

APPENDIX 8: THE MAIN POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact	Mitigation measures
▪ BEFORE CONSTRUCTION	
<p>Risks for all environmental components, and:</p> <ul style="list-style-type: none"> ▪ cutting of all existing and established communications, ▪ demolition of structures and/or relocation of population; ▪ disruption of habitats and ecosystems, cutting of animal migration routes ▪ disrupting the harmony and integrity of the landscape 	<ul style="list-style-type: none"> ▪ Develop the project documentation in accordance legal regulations, environmental permit, and with observance of all specific features of the area. ▪ Develop appropriate operational emergency response plans for any accident situations and procure the necessary equipment. <hr/> <ul style="list-style-type: none"> ▪ Planning and establishing new communications structures for settlements where traditional ways of communication are disrupted by the motorway construction. ▪ Provide systematic and detailed information to the local population and interested public about the motorway route to make it possible for them to consider all dimensions of potential impacts and to participate in the decision-making process in a high-quality manner. Publicly announce daily traffic situation and provide information to the public on the scope and schedule of construction activities, expected difficulties and access restrictions. ▪ Prepare project documentation that will be the basis for implementing the expropriation process in accordance with the applicable legislation, and make timely payments of compensations in accordance with the national law; ▪ At a minimum, the drainage design shall provide a closed drainage system, with oil and grease separator, and, where necessary, further treatment of water to achieve the water quality in accordance with the regulations; ▪ On all locations where the route crosses watercourses, or is located near stream banks, as well as near water sanitary protection zones, thermal water sources or aquifers, it is mandatory to design traffic barriers or concrete blocks (New Jersey) to physically prevent vehicles from rolling off the motorway. ▪ As part of the Construction Site Organization Plan (CSOP), completely plan the construction site, places for disposal of construction and waste materials, parking places, fuel filling points, etc.; ▪ Finding a solution that will provide local population with access to plots and other areas located immediately next to the construction during construction of the motorway and support structures;

	<ul style="list-style-type: none"> ▪ The watercourse training project, which includes environmentally acceptable structures, that is, the criterion should be to avoid relocating the natural bed, or to design culverts through the motorway structures wherever conditions permit. Apply the principles of environmentally friendly practices when designing relocation of beds. ▪ When designing bridges, take maximum care of the bridge design in order to integrate it into the landscape in the best possible way. When designing bridge structure, to a maximum extent avoid solutions requiring high and massive elements, on the bridge itself and on the banks alike, and to a maximum extent possible avoid encroaching upon the riverbed itself or canyon sides. From the conceptual design stage onwards, include both an architect and a landscape architect as part of the design team; ▪ In addition to bridges, a design solution with an included system of measures for integration of the facilities in the environment, should also be developed for the areas of junctions, roadside service facilities, border crossing, toll gates, and TMCCs; ▪ Tunnel portals shall be designed not to protrude beyond the rock on any part, but to be a part of the rock both structurally and perceptively, and with stone lining of a similar colour as the rock; ▪ The design solution of roadside service facilities shall respect the surrounding natural space, both in architecture of the structure itself (minimum height of the structure, type of construction materials - use natural stone, colours and textures as much as possible), and in the open space next to the structures (use plant species from the composition of the local flora); ▪ On outer slopes of hills, wherever possible, design cuts instead of side cuts and embankments. Design side cuts and cuts at the steepest possible gradient, in order to minimize the width of encroachment into the existing terrain; ▪ Establish water and air quality baseline in the area affected by the project before construction commences in order to conduct monitoring in the further stages of project implementation; ▪ In parts where the motorway passes near residential buildings and populated areas, provide physical barriers that will protect the population from noise; ▪ Prior to construction, it is necessary to perform a survey and record any rare and endangered plant and animal communities (especially in the vicinity of river courses), and provide precautionary measures in accordance with expert guidance, in order to preserve these communities if any are registered; ▪ Prior to proceeding with construction of the motorway, carry out detailed archaeological surveys and develop a study on preliminary archaeological reconnaissance of the terrain, which will establish positions of registered sites and possible new sites that have not been registered so far, given that the route also partly passes through so far unexplored and inaccessible terrain, and establish their relationship with the planned motorway route.
