6 IMPACT ASSESSMENT

In this Chapter, construction and operation activities of the Proposed Morava Corridor Motorway Project are against the baseline conditions in order to assess the environmental and social potential impacts of the Project. With this intention, Chapter 6 provides a summary of the major, moderate and positive impacts identified during the ESIA study for the construction and operation of the Project.

The basic approach for the ESIA is adopted for conducting the environmental and social impact study for the proposed project to assess the existing baseline in the AoI (i.e., *defined as the area of 1,000 m buffer along the length of the Project, consisting of a 500 m buffer on both sides of the Project*), where the components and activities of the project having potential environmental and social impacts. Environmental and Social impact assessments are framed with the prevailing institutional and legislative setup provided in Section 4 Legal Framework.

The main approaches for the assessment covers:

1. Identification and analysis of potential positive and negative impacts, direct and indirect impacts, and short-term and long-term impacts likely to result from project implementation;
2. Identification of feasible and cost-effective mitigation measures to avoid or to minimize negative impacts, and to provide technical guidance to the engineering design for the implementation of proposed mitigations.
3. Identify potential opportunities for environmental enhancement;
4. Preparation of Environmental and Social Management and Monitoring Plan for effective implementation of environmental mitigation measures at different stages of the project.

6.1 Scoping of the Impacts

The potential environmental and social impacts of the Proposed Morava Corridor Motorway Project together with River Regulation[1] are summarized in the scoping matrix for the main Project phases (construction and operation) to identify the likely environmental and social aspects originating from them. These phases are described below:

- The Construction Phase activities, which comprises pre-construction including detailed design, construction and post-construction phases, considered in the scoping stage. In this respect, this phase covers all detailed design and construction activities as well as decommissioning of the temporary construction facilities.

[1] River Regulation Project is designed as a part of the Morava Corridor Motorway Project and general constrcution impacts are same and in paralel with the impacts caused by major constrcution works such as excavation, air qulity etc. In this respect, common impacts, impact asessment and related mtigation measures are covered under common topics. Only specific impacts caused by river regulation works are individually assessed and expressed related sections.

- The Operational Phase considers all operational activities including:
  - Operation of the motorway, which may potentially result in impacts such as the generation of noise and vibration, release of chemicals, fuels or hazardous substances, accidental spills and leakage from movement of the vehicles as well as killing of crossing animals and generation of various waste streams;
  - Potential impact of the River Regulation works on surface and subsurface water quality at West Morava Basin, and potential impacts on fresh water and terrresterial ecology of the project AoI.
  - Maintenance activities of the motorway, which may potentially result in impacts such as on the occupational health and safety for the workers that will perform regular maintenance of the motorway and public safety during the maintenance.

The potential impacts (adverse and positive) of all planned project activities have been identified and the interaction between the project activities in all these phases and the natural, physical environment and social-economic aspects are addressed using the environmental and social scoping matrixes provided in Table 6-1 and Table 6-2 below.

Table 6-1. Scoping Matrix – Potential Environmental Impacts

Project Stage	Sub Project Stage	Potential Impact Locations	Activity/Source	Water Quality		Air Quality and Climate				Noise and Vibration	Geology Soils and Cont.			Waste Management	Terrestrial and Aquatic Ecos.			Archaeological and Cultural Res.	Landscape
				Surface Water	Ground Water	NOx	SO2	Dust (PM2.5/10)	GHG Emissions		Errosion	Geohazards	Soil		Aquatic Ecosystems	Terrestrial	Protected Areas		
Pre-Construction Activities	Site preparation	Camp Sites, Borrow Pits, Quarries, Asphalt Plants, Concreate Batching Plant, Construction corridor, Access Roads, River Regulation	Top-soil stripping	X							X	X	X	X	X	X		X	X
			Top-Soil Storage	X				X		X	X		X	X	X	X			X
			Tree Cutting /Vegetation clearance							X	X		X	X		X			X
			Demolishing of Exiting Buildings/Structures	X	X			X		X			X	X					
			Geological and Geotechnical Studies							X				X				X	
			Mapping and Alignment/site selection														X	X	
			Land Take/Expropriation																
	Site Mobilization		Mobilization of Machinery and Equipment			X	X	X	X	X			X	X					
			Procurement of Materials and Equipment																
			Employment																
Construction Activities	Construction	Camp Sites, Borrow Pits, Quarries, Asphalt Plants, Concrete Batching Plants, Construction corridor, Access Roads, River Regulation	Camp Sites	X	X	X	X	X		X			X	X	X	X		X	X
			Material Storage	X	X			X		X	X		X	X	X	X		X	X
			Waste Storage/Disposal Sites	X	X								X	X	X	X			
			Water Supply	X	X										X				
			Wastewater Treatment and Disposal	X										X	X	X			
			Excavation	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
			Backfilling	X	X	X	X	X	X	X	X	X	X	X	X	X			
			Storage, Re-Use and Disposal of Excavations	X	X			X		X	X		X	X	X	X			X
			Material Spreading/Rolling/ Compaction	X		X	X	X	X	x			X	X	X				
			Asphalt-Concrete Wearing	X		X	X	X		X				X					

Project Stage	Sub Project Stage	Potential Impact Locations	Activity/Source	Water Quality		Air Quality and Climate				Noise and Vibration	Geology Soils and Cont.			Waste Management	Terrestrial and Aquatic Ecos.			Archaeological and Cultural Res.	Landscape
				Surface Water	Ground Water	NOx	SO2	Dust (PM2.5/10)	GHG Emissions		Errosion	Geohazards	Soil		Aquatic Ecosystems	Terrestrial	Protected Areas		
			Crushing and sieving					X		X				X		X			
			Machinery and Equipment	X		X	X	X	X	X			X	X	X	X			
			Asphalt Preparation	X		X	X		X	X			X	X	X				
			Concreate Batching	X				X	X	X				X	X	X			
			Transportation			X	X	X	X	X				X					
			Procurement of Materials																
			Employment																
Post Construction Activities	Demobilization	Camp Sites, Borrow Pits, Quarries, Asphalt Plants, Concreate Batching Plant, Access Roads, River Regulation	Demobilization of Equipment and Machinery			X	X		X	X			X	X					
			Re-instatement of Camp Sites and Access Roads	X				X	X	X	X		X	X	X	X			X
			Rehabilitation of Barrow Pits and Quarries	X	X			X	X	X	X		X	X					X
			Demobilization of Workers																
Operation	Motorway, Maintenance and Service Stations River Regulation		Movement of the vehicles	X		X	X	X	X	X	X		X	X	X	X			X
			Operation of Service Stations	X	X					X				X					
			Operation of Maintenance Station	X	X					X				X					
			River Regulation	X	X	-	-	-	-	-	X	X	X	-	X	X	X	-	X

Table 6-2. Scoping Matrix - Potential Social Impacts

Project Stage	Sub Project Stage	Potential Impact Locations	Activity/Source	Population	Infrastructure	Economy	Re-settlement and Land	Ecosystem Services	Labor and Working Conditions	Occupational Health and Safety	Community Health and Safety	Vulnerable People
Pre-Construction Activities	Site preparation	Camp Sites, Borrow Pits, Quarries, Asphalt Plants, Concreate Batching Plant, Construction corridor, Access Roads, River Regulation	Top-soil stripping		X		X	X		X	X	
			Top-Soil Storage							X	X	
			Tree Cutting /Vegetation clearance				X	X		X	X	X
			Demolishing of Exiting Buildings/Structures				X			X	X	X
			Geological and Geotechnical Studies		X		X			X	X	
			Mapping and Alignment/site selection				X			X		
			Land Take/Expropriation			X	X			X		
	Site Mobilization		Mobilization of Machinery and Equipment			X				X	X	
			Procurement of Materials and Equipment			X				X		
			Employment	X		X			X			X
Construction Activities	Construction	Camp Sites, Borrow Pits, Quarries, Asphalt Plants, Concreate Batching Plant, Construction corridor, Access Roads, River Regulation	Camp Sites	X	X	X				X	X	X
			Material Storage							X	X	
			Waste Storage/Disposal Sites							X	X	
			Water Supply		X					X	X	
			Wastewater Treatment and Disposal		X					X	X	
			Excavation		X					X	X	
			Backfilling		X					X	X	
			Storage, Re-Use and Disposal of Excavations				X				X	
			Material Spreading/Rolling/Compaction							X	X	
			Asphalt-Concreate Wearing									
			Crushing and sieving							X	X	
			Machinery and Equipment							X	X	
			Asphalt Preparation							X	X	
			Concreate Batching							X	X	
			Transportation		X					X	X	
			Procurement of Materials									
			Employment	X		X			X	X		X
Post	Demobilization	Camp Sites, Borrow Pits,	Demobilization of Equipment and Machinery		X					X	X	

Project Stage	Sub Project Stage	Potential Impact Locations	Activity/Source	Population	Infrastructure	Economy	Re-settlement and Land	Ecosystem Services	Labor and Working Conditions	Occupational Health and Safety	Community Health and Safety	Vulnerable People
		Quarries, Asphalt Plants, Concreate Batching Plant, Access Roads, River Regulation	Re-instatement of Camp Sites and Access Roads		X						X	
			Rehabilitation of Barrow Pits and Quarries								X	
			Demobilization of Workers						X			X
Operation	Motorway, Maintenance and Service Stations River Regulation		Movement of the vehicles								X	X
			Operation of Service Stations						X	X		X
			Operation of Maintenance Station						X	X		
			River Regulation	-	X	-	-	X	-	-	-	X

6.2 Methodology for Impact Assessment

6.2.1 Impact Types and Definitions

Impacts may occur as positive, negative, direct, indirect and cumulative. Determination of the type of impact is the important step of the assessment process. The determination of the impact type is based on geographical size, sensitivity of receptor, duration, significance and likelihood of the impact. Impact types are provided in Table 6-3.

Table 6-3. Impact Types and Definitions

Impact Type	Definition
Positive	Impacts that make positive changes over the current conditions.
Negative	Impacts that lead to new and undesirable changes over the current conditions.
Direct	Direct impacts occur through direct interaction of an activity with an environmental, social, or economic component.
Indirect	Impacts which are not a direct result of the project, often produced away from or as a result of a complex impact pathway.
Cumulative	Impacts that consist of an impact that is created as a result of the combination of the project evaluated in the current project together with other projects causing related impacts.

6.2.2 Method to Assess Environmental and Social Impacts

6.2.2.1 Determination of Impact Significance Criteria

The environmental and social impacts are dependent on the impact significance criteria (SC) of the particular impact and the Likelihood (L) of the impact occurring. Impact significance criteria (SC) is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and receptor sensitivity (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$\mathbf{SC= (E+D+M+R) \times N/4}$$

A rating scale as defined in below table represents each individual aspect in the determination of the consequence.

Table 6-4. Criteria for Determining Impact Significance

Aspect	Score	Definition
Nature (N)	**-1**	**Negative**: Impacts that are considered to represent an adverse change from the baseline condition or introduces a new undesirable factor. Impacts are described as "negative" when they; • Reduce the socio-economic welfare (i.e. living quality and result in land acquisition) • Reduce the quality of existing environment and habitat.
	+1	**Positive:** Impacts that are considered to represent an improvement on the baseline condition or introduces a new desirable factor. Impacts are described as "positive" when they; • Enhance socio-economic welfare (i.e. health, employment). • Enhance the quality of existing environment and habitat.
Extent (E) of an impact depends on the impact's type, duration and scale, as well as resistant properties of the resource / receptor	**1**	**Project Site:** (i.e. limited to the area applicable to the specific activity)
	2	**Municipality** (i.e. the area within 5 km of the site),
	3	**District** (i.e. extends between 5 and 15 km from the site
	4	**Regional:** (i.e. extends beyond 50 km from the site)
	5	**National:** *potential impacts that expected to create changes at national level.*
Duration (D) is the time period over which a receptor is affected.	**1**	I**mmediate** (<1 year)
	2	**Short term** (1-5 years),
	3	**Medium term** (6-15 years),
	4	**Long term** (the impact will cease after the operational life span of the project)
	5	**Permanent** (no mitigation measure of natural process will reduce the impact after construction).
Magnitude (M) is considered to be a function of impact extent, duration and sensitivity of receptor.	1	**Minor**: where the impact affects the social and physical environment in such a way that cultural, social and environmental functions and processes are not affected.
	2	**Low**: where the impact affects cultural, social and environmental functions and processes are slightly affected.
	3	**Moderate**: where the affected cultural, social and environmental functions are altered and processes continue in a modified way.
	4	**High**: where cultural, social or environmental functions or processes are altered to the extent that it will temporarily cease.

Aspect	Score	Definition
	5	**Very high:** where natural, cultural, social or environmental functions or processes are altered to the extent that it will permanently cease.
Receptor Sensitivity (R)[2] describes the ability of the receptor to withstand adverse impacts. It takes into consideration not only activity-impact-receptor pathways, but also social and environmental characteristics of the receptor that might make it more or less resilient to change.	1	**Low:** Local community and/or environment is fully equipped/has the tools to manage changes of life quality. • Species and/or population has high capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact), and is potentially unaffected or marginally affected • People being least vulnerable to change or disturbance (i.e. ambient conditions such as air quality are well below applicable legislation and international guidance) • Individuals who are able to quickly adapt to temporary disruption in their living conditions, livelihood status or a change in the status of public infrastructure
	3	**Medium:** Local community and/or environment is partially equipped/has the tools to manage changes of life quality. For example: • Internationally threatened species /protected area within the area impacted by the project activities outside of period of high sensitivity or during routine or reliably predictable peak presence • Species and/or population which has moderate capacity to absorb or adapt to change (i.e. has capacity to move away from or adapt to the project impact), leading to potential temporary but sustainable effect which does not substantially alter character or result in significant loss of ecological functionality • People being vulnerable to change or disturbance (i.e. ambient conditions such as air quality are below adopted standards • Negative change in livelihood status, household assets/income or living conditions. Temporary disruption to businesses resulting in a small drop in business revenue. • Increased risk to public health that can be controlled using detailed mitigation measures. • Disruption to public infrastructure that results in an inconvenience to other users

[2] Receptors may be humans, ecological and physical components of the environment. Receptor sensitivity considers how a particular receptor may be more or less susceptible to a given impact. More sensitive receptors may experience a greater degree of change, or have less ability to deal with the change, compared with less sensitive receptors that may be more resilient or adaptable.

Aspect	Score	Definition
	5	**High:** Sensitive local community and/or environment not equipped or prepared to cope with social and environmental impacts such as changes of life quality. For example: • Internationally threatened species /protected area within the area impacted by the project activities during period of high sensitivity (e.g. during breeding, spawning or nesting) and during routine or reliably predictable peak presence • Species and/or population which has little or no capacity to absorb or adapt to change (i.e. little or no capacity to move away from or adapt to the project impact), leading to potential for substantial change of character and/or loss of ecological functionality • Most vulnerable groups (i.e. ambient conditions such as air quality are at or above adopted standards • Individuals with a marginal livelihood, low socio-economic income or poor quality living conditions • Individuals who are vulnerable due to their age, disability or other reason and who may require special assistance during engagement activities • Businesses with a marginal economic existence which are not able to easily adapt to change

6.2.2.2 Determination of Impact Likelihood

Once impact significance criteria "SC" has been determined Impact Assessment "(IA)" is determined in accordance with the standard risk assessment relationship by multiplying "SC" and "L" (Likelihood is rated/scored as per Table 6-5).

Table 6-5. Likelihood Scoring

Likelihood	**1**	Improbable (the possibility of the impact materializing is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur)

6.2.2.3 Determination of the Overall Impact

The overall impact (IA) is categorized as low, medium or high. Environmental and social IA is therefore calculated as follows:

IA= SC x L

Table 6-6. Determination of the Overall Impact*****

Determination of the Overall Impact						
Significance Criteria (SC)	**5**	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	**2**	**3**	**4**	**5**
		Likelihood				

**For positive impacts, the column of the impact assessment table is marked with green colour.*

The outcome of the IA will result in a range of scores, ranging from 1 through to 25. These IA scores are then grouped into respective classes as described in Table 6-7.

Table 6-7. Description of the Overall Impact Scores

Score of the Impacts		
Value*	**Score**	**Definition**
1-8	**Low**	Impacts with a "**Low**" significance are expected to be noticeable changes to baseline conditions, beyond natural variation, but are not expected to cause hardship, degradation, or impair the function and value of the receptor. However, these impacts warrant the attention of the Project parties, and should be avoided or mitigated where practicable.
9-16	**Medium**	Impacts with a "**Moderate**" significance are likely to be noticeable and result in lasting changes to baseline conditions, which may cause hardship to or degradation of the receptor, although the overall function and value of the receptor is not disrupted. These impacts are a priority for mitigation in order to avoid or reduce the significance of the impact.

Score of the Impacts		
Value*	**Score**	**Definition**
17+	**High**	Impacts with a "**High**" significance are likely to disrupt the function and value of the receptor, and may have broader systemic consequences (e.g. environment, ecosystem or social well-being). These impacts are a priority for mitigation in order to avoid or reduce the significance of the impact.

*In case the value of the overall impact is a fractional number, the value is rounded as <0.5 to round down; >0.5 to round up.

The impact IA will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

The impact assessment in each technical chapter will include impact summary table for each phase of the Project (an example is presented in).

Development of Mitigation Measures and Enhancement Plans

One of the aims of an ESIA consists of suggesting mitigation measures in order to limit any potential negative impacts affecting all physical, biological and socioeconomic resources as well as receptors due to Project activities. Mitigation measures are defined against each significant adverse impact by making use of avoidance, minimization, restoration and remediation as appropriate. Mitigation measures provided in each impact assessment table are also grouped under each project phase such as design, pre-construction, post construction and operation. In general, mitigations suggested for operation phase are directly related to the Project design, in this respect these mitigations are also grouped under design phase.

A hierarchy of mitigation options is considered, with avoidance at the source of the impact as a priority and compensatory measures or offsets to reduce the impact significance as a last resort. The mitigation hierarchy that is utilised in this ESIA is presented in Table 6-8 below.

Table 6-8. Hierarchy of Options for Mitigation

Options	Explanation
Avoid at Source; Reduce at Source	Avoiding or reducing at source is designing the project so that a feature causing an impact is designed out (eg, avoiding constraint areas during site selection) or altered (eg, reduced waste volume).
Abate on Site	This involves adding something to the design to abate the impact (eg, pollution controls).
Abate at Receptor	If an impact cannot be avoided, reduced or abated on-site then measures can be implemented off-site (eg, noise screening at properties).
Repair or Remedy	Some impacts involve unavoidable damage to a resource. Repair essentially involves restoration and reinstatement type measures.

The aim of the mitigation measures is to prevent or reduce the importance of negative impacts whilst optimizing the feasibility and potential benefits of the Project. Impact mitigation objectives are often established on the basis of legal standards or by referring to best practice. In the absence of any existing benchmarks, objectives specific to the project are established. Mitigation activities are supported with management plans linked to potential impacts, and they include monitoring requirements detailing what will be monitored, the method of monitoring, frequency, and measurable targets. Stepps for determination of mitigations in line with "Mitigation Hierarchy" provided below.

- Avoid at Source, Reduce at Source: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting theworking area or changing the time of the activity). For this purpose, Constraint Maps regarding no-go areas and sensitive locations are prepared as an Annex of ESIA Report to serve as a Guiding document for the Detailed design as well as Sub-management and monitoring plans.
- Abate on Site: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- Compensate in Kind, Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Taking into account how mitigation will reduce a predicted impact, receptor sensitivity and significance of the after-mitigation impacts, residual impacts are identified. Some mitigation measures may directly address the impact on the predicted receptors, in which, the overall impact after applying the mitigation measures will result in reducing the impact on the sensitive receptors.

Where significant residual impacts or risks remain, further options for mitigation are evaluated and impacts are re-assessed until they are considered to be low and technically and financially feasible for the Project and would be deemed to be within acceptable levels.

Residual Impacts

Residual impacts will be identified by taking into account the new Nature (N'), Extent (E'), Duration (D'), Magnitude (M'), receptor sensitivity (R') and Likelihood (L') on how mitigation will reduce a predicted impact and significance of the after-mitigation.

For the purpose of this methodology the residual impact (RI) is represented by:

$$SC' = (E'+D'+M'+R') \times N'/4$$

$$RI = SC' \times L'$$

Table 6-9. Assessment of Potential Impacts (As an example)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Spillage/Leakage to Surface Water	-1 Negative	2 Municipality	2 Short Term	4 High	3 Medium	-2.75	4 High Probability	11 Medium	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-2.25	2 Low Probability	-5 Low
Employment Opportunities	1 Positive	3 District	2 Short-term	3 Moderate	5 High	3.25	5 Definite	16 Medium	1 Positive	4 Regional	2 Short-term	4 High	5 High	3.75	5 Definite	19 High

6.3 Water Quality

In this section, construction and operation impacts due to project activities on surface water and ground water within the Area of Influence (AoI) of the Project and measures will be taken by the Contractor and the Employer were determined.

6.3.1 Surface Water

Surface water quality and flow characteristics (level and volume) may be susceptible to contamination by the Project activities during the construction and operation phase of the Project.

The sensitive receptors were determined according to the Baseline Conditions of the surface water (See Chapter 5). Impacts that may be caused by the Project together with the mitigation measures are provided in Table 6-10 and Table 6-11.

6.3.1.1 Construction Phase

The construction activities may cause negative impacts on surface water sources throughout the construction phase in case no mitigation measures are taken.

Some of the potential sources of the impacts can be raised from;

- Construction machinery through risk of spillages or accidental releases of oil and petroleum products, discharge of motor oil and/or similar waste.
- Uncontrolled disposal of excavated materials.
- Uncontrolled drainage of sanitary waters in project facilities.

During the construction works, surface water quality is considered to be temporary affected by the construction activities including but not limited to:

- Silty/soiled water from excavations (road and river regulation), quarries, topsoil placing, machinery washing, washing of finished road surfaces to remove accumulated soil and disturbance of drains and streambeds.
- The surface water may be at risk in case of a construction site or refueling and storage depot is located near a surface water body.
- Discharge of wastewater from construction workers' accommodation sites and other construction facilities and activities poses a risk to water environment if not treated prior to discharge.

All impacts and mitigations for surface water quality in the Construction Phase of the Project is provided in Table 6-10.

Table 6-11 shows the overall rating of the impacts before and after mitigations. Potential impacts of the construction works performed in the West Morava River (i.e. river regulation, foundations for bridges etc.) are considered with high impact significance due to large impact extent and high impact magnitude. Other potential impact soruces sucha as spillage/leakage to surface water and the wastewater discharge are considered with medium significance before mitigation implementations. All mitigation measures provided in Table 6-10 are design to reduce the magnitude and minimize the likelihood of the impacts. After taking mitigation measures, the residual impacts estimated to be decreased significantly, and the impact significance of the residual impacts are classified as low.

