler hours in summer months – carry out physically demanding activities in early morning or late afternoon to reduce the risk of heat stress. 		<p>increasing measures</p> <p>Checking the storage of hazardous substances</p> <p>EPRP prepared</p> <p>Number and location of installed fire detection and suppression devices</p> <p>Temperature and heat index recorded at the work site</p>	<p>flammable substances</p> <p>Reports of the supervising engineer on the implementation of fire protection activities on the construction site</p> <p>100% of high-risk areas equipped with operational fire detection and suppression systems</p> <p>Zero reported cases of heat stress or heat-related illnesses among workers</p>
19.4.4	Construction	Heavy snow and ice events may damage construction equipment, delay construction activities, and pose health and safety risks for workers	<ul style="list-style-type: none"> > Apply salt or other appropriate de-icing agents (e.g., calcium-magnesium acetate, magnesium chloride, sand) on construction roads, access points, and pedestrian walkways to prevent ice buildup and improve traction. > Reinforce temporary access roads in areas prone to freezing to ensure stability and navigability during winter conditions. This may include additional layers of gravel or geotextile material. 	JPAC or JPAC to transfer the responsibility to the contractor per Contractual Agreement	<p>Frequency and amount of de-icing agents applied on construction roads, access points, and pedestrian walkways</p> <p>Inspection reports on road condition and stability during winter conditions</p>	<p>Zero reported incidents of slips or vehicle accidents due to ice on treated surfaces</p> <p>No reports of blocked or impassable access roads due to freezing</p>

OFFICIAL USE

62

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Ensure that all machinery, vehicles, and equipment are properly equipped to handle cold temperatures, including antifreeze in engines, battery checks, and ensuring proper function of hydraulic systems in freezing conditions. 		<p>Records of engine antifreeze checks, battery checks, and hydraulic system functionality tests</p>	100% of machinery and vehicles inspected and equipped for cold weather before use
19.4.5	Operation	Floods, landslides and rock falls can cause physical damage to transport infrastructure, with traffic disruption and destruction of vehicles, as well as interrupted plumbing roads and underground installations	<ul style="list-style-type: none"> > Perform periodic geotechnical monitoring with the aim of landslide control. > In case of reconstruction, implement recultivation and restoration as stipulated by BMP and where possible reforest land within the Project area of influence <ul style="list-style-type: none"> > Prepare and implement Operational Emergency Preparedness and Response Plan (OEPRP) for the operational phase. The Plan shall: <ul style="list-style-type: none"> > Sets out key national and EU policies, laws and standards related to emergency response to reduce negative climate-related impacts on society or the environment > Defines roles and responsibilities > Identifies and classifies potential emergencies in operation phase, including floods, landslides, rock falls, extreme heat and droughts, fires, heavy snow/ice events, as well as spill management > Lists the activities, measures and equipment needed to respond to emergencies (e.g., the following 	<p>JPAC or JPAC to transfer the responsibility to the sub-contractor per Contractual Agreement</p>	<p>Performed geotechnical monitoring</p> <p>Reforested surfaces as targeted in BMP.</p> <p>Prepared OEPRP</p> <p>Conducted regular inspection of plumbing installations</p> <p>Conducted regular inspection of drainage system</p> <p>Installed temporary or permanent channels and pipelines</p> <p>Marked the terrain and set up traffic signals</p> <p>Established program of regular maintenance and</p>	<p>Reports on conducted geotechnical test and monitoring, with positive results</p> <p>Percentage of reforested and recultivated area</p> <p>Inspection reports</p> <p>Traffic reports</p> <p>Evidence of the performed verification of the correctness of the drainage system, as well as regular maintenance and control of road infrastructure</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>protection measures should be applied: in case of minor flood/landslides in the Project area, carry out a risk assessment and, if necessary, stop and/or diverse traffic; in case of traffic accidents and spillage of hazardous substances – suspend and/or diverse traffic, catch leaking liquid into intervention vessels, use special sorbents and others substances for decontamination of the terrain and remediation of consequences at the place of spillage of hazardous substances, use fire-protection equipment)</p> <ul style="list-style-type: none"> > Defines the implementation of trainings for emergency preparedness > Defines media ways of communication in emergency situations > Defines the procedure of mitigation and recovery after emergency situations > Defines the maintenance and control of this plan. > Regular inspection of plumbing installations to prevent leaks. > Regularly check the drainage system for the management of surface and rainwater from the road in order to prevent overflow in the form of concentrated torrents. > In case of noticeable torrential flow of water from larger catchment areas, collect and 		inspection of road infrastructure	

OFFICIAL USE

64

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>channel water through temporary or permanent channels and pipelines.</p> <ul style="list-style-type: none"> > In case of landslide/rock falls, mark the terrain and set up appropriate traffic signals. > In the event of a landslide or flood that poses a risk to user safety, the motorway (section) to be closed and rehabilitation, stabilisation, and adaptation measures undertaken as soon as possible. Monitoring of the landslide area to be carried out to assess terrain stability and the potential for further landslide/erosion movement or expansion. > Establish an appropriate program of regular maintenance and inspection of road infrastructure. 			
19.4.6	Operation	Droughts, or high temperatures, cause the heating of the asphalt and thus cause higher emissions of greenhouse gases. Droughts can lead to the melting of the road surface mask, which further leads to the formation of ruts that destabilise the movement of vehicles.	<ul style="list-style-type: none"> > Prepare Operational Emergency Preparedness and Response Plan (OEPRP). > In case of reconstruction, use high quality road construction materials, which are resistant to high temperatures. > Set appropriate signals or motivating messages to help drivers adapt to driving conditions on the road and according to their psychophysical abilities. > Control water leakage, to prevent its disappearance in extremely dry periods, which can cause land subsidence. 	JPAC or JPAC to transfer the responsibility to the sub-contractor per Contractual Agreement	<p>Prepared OEPRP</p> <p>Used road construction materials, which are resistant to high temperatures</p> <p>Set appropriate road signs</p> <p>Regular inspections of water leakage</p> <p>Limited vehicle movement</p> <p>Established program of regular</p>	<p>Reports on used construction materials</p> <p>Inspection reports</p> <p>Traffic reports</p> <p>Reports on conducted inspections and monitoring</p> <p>Reports on the implemented activities on road infrastructure maintenance, which are related</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Restrict the movement of vehicles transporting dangerous substances during periods of high temperatures. > Establish an appropriate program of regular control maintenance and inspection of road infrastructure. 		<p>maintenance and inspection of road infrastructure</p>	<p>to the reduction of the risk of high temperatures and droughts</p>
19.4.7	Operation	Fire smoke reduces the visibility and can cause physical damage to transport infrastructure, with traffic disruption or even death of road users.	<ul style="list-style-type: none"> > Regularly control the state of fires in the project area by visual inspection and monitoring of news in local media, including monitoring of the index of danger from the occurrence and spread of forest fires on the website of Federal Hydrometeorological Institute¹⁰. > Prepare Operational Emergency Preparedness and Response Plan (OEPRP) for the operational phase. > Install fire extinguishers in tunnels. > Restrict the movement of vehicles transporting dangerous substances in the period possible for fire. > Avoid planting resinous trees along road section. > In case of least fire danger, divert traffic. 	<p>JPAC or JPAC to transfer the responsibility to the sub-contractor per Contractual Agreement</p>	<p>Periodical visual inspection of project area Prepared OEPRP Installed fire extinguishers in the tunnel Limited vehicle movement. Resinous trees are not planted near the road</p>	<p>Reports on the periodical visual inspection of construction site Inspection reports Traffic reports Confirmation of installed fire extinguishers in tunnels and reports on regular verification of their correctness Reforest and recultivation reports, which indicate that no resinous trees have been planted near the road</p>