	<ul style="list-style-type: none"> ▪ As part of the main projects for individual sections, develop separate documents that will specify all points of conflict of the road with the existing infrastructure system: local roads and parts of the water and power supply networks, as well as solving of these points of conflict.

<p>Conflict points of the motorway with existing and planned infrastructure</p>	
<p>Compliance with legal regulations relating to construction site.</p>	<ul style="list-style-type: none"> ▪ Obtaining all necessary permits for execution of the planned works, and certificates for equipment and machinery. ▪ Preparation of the Construction Site Organization Plan (SCOP) (for all subsections according to the construction plan), technological diagrams, Study on safety at work and fire protection and the Environmental Management Plan pursuant to the Regulation on construction site organization, obligatory documentation on construction site and participants in construction (Official Gazette of FBiH, nos. 48/09, 75/09 and 93/12) and the Waste Management Plan pursuant to the Law on Waste Management (Official Gazette of FBiH nos. 33/03 and 32/09).
<p>▪ CONSTRUCTION</p>	
<p>Impact on population:</p> <ul style="list-style-type: none"> ▪ Increased levels of noise and vibration in the immediate vicinity of the construction site; ▪ Partial or complete change of traditional movement routes of local population; ▪ Proximity or overlap of traditional roads with construction roads, which can create disruptions in traffic and increased possibility of accidents; ▪ Increase in length of travel from place of residence to places of work, schools, shops, etc. 	<ul style="list-style-type: none"> ▪ Minimize any negative impacts such as difficult access, increased levels of noise, vibration and dust, and presence of heavy machinery by adhering to specified measures; ▪ Publicly announce daily traffic situation and provide information to the public on the scope and schedule of construction activities, expected difficulties and access restrictions. ▪ Restrict movement of heavy machinery during the motorway construction, in order to minimize the area of agricultural soil devastated by the works. To the maximum extent, use the existing network of roads, which should be repaired upon completion of construction works; ▪ Use modern machines and vehicles with insulated noise sources (engines; exhaust system), which involves purchase of new machines or measures of installing additional sound insulation, as well as constantly maintaining the proper condition of the sound insulation. In addition, it is recommended to operate machinery only in the period from 7:00 to 18:00 (in all parts of the route which are less than 60 m away from the settlements).
<p>Impact on microclimate:</p> <ul style="list-style-type: none"> ▪ with respect to increased air warming and emissions of pollutants into the air, which leads to the effect of a 'cloudy' atmosphere and consequences in the form of higher air temperatures. 	<ul style="list-style-type: none"> ▪ As soon as possible introduce automatic monitoring of meteorological parameters and parameters of air pollution along the entire motorway route. On the stretch from Dobož to Tarčin, automatic meteorological stations should be installed at least 20 points on the route, of which at least 5 should be with measurements of all relevant meteorological parameters. ▪ The above-mentioned negative impacts on microclimate can be considerably mitigated by planting green belt in the immediate motorway area.
