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Chapter 18 Residual Impacts

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Chapter 18 Residual Impacts

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18 Residual Impacts

Residual effects are impacts remaining after the implementation of all mitigation measures outlined in the ESMP and BMP. This Chapter of the ESIA predicts residual effects for each Project phase (pre-construction, construction, and operation).

The following table summarises the identified significant E&S impacts and their assessment after implementation of mitigation measures.

Table 18-1: Assessment of residual impacts

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Habitats					
Pre-construction	Adverse impacts due to inadequate planning of works and Main Design requirements	Major / Significant	19.1.1	If the Main Design is developed to include revitalization of habitats after the construction is finalized with planting autochthonous plant species characteristic for the area and prevent growing and spread of invasive species and if mitigation measures given in BMP are implemented, this impact will be fully mitigated.	No
Pre-construction	Lack of up-to-date baseline conditions	Major / Significant	19.1.2	The impact can be fully mitigated by conducting surveys as given in the ESMP and BMP.	No
Construction	Loss of habitats due to preparation of the construction site and performing construction works	Major / Significant	19.1.3	With implementation of the proposed measures, it is not possible to fully mitigate this measure. This impact is considered to be the project permanent impact. PBFs and CHs recorded in the Project area will likely be under adverse pressures of different nature. These pressures can be partly mitigated by the proposed measures; however, some of the features will be	Yes

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
				under direct and unavoidable impact due to their position in relation to the planned motorway route. This residual impact is not acceptable as is, and compensation will have to be included.	
Construction	Potential additional unplanned disturbance of habitats	Moderate / Significant	19.1.3	If the mitigation measures given in BMP are implemented, this impact will be fully mitigated.	No
Construction	Spread of invasive species	Moderate / Significant	19.1.4	The impact can be fully mitigated by conducting surveys as given in the ESMP and BMP.	
Operation	Habitat fragmentation	Moderate / Significant	19.1.5	With implementation of the proposed measures, it is not possible to fully mitigate this measure. This impact is considered to be the project permanent impact. Compensational measures will have to be implemented as given in the BMP.	Yes
Vegetation and flora					
Pre-construction	Adverse impacts due to inadequate planning of works	Moderate / Significant	19.1.6	If the Main Design is developed to include Invasive Species Management Plan to prevent growth and spread of invasive species and if mitigation measures given in BMP are implemented, this impact will be fully mitigated.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Pre-construction	Lack of up-to-date baseline conditions	Moderate / Significant	19.1.6	The requirements regarding updating baseline conditions are given in the BMP. If they are completed as required, the impact will be fully mitigated.	No
Construction	Vegetation removal and clearance of flora species in the phase of preparation of construction site and during the performance of construction works	Moderate / Significant	19.1.7	With implementation of the proposed measures, it is not possible to fully mitigate this measure. This impact is considered to be the project permanent impact. Due to this reason, the Project requires compensation as given in the BMP.	Yes
Fauna					
Pre-construction	Adverse impacts due to inadequate planning of works and Main Design requirements	Major / Significant	19.1.9	If the Main Design is developed to include protective bird panels and to avoid any possible roosts and hibernations sites, and if mitigation measures given in BMP are implemented, this impact will be fully mitigated	No
Pre-construction	Lack of up-to-date baseline conditions	Moderate / Significant	19.1.10	The requirements regarding updating baseline conditions are given in the BMP. If they are completed as required, the impact will be fully mitigated.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Construction	Disturbance of fauna	Moderate / Significant	19.1.11	This impact is temporary and might cause reversible change in fauna behaviour. If the mitigation measures given in BMP are implemented, this impact will be fully mitigated.	No
Construction	Potential disturbance of nests/roosts of species that have a seasonally variable vulnerability due to breeding, feeding times or seasonal migrations	Moderate / Significant	19.1.12	If the mitigation measures given in BMP are implemented, this impact will be fully mitigated.	No
Construction	Potential fatalities or injuries of fauna species due to vegetation removal and movement of heavy machinery	Moderate / Significant	19.1.13	If the mitigation measures given in BMP are implemented, this impact will be fully mitigated.	No
Operation	Habitat fragmentation	Moderate / Significant	19.1.14	Assuming successful implementation of mitigation measures, and maintenance of amphibian funnels and passages under the viaducts, this impact can be fully mitigated.	No
Groundwater					
Construction	Intrusion of groundwater in tunnel tubes during excavation that can impact stability of the structure and cause the safety risk	Moderate / Significant	19.2.2	With implementation of appropriate mitigation measures provided in the ESMP this impact will be fully mitigated.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Construction	Impact on the direction of ground flow and recharge by cutting the underground streams by tunnelling	Moderate / Significant	19.2.3	With appropriate mitigation measures provided in the ESMP this impact will be mitigated to a greater extent. Currently available research indicates that tunnelling should not cause permanent cutting of the underground streams and result in a residual impact, however temporary disruptions in the groundwater regime during tunnel drilling are possible.	No
Construction	Impact on groundwater quality due to: › direct release of intercepted tunnel drainage water without treatment › turbidity caused by erosion and excavation or blasting of the rock mass › accidental spills in vicinity of the springs	Moderate / Significant	19.2.4	With implementation of appropriate mitigation measures provided in the ESMP this impact will be fully mitigated.	No
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	Moderate / Significant	19.2.5	With implementation of appropriate mitigation measures provided in the ESMP this impact will be fully mitigated.	No
Surface water					