¹⁰ <https://www.fhmzbih.gov.ba/latinica/AGRO/pozar.php>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.4.8	Operation	Heavy snow and ice can damage pavements and drainage systems, disrupt traffic, increase accident risks, and pose health and safety hazards for road users	<ul style="list-style-type: none"> > Regularly clear snow and ice from the road surface, pavements, and drainage systems to maintain safe driving conditions. > Conduct regular inspections of pavements, bridges, and drainage systems before, during, and after snow/ice events to assess any damage or accumulation that could pose a hazard to motorists. > Apply de-icing agents (e.g., calcium-magnesium acetate, magnesium chloride, sand) to the road surface before and after snow events to prevent ice formation and improve traction. > Implement reduced speed limits and temporary road closures in case of extreme snow/ice conditions to reduce the risk of accidents and improve safety. 	JPAC or JPAC to transfer the responsibility to the sub-contractor per Contractual Agreement	Frequency and timing of snow/ice clearing activities Detected damage or hazard points identified per inspection Amount and type of de-icing agents applied Duration of speed limits and closures	100% of priority roads, pavements, and drainage systems cleared as soon as possible 100% of designated infrastructure inspected according to schedule No reported accidents attributable to ice formation on treated surfaces
19.4.9	Operation	A significant increase in GHG emissions in the project area is expected, with the commissioning of the motorway section, which has an adverse effect on the environment.	<ul style="list-style-type: none"> > Implement recultivation and restoration as stipulated by Biodiversity Management Plan (BMP) and where possible reforest land within the Project area of influence. > Encourage drivers with motivational messages on electronic displays to maintain a consistent speed of 110 km/h for the benefit of reducing GHG emissions 	JPAC	Reforested surfaces as targeted in BMP Implemented messages on speed control	Percentage of reforested and recultivated area Traffic reports

19.5 Air Quality

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Air quality						
19.5.1	Pre-construction	Due to the timespan between preparation of this Study and start of construction works, up-to-date information on air quality in the project areas will be needed to determine baseline conditions	> Repeat the analysis of air quality in the project area, possibly in two seasons (summer and winter).	JPAC or JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Refer to results of water quality monitoring described in Chapter 5.3.3 to check for locations and parameters to be analysed	Environmental baseline report on air quality prepared
19.5.2	Construction	Emissions of construction dust Emission of exhaust gases from combustion processes in generators and other construction equipment and vehicles	> The CESMP is to include a chapter on air quality management that shall contain: <ul style="list-style-type: none"> > identification of all air emission sources including motorway construction activities, concrete and asphalt production facilities, sourcing and transport of construction materials, and other emissions generating facilities, > identification of all types of emission from each source, > details of mitigation measures for each source, > specific location and schedule where such measures shall be implemented to minimise impacts to sensitive receptors due to the 	Contractor	Engineer supervision of the Contractor's work based on CESMP (TSMP, MMP): weekly visual inspections throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures. Records should be kept of these visual inspections and submitted in the monthly reports	Plans and method statements prepared, reviewed, and approved by the supervising engineer. Completion of weekly inspections. Implement a regular vehicle maintenance and repair program. No community grievances raised

OFFICIAL USE

68

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>presence construction work (details are given after this table),</p> <ul style="list-style-type: none"> > monitoring and reporting. <p>> Specific mitigation measures to be included in the chapter on air quality management shall include, but will not be limited to:</p> <ul style="list-style-type: none"> > for dust from construction activities, implement the schedule of active wetting of soil on the corridor when the unfavourable weather conditions are present (presence of wind, low humidity) and emission-intensive activities are taking place on the corridor according. Active wetting shall be performed according to the schedule given in the table that follows. > avoid overwatering as this may make the surrounding muddy, > earthwork operation to be suspended when the wind speed exceeds 20 km/h in areas within 500 m of any community, > ensure proper state of maintenance machinery and vehicles to minimise air emissions, > smoke emitting vehicles and equipment shall not be allowed and shall be repaired or removed, 		prepared by the external supervising engineer.	relating to construction dust.

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > undertake immediate repairs of any malfunctioning construction vehicles and equipment, > use construction equipment and vehicles that meet national emission standards, > wherever possible, use electrically powered equipment rather than gas or diesel-powered equipment, > give priority to fuel efficient machinery, > ensure that all diesel and petrol running machinery use equipped with catalytic convertors, > position any stationary emission sources (e.g., portable diesel generators, compressors, etc.) as far as is practical from sensitive receptors, > provide truck-washing facilities at tunnel portal and viaduct construction sites to prevent truck-out of mud and dust; above ground option is deemed to be the priority, > rock crushing plant equipment shall be fitted with water sprinklers that will run while the plant is operational, 			

OFFICIAL USE

70

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > if the sprinklers stop working, the plant shall also cease operation until the sprinklers are functioning, > avoid water runoff on the site. In case of a runoff decrease water flow rate from the sprinklers, or fix the sprinklers if not functioning properly (there is a leak), > emissions from on-road and off-road vehicles shall comply with national or regional programs, > regardless of the size or type of vehicle, owners and operators should implement the manufacturer recommended engine maintenance programs, > drivers should be instructed on a routine basis by the Contractors Health and Safety Specialists on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits, > implement a regular vehicle maintenance and repair program, > conveyor belts (e.g., at batching plants and rock crushing plants) shall be fitted with windboards, and conveyor transfer points and 			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>hopper discharge areas shall be enclosed to minimise dust emissions,</p> <ul style="list-style-type: none"> > all trucks used for transporting materials to and from the site will be covered with canvas tarpaulins. 			
19.5.3	Operation	Emission from exhaust gases from vehicles using the motorway	<ul style="list-style-type: none"> > If measurement of standard air quality parameters show that values exceed maximum allowed values prescribed by national regulation, the following protection measures must be undertaken: <ul style="list-style-type: none"> > construction of barriers to prevent spreading the pollutants; best are wide leafed green plants, > if this is not sufficient protection or these species cannot grow on the Project area, artificial barriers are also acceptable, e.g. noise barriers also prevent spread of air pollution, and their efficiency depends on their height (see Table 19-1 for details). 	JPAC	Standard set of parameters to include CO, SO ₂ , O ₃ , NO, NO ₂ , NO _x , PM ₁₀ and PM _{2.5} .	Air quality report

Table 19-1: Locations on the route where mitigation strategies should be applied

Location	GPS coordinates		Mitigation strategies	Scenario for which the measures should be taken	Phase during which the measures should be taken
	Starting point	Ending point			
1	1+100	1+800	Wetting of the soil	Wind	Construction
2	0+900	1+800	Wetting of the soil	Windless	Construction

Location	GPS coordinates			Mitigation strategies	Scenario for which the measures should be taken	Phase during which the measures should be taken
	Starting point	Ending point				
3	3+800	5+400		Wetting of the soil	Wind	Construction
4	3+700	4+800		Wetting of the soil	Windless	Construction
5	24+750	25+450		Wetting of the soil	Wind	Construction
6	29+150	30+000		Wetting of the soil	Wind	Construction
7	30+900	31+900		Wetting of the soil	Wind	Construction
8	34+750	35+100		Wetting of the soil	Wind	Construction
9	Konjic Bypass Connecting Road – from km 0+000 to km 1+000			Wetting of the soil	Wind and windless	Construction
10	Ovcari Loop Connecting Road – from km 0+000 to km 0+400			Wetting of the soil	Wind	Construction
11	Ovcari Loop Connecting Road – from km 0+000 to km 1+000			Wetting of the soil	Windless	Construction
12	24+750	25+450		Construction of barriers to prevent the spreading of air pollution	Wind and windless	Operational
13	29+150	30+000		Construction of barriers to prevent the spreading of air pollution	Wind and windless	Operational
14	30+900	32+400		Construction of barriers to prevent the spreading of air pollution	Wind and windless	Operational

19.6 Noise

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Noise						
19.6.1	Pre-construction	Due to the timespan between preparation of this Study and start of construction works, up-to-date information on ambient noise levels in the project area will be needed to determine the baseline conditions	Repeat the analysis of ambient noise in the Project area, possibly in two seasons (summer and winter).	JPAC or JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Refer to results of ambient noise levels described in Chapter 11 to check for locations and parameters to be analysed	Environmental baseline report on ambient noise levels prepared
19.6.2	Pre-construction	Inadequate planning of noise barriers may cause impacts on residents from increased levels of noise from motorway traffic	<ul style="list-style-type: none"> > Confirm the noise modelling results and proposal for noise barrier locations given in Chapter 11 after the Main Design is completed. > Confirm the technical details of noise barriers considering also the JPAC Technical standards for noise barriers. > The locations of noise barriers will also be reconsidered in consultation with the local community of Konjic and settlements Tresanica, Gornje Polje, Glavicine, Bijela, Podgorani, Kutilivac and Vrapcici, since these settlements are most likely to experience negative impacts of increased level of noise. 	Contractor	Revision of the Main Design.	Main Design to include definite selection of noise barriers at appropriate locations.
19.6.3	Construction	Impact on workers and residents from increased levels of	<ul style="list-style-type: none"> > Include noise control measures in the CESMP to avoid the exceeding of 	Contractor	Engineering supervision of construction works.	Noise control measures implemented and recorded as