<p>Impact on waters:</p>	<ul style="list-style-type: none"> ▪ Special method of blasting in order not to disrupt groundwater flows on the stretches where the route passes near sensitive zones, or zones of unacceptable and high risk to groundwater;

<ul style="list-style-type: none"> ▪ Silting of the bed, water contamination, increase in water level in the upstream part or even complete filling of the bed with construction material. ▪ Execution of construction works like blasting in rock massif, excavation, destruction and stripping of topsoil, disposal of material, etc. can lead to disturbance or cutting of natural groundwater recharge routes. In the same way, occurrence of soil pollution is also possible, and such turbid or otherwise polluted water can easily infiltrate underground; ▪ Contamination of the surrounding soil, banks and water surfaces due to uncontrolled/accidental leakage of fuels, lubricants and oils from construction machinery or vehicles because of their faulty operation or negligence of workers, due to improper filling of fuels and improper disposal of wastewater from the construction site may lead to groundwater pollution; ▪ Dumping different waste from the technological process or construction complex (liquids, particles and solid waste) on the banks or directly into beds of rivers can lead to water pollution and propagation of pollution along the course; ▪ Discharging used water (technological and hygienic) into water courses, or into the soil can lead to diffusion of hazardous pollutants and biological agents; ▪ Changing the hydrological regime in marshes and ponds in the wider motorway area threatens the complex ecosystem. 	<ul style="list-style-type: none"> ▪ Tunnelling shall be carried out so as to avoid affecting the direction of groundwater flow and to prevent inflow into surface water; ▪ All excavation material that will not be immediately used in construction activities must be stockpiled in the designated locations in accordance with the construction site organization project (excess material stockpiles) protected from erosion, as well as outside of the defined sensitive zones, or zones of unacceptable and high risk to groundwater; ▪ Vegetation cover shall be preserved to the maximum extent possible, i.e. buffer zones made of plant cover shall be left between the road and water bodies. ▪ In the vicinity of watercourses, use only clean material for embankment, such as gravel, without earth or other impurities. ▪ Disposal should not be made in the riverbed and along watercourse banks, or in the sanitary protection zones as well as in the zones identified as aquifers. In case that these sites are found to be on a water domain and public water domain, it is necessary to request water management approval. ▪ Surfaces sensitive to erosion shall be protected by stabilizing agents and erosion-preventing plants. ▪ Conduct frequent and controlled disposal of municipal and hazardous waste in the prescribed manner, or prohibit any temporary or permanent disposal of waste material on the surrounding soil, except at the places designated for that purpose by the Construction Site Organization Project, and provide watertight waste containers. At the same time, disciplinary action shall be taken against violators of the established rules of conduct. During the construction, it may be expected that contractors will find registered or unregistered (illegal) dumps of different waste at several places. Depending on the type of waste, all these sites shall be rehabilitated according to specific projects; ▪ Used water from construction site shall be collected by safe drainage systems, collected in appropriate tanks and treated in the prescribed manner (whether on site or on a remote location) before being discharged into watercourses. On construction sites, it is mandatory to install ecological toilets to be used by workers; ▪ Machinery storage and servicing areas shall be protected by an impermeable base, outside the zones defined as the zones of unacceptable and high risk to groundwater. Oily rainwater from these areas shall be collected and treated in grit trap and oil and grease separator before being discharged into the recipient; ▪ Repair of machinery and replacement of oil shall be prohibited in the zones of high risk to groundwater; ▪ River flow shall be maintained at all times. If access to river channel is required, measures should be taken to divert the water flow past the works; ▪ Contractors should be prepared for flash floods and sudden rises in water level, and should secure all works (including embankments under construction, formwork, steel, etc.) so that the works are not disrupted by flood flows.
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	<ul style="list-style-type: none"> ▪ All construction site areas and other temporary impact zones shall be rehabilitated in accordance with the Rehabilitation Plan, i.e. reinstated depending on the future land use. ▪ Separate water management requirements shall be requested for the locations of construction site bases, services, asphalt plants, borrow pits and other facilities. ▪ In case of harmful impacts on water sources used for water supply, in the shortest possible period provide an alternative water supply for the population in the affected area.