Table 6-10. Impact and Mitigations for Surface Water Quality in Construction Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Spillage/Leakage to Surface Water • Silty/soiled water from excavations (e.g. cut and fill), exposed ground, stockpiles of soil, quarries, topsoil placing and excess material, plant and wheel washings, construction roads, washing of finished road surfaces to remove accumulated soil and disturbance of drains and streambeds (i.e. in-stream construction of culverts and channel diversions/improvement works), and landscaping e.g. of road embankments. • When construction site, a refueling and storage area are near to surface waters, a risky situation may occur for surface waters due to spillage possibility of hazardous substances. Liquid cement can be highly polluting and can increase damage in aquatic life. Since liquid cement has high alkalinity and it is corrosive. The accidental spillage of cement, fuel oils and lubricants can cause important consequences on watercourses, aquatic ecology and downstream users. • During construction, motorway repair activities such as removal of asphalt and replacement, painting etc. can impact to surface water quality since chemicals is used during these activities. The risk of water pollution is high especially close to surface water bodies in all road sectors.	Top-soil stripping Top-Soil Storage Demolishing of Exiting Buildings /Structures Material Storage Excavation Backfilling Storage, Re-Use and Disposal of Excavation Excavation for the River Regulation Asphalt concrete Wearing Machinery and Equipment Asphalt Preparation Concrete Batching	The West Morava River and its tributaries as well as water ponds and lakes located in AoI has been identified as a sensitive receptor.(for detailed information see Chapter-5)	<u>Design</u> • Storm water drainage risk assessment will be conducted in order to confirm that storm water drainage designs used for construction works are effective to mitigate impacts on land use, surface water and sensitive ecological sites therein. Out-put of this assessment including suggested mitigations will be incorporated to relevant plans such as Soil Erosion, Reinstatement and Landscape (SERL) Management Plan. <u>Construction</u> • The Project Environmental Management Plan (EMP) will include Spill Response and Prevention, Water Quality Management, Hazardous Material Management procedures that will be implemented. • Accidental spills will be avoided through good practice and restriction of refueling near watercourses. Safe fueling and gasoline handling procedures will be practiced in the construction areas. If heavy equipment cannot be moved to appropriate fueling points, an impervious surface (such as a drip-tray) will be used for refueling this equipment to prevent accidental releases to groundwater aquifers. • Re-fueling of all plant, vehicles and machinery will be carried out at minimum 50 m of any watercourse, drain or channel leading to a water course. • Hazardous materials will not be stored in excavated areas. Exposure to hazardous materials in open areas will be kept to a minimum in size and time. • All hazardous material or waste storage areas used for construction works will be connected to a

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			closed impervious sump or waste water treatment facility and/or bounded with secondary containment. Secondary containment structures will consist of berms, dikes, or walls capable of containing the larger of 110% of the largest tank or 25% of the combined tank volumes in areas where hazardous materials are handled such as fuel stores and loading areas, concrete mixing, hazardous material stores to prevent hazardous materials entering the site drainage. • Oil separator will be used for silty/soiled water from construction activities and after silty/soiled water is brought to national and international discharge criteria will be discharged to suitable receiving environment. • Scheduling of construction activities near the West Morava River during period of heavy rainfall will be considered. High sediment producing activities such as road paving will be avoided as much as possible and exposed surfaces and stored materials covered as necessary to reduce erosion of sediments to surface water. • Soil extraction or excavation areas by the river banks will be protected by appropriate fencing such as orange safety barrier fencing during the construction phase, to prevent negative impact that may be caused by driving and unloading of materials nearby. • Wastewater generated during concrete batch plant operation and cement trucks washing will be monitored for pH and temperature. Concrete wastewater can show high pH values, and high alkalinity. • Water flow in the river (or any stream) will not be fully blocked, and continuity of the flow will be maintained as much as possible,

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Sensitive areas of rivers and drains will be protected from impact from vehicles and other construction activities with appropriate fencing such as orange safety barrier fencing or other appropriate ways. • Spill Response Kits will be available on construction site. • Spill Response Kits will be held at secure, clearly signposted locations, instructions will be provided in appropriate languages and personnel will be trained in their use. • Spills will be immediately contained on site and all contaminated materials including soils will be removed from the site for suitable treatment and disposal. • All staff and subcontractors will report any spill incidents, and these will be subject to investigation and close out remedial and preventive actions.
Working in the River-Bed and River Regulation works • River regulation works during constructon phase can impact to surface water quality.	Excavation for the River Regulation	The West Morava River and its tributaries as well as water ponds and lakes located in AoI has been identified as a sensitive receptor.(for detailed information see Chapter-5)	<u>Construction</u> • The timing of the work will be constrained by the months of high-water level and Environmental requirements if the works directly related with the existing River flow. • Size of the working area in the riverbed will be reduced and limited as much as practicable. • Water flow in the river (or any stream) will not be fully blocked, and continuity of the flow will be maintained as much as possible, • Water turbidity at up-steam and down-stream of the working area will be monitored during construction activity in the riverbed. If the turbidity level exceeds the standards, level of construction works will be decreased (or stopped) at

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			corresponding location until the turbidity is decreased to regulated levels. • Re-fueling of all plant, vehicles and machinery will be carried out at minimum 50 m of any watercourse, drain or channel leading to a water course. • Storage and handling of fuels, oils and other hydrocarbons through a controlled process, involving measures to prevent soil and water contamination. Those should include fuel and oil storage on sealed surfaces and within secondary containment; • All sites near rivers will be protected by fencing and other means to prevent loss of construction materials, particularly hazardous materials. • Movement of equipment inside rivers, streams, or on their banks, will be prevented except when it is unavoidable due to the construction of a structure or in emergency situation. • Training will be provided to machine operators regarding the sensitivities and working procedures, with attention to machine and equipment inspection for leaks prior to use, safe storage and handling of fuels/oils/hydrocarbons near the watercourse and/or precautionary measures to prevent contamination of soil and watercourse • Emergency Preparedness and Response Plan (EPRP) will be followed by all staff working on or near the river.
Wastewater generation • Wastewater generation during construction activities can impact the water quality. Wastewater originated from project facilities and activities used construction works can arise a	Camp Sites Asphalt Plants Concrete Batching Plants Wastewater Treatment and Disposal	The West Morava River and its tributaries as well as water ponds and lakes located in AoI has been identified as a sensitive	<u>Pre-Construction</u> • Design of wastewater treatment facilities should sustain water discharge standards provided in Chapter 4 and Appendix – 4. • During site arrangement, the potential wastewater sources from camp/site facilities, asphalt plant,

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
risk to water environment if it is not treated before discharge.		receptor.(for detailed information see Chapter-5)	concrete batching plant, and quarries will be defined. Depending on availability on waste treatment facilities, these sources can be connected to local sewerage system, which should be ended with proper wastewater treatment facility sustains the discharge quality standards given in Chapter-4 and Appendix -4. • Wastewater treatment facilities will be established before operation of construction project facilities such as camp sites, asphalt plants and concrete batching plant. Permits and licenses for operation of these wastewater treatment facilities will be in line with national requirements. <u>Construction</u> • All wastewater discharges from all construction components must comply with the relevant legal requirements provided in Chapter 4 and appendix 4. • The treated water will be reused whenever possible.

Table 6-11. Scoring of Surface Water Impacts in Construction Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Spillage/Leakage to Surface Water	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	3 **Medium**	-2.75	4 **High**	-11 **Medium**	-1 **Negative**	2 **Municipality**	2 Short Term	2 Low	3 Medium	-2.25	2 Low	-5 **Low**
Working in the River-bed and River Regulation works	-1 **Negative**	4 **Regional**	2 **Short Term**	5 **Very High**	3 **Medium**	-3,5	5 **Definite**	-18 **High**	-1 **Negative**	4 **Regional**	2 Short Term	2 Low	3 Low	-2.75	3 Definite	-8 **Low**
Wastewater discharge	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	3 **Medium**	-2.75	5 **Definite**	-14 **Medium**	-1 **Negative**	2 **Municipality**	2 Short Term	2 Low	3 Medium	-2,25	1 Improbable	-2 **Low**

6.3.1.2 Operation Phase

During the operation phase of the Motorway, surface water quality may be impacted negatively in case inadequate mitigation measures be taken.

The potential operational impacts may be rised due to:

- Pollutants released from vehicles,
- Occupation of the flood plain by the Motorway,
- Alteration of flow patterns due to hydraulic structures,
- Spills due to road accident and from gas stations and service areas,
- Motorway repair activities such as removal of asphalt and replacement, painting etc. can impact to surface water quality,
- High storm water flow rates can cause flooding, erosion and habitat degradation due to increase of impermeable surface.
- Potential impact on water regime is related to the regulated sections of West Morava River.
- Potential impact of river regulation work on water quality of West Morava River.

Table 6-12 details the impact and mitigations for surface water quality in operation phase of the Motorway.

Table 6-13 shows the overall rating of the impact of before and after mitigations. Spillage/leakage to surface water, the wastewater discharge and river regulation works are considered medium since the magnitude and the likelihood of the impacts are determined as high. In addition, flooding is considered high since the magnitude and the likelihood of the impacts are determined as high. After taking mitigation measures, as shown in Table 6-13, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-12. Impact and Mitigations for Surface Water Quality in Operation Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Spillage/Leakage to Surface Water • Spills due to road accident and from operational project facilities[3] also pose a greater risk of surface water contamination during operation phase. The risk of water pollution is also high in all Motorway sections close to surface water bodies such as creeks. Accidental releases to surface water can cause significant impact when high amount of water contaminated with hazardous substances discharge into the surface water. • Motorway repair activities such as removal of asphalt and replacement, painting etc. can impact to surface water quality by the chemicals used for those activities. • During operation phase of the Motorway, surface water may be affected by routine deposits from vehicles accumulated on the Motorway surface and transported to the road drainage system (e.g. tire and brake deposits, hydrocarbons from engines, liquid exhaust emissions, etc.). The sources may be caused by the leaks from the road body itself (tar oils) and road marking materials.	Movement of the vehicles Operation of Service Stations Operation of Maintenance Station Vehicle collisions Snow removal or de-icing applications	The West Morava River and its tributaries as well as water ponds and lakes located in AoI has been identified as a sensitive receptor.(for detailed information see Chapter-5)	<u>Design</u> • Storm Water and Drainage Risk Assessment for operation of the Project will be prepared. The scope of the assessment should confirm if storm water drainage designs are effective to mitigate impacts on land use, surface water and groundwater or sensitive ecological sites therein. • Storm water and draining mitigation measures will be implemented in the design phase, such as the use of storm water collection ponds, which enables the controlled discharge of storm water as well as protects the accidental spills caused by an accident. <u>Operation</u> • Storm water collection channels and ponds are regularly (visually) inspected for its integrity. • In case of an accidental spill, collected water in the storm water collection pond will be sampled and discharged in accordance to the standards stipulated in Chapter-4 and Appendix-4. • Spill Response Kits will be available at service and maintenance stations, will be held at secure, clearly signposted locations, instructions will be provided with the kits and personnel will be trained in their use. • Any spillages will be immediately contained on site and all contaminated materials including soils will be removed from the site for suitable treatment and disposal. • All staff and subcontractors will be required to report any incidents and these will be subject to

[3] Example: Parking areas, service areas, toll maintenance areas. For further details of the Operational Project Facilities (Please see Chapter 3.9 of the ESIA Report.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			investigation and remedial and preventive actions will be taken.
Wastewater Discharge • If wastewater discharge from service areas (petrol filling stations, restaurants, sanitary facilities etc.) is not treated appropriately in line with Serbian and international standards, local receiving streams can be negatively impacted.	Operation of Service Stations Operation of Maintenance Station	The West Morava River has been identified as a sensitive receptor.	<u>Design</u> • Depending on availability on waste treatment facilities, all wastewater from the Operational operational Project Facilities such as service stations and maintenance stations can be connected to the local/municipal sewage network, which should be ended with proper wastewater treatment facility sustains the discharge quality standards. • If wastewaters from Operational Project Facilities are collected in septic tanks, waste water will be regularly transport by a licensed contractor to a nearest licensed wastewater treatment facility, which sustains the discharge requirements.
Flooding • The Motorway was built in the flood plain of the West Morava River. Therefore, the space required for the surface water to expand during the overflow periods is no longer available and the water will be retained upstream. • In increase the impermeable surface area and the rate of surface water flow rates can caused by development of the Motorway. Thus, high storm water flow rates can cause flooding, erosion and habitat degradation. • Hydraulic structures such as bridge, culverts and diversion channels can prevent flow during flood times, thus water flow levels upstream of structure can increase above what would occur in absence of the structure.	Impermeable Surfaces Bridges, Culverts Tree Cutting /Vegetation clearance	The Sensitive receptor is determined as the whole Project area within a 500 m AoI from either side of the Motorway Alignment.	<u>Design</u> • In Design Phase of the Project, Hydrotechnical Study Report was prepared by Jaroslav Cerni to assess hydrogeological framework of the Area of Influence of the Project. Considering this assessment, the project design including river regulation has been conducted and feasible measures have been developed. • In Design Phase, sustainable road drainage and storm water management practices are part of the storm water design process for culverts and drainage stream designs will be implemented and maintained in accordance with international guidelines. • The Soil erosion, Reinstatement and Landscape Management Plan will be developed and implemented. That Plan will reflect the EHS guidelines for Environmental, Health, and Safety

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			Guidelines for Toll Roads in full (as well as Serbian Regulations). <u>Construction</u> • In order to protect against flooding and eliminate more consecutive sharp bends and bank erosion, river regulation (see Chapter 3.3 for detailed information) will be carried out by the Contractor.
Change in River Flow • River diversion may affect the natural water flow due to construction of artificial structures such as new flow channels (designed as by pass channels) proposed for meandering sections, which may result in river flow change (in terms of flow speed) due to slope increase that may cause scouring especially during the high water period or heavy rains, impact on subsurface ground water flow and flood risk for down stream etc.	Channalized section of the Morava River	The West Morava River has been identified as a sensitive receptor.	<u>Design</u> • New river beds will be made curves (and not straight) with asymmetrical cross sections. • Natural materials will be used to protect and strengthen banks (turf and forest plantations) in conjunction with steel structures (gabions) rather than monolithic concrete. • The design will not include any structure blocking the continuity of the flow. <u>Operation</u> • Flow monitoring stations will be established at river diversion locations. Number and position of the flow monitoring stations will be defined during the detailed design phase in corrdination with Serbian Environmental Protection Agency and other relevant state institutions. These flow measurement locations will be part of the early warning system for flood protection.
Change in River Water Qualty • Additional sediment movement such as scouring and river-bank erosion. • Contaminant movement from new diversion channel ditch (i.e. due to scoured sediments and river bank erosion etc.)	Channalized section of the Morava River	The West Morava River has been identified as a sensitive receptor.	<u>Design</u> • The potential locations subject to scouring will be strengthened. For this purpose, as mach as natural materials i.e. gabions will be used at these locations. <u>Construction</u> • In general, no significant water quality change in the river is expected. On the other hand, protection of sediment movement at new section

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			will be minimize the risk. These protection measures are already provided in relevant sections (i.e. erosion, soil etc.) • Water quality monitoring along West Morava River will be performed to assess the performance of the mitigation measures.

Table 6-13. Scoring of Surface Water Impacts in Operation Phase

Impacts Before Mitigation									Impact After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Spillage/Leakage to Surface Water	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	3 **Medium**	-2.75	4 **High**	-11 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	3 **Medium**	-2.25	2 **Low**	-5 **Low**
Wastewater discharge	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	3 **Medium**	-2.75	5 **Definite**	-14 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	3 **Medium**	-2,25	1 **Improbable**	-2 **Low**
Flooding	-1 **Negative**	4 **Regional**	3 **Medium Term**	5 **Very High**	5 **High**	-4.25	4 **High**	-17 **High**	-1 **Negative**	3 **District**	2 **Short Term**	4 **High**	5 **High**	-3.75	3 **Medium**	-11 **Medium**
Change in River Flow	-1 **Negative**	3 **District**	4 **Long Term**	4 **High**	3 **Medium**	-3.25	4 **High**	-14 **Medium**	-1 **Negative**	3 **District**	4 **Long Term**	2 **Low**	3 **Medium**	-3.00	2 **Low**	-6 **Low**
Change in River Water Quality.	-1 **Negative**	3 **District**	4 **Long Term**	4 **High**	3 **Medium**	-3.25	4 **High**	-14 **Medium**	-1 **Negative**	3 **District**	4 **Long Term**	2 **Low**	3 **Medium**	-3.00	2 **Low**	-6 **Low**

6.3.2 Groundwater

6.3.2.1 Construction Phase

Large construction sites, if not properly managed and operated, may lead to significant negative impacts on groundwater quality of the AoI.

During the construction phase, the potential sources of impact can be due to:

- Aquifers can be contaminated in the event of accidental or intentional discharges of hazardous materials to the ground,
- The bedrock aquifers can be impacted by activities such as site clearance, earthworks, spillages and leakages from construction activities,
- All wastewater from construction accommodation sites and other construction facilities and activities poses a risk to water environment if not treated prior to discharge,
- Deep cuttings and excavation are necessity during construction phase. Deep cuttings may have impacts on groundwater regime.

It is important to note that, regulation activities on Morava River as mentioned in Section 6.3.1.1 will be made in order to transfer water flow to prevent flood without distrupting groundwater levels. Furter details on river regulation works within the scope of the Project is given in Chapter 3.3. of the ESIA Report.

Table 6-14 details the impact and mitigations for groundwater quality in construction phase of the Project.

Table 6-15 shows the overall rating of the impact of before and after mitigations. Leakage to Groundwater and Groundwater Contamination due to Wastewater Discharge to Water Environment are considered medium since the magnitude, the likelihood of the impacts and receptor sensitivity are determined as high. Alteration of groundwater level is considered high since the duration, magnitude, the likelihood of the impacts and receptor sensitivity are determined as high. After taking mitigation measures, as shown in Table 6-15, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-14. Impact and Mitigations for Groundwater Quality in Construction Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Leakage to Groundwater • During construction phase, particularly in shallow overburden areas, aquifers can be contaminated in the event of accidental or intentional discharges of hazardous materials to the ground.	Material Storage Waste Storage/Disposal Excavation Excavation for the River Regulation Backfilling Storage, Re-Use and Disposal of Excavations	West Morava River and its tributaries Groundwater Basin in AoI of the Project.	Pre-construction • Fuelling and storage areas will be planned and designed with containment to prevent releases to ground. Construction • Accidental spills will be avoided through good practice and restriction of refueling near watercourses. Safe fueling and gasoline handling procedures will be practiced in the construction areas. Where the construction equipment cannot be moved to fueling points, an impervious surface (such as drip-trays) will be used during refueling of construction equipment to prevent accidental leakage to groundwater. • Hazardous materials will not be stored in excavated areas. • Exposure to hazardous materials in open areas will be kept to a minimum in size and time.
Groundwater Contamination due to Wastewater Discharge to Water Environment • Wastewater generation during construction activities can impact the water quality. Wastewater originated from project facilities and activities used construction works can arise a risk to water environment if it is not treated before discharge	Camp Sites Asphalt Plants Concrete Batching Plants Wastewater Treatment and Disposal	West Morava River Groundwater Basin	Pre-construction • Design of wastewater treatment facilities should sustain water discharge standards provided in Chapter 4 and Appendix – 4. Construction • Wastewater and/or treated wastewater form treatment facilities will not be discharged or collected in any earth based dry stream course or soil pit. • Any underground septic tank either for the collection of wastewater or treated wastewater will be impervious and protected from any leakage.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Integrity of underground septic tanks will be regularly inspected and maintained.
Alteration of Groundwater Level • River regulation may impact groundwater levels. • Use of groundwater during construction works. • If borrow pits are opened deeper than maximum level of groundwater, it may create adversely impact on groundwater.	Excavation of Borrow Pits Excavation for the River Regulation	West Morava River Groundwater Basin	<u>Design</u> • The regulation activities within the scope of this Project is to protect against flooding and eliminate more consecutive sharp bends and bank eroision. • During the design phase, river regulation activities will prioritize to protect and minimize negative impacts on watercourses and stability of the riverbed. • The use of groundwater resources will be subject to approval by the local Authority. The Authority may allow the extraction wells to be drilled and used if the groundwater supply is sufficient. These approvals are based on the availability of the water source. Where the use of ground water is as water source for the construction works (including Project facilities), all permits will be secured before the use. <u>Construction</u> • Groundwater level but excessive dredging below the groundwater level will not be conducted. • Groundwater level will be regularly monitored from existing groundwater wells located near the construction site.Groundwater use shall not exceed the permitted level. • Excavation of the borrow pits can go deeper than groundwater level but excessive dredging below the groundwater level will not be conducted.

Table 6-15. Scoring of Groundwater Impacts in Construction Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Leakage to Groundwater	-1 **Negative**	2 **Municipality**	2 **Short Term**	5 **Very High**	5 **High**	-3.5	4 **High**	-14 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	5 **High**	-2.75	2 **Low**	-5.5 **Low**
Groundwater Contamination due to Wastewater Discharge to Water Environment	-1 **Negative**	2 **Municipality**	2 **Short Term**	5 **Very High**	5 **High**	-3.5	4 **High**	-14 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	5 **High**	-2.75	1 **Improbable**	-5.5 **Low**
Alteration of Groundwater Level	-1 **Negative**	2 **Municipality**	5 **Permanent**	5 **Very High**	5 **High**	-4.25	4 **High**	-17 **High**	-1 **Negative**	2 **Municipality**	2 **Short Term**	5 **High**	5 **High**	-3.5	1 **Improbable**	3.5 **Low**

6.3.2.2 Operation Phase

Potential impacts on water resources during operation/use of the Motorway are generally more limited than construction phase. Table 6-16 details the impact and mitigations for groundwater quality in operation phase of the project.

New diversion channels will be constructed at the flood plain section (alluvium deposits) of the West Morava River. Geologically, the river-bed of the West Morava River is the surficial part of the shallow aquifer. Due to this fact, the geological characteristics of the new channel same as with the existing river ditch.

Soil quality assessment in the project AoI indicates that there are elevated level of contaminants along the basin. Literarture shows that these elevated contaminant leves are caused by flood sediments either sourced by natural geogenic sources found in West Morava River Basin and/or anthropogenic sources such as mining activities located upper section of the basin. Therefore, existing surface and ground water quality in the basin already defined by these sources. Therefore, no quality cahnge is expected on groundwater. On the other hand, ground water quality monitoring shoyld also be included in parallet to the water quality monitoring along West Morava River in order to assess the performance of the mitigation measures.

Table 6-17 shows the overall rating of the impact of before and after mitigations. Accidental Spillage and Surface Runoff Contaminated Water is considered medium since the magnitude and the likelihood of the impacts are determined as high. After taking mitigation measures, as shown in Table 6-17, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-16. Impact and Mitigations for Groundwater Quality in Operation Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Accidental Spillage and Surface Runoff Contaminated Water • Runoff from the road pavement which can contain some degree of silt/dust and pollutants from atmospheric deposition, vehicle emission as well as from possible accidental road spillage incidents can impact quality of groundwater locally.	Movement of the vehicles Crashing	West Morava River and its tributaries Groundwater Basin	Operation • In the event of a major spillage accident, site assessment studies will be carried out in the spillage area and monitoring requirement will be determined accordingly. • Storm water collection channels and ponds are regularly (visually) inspected for its integrity.

Table 6-17. Scoring of Groundwater Impacts in Operation Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Accidental Spillage and Surface Runoff Contaminated Water	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	3 **Medium**	-2.75	4 **High**	11 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	3 **Medium**	-2.25	2 **Low**	-4.5 **Low**

6.4 Air Quality and Climate

Air quality impacts are expected to occur during the construction and operation phase of the Project.

During construction phase of the Project, impacts to the air quality may result from but not limited to:

- outdoor machinery,
- road construction,
- construction vehicle and equipment,
- transportation,
- emissions caused by construction facilities (i.e. borrow pits, quarries, crushers, screen plants, asphalt plants and batch plants).

On the other hand, the operation phase of the Motorway, major air quality impacts may result from traffic generation.

As a result of environmental baseline studies, sensitive receptors were determined in Chapter 5 of the ESIA Report. Based on the baseline air quality information, the impact on the sensitive receptors was determined and these impacts, together with mitigation methods, are detailed in the Table 6-19 and Table 6-20.

6.4.1 Construction Phase

The construction activities may cause negative impacts on air quality and climate throughout the construction in case inadequate mitigation measures taken.

The Project will extend along an approximately 112 km route and there will be several emission sources on the Proposed Motorway Route. During construction phase, all activities including pre-construction land arrangement, quarry and borrow pit, crushing plants, batch plants, asphalt plants, road construction activities and construction equipment and vehicle movement such as cement mixers, trucks, backhoes, asphalt pavers etc. are sources of air emission.

Significant pollutant will be dust generated from construction activities mentioned above, and the release of engine emissions (such as NO_X, SO_X, particles, CO, VOC etc.) from construction equipment and vehicles.

Detailed emission source list including the location on the Proposed Motorway Route, emission calculations and air modelling methodology are given in Air Quality Modeling Report (see Appendix-8).

Air Modeling studies were carried out on dust parameters for construction activities. Air pollution contribution values (APCV) of PM_{10} and PM deposition, determined from the modeling studies. PM_{10} Air Pollution Contribution Values (APCV) and total pollution values which are calculated according to background monitoring. The results are shown in Table 6-21.

Table 6-18. Construction Phase APCV Determined from the Modeling Studies

Parameter	Period	Maximum APCV (µg/m³)	Limit Values(µg/m³)		
			National Limit Values	EU Limit Values	WHO Limit Values
PM 10	24 Hour	14,2	50	50	50
	1 Year	2,36	40	40	20
PM 2,5	24 Hour	1,27	-	-	25
	1 Year	0,26	-	20	10

In accordance with Table 6-18, daily and yearly APCV of PM_{10} and $PM_{2,5}$ to be originated from construction operations are comply with the national and international standards for all periods.

Table 6-19 details the impact and mitigations for the air quality and climate in the Construction Phase of the Project.

Table 6-20 shows the overall rating of the impacts before and after mitigations. Dust generation is considered medium since the magnitude and the likelihood of the impacts and receptor sensitivity are determined as high. After taking mitigation measures, as shown in Table 6-20, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-19. Impact and Mitigations for Air Quality and Climate in Construction Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Dust Generation • Use of unpaved road network during construction works are likely to cause dust. • Due to the high wind speeds occurring in the region, the potential for dust generation increases further, if there are no natural obstacles in the AoI. • Demolition of existing buildings located on the Project alignment can be a dust source. • Use of dusty construction materials. • Outward movement of more than 50 HDVs per day. • Transport, storage and disposal of excavation and residual filling materials and storage of filling and backfill materials. • Concreate batching plant operation.	Camp Sites Material Storage Excavation Backfilling Storage, Re-Use and Disposal of Excavations Material Spreading/Rolling/Compaction Asphalt Concrete Wearing Crushing Machinery and Equipment Asphalt Preparation Concrete Concreate Batching Transportation Demobilization of Equipment and Machinery Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Barrow Pits	All measurement locations[4] used to determine baseline air quality, i.e. the entire buffer area, are determined as sensitive receptors. (see Chapter-5)	<u>Construction</u> • The Project Environmental Management Plan (EMP) will include Air Quality Management procedures that will be implemented. • If there is a requirement for unpaved roads close to settlements to be used by vehicles, surface-binding agents may be used, options include salt to or gravel coat the road. • 20kph speed limit will be applied on unpaved surfaces close to settlements. • Vehicles will be kept clean, so that no dirt is carried on the vehicles into and out of the area. • Where the mitigation measures are inadequate, surface-binding agents will be used in exposed earthworks. • Localized watering/dampening and activity-specific watering/dampening will be used to reduce localized dust emissions. • Stockpiling of stripped surface material, eg. rock, sand and soil, stockpiling of unwashed materials, will be limited. Stockpiles should be kept as enclosed as possible or covered. • Stockpiles will be placed as far away from receptors as possible. • Design of stockpiles will be optimized to maintain a low profile without a sharp change in shapes.

[4] The baseline measurements were made at 42 different points for all Sections in the nearest settlements along the Proposed Motorway Route which were selected based on the proximity to the potential pollution sources of the Project such as Motorway itself and the project facilities. Since the results of the measurements for PM10, PM2.5, SO2 and NO2 do not exceed the Serbian (Degree on monitoring conditions and air quality requirements, "Off. Gazette of RS" No. 11/2010, 75/2010 and 63/2013) and WHO limit values (WHO Ambient Air Quality Guideline), all measurement locations along the entire AoI, are determined as sensitive receptors and the impact assessment will be carried out accordingly.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Wind breaks or dust protection systems (including sprinklers) should be built around the main construction activities where necessary and, if possible, near potentially dusty works to minimize the impact of nearby residential receptors. • Good practice should be applied for selection of Project vehicles that meet the latest emission standards (e.g. EURO 3 or US EPA Tier 2 emission standards) and maintained in a reasonable working order. • When not in use, vehicles should be shut down unless it is due to health and safety reasons (e.g. maintenance of the air conditioner). • Air pollution control equipment (e.g. baghouse) should be installed and operated for the asphalt plants. • During transportation on public roads, the excavated materials will be covered with nylon canvas or suitable materials with a grain size greater than 10 mm in public roads as good practice. • To reduce fugitive dust emission during vehicle operation on public roads and at construction sites, service roads and quarry/material borrow/storage sites, dust suppression methods (i.e. watering with water trucks, applying nontoxic chemicals, speed limits for mobile vehicles, using well-maintained vehicles/equipment) should be used.