OFFICIAL USE

74

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
		noise during construction works	<p>permitted values in accordance with the Law on protection against noise, such as:</p> <ul style="list-style-type: none"> > restriction of works to day-time only (period of day: 06:00 to 22:00, period of night: 22:00 to 06:00), > on unpaved roads, maximum speed of vehicles should be restricted to 20 km/h to minimise load-rattle, > haul routes should avoid passing dwellings at distances closer than ten metres, > equipment and machinery to be shut down when not in use, > in case of noise increase complaints by residents, simultaneous use of machines that generate noise over 70 dB should be limited to reduce negative cumulative impacts of noise levels generated during construction works and to ensure that noise levels are within legally defined values, and all noise complaints shall be investigated, > all equipment and vehicles will be maintained in good working order - implement a regular equipment maintenance and repair program, 		<p>Monitoring of ambient noise in accordance with the provisions of the issued Decision on the Approval of the EIA Study (at least once a year near housing facilities and additionally upon complaints of the local residents, if any).</p> <p>Monitoring of the ambient noise should be performed by an authorised company (a third party).</p> <p>Weekly site walkover inspections to consider if noise mitigations being appropriately implemented.</p>	<p>implemented in monthly reports prepared by the external supervising engineer.</p> <p>No noise related complaints received.</p> <p>Equipment maintenance and repair program implemented.</p> <p>Noise barriers installed and Engineering revision approved the installation.</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > machines and vehicles to be used in construction activities must have use/operation permits, > noise monitoring to be done at the edge of industrial areas and construction sites, > noise monitoring to be done in settlements, > monitoring upon complaints during the construction phase of the Project to confirm compliance with legally prescribed values or to identify where additional mitigation is required. > Installation of noise barriers based on the results of noise modelling and local community consultations in the pre-construction phase. See Chapter 11 for details. Since the traffic models suggest a gradual increase in vehicle circulation, a two-step deployment of the noise barriers is possible based on traffic flow monitoring and motorway noise monitoring programs: <ul style="list-style-type: none"> > At the beginning of motorway operation: N01, N03, N05 > When increase of vehicle circulation is identified: N02, N04, N06 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.6.4	Operation	Impact on residents from increased levels of noise from motorway traffic	<ul style="list-style-type: none"> > It is possible that traffic intensity during motorway use will be higher than originally planned. If this would be the case, perform control measurements of the noise level along the complete motorway length annually, during the first three years of the operation of the motorway, in order to determine the noise emission level. If the allowed levels were exceeded, additional protection measures must be planned in the form of additional noise protection barriers, preserving the road and the tarmac in a good condition, pavement curtain which absorbs noise, green belts etc. > Noise monitoring upon complaints during the operation phase to confirm compliance or to identify where additional mitigation is required. 	JPAC	<p>Periodical monitoring of ambient noise in accordance with the provisions of the Decision on Approval of EIA Study.</p> <p>Monitoring of ambient noise should be performed by an authorised company (third party).</p> <p>If the monitoring shows that the measured values are below the limit values specified by the Law on Protection Against Noise, then the monitoring can be performed once in three years.</p>	<p>Noise control measures implemented and recorded.</p> <p>Annual report to be submitted to FMET in line with the Decision on Approval of EIA Study.</p> <p>No complaints received.</p>

Table 19-2: Locations on the route where noise barriers should be applied

Mo.	Location	Length	Height	Position
Barriers on the right side of motorway (sensitive receivers WEST of motorway)				
N01	at west of motorway, from km 3+710 (end of right tunnel tube T-1) to km 10+500 (start of right tunnel tube T-2),	6,790 m	3-5m	as close to the road surface as allowed
N02	at west of motorway, from km 27+200 (end of overpass 1) to km 29+200 (section P584)	2,000 m – 25 m for spans of overpass 2 and overpass 3	3m	as close to the road surface as allowed
Barriers on the left side of motorway (sensitive receivers EAST of motorway)				

N03	at east of motorway, from km 3+733 (end of left tunnel tube T-1) to km 4+611 (section P93)	878 m	5m	bridge & embankment: as close to the road surface as allowed cut: top of cut
N04	at east of motorway, from km 6+500 to km 7+000	500 m	3m	as close to the road surface as allowed
N05	at east of motorway, from km 33+980 (end of left tunnel tube T-5) to km 34+941 (section P700)	961 m + 250 m overlap at interchange "Mostar North"	3m	as close to the road surface as allowed
Barriers on north side of Connecting Road 1 (to I/C "Mostar North")				
N06	at north of Connection Road 1, from km 0+000 to km 0+540 (toll station)	540 m	4.5m	as close to the road surface as allowed
Barriers on Neretva bridge of Konjic Bypass				
N07a (left)	from km 0+330 to km 0+560	230 m	5m	as close to the road surface as allowed
N07B (right)	from km 0+430 to km 0+560 (toll station)	130 m	3m	as close to the road surface as allowed

19.7 Vibration

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Vibration						
19.7.1	Construction	Structural damage from vibration caused by equipment and operation methods employed including use of explosives	> Respected recommending safety distances for tunnel drilling and bridge foundations in the identified vibration hotspots: bridge M-2 and north portal of tunnel T-1, bridge M-3 and south portal of tunnel T-1, bridge south of Konjic South I/C, bridge ~23+600, bridge ~24+250, bridge on "east access road to Konjic North I/C",	Contractor	Engineering supervision of construction works. Weekly site walkover inspections to consider if vibration mitigations being	Vibration control measures implemented and recorded as implemented in monthly reports prepared by the

OFFICIAL USE

78

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>bridge in "Konjic Bypass" ~0+760, bridge in "Konjic Bypass" ~0+420. See the ESIA Chapter 12 Vibrations for details. (Recommended safety distances are between 16m and 29m for pile-driving, between 10m to 17m for drilling and 17m for operation of heavy-duty vibrator rollers)</p> <ul style="list-style-type: none"> > If sensitive receivers are acknowledged within the safety zone buffers, then other methods of construction should be used, such as low vibration sonic pile drivers or pre-digging holes for piles, less powerful excavation machinery, compacting rollers without vibration, etc. > In case of usage of explosives for the tunnel mining (tunnels T1, T2, T3 and T6), the same limit of 10 mm/s peak particle velocity applies to nearby sensitive receivers. The contractor shall deliver, prior to construction, a detailed study that accounts for the soil in each area of interest and the explosive charges he is planning to use. Controlled explosions should also take place prior to construction, as a test to validate the study's forecasts for the vibration levels to the receivers. > Continuous vibration monitoring during construction works involving the above operations is highly recommended, as well as a detailed pre- and post- construction condition assessment and crack survey for 		<p>appropriately implemented.</p>	<p>external supervising engineer.</p> <p>Appropriate communication with local community established.</p> <p>No vibration related complaints received.</p> <p>Equipment maintenance and repair program implemented.</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>any existing structures in a distance up to 40m from the relevant works.</p> <ul style="list-style-type: none"> > Before carrying out any inevitable activities that produce vibrations near receivers 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. > All machinery and equipment must be maintained at high levels of optimum operation. Machinery and operational equipment (including excavators, crushers, loading/unloading, generators, concrete plants, etc.) will be placed as far away from noise and vibration-sensitive areas as possible. > Design activity planning to avoid the effects, e.g., avoiding the simultaneous use/operation of equipment that produces vibrations and not using it during quiet hours. > The choice of equipment will consider the vibration level. Where possible, electrical equipment will be used instead of diesel or petrol engine equipment and must comply with European Directive 2000/14/EC on project machinery noise. Regular maintenance of equipment and vehicles is recommended in accordance with manufacturers' recommendations. Any 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>broken parts should be replaced immediately.</p> <ul style="list-style-type: none"> > In the event of any complaint, the source of the excessive vibration will be identified and measures such as the location of the equipment and the operating hours will be assessed. > Regularly check that all installations, machinery, and vehicles are operated efficiently and according to the specifications of manufacturers, by trained and qualified operators. In addition to increased safety, this process also affects the proper maintenance and as quiet operation of the machinery as possible. 			

19.8 Soil

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Soil						
19.8.1	Pre-construction	Due to the timespan between preparation of this Study and start of construction works, up-to-date information on soil quality in the project area will be	<ul style="list-style-type: none"> > Repeat the analysis of soil quality in the project area, possibly in two seasons (summer and winter). 	JPAC or JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Refer to results of soil quality monitoring described in ESIA to check for minimum locations and parameters to be analysed.	Environmental baseline report on soil quality prepared

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
		needed to determine the baseline conditions			Increase the number of samples if deemed necessary to cover more specific points of interest.	
19.8.2	Pre-construction	Occurrence of rockfall due to instability of terrain and the nature of construction works	<ul style="list-style-type: none"> > Carry out a rockfall analysis to determine position and length of Rock Fall Protection Fence in the Klenova Draga valley 	JPAC to transfer the responsibility to the Contractor through Contractual Agreement	Revision of the rockfall analysis and approval by the Beneficiary	Installation of RockFall Protection Fence
19.8.3	Construction	Soil erosion resulting from excavation works and use of heavy machinery and equipment	<p>The detailed design of the Project shall incorporate following measures to reduce the likely release of loose material or material with the potential to become loose in-situ:</p> <ul style="list-style-type: none"> > Slope stabilisation - including mulching (straw mulching), brushwood mulching, erosion control blankets, soil binders and gravelling. > Retaining walls - to retain loose materials on slopes where it would naturally be held. > Sediment traps and basins - which will intercept and retain sediment-laden runoff. > Drainage channels – which will divert run-off water. 	JPAC or JPAC to transfer the responsibility to the Contractor as per Contractual Agreement	Engineering supervision of the contractor's work.	Monthly engineering supervision reports. Photographs from the site.

OFFICIAL USE

82

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Treatment system – to remove material contained within the run-off water. > Revegetation in line with the Land and Habitat Restoration Plan (LHRP) that will be constituent of the CESMP. This plan will be read and implemented in combination with the Topsoil Management Plan and Waste Management Plan. This plan will include measures to increase the stability of loose materials and surfaces which become exposed during construction phase. It will also include measures restoration of the borrow pits and their surroundings, if any, and recultivation of the construction waste landfill. 			
19.8.4	Construction	Loss of fertile topsoil Deforestation may cause soil erosion Soil dewatering	<ul style="list-style-type: none"> > Prepare a Topsoil Management Plan (TSMP). This plan will be constituent of the CESMP and shall describe topsoil stripping procedures and rules, topsoil stripping depth and volumes, topsoil stripping supervision, transportation and stockpiling requirements, stockpile location, topsoil stockpile design, stockpile management, erosion hazard and erosion control, runoff drainage/diversion, soil protection measures at the storage area, maintenance of the stockpile and topsoil application procedure. > In the TSMP, provide for the proper removal of the fertile and potentially fertile soil layer, in accordance with the 	JPAC to transfer the responsibility to the Contractor through Contractual Agreement	Engineering supervision of the contractor's work in line with the TSMP.	Monthly engineering supervision reports. Photographs from the site.

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			provisions of the <i>Law on Agricultural Land</i> , Article 55 (O.G. FBiH, No. 52/09).			
19.8.5	Construction	<p>Accidental spills</p> <p>Direct discharge of wastewater from maintenance of construction vehicles at the site and sanitary waters from construction camp may lead to soil contamination</p> <p>Inappropriate waste disposal may lead to soil contamination</p>	<ul style="list-style-type: none"> > Implement the same measures as under Geology and Groundwater > Implement the same measures as under Surface Water > Implement the same measures as under Waste and Materials Management. 	JPAC to transfer the responsibility to the Contractor through Contractual Agreement	The same as under Water and Waste.	The same as under Water and Waste.
19.8.6	Operation	<p>Direct discharge of surface run-off without treatment</p> <p>Accidental fuel and oil spills</p> <p>Use of de-icing agents</p>	<ul style="list-style-type: none"> > Include in the Operational Environmental and Social Management Plan (OESMP) and implement the following measures: <ul style="list-style-type: none"> > maintenance and clean up the drainage system to prevent impact on erosive sliding of the soil or flooding, > monitoring of slopes, in particular after strong rains for identification of possible traces of erosion, > implementation of mitigation measures defined for works during road repair/maintenance works, 	JPAC Management and Maintenance Department as well as selected Contractors for operation and maintenance activities	Monitoring of adherence to measures.	No records on land contamination.

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > analysis of soil for identification of the impact caused by ice breaking salt with subsequent organic amendment and/or amendments to adjust pH or nutrient deficiencies. > Implement the same measures as under <i>Surface Water</i>. 			

19.9 Landscape

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Landscape						
19.9.1	Construction	Changes to the existing landscape and visual impacts due to the construction works	<ul style="list-style-type: none"> > In the Construction Environmental and Social Management Plan (CESMP) include a Land and Habitat Restoration Plan. The Plan sets out how a development will maintain the retained landscape and existing ecology of the site. It should include actions to ensure the designed landscape fulfils its roles, including providing habitats and recreational space. The Plan shall contain: <ul style="list-style-type: none"> > Overall vision for the habitat adjacent to the motorway, > Management responsibilities, 	JPAC and Contractor	Engineer supervision.	<p>Completion of weekly inspections.</p> <p>No community grievances raised relating to visual impacts due to the construction works.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Identification and description of landscape components, including existing and proposed vegetation, > Litter removal. > Implement measures relating to the proper organisation of construction site defined in Construction Site Organisation Plan (CSOP). Mitigation can be achieved by keeping the construction site cleaned after the construction works, if the machinery is parked on the route of motorway, not around it. > Disposal of inert material on designated disposal sites and recultivation afterward. > Recultivation with autochthonous species characteristic for the area in order to preserve gene pool and amenity. > Implement recultivation and restoration as stipulated by Biodiversity Management Plan (BMP) and where possible reforest land within the Project area of influence. > All planting will be of local provenance and in keeping with the local character. > During the construction phase of the works, restricted hours of working will be proposed within built up areas, where the construction phase of the works is considered to impact on residential properties, avoiding the of use of machinery during those hours when 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>residents are most likely to be at home, thus reducing the potential of visual disturbance within view.</p> <ul style="list-style-type: none"> > Upon completion, areas used as construction compounds will be returned to their original use and state. 			
19.9.2	Operational	Changes to the existing landscape and visual impacts due to the presence of permanent motorway structures	<ul style="list-style-type: none"> > N/A (There is no applicable measure because permanent change is due to the fact that the motorway is a linear structure that remains permanently in space) 	N/A	N/A	N/A

19.10 Waste and Materials Management

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Waste and materials management						
19.10.1	Construction	Contamination of environment due to inappropriate management of spoil and other types of waste generated in construction	<ul style="list-style-type: none"> > Seek to maximise reuse or recovery of waste arisings on-site. This may include generation of hardcore material from excavated foundations, reuse of earthworks, recycling of other removed or demolished features. > Separation of materials and substances, including construction materials products, which are not waste (e.g., excess material at construction or reconstruction of a building or separated substance or 	Contractor	<p>Engineering supervision of construction works.</p> <p>Supervision by environmental inspection authorities.</p> <p>Keeping record on waste types and quantities.</p>	<p>Engineering supervision reports.</p> <p>Contract with waste collection companies' and proofs of waste transfer.</p> <p>Complaints Log containing no entries on poor waste management.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>materials or building products such as brick or a tile from a building that is being removed or reconstructed), if they can be used without processing for the same purpose in which they were produced.</p> <ul style="list-style-type: none"> > If the excavated material is not contaminated with hazardous substances in such a way that it is classified as hazardous construction waste, the investor can reuse it on the construction site. > Prevent the mixing of certain types of dangerous of construction waste with other waste or substances and materials that are not waste. > Prevent the release of asbestos fibres into the air from asbestos waste and spills of liquid waste which may contain asbestos when asbestos waste is present in construction. > The reprocessing of asbestos into recycled materials is not allowed, as it is not permitted to use it again as a raw material or substance. > The investor and/or Contractor must provide information on the quantity and composition of excavated materials from the construction site, as well as details about excavation methods and testing procedures in accordance with waste management regulations, EPRD PRs, and EIB standards. This data must be 		Keeping waste shipment documentation.	No negative inspection reports.

OFFICIAL USE

88

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>recorded in mandatory documentation at the construction site and utilised in the preparation of a report on construction waste and waste management. The report should be kept for at least three years after obtaining authorisation for use and made available to competent inspectors upon request.</p> <ul style="list-style-type: none"> > Cut trees and stumps should be disposed of along the route in places accessible for the trees to be removed by the competent authorities and where it will not disturb the works. The Contractor will temporarily place this waste at a sufficient distance from the watercourse. These activities will be performed by the competent (local) forestry authority > Develop and implement Detailed Construction Waste Management Plan (DCWMP) based on the Preliminary Construction Waste Management Plan. DCWMP is to be developed prior to construction in accordance with the principles of Law on Waste Management, EBRD PRs and EIB standards, with special emphasis on management of hazardous waste and demolition waste from expropriated facilities. The DCWMP should be developed taking in consideration procedures related to waste management. The DCWMP shall include measures for: 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > on-site separation and selection of different types of waste, > proper temporary storage of waste (adequate storage of different types of both hazardous and non-hazardous waste), > site selection and site management of temporary storage of waste must be carried out in accordance with the EBRD PRs and EIB standards, > final disposal of hazardous waste should be conducted by engagement of authorised third parties, > special emphasis is placed on adequate treatment and disposal of asbestos waste, > the authorised company is obliged to keep a proper record of the generated asbestos waste, and waste streams, and to keep and provide record of how and where the waste has been disposed. <ul style="list-style-type: none"> > The DCWMP should be implemented in conjunction with a Topsoil Management Plan (TSP) and a Biodiversity Management Plan (BMP). > Where on-site reuse (or other forms of recovery) cannot be achieved, the arisings should be sent to licenced off-site 			

OFFICIAL USE

90

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>reuse, recycling, or recovery facilities. If it is not possible to use the materials off site, then they should be temporarily stored on site, in locations approved by the relevant authorities and in line with provisions of EBRD PRs and EIB standards.</p> <ul style="list-style-type: none"> > JPAC is obligated to engage authorised companies for waste management, and also to verify the validity of their permits. Additionally, JPAC must conduct a thorough review to ensure that their practices align with international best practices, EBRD PRs and EIB standards. > Ensure appropriate number of containers and bins in all areas of the construction site. > Educating workers and employees about the waste generated and its management in accordance with the adopted procedures at the site. > The contractor will be required to define the disposal and generation of waste. > Introduce the principle of waste reduction and recycling. > Daily collection and temporary storage of hazardous and non-hazardous waste. > Municipal waste shall be collected by a local utility company. 			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Hazardous waste shall be collected and treated by a licensed waste operator. > Hazardous waste before it is handed over to an authorised person must be packaged and stored in such a way as to prevent any contact of waste with the environment. > Segregate waste streams to prevent cross contamination and maximise recovery. > If waste for which the contents are unknown is stored, measures should be taken that include testing and analysis to examine the characteristics of the waste. Until its characteristics are determined, this waste is considered hazardous. > Liquid waste and wastewater must not be discharged into drains or sewers. > Avoid blowing, spilling, or dropping waste outside the construction site into the environment. > Prevent the outflow of rainwater that has come into contact with hazardous waste on the ground, in water, and underground water. > Prevent liquid waste from flowing onto the ground, into water, and underground water. 			

OFFICIAL USE

92

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.10.2	Construction	Environmental damage caused by improper materials/chemicals management	<ul style="list-style-type: none"> > It is necessary to arrange and to plan the transport and unloading of different materials, such as: <ul style="list-style-type: none"> > Materials will be brought by dump trucks or tippers. > Machines for spreading, planning and compaction of imported excavated material should be provided at the sites. > Material compaction will be done in layers with vibro rollers. > Filling of the material should be done up to the projected slopes, while respecting the projected slopes which will ensure the drainage of the landfill surfaces. > When excavation works are done, the sites will be flattened and closed. > During transport, trucks should be covered with a tarpaulin, and the wheels should be washed before using the main road. > To minimise the effect of construction traffic on the City of Konjic, Viaducts No. 3 and No. 4 shall be prioritised in the tender documentation to be built first. > Tunnels T1 and T2 north of the Neretva River shall also be prioritised in the tender documentation for construction to 	Contractor	<p>Engineering supervision of construction works.</p> <p>Keeping records on (i) licenses and permits of suppliers or vendors, (ii) material resources tracking, treatment, disposal, and delivery notes records, and (iii) records of any contingency arrangement for material resources and waste arisings.</p>	<p>Engineering supervision reports.</p> <p>Complaints Log containing no entries on poor material management.</p> <p>No negative inspection reports.</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>aid in the transportation of surplus material.</p> <ul style="list-style-type: none"> > Contractor must avoid traffic of the trucks with construction material crossing Konjic. Particular constrains are to be arranged between JPAC, Constructor and the City of Konjic. > Programming/procurement of the construction works for Prenj Tunnel needs to be considered in a way to allow for complete reuse of the excavated material from the tunnel in the embankments for the northern motorway subsection. JPAC has to define the scope of activities in the tender documentation for the construction of Prenj Tunnel. > Ensure that the specification of recycled and secondary content in imported materials (such as earthwork, stone and aggregate, cement, and asphalt), is set out during detailed design. > A Materials Management Plan (MMP) shall be developed by the appointed contractor and will include details on how the site construction materials would be managed. The Plan shall include planning and controlling of all materials and equipment in advance, procuring them at a reasonable cost, storing them adequately and making them available as needed. The Plan shall be based on best 			

OFFICIAL USE

94

COWI | IPF

INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>practices and all the requirements of this ESIA such as:</p> <ul style="list-style-type: none"> > capturing project requirements early in the process, including a written scope of requirements that identifies deliverables, equipment and materials needed, > involving construction team early in the process for effective material management in construction, especially during the design phase, > evaluating proposals from suppliers or vendors based on their performances on past and present projects, > adequate storage planning where each material requisition is planned with a level of storage and preservation based on the equipment type and manufacturers' preservation requirements. Specific storage measures should be planned for chemicals/hazardous materials. > materials on-site quality assurance and quality control > keeping records of: (i) licenses and permits of suppliers or vendors, (ii) material resources tracking, treatment, disposal, and 			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			delivery notes records, and (iii) records of any contingency arrangement for material resources and waste arisings that had to be implemented will also be detailed.			
19.10.3	Construction	Environmental damage caused by opening of borrow pits	<p>In case the Contractor decide to open the borrow pits instead of material purchase, the following measures shall be implemented:</p> <ul style="list-style-type: none"> > Develop and implement a Borrow Management Plan, which should include locations of proposed extraction sites, plan for access, dust management on access roads, stockpile locations and management, and plan for rehabilitation of sites, commitments to obtain all regulatory approvals following approval from JPAC. > Materials shall not be borrowed from the Neretva River. The Contractor is not permitted to open new extraction pits within this river basin. > Borrow pits may not be opened in protected areas in line with the national and EBRD and EIB requirements. > Before putting in operation a borrow pit, all necessary water related, and construction related permits must be obtained. > If Contractor decides to purchase construction materials from the market, it 	Contractor	<p>Engineering supervision of construction works.</p> <p>Keeping record on material purchase.</p> <p>Implementation of measures from the permits.</p>	<p>Engineering supervision reports.</p> <p>No complaints received.</p> <p>Copies of permits.</p> <p>Copies of the purchase documentation.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>is allowed to subcontract only licenced material providers that have valid water management and working permits.</p> <p>> Constraints concerning eventual itineraries through the City of Konjic must be discussed and agreed between JPAC, Contractor and the City of Konjic.</p>			
19.10.4	Construction	Environmental damage caused by inadequate management of disposal sites	<p>> Excavated material that will not be used in construction activities must be deposited outside the water pollution risk zones, as stipulated in the Preliminary Water Consent.</p> <p>> The disposal of excavation material must not be carried out along the banks of watercourses, in sanitary protection zones, or in water resources, as specified in the Preliminary Water Consent.</p> <p>> After the formation of the disposal areas, it is necessary to carry out humification in a layer of 20 cm. To carry out this process, the humus that has been removed from the site will be utilised together with fresh humus, if needed.</p> <p>> Peripheral ditches shall be constructed along the perimeter of the disposal sites to collect rainwater from external sources and the closed section of the sites, directing it towards the nearest recipient. On the opposite side, the planned ditch runs alongside the sites and connects to the existing road's drainage ditch, leading to the recipient. In areas where the</p>	Contractor	<p>Engineering supervision of construction works.</p> <p>Supervision by environmental inspection authorities.</p>	<p>Engineering supervision reports.</p> <p>Complaints Log containing no entries on poor disposal management.</p> <p>No negative inspection reports.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>ditch's slope exceeds 4%, concrete elements must be used to line the ditch.</p> <ul style="list-style-type: none"> > Areas of the landfill closing plateau have to be projected horizontally. The slope of the scarp between the two layers shall be given in a slope of 1:2 so that the scarp of each subsequent surface is pulled by 2.00 m towards the middle of the landfill. > Specific studies shall be undertaken to ensure integration within the surrounding environment. 			
19.10.5	Operation	Effects of inappropriate waste generation and disposal during operation and maintenance activities	<p>Operation</p> <ul style="list-style-type: none"> > waste bins for separate waste collection at rest areas and toll stations will be provided, > waste will be transferred to licenced operators for waste management for final treatment/disposal. <p>Maintenance</p> <ul style="list-style-type: none"> > The same measures as under the construction phase (19.10.1-19.10.3), as applicable. 	<p>JPAC for operation Contractor for maintenance</p>	<p>Supervision by JPAC's Senior Associate for Environmental Policy. Keeping waste shipment documentation. Engineering supervision of maintenance works.</p>	<p>Contract with waste collection companies and proofs of waste transfer. No negative inspection reports.</p>

19.11 Community Impacts

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Community health and safety						
19.11.1	Design Pre- construction Construction	Community health and safety Impact on vulnerable groups	<ul style="list-style-type: none"> > In the final design stage, organise consultations with City level authorities and LCOs on all issues of significance for the communities, including but not limited to the issues of planned disposal sites for construction waste, planned new local roads and underpasses/overpasses (considerations of sufficiency, dimensions and safety) with the aim of clearly presenting all planned additional infrastructure, hear the views of local residents in relation to access to their land and make changes, as far as practicable,, to accommodate their needs. > In the pre-construction phase, ensure the approvals and permits from all relevant authorities and, if necessary, install barriers for the safety of traffic participants. > During the construction phase, JPAC and the Contractors to organise at least one public consultation meeting for each subsection (in Mostar or in Konjic – whichever is closer to the subsection) to present the Project progress and receive feedback regarding the impacts of construction works. 	JPAC	Consultation reports	Consultation meetings organised and documented

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Include in CESMP provisions on workers accommodation (camps) in accordance with PR provisions and the EBRD/IFC Guidance Note "Workers' accommodation: processes and standards" 2009 referred to in PR 2, including the requirements for developing disease prevention measures by the Contractor, including communicable diseases and Sexually Transmitted Diseases (STD) - or Sexually Transmitted Infections (STI), as well as with EBRD Briefing Note on Workplace Risk Assessment > Ensure that medical staff, first aid facilities, sick bay and ambulance services are available at all times at the site and at any accommodation (camps) for Contractor's personnel and ensure that all suitable arrangements are made in line with necessary welfare and hygiene requirements enabling prevention of epidemics. > Throughout contract implementation: <ul style="list-style-type: none"> > provide education/awareness raising activities in the form of online presentations and brochures for communicable diseases and STDs, STI and HIV/AIDS on screening, diagnosis, counselling > provide education/awareness raising activities in the form of 	JPAC to include in the Contractual Agreement	Supervising engineer to randomly check at least once per week during construction activities	<p>Workers' accommodation provisions included in CESMP.</p> <p>Provisions implemented during construction works.</p> <p>Periodic checks including site visits and reports on contractors performed.</p> <p>Training and campaigns on workers' code of conduct, STDs, STI and HIV/AIDS, COVID-19 performed.</p> <p>Construction Workers' Code of Conduct and Construction Labour and Employment Plan developed and implemented.</p>

OFFICIAL USE

COWI | IPF

100 INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>online presentations or brochures for the workforce about refraining from unacceptable conduct toward local community members, specifically women, and inform workers about local laws that make sexual harassment and gender-based violence and harassment a punishable offence which is prosecuted,</p> <ul style="list-style-type: none"> > cooperate with law enforcement agencies as needed in investigating complaints about gender-based violence and harassment. > during construction works create safe crossing points, provision of flagmen and site security to ensure that interaction between construction workers and all project vehicles and equipment, and the public, are limited. > Develop a Construction Workers' Code of Conduct, which will be clearly displayed at different Project areas and posted in the Contractors' vehicles and machinery driving cabs. Contractors' and subcontractors' personnel will be made aware of and acknowledge their understanding of the Code of Conduct by initialling it prior to the start of any physical work at any Project Area. <p>Compliance with the Code of Conduct shall</p>			

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>be a condition in all workers' employment contracts. The Code of Conduct will include provisions intended to combat gender-based violence and harassment. It will include a list of acts considered as requiring a disciplinary procedure by the Contractors, or by the Supervision Engineer if the Contractors is not acting in due course. The Contractors will conduct Information, Education and Communication (IEC) campaigns on workers' code of conduct vis-a-vis the local community, at least every other month, addressed to all the site staff and workers (including all the Contractor's employees, all Subcontractors and any other Contractor's or Employer's personnel, and all truck drivers and crew making deliveries to site for construction activities)</p> <p>> Develop and implement a Construction Labour and Employment Plan which will include:</p> <ul style="list-style-type: none"> > Details of: (i) employment opportunities for locals; (ii) how employment opportunities will be advertised; (iii) the recruitment process which will be transparent and fair, non-discriminatory and provides equal opportunities for both men and women; (iv) the training opportunities which will be provided for graduates and 			

OFFICIAL USE

COWI | IPF

102 INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>employees on technical, health and safety and manual work where suitable.</p> <ul style="list-style-type: none"> > A requirement that all workers (including sub-contractors) have employment contracts and that these contracts are in line with national legislation, applicable ILO standards and PR2; > A requirement that all workers have access to human resources policy and procedures; > A requirement that all workers (including sub-contractors) must comply with Compliance with the Construction Workers' Code of Conduct (this will be included in the employment contracts); <p>Details of the grievance mechanism for all workers (including sub-contractors) in line with Lenders' requirements.</p>			
			<ul style="list-style-type: none"> > Develop and implement an Emergency Preparedness and Response Plan for construction (EPRP) (as part of the CESMP) to identify and address all major hazards for workers and the local community during the motorway construction. > Prevent unauthorised access of the public to construction sites and contact with 	<p>JPAC to include in the Contractual Agreement</p>	<p>JPAC to review Contractor's EPRP to ensure continuity with commitment in this ESMP.</p> <p>Supervising engineer to randomly check at least once per week</p>	<p>EPRP for construction developed and implemented.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			dangerous locations and equipment and hazardous materials by establishing a fenced safety zone around the facilities during construction of Project infrastructure.		during construction activities.	
			<ul style="list-style-type: none"> > Develop and implement a Traffic Management Plan (TMP) for the construction phase (as part of the CESMP) containing traffic organisation measures. 	JPAC to include in the Contractual Agreement	<p>Supervising engineer to randomly check at least once per week during construction activities.</p>	<p>TMP for construction developed and implemented.</p> <p>TMP implemented throughout construction phase.</p>
			<ul style="list-style-type: none"> > Implement SEP, in particular the provisions on providing timely information to local communities on the extent of works and duration prior to the commencement of construction works, as well as information on access to land on the other side of the motorway and the contact details of the Contractors for any grievances. > Carry out a detailed pre- and post-construction condition assessment and crack survey for any existing structures (residential, cultural/religious or commercial assets) in a distance up to 40m from construction works (see 19.7 <i>Vibrations above</i>). > Place a panel with all relevant data about the construction (names of investor, contractor and designer; name and type of structure; time of commencement and 	JPAC to include in the Contractual Agreement	<p>Development of quarterly monitoring reports on SEP implementation.</p> <p>Monthly review of external grievances.</p>	<p>Reports on SEP implementation developed and submitted to EBRD (containing indicators on stakeholder engagement).</p> <p>Project-specific grievance mechanism in place</p> <p>Grievance Registry established and all received grievances recorded in the Registry.</p> <p>A panel with all relevant data about the construction</p>

OFFICIAL USE

COWI | IPF

104 INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			completion of construction works). Panel to include information regarding contact details for environment, safety, and community matters.			placed near the construction site.
19.11.2	Operation	Community health and safety	<ul style="list-style-type: none"> > Develop and implement an Emergency Preparedness and Response Plan (EPRP) for operation (as part of the OESMP) to identify and address all major hazards for workers and the local community during the motorway operation. > Develop and implement a TMP for the operation phase (as part of the OESMP) to identify and address all major hazards for workers and the local community during the motorway operation. The Plan should also include details on safety and stakeholder engagement measures relating to road safety to be applied. > 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. 	JPAC	JPAC	<p>EPRP and TMP (as part of the OESMP) developed and implemented.</p> <p>Reports on SEP implementation developed and submitted to EBRD (containing indicators on stakeholder engagement).</p> <p>Project-specific grievance mechanism in place.</p> <p>Grievance Registry established and all</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
						received grievances recorded in the Registry.

19.12 Disruption to Public Utility Services (Electricity, Water, Sewage, Telecommunication)

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Disruption to public utility services (electricity, water, sewage, telecommunication)						
19.12.1	Construction	<p>Disruptions to public utility services (electricity, water, sewage, telecommunication)</p> <p>Impact on vulnerable groups</p>	<ul style="list-style-type: none"> > Implement mitigation measures for identified collision points contained in the preliminary consents from competent authorities and public utility companies, responsible for transport/transmission, communications and infrastructure (such as additional construction activities for collision resolution). > Ensure emergency and prompt reaction in case of disruption. <ul style="list-style-type: none"> > Implement SEP, in particular provisions on providing timely information to local communities (both residents and private commercial facilities) on planned cuts in public utility services and contact points in case of accidental disconnections, and (ii) provisions on regular communication with utility companies regarding ground disturbance works near public utility 	<p>Contractor</p>	<p>Supervising engineer to randomly check at least once per week during construction activities.</p>	<p>Implemented all mitigation measures for identified collision points contained in approvals from competent authorities and public utility companies, responsible for transport, communications, and infrastructure.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			installations to reduce the risk of accidental disconnections and to ensure any issues are flagged with these utility companies.			Project-specific grievance mechanism in place. Grievance Registry established and all received grievances recorded in the Registry.

19.13 Impacts on water

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Impacts on water						
19.13.1	Pre- construction	Impact on groundwater quality and water supply Impact on vulnerable groups	> Implement all appropriate engineering measures as described in detail in <i>Chapter. 7 Geology and groundwater</i> to prevent cutting off underground streams and contamination of groundwater, as well as ensuring the Project does not impact the supply of drinking water in any village.	Contractor	Supervising engineer to randomly check at least once per week during construction activities.	Implemented all mitigation measures for identified collision points contained in approvals from competent authorities and public utility companies, responsible for transport, communications, and infrastructure. In case of disruption, emergency and

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > 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. 	JPAC in cooperation with Contractor	<p>Development of quarterly monitoring reports on SEP implementation.</p> <p>Monthly review of external grievances.</p>	<p>prompt reaction ensured.</p> <p>Reports on SEP implementation developed and submitted to EBRD (containing indicators on stakeholder engagement).</p> <p>Project-specific grievance mechanism in place.</p> <p>Grievance Registry established and all received grievances recorded in the Registry.</p>

19.14 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Land acquisition, restrictions on land use and involuntary resettlement						
19.14.1	Pre-construction	Land acquisition, restrictions on land use	<ul style="list-style-type: none"> > Develop and implement the LARPs for the subsections: Konjic (Ovcari)-Prenj Tunnel, for the Prenj Tunnel itself, for Prenj Tunnel-Mostar North and for the 	JPAC	Biannual reports on the progress achieved with the	LARPs developed and submitted to EBRD and EIB.

OFFICIAL USE

COWI | IPF

108 INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
	Construction	and involuntary resettlement Temporary occupation of private land and temporary losses of business income, loss of wages (of hired labor/employees) during construction works Impact on vulnerable groups	<p>Konjic Bypass, in line with the developed LARF. Given the low levels of income and other vulnerabilities of the households living or owning land in the Project area, it will be necessary for JPAC to take this into account during the development of the LARPs, provision of direct support to vulnerable households, and the implementation of the land acquisition process, and ensure transparency and measures to improve the livelihoods and standards of living of affected persons.</p> <ul style="list-style-type: none"> > Develop and implement site-specific LARP in line with the developed LARF, if privately owned, used or occupied land take is required for construction of new local roads. > Set up and implement a Project-specific grievance mechanism as elaborated in LARF/LARPs and SEP. 		implementation of the LARPs. Development of quarterly monitoring reports on SEP implementation. Report on LARP and SEP implementation in AESR to EBRD and EIB. Monthly review of external grievances.	Reports on LARP and SEP implementation developed and submitted to EBRD and EIB (containing indicators on land acquisition and physical displacement, and stakeholder engagement). Project-specific grievance mechanism in place. Grievance Registry established and all received grievances recorded in the Registry.
			> Develop and implement a Traffic Management Plan (TMP) for the construction phase (as part of the CESMP) containing traffic measures. The TMP will need to consider phasing off the works to ensure local access is retained, as access restrictions may cause temporary losses of business income during construction works.	Contractor	JPAC to review Contractor's TMP to ensure continuity with commitment in this ESMP. Supervising engineer to random check at least once per week during construction activities.	Documented TMP (as part of CESMP). TMP implemented throughout construction phase. Log of complaints relating to access restrictions.

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<ul style="list-style-type: none"> > Implement the Detailed Construction Waste Management Plan (DCWMP) and put in operation waste management procedures to avoid inappropriate deposition of construction waste in and around the construction site. 	Contractor	<p>Complaints relating to access restrictions.</p> <p>Supervising engineer to random check at least once per week during construction activities.</p>	<p>DCWMP implemented throughout construction phase.</p> <p>Log of complaints relating to inappropriate deposition of construction waste.</p>
			<ul style="list-style-type: none"> > Ensure the LARPs development and implementation focus on vulnerable groups (such as low-income households, marginalised communities, and war returnees) by conducting in-depth vulnerability assessments to identify those most affected by the project. > Create tailored mitigation measures through LARPs for each identified vulnerable group, addressing their unique needs and challenges. > In LARPs foreseen clear and transparent communication channels for vulnerable groups to actively participate in the process, ensuring their voices are heard, and their concerns are addressed in planning and compensation schemes. 	JPAC	<p>Biannual reports on the progress achieved with the implementation of the LARPs.</p> <p>Report on LARP implementation in AESR to EBRD and EIB.</p>	<p>LARPs developed and submitted to EBRD and EIB.</p> <p>Reports on LARPs implementation developed and submitted to EBRD and EIB (containing indicators on land acquisition and physical displacement).</p>

19.15 Road Damage and Impacts on Local Traffic

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Road damage and impacts on local traffic						
19.15.1	Construction	Local road damages Traffic congestions Access restrictions Impact on vulnerable groups	<ul style="list-style-type: none"> > Implement SEP, in particular the provisions on providing timely information to local communities about the Project, risks and disturbances associated with the construction and operational phases, timing of any disruptions, and alternative access routes (with maps) during any periods of restricted access. > Provide information on alternative access roads as needed and informing relevant local communities about these options. > Organise consultations with City level authorities and LCOs on all issues of significance for the communities, including but not limited to the issues of planned disposal sites for construction waste, planned new local roads and underpasses/overpasses (considerations of sufficiency, dimensions and safety) with the aim of clearly presenting all planned additional infrastructure, hear the views of local residents in relation to access to their land and make changes, as far as practicable, to accommodate their needs. <ul style="list-style-type: none"> > Develop and implement a TMP for construction phase (as part of the 	JPAC	Development of quarterly monitoring reports on SEP implementation. Monthly review of external grievances.	Reports on SEP implementation developed and submitted to EBRD (containing indicators on stakeholder engagement). Project-specific grievance mechanism in place. Grievance Registry established and all received grievances recorded in the Registry.

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>CESMP) containing traffic management measures. The TMP will need to consider phasing off the works to ensure local access is retained, including public transport.</p> <ul style="list-style-type: none"> > Prior to construction works, document the status of all local roads which will be used by the Contractors during construction works. All local roads used for purpose of construction machines and vehicles movement should be fully restored to at least pre-project state, prior to demobilisation of construction teams if traffic during the construction phase caused any damage. > Construct new local roads to enable local inhabitants to reach their land plots and other locations in case local roads are interrupted by the motorway section. If no state-owned land free from private users is available for construction of these new roads, prepare site-specific LARPs in line with the developed LARF for any occupation of privately owned, used or occupied land take. 		<p>ensure continuity with commitment in this ESMP.</p> <p>Supervising engineer to random check at least once per week during construction activities.</p> <p>Complaints relating to road damages and traffic congestion.</p>	<p>TMP implemented throughout construction phase.</p> <p>Log of complaints relating to road damages and traffic congestion.</p>
				Contractor	<p>Supervising engineer to random check at least once per week during construction activities.</p>	<p>Local and main road restored to at least pre-project state.</p> <p>New local roads constructed.</p>

19.16 Health and Safety Risks for Workers; Labour and Employment

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Health and safety risks for workers, labour and employment						
19.16.1	Construction	Health and safety risks for workers	<ul style="list-style-type: none"> > Develop and implement an OHS Plan and Fire and Explosion Management Plan and implement specific OHS measures with special focus on (but not limited to): unexploded ordnances, installing safety fences and warning signs at all critical work areas (e.g. open trenches, excavations, material and equipment staging areas, etc.), movement of vehicles and traffic management, influx of workers into the local area including general measures, health surveillance, code of conduct of workers etc.; sufficient provision of medical care facilities and resources for workforce; working at heights, working in confined spaces, working with hazardous material (e.g. explosives); management of electrical hazards, prevention of unintended ground movements and collapse, and biological hazards (poisonous snakes). > Follow the FBiH legislation on labour and OHS, as well as PR 2 provision on grievance mechanism for workplace concerns. > Organise workers' camps in line with EBRD/IFC Guidance Note "Workers' accommodation: processes and standards" 2009. 	Contractor	<p>JPAC to review Contractor's CSOP to ensure continuity with commitment in this ESMP.</p> <p>Supervising engineer to random check at least once per week during construction activities.</p>	<p>Fire and Explosion Management Plan and OHS Plan (developed and implemented).</p> <p>Provisions on applying the relevant requirements of FBiH legislation and PR2 incorporated into contracts with Contractor.</p> <p>OHS statistics reported monthly.</p>

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.16.2	Construction	Labour and employment	<ul style="list-style-type: none"> > Require the contractor and subcontractors to develop and implement a comprehensive Labour Management Plan (LMP) prior to the start of construction. The LMP should include: <ul style="list-style-type: none"> > Adherence to the Labour Law of FBiH and Lenders' requirements > A requirement that all workers have access to human resources policy and procedures > A requirement that all workers (including sub-contractors) must comply with the Construction Workers' Code of Conduct (this will be included in the employment contracts) > Provisions for fair recruitment, employment contracts, wages, working hours, and grievance mechanisms > Measures to prevent discrimination, child labour, forced labour and other labour rights violations > Specific protocols for the inclusion and protection of foreign workers, ensuring compliance with BiH's Law on Foreigners for work permits and residence permits > Details of the grievance mechanism for all workers (including sub-contractors) in line with EBRD and EIB requirements, to address and resolve complaints confidentially and promptly, ensuring accessibility to all workers, including foreign employees 	Contractor (and subcontractors)	JPAC to review Contractor's LMP to ensure continuity with commitment in this ESMP.	<p>LMP developed and implemented.</p> <p>Supervision Engineer to report compliance with labour standards monthly.</p>

OFFICIAL USE

COWI | IPF

114 INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.16.3.	Construction	Labour and employment	<ul style="list-style-type: none"> > Mandate that all employment contracts are provided in workers' native languages and English, clearly outlining terms of employment, wages, working hours, and grievance procedures. > Require Supervision Engineers to regularly monitor the contractor's and subcontractors' compliance with labour standards, including: <ul style="list-style-type: none"> > Verification of employment contracts and payroll records. > Inspections to ensure safe and fair working conditions. > Oversight of working hours and rest periods to prevent excessive work hours. 	Contractor	Supervising engineer to regularly monitor contractor and subcontractor's compliance with labour standards	<p>Deliver copies of contracts to Supervising Engineer who will confirm in written that contracts are in worker's native languages and English, with clear indications.</p> <p>Supervision Engineer to report compliance with labour standards monthly.</p>
19.16.4.	Construction	Labour and employment	<ul style="list-style-type: none"> > Require the contractor to enhance local employment opportunities by prioritising hiring from local communities for general labour roles; include in tender requirements a clear plan for local recruitment and workforce integration. Mandate the contractor to implement training and upskilling programs for local workers. Encourage contractors to source materials, transport services and other construction-related needs from local businesses. 	Contractor	Supervising Engineer to monitor the enhancement of local employment opportunities and implementation of trainings and upskilling programs for local workers.	<p>Tender requirements include sections on local recruitment</p> <p>Trainings for workers organised.</p>

OFFICIAL USE

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.16.5	Operation	Health and safety risks for workers	<ul style="list-style-type: none"> > Include in OESMP specific health and safety requirements for road maintenance. It should include (but not be limited to): hazardous materials management, traffic accidents, traffic management, working at heights, working in confined spaces, electrical hazards, etc. 	JPAC or subcontractor (if engaged)	JPAC to review contractual conditions of all subcontractors to ensure continuity with commitment in this ESMP.	OESMP containing specific health and safety requirements developed and implemented. OHS statistics reported monthly.

19.17 Cultural, historical, and archaeological heritage

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Cultural, historical, and archaeological heritage						
19.17.1	Pre-construction Construction Operation	Damage to visible and buried cultural, historical, and archaeological heritage	<ul style="list-style-type: none"> > Submit the requests for obtaining prior consents on the Preliminary Designs from Federal Institute for Protection of Monuments. > Include in the Main Design all the measures as instructed by the Institute and undertake any preventive archaeological surveys as required by the Federal Institute for Protection of Monuments and notify the Institute of survey results. > Ensure the presence of an archaeologist in the pre-construction phase in the area of the settlement Kuti (Kutilivac), where earlier research has indicated the 	JPAC	Record of (any) use of chance finds procedure.	Preventive archaeological surveys conducted as required by the competent authorities CESMP includes measures for protection of cultural heritage Chance Find Procedure developed and shared with EBRD and Contractor.

OFFICIAL USE

COWI | IPF

116 INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>presence of a larger necropolis with approximately 27 medieval tombstones (stecak) near the old Orthodox cemetery in Kuti. This is to ensure proper field research before the commencement of construction work.</p> <ul style="list-style-type: none"> > Communicate with the Konjic Parish and Islamic Community through individual meetings about the Project, risks and disturbances associated with the construction and operational phases, timing of any disruptions, and alternative access routes (with maps) during any periods of restricted access > Ensure alternative access to the mosque and Orthodox cemetery in the Donje Selo settlement, Orthodox cemetery in the Mladesković settlement and the Muslim cemetery in the Kutilivac settlement in case of any access restrictions. > Post community grievance mechanism information on the entrances to the mosque and cemeteries as well as construction sites. > Post info-panels placed on construction sites and places of worship. > Ensure that the Contractor develops a Chance Find Procedure and trains relevant staff and in its requirements prior to any site preparation and 			

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
			<p>construction works. The provisions of the Chance Find Procedure need to include:</p> <ul style="list-style-type: none"> > Notification of relevant competent bodies of found objects/sites; > Alerting project personnel to the possibility of chance finds being discovered; > Fencing off the area of finds to avoid any further disturbance or destruction. > Having a person responsible for cultural heritage available and present during land disturbance activities. > Implement SEP, in particular the provisions on ongoing consultations and engagement with affected stakeholders prior to, during and after works being conducted near sites of interest. 			

19.18 Danger from UXOs

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
Danger from UXOs						

OFFICIAL USE

COWI | IPF

118 INFRASTRUCTURE PROJECT FACILITY – TECHNICAL ASSISTANCE 8 (IPF8) – TA2018148 R0 IPA
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT – CHAPTER 18 ESMP

No.	Phase	Impact to be addressed	Management / Mitigation/ Enhancement	Responsibility	Monitoring	Key Performance Indicator (KPI)
19.18.1	Pre-construction	Danger from UXOs	In case of any mined areas, ensure demining before construction works in cooperation with BHMAC specialists	BHMAC	JPAC to obtain the approval/verification from BHMAC that the field does not have suspected areas and mine risks	Demining activities finalised Approval from BHMAC received
			> Arrange the execution of construction works only after JPAC receives approval/verification from BHMAC	Contractor	JPAC to submit a copy of the approval/verification that the field does not have suspected areas and mine risks to the Contractor	
19.18.2	Construction	Danger from UXOs	> Ensure that equipment operators receive training for identification of potential UXOs during construction works. Pay special attention during earth moving works and blasting works. In case of any doubt, stop the works and send a notification to BHMAC for consultations and further instructions	Contractor for construction / JPAC to include in the contractual agreement with the Contractor	Supervising engineer to check regularly	Works stopped in case of doubt related to potential UXOs presence on construction site and BHMAC notified