<p>Impact on air</p> <p>Disruption of air quality will result from:</p> <ul style="list-style-type: none"> ▪ impact of exhaust gases from trucks and machinery that will be used in the construction of the motorway, ▪ impact of particulate matters (dust) that will be raised from the construction site, transport roads during passage of trucks and machinery, ▪ impact of particulate matters from temporary stone aggregate stockpiles 	<ul style="list-style-type: none"> ▪ Construction site, places of borrow pit of materials, temporary roads and handling areas shall be dampened during warm, dry and windy weather conditions in order to prevent dust from being raised. ▪ Transport of gravel, asphalt, stone and earth material and similar materials shall be carried out with tarpaulin covered trucks. ▪ When blasting for excavations in rock massif, choose the type of explosive that has the least harmful environmental impact. For the use of blasting boreholes use drills with dust collection in plastic bags. ▪ Install soot separating filters on exhaust pipes of all machines and vehicles with diesel engines; ▪ Use machinery in good technical order and perform regular maintenance of construction machines, turning them off when not in use; ▪ With regular (planning periodic) and extraordinary technical inspections of machines and vehicles, ensure maximum proper order and functionality of the motor fuel combustion system, and use (and regularly control) fuel with guaranteed quality standard.
<p>Impact on soil and agricultural land</p> <ul style="list-style-type: none"> ▪ Land of the best types, the highest-quality capability classes, the best use structure and the most favourable agro-zones will physically disappear by construction of the motorway. ▪ On the parts of agricultural land that are saved from physical disappearance, long-term exposure to contamination and erosion processes, as well as other adverse impacts, can be expected. 	<ul style="list-style-type: none"> ▪ Enforcement of preventive measures like: banning the use of leaded fuel, mandatory use of vehicles with catalytic converters, regulating movement speeds in zones of intensive agricultural production (agro-zone I), within the corridor prohibiting the cultivation of crops that accumulate toxic substances in edible parts of the plant. ▪ It is necessary to regulate implementation of all preventive measures by introducing appropriate legal solutions and international standards. The action of inspection services to strictly monitor compliance with appropriate measures is also very important in all this, especially when the measures are carried out on the recommendations to be given by the Food Safety Agency. ▪ Mitigation measures in the stage of road construction are carried out by removing, stockpiling and preserving the humus layer of soil, maintaining passability of roads and access to agricultural plots, remedying degraded soil, decontaminating contaminated soils and establishing vegetation protection belts. ▪ Removing and stockpiling the fertile soil layer is an important measure to take, bearing in mind that it is almost impossible to avoid destruction of the first agro-zone soils. It is important to take into account the practical aspects of the measure, since if the humus layer is only removed and stockpiled only as a matter of form and not used soon

	<p>thereafter, this measure is useless as it entails the additional cost of storing and maintaining such material and the gradual loss of humus that it mineralizes or erodes over time and becomes useless.</p> <ul style="list-style-type: none"> ▪ Ensuring accessibility and passability of agricultural properties is one of the requirements that must be met in the motorway construction stage, which is accomplished by construction of bridges and appropriate passages. ▪ Carry out remediation of degraded land, thus achieving rehabilitation of erosive processes, preventing the occurrence of water pooling, rehabilitating the surfaces on which temporary structures were built, and where stockpiles for disposal of the stripped fertile soil layer and open borrow pits of filling materials were located. ▪ In places where fuel, oil and lubricant were spilled, carry out decontamination by applying sawdust or some other material, where in the case of sawdust, after decontamination it is collected and burned under controlled conditions, and then the decontaminated soil layer is removed and stored to the designated place. ▪ An important measure to be taken during construction of the road is the establishment of vegetation belts, which is especially important for protection of the remaining agricultural lands of capability classes II and III. The vegetation belt should be at least 2.5-3 m high.