Table 6-20. Scoring of Air Quality and Climate Impacts in Construction Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Dust Generation	-1 Negative	1 Project Site	4 Long Term	4 High	5 High	-3.50	5 Definite	**-18 Medium**	-1 Negative	1 Project Site	4 Long Term	3 Moderate	5 High	-3.25	2 Low Probability	-7 **Low**

6.4.2 Operation Phase

During the operation phase of the Project, air quality and climate may be impacted negatively in case inadequate mitigation measures be taken.

Section-1 of the Morava Corridor Motorway expected to start operation in year 2021.

The main pollution source during the operation phase is exhaust emissions of the vehicles along the Proposed Motorway Route. The calculations of the emissions caused by traffic along the Motorway are divided into three sections as:

1. Pojate – Kruševac
2. Kruševac (Koševi) – Adrani
3. Adrani - Mrčajevci - Preljina

According to data derived from the Roads of Serbia for the year of 2018, the value of average annual daily traffic between Pojate and Preljina ranges from 3,609 vehicles/day (section Ratina - Kraljevo (Kamidžora)) to 12,743 vehicles/day (section Mrčajevci - Preljina). The average value, which accounts for the lengths of individual sections, is 8,205 vehicles/day.

Modeling studies are carried out for NO_2, SO_2, PM_{10}, $PM_{2,5}$ and CO parameters for operation activities. APCV estimated in the measurement points and the associated limit values are presented in Table 6-21.

Table 6-21. Operation Phase APCV Determined from the Modeling Studies

Parameter	Period	Maximum APCV (µg/m³)	Limit Values(µg/m³)		
			National Limit Values	EU Limit Values	WHO Limit Values
SO_2	1 Hour	130.50	350	350	-
	24 Hour	26.33	125	125	20
	1 Year	7.40	50	50	50
NO_2	1 Hour	203.98	150	200	200
	Exceedance	1	can be exceeded 18 times	can be exceeded 18 times	-
	24 Hour	41.16	85	-	-
	1 Year	11.57	40	40	40
PM_{10}	24 Hour	1.45	50	50	50
	1 Year	0.41	40	40	20
$PM_{2,5}$	24 Hour	1.45	-	-	25
	1 Year	0.41	-	20	10
CO	Maximum Daily 8-Hour Mean	100.19	10,000	10,000	10,000
	24 Hour	20.21	5,000	-	-
	1 Year	5.68	3,000	-	-

All parameters complied by the national and international limit values[5]. Only NO_2 parameter slightly exceeds hourly EU and WHO limit value. National standards and EU standards allows to exceed hourly limit values 18 times in a year. Project exceeds hourly NO_2 limits one time. Therefore, modeling studies complies with standards. Only WHO NO_2 limit values slightly exceeded in operation phase.

Table 6-22 details the impact and mitigations for air quality and climate in operation phase of the Motorway.

Table 6-23 shows the overall rating of the impact of before and after mitigations. Impact of the gaseus emissions is considered medium since the receptor sensitivity is determined as high. The modelling study indicates that the impact of gaseus amissions during operation phase of the project is limited and not significant. No project specific mitigation measures are suggested for this impact. In general, it is envistaged that with the implementation of new technologies on mobile sources (i.e. increased engine efficiency, use of electrical cars, and implementation of low emissions standards etc.) emissions will be reduced in time. On the other hand, ambient air quality montitoring is required to assess the contribution of the project.

[5] Degree on monitoring conditions and air quality requirements, "Off. Gazette of RS" No. 11/2010, 75/2010 and 63/2013) and WHO limit values (WHO Ambient Air Quality Guideline)

Table 6-22. Impact and Mitigations for Air Quality and Climate in Operation Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Gaseous Pollutant Generation • It is predicted that there will be an increase in the number of vehicles along the Proposed Motorway Route and since the traffic uses the main arterial roads, it will affect the air quality within the wide traffic network because of increase in concentrations of gaseous pollutants.	Movement of the vehicles	All measurement locations used to determine baseline air quality, i.e. the entire AoI are determined as sensitive receptors. (see Chapter-5)	Operation • No mitigation is required. • Continuous air quality monitoring is suggested.

Table 6-23. Scoring of Air Quality and Climate Impacts in Operation Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxl**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Gaseous Pollutant Generation	-1 **Negative**	2 **Municipality**	2 **Short Term**	3 **Medium**	5 **High**	-3.00	3 **Medium**	-9 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	3 **Medium**	5 **High**	-3.00	3 **Medium**	-9 **Medium**

6.4.3 Overview of Greenhouse Gas Emissions Approach

Project activities indicate that the most relevant greenhouse gas (GHG) emitted from the project is Carbon dioxide (CO_2). As the common best practice, GHG emissions are calculated for construction and operation of the phases in accordance to the Greenhouse Gas Protocol[6]. In this respect, GHG calculations are based on three-scope process. These are;

- Scope 1 covers the direct emissions from sources used or controlled by the Contractor.
- Scope 2 emissions include indirect emissions from electric power taken from the grid; and
- Scope 3 emissions include emissions from sources that are neither owned nor directly controlled by the construction company but related to the project activities.

Available data from project plans, public sources, and previous studies have been used. Data gaps are filled with reasonable assumptions to estimate approximate level of the emissions for a given activity.

6.4.3.1 Construction Phase

Relevant activities and calculated CO_2 levels of each scope during construction are given in Table 6-24 below. The Table also includes key assumptions. The construction period is 4 years. In general, a conservative calculation method is considered on the individual assumptions regarding Greenhouse Gas Protocol. In total, the emissions over the entire construction period are about 390,259 tCO_2. With by far the greatest portion occurring under Scope 1 (381,270 t). Scope 2 and Scope 3 are being very minor in comparison. The average combined annual CO_2 emission for the construction period is 97,564 tCO_2/year

[6] The GHG Protocol is developed by World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) to establishe comprehensive global standardized frameworks to measure and manage greenhouse gas (GHG) emissions from private and public sector operations, value chains and mitigation actions.

Table 6-24. Major GHG Emissions during Construction Period

Scope	Project Activity	Description	Emission (tCO_2)
Scope1	Road and River Regulation construction*		
	• Construction machinery- (including generators, project-related vehicles, etc.) • Asphalt and concrete production • transport-hauling of bulk construction materials*	- ROADEO[7] "Road Emissions Optimization: A toolkit for greenhouse gas emissions mitigation in road construction and rehabilitation" is used	381,270
Scope 2	Grid electricity use		
	• Worker Accommodation Camps (approximate 3000 workers in 3 camps)	- Consumption avg 500 kWh/person - 4 years construction period - Grid emission factor for Serbia is 1.099 tCO2/MWh[8]	6,594
Scope 3	Indirect emissions from the off-site production of material		
	• Transport of bitumen	- 300 t/day; - Travel distance 500 km (Pancheva Refinery) - Emission factor 0.280 kg/km	1,725
	• Transport of cement	- 250 t/day; - Travel distance 250 km (nearest cement producers) - Emission factor 0.280 kg/km - diesel[9]	670
Total			**390,259**

* Excavated materials from the river regulation work are planned to be used for road construction. Wit this intention, GHG emissions from the River Regulation Work is included in the total GHG emissions.

6.4.3.2 Operation Phase

Relevant activities and calculated annual CO_2 levels of each scope during operation of the motorway are given in Table 6-25. The table also includes key assumptions. The assumed operation period is taken between the years 2023 and 2045. The average combined annual CO_2 emission for all scopes is about 35,000 tCO_2/year.

It is considered that the Scope 3 emissions will occur only the additional traffic induced by the Motorway, as based the traffic information given in Chapter 3. The Motorway will also result in a certain savings of emissions such as engine improvements for new model cars as well as

[7] Microsoft Excel-based Road Emission Optimization Toolkit has been developed as part of an effort to assess the reduction of GHG emissions in the road construction industry, ESMAP, World Bank Group

[8] The Institute for Global Environmental Strategies (IGES), 2019

[9] WRI, 2019

fuel change. These savings cannot be accurately estimated at this time, and are thus not considered quantitatively in these calculations.

Table 6-25. Major Annual GHG Emissions during Operation Period

Scope	Project Activity	Description	Emission (tCO_2)
Scope1	Road maintenance		
	• Road maintenance (approximately 5 km/year)	- 5% of construction GHG	26,534
Scope 2	Grid electricity use		
	• Lightning of cross roads	- Approximately 1,000 lamps for 12 cross roads - 200 W / Lamp - 60% efficiency - Grid emission factor for Serbia is 1.099 tCO2/MWh	4,396
Scope 3	Indirect emissions from the off-site production of material		
	• Increase in traffic	- Estimated maximum daily bases traffic increase between the years 2018 to 2045 is approximately 11,000, which corresponds to 400 vehicle/day/year. - App. 90% personal cars - App. 10% light and heavy vehicles - 0.240 kg CO_2/km - gasoline - 0.280 kg CO_2/km – diesel	3,989
Total			**34,919**

6.4.3.3 Alternative Analysis

According to Principle 2 of the Equator Principles 1, an alternative analysis (to determine less GHG-intensive options) is required for projects emitting more than 100,000 t of CO_2 equivalent annually within combined Scopes 1 and 2. Per the preceding calculations, the combined Scope 1 and 2 emissions for the construction phase of this Project is about 97,000 tCO_2 per year and for the operation phase it is about 30,000 tCO_2 per year. Both annual values are below the threshold limit of 100,000 tCO_2. In this respect an alternative analysis is not considered for the Project. On the other hand, the calculated annual emissions during construction are based on draft-stage design information and the overall averages are based on 4 years construction phase. During construction of the Project, a year-by-year evaluation of emissions may exceed the 100,000 tCO_2 threshold value in the peak construction periods in particular. Therefore, a further update and breakdown of the GHG emission calculations will be warranted once further

design details and project schedule are confirmed[10]. Furthermore, following are suggested to be considered during detailed design and construction works.

- Minimization of unnecessary earthworks and minimization of travel distances. The main project target is to use excess materials at the same location for different requirement of the project. For example, stripped top-soil will be used for arrangement of the road bunkers and the use of excess materials at borrow areas for site arrangements and backfilling.
- The use of adequate construction equipment. This involves not only thick pavement layers (paving machine, compactor) but also earthworks (grader, compactor)
- The mobilization of qualified workmanship
- The proper management of material production and laying (avoiding
- unnecessary stops during laying operations)
- The selection of adequate materials (to avoid deformation and rutting under traffic load)
- Minimization fuel use and use of more efficient engines end equipment's.
- Equipment's and structures used for the road safety may have significant indirect GHG emission share. For example; construction of safety barriers is can be a major GHG emission source (upto 25%) in a road project. These emissions vary depending on the barriers'type and materials. The principle of the alternative practice is to:
    - Limit the construction of safety barriers to the strict minimum required for safety purpose by optimizing the project
    - Select, where possible, lower emitting materials (from 4 to 23% of GHG emissions due to pavement in the case of steel or concrete barriers and from 2 to 12% in the case of wood barriers)
    - There may be a significant interest in limiting the use of steel and concrete barriers where possible through adequate and safe design (safety zone cleared of obstacles, removal of aggressive spots, etc.), or to replace it by wood barriers when traffic volumes and loads are low enough. The potential impact could be upto 50% of the length of barriers, or from 2 to 12% of the emissions of pavement (depending on the selected structure). This requires anticipation in the geometric design, and efforts during the design phase
- Properly assess the traffic load which the pavement will have to bear during its life. This includes an adequate assessment of overloading, which in turn may result in stronger (thicker) pavement structures than in the absence of overloading. The

[10] Equator Principles, June 2013

expected benefit is to avoid premature failure and reconstruction, which will be ineffective in terms of GHG emissions.

- Assess the potential use of warm and cold asphalt aggregate processes. The literature shows that the total life-cycle of a pavement construction (binder, aggregate, mixing process, transport, processing) with a cold process could reduce GHG emissions from about 30-35 %.
- Assess the potential use of recycled materials. This technic can also be considered for the operation of the motorway, in particular, during maintenance of the road.
    - Cement concrete pavements can be recycled in place by breaking the existing concrete and overlaying it with a new asphalt or cement concrete surface. Alternatively, the existing concrete may be broken up, removed and crushed into aggregate sizes at the mixing plant and used as recycled concrete with additional cement.
    - Reclaimed Asphalt Pavements (RAP) can be recycled:

      In hot mixing plants at a recycling rate generally close to 10% in elevator foot, corresponding to the maximum acceptable threshold in most international specifications and standards. Nevertheless, this level in specifications is being updated by taking into account possible higher recycling rates that can possibly be reached now, depending on recent improvements in mixing plant technology:

      Up to 25% into the mixer,

      Up to 35% into dryer recycling ring,

      Up to 50% in case of two drums in parallel, this is the most advanced technology for hot asphalt recycling, nevertheless available only for very few plants at the present time.

      In hot surface recycling/thermo-regeneration, this technology is usable only for wearing courses on a maximum thickness of 40 mm;

      Cold in mixing plant or on-site by adding as binder either bitumen emulsion (or foam bitumen), or cement or a mix of bituminous emulsion and cement. This technology is very attractive in terms of mitigation of GHG emissions as it permits a recycling rate up to 100% of in-site existing materials, which is significantly higher than recycling technology in hot mixing plants. Nevertheless, the elastic modulus and structural efficiency of these materials remain relatively weak and cause an increase in the thickness of the corresponding layer by about 30% when compared to traditional hot asphalt materials. Also in-site cold recycling requires a sufficient homogeneity of

existing pavement structures, which is not the case for most job sites, causing quality defects.

- Design of the Motorway embankments and drainage system needs to be suitable for the potentially more intense (though less frequent) rainfalls;
- Measures should be reviewed periodically by the Project Operator as part of the environmental management system to promote water conservation at the Service Areas (eg recycling/re-use of any car-wash waters, rainfall recovery/re- use for onsite irrigation).

6.4.3.4 Monitoring & Reporting Requirements

According to Annex A of the Equator Principles, project developers/ borrowers must quantify Scope 1 and 2 GHG emissions in accordance with internationally recognized methods and goods practices. These Scope 1 and 2 emission levels must then be publicly reported annually if they exceed 100,000 tCO_2 equivalent annually during the operational phase of the project. Whilst not obligatory, borrowers are encouraged to voluntarily report their emissions if exceeding 25,000 tCO_2 equivalent annually. In the case of this Project, per the above calculations and assumptions, the Scope 1 and 2 emissions during operations are estimated to be about 30,000 tCO_2 that is above the threshold. In this respect, a public reporting is suggested for the operation of the Motorway.

In order to contribute to enforcement of EU Acquis in a climate change field and fulfilment of obligations under the UNFCCC, the Government of Serbia has launched an EU twinning project “Establishment of a mechanism for implementation of the Monitoring and Reporting of GHG Emissions (MMR)”. The main goal of the project is the establishment and maintaining of a system and processes for collection and storage of and report on climate change related data and information.

6.4.3.5 Climate Change Adaptation

The Republic of Serbia has been part of the United Nations Framework Convention on Climate Change (UNFCCC) since 2001 and the Kyoto Protocol since 2008 as a developing country (non-Annex I country). The Republic of Serbia defines the Climate Change (CC) as a global challenge that requires a rapid and decisive response from every country. It is anticipated that the consequences of climate change could have material, financial impacts as well as human loss in The Republic of Serbia. In this respect, The Republic of Serbia has developed “The National Climate Change Strategy” (NCCS) in 2019 in order to establish a strategic framework for climate action and including adaptation options addressing the climate risks. NCCS is also an indicator that RS is moving forward in the fulfilment of both its international commitments

and national objectives. The Paris Agreement11 is the major basis of the NCCS. Prior to the Paris Conference, Serbia submitted its Intended National Determined Contribution (INDC) with the pledge to reduce greenhouse gas emissions of 9.8% by 2030 compared to 1990 levels (Ref 1).

The Second National Communication (SNC) and the draft National Adaptation Plan (NAP) of Serbia indicate that the average temperature increase between the period 1960-2012 is about 0.3°C per decade. Furthermore, developed climate scenario models anticipate future temperature increase estimates varies in the range from 3.8 to 4.6°C (depending on climate scenarios) (Ref 2). In parallel to temperature increase, a significant decrease in precipitation amount compared to the reference period (1961-1990) during the most of seasons (except in spring) is projected for the period of 2071-2100 over the majority of the country. This decrease is projected up to 30% in the summer season across almost the whole territory of the Republic of Serbia. Moreover, the impacts of climate change may, among other, jeopardize infrastructure, agriculture productivity, water availability and public health. Vulnerability and Adaptation options for the purpose of the Strategy were identified also based on the Second National Communication (SNC) and the draft National Adaptation Plan (NAP). These documents underline three most vulnerable sectors:

1. Agriculture – food production:
2. Forestry – bioenergy:
3. Hydrology and Water Resources – hydro-electric production:

As given in the Draft Low Carbon Development Strategy Action Plan (LCDSAP) dated December 2019, total GHG emissions in 2015 estimated as to 61.233 kt CO2eq, which represents 2,3% decrease of emissions compared to the year 2010 and 24,9% compared to 1990.

Energy is the major GHG emitting sector in the country with a share of 80,6% in overall emissions, of which, the sub-sector Energy Industries that contains public electricity and heat production, transport, refineries and manufacturing of fuels. In the country there is a decreasing trend for GHG emissions since 1990 (21,4%) due to lower production in general. Structural changes in the sector are other cause of the decrease. Compared to 2010, emissions have been decreased by 5% in 2015.

[11] The Paris Agreement, adopted under the United Nations Framework Convention on Climate Change (UNFCCC) in 2015 and entered into force on 4 November 2016. It sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. Previously, the European Union (EU) adopted the 2030 Climate and Energy Framework; its targets entail a GHG reduction of 40% by 2030 compared to 1990 levels.

GHG emissions in sub sectors/categories of the energy sector in 2015 were:

- In Transport sector the GHG emissions are 31,4% higher than in 1990 and 11,1% below the 2010.
- GHG emissions from Manufacturing Industries and Construction are 46,2% lower than 1990 values and 19,3% lower than 2010. This decrease is the consequence of the decrease in manufacturing industry and, to some extent, to the increase in the biomass consumption (137% higher than 2010).
- GHG emissions in the “Other sectors”, (commercial, residential and other institutional buildings and fuel combustion in agricultural stationary equipment) are 61,5% lower than 1990 values and 22% lower than 2010.
- Fugitive GHG emissions i) from mining and post-mining activities, ii) oil and gas production, and processing (the main source of CH4 emissions in the Energy sector) are 34,3% lower than in 1990 values and 4,7% higher than in 2010.

Four mitigation scenarios are developed under the LCDSAP in order to develop the strategy as well as to identify the indicators for the achievement of the climate vision. The models used for all scenarios are also covers the EU targets regarding 2020, 2030 and 2050 in addition to the respective policies and measures, besides national requirements. The base year used for expression of the GHG emission reduction is 2010.

Those scenarios are:

- Scenario 1: Baseline scenario regarding current trend plus implementation of the EU-Emission Trading Scheme.
- Scenario 2: Implementation of all EU acquis in whole is transposed and implemented,
- Achieving 33% GHG emissions compared to 1990; With the use of Renewable Energy Sources (RES) by 2030 and implementation of Enhanced Energy Efficiency (EEE), as the Republic of Serbian contribution to the EU target (Contribute to 1,50C goal).
- Scenario 3: The Republic of Serbia individually achieves the EU 2030 targets (meaning -40% GHG emissions compared to 1990; with the use of RES by 2030 and increased level of EEE.)
- M4 scenario: Serbia achieves 80% GHG cuts in 2050 compared to 1990 levels (aligned with the European Commission communication on climate neutrality).

Action Plan annexed to the LCDSAP covers two mitigation items (Item 11 and Item 14), which are directly related to the Project. According to these items

- (Item 11) New vehicles are becoming more efficient based on CO2 standards that are in effect in EU, of which Serbia benefits indirectly. The EU has adopted Regulation

443/2009 defining targets for CO2 emissions of 130 gCO2/km in 2015 and 95 gCO_2/km in 2021. In 2019, the EU targets for 2030 have been agreed, emissions have to decrease by 37.5 % by 2030 compared to 2021 levels for cars and by 30 % for vans. The EU, for the first time in 2019, agreed also on the reduction target for trucks and buses, for which the average emissions of new vehicles in 2030 will have to be 30 % lower than in 2019. Based on these targets, vehicles in Serbia will become more efficient even if Serbia is not part of the EU, since the same vehicles are sold in Serbia as in EU. Serbia needs to align its legislation to the EU legislation no later than by 2021.

For the improvement of efficiency of vehicles, it is important that Serbia controls the import of used cars and their use, especially for very old vehicles. There is a risk that, due to upcoming electrification, even more old vehicles from the EU will be imported to Serbia, limiting the effects of the legislation on new vehicles. That is why the legislation on yearly taxation has to change in the way that it will stimulate buying vehicles that are more efficient and emits less CO_2 per km. The Law on taxes on the use, possession and carrying goods (Official Gazette of the Republic of Serbia no. 26/01, 80/02, 43/04, 132/04, 112/05, 114/06, 118/07, 114/08 and 31/09) defines yearly tax for vehicles that is dependent on the volume of the engine and age of the vehicle. Discount for older cars needs to be gradually removed, since they have much greater negative impact on the environment than new cars. To support low CO_2 emissions vehicles, CO_2 emissions should be included in the calculation of level of the yearly registration tax, with lower taxes for lower emitting cars. For a faster penetration of electric vehicles, subsidies would need to be offered, at least in the early stage of market development. Furthermore, the Public Procurement Directive, aligned with the Directive on the Promotion of Clean and Energy Efficient Road Transport Vehicles, recognizes that public procurement can be a powerful market mover for the introduction of new technologies, including of clean and high energy efficient vehicles. This is not because it can have direct large impact on emissions reduction, but because of its large demonstration effect. Serbia will have to invest in charging infrastructure for electric vehicles and also for other alternative fuels (natural gas). This will, partially, have to be supported by the Government (through energy efficiency fund).

- (Item14) Freight transport is necessary for economic growth and normally witnessing higher growth rates than GDP. As such, in a context where Serbia's GDP will continue to grow and freight more than the GDP, it is important to find modalities to limit from this source, without necessarily limiting freight and growth. Serbia lies on X. and XI. Corridors experiencing high freight flows also from abroad. These will heavily increase when Serbia joins the EU, as has also been experienced by other countries joining EU, due to free trade and movement of goods.

  Therefore, in order to support promotion of sustainable freight transport it is important to implement modulation of yearly infrastructure charges for HDVs according to CO_2

emission performance standards and implement road charging for freight vehicles based on EURO emission standard.

Furthermore, the updates of Strategy of railway, road, inland waterway, air and intermodal transport development of Republic of Serbia 2008-2015 has to be prepared to assess different aspects of transport development and Serbia's needs and possibilities to define optimal infrastructure development path for the future in order to ease the future pressure on road infrastructure.

With the implementation of these mitigations, it is aiming to save total of 908 ktCO2 eq per annum by the year of 2030.

6.4.3.6 Assessment of GHG Contribution

The GHG estimates demonstrates that GHG contribution of the project during construction is about 97 ktCO2 per year, which is approximately 0,2 % of the estimated total emissions of the Republic of Serbia for the year 2015. By considering the four year construction period, the GHG contribution of the construction works will be limited and will not cause a major change for the national targets. Furthermore, the Project itself is the one of the target project to help to increase the energy efficiency objective of the action plan, in particular during the operation phase of the project. The impact of the GHG emissions are considered minor and negligible.

6.5 Noise and Vibration

Noise levels around the AoI will increase during the construction temporarily and operation phase of the Project. The difference between the baseline noise levels and the noise levels during Project implementation will determine the impact and its significance. Table 6-32 and Table 6-39 detail the impact and mitigations for the noise and vibration in the Construction Phase and Operation Phase of the Project.

Modelling study was performed to determine noise and vibration level both for construction and operation phase of the Project. Receiver (R) coordinate information used in Acoustic Report of the modelling study is given in Table 6-26.