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Construction	Reduction in water quality of Tresanica, Neretva and Bijela due to direct release of pollutants generated in connection with construction actives	Moderate / Significant	19.3.1 19.3.2 19.3.4 19.3.5.	With development of the CSOP, RCMP, CESMP, DCWMP and implementation of all proposed measures, as stipulated by the ESMP, that also include good practice construction, these impacts will be fully mitigated. Additionally, with river training of Tresanica and Bijela impacts of construction works on the water quality and river ecology will be avoided.	No
Construction	Change in river flow and recharge by cutting or diverting permanent and intermittent streams around the motorway structures	Moderate / Significant	19.3.3	With measures to ensure hydraulic connectivity of surface streams stipulated in the ESMP, this impact will be fully mitigated.	No
Operation	Reduction in water quality in river system resulting from: › Direct release of intercepted surface run-off › Direct release of sanitary water from toll station › Accidental spill of hazardous material resulting from traffic accidents. › Use of de-icing agents	Moderate / Significant	19.3.6.	With proper number of oil separators installed to specifically cover the two viaducts over Tresanica and Neretva, and development of OESMP that include Emergency Preparedness and Response Plans and implementation of all measures as stipulated by the ESMP, these impacts will be fully mitigated	No
Climatic factors					

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Construction	Landslides and rock falls can endanger the stability of the terrain, with harmful consequences for water quality, people, and construction equipment	Moderate / Significant	19.4.1	With development of an EPRP and implementation of appropriate measures this impact may be prevented but not fully mitigated.	Yes
Construction	Fires can cause thick smog, dangerous to human health and the environment, due to greenhouse gas emissions.	Moderate / Significant	19.4.2	With development of an EPRP and implementation of proposed fire prevention and response actions this impact may be prevented but not fully mitigated.	Yes
Operation	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.	Moderate / Significant	19.4.3	With development and implementation of an EPRP and BMP, as well as regular inspection on the motorway route as specified in the mitigation measures, this impact can be prevented but not fully mitigated.	Yes
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 destabilize the movement of vehicles.	Moderate / Significant	19.4.4	With development of proposed mitigation measures, this impact can be fully prevented.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Operation	Fire smoke reduces the visibility and can cause physical damage to transport infrastructure, with traffic disruption or even death of road users	Moderate / Significant	19.4.5	With implementation of proposed fire prevention and response actions this impact may be prevented but not fully mitigated.	Yes
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	Moderate / Significant	19.4.6	With implementation of the proposed measures, it is not possible to fully mitigate this impact. This impact is considered to be the project life-long impact but its significance will decrease with continuous improvements on the car engine technology	Yes
Air quality					
Construction	Emissions of construction dust Emission of exhaust gases from combustion processes in generators and other construction equipment/ vehicles	Moderate / Significant	19.5.1 19.5.2	With development of CESMP that include mitigation measures for management of air quality, Topsoil Management Plan, Materials Management Plan, and implementation of all included measures, as stipulated by the ESMP, these impacts will be fully mitigated	No
Noise					
Construction	Impact on workers and residents from increased levels of noise during construction works	Moderate / Significant	19.6.3	With implementation of CESMP that includes proposed noise reduction measures from this ESMP, this impact can be fully mitigated.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Operation	Impact on residents from increased levels of noise from motorway traffic	Moderate / Significant	19.6.1 19.6.2 19.6.4	With appropriate modelling of noise propagation and installation of the noise barriers near settlements, this impact will be fully mitigated. Additional measures are also foreseen in case the traffic intensity would be higher than originally planned	No
Vibrations					
Construction	Structural damage from vibration caused by equipment and operation methods employed including use of explosives	Minor / Significant	19.7.1	If recommended safety distances for work with high vibration machines are respected and other proposed mitigation measures implemented, this impact can be fully mitigated.	No
Soil					
Construction	Occurrence of rockfall due to the nature of construction works Compaction and erosion as a result of using heavy machinery and equipment Deforestation may cause soil erosion Soil dewatering Direct discharge of wastewater from maintenance of construction vehicles at	Moderate / Significant	19.8.1 19.8.2 19.8.3 19.8.4 19.8.5	With development of CESMP that includes Topsoil Management Plan and Recultivation/Land Restoration Plan, and implementation of all included measures including those for spill management, water and waste management as stipulated by the ESMP, these impacts will be fully mitigated.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
	the site and sanitary waters from construction camp Inappropriate waste/spoil disposal				
Operation	Direct discharge of surface run-off Accidental fuel and oil spills Use of de-icing agents	Moderate / Significant	19.8.6	With development and implementation of OESMP that includes proposed measures and implementation of all measures, as stipulated by ESMP, that are proposed for waste and waste management, these impacts will be fully mitigated.	No
Landscape					
Construction	Changes to the existing landscape and visual impacts due to the construction works	Moderate / Significant	19.9.1	With implementation of the proposed measures relating to the proper organization of construction site and selection the location of the landfill that fits into the visual appearance of the environment, these impacts will be mitigated.	No
Operation	Changes to the existing landscape and visual impacts due to the presence of permanent motorway structures	Moderate / Significant	19.9.2	It is not possible to fully mitigate this measure. This impact is considered to be the project permanent impact.	Yes
Waste and materials management					

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Construction	Contamination of environment due to leakage and spillage of wastes associated with poor spoil and waste handling and storage/ disposal arrangements	Major / Significant	19.10.1	With full implementation of Detailed CWMP as stipulated by the ESMP, this impact will fully be mitigated.	No
	Environmental damage due to the opening of borrow pits	Major / Significant	19.10.3	Through implementing measures listed in ESMP that are consistent with Lenders E&S standards, obtaining all permits in line with the national permitting requirements or subcontracting the licenced material providers, whichever is appropriate, this impact will be fully mitigated.	No
Community impacts					
Pre-construction Construction	Community health and safety	Moderate / Significant	19.11.1	With implementation of the proposed measures to reduce the potential for impacts from worker influx such as awareness raising activities on communicable diseases and GBVH and implementation of provisions on workers' accommodation (camps) in accordance with PR provisions and the EBRD/IFC Guidance Note "Workers' accommodation: processes and standards" 2009, this impact will be fully mitigated.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
				In addition, this impact will be fully mitigated with the development and implementation of an Emergency Preparedness and Response Plan, Traffic Management Plan and Stakeholder Engagement Plan, through application of effective and efficient GRM[1], as well as providing regular information to the public 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.	
Disruption to public utility services (electricity, water, sewage, telecommunication)					
Construction	Disruptions to public utility services (electricity, water, sewage, telecommunication)	Moderate / Significant	19.12.1	This impact will be mitigated with the implementation of 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.	No
Impacts on water					

[1] GRM stands for Grievance Redress Mechanism

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Pre-construction and construction	Impact on groundwater quality and water supply	Moderate / Significant	19.13.1	This impact will be mitigated with the implementation of all appropriate engineering measures to prevent cutting off underground streams and contamination of groundwater, as well as enabling water supply to all communities at all times.	No
Land acquisition, restrictions on land use and involuntary resettlement					
Pre-construction Construction	Land acquisition, restrictions on land use and involuntary resettlement Temporary occupation of private land and temporary losses of business income, wages during construction works	Major / Significant	19.14.1	All eligible PAPs will be compensated as per the entitlement conditions stipulated under approved LARPs to be prepared for the sections Konjic (Ovcari)-Prenj Tunnel, for the Prenj Tunnel itself, for Prenj Tunnel-Mostar North and for Konjic Bypass. Vulnerable groups, in addition to compensation for project affected land, assets and income, will be provided with additional rehabilitation measures as per the needs identified during LARPs preparation and implementation periods. GRM will be in place during the entire project cycle to address any project related claims raised by PAPs and/or communities within project influence areas.	Yes
Road damage and impacts on local traffic					

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Construction	Local road damage Traffic congestions Access restrictions	Moderate / Significant	19.15.1	These impacts will be mitigated with the implementation of TMP which will consider phasing of the works to ensure local access is retained. In addition, existing local roads will be restored to at least pre-project state and new local roads will be constructed in case local roads are interrupted by the motorway section to enable local inhabitants to reach their land plots and other locations.	No
Health and safety risks for workers					
Construction/ Operation	Health and safety risks for workers	Moderate / Significant	19.16.1 19.11.1 19.6.1	Several mitigation measures including application of an effective and efficient GRM are proposed in the ESMP to mitigate any possible impact on workers' health and safety during construction phase. If all mitigation measures are implemented the residual impacts will be fully mitigated.	No
Cultural, historical, and archaeological heritage					
Pre-construction Construction	Damage to visible and buried cultural, historical, and archaeological heritage	Moderate / Significant	19.17.1	This impact will be mitigated with the implementation of measures listed in the ESMP and additionally as to be instructed by the Federal Institute for Protection of Monuments during the design stage.	No

Phase	Identified impact	Impacts evaluation/ significance before mitigation	Proposed mitigation measures	Assessment of impacts after mitigation	Residual impact after mitigation
Operation					
Danger from UXOs					
Pre-construction	Danger from UXOs	Moderate / Significant	19.18.1	Adequate mitigation measures are proposed in ESMP to mitigate any possible impact related to the danger from UXOs during pre-construction phase. It will be necessary to arrange the execution of construction works upon JPAC receives the approval/verification that the field does not have suspected areas and mine risks. Upon the completion of demining activities and obtaining the approval that the field does not have suspected areas and mine risks, the residual impacts of the pre-construction phase will be fully mitigated.	No
Construction	Danger from UXOs	Moderate / Significant	19.18.2	As for the construction phase, mitigation measures are proposed in ESMP for mitigate any possible impact related to the danger from UXOs during construction phase. Upon the implementation of such measures (such as, stopping works in case of any doubt regarding possible UXOs and notifying to BHMAC) the residual impacts of the Project construction phase will be fully mitigated.	No

Assessment of magnitude and acceptability of residual impacts which will remain after the mitigation are given in the table below.

Table 18-2: Assessment of magnitude and acceptability of post mitigation residual impacts

Post mitigation residual impacts	Magnitude	Acceptability/Comment
Habitat loss due to preparation of construction site and during the performance of construction works, fragmentation of habitats	Moderate	With implementation of the proposed mitigation measures it is not possible to fully mitigate this impact. This impact is considered to be the project permanent impact. Magnitude is considered to be moderate due to the size of the impacted area. Directly impacted habitats mainly include habitats under anthropogenic pressure. However, habitats that are PBFs and CHs are located within project's area of influence as provided in CHA. Some area of natural woodlands not meeting the criteria for PBFs of CH will be lost; however, afforestation of the same area will partly mitigate the loss of best-preserved natural habitats. Due to the EBRD NNL/NG requirements, compensation is necessary for this Project. The compensation guidelines are provided in the BMP.
Vegetation removal and clearance of flora species in the phase of preparation of construction site and during the performance of construction works	Minor	With implementation of the proposed mitigation measures it is not possible to fully mitigate this impact. It is considered to be an acceptable and minor impact due to mitigation and compensation measures significantly reducing the impact. This impact is considered to be the project unavoidable and permanent impact.
Impact of natural disasters including landslides, rock falling, draughts and fires on the motorway and the traffic	Moderate	Natural disasters cannot be avoided. With implementation of mitigation measures some degree of prevention can be achieved, while the level of preparedness and response can be increased. It is to be noted that the sensitivity of project area to landslides is low to moderate. The impact is considered to be moderate mainly due to increased risk of naturally occurring fires and draughts.
GHG emissions from vehicle transport	Low	With implementation of the proposed mitigation measures it is not possible to fully mitigate this impact. The increase in emissions from the operation phase is the result of the projected increase in traffic by 2060, as predicted by the Traffic Study. This impact is considered to be unavoidable and permanent impact.
Changes to the existing landscape and visual impacts due to the presence of permanent motorway structures	Moderate	With implementation of the proposed mitigation measures it is not possible to fully mitigate this impact. This impact is considered to be the project permanent impact. The magnitude is considered to be moderate due to the existence of permanent motorway structures constructed above the ground. This impact is considered to be the unavoidable and permanent impact.
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Moderate	Even with implementation of the mitigation measures proposed in the LARF (which will be further detailed in future LARPs), it is not possible to fully mitigate this impact. The magnitude after application of these measures is expected to be moderate considering that

Post mitigation residual impacts	Magnitude	Acceptability/Comment
		one of the key principles of LARF is that livelihoods, and standards of living of affected persons shall be improved or at least restored.