<p>Impact on flora</p> <ul style="list-style-type: none"> ▪ Impacts that will be reflected on flora during construction of the motorway route will be manifested in the loss of wood mass, decrease in biological diversity, decrease in the number of flora elements, loss of habitats, as well as change of landscape characteristics of the area. ▪ Impacts on flora will occur along the entire road route in full profile with the additional impact of the route during operation. In this part, the vegetation part and all stratal elements will be completely lost. ▪ Impact on the vegetation component is expected along the entire route profile due to the formation of pavement lanes, due to construction of bridges, viaducts, tunnels, interchanges, RSF - roadside service facilities, access roads, construction and organization of construction sites, borrow pits, supporting facilities and stockpiles for disposal of excavated material. 	<ul style="list-style-type: none"> ▪ Prior to construction, it is necessary to perform a survey and record any rare and endangered plant communities (especially in the vicinity of river courses), and provide precautionary measures in accordance with expert guidance, in order to preserve these communities if any are registered; ▪ Systematically implement measures for conservation of flora elements with a previously developed plan of work and of implementation of environmental monitoring measures. ▪ All trees should be cut to standard length, cleared of all branches. All cut trees, branches, and roots must be removed in accordance with existing legal provisions, rules and regulations. ▪ Strict prohibition of excessive felling of trees in the area of serpentines near Žepče. It is necessary to carefully plan, manage and perform monitoring of tourism operations in the protected area in order to ensure their long-term sustainability. ▪ Preventing uncontrolled falling of material or intentional pushing of material down slope. Planting native species as described in more detail by sections in Chapter 5.2.6. Flora within the Application. ▪ In riparian areas carry out planting of native species as described in more detail by sections in Chapter 5.2.6. Flora within the Application. ▪ In the construction site building phase, establish the vegetation cover baseline and presence of individual flora elements. ▪ Monitoring of the condition and impact on the surrounding vegetation with special protection measures shall be specified as part the Construction Site Organization Plan (CSOP).

<ul style="list-style-type: none"> ▪ Significant impact on flora will be manifested during construction in the immediate vicinity of the route where construction sites will be located, as well as in the part of access roads to the route itself, as well as by the location of other infrastructure facilities that will be constructed for the purpose of construction of the route and individual structures on it. 	<ul style="list-style-type: none"> ▪ Follow up the plans and progress of rehabilitation and reclamation of disrupted areas (work areas where machines, manpower, supporting facilities, access roads, cuts, viaducts, riverbeds, etc. are located). ▪ In part of construction work and construction site organization itself, integrate structures into the surrounding area, respecting and using autochthonous species. ▪ When forming the construction site and the area, observe floral characteristics (single trees or tree groups) that will not affect execution or organization of works. ▪ On outer slopes of hills, wherever possible, design cuts instead of side cuts and embankments. Design side cuts and cuts at the steepest possible gradient, in order to minimize the width of encroachment into the existing terrain. ▪ When performing works along river courses, keep existing vegetation where possible and leave trees where nests are built.
<p>Impact on fauna</p> <p>will be manifested through direct and indirect impact:</p> <ul style="list-style-type: none"> ▪ Direct impact implies the physical loss of particular species in space, whether it is an immediate death caused by works related to the route or a long-term loss caused by cumulative action. ▪ Indirect impact implies the impact on organisms and species that will be manifested by population decline, migration from the affected space. These impacts are caused by the intensity and manner of the works (increased noise from the operation of machinery and trucks, vibrations, physical pollution of the environment, reduction of natural food sources, loss of habitats, loss of spawning and nesting sites, etc.). ▪ The impacts will affect all groups: birds, mammals, amphibians, reptiles, insects along the whole or part of the route. 	<ul style="list-style-type: none"> ▪ Carry out felling of riparian forest vegetation in the winter season to somehow reduce the additional negative impact on land and water fauna. ▪ Measures for protection of hunting game on many sections rich in hunting animals (Medakovo-Ozimica, Poprikuše-Nemila, Nemila - D.Gračanica, D.Gračanica-Drivuša) are facilitated by Investor's solution with numerous tunnels, viaducts, and bridges. For sections 2 and 3, or Medakovo - Ozimica and Ozimica - Poprikuše, crossings for animals have been made, ensuring undisturbed movement and migration of game from both old routes. ▪ Establish monitoring with video cameras at animal crossing sites. ▪ It is necessary to build bird nesting boxes in the floodplain forest area and to monitor the daily, monthly and annual bird migration, as well as their distribution in the space. ▪ Part of the river bank of the Bosna River - backwaters, shall be arranged to be suitable for birds, amphibians and reptiles to stay. ▪ Leave fish migration passes when carrying out work on river banks and river beds. ▪ Continuously inform the local population and interested public (hunting, fishing clubs and nature conservation NGOs) about the motorway route to make it possible for them to consider all dimensions of the potential impact on fauna with high-quality participation in the decision-making process. ▪ Establish cooperation with hunting, fishing clubs and nature conservation NGOs in all areas through which the route will pass in order to timely indicate and take measures for protection of migratory corridors, animal crossings and passages, and spawning and game breeding sites. ▪ Inspection and review of ten-year and annual plans for the use of game and fish stocks shall be carried out by hunting and fishing clubs, and measures for protection, improvement and mitigation taken and planned accordingly (establishing prohibition of hunting and fishing of individual species, establish feeding sites for endangered birds and game species, construction of small bays, and fishing spots for sport fishermen).

	<ul style="list-style-type: none"> ▪ When carrying out works on or in the immediate vicinity of river courses, to a maximum extent consider reducing pollution of watercourses by solid waste, oily water, suspended particles from soil erosion, which can adversely affect the state of fish populations. ▪ Establish monitoring of river ecosystems and aquatic organisms. ▪ Establish monitoring of amphibians, reptiles and insects along sensitive ecosystems (forest ecosystems, cultivated areas, pastures, meadows, river banks and riverbeds). The monitoring would apply to the watercourses located on the route of planned motorway. ▪ Develop appropriate operational plans for monitoring and emergency response to possible accidents, and obtain the necessary equipment (cameras for monitoring game movements) and install it at the planned chainages.
<p><i>Impact on landscape</i></p> <ul style="list-style-type: none"> ▪ Visual and aesthetic adverse effects in terms of disruption of the harmonious landscape environment due to formation of excavations, embankments, stockpiles of excavated material, temporary construction site structures, stockpiles of stored materials and elements for installation, etc. ▪ when forming borrow pits, disruption of landscape features can assume a permanent character. 	<ul style="list-style-type: none"> ▪ Workplaces and structures should be planned and constructed so as to minimize disruption of the existing landscape features, and therefore the obligation of preserving the existing value of the landscape should be taken into account when planning stockpiles, borrow pits, temporary parking areas, etc. ▪ After completing construction works, the existing landscape should be reinstated as soon as possible. ▪ During construction, plan access roads to pass through the areas that do not require excavations and embankments so that it will be easier to rehabilitate them. If possible, plan to keep access roads that cannot be rehabilitated in operation after construction for the local population. ▪ When carrying out works on river banks and in riverbeds, work so as to leave migration passes for fish, and part of the work area along the riverbank should be arranged and reduced to a temporary separator/ catch basin to prevent pollution of the watercourses. In operation stage ▪ During operation, success of the self-vegetation process should be assessed and, where necessary, planned planting should be carried out. ▪ Establish a programme for monitoring reclaimed areas, and take mitigation / seedling replacement, replenishment, mowing, etc. measures accordingly.
<p><i>Impact on protected parts of nature</i></p> <ul style="list-style-type: none"> ▪ Serpentine complex Žepče - impacts due to falling, erosion and forest felling; ▪ Removal of vegetation and soil layer as a consequence of the motorway construction; ▪ Degradation of land due to construction works and movement of heavy machinery; 	<ul style="list-style-type: none"> ▪ The measures to be taken in the construction stage would be related to systematic implementation of prescribed measures and monitoring of all environmental components. ▪ In addition, existing vegetation, characterized by a high degree of biological diversity, should be preserved to the greatest extent possible. Construction site and construction activities as a whole must be organized in conformity with this fact.

<ul style="list-style-type: none"> ▪ Deposition of dust that will be raised from the construction site and transport routes when trucks and machinery pass; ▪ Negative impact of exhaust gases from trucks and machinery on the physiology of plants near construction site. ▪ During construction works on bridges, development of access roads along river courses and execution of works in riverbeds, the landscape view along river banks and river courses themselves may be disrupted. 	
<p><i>Impact on cultural and historical heritage</i></p> <ul style="list-style-type: none"> ▪ In the observed scope there are no formally protected monuments, but considering that the entire territory of Bosnia and Herzegovina has been inhabited since prehistoric times and there are numerous material remains from all historical periods, and since the route is being constructed on so far unexplored terrain, it is possible that chance material finds of movable or immovable heritage will occur, especially the when works are carried out in and near the riverbed of Bosna. ▪ Indirect impact on structures in the immediate vicinity of cultural and historical heritage is also possible due to noise and vibration during construction site organization, transport and storage of materials, borrow pits and stockpiling of materials. 	<ul style="list-style-type: none"> ▪ Develop a study on preliminary archaeological field reconnaissance and train workers on how to identify possible finds and how to handle archaeological remains, if found; ▪ Mandatory and continuous supervision of archaeologists and conservators in areas where preliminary surveys establish presence of cultural heritage sites and their constant consultative participation during the execution of the section; ▪ In case archaeological sites are encountered during construction, it is necessary immediately to stop the works and inform the competent cultural and historical heritage protection institutions or services, depending on the municipality where the site is located. ▪ In organization of construction site (access roads, borrow pit and storage of materials, storage of machinery, stockpile of materials) it is necessary to make sure to avoid cultural and historical heritage sites; ▪ Location of access roads, disposal of waste and deployment of heavy machinery shall be forbidden in areas in close proximity to known sites of cultural and historical heritage structures, as well as in areas where the possibility of physical damage or damage to archaeological finds is identified; ▪ Implementation of measures relating to noise and vibration protection and environmental protection.
<p><i>Impact on hunting</i></p> <ul style="list-style-type: none"> ▪ Decreasing incomes of hunting clubs from the sale of hunting licenses and hunting game shooting itself. ▪ impact on condition, presence, abundance of game in the area due to exposure to noise, vibration, presence of machinery, people and other elements 	<ul style="list-style-type: none"> ▪ Implementation of measures relating to noise and vibration protection and protection of fauna.

<p>that will negatively affect wildlife and hunting in general.</p> <ul style="list-style-type: none"> ▪ Decrease in game abundance due to migration of game inland, then fragmentation of habitats, increase in pressure of poachers and hunters on unprotected game. ▪ Impact on birds and their presence and abundance in the area will be manifested through cutting of vegetation, disruption and loss of habitats and nesting sites. ▪ Letting alone and not disturbing game and birds during nesting is one of the main ecological factors to which birds and game respond by migrating or leaving these habitats. 	
<p><i>Impact of noise and vibrations:</i></p> <ul style="list-style-type: none"> ▪ Mechanization of motorway construction causes large noise and vibration in the construction work area, but also in prefabrication areas (crushing and separating plants, concrete plants, asphalt plants) and on roads where vehicles move. The sources of construction noise are the execution of construction works on construction sites (heavy construction machinery, possibly blasting at tunnel construction sites) as well as the noise caused by the traffic of construction machinery related to the execution of works. ▪ A particular problem is the application of blasting for excavation in rock material - especially in open space (on the route, in quarries-borrow pits) and to a lesser extent in tunnels, which result in intense but short vibration effects (seismic action of explosion may have a particular effect by transmitting the shock wave through the ground to the environment). 	<ul style="list-style-type: none"> ▪ In the further stage of design, specify the locations and lengths of physical barriers that will protect population from noise in parts where the route passes through populated places or in their close proximity; ▪ Plan construction activities so as to avoid parallel activities of multiple equipment in the vicinity of receiver. ▪ On all construction machines and vehicles that are used in construction, it is mandatory to install sound protection (insulation) of engine and other assemblies that produce or contribute to development of noise; ▪ During execution of the works, keep the machinery (construction machines and vehicles) in proper operating order and use the same only when necessary. Equipment that is not being used at that time shall be shut off. ▪ Restrict the activities that potentially produce high noise (e.g. driving piles, blasting, and other activities) only to working hours during the day (7:00 to 19:00, Monday to Friday, and 7:00 to 13:00 on Saturdays) and avoid Sundays. Exceptions may be applied for e.g. individual structures such as tunnels; ▪ If blasting is used for excavations in rock massif, choose the type of explosive that has the least harmful environmental impact, use the technique of millisecond activation of explosive charges with directed action of explosion, in order to reduce the effect of superposition of dynamic impacts (vibration), noise and dust emission. Alternatively use an excavation technique using hydraulic hammers or mechanical excavation with milling machines, "moles" and the like; ▪ In case of exceeding the permitted values, provide workers with safety equipment at work and apply occupational safety regulations.

<p>Impact on infrastructure:</p> <ul style="list-style-type: none"> ▪ At places where power transmission lines intersect with the motorway, reconstructions on the power transmission lines may be needed in order to comply with prescribed safety and technical elements. ▪ In the area of Zenica Municipality (section Perin Han - Crkvica), the gas pipeline route is intertwined with the motorway route, so that the collision points between the gas pipeline and the motorway should be technically solved in this part. ▪ The conflict with existing power facilities (transmission lines) must be resolved through the main design and eliminated through preliminary works. ▪ There is a significant conflict with existing traffic routes of higher categories: main roads and railway line (double-track, electrified) which was solved already at the levels of conceptual designs, and in more detail in the stage of main design. 	<ul style="list-style-type: none"> ▪ In places of conflict with the existing power facilities (power transmission lines), through preliminary works relocate the lines; or separate/ protect/ insulate the lines by technical measures; ▪ In places of conflict with existing high-category traffic facilities, main roads and railway lines (double-track, electrified), it is mandatory to carry out the necessary temporary protection structures that will separate the facilities from the construction work area; apply all prescribed traffic signs and markings and, where necessary, provide traffic police patrols; ▪ In the stage of preparation and construction of the road, carry out measures for protection of infrastructure facilities in places where the route is intersected, run in parallel, or only approached in some places, in accordance with special regulations and conditions; ▪ Develop a project of temporary traffic regulation during construction of the planned project. Through it, regulate access points to the existing traffic system and ensure that there are no potential conflict points with existing traffic system during construction of the planned project; ▪ Plan grade-separated crossing of existing roads at places where the construction area is intersected; ▪ At places where field and forest roads are intersected, provide a network of alternative roads that will provide access to all the plots that had access before construction of the planned project, the locations of which will be defined in the project development stage. All crossings of field and forest roads over the route of the planned project must be grade-separated; ▪ Reinstate all existing roads and roads that are damaged due to the use of machinery and vehicles on construction of the planned road; ▪ In the next design stage, establish the exact position of water supply facilities (pipelines, tunnels, tanks etc.) which come into conflict with the adopted motorway route, and as part of the technical documentation solve the conflicts with this infrastructure; ▪ In the main design development stage, analyse the methods of water supply to the population in the periods when construction works on bridging this infrastructure are performed, with mandatory cooperation with the utility companies managing this infrastructure; ▪ The measures for protection of existing power network are contained in special regulations for construction of power networks, and they also contain measures for protection of cable lines at intersections with the motorway and connections to it. ▪ In the stage of construction, apply all prescribed/stipulated construction measures in order to protect the infrastructure lines.
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