Table 6-26. Receiver Information

Receivers	Comments	Extent	Sensitivity	Importance	Distance to road axis (m)	Road Points (Km)	Coordinate, X	Coordinate, Y
1	Residential buildings	Site	Medium	Medium	380	0	21,44011567	43,75122803
2	Commercial	Single	Low	Low	110	0-1	21,44186074	43,74192927
3	Residential buildings	Site	Medium	Medium	520	3-4	21,42976922	43,72001481
4	Residential buildings	Site	Medium	Medium	130	8	21,41243567	43,6852153
5	Residential buildings	Site	Medium	Medium	375	9-10	21,40308767	43,67331834
6	Residential buildings	Site	Medium	Medium	470	10-11	21,38126393	43,67474381
7	Residential buildings	Site	Medium	Medium	500	13	21,37153381	43,65392251
8	Residential buildings	Site	Medium	Medium	710	17	21,36115823	43,62354901
9	Residential buildings	Site	Medium	Medium	100	17-18	21,36572827	43,61681742
10	Residential buildings	Site	Medium	Medium	390	23	21,29667742	43,61026439
11	Residential buildings	Site	Medium	Medium	55	25-26	21,27045309	43,59580577
12	Residential buildings	Site	Medium	Medium	175	28	21,24241451	43,58600911
13	Residential buildings	Site	Medium	Medium	300	30-31	21,22182492	43,60224038
14	Residential buildings	Site	Medium	Medium	720	32-33	21,19832145	43,61388088
15	Residential buildings	Site	Medium	Medium	350	36-37	21,14714958	43,61300376
16	Residential buildings	Site	Medium	Medium	540	38-39	21,13068071	43,61912856
17	Residential buildings	Site	Medium	Medium	25	43-44	21,07279784	43,62641037
18	Residential buildings	Site	Medium	Medium	40	45	21,05515895	43,62606008
19	Residential buildings	Site	Medium	Medium	150	46-47	21,03972995	43,63077563
20	Residential buildings	Site	Medium	Medium	190	48	21,02440913	43,63307597
21	Residential buildings	Site	Medium	Medium	20	50-51	20,9972607	43,6248578
22	Residential buildings	Site	Medium	Medium	300	50-51	20,99784337	43,62190447
23	Residential buildings	Site	Medium	Medium	40	51-52	20,98103379	43,6306549
24	Residential buildings	Site	Medium	Medium	40	52-53	20,97078178	43,63135506
25	Residential buildings	Site	Medium	Medium	10	54	20,95400673	43,6349962

Receivers	Comments	Extent	Sensitivity	Importance	Distance to road axis (m)	Road Points (Km)	Coordinate, X	Coordinate, Y
26	Residential buildings	Site	Medium	Medium	25	56-57	20,92724325	43,64372526
27	Residential buildings	Site	Medium	Medium	30	58	20,91133288	43,65390663
28	Residential buildings	Site	Medium	Medium	60	60	20,89165185	43,66116494
29	Residential buildings	Site	Medium	Medium	190	61-62	20,8750816	43,66141816
30	Residential buildings	Site	Medium	Medium	20	63	20,85612756	43,66265644
31	Residential buildings	Site	Medium	Medium	85	66	20,83094431	43,67790181
32	Residential buildings	Site	Medium	Medium	100	68-69	20,80320696	43,68858119
33	Residential buildings	Single	Medium	Medium	140	70	20,7871039	43,69833968
34	Residential buildings	Site	Medium	Medium	120	72	20,76654634	43,70637611
35	Residential buildings	Site	Medium	Medium	120	74	20,75229284	43,72259825
36	Residential buildings	Single	Medium	Medium	60	74-75	20,74979203	43,72686968
37	Hotel	Single	Medium	Low	180	75-76	20,73880279	43,72996946
38	Residential buildings	Site	Medium	Medium	350	76	20,73626687	43,73629339
39	Residential buildings	Site	Medium	Medium	230	77-78	20,72019148	43,74036096
40	Residential buildings	Site	Medium	Medium	900	79	20,68411075	43,74585837
41	Residential buildings	Site	Medium	Medium	90	80-81	20,70126681	43,75002828
42	Residential buildings	Site	Medium	Medium	140	80	20,6630601	43,75450502
43	Residential buildings	Site	Medium	Medium	750	80-81	20,66982602	43,76199799
44	Residential buildings	Site	Medium	Medium	650	81	20,64882123	43,7636101
45	Residential buildings	Single	Medium	Medium	390	82	20,65682249	43,7722241
46	Residential buildings	Single	Medium	Medium	320	84	20,63052744	43,78278467
47	Residential buildings	Site	Medium	Medium	40	87	20,59837392	43,79070763
48	Residential buildings	Site	Medium	Medium	380	89	20,57821617	43,80272715
49	Residential buildings	Single	Medium	Medium	580	90-91	20,56479579	43,81390457
50	Residential buildings	Single	Medium	Medium	130	95	20,5148306	43,83451111
51	Residential buildings	Site	Medium	Medium	50	98	20,49456125	43,853061

Receivers	Comments	Extent	Sensitivity	Importance	Distance to road axis (m)	Road Points (Km)	Coordinate, X	Coordinate, Y
52	Residential buildings	Single	Medium	Medium	260	103-104	20,43653608	43,87762186
53	Residential buildings	Site	Medium	Medium	75	106	20,41582447	43,88774603
54	Residential buildings	Single	Medium	Medium	40	106-107	20,41233937	43,89400372
55	Residential buildings	Single	Medium	Medium	70	107-108	20,41012081	43,90054694
56	Residential buildings	Site	Medium	Medium	70	107-108	20,40763814	43,90855635
57	Residential buildings	Site	Medium	Medium	160	108-109	20,40261895	43,90983574
58	Residential buildings	Site	Medium	Medium	140	108-109	20,40507555	43,91201844
59	Residential buildings	Single	Medium	Medium	80	109-110	20,39605276	43,91628384
60	Residential buildings	Site	Medium	Medium	710	106-107	20,40427300	43,89262900
61	Residential buildings	Site	Medium	Medium	211	83	43,76726800	20,63514500
62	Residential buildings	Site	Medium	Medium	487	73	43,71067200	20,75822600
63	Residential buildings	Site	Medium	Medium	600	66-67	43,6862280	20,8289360
64	Residential buildings	Site	Medium	Medium	60	60	43,6732750	20,9010080
65	Residential buildings	Site	Medium	Medium	62	53-54	43,6335660	20,9580860
66	Residential buildings	Site	Medium	Medium	30	54-55	43,6431610	20,9485080
67	Residential buildings	Site	Medium	Medium	90	53	43,6315780	20,9638150
68	Residential buildings	Site	Medium	Medium	107	48-49	43,6242360	21,0150470
69	Residential buildings	Single	Medium	Medium	327	42	43,6260830	21,0905230
70	Residential buildings	Site	Medium	Medium	34	25-26	43,6024630	21,2652670
71	Residential buildings	Site	Medium	Medium	461	18	43,6118130	21,3623020

6.5.1 Construction Phase

Although the construction noise is temporary, the noise levels will increase significantly during the construction phase of the Project compared to the baseline condition.

Potential source of noise and vibration impacts may be caused by but not limited to:

- noise and vibrations emitted by machinery, equipment and vehicles used during construction,
- demolition,
- production of gravel and concrete,
- construction works (i.e. earthworks, bridge construction, on-site and off-site transport of materials, etc.)

Therefore, emission of noise and vibrations will affect sensitive receptors (for details of the sensitive receptors see Chapter 5 of the ESIA Report).

Noise Modelling Study was performed to determine noise and vibration level for construction phase of the Project.

Construction Noise

To perform noise modelling study, the quantities of construction machines and equipment that will be required for construction activities were taken into consideration as sources of noise emissions. All of the construction sub-stages were assumed to be held at the same time in a specific construction corridor around main motorway axis and they are defined as area sources. Besides, quarries, concrete plants and asphalt plants were also integrated to the noise model as separate area sources. All noise sources for the construction are defined as area noise sources and machine and equipment are considered as distributed noise sources over defined areas.

Phases of the construction are earthworks, structural works, paving and finishing works. In the worst-case scenario, all the phases of the construction takes place at the time but in different locations.

Construction machine and equipment list and their sound power levels are detailed in acoustic report which gives also methodology of impact assessment. (See Appendix-9).

Table 6-29 below summarizes the details of the noise impact assessment for construction phase.

Table 6-27. Sound Power Level of Construction Phase

Sound Power Level for Each Phase							
	Lw (dBA)	Earthworks		Concrete Works		Finishing	
Machine/Equipment	Lw For Each Equipment	Quantity	Total Lw (dBA)	Quantity	Total Lw (dBA)	Quantity	Total Lw (dBA)
Excavator	104.5	40	120.6	10	114.5	10	114.5
Grader	104.5	10	114.5	-	0	-	0
Truck	103.5	600	131.3	250	127.5	50	120.5
Roller	101.5	2	104.5	2	104.5	15	113.3
Pumps	97.5	10	107.5	30	112.3	10	107.5
Man Lift	101.5	5	108.5	5	108.5	5	108.5
Vacuum Street Sweeper	93.5	4	99.5	1	93.5	1	93.5
Front End Loader	99.5	50	116.5	20	112.6	10	109.5
Mixer	100.5	10	110.5	30	115.3	10	110.5
Paver	105.5	-	0	-	0	12	116.3
Rock Drill	101.5	6	109.3	-	0	-	0
Compressor (air)	99.5	10	109.5	10	109.5	5	106.5
Generator	102.5	60	120.3	50	119.5	30	117.3
Pickup Truck	74.5	45	91.1	40	90.6	80	93.6
Compactor (ground)	96.5	64	114.6	-	0	-	0
Crane	100.6	5	107.6	30	115.3	10	110.6
Hydra Break Ram	103.5	10	113.5	5	110.5	-	0
Total		132.4 dBA		128.9 dBA		124.7 dBA	

Table 6-28. Sound Power Level of Plants

Sound Power Level for Each Phase							
	Lw (dBA)	Asphalt Plant		Batch Plant		Barrow Pit/Quarry	
Machine / Equipment	Lw For Each Equipment	Quantity	Total Lw (dBA)	Quantity	Total Lw (dBA)	Quantity	Total Lw (dBA)
Slurry Plant	101.5	2	104.5	-	0	-	0
Truck	103.5	40	119.6	-	0	-	0
Generator	102.5	1	102.5	1	102.5	1	102.5
Rock Drill	101.5	-	0	-	0	1	101.5
Grader	104.5	-	0	2	107.6	1	104.5
Dump Truck	103.5	-	0	25	117.5	25	117.5
Mixer	100.5	-	0	40	116.5	-	0
Pumps	97.5	-	0	2	100.5	-	0
Concrete Batch Plant	98.3	-	0	-	0	-	0
Front End Loader	99.5	1	99.5	1	99.5	1	99.5
Total		119,8 dBA		120,5 dBA		118 dBA	
Lw'' (sound power level per area) (dBA/m^2)		70 dBA/m^2		75 dBA/m^2		60 dBA/m^2	

Table 6-29. Assessment Ldn for Construction Phase

Location	Distance (m)	Source Leq	Limit Value	Limit Exceedance	Magnitude Of Impact			Responsivity			Impact Significance
		Ld (dBA)	Ld (dBA)		Scale Of Impact	Extent	Impact Mag	Importance	Sensitivity	Responsivity	
R1	380	50,9	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R2	110	62,8	55	7,8	Medium	Single	N	Low	Low	Low	Negligible
R3	520	51,7	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R4	130	62,3	55	7,3	Medium	Site	M	Medium	Medium	Medium	Moderate
R5	375	56,4	55	1,4	Negative	Site	N	Medium	Medium	Medium	Negligible
R6	470	53,7	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R7	500	54,8	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R8	710	52,9	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R9	100	63,5	55	8,5	Medium	Site	M	Medium	Medium	Medium	Moderate
R10	390	57,2	55	2,2	Negative	Site	N	Medium	Medium	Medium	Negligible
R11	55	71,5	55	16,5	Large	Site	L	Medium	Medium	Medium	Major
R12	175	59,9	55	4,9	Small	Site	S	Medium	Medium	Medium	Minor
R13	300	57,0	55	2,0	Negative	Site	N	Medium	Medium	Medium	Negligible
R14	720	41,1	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R15	430	56,2	55	1,2	Negative	Site	N	Medium	Medium	Medium	Negligible
R16	370	52,3	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R17	330	57,9	55	2,9	Negative	Site	N	Medium	Medium	Medium	Negligible
R18	680	54,9	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R19	570	53,0	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R20	740	53,5	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R21	20	72,4	55	17,4	Large	Site	L	Medium	Medium	Medium	Major
R22	300	56,8	55	1,8	Negative	Site	N	Medium	Medium	Medium	Negligible
R23	40	70,9	55	15,9	Large	Site	L	Medium	Medium	Medium	Major
R24	40	69,7	55	14,7	Large	Site	L	Medium	Medium	Medium	Major

Location	Distance (m)	Source Leq	Limit Value	Limit Exceedance	Magnitude Of Impact			Responsivity			Impact Significance
		Ld (dBA)	Ld (dBA)		Scale Of Impact	Extent	Impact Mag	Importance	Sensitivity	Responsivity	
R25	10	71,4	55	16,4	Large	Site	L	Medium	Medium	Medium	Major
R26	25	72,7	55	17,7	Large	Site	L	Medium	Medium	Medium	Major
R27	30	71,6	55	16,6	Large	Site	L	Medium	Medium	Medium	Major
R28	60	73,1	55	18,1	Large	Site	L	Medium	Medium	Medium	Major
R29	190	59,9	55	4,9	Small	Site	S	Medium	Medium	Medium	Minor
R30	56	73,1	55	18,1	Large	Site	L	Medium	Medium	Medium	Major
R31	285	66,1	55	11,1	Large	Site	L	Medium	Medium	Medium	Major
R32	35	65,2	55	10,2	Lage	Site	L	Medium	Medium	Medium	Major
R33	140	61,6	55	6,6	Medium	Single	N	Medium	Medium	Medium	Negligible
R34	120	62,2	55	7,2	Medium	Site	M	Medium	Medium	Medium	Moderate
R35	120	63,7	55	8,7	Medium	Site	M	Medium	Medium	Medium	Moderate
R36	60	72,3	55	17,3	Large	Single	S	Medium	Medium	Medium	Minor
R37	180	60,6	55	5,6	Medium	Single	N	Low	Medium	Low	Negligible
R38	350	57,4	55	2,4	Negative	Site	N	Medium	Medium	Medium	Negligible
R39	230	59,0	55	4,0	Small	Site	S	Medium	Medium	Medium	Minor
R40	900	56,4	55	1,4	Negative	Site	N	Medium	Medium	Medium	Negligible
R41	90	65,9	55	10,9	Large	Site	L	Medium	Medium	Medium	Major
R42	140	61,9	55	6,9	Medium	Site	M	Medium	Medium	Medium	Moderate
R43	750	51,8	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R44	650	52,6	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R45	390	55,2	55	0,2	No Impact	Single	No Impact	Medium	Medium	Medium	No Impact
R46	320	56,7	55	1,7	Negative	Single	N	Medium	Medium	Medium	Negligible
R47	40	71,3	55	16,3	Large	Site	L	Medium	Medium	Medium	Major
R48	380	55,9	55	0,9	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R49	580	52,6	55	0,0	No Impact	Single	No Impact	Medium	Medium	Medium	No Impact

Location	Distance (m)	Source Leq	Limit Value	Limit Exceedance	Magnitude Of Impact			Responsivity			Impact Significance
		Ld (dBA)	Ld (dBA)		Scale Of Impact	Extent	Impact Mag	Importance	Sensitivity	Responsivity	
R50	130	62,6	55	7,6	Medium	Single	N	Medium	Medium	Medium	Negligible
R51	50	72,7	55	17,7	Large	Site	L	Medium	Medium	Medium	Major
R52	260	66,0	55	11,0	Large	Single	S	Medium	Medium	Medium	Minor
R53	75	70,5	55	15,5	Large	Site	L	Medium	Medium	Medium	Major
R54	40	72,1	55	17,1	Large	Single	S	Medium	Medium	Medium	Minor
R55	70	68,4	55	13,4	Large	Single	S	Medium	Medium	Medium	Minor
R56	70	61,6	55	6,6	Medium	Site	M	Medium	Medium	Medium	Moderate
R57	160	61,5	55	6,5	Medium	Site	M	Medium	Medium	Medium	Moderate
R58	140	62,3	55	7,3	Medium	Site	M	Medium	Medium	Medium	Moderate
R59	80	66,9	55	11,9	Large	Single	S	Medium	Medium	Medium	Minor
R60	710	51,8	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R61	211	56,2	55	1,2	Negative	Site	N	Medium	Medium	Medium	Negligible
R62	487	57,5	55	2,5	Negative	Site	N	Medium	Medium	Medium	Negligible
R63	550	53,2	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R64	60	47,6	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R65	62	59,5	55	4,5	Small	Site	S	Medium	Medium	Medium	Minor
R66	30	56,0	55	1,0	Negative	Site	N	Medium	Medium	Medium	Negligible
R67	90	60,1	55	5,1	Medium	Site	M	Medium	Medium	Medium	Moderate
R68	280	57,8	55	2,8	Negative	Site	N	Medium	Medium	Medium	Negligible
R69	160	63,4	55	8,4	Medium	Single	N	Medium	Medium	Medium	Negligible
R70	34	54,5	55	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R71	461	62,2	55	7,2	Medium	Site	M	Medium	Medium	Medium	Moderate

Since construction activities will end in a specific time period (4 years), no residual noise impacts are expected from construction activities.

Construction Vibration

Vibration during the construction phase is mainly from two main sources:

- blasting activities held in quarries and
- construction vibration due to machine and equipment that is used in main motorway construction.

Vibration from blasting activity was calculated for two scenarios for every facility where blasting activity is held. One scenario assumes that blasting is happening at the closest point to the residential areas in the boundary polygon of facility. Second scenario as assumes that blasting is happening at the mean distance inside the boundary polygon of facility. This strategy was developed because the area of the facilities that includes blasting activities is very large and it cannot be precisely known where the specific blasting point is.

With given blasting design it is estimated that the closest safe distance for blasting activities is 185 meters, which is calculated by using the Divine Equation. The values used in the calculation are given in Table 6-30 and the figure for blasting calculations is given below**.** Any blasting activity will be dangerous and has impact closer than this distance to the receiving bodies.

All of the receiving bodies are counted as Category III according to the US Federal Transit Administration document that is non-engineered timber and masonry buildings. (John A. Volpe National Transportation Systems Center, 2018)

Table 6-30. Blasting Calculations at Quarry Areas

Facility Information				Receptor Minimum Distance			Receptor Average Distance			Assessment Min Distance	Assessment Ave. Distance	Limits
Facility	Explosive amount in single hole (kg)	Receptor Distance Min (m)	Receptor Distance Average (m)	Vibration PPV (mm/s)						FTA Limits	FTA Limits	FTA Categories 3
Makresane Quarry	50	500	750	2.0	0.4	1.0	1.1	0.2	0.5	Suitable	Suitable	5.08
Citluk Quarry	50	40	300	116.1	23.2	58.1	4.6	0.9	2.3	Impact	Suitable	5.08
Vrnjci Quarry 1	50	20	250	352.0	70.4	176.0	6.2	1.2	3.1	Impact	Suitable	5.08
Vrnjci Quarry 2	50	580	800	1.6	0.3	0.8	1.0	0.2	0.5	Suitable	Suitable	5.08
Sumarice Quarry	50	10	300	1066.9	213.4	533.5	4.6	0.9	2.3	Impact	Suitable	5.08

For main Proposed Motorway Route construction vibration calculations, it was identified that the process that produces most vibration is “Surface Filling”. Calculations were held according to the information and reference vibration levels gathered from FTA document. Reference vibration levels for specific equipment for “Surface Filling” activities are given in following Table 6-31.

Table 6-31. Reference Vibration Levels for Machine and Equipment

Surface Filling	Reference Vibration (inch/sec) @25 feet
Finisher	0,089
Double Metal Banded	0,21
24 tons Adjustable Tıre Pressure Cylınder	0,21
Double Steel Banded Cylınder (3 TONS)	0,21
CAT 955 Loader	0,089
Asphalt Sweeper	0,076
Compactor	0,21
Street Sweeper	0,89

Critical distance was calculated as 35 meters for main motorway construction vibration calculations. As can be seen from Figure 6-1, any Proposed Motorway Route construction activity closer than 35 meters to the receiving bodies will have impact and will be dangerous. Again, for main Proposed Motorway Route construction vibration calculations buildings are counted as Category III according to FTA document.

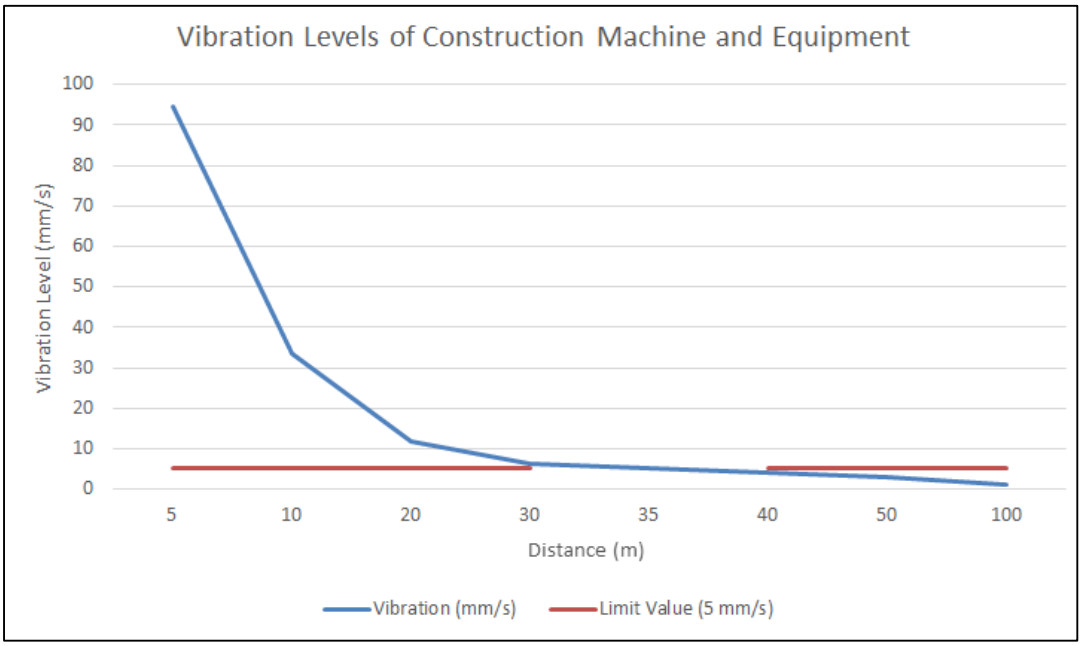

Figure 6-1. Vibration Critical Distance for Main Motorway Construction Activities

As shown in Table 6-33, the overall rating of vibration is considered medium since the magnitude and the likelihood of the impacts are determined as high due to blasting activities within the scope of Project. After taking mitigation measures, the likelihood and the magnitude of the impact expected to decrease to the levels stipulated by the national regulations.

Table 6-32. Impact and Mitigations for Noise and Vibration in Construction Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Noise Pollution • The noise impact will be temporarily and expected to affect the settlements within the AoI of the Project. • In construction of bridges and viaducts, noise arising from general construction works is considered in road construction site evaluations. Bored piles is used, which has lower noise level than driven piles. • Noise pollution due to vehicle operation.	Camp Sites Material Storage Excavation Backfilling Storage, Re-Use and Disposal of Excavations Excavation for River Regulation Material Spreading/Rolling/Compaction Asphalt concrete Wearing Crushing Machinery and Equipment Asphalt Preparation Concreate Batching Transportation Demobilization of Equipment and Machinery Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Barrow Pits	All Settlements within the AoI (see Chapter 5)	<u>Pre-construction</u> • Project Environmental Management Plan (EMP) will include Noise and Vibration and Management Plan that will be define the sensitive receptor locations, monitoring program and specific mitigation measures to be implemented. • Traffic Management Plan (EMP) and construction Method Statements will include any agreed noise and vibration mitigation measures. • Planning of transport routes including temporary access roads, haul roads and construction work sites should be determined to avoid populated areas and away from sensitive receptors and villages as much as possible. • The Project should consider the construction of a newly allocated access road instead of using the existing road network. • As Project construction progresses, buildings that may be potentially affected will be identified prior to construction, including assessing whether buildings are sensitive to night-time disturbance. <u>Construction</u> • Motorway alignment will be used for the transport of construction materials and equipment wherever possible. • Internal haul routes will be well designed and maintained and steep gradients should be avoided where possible. • Empty vehicles will not have loose chains or other noise “generating parts on the loading platform. • During off-loading, materials will dropped from an appropriate height to avoid noise disturbance to the surrounding receptors or to minimize noise from the site in general. • All construction equipment and vehicles will be regularly checked and maintained. This should particularly include the regular inspection of diesel powered equipment and, if necessary, replacement of intake and exhaust silencers. Any change in the

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			noise emission characteristics of equipment should serve as trigger for withdrawing it for maintenance. • Position of all auxiliary plant (e.g. generators, compressors) should be determined to cause minimal noise disturbance. • In case of noise exceedance, silencers or acoustic enclosures on machines as well as portable sound barriers around stationary equipment, should be installed where applicable. • 20kph speed limit will be applied on unpaved roads to reduce noise and vibration, limit fugitive dust generation, reduce emission and reduce the risk of accidents (vehicles, pedestrians, cyclist, and fauna). • Speed exceedances will be notified to the site administration and handled according to H&S Management Plan. • Additional driver training, temporary speed restrictions, improved driving monitoring, etc., will be provided as necessary or required. • Movement of construction traffic through sensitive receptor community areas will be prevented or limited, wherever possible. If this cannot be avoided, additional measures defined in the Traffic Management Plan (TMP) such as slower driving rules, physical speed restrictions) will be applied. • Noise mitigation measures specifically related to equipment and vehicle traffic through sensitive receptors should be directed at: - Minimizing individual vehicle engine, transmission, and body noise/vibration. This is achieved through the implementation of an equipment maintenance program. - Maintain road surface regularly. - Avoid unnecessary idling times. - Minimizing the need for trucks/equipment to reverse movement. This will reduce the frequency of reverse warnings will occur. Alternatives to the traditional reverse 'beeper' alarm such as a 'self-adjusting' or 'smart' alarm could be considered. These alarms include a mechanism to detect the local noise level and automatically adjust the output of the alarm is so that

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			it is 5 to 10 dB above the noise level near the moving equipment. - Where possible, noisy activities such as, decommissioning and maintenance, should be limited to day-time hours. • Noise levels will not exceed WHO Environmental Noise Limits, national limits or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site. • Noise level limits for construction activities are stated in the national EIA. If limits are exceeded, then appropriate mitigation measures will be implemented in accordance with the Serbian regulations. These may include: - Night-time operation and transport should be minimized as much as possible, near to villages or where a transport road passes. - Distance between construction site and sensitive receptors (e.g. hospitals, nursing homes, schools) should be mazimised. If this is not possible, then temporary noise barriers (eg. portable sound walls, soil berm) should be installed between the construction site and sensitive receptors. - Construction equipment used in intermittent periods will be shut down at intervals between works. - Working hours for some construction equipment or operations with greater noise and vibration impact will be limited to core daytime hours or routes where the area is less susceptible to noise. • Sensitive receptors (e.g. hospitals, nursing homes, schools) will be provided with advanced notification of noisy works and project specific additional mitigation measures. • Special acoustic insulation and related mitigation measures will be evaluated on a case-by-case basis.
Vibration	Excavation Backfilling Asphalt Concrete Wearing	All Settlements within the AoI (see Chapter 5)	Pre-construction

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
• Potential damage to buildings caused by construction vibration • Potential vibration caused during the work in quarries	Crushing Machinery and Equipment Transportation Demobilization of Equipment and Machinery		• Buildings near vibration sources (e.g. blasting, pile-driving and operating heavy earth-moving equipment) will be identified prior to construction. • Buildings and occupants with susceptibility detection will be evaluated for vibration, and if vibration estimates or measurements show potential for building damage, alternative construction methods will be developed to prevent damage. • Vibration standards according to Serbian regulations (Law on Environmental Noise / 2010) will be implemented through the Noise and Vibration Management Plan. Documentation will be prepared for each of the identified buildings. • Quarry Management Plan will be developed, and should include noise and vibration mitigation measures such as placement of rock structures as a noise barrier between the quarry area and potentially affected villages. • Material procured from quarries and suppliers that are not directly owned by the Project Owner or the Contractor will be evaluated to assess the operations of this facility to verify compliance with its permitted activities and relevant operating conditions. <u>Construction</u> • Monitoring of vibration in initiation of relevant activities will be performed to ensure that national legal requirements and international standards are met. • Additional measures will be taken to reduce vibration effects if standards are exceeded, and, if necessary, to change operating methods to use equipment that generates lower vibration levels. • Mitigation measures will be taken into account to prevent negative impacts caused by vibration in quarries, and this will be documented in the Quarry Management Plan. • During blasting operations, when hydraulic drills are used for drilling of boreholes, the number of the boreholes will be decided according to the blasting plan in order to reduce to a minimum any need for secondary blasting of rock.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• During blasting operations at quarry sites and during earthworks, monitoring/inspection will be carried out to ensure compliance with legal requirements and blasting permit requirements.

Table 6-33. Scoring of Ambient Noise and Vibration Impacts in Construction Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Noise Pollution	-1 **Negative**	1 **Project Site**	2 **Short Term**	4 **High**	3 **Medium**	-2.50	5 **Definite**	-13 **Medium**	-1 **Negative**	1 **Project Site**	2 **Short Term**	2 **Low**	3 **Medium**	-2	2 **Low**	-4 **Low**
Vibration	-1 **Negative**	1 **Project Site**	2 **Short Term**	5 **Very High**	3 **Medium**	-2.75	5 **Definite**	-14 **Medium**	-1 **Negative**	1 **Project Site**	2 **Short Term**	3 **Moderate**	3 **Medium**	-2.25	3 **Medium**	-7 **Low**

6.5.2 Operation Phase

Modelling study was performed to determine noise and vibration level for operation phase of the Project.

Operation Noise

Noise sources during operation phase of the Motorway is mainly due to road traffic which will be cumulated throughout the road axis. This perspective was incorporated during the noise modeling study and magnitude of the impact as well as impact significance can be found in Table 6-34.

Since surrounding terrain alignment information around road axis is not finalized at this stage of the Project, it is difficult to determine exact mitigation measures that will suit to prevent operational noise impacts. Therefore, following measures may be incorporated after the finalization of road axis in order to prevent noise related impacts during the operation phase as:

Noise barriers: Noise barriers are engineered structures that lower the noise exposure at determined receiver locations. However, it is not reasonable to build noise barriers at every situation. Rather than reducing the noise exposure, physical characteristics of noise barriers are also needed to be considered such as; static and wind loads. Optimized height of the noise barriers should not be exceeding 4 meters in order to maintain effectiveness of sound reduction and practicality of construction. For maintaining effectiveness of the barrier structures following aspects should be considered;

- Distance between receiver locations and barrier structures
- Terrain levels of the road axis and receiver locations
- Height of the receiver location and road axis
- Social acceptance of barrier structures (because of wall like structure of the noise barriers some residents living just behind those structures may refuse noise barriers to be built)

Noise Berms: Noise berms are more efficient than noise barriers in many cases in terms of applicability. However, for application of berms available space, terrain levels and availability of the berm material are limiting aspects.

Vegetation: Vegetation is an option for noise reduction and social acceptance. Even though vegetation has no proved sufficient effect for noise reduction surely it has affirmative psychological effects on residents.

Stone Mastic Asphalt Surface (SMA) Application (approximately 4dBA noise reduction): SMA have modified surface textures which bring about reductions in noise and could reduce the noise generated by the tire/pavement interaction.

Applicability and effectiveness of noise barriers and noise berm structures and vegetation applications strongly depend on the terrain structure between noise source and receiver. Because of explained situation noise barrier structures are assumed to be suitable for every major impacted case and designed accordingly.

Noise reduction gained by barrier structures also strongly depends on the terrain levels. Since the Project's terrain data is not finalized, it is not possible to determine amount of reduction will be gained by barrier structure, thus; a standard noise reduction is assumed as 10 dB for every barrier structure.

Table 6-34. Assessment Ldn, for Operation

Location of the Receivers (R)	Distance (m)	Source Leq		Limit Value		Limit Exceedance	Magnitude Of Impact			Responsivity			Impact Significance
		Ld (dBA)	Ln (dBA)	Ld (dBA)	Ln (dBA)		Scale Of Impact	Extent	Impact Mag	Importance	Sensitivity	Responsivity	
R1	380	45,9	42,1	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R2	110	57,6	52,3	55	45	7,3	M	Single	N	Low	Low	Low	Negligible
R3	520	45,8	42,8	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R4	130	56,8	52	55	45	7,0	M	Site	M	Medium	Medium	Medium	Moderate
R5	375	50,1	46,6	55	45	1,6	N	Site	N	Medium	Medium	Medium	Negligible
R6	470	48,3	45,1	55	45	0,1	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R7	500	49,2	45,1	55	45	0,1	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R8	710	45,5	41,2	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R9	100	58	52,6	55	45	7,6	M	Site	M	Medium	Medium	Medium	Moderate
R10	390	50,1	45	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R11	55	62,5	56,7	55	45	11,7	L	Site	L	Medium	Medium	Medium	Major
R12	175	55,9	51,5	55	45	6,5	M	Site	M	Medium	Medium	Medium	Moderate
R13	300	53,3	48,5	55	45	3,5	S	Site	S	Medium	Medium	Medium	Minor
R14	720	45,3	41,8	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R15	430	49,9	46,8	55	45	1,8	N	Site	N	Medium	Medium	Medium	Negligible
R16	370	49,4	46,4	55	45	1,4	N	Site	N	Medium	Medium	Medium	Negligible
R17	330	51,6	47,7	55	45	2,7	N	Site	N	Medium	Medium	Medium	Negligible
R18	680	45,9	42,3	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R19	570	45,9	43	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R20	740	45,4	42,3	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R21	20	73,2	67,4	55	45	22,4	L	Site	L	Medium	Medium	Medium	Major
R22	300	52,9	47,9	55	45	2,9	N	Site	N	Medium	Medium	Medium	Negligible
R23	40	68,5	62,8	55	45	17,8	L	Site	L	Medium	Medium	Medium	Major
R24	40	59,7	54,7	55	45	9,7	M	Site	M	Medium	Medium	Medium	Moderate
R25	10	78,2	72,4	55	45	27,4	L	Site	L	Medium	Medium	Medium	Major
R26	25	67,6	61,8	55	45	16,8	L	Site	L	Medium	Medium	Medium	Major
R27	30	66,9	61,1	55	45	16,1	L	Site	L	Medium	Medium	Medium	Major
R28	60	65,5	59,7	55	45	14,7	L	Site	L	Medium	Medium	Medium	Major
R29	190	55,9	51	55	45	6,0	M	Site	M	Medium	Medium	Medium	Moderate
R30	56	63,6	58	55	45	13,0	L	Site	L	Medium	Medium	Medium	Major
R31	285	53,1	48,6	55	45	3,6	S	Site	S	Medium	Medium	Medium	Minor
R32	35	68,2	62,4	55	45	17,4	L	Site	L	Medium	Medium	Medium	Major
R33	140	54,8	51,1	55	45	6,1	M	Single	N	Medium	Medium	Medium	Negligible
R34	120	54,1	50,4	55	45	5,4	M	Site	M	Medium	Medium	Medium	Moderate
R35	120	60,7	55,4	55	45	10,4	L	Site	L	Medium	Medium	Medium	Major
R36	60	63	57,5	55	45	12,5	L	Single	S	Medium	Medium	Medium	Minor
R37	180	53,6	50,2	55	45	5,2	M	Single	N	Low	Medium	Low	Negligible
R38	350	52	47,5	55	45	2,5	N	Site	N	Medium	Medium	Medium	Negligible
R39	230	55,4	50,3	55	45	5,3	M	Site	M	Medium	Medium	Medium	Moderate
R40	900	43,8	40,3	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R41	90	60	55,1	55	45	10,1	L	Site	L	Medium	Medium	Medium	Major

Location of the Receivers (R)	Distance (m)	Source Leq		Limit Value		Limit Exceedance	Magnitude Of Impact			Responsivity			Impact Significance
		Ld (dBA)	Ln (dBA)	Ld (dBA)	Ln (dBA)		Scale Of Impact	Extent	Impact Mag	Importance	Sensitivity	Responsivity	
R42	140	57,1	52,5	55	45	7,5	M	Site	M	Medium	Medium	Medium	Moderate
R43	750	45,6	41,9	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R44	650	46,3	43	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R45	390	51,2	46,6	55	45	1,6	N	Single	N	Medium	Medium	Medium	Negligible
R46	320	51,5	48,4	55	45	3,4	S	Single	N	Medium	Medium	Medium	Negligible
R47	40	68,1	62,4	55	45	17,4	L	Site	L	Medium	Medium	Medium	Major
R48	380	50,6	47,2	55	45	2,2	N	Site	N	Medium	Medium	Medium	Negligible
R49	580	46,5	43,5	55	45	0,0	No Impact	Single	No Impact	Medium	Medium	Medium	No Impact
R50	130	57	52,4	55	45	7,4	M	Single	N	Medium	Medium	Medium	Negligible
R51	50	64,7	58,9	55	45	13,9	L	Site	L	Medium	Medium	Medium	Major
R52	260	53	49,3	55	45	4,3	S	Single	N	Medium	Medium	Medium	Negligible
R53	75	62	56,5	55	45	11,5	L	Site	L	Medium	Medium	Medium	Major
R54	40	65,5	59,7	55	45	14,7	L	Single	S	Medium	Medium	Medium	Minor
R55	70	60,4	55,2	55	45	10,2	L	Single	S	Medium	Medium	Medium	Minor
R56	70	56,2	52,1	55	45	7,1	M	Site	M	Medium	Medium	Medium	Moderate
R57	160	56,7	52,2	55	45	7,2	M	Site	M	Medium	Medium	Medium	Moderate
R58	140	59,2	53,9	55	45	8,9	M	Site	M	Medium	Medium	Medium	Moderate
R59	80	60,6	55,4	55	45	10,4	L	Single	S	Medium	Medium	Medium	Minor
R60	710	45,5	42	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R61	211	40,8	37,9	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R62	487	53,2	48	55	45	3,0	S	Site	S	Medium	Medium	Medium	Minor
R63	550	48,8	45,2	55	45	0,2	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R64	60	37,2	32,8	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R65	62	54,2	50,8	55	45	5,8	M	Site	M	Medium	Medium	Medium	Moderate
R66	30	46,8	41,2	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R67	90	52,7	49,2	55	45	4,2	S	Site	S	Medium	Medium	Medium	Minor
R68	280	52,9	49	55	45	4,0	S	Site	S	Medium	Medium	Medium	Minor
R69	160	58,1	52,9	55	45	7,9	M	Single	N	Medium	Medium	Medium	Negligible
R70	34	44,8	39,2	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact
R71	461	45,8	42,1	55	45	0,0	No Impact	Site	No Impact	Medium	Medium	Medium	No Impact

The location of the receivers where have “Major” noise impact significance recommended to implement noise barriers. Detailed information on the recommended noise barriers including their locations and size is given in Table 6-35.

Table 6-35. Geometrical Information about Recommended Noise Barriers

Barrier No	Barrier KM	Barrier Side	Relevant Receivers	Length (m)	Height (m)
1	25-26	LHS	11	1381	3
2	50-51	RHS	21	845	3
3	51-52	RHS	23	796	3
4	54	RHS	25	285	3
5	53-55	LHS	25-65	1055	3
6	55-59	LHS	26-27	4101	3
7	58-59	RHS	27	926	3
8	59-61	LHS	28	1557	3
9	63	LHS	30	724	3
10	68-69	RHS	32	1080	3
11	74	LHS	35	796	3
12	80	LHS	41	1221	3
13	86-88	RHS	47	2077	3
14	96-98	RHS	51	2029	3
15	104-107	RHS	53	2426	3
*LHS=Left Hand Side *RHS=Right Hand Side					

After implementing the recommended noise barriers according to Table 6-35, the final impact significance are given in the Table 6-36.

Table 6-36. Final Impact Significance after Mitigation of the Noise Receivers that had “Major” Impact

Location of the Receiver (R)	Distance (m)	Final Impact Significance Before Mitigation	Final Impact Significance After Mitigation
R11	55	Major	Negligible
R21	20	Major	Major
R23	40	Major	Moderate
R25	10	Major	Major
R26	25	Major	Moderate
R27	30	Major	Moderate
R28	60	Major	Minor
R30	56	Major	Minor
R32	35	Major	Moderate
R35	120	Major	No Impact
R41	90	Major	No Impact
R47	40	Major	Moderate
R51	50	Major	Minor
R53	75	Major	Negligible

Three “Major” affected receivers after implementation of recommended noise barriers (see Table 6-37, additional measures such as;

- to implementate noise berms which are more efficient than noise barriers in many cases in terms of applicability;
- to implementate Vegetation and SMA Surface Application to reduce potential residual impacts;
- to rehabilitate receptors by insulating to reduce recoptor sensitivity
- to pay compensation to receivers in cases where insulation is not possible

are recommended.

For the “Moderate” affected receivers after implementation of recommended noise barriers, additional mitigation measures such as noise berms, vegetation and SMA Surface Application are recommended to be implemented.

For receiver locations where the final impact significance is moderate, noise monitoring processes[12] is recommended. This monitoring process should either be periodic or continuous.

> For continuous monitoring systems; implementation of steady online noise monitoring devices is recommended.
>
> For periodic noise monitoring systems; the frequency of the monitoring is recommended to be twice or three times annually.

In addition to noise monitoring processes, grievances regarding the noise will be recorded in the Grievance Mechanism and necessary mitigation measures will be adopted, as appropriate.

During noise monitoring studies both for periodic and continuous rules defined about environmental noise monitoring studies in ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise is recommended to be adopted.

[12] The noise monitoring was conducted in line with ISO 1996-2: Acoustics – Description and measurement of environmental noise. During noise monitoring process both for periodic and continuous; the rules defined about environmental noise monitoring studies in ISO 1996-2 international standard recommended to be followed.

Operation Vibration

Ground-borne vibrations due to irregularities on the road, especially generated by heavy vehicles on the flowing traffic, may have an impact on receivers close to the main road axis.

An empirical equation developed by R. Watts and V.V. Krylov used to predict the PPV in mm/s at a building foundations due to heavy vehicles passing over a road surface defects

$$PPV_{max} = 0.028 \times a \times \frac{v}{48} \times t \times p \times \left(\frac{r}{6}\right)^{x}$$

Where;

a : maximum height or depth of the road surface defect in mm,
v : maximum expected speed of heavy vehicle in km/h
p : the wheel index, which is over 0.75 for heavy vehicles when one wheel crosses a damaged spot, or 1 in other cases
t: the coefficient of soil supporting a roadway structure
r : the distance between the measuring point and the moving vehicle
x: power coefficient

Table 6-37. Ground Scaling Factors and Power Coefficients for Different Soils (Watts and Krylov, 2000)

Ground Type	Ground Scaling Factor (G)	Power Coefficient for Attenuation (X)
Alluvium	4.40	-0.79
Peat	2.39	-1.19
London clay	1.93	-1.06
Sand/gravel	0.58	-0.74
Boulder clay	0.27	-0.93
Chalk rock	0.06	-1.08

Source: G.R. Watts, V.V. Krylov. Ground-borne vibration generated by vehicles crossing road humps and speed control cushions. Applied Acoustics 59 (2000) 221-236

Calculations conducted for a heavy vehicle having 80 km/h and 50 mm of maximum road defect, and two wheels crosses the damaged spot. Since softer ground types are not suitable for construction of founded structures, both London clay and sand/gravel arrangements considered in the calculations. Results of the calculations based on these parameters, are presented in the Figure below:

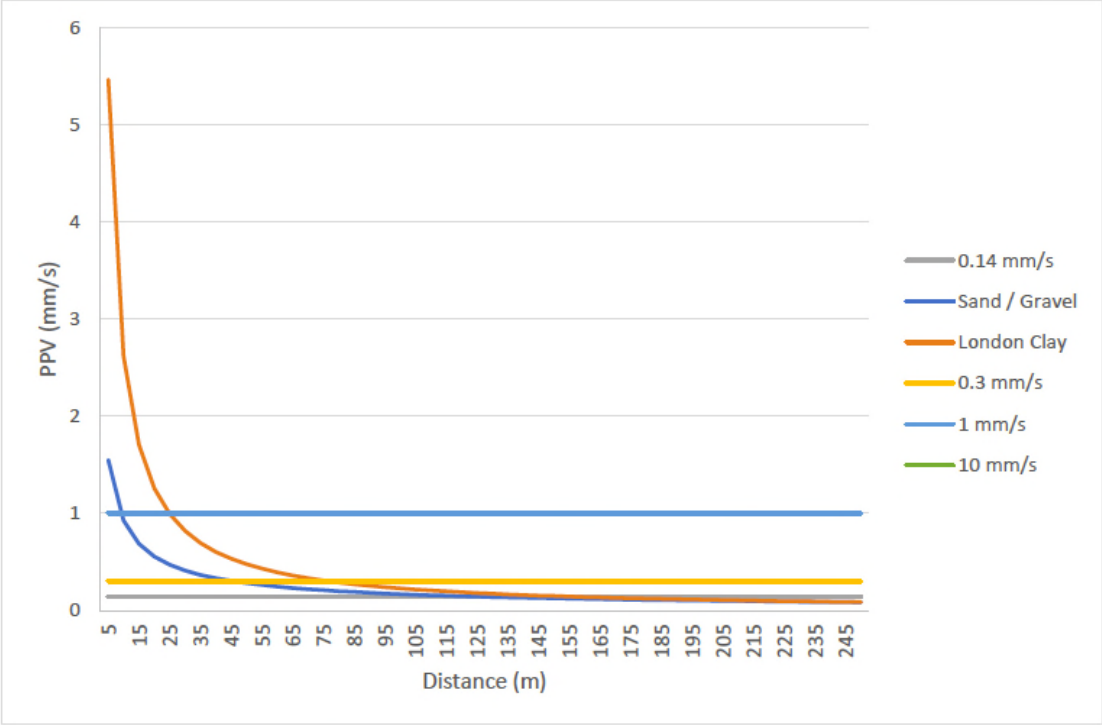

Figure 6-2. Operational Vibration - PPV vs Distance

In case of London clay ground type, traffic-induced ground borne vibration is expected to become imperceptible at 80 meters from the Motorway which is below 0.3 mm/s as indicated in BS 5228-2. Vibration levels over 1 mm/s are expected to occur in the areas closer than 25 m to the Motorway.

In the areas with sand/gravel vibration levels exceeding 1 mm/s at a distance of 10 m to the road and it is expected to decrease to 0.3 mm/s at 45 m from the Motorway. The vibration calculation results provided in the Table 6-38 indicates that vibration impact during operation will be negligible or insignificant.

Table 6-38. Impact Assessment for Operational Vibration

Location of the Receiver (R)	Distance (m)	PPV (mm/s)		Impact Significance	
		Sand/Gravel	London Clay	Sand/Gravel	London Clay
R1	380	0.06	0.06	No Impact	No Impact
R2	110	0.16	0.21	Negligible	Negligible
R3	520	0.05	0.04	No Impact	No Impact
R4	130	0.14	0.17	No Impact	Negligible
R5	375	0.06	0.06	No Impact	No Impact
R6	470	0.05	0.04	No Impact	No Impact
R7	500	0.05	0.04	No Impact	No Impact
R8	710	0.04	0.03	No Impact	No Impact
R9	100	0.17	0.23	Negligible	Negligible

Location of the Receiver (R)	Distance (m)	PPV (mm/s)		Impact Significance	
		Sand/Gravel	London Clay	Sand/Gravel	London Clay
R10	390	0.06	0.05	No Impact	No Impact
R11	55	0.26	0.43	Negligible	Small
R12	175	0.11	0.13	No Impact	No Impact
R13	300	0.07	0.07	No Impact	No Impact
R14	720	0.04	0.03	No Impact	No Impact
R15	430	0.06	0.05	No Impact	No Impact
R16	370	0.06	0.05	No Impact	No Impact
R17	330	0.07	0.06	No Impact	No Impact
R18	680	0.04	0.02	No Impact	No Impact
R19	570	0.05	0.03	No Impact	No Impact
R20	740	0.04	0.02	No Impact	No Impact
R21	20	0.56	1.26	Small	Medium
R22	300	0.07	0.07	No Impact	No Impact
R23	40	0.33	0.60	Small	Small
R24	40	0.33	0.60	Small	Small
R25	10	0.93	2.62	Small	Medium
R26	25	0.47	0.99	Small	Small
R27	30	0.41	0.82	Small	Small
R28	60	0.25	0.39	Negligible	Small
R29	190	0.10	0.12	No Impact	No Impact
R30	56	0.26	0.42	Negligible	Small
R31	285	0.08	0.07	No Impact	No Impact
R32	35	0.37	0.70	Small	Small
R33	140	0.13	0.16	No Impact	Negligible
R34	120	0.15	0.19	Negligible	Negligible
R35	120	0.15	0.19	Negligible	Negligible
R36	60	0.25	0.39	Negligible	Small
R37	180	0.11	0.12	No Impact	No Impact
R38	350	0.07	0.06	No Impact	No Impact
R39	230	0.09	0.09	No Impact	No Impact
R40	900	0.03	0.02	No Impact	No Impact
R41	90	0.18	0.26	Negligible	Negligible
R42	140	0.13	0.16	No Impact	Negligible
R43	750	0.04	0.03	No Impact	No Impact
R44	650	0.04	0.03	No Impact	No Impact
R45	390	0.06	0.05	No Impact	No Impact
R46	320	0.07	0.07	No Impact	No Impact
R47	40	0.33	0.60	Small	Small
R48	380	0.06	0.06	No Impact	No Impact
R49	110	0.16	0.21	Negligible	Negligible
R50	520	0.05	0.04	No Impact	No Impact
R51	130	0.14	0.17	No Impact	Negligible

Location of the Receiver (R)	Distance (m)	PPV (mm/s)		Impact Significance	
		Sand/Gravel	London Clay	Sand/Gravel	London Clay
R52	375	0.06	0.06	No Impact	No Impact
R53	470	0.05	0.04	No Impact	No Impact
R54	500	0.05	0.04	No Impact	No Impact
R55	710	0.04	0.03	No Impact	No Impact
R56	100	0.17	0.23	Negligible	Negligible
R57	390	0.06	0.05	No Impact	No Impact
R58	55	0.26	0.43	Negligible	Small
R59	175	0.11	0.13	No Impact	No Impact
R60	300	0.07	0.07	No Impact	No Impact
R61	720	0.04	0.03	No Impact	No Impact
R62	430	0.06	0.05	No Impact	No Impact
R63	370	0.06	0.05	No Impact	No Impact
R64	330	0.07	0.06	No Impact	No Impact
R65	680	0.04	0.02	No Impact	No Impact
R66	570	0.05	0.03	No Impact	No Impact
R67	740	0.04	0.02	No Impact	No Impact
R68	20	0.56	1.26	Small	Medium
R69	300	0.07	0.07	No Impact	No Impact
R70	40	0.33	0.60	Small	Small
R71	40	0.33	0.60	Small	Small

Table 6-40 shows the overall rating of the impacts before and after mitigations. Noise pollution is considered high since the magnitude, the receptor sensitivity and the likelihood of the impacts are determined as high. Implementation of noise barriers for noise pollution, along with other proposed mitigation measures, the overall impact after mitigation measures as shown in Table 6-40 is expected to reduce the sensitivity of the receptor as well as the extend of the impact's magnitude According to the modeling study, it is seen that there will be no vibration impact during the the operation phase of the Project. For the noise polution, modelling study show that 14 of 71 receptors determined have major impact before the mitigation measures and almost 3 percent of the receptors (i.e. 2 of 71 receptors) is remained as major after the mitigation measures is taken. However, for these two receptors that have major impact after mitigation, the mitigation measures to be taken was determined and will be implemented. As a result, the magnitude and likelihood of the impact are decreased to medium with the mitigation measures thus, the residual impact is medium.

Table 6-39. Impact and Mitigations for Noise and Vibration in Operation Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Noise Pollution • Increasing noise level due to road traffic on the Motorway	Movement of the vehicles Operation of Service Stations Operation of Maintenance Station	All Settlements within the AoI (see Chapter 5)	<u>Design</u> • Stone Mastic Asphalt (SMA) surfacing that cause's low noise will be used by the Contractor for the Motorway. • Natural topography will be used for noise protection. • Additional noise barriers will be considered for the sensitive receptors, as necessary. • The landscape screening will be done either by lowering the Motorway or adding soil embankment • The noise barriers adjacent to the motorway will be used. • The building insulations will be improved (for example, sound insulation of windows and walls), where necessary. • In cases where insulation is not possible, compensation will be considered. <u>Operation</u> • Maintenance of the road surface will be done. • Speed limits will be applied.

Table 6-40. Scoring of Ambient Noise and Vibration Impacts in Operation Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Noise Pollution	-1 **Negative**	1 **Project Site**	5 **Permanent**	4 **High**	5 **High**	-3.50	5 **Definite**	-18 **High**	-1 **Negative**	1 **Project Site**	4 **Long Term**	2 **Low**	5 **High**	-3.00	3 **Medium**	-9 **Medium**

6.6 Geology and Soil

Impacts on soil and geology will be a concern mainly during the construction phase of the Project as the construction activities include direct and/or extensive physical interaction with the environmental components.

On the other hand, risk of soil contamination due to accidents and geotechnical and seismic risks would be of the primary concern for the operation phase.

Assessment of the impacts for geology and soil in construction and operation phases is provided in Subsection 6.6.1 and Subsection 6.6.2.

As a result of environmental baseline studies, sensitive receptors were determined in Chapter 5 of this Report. Table 6-41 and Table 6-43 detail the impact and mitigations for geology and soil in the Construction and Operation Phases.

6.6.1 Construction Phase

The Project will be constructed along a long route of approximately 112 km and significant volumes of the earthworks will be conducted in the scope of the Project, relevant measures required to be taken into a consideration, in order to avoid significant impacts on the soil environment.

The potential impacts of the land preparation and construction activities on the soil environment are summarized as;

- disturbance such as loss of fertile top layer,
- mixing of soil layers and types,
- soil compaction etc. due to top soil stripping, cut and fill operations,
- construction of road structures and extraction of construction materials at the quarry sites;
- soil erosion and soil contamination due to unexpected leakages or spills.

In addition, geotechnical risks along the Proposed Motorway Route will be identified to ensure safety and stability.

In case of not implementing the mitigation measures, top soil itself or its vegetative properties along the Motorway route may be lost due to erosion or mixing with coarse or contaminated soils. Thus, top soil management measures will be applied in the scope of the Project

Table 6-41 details the impact and mitigations for geology and soil in the Construction Phase of the Project.

Table 6-42 shows the overall rating of the impacts before and after mitigations. Erosion, land degradation and soil loss and soil pollution caused by construction activities are considered medium since the magnitude and the receptor sensitivity of the impacts are determined as high. For potential earthquake related impact, the design of the project to took consideration of national requirement while conducting seismic design and risk assessment of the Project. In addition, construction specific emergency preparedness and response plan will be adopted throughout the construction phase. For erosion related impact, the design of the Project took measures to reduce of the sensitivity of the receptors. Considering, measures taken for both erosion and earthquake related impacts as shown in Table 6-41, the sensitivity of the receptors will reduce to medium.

Table 6-41. Impact and Mitigations for Geology and Soil in Construction Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Earthquake[13] • Earthquake may occur either during the construction or the operation of the Project. The Project site is located on the 2nd degree seismic zone.	Faults Bounding on blocks	(See Subsection 5.8.8 in Chapter 5)	Design and Pre-construction • The Project will comply with the relevant Serbian regulatory requirements related to seismic design and risk assessment.(14) • Emergency Preparedness and Response Plan (EPRP) will be implemented.
Erosion • Several areas of potential soil erosion were identified as part of the preliminary geotechnical assessment investigation. There are areas along the Project which have a natural erosion risk due to their subsurface characteristics, areas at risk from excavation works and soil movement such as steep slopes at cut and fill sections.	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Excavation Backfilling Storage, Re-Use and Disposal of Excavations	(See Subsection 5.8.8 in Chapter 5)	Design • The Soil Erosion, Reinstatement and Landscape Management Plan will be developed and implemented. The Plan will adopt measures stated in the IFC EHS Guidelines: Construction and Decommissioning (2007) as: o Scheduling to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical, o Contouring and minimizing length and steepness of slopes o Mulching to stabilize exposed areas o Re-vegetating areas promptly o Designing channels and ditches for post-construction flows o Lining steep channel and slopes (e.g. use jute matting). Also, structure of the Plan will comply with the IFC EHS Guidelines: Toll Roads (2007).

[13] The Project will not create any seismic activity As a result, it is not expected any earthquake caused by the Project. In this section, the impact of the earthquake on the Project area and mitigations is evaluated.
[14] Depending on the ground conditions and the seismic characteristics of the region, design and design verification will be carried out according to Eurocode 8: Design of structures for earthquake resistance.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Soil Pollution caused by Construction Activities • Soil pollution and degradation during construction phase can be caused by improper handling of oil and its derivatives that are used for machinery. Pollution can also be caused by vehicles and machinery washing outside planned locations, inadequately regulated construction sites, and other activities that are not carried out under recommendations of technical measures of protection during construction works. • During the construction phase, a risky situation can occur for soil quality due to possibility spillage of hazardous substances. The accidental spillage of cement, fuel oils and lubricants may cause important consequences on soil quality. • Soil quality assessment in the project AoI indicates that there are elevated level of contaminants along the basin (see Chapter 5). Literarture shows that these elevated contaminant leves are caused by flood sediments either sourced by natural geogenic sources found in West Morava River Basin and/or anthropogenic sources such as mining activities located upper section of the basin. Storage of the excavated material (surface soil) may cause spread of contaminants.	Top-Soil Storage Camp Sites Material Storage Waste Storage/Disposal Excavation Backfilling Storage, Re-Use and Disposal of Excavations Material Spreading/Rolling/Compaction Machinery and Equipment Asphalt Preparation	• All soil temporary storage and disposal sites; these areas are not defined yet. Before construction, site specific baseline studies are required for all defined temporary storage areas and permanent disposal sites. • Nearby settlements which are under the dust impact. • Morava river and its tributaries in relation to storage and disposal areas • Camp sites.	<u>Construction</u> • Spill Response and Prevention Procedure will be prepared and implemented. • Construction equipment, machines and vehicles will be parked on arranged locations. • Parking surfaces (soil, gravel, and rock) will be protected from pollution from oil, oil derivate, naphtha and naphtha derivate. In case of pollution, measures will be taken in accordance with the Law on Soil Protection ("Official Gazette of RS" no. 112/15) • Washing of equipment, machinery and vehicles will be prohibited within construction area. • Concrete mixer washout areas will be designated and any other washing of concrete mixer and uncontrolled removal of the remaining parts of concrete mass on any surface outside road area will be prohibited. • Excavated material will be re-used to the extent possible. • Excess materials will be used during site arrangement and resinstaement activities. • Before storage of excess excavated materials, soil samples form excess material and proposed storage site will be sampled in order to understand the suittability of the proposed area fort he storage. • Hazardous materials will not be stored in excavated areas.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Exposure to hazardous materials in open areas will be kept to a minimum in size and time
Land Degradation and Soil Loss • Large amounts of construction material will be transported during the construction phase. New borrow pits will be opened. These activities can cause land degradation or permanent soil loss.	Excavation Top-Soil Storage	Project Area	<u>Design and Pre-construction</u> • All borrow pits and unsuitable soil waste areas will be designed in accordance with the mitigation measures within the national EIA and any permit conditions (outside the alignment expropriation boundaries). • Soil, Erosion, Rehabilitation and Landscape Management Plan will be prepared for all borrow pits and unsuitable soil waste areas used during construction works. <u>Construction</u> • Borrow pits and unsuitable soil waste areas will be executed according to design specifications, method statements and reinstatement plans.

Table 6-42. Scoring of Geology and Soil Impacts in Construction Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Earthquake	-1 **Negative**	4 **Regional**	1 **Immediate**	3 **Moderate**	5 **High**	-3.25	1 **Improbable**	-3.25 **Low**	-1 **Negative**	4 **Regional**	1 **Immediate**	3 **Moderate**	3 **Medium**	-2.75	1 **Improbable**	-2.75 **Low**
Erosion	-1 **Negative**	2 **Municipality**	1 **Immediate**	3 **Moderate**	5 **High**	-2.75	4 **High**	-11 **Medium**	-1 **Negative**	2 **Municipality**	1 **Immediate**	2 **Moderate**	3 **Medium**	-2	4 **High**	8 **Low**
Soil Pollution Caused by Construction Activities	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	5 **High**	-3.25	3 **Medium**	-10 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	5 **High**	-2.75	1 **Improbable**	-3 **Low**
Land Degradation and Soil Loss	-1 **Negative**	2 **Municipality**	2 **Short Term**	3 **Moderate**	5 **High**	-3	5 **Definite**	-15 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	1 **Minor**	5 **High**	-2.5	1 **Improbable**	-3 **Low**

6.6.2 Operation Phase

During the operation phase, soil contamination risks may be caused by the improper handling of the hazardous materials to be used in the road maintenance activities and leakage/spill of fuels, chemicals, etc. during the unexpected accidents. In that case, the associated impacts would be similar to the impacts described for the construction phase and a similar mitigation strategy would be adopted for the mitigation of potential impacts.

Last, seismic risks would be of concern for the entire operational life of the Motorway thus further evaluation on the potential risks and mitigation approaches is provided below.

Table 6-43 details the impact and mitigations for geology and soil in the Operation Phase of the Project.

Table 6-44 shows the overall rating of the impacts before and after mitigations. Earthquake impact is considered as low since the likelihood and duration are determined low. On the other hand, road and accidental spillage is considered as medium since the magnitude and likelihood are determined as high. For potential earthquake related impact, the design of the project to took consideration of national requirement while conducting seismic design and risk assessment of the Project. In addition, construction specific emergency preparedness and response plan will be adopted throughout the operation phase. Considering, measures earthquake related impacts as shown in Table 6-43, the sensitivity of the receptor will reduce to medium.

Table 6-43. Impact and Mitigations for Geology and Soil in Operation Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Earthquake • Earthquake may occur either during the construction or the operation of the Project. The Project site is located on the 2nd degree seismic zone.	Faults Bounding on blocks	(See Subsection 5.8.8 in Chapter 5)	Design • The Project will comply with the relevant Serbian regulatory requirements[15] related to seismic design and risk assessment. • Emergency Preparedness and Response Plan will be implemented for the operation phase.
Runoff from the Road and Accidental Spillage • Runoff from the road pavement which can contain some degree of silt/dust and pollutants from atmospheric deposition, vehicle emission as well as from possible accidental road spillage incidents can impact quality of groundwater locally.	Movement of the vehicles Operation of Service Stations Operation of Maintenance Station Crashing	Project Area	Design • The Storm Water Drainage Risk Assessment will be conducted in order to confirm that storm water drainage designs are effective to mitigate impacts on soil quality therein. Measures will be taken, such as the use of sand layers, which should be used as filters in leakage pits, to prevent the penetration of harmful substances into deeper soil layer. • Emergency Preparedness and Response Plan (EPRP) will be developed.

[15] Depending on the ground conditions and the seismic characteristics of the region, design and design verification will be carried out according to Eurocode 8: Design of structures for earthquake resistance.

Table 6-44. Scoring of Geology and Soil Impacts in Operation Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Earthquake	-1 **Negative**	4 **Regional**	1 **Immediate**	3 **Moderate**	5 **High**	-3.25	1 **Improbable**	-3.25 **Low**	-1 **Negative**	4 **Regional**	1 **Immediate**	3 **Moderate**	3 **Medium**	-2.75	1 **Improbable**	-2.75 **Low**
Runoff from the Road and Accidental Spillage	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	3 **Medium**	-2.75	4 **High**	-11 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	3 **Medium**	-2.25	2 **Low**	-5 **Low**

6.7 Resources and Waste

This section discusses resource efficiency for the Project and all waste impact that may occur during construction and operation phases of the Project. Following subsections determine magnitude of waste related impacts to the environment and how to manage, reduce or prevent them with recommended mitigation measures.

Resource

For the construction of the Project and all related infrastructure, significant quantities of various typical construction materials will be needed; these will include concrete, prefabricated segments (e.g. beams for bridges), steel, aggregates, and asphalt. In addition, large volumes of soil/topsoil will need to be excavated for motorway and river regulation works and as much as re-used as filling material as well as site arrangement and reinstatement.

Arrangements for sourcing and transport of the materials and equipment are under the responsibility of the Contractor. The supply of these materials will involve supply from local, national or international sources and use of transport by road or rail.

As explained in Section 3, at preliminary design phase of the project, a total of 56 borrow area and quarry have been identified along the project route. In addition to these borrow areas, excavated materials from river diversion channels will be used for the motorway construction. The construction material requirements have not been finalized since geotechnical investigations for the final design are still ongoing and the suitability of cut-fill requirements for the project have not been finalized. Due to this reason, a range for the material requirement could not be assessed. However, a preliminary estimate Amount of aggregate required for the construction is estimated as 8.156,400 m3 in total. The amount include reserves of alluvial gravel, aggregate of carbonate origin (limestone), used for the construction of the upper supporting layers of pavement structure and concrete. As the Contractors estimate the quarries and borrow areas together with the excavated material sourced from river diversion project is sufficient for construction works. On the other hand, depending on the results of detailed geotechnical study, there will be some changes about the size and location of proposed material source. In case a requirement, constraint maps prepared as a result of ESIA study will be used for the new site determination in order to avoid and minimize any potential impact on sensitive locations. Additionally, the contractor will conduct Environmental Site Assessment as a Due Diligence study for new proposed sites in line with the policies and mitigations identified in the ESIA. In this respect, EHS considerations that will need to be taken into account in the selection of appropriate quarry sites and access routes will be based on IFC General EHS Guidelines (IFC, 2007) as well as guidelines for IFC EHS Guidelines for Construction Materials Extraction (IFC, 2007). These guidelines will take into account the noise, air quality, proximity to sensitive receptors, community HS, vibration issues (blasting), habitat and biodiversity among other considerations for the selection and use of these quarries.

An audit procedure will be developed to assess the existing quarries with respect to the IFC and Serbian regulatory requirements.

The approximate earthwork volumes are: 20 million m^3 of cut volume and 17 million m^3 of fill volume. Based on the above estimates there will be a net surplus of material across the Project of approximately 3 million m^3. As stated above, most of the material will be useful for construction of other parts of the Project (embankments, road base materials, backfilling for reinstatement of borrow areas etc.) and the aim will be to achieve a balance of cut and fill material as far as possible. It should be noted that geotechnical assessment is being conducted for the final design stage and a more accurate number will be established. The soil quality will be tested in areas where potential sources of contamination may be expected to ensure proper usage as material for the cut and fill requirements (see Chapter 5 Geology and Soils).

Water is another major requirement in the project. The estimated amount of water use for labor camps is 25,000 tons in total of 2 camps as monthly average. If the number of camps is to be 3 then this estimate will yield as 38,000 tons per month. For batch plants, water consumption is estimated as approximately 10,000 tons per month. Regarding the consumptions of resources in asphalt plants, it is estimated to consume 3,500 tons of water as monthly average. Potential water consumptions for the construction of project are provided in Table 6-45. Water will mainly be supplied from existing sources and the water wells.

Table 6-45. Amount of Water Use during Construction

Description	Water Use (ton/month)
Labour camps	25,000
Batch plants	10,000
Asphalth plants	3,500
Concrete Production	8,500
Total	**47,000**

Some of the other materials used for the project

- 7,500 tons of cement per month is expected to be used in the concrete batching plant. Cement for concrete production will be supplied from the cement producer facilities nearby the project site (around 250 km distance). Approximately 25 dump trucks per day will be used for raw material transportation to batch plants.
- Average daily production of the asphalt is estimated as 3,000 tons. Bitumen will be used in the asphalt production and it will be supplied from Pančevo Refinery. The distance between the project site and refinery is about 500 km.

Waste

Following waste materials are expected to be generated during the construction and operation phases of the Project.

Excavation Materials: Excavation materials will result from the construction activities of the Project. Numerous cuttings to be built along the Proposed Motorway Route are planned. In addition, river regulation works to prevent flooding will result in excavation materials. The amount of excavation material caused by the river regulation is 9 647 756 m^3. Wherever possible, materials excavated from excavation sites will be reused as fillers on the construction site or for reinstatement purposes. This will maximize the rate of use of materials on-site and reduce the need for off-site disposal. On the other hand, unsuitable soil from excavations are not expected to be generated in large quantities during the construction of the Project.

If there is excess unsuitable excavation material, proper storage and evacuation of the material will be carried out in order to not carry the pollution to another location considering the high heavy metal values found in the soil during the baseline studies. When it needs to be moved to another location, it should be proved that it will not create pollution in that area by conducting soil and field analyses.

Domestic Waste: It is foreseen that there will be approximately 2000 construction phase workers in the two worker accommodation sites. The Contractor stated that the domestic waste to be produced at all sites will be collected and stored in containers placed at suitable points and the recyclable waste will be collected separately. These wastes will be collected periodically by licensed companies and sent to the nearest waste disposal facility.

Worldwide, waste generated per person per day averages 0.74 kilogram (The World Bank, n.d.). Thus,

$$0.74\ {}^{kg}/_{person.day} \times 2000\ people = 1{,}480\ {}^{kg}/_{day}$$

Thus, it is estimated that a total of 740 kg of domestic waste will be produced per camp per day.

In summary, it is foreseen that the importance of the impact of domestic wastes to be produced during construction phase will be small as the generated wastes will be collected at certain intervals.

During the operation phase of the Project, it is foreseen that the domestic wastes will be limited to the small volumes related to the maintenance works and the maintenance of the landscape areas.

In summary, no significant impact is anticipated given that appropriate waste treatment, storage and disposal procedures will be adopted and detailed information on waste disposal sites to be potentially used within the scope of the Project provided in Chapter 3.6 (Third Party

Utilities) of the ESIA Report. Before the construction phase, waste disposal sites will be visited and appropriate disposal sites will be added to the waste management plan.

Waste Oil: During the construction phase, waste oil originating from the maintenance of construction machinery, equipment and vehicles will be generated. Maintenance activities such as oil change of construction machinery and equipment will be carried out at various locations along the Proposed Motorway Route. Therefore, drip trays will be used to avoid soil pollution.

The waste oil produced required to be collected in safe sealed containers. It will be stored in an area with a concrete surface and in a suitable secondary container to prevent spills and leaks from reaching the soil and groundwater. Containers will be appropriately labelled. These labels will also indicate the amount of waste stored and the time of storage. If containers are damaged, waste will be transferred to other containers with the same characteristics.

It is recommended that the waste oil containers are kept in bounded areas; such that there will be a permeable wall around the oil storage areas to contain any spillage. Ideally, its volume required to contain 110% of the oil stored there.

The transportation of wastes required to be carried out by persons and institutions licensed for this work and by means of the vehicles appropriate to the characteristics of the waste transported. These hazardous wastes will be sent to an arranged licensed facility. All health and safety precautions related to personnel responsible for activities such as transportation and temporary waste storage at the facility will be taken.

Other typical construction wastes will be stored temporarily onsite in appropriate containers and then transferred to and disposed of (or treated) via licensed waste facilities located in vicinity of the Project. The waste facilities used during construction will be selected by the EPC contractor. The wastes that will be generated during the construction process include:

Recyclable wastes: waste metals, plastics, cables, glass, paper (packaging material, clean air filters, clean containers, drums bins, crushed stone).

- Wastewater from construction camps and construction operations
- Non-hazardous waste from construction camps and construction operations (scrap metal, slightly contaminated discarded material)
- Hazardous waste (chemicals, additives, paints) generated from use of hazardous materials for road construction
- Machinery operation and maintenance related wastes (machinery parts replacement, used filters, etc)
- Waste generated from concrete batch plant and asphalt plant and painting operations (wastewater, sludge, waste bitumen, spent paint)
- Medical waste
- Waste batteries and accumulators.

The quantities of materials used and wastes generated during the Project operation phase will primarily relate to the operation of the service and maintenance areas and the toll plazas, as well as to the maintenance of the road corridor. Solid waste generation during operation and maintenance activities may include road resurfacing waste (e.g. removal of the old road surface material); during operation and maintenance activities may include road resurfacing waste (e.g. removal of the old road surface material); road litter, illegally dumped waste, or general solid waste from rest areas; animal carcasses; vegetation waste from right-of-way maintenance; and sediment and sludge from stormwater drainage system maintenance (including sediment traps and oil/water separation systems). Paint waste may also be generated from road and bridge maintenance (e.g. due to removal of old paint from road stripping and bridges prior to re-painting).The oil to be used for maintenance activities must not contain PCBs (polychlorinated biphenyl) or other carcinogenic chemicals. All wastes should be collected and disposed of properly by the arranged licensed company.

6.7.1 Construction Phase

During the construction phase, a significant amount of rock and soil material will be formed from the earthworks. In the design phase, the disposal sites of excess material and the methods of disposal (area, compaction, slope stability, drainage, etc.) will be identified. Areas for disposal of inert materials (construction and demolition waste) will be determined in consultation with the related local authorities.

During the construction phase, the Waste Management Plan will be carried in accordance with the IFC EHS Guidelines for Construction Materials Extraction (2007) and the recommendations of the IFC General EHS Guidelines (2007).

Table 6-46 shows the overall rating of the impacts before and after mitigations. Destruction of habitats and plants during earthworks and resource extraction, disposal of excavated waste

soil and hazardous waste generated during construction activities are considered medium since the magnitude and the likelihood of the impacts are determined as high. After taking mitigation measures, as shown in Table 6-47, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-46. Impact and Mitigations for Waste Generation in Construction Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
• Destruction of habitats and plants during earthworks and resource extraction	Top-soil stripping Tree Cutting /Vegetation clearance Demolishing of Exiting Buildings/Structures Camp Sites Waste Storage/Disposal Excavation Crushing Asphalt Preparation Concrete Batching	Existing waste disposal sites, settlements near to the camp areas and storage areas are determined as sensitive receptors.	<u>Design and Pre-construction</u> • Quarry Management Plan will be developed and implemented during the construction phase. • Soil Erosion, Reinstatement and Landscape (SERL) Management Plan will be prepared in accordance with Serbian law, IFC EHS Guidelines and international environmental management systems. • Emergency Preparedness and Response Plan (EPRP) will be developed and implemented. • Hazardous Material Management Plan will be developed and implemented. <u>Construction</u> • Quarries will be operated and monitored to comply with national and international standards (IFC EHS Guidelines for Construction Materials Extraction (2007) • Where possible, existing (fully licensed) quarries should be used instead of opening new quarries. • Existing quarries will be assessed to ensure that the permits are valid and that operations are appropriate and in accordance with national and international standards. • If a new quarry is opened outside the expropriation boundaries, all required permits will be obtained
• Disposal of excavated waste soil	Top-soil stripping Tree Cutting /Vegetation clearance Demolishing of Exiting Buildings/Structures Camp Sites Waste Storage/Disposal	Existing waste disposal sites, settlements near to the camp areas and storage areas are determined as sensitive receptors.	<u>Pre-construction</u> • Waste Management Plan and Soil Erosion, Reinstatement and Landscape (SERL) Management Plan will include best management practices for excavated waste soils.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
	Excavation Crushing Asphalt Preparation Concrete Batching		Construction • Excavated soils will be reused as much as possible and, where applicable, alternative uses of surplus residues will be investigated.
• Hazardous waste generated during construction activities	Demolishing of Exiting Buildings/Structures Camp Sites Waste Storage/Disposal Excavation Crushing Asphalt Preparation Concrete Batching	Existing hazardous waste disposal sites Settlements near to project construction sites including all project facilities and activities Natural habitats	Pre-construction • Hazardous Material Management Plan will be prepared and implemented. Construction • Hazardous waste generated during construction will not be discharged in surface water. (Law on Waste Management ("Official Gazette of RS", no. 36/09 and 88/10). • All hazardous waste should be properly collected, marked and disposed at approved location in accordance with the procedure prescribed within the Law on waste management (“Official Gazette of RS”, 36/09, 88/10, 14/16). It is strictly forbidden to dispose any type of hazardous waste on locations where surplus earth material will be disposed. • Hazardous waste will be managed and disposed in accordance with Law on Waste Management and the Directive 91/689/EEC on hazardous waste. • Hazardous waste will be collected and disposed by a licensed waste contractor.
Resource Efficiency* • Excess amount of resource usage may cause negative impact.	All Pre-Construction and Construction Works		Construction • When the project is a potentially significant consumer of water, in addition to applying the resource efficiency requirements of this Performance Standard, the Contractor shall adopt measures that avoid or reduce water usage so that the project’s water consumption does not have significant adverse impacts on others. These measures include, but are not limited to,

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			➢ the use of additional technically feasible water conservation measures within the construction activities, ➢ the use of alternative water supplies, water consumption offsets to reduce total demand for water resources to within the available supply • The Contractor will avoid the release of pollutants or, when avoidance is not feasible, minimize and/or control the intensity and mass flow of their release according to the mitigation measures given in the Report. This applies to the release of pollutants to air, water, and land due to routine, non-routine, and accidental circumstances with the potential for local, regional, and transboundary impacts. • Where waste generation cannot be avoided, the Contractor will reduce the generation of waste, and recover and reuse waste in a manner that is safe for human health and the environment. Where waste cannot be recovered or reused, the Contractor will treat, destroy, or dispose of it in an environmentally sound manner that includes the appropriate control of emissions and residues resulting from the handling and processing of the waste material. If the generated waste is considered hazardous, the client will adopt GIIP alternatives for its environmentally sound disposal while adhering to the limitations applicable to its transboundary movement.

*In addition to the mitigitions outlined in this section, detailed measures are specified in each environmental section; water quality, air quality and climate, noise and vibration, and geology and soil. In addition, both the Construction Contractor and the Project Owner will detail their implementation plans within the scope of the quality system they will implement within the project. Impacts on resources are also addressed as part of social impact assessment.

Table 6-47. Scoring of Waste Generation Impacts in Construction Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Destruction of habitats and plants during earthworks and resource extraction	-1 **Negative**	1 **Project Site**	2 **Short Term**	4 **High**	3 **Medium**	-2.5	4 **High**	-10 **Medium**	-1 **Negative**	1 **Project Site**	2 **Short Term**	2 **Low**	3 **Medium**	-2	1 **Improbable**	-2 **Low**
Disposal of excavated waste soil	-1 **Negative**	1 **Project Site**	2 **Short Term**	4 **High**	3 **Medium**	-2.5	4 **High**	-10 **Medium**	-1 **Negative**	1 **Project Site**	2 **Short Term**	2 **Low**	3 **Medium**	-2	2 **Low**	-4 **Low**
Hazardous waste generated during construction activities	-1 **Negative**	1 **Project Site**	2 **Short Term**	5 **Very High**	3 **Medium**	-2.75	4 **High**	-11 **Medium**	-1 **Negative**	1 **Project Site**	2 **Short Term**	2 **Low**	3 **Medium**	-2	**1** **Improbable**	-2 **Low**
Resource Efficiency	-1 Negative	1 **Project Site**	2 **Short Term**	4 **High**	5 **High**	-3	4 High	-12 **Medium**	-1 Negative	1 **Project Site**	2 **Short Term**	2 **Low**	5 **High**	-2.5	**2** **Low**	-5 **Low**

6.7.2 Operation Phase

The waste to be generated during the operation phase will be sourced from food, paper and packaging waste from the passengers who will use the parking lots along the Motorway. A sufficient number of waste bins and containers will be placed in the parking lots and disposal of waste will be cooperated with arranged by the local authorities.

Also, during the maintenance activities of the Motorway and operational vehicles/equipment, hazardous waste may impact the environment.

Table 6-48 details the impact and mitigations for waste in operation phase of the Motorway.

Table 6-49 shows the overall rating of the impact of before and after mitigations. Generation of waste is considered high since the duration, magnitude and the likelihood of the impacts are determined as high. After taking mitigation measures, as shown in Table 6-49, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-48. Impact and Mitigations for Waste Generation in Operation Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
• Generation of Waste	Operation of Maintenance Station	Existing waste disposal sites and retail stations are determined as sensitive receptors.	<u>Design</u> • Waste Management Plan will be prepared and implemented • Hazardous Material Management Plan will be prepared and implemented. <u>Operation</u> • To minimize the risk of road paving maintenance work, follow the IFC EHS Toll Road Guidelines (2007). • Mitigation measures will take into account the requirements of Serbian regulations and IFC General EHS Guidelines. o An appropriate training should be provided to all personnel in operational project facilities and at toll booths to show where different types of waste will be placed. o Solid waste will be collected regularly and disposed of properly at an appropriate disposal site. o Waste containers will be capable of handling the solid wastes in an appropriate and safe manner and will not be affected by weather conditions. o Waste containers required to have labels identifying the type of waste. Proper labelling will prevent mixing of hazardous waste and non-hazardous solid waste. o Reuse/recycling methods will be considered to minimize the generation of solid waste. o Certified/licensed facilities will be used for the final disposal of solid wastes which cannot be reused/recycled. o Signs and other posting will be used to inform drivers not to throw litter. Litter or illegally disposed waste along the Motorway required to be collected and disposed of properly. o Recycling and trash containers will be provided in parking lots and rest areas to minimize litters on the Motorway. o Sediments and sludge from storm drainage systems required to be managed and disposed appropriately. o Old road surface materials can be managed by re-using in paving or stockpiling materials may be stored for roadbed or other uses.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• All hazardous waste should be properly collected, marked and disposed at approved location in accordance with the procedure prescribed within the Law on waste management (“Official Gazette of RS”, 36/09, 88/10, 14/16). It is strictly forbidden to dispose any type of hazardous waste on locations where surplus earth material will be disposed.

Table 6-49. Scoring of Waste Management Impacts in Construction Phase

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Generation of Waste	-1 **Negative**	2 **Municipality**	4 **Long Term**	2 **Low**	3 **Medium**	-2.75	5 **Definite**	11 **Medium**	-1 **Negative**	2 **Municipality**	4 **Long Term**	2 **Low**	3 **Medium**	-2.75	2 **Low Probability**	-6 **Low**

6.8 Terrestrial and Freshwater Ecology

The construction and operation of the Project will involve a wide range of activities that have the potential to affect ecology. Impacts of project activities can be further divided into the target group of biological elements as terrestrial and aquatic. Important impacts of motorway construction and operation activities on biological environment are mainly habitat fragmentations. Habitat fragmentation can be described as the splitting of natural habitats and ecosystems into smaller, more isolated patches. The process of fragmentation is connected to many different factors, of which the direct loss and isolation of natural habitat are the most important.

The ecological effects of transportation include disturbance in terms of noise, visual nuisance from artificial structures and machinery activities and pollution, which act to reduce the suitability of adjacent areas for wildlife. The infrastructure itself contributes significantly towards habitat fragmentation by creating barriers to animal movement. This may result in the isolation and loss of sensitive species. The steady increase in the number of animal casualties associated with roads and to a lesser extent with drowned animals in waterways provides a further indication of the fragmentation effect. Fauna mortality, in particular, has helped raise the public perception of the problem, due to the inherent link to traffic safety. Finally, devaluation of the landscape and nature for human recreation can make an important negative economic factor.

During the planning, construction or upgrading of transportation infrastructure, all possible efforts must be made to maintain or restore ecological structures and connect habitats and populations. Particular attention will be paid to rivers, streams, riparian forests, wooded corridors, networks of hedges and dikes etc., which provide ecological corridors for growth, expansion of range and/or migration of wildlife populations and can often be the last refuge for many species in an intensively man-used landscape.

Best practice assigns that project planning and design will aim to avoid ecological damage, especially to protected or sensitive habitats and/or species. The avoidance of fragmentation will be considered before resorting to mitigation measures.

The general principles that will be considered to avoid against the habitat fragmentation are:

- The fragmentation of natural habitats by transportation infrastructure is a problem, which can only be solved through acceptance of the issue at a policy level. Only an interdisciplinary approach involving planners, economists, engineers, ecologists and landscape architects etc., can provide the necessary tools for successfully addressing fragmentation. Public involvement is also essential to ensure the success of the chosen solutions.

- Habitat connectivity is a vital property of landscapes and is especially important for sustaining animal movement across the landscape. The preservation of habitat connectivity should be a strategic goal in the environmental policy of the transport sector.
- Avoiding and mitigation will be applied from the start of the planning process.

The relevant construction and operational activities of the Project likely to give rise to impacts on receptors are summarized in Table 6-50, along with the likely pathway of the impacts.

Table 6-50. Potential Impacts of the Project on Biological Environment

Phase of the Project Activities	Activity	Potential Impact
Construction	Vegetation clearance	Damage or loss of habitats Loss of important plant species Direct incidental killing of fauna Loss of habitat for faunal species Increase in noise, visual and vibration which may cause disturbance or displacement of fauna Invasive species
	Camp sites, borrow areas, batch and asphalt plants and quarries	Damage or loss of habitat Increase in noise, visual and vibration which may cause disturbance or displacement of fauna
	Construction of culverts, bridges and viaducts	Damage or loss of habitat Increase in noise, and vibration and disturbance on fauna Disruption of ecological connectivity Loss of ecosystem services
	Presence of site preparation and construction vehicles	Increase in noise, visual and vibration which may cause disturbance or displacement of fauna Damage or loss of flora and /or fauna
Operation	Operational traffic	Increase in noise, visual and vibration which may cause disturbance or displacement of fauna Damage and/or loss of fauna Barrier effects

Protected Areas

According to the EIAs prepared for the Morava Motorway Project, based on the decision of the Institute for Nature Protection of Serbia, It was determined that the area foreseen for the Motorway, is not located in "protected areas for which protection procedure has been carried out or initiated", "Ecological Network of the Republic of Serbia ", and "recorded natural assets".

Internationally Recognized Areas

IFC PS6 states that internationally and/or nationally recognized areas of high biodiversity value are likely qualified as critical habitat. These include Key Biodiversity Areas (KBAs), Important Bird Areas (IBAs) and Important Plant Areas (IPAs). Therefore, all of the KBAs within and in the vicinity of the Project Area are considered to be of high sensitivity.

Nationally Recognized Areas

IFC PS6 states that internationally and/or nationally recognized areas of high biodiversity value are likely qualify as critical habitat. These include nationally protected areas. Therefore, all of the protected areas within and in the vicinity of the Project area are considered to be of high sensitivity.

There is no nationally or internationally protected area within the AoI. Only one nationally recognized nature reserve area located is outside the AoI (Section-2, KP 30). The "Osredak" Special Nature Reserve protected area is situated 530 m distance to the Proposed Motorway centerline. The Project does not pose any direct impact (land take, construction of any access roads, borrow area etc.) to the site. The results of the assessment on physical impacts (i.e. air quality, noise, soil and water quality) given in this chapter indicate that indirect impacts of the Project to the site are also insignificant or negligible. All the assessment on noise and air impacts have been estimated with numerical models. As an example, estimated noise level at the Osredak Special Nature Reserve is 40 dB, which indicates that no noise impact on the area is expected due to its distance to project facilities. The site is also included in the constraint maps as no-go area.

River diversion project will cause a significant change in the river flow. In order to reduce the impact of flow in the new riverbed due to river regulation, natural material (such as rocks) will be used for the protection of scouring and river bank erosion. Continuity of the flow will be maintained in the new channel and the flow of the river will not be impacted. Therefore, no adverse impacts on Gornje Pomoravlje KBA.

Habitats

Nine different 3rd level EUNIS habitat types were identified in the Proposed Motorway Route. Natural habitats are usually not continuous but intermittent. The Project area covers mostly invasive plant species habitats and agricultural lands (see Table 6-51). Sensitive habitats are also provided in the "Constraint Map" given in Appendix-5.

Table 6-51. Habitat Sensitivity and Habitat Loss due to Project

Habitat Code		Habitat Type	Rationale	Sensitivity	Total Area (buffer)		Damage or Loss of Habitats due to Permanent Structures (Motorway and River Regulation Footprint)		Damage or Loss of Habitats due to Temporary Structures (Project Facilities)	
					ha	%	ha	%	ha	%
Natural	C2.3	Permanent non-tidal, smooth-flowing watercourses	These habitat are described as a priority Habitat according to the EU Habitats Directive (92/43/EEC) and Law On Nature Protection ("Official Gazette of RS", no. 36/2009, 88/2010 and 91/2010 – corr.and 14/2016)	Medium	685.95	3.7	65.3	5,7	1,3	0,1
	E2.1	Permanent mesotrophic pastures and aftermath-grazed meadows		Medium	188.42	1.0	12.8	1,1	7.9	0,6
	G1.1	Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix		Medium	2710.59	14.7	208.1	18,3	130.8	10,0
	G1.7	Thermophilous deciduous woodland		Medium	2211.62	12.0	70.7	6,2	240.3	18,4
	J5.3*	Highly artificial non-saline standing waters		Medium	19.94	0.1	0	0,0	0.13	0,01
Total Natural Habitats					*5816,52*	*31,5*	*356.8*	*31,4*	*380.6*	*38.9*
Modified	I1.1	Intensive unmixed crops	Habitat that support species of Low sensitivity	Low	11312.1	61.4	749.2	66,0	920	70,4
	J1.2	Residential buildings of city and town centres		Low	863.65	4.7	8.2	0,7	1.5	0,1
	J2.3	Rural industrial and commercial sites still in active use		Low	142.92	0.8	1.5	0,1	0	0,0
	J3.2	Active opencast mineral extraction sites,		Low	74.43	0.4	2.0	0,2	1.1	0,1

Habitat Code		Habitat Type	Rationale	Sensitivity	Total Area (buffer)		Damage or Loss of Habitats due to Permanent Structures (Motorway and River Regulation Footprint)		Damage or Loss of Habitats due to Temporary Structures (Project Facilities)	
					ha	%	ha	%	ha	%
		including quarries								
	J4.2	Road Networks		Low	130.83	0.7	25,7	2,3	1.7	0,1
	J5.3	Highly artificial non-saline standing waters		Low	96,68	0.5	2.3	0,2	1.9	0,2
Total Modified Habitats					*12620,6*	*68,5*	*779.1*	*74.9*	*926.3*	*61.1*
Total					**18437,1**	**100.0**	**1135.9**	**100.0**	**1306.8**	**100.0**

**areas which naturalized in time*

Table 6-52. Detailed Habitat Loss due to Each Project Component

Project Component	Total Area of the Component (ha)	% Area of the Component	Habitat	Total Area of the Habitat within the Component (ha)	% Area of the Habitat within the Component
Motorway	829,38	33,76	C2.3	7,57	0,91
			E2.1	10,79	1,30
			G1.1	70,79	8,54
			G1.7	66,80	8,05
			I1.1	634,97	76,56
			J1.2	8,15	0,98
			J2.3	1,52	0,18
			J3.2	1,24	0,15
			J4.2	25,45	3,07
			J5.3	2,10	0,25
River Regulation	316,25	12,87	C2.3	57,69	18,24
			E2.1	1,96	0,62
			G1.1	137,29	43,41
			G1.7	3,94	1,25
			I1.1	114,18	36,10
			J3.2	0,78	0,25
			J4.2	0,23	0,07
			J5.3	0,17	0,05
Batch Plant	37,48	1,53	G1.1	1,91	5,10
			G1.7	1,68	4,48
			I1.1	33,83	90,26

Project Component	Total Area of the Component (ha)	% Area of the Component	Habitat	Total Area of the Habitat within the Component (ha)	% Area of the Habitat within the Component
			J5.3	0,06	0,16
Precast Yard	13,58	0,55	G1.1	0,28	2,06
			G1.7	0,46	3,39
			I1.1	12,84	94,55
Beam Plant	25,81	1,05	I1.1	25,80	100,00
Borrow Area	956,14	38,92	C2.3	0.00	0,00
			E2.1	6,16	0,64
			G1.1	125,34	13,11
			G1.7	45,19	4,73
			I1.1	776,04	81,16
			J3.2	0,77	0,08
			J4.2	0,60	0,06
			J5.3	2.00	0,21
SW Plant	8,55	0,35	G1.7	0,11	1,29
			I1.1	8,45	98,83
Quarry	201,76	8,21	C2.3	1,33	0,66
			E2.1	1,80	0,89
			G1.1	1,65	0,82
			G1.7	189,26	93,80
			I1.1	5,04	2,50
			J1.2	1,24	0,61
			J3.2	0,32	0,16
			J4.2	1,12	0,56
Asphalt Plant	11,3	0,46	G1.1	0,06	0,53
			G1.7	0,28	2,48
			I1.1	10,67	94,42
			J1.2	0,27	2,39
Subbase Plant	6,39	0,26	G1.7	0,11	1,72
			I1.1	6,28	98,28
Camp Area	42,7	1,74	G1.1	1,61	3,77
			G1.7	0,04	0,09
			I1.1	41,06	96,16
Crusher	7,07	0,29	G1.7	3,15*	100,00
Total	2456,41	100,00			

*The remaining area of the Curshers are located in the Quarry sites

It can be observed that the most affected habitat (permanently occupied by the motorway and river regulation – habitat lost) is agricultural lands (66%), described with a low sensitivity. Thermophilous deciduous woodland (6.2%) and Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix (18.3%). The affection to the rest of the habitats will be much lower, with a percentage of habitat loss below 9.5% in all the cases. Regarding temporary occupancies of habitats, they are mostly limited to agricultural lands (70.4%), Thermophilous deciduous woodland (18.4%) and Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix (10%). The rest of the habitats represent a percentage below 1.2%.

Threatened Flora and Fauna Species

Flora

There are no species endemic and protected by international conventions in the Project area.

According to the National legislation, there is one plant species listed as strictly protected (Ann-I) *Nuphar lutea*. Only, *Arctium lappa, Hypericum perforatum, Iris pseudoacorus, Acinos hungaricus, Lamium album, Althea officinalis, Crataegus monogyna, Rosa canina, Galium odoratum* and *Viola odorata* species listed as protected species (Ann-II) were identified. These species are assessed as medium sensitivity.

Invertebrates

According to the National legislation, there are 2 species *Papilio machaon* and *Pieris brassicae* listed as strictly protected (Ann-I). The species potentially found in the Project AoI don't have important concentrations in terms of the species listed in National Protection lists. These species identified in the studies have high global populations and widely distributed species in the country and in Europe. According to this situation, these species are assessed as high sensitivity.

Zerynhia cerisy is evaluated as NT (Near Threatened) according to IUCN Red List is assessed as medium sensitivity. Rest of the invertebrate species are low sensitivity.

Amphibian –Reptilian

According to the National legislation, there are 8 Amphibian species and 7 Reptile species listed as s strictly protected (Ann-I) and 1 Amphibian species listed as protected species (Ann-II). The species potentially found in the Project AoI don't have important concentrations in terms of the species listed in National Protection lists. These species identified in the studies have high global populations and widely distributed species in the country and in Europe. According to this situation, species listed in Ann-I are assessed as high sensitivity and species listed in Ann-II are assessed as medium sensitivity.

Emys orbicularis, Testudo hermanni and *Darevskia praticola* are evaluated as NT (Near Threatened) according to IUCN Red List and assessed as medium sensitivity.

Triturus macedonicus, Anguis fragilis, Lacerta viridis, Podarcis muralis and Vipera ammodytes are assessed as low sensitivity due to their global and national status.

Birds

According to the National legislation, 75 of the bird species are listed as strictly protected (Ann-I). And 19 species are listed as protected species (Ann-II).The species potentially found in the Project AoI don't have important concentrations in terms of the species listed in National Protection lists. These species identified in the studies have high global populations and widely distributed species in the country and in Europe. There were no bird species and/or habitats in flocks and/or colonies observed in the study area. According to this situation, species listed in Ann-I are assessed as high sensitivity and species listed in Ann-II are assessed as medium sensitivity.

Aquila heliaca, Streptopelia turtur are evaluated as VU (Vulnerable) and *Milvus milvus*, *Falco vespertinus* are evaluated as NT according to the IUCN Red List. These species are assessed as medium sensitivity. Rest of the species not belonging to the National legislation and evaluated lower than NT according to the IUCN are assessed as low sensitivity.

Mammals

According to the National legislation, 33 of the mammal species are listed as strictly protected (Ann-I). And 1 species is listed as protected species (Ann-II). The species potentially found in the project AoI don't have important concentrations in terms of the species listed in National Protection lists. These species identified in the studies have high global populations and widely distributed species in the country and in Europe. According to this situation, species listed in Ann-I are assessed as high sensitivity and species listed in Ann-II are assessed as medium sensitivity.

Rhinolophus Euryale, Myotis bechsteinii and *Lutra lutra* are evaluated as NT (Near Threatened) and *Myotis capaccinii* is evaluated as VU (Vulnerable) according to IUCN Red List and assessed as medium sensitivity. Rest of the species do not belong to the National legislation and evaluated lower than NT-VU according to the IUCN are assessed as low sensitivity.

Aquatic Environment

According to the National legislation, 4 of the fish species and 2 of the macrobenthic species listed as strictly protected (Ann-I). 9 fish species and one macrobenthic species listed as protected species (Ann-II). The species potentially found in the Project AoI don't have

important concentrations in terms of the species listed in National Protection lists. These species identified in the studies have high global populations and widely distributed species in the riverine system of the country and Europe. According to this situation, species listed in Ann-I are assessed as high sensitivity and species listed in Ann-II are assessed as medium sensitivity.

Cyprinus carpio is evaluated as VU (Vulnerable) according to IUCN Red List and assessed as medium sensitivity. Within the macrobenthic organisms, *Hirudo medicinalis* is classified as 'Near Threatened Species-NT',*Astacus astacus* classified as 'Vulnerable-VU' and *Unio crassus* classified as 'Endangered-EN' according to IUCN Red List. In this context, *Hirudo medicinalis* and *Astacus astacus* assessed as medium and *Unio crassus* assessed as high sensitivity. Rest of the aquatic species not belonging to the National legislation and evaluated lower than NT-VU according to the IUCN are assessed as low sensitivity.

Critical Habitat Assessment

Conservation of biodiversity requires protection of habitats for survival of species as well as sustenance of ecosystems. As stated by IFC PS 6, habitats constitute "a terrestrial, freshwater or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment" (IFC, 2012). To meet IFC PS 6 requirements, clients would have different obligations for different kinds of habitats. This enables to provide a better understanding of specific species and habitat requirements and establish meaningful management units to define a mitigation strategy. In order for IFC PS6 requirements to be met, clients have different responsibilities regarding different habitat types.

The first step in assessment of habitat features is to differentiate between modified, natural and critical habitats, each of which require different conservation efforts and compensatory measures. Modified habitats, in the most general sense, are those that have been subject to some form of alteration, often resulting in agricultural land. Despite the fact that some modified habitats might lose all of their natural characteristics, it is still required to minimize further impacts. Natural habitats are composed of plant and/or animal species that are mostly of native origin, where human activity has not been significant enough to modify ecological functions and species composition within. In line with IFC PS 6, in areas of natural habitat project activities will not significantly convert or degrade the habitat unless the following conditions are met (IFC, 2012):

- There are no technically and financially feasible alternatives;
- The overall benefits of the project outweigh the costs, including those to the environment and biodiversity; and
- Any conversion or degradation is appropriately mitigated.

In areas of natural habitat, mitigation measures are required to be designed to achieve no net loss of biodiversity. Critical habitats are areas of high biodiversity value that may include at least one or more of the five values specified in IFC PS 6. Critical habitat criteria are as follows and should form the basis of any critical habitat assessment (IFC, 2019 GN53):

I. Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species;
II. Criterion 2: Endemic and/or restricted-range species;
III. Criterion 3: Migratory and/or congregatory species;
IV. Criterion 4: Highly threatened and/or unique ecosystems; and
V. Criterion 5: Key evolutionary processes.

Numerical thresholds have been defined for the first four critical habitat criteria. The thresholds are indicative and serve as a guideline for decision-making only (IFC, 2019 GN56).

I. Criterion 1: Critically Endangered and Endangered Species

Species threatened with global extinction and listed as CR and EN on the IUCN Red List of Threatened Species shall be considered as part of Criterion 1. Critically Endangered species face an extremely high risk of extinction in the wild. Endangered species face a very high risk of extinction in the wild.

Criterion 1 of species that are listed nationally/regionally as CR or EN in countries that adhere to IUCN guidance shall be determined on a project-by-project basis in consultation with competent professionals.

Thresholds for Criterion 1 are the followings:

a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species).

b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a).

c) As appropriate, areas containing ***important concentrations*** of a nationally or regionally listed EN or CR species.

According to the findings obtained from surveys in these habitats, no Terrestrial and Aquatic flora-fauna species classified as CR were observed. Only Unio crassus classified as EN in global scale according to IUCN. Although, European population of Unio crassus classifed as VU. Unio crassus was not detected in the field study and was included in the lists based on the literature. Species classified as VU status have been identified during the studies, but the habitats don't have globally important concentrations in these habitats. All of the species

identified in these studies have high global populations and all species are widely distributed species.

As it is given in the baseline chapter of the ESIA Report, the literature together with the baseline study indicates that neither species potentially found in the project AoI nor the habitats don't have important concentrations in terms of the species listed in National Protection lists. The assessment shows that the area is heavily under the anthropogenic influences (mainly agriculture and populated settlements along Morava River and the existing road).

II. Criterion 2: Endemic and Restricted-range Species

- For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO[16] less than 50,000 square kilometers (km^2).
- For marine systems, restricted-range species are provisionally being considered as those with an EOO of less than 100,000 km^2.
- For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).

The threshold for Criterion 2 is the following:

a) Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species

According to the findings obtained from surveys in these habitats, no Terrestrial and Aquatic flora-fauna species classified as Endemic and Restricted-Range Species were observed. All of the species identified in the studies have high global populations and all species are widely distributed species.

There are no Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas for restricted-range species.

For the above reasons, no Critical habitat is expected to be present within the AoI according to Criterion 2.

III. Criterion 3: Migratory and Congregatory Species

[16] IFC Guidance Note GN74 For purposes of this Guidance Note, the term endemic is defined as restricted-range. Restricted range refers to a limited extent of occurrence (EOO).

Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem).

Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis.

Thresholds for Criterion 3 are the followings:

a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.
b) Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.

During the studies, it was observed that there are areas used for breeding and wintering purposes. However, the species in these areas do not form large colonies.

There are no Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas for congregatory species.

There are no Wetlands of International Importance designated under criteria 5 or 6 of the Ramsar Convention.

For the above reasons, no Critical habitat is expected to be present within the AoI according to Criterion 3.

IV. Criterion 4: Highly Threatened or Unique Ecosystems

The IUCN is developing a Red List of Ecosystems, following an approach similar to the Red List for Threatened Species. "The client should use the Red List of Ecosystems where formal IUCN assessments have been performed. Where formal IUCN assessments have not been performed, the client may use assessments using systematic methods at the national/ regional level, carried out by governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally recognized NGOs). GN80".

The thresholds for Criterion 4 are the followings:

a) Areas representing ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.
b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.

None of the habitats identified within the AoI are considered to be "Highly Threatened and/or Unique Ecosystems" i.e.:

(i) at risk of significantly decreasing in area or quality;

(ii) with a small spatial extent; and/or

(iii) containing unique assemblages of species including assemblages or concentrations of biome-restricted species.

The Terrestrial and Aquatic habitats identified are not considered as threatened according to the "IUCN Red List of Ecosystems" and "European Red List of Habitats". These habitats are very common in Europe.

For the above reasons, no Critical habitat is expected to be present within the AoI according to Criterion 4.

V. Criterion 5: Key Evolutionary Processes

The structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties. In some cases, spatial features that are unique or idiosyncratic of the landscape have been associated with genetically unique populations or subpopulations of plant and animal species. Physical or spatial features have been described as surrogates or spatial catalysts for evolutionary and ecological processes, and such features are often associated with species diversification. Maintaining these key evolutionary processes inherent in a landscape as well as the resulting species (or subpopulations of species) has become a major focus of biodiversity conservation in recent decades, particularly the conservation of genetic diversity. By conserving species diversity within a landscape, the processes that drive speciation, as well as the genetic diversity within species, ensures the evolutionary flexibility in a system, which is especially important in a rapidly changing climate.

There is no any isolation, spatial heterogeneity and wealth of environmental gradients in the AoI. It also has not been subject to much higher levels of habitat loss and fragmentation. AoI does not support key evolutionary processes.

For the above reasons, no Critical habitat is expected to be present within the AoI according to Criterion 5.

The habitats identified in the field study are very common in Europe. Invasive species are generally found in natural habitats in the Project site. A large part of the Project site consists of agricultural areas.

Surroundings of the Project site show similar habitat and ecosystem characteristics to those that had been identified at the project site before the onset of construction activities. Therefore, vicinity of the Project site bears suitable alternative habitats for fauna species with high

ecological carrying capacity. Outside the Project site, there are animal species from each large terrestrial vertebrate class, with prey-predator relationships representing the food pyramid.

In the official letter issued by the Institute for Nature Protection of Serbia[17] for the local EIAs "Location Condition" (03 no.019-1532/2 19.06.2019) includes the following statements for the area where the activity will take place;

There are no "protected areas on the Motorway Section for which protection procedure has been carried out or initiated", "ecologically significant areas and ecological corridors of international importance of the ecological network of the Republic of Serbia determined by the Decree on Ecological Network (Official Gazette of RS, No.102/2010)".

It is also the habitat of several species of strictly protected and protected species of fish, amphibians, reptiles, birds and mammals. No endemic or relict species were found. *The animal and plant species that inhabit this area are relatively widespread in the territory of Serbia, so the area does not represent a vital part of the habitat for their survival or overall conservation status.*

Furthermore, according to the findings obtained from studies in these habitats, no flora and fauna species classified as dangerous and / or threatened (CR) were observed. Species under protection according to national and international conservation criteria are available. However, all of the species identified in the field have high global populations and all species are widely distributed ones.

Critical habitat assessment carried out in the Area of Influence defined in the report presented in Appendix-11.

Supplemental Biodiversity Assessment ("SBA") including Critical habitat assessment (CHA), Updated biodiversity impact assessment, Offset strategy and Biodiversity Management Plan following IFC Performance Standard 6 is currently underway to more fully understand the national and global significance of the habitats and species which may be affected, which will enable targeted mitigation to be put in place where required. SBA will be presented in addition to ESIA.

[17] In the process of elaboration of the Fifth National Report on implementation of the Convention on Biological Diversity, the Institute for Nature Conservation of Serbia have given their contribution by delivering information and data.

6.8.1 Construction Phase

The Impact Assessment on Terrestrial and Freshwater Ecology during the Construction Phase

Table 6-53 details the impact and mitigations for the Terrestrial and Freshwater Ecology in the Construction Phase of the Project.

Table 6-54 shows the overall rating of the impacts before and after mitigations. All of the potential impacts may cause medium receptor sensitivity with various duration. Therefore, the overall impacts prior to mitigation measures are medium. After taking mitigation measures, as shown in Table 6-54, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-53. Impact on Terrestrial and Freshwater Ecology (Construction Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Impact assessment for "Protected Areas" was not performed due to protected areas will not be affected in any way since they are located outside the Morava Corridor Motorway Project AoI.			
Damage or loss of terrestrial habitats due to permanent structures • Construction activities can directly cause damage and loss of habitats: Vegetation clearance and motorway	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Land Take/Expropriation Mobilization of Machinery and Equipment Camp Sites Material Storage Waste Storage/Disposal Excavation Backfilling Storage, Re-Use and Disposal of Excavations Machinery and Equipment	Terrestrial Habitats	<u>Design</u> • Afforestation activities to be performed in line with No net loss principle, i.e preparation of Biodiversity Management Plan and SERL Management Plan. • Gallery vegetation will be created along West Morava's new riverbed, as it existed before the regulation, to restore the natural habitat condition. This gallery will also be retention for possible high waters. • After the river regulation, 17 m of revegetated area with native species will be created on both sides of the new river bed. <u>Pre-Construction</u> • Delimitation of areas to be cleared before the beginning of the construction activities in order to limit as much as possible the surface of vegetation to be cleared. <u>Construction</u> • Project construction sites and access roads will be separated from sensitive areas with appropriate fencing and signage. • Appropriate fencing such as orange safety barrier fencing will be installed to protect sensitive habitats. (Sensitive habitats are provided in the Constraint Map given in Appendix-5) • In sensitive habitat areas, pedestrian, equipment and vehicle access will be limited to the designated access to construction sites. Parking and driving off the designated access roads will not be allowed.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Waste generated from construction work and activities will be stored at designated areas and then disposed. Solid waste will not be allowed to be left at natural habitats. • Construction waste generated due to project activities will first be stored at designated storage areas and then disposed. Solid waste will not be allowed to be left at natural habitats. • Licensed/approved facilities for solid and liquid waste disposal will be used and a duty of care and chain of custody for all waste leaving the site will be followed. • Riparian vegetation along the West Morava River will be restored.
Damage or loss of terrestrial habitats due to temporary structures • Construction activities can directly cause damage and loss of habitats: Vegetation clearance, Soil and rock excavations and Borrow pits, quarries, camp sites and other facilities.	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Land Take/Expropriation Mobilization of Machinery and Equipment Camp Sites Material Storage Waste Storage/Disposal Excavation Backfilling Storage, Re-Use and Disposal of Excavations Machinery and Equipment Demobilization of Equipment and Machinery	Terrestrial Habitats	<u>Design and pre-construction</u> • Delimitation of areas to be cleared before the beginning of the construction activities in order to limit as much as possible the surface of vegetation to be cleared. • SERL Plans will be developed for all Project Facilities – camps, site facilities, borrow pits, quarries, batching plant, and asphalt plants. • SERL plans for borrow pits will include habitat designs that allow artificial wetlands to be reformed. During the baseline field studies, existing borrow pits which had already been opened in the region in the past, had over time developed into wetland habitats. This measure will encourage development of new habitats, especially aquatic plants and bird species. <u>Construction</u> • Project construction sites and access roads will be separated from sensitive areas with appropriate

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
	Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles		fencing and signage. • Appropriate fencing such as orange safety barrier fencing will be installed to protect sensitive habitats. (Sensitive habitats are provided in the Constraint Map given in Appendix-5) • In sensitive habitat areas, pedestrian, equipment and vehicle access will be limited to the designated access to construction sites. Parking and driving off the designated access roads will not be allowed. • Waste generated from construction work and activities will be stored at designated areas and then disposed. Solid waste will not be allowed to be left at natural habitats. • Licensed/approved facilities for solid and liquid waste disposal must be used and a duty of care and chain of custody for all waste leaving the site will be followed. • Project Facilities will be dismantled upon completion of the construction phase. • Areas where the facilities are located will be reinstated according to SERL Plans.
Habitat fragmentation • Linear infrastructures, such as highways, contribute significantly towards the habitat fragmentation. Building of a closed highway will cause fragmentation and separation of habitats.	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Land Take/Expropriation Mobilization of Machinery and Equipment Excavation Movement of the vehicles	Terrestrial Habitats	<u>Construction</u> • Fauna crossing points (i.e. culverts) will be designed and installed along the motorway. Culverts for animals are primarily constructed as safe crossing points for mammals. Target species are usually mammals. Small fauna species may readily use these culverts as well. As a minimum when using culverts a ledge will be incorporated where species such as otters and reptiles can cross alongside the river even at times of high flow. It can also be used on bridges to be built on the West Morava River to prevent barrier effect.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			Vegetated area will be left between the bridge abutment and the riverbank. (Sensitive habitats are provided in the Constraint Map given in Appendix-5)
Loss of sensitive plant species • Flora species will be directly affected from the road construction through construction activities. *National Legislation Ann-I* *Nuphar lutea* *National Legislation Ann-II* *Arctium lappa,* *Hypericum perforatum,* *Iris pseudoacorus,* *Acinos hungaricus,* *Lamium album,* *Althea officinalis,* *Crataegus monogyna,* *Rosa canina,* *Galium odoratum* *Viola odorata*	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Land Take/Expropriation Mobilization of Machinery and Equipment Camp Sites Material Storage Waste Storage/Disposal Excavation Backfilling Storage, Re-Use and Disposal of Excavations Machinery and Equipment Demobilization of Equipment and Machinery Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles	Terrestrial Habitats	Pre-Construction • Seeds of nationally protected flora will be collected from the construction area to be used in the post-construction landscaping phase (Location of the species are provided in the Constraint Map given in Appendix-5) • Where practical, collected seeds of the limited range distributed flora will be delivered to the Plant Gene Bank in Belgrade, for conversation purposes. • Where practical, *Iris pseudoacorus* (KP 60+700) will be relocated to nearby or similar habitats by a suitably qualified person such as botanist. Construction • Measures to reduce dust and air quality will be taken as mentioned in Sections 6.4 • Dust suppression will be used at working sites (i.e. truck roads, storage areas etc.) in the proximity or near to the areas, where the *Nuphar lutea* species is located, and dust will be prevented. In addition, specie specific signs (to inform workers and local people) will be prepared for the areas where this species is located, and necessary measures will be taken to prevent this area from being affected by construction works.
Loss of sensitive fauna species • Construction activities can result in accidental loss of fauna, due in most of the cases to the presence and activity of the machinery	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance	Terrestrial Habitats	Pre-Construction • Where possible, gradual vegetation clearance will be planned to enable fauna to move to other areas.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
<u>Invertebrates</u> *Zerynhia cerisy* <u>Amphibian –Reptilian</u> *Emys orbicularis,* *Testudo hermanni* *Darevskia praticola* <u>Birds</u> *Aquila heliaca,* *Streptopelia turtur* *Milvus milvus,* *Falco vespertinus* <u>Mammals</u> *Rhinolophus Euryale* *Myotis bechsteinii* *Lutra lutra* *Myotis capaccinii* *and Nationally Protected species** **Lists of species protected by the National legislation given in the baseline report will be taken into consideration during the construction activities.*	Land Take/Expropriation Mobilization of Machinery and Equipment Camp Sites Material Storage Waste Storage/Disposal Excavation Backfilling Storage, Re-Use and Disposal of Excavations Machinery and Equipment Demobilization of Equipment and Machinery Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles		• Pre-construction surveys for target fauna will be undertaken within high sensitive areas by a competent ecologist to assess their presence in the construction site. • Before any construction works in the West Morava River or at the river banks the locations will be controlled for potential presence of otters (burrows, trail, feces, and pubs). Additionally, the borders of the construction area will be identified, and the construction area will be prevented for the entrance of individuals (otters) during construction works. • Protection strategy for sensitive fauna will be developed and implemented in coordination with National Protection Institute. If during the construction activities, any sensitive fauna species is observed, the works will be suspended in the specific location immediately, and the National Protection Institute will be informed without delay. • In the areas where bridge structures are proposed, observation for *Lutra lutra* will be made by a competent biologist. If the Holts of *Lutra lutra* are observed in the field, biologist will verify that it is not used by the species. • Before any construction works in the breeding and wintering habitats, the size of these habitats will be controlled. • Vegetation clearance will be avoided, whenever feasible, during the breeding and wintering periods. • Construction activities will be planned to minimize disturbance during the breeding bird period (1 April to 30 June). During baselines field survey areas were identified with suitable habitats for breeding: Quarry at KP 25 and Borrow Pit at KP 67.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Construction activities will be planned to minimize disturbance during the wintering bird period (1 December to 1 February). During baselines field survey areas were identified as wintering area: Borrow Pit at KP 60 and West Morava River corresponding to KP 95. • If construction has started before these dates, work can be continued in both breeding and wintering areas. <u>Construction</u> • Speed of construction vehicles will be limited, in order to limit emission of dust in non-paved access roads and avoid the risk of accidents with fauna. • Sensitive habitats will be protected by the use of appropriate fencing such as orange safety barrier fencing. Protective measures will be implemented especially in locations of active construction works to also avoid the entry fauna and avoiding accidents.
Increase in noise, visual nuisance and vibration which may cause disturbance or displacement of fauna • Construction activities can directly and indirectly cause disturbance to species of fauna, due in most of the cases to the presence and activity of the machinery.	Mobilization of Machinery and Equipment Camp Sites Material Storage Excavation Backfilling Storage, Re-Use and Disposal of Excavations Crushing Machinery and Equipment Asphalt Preparation Concrete Batching	Terrestrial Habitats	<u>Construction</u> • Measures to reduce noise will be taken as mentioned in Sections 6.5 • Noise, waste and spills created during the construction activities will be managed under an Environmental Management Plan, to limit the disturbance to fauna. • Environmental Awareness training will be provided to all personnel to increase awareness about the impact of disturbance, waste and spills on habitats and fauna.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
	Demobilization of Equipment and Machinery Movement of the vehicles		
Introduction of Alien invasive species • The clearing of new areas may provide opportunities for Alien invasive species introduction.	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Land Take/Expropriation Mobilization of Machinery and Equipment Excavation Machinery and Equipment Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles	Terrestrial Habitats	<u>Construction</u> • Intrusion of any invasive flora species into the project area and its surroundings will be prevented. For this purpose, especially vehicles used for vegetation clearance and/or plant transfer will be washed/cleaned prior to use. • Project employees will not be allowed to bring any live animals or plants into the construction site to avoid the risk of pest/invasive species establishing in the Project area. • Planting of alien species will be prohibited within the Project Facilities or any areas within the AoI, including landscaping of revegetated areas. • Where practical, alien species will be seasonally monitored to record their populations in the construction area and to prevent them from spreading throughout the AoI. Additionally, prompt revegetation (i.e. sowing of native herbaceous species and/or planting native shrubs/trees) on bare soil with natural or semi-natural vegetation will reduce the spread of alien species. • Revegetation (i.e., the sowing of native herbaceous species on top-soils and/or the planting of native shrubs/trees) will be undertaken as soon as possible after clearance and construction.
Damage to Freshwater Ecosystem There are a number of activities during the construction activities that can result in damage to the freshwater ecosystems:	Waste Storage/Disposal Water Supply Wastewater Treatment and Disposal	Aquatic Habitats	<u>Pre-Construction</u> • Temporary culverts proposed for river and stream crossings as mitigation measure to protect sensitive aquatic habitats (see Water Environment

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
• Soil and rock excavations, with an associated change of the water quality. • Borrow pits and quarries, with an associated change of the water quality. • Construction of culverts, bridges and viaducts, with an associated change of the water quality. • Smoothing of beds of stream flows and the activities of flood areas. • Increase of the turbidity as a result of conducting construction activities within the water feature. • Accidental spill of fuel or hazardous wastes affecting a water feature: river, lake, creek, etc. • Dilution of the spill in the water feature will affect to the whole freshwater ecosystem, through direct exposure to the chemical compounds present in the spilled product, or by ingest of exposed organisms. • Increase of the turbidity as a result of conducting construction activities within the water feature. • During the construction phase of the bridges that will be constructed increasing of sediment and/or turbidity in the waterbed due to bridge construction. Excessive sediment formation in rivers can cause fish deaths by blocking their gills.	Excavation Storage, Re-Use and Disposal of Excavations		Terrestrial section 6 of the ESIA) will be designed to allow fish crossing during both high and low flows (i.e. bottomless culverts). • The natural structure of the riparian vegetation which forms the spawning and sheltering area for many aquatic organisms will be preserved where possible. • Vegetation clearance works will be planned and executed to avoid damage to the riparian vegetation, whenever possible. • Any intervention in particular during river regulation works in long distance or that can significantly disturb the river habitat (riverbed and side slope) will be prevented during the breeding season of fish species (30th April to 15th June). <u>Construction</u> • The permanent non-tidal, smooth-flowing watercourses habitat (EUNIS Code C2.3) within the proposed Motorway route is sensitive and highly susceptible to damage. For this reason, the construction activities will be executed without damage to the habitats which outside the proposed Motorway route. (Locations of the habitats are provided in Biodiversity Baseline Report - EUNIS Habitat Map given in Appendix-7). • To avoid any increase of the turbidity levels, excavated materials will not be deposited or stored in or near freshwater features. Detailed mitigations about spillage are given in Sub-section 6.3.1 Construction within the Riverbed • Measures to avoid spills will be taken as mentioned in Sub-section 6.3.1. Spillage/Leakage to Surface Water. • If any emergency, construction or river crossing works in or near West Morava River and its

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			tributaries must be carried out during the breeding season, a Method Statement will be developed detailing protection measures such as sediment traps/booms, temporary diversions, etc. and monitoring process. • Monitoring will be done during construction by specialist subcontractor/biologist.
Freshwater Habitat loss / change due to river regulation • Habitat change due to river regulation • Construction and excavation works in mainstream, floodplain and coastal areas of river regulation construction area • During the construction of the river regulation construction activities can cause fish deaths • Small amount of water will continue to be supplied on the old riverbed. However fish species will be stranded in the old river bed due to decreasing of water level after the alteration of river bed. • Spawning and sheltering behavior of fish species will be directly affected by river regulation construction activities. • Change in river flow rate	Excavation Backfilling Machinery and Equipment	Aquatic Habitats	<u>Design and Pre-Construction</u> • The new riverbed should be designed with the ground material that characterizes the riverbeds in the region as much as possible (rocks, gravels). There should be sufficient areas on the riverbanks where aquatic plants can hold, and as a result, plant development can be achieved. This will create suitable spawning and sheltering areas for fish species. • The barriers at the upstream end of the abandoned river channel will not allow fish migration, but as the compensation measure, the abandoned meanders will be left open on the downstream side. Fish migration is possible through the new river channel of the West Morava River. • In order to reduce the impact of flow in the new riverbed due to river regulation, natural material (such as rocks) will be used for the protection of scouring and river bank erosion. Continuity of the flow will be maintained in the new channel and the flow of the river will not be impacted. • Stream mouths will be arranged to allow fish passage in places where existing streams will be connected to the new riverbed. • Afforestation activities will be performed on the river regulation works in line with the 'no net loss principle', i.e., preparation of Biodiversity Management Plan and SERL Management Plan.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			Construction • During river regulation or diversion works, fish species stranded in the natural small ponds (puddle) will be transported to the riverbed by a competent biologist. • Fish transportation will be made in specialized vehicles with tanks and oxygen, if necessary, other vehicles will be adapted for this purpose and equipped with a container for transporting fish.
Loss of important aquatic species • Construction activities can result in accidental loss of aquatic species, due in most of the cases to the presence and activity of the machinery *Nationally Protected species Ann-I* *Carassius carassius** *Tinca tinca* *Cobitis elongata* *Zingel zingel* *Unio carassus* *Astacus astacus* *Nationally Protected species Ann-II* *Abramis brama* *Barbus balcanius* *Chondrostoma nasus* *Cyprinus carpio (VU)* *Squalius cephalus* *Esox lucius* *Perca fluviatilis* *Sander lucioperca*	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Land Take/Expropriation Mobilization of Machinery and Equipment Camp Sites Material Storage Waste Storage/Disposal Water Supply Wastewater Treatment and Disposal Excavation Backfilling Storage, Re-Use and Disposal of Excavations Crushing Machinery and Equipment Asphalt Preparation Concrete Batching	Aquatic Habitats	Pre-construction and Construction • Construction work (bridge structures, drainage, temporary crossings and temporary works for structures) on and near the West Morava River and its tributaries between 30th April to 15th June will be planned and executed with care to avoid or minimize impact to fish species caused by human or equipment activities. • A Method Statement for Work on or Near Watercourse will be prepared detailing the measures such as sediment traps/booms, temporary diversions, etc. • If construction work (river regulation, bridge structures, drainage, temporary crossings, and temporary works for structures) has commence before the start of breeding season, work can continue in line with the measures detailed in the Method Statement.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Silurus glanis *Hirundo medicinalis*	Demobilization of Equipment and Machinery Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles		

Table 6-54. Impacts Scoring on Terrestrial and Freshwater Ecology (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impact**
Damage or loss of terrestrial habitats due to permanent structures	-1 Negative	2 Municipality	5 Permanent	5 Very High	3 Medium	-3.75	5 Definite	-19 High	-1 Negative	2 Municipality	5 Permanent	2 Low	3 Medium	-3.00	2 Low Probablity	-6 Low
Damage or loss of terrestrial habitats due to temporary structures	-1 Negative	2 Municipality	4 Long Term	4 High	3 Medium	-3.25	5 Definite	-16 Medium	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	2.25	2 Low Probablity	-5 Low
Habitat fragmentation	-1 Negative	2 Municipality	5 Permanent	5 Very High	3 Medium	-3.75	5 Definite	-19 Hİgh	-1 Negative	2 Municipality	5 Permanent	3 Medium	3 Medium	-3.25	2 Low Probablity	-7 Low
Loss of important plant species	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-2.25	5 Definite	-11 Medium	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-1.75	2 Low Probablity	-3.5 Low
Loss of important fauna species	-1 Negative	2 Municipality	2 Short Term	2 Low	5 High	-2.2.75	5 Definite	-14 Medium	-1 Negative	2 Municipality	2 Short Term	2 Low	5 High	-2.75	2 Low Probablity	-6 Low
Increase in noise, visual and vibration which may cause disturbance or displacement of fauna	-1 Negative	2 Municipality	2 Short Term	3 Medium	3 Medium	-2.5	5 Definite	-13 Medium	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-2.25	2 Low Probablity	-5 Low
Introduction of Alien invasive species	-1 Negative	2 Municipality	3 Medium Term	3 Medium	3 Medium	-2.75	5 Definite	-14 Medium	-1 Negative	2 Municipality	3 Medium Term	2 Low	3 Medium	-2.50	2 Low Probablity	-5 Low
Damage to Freshwater Ecosystem	-1 Negative	3 District	5 Permanent	4 High	3 Medium	-3.75	5 Definite	-19 High	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-2.25	2 Low Probablity	-5 Low
Freshwater Habitat loss / change due to river regulation	-1 Negative	2 Municipality	5 Permanent	5 Very High	3 Medium	-3.75	5 Definite	-19 High	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-2.25	2 Low Probablity	-5 Low
Loss of important aquatic species	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-2.5	5 Definite	-13 Medium	-1 Negative	2 Municipality	2 Short Term	2 Low	3 Medium	-2.25	2 Low Probablity	-5 Low

6.8.2 Operation Phase

The Impact Assessment on Terrestrial and Freshwater Ecology during the Construction Phase

Table 6-55 details the impact and mitigations for the Terrestrial and Freshwater Ecology in the Operation Phase of the Project.

Table 6-56 shows the overall rating of the impacts before and after mitigations. All of the potential impacts may cause medium receptor sensitivity with permanent duration. Therefore, the overall impacts prior to mitigation measures are medium. After taking mitigation measures, as shown in Table 6-56, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-55. Impacts on Terrestrial and Freshwater Ecology (Operation Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Impact assessment for "Protected Areas" was not performed due to protected areas will not be affected in any way since they are located outside the Morava Corridor Motorway Project AoI.			
Accidental loss of fauna • The presence of a motorway can result in the loss of some fauna, as a result of accidents when crossing the motorway, getting run over by the vehicles. This can affect to all the different groups of fauna.	Movement of the vehicles	Terrestrial Habitats	<u>Design</u> • Hard fences are erected to prevent the access of animals onto roads. They are mostly constructed to reduce accidents due to collisions between large mammals and cars, but also to reduce the number of smaller animals killed on the roads. The disadvantage of hard fences is that they increase the barrier effect. In most cases, hard fences must therefore be combined with wildlife passages. In these cases, they fulfill an important role in guiding animals to the crossing points. • Hard fences will always be built on both sides of a road. The ends of the hard fences are danger points: animals may go around the end of the hard fence and get trapped on the road. Hard fences will therefore end at structures like bridges. • Warning signs aim at influencing the behavior of drivers in order to reduce the number and severity of collisions between large mammals and cars. • Road lights often attract insects and as a consequence bats or nocturnal birds which hunt them. This results in high mortality for the insects as well as for their predators. To prevent collisions of insects the use of sodium lights is recommended. <u>Operation</u> • Standard traffic signals will be placed in areas where collisions often occur. They also exist for amphibians, water birds and other animals.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Barrier effect in fauna • The linear infrastructures, such as motorways projects, contribute significantly towards the habitat fragmentation by creating barriers to fauna animal movement and the isolation of their populations. • The barrier effect created by such linear infrastructures can affect the dispersion and movement capacity of the fauna. This affects indirectly to their capacity for searching food, shelter or other individuals of their same species during the breeding season. These factors are linked with the species populations dynamic and can influence in the survival of threaten species.	Motorway	Terrestrial Habitats	<u>Design</u> • Culverts for animals are primarily constructed as safe crossing points for mammals. Target species are usually mammals. Small fauna species may readily use these culverts as well. As a minimum when using culverts a ledge will be incorporated where species such as otters and reptiles can cross alongside the river even at times of high flow. • It can also be used on bridges to be built on the West Morava River to prevent barrier effect. Vegetated area will be left between the bridge abutment and the riverbank. • There are 65 culvert and 40 bridges along the motorway. Box Culverts with dimensions of at least 1.5 m x 2 m and Pipe culverts with diameters to be between 60 and 140cm will be placed in natural habitats where the species most likely to be crossing to reduce habitat fragmentation. <u>Operation</u> • Regular maintenance and cleaning will be done to prevent flood-carrying materials from blocking the culvert inlets

Table 6-56. Impacts Scoring on Terrestrial and Freshwater Ecology (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impact**
Accidental loss of fauna	-1 Negative	2 Municipality	5 Permanent	4 High	5 High	-4	5 High Probability	20 High	-1 Negative	1 Project Site	5 Permanent	2 Low	5 High	-3.25	2 Low	-7 Low
Barrier effect in fauna	-1 Negative	2 Municipality	5 Permanent	4 High	5 High	-4	5 High Probability	20 High	-1 Negative	1 Project Site	5 Permanent	2 Low	5 High	-3.25	2 Low	-7 Low

6.9 Archaeological and Cultural Resources

According to Spatial Plan, National EIAs and the interviews with focus groups, it was determined that there are intangible cultural heritage such as two sacred trees and an old building in the Municipality of Maskare, archaeological sites and immovable cultural assets in the Project and the route of the motorway and area of the river regulation was determined in line with these information.Thus, the Motorway route and area of the river regulation works will not coincide with any archaeological area and immovable cultural assets and will not impact these areas. During construction phase of the Project, a Chance Finds Procedure will be prepared and it will be implemented for the all Project sections. The Procedure will include measures; in case of a chance find occurs during the excavation works. In exizisting situtaiton, to access of these sacred trees are through existing unpaved village roads. During the operation phase of the Project, the access to the sacred tree located in Bela Voda village will be provided with under passes. On the other hand, the sacred tree located in Donja Gorevnica Village will use the existing path as there will be no limits to access.These trees are located respectively.

Table 6-57 details the impact and mitigations for the archaeological and cultural resources in the Construction Phase of the Project and there will be no impact during the Operation Phase of the Motorway.

Table 6-58 shows the overall rating of the impacts before and after mitigations. Dust generation is considered medium since the magnitude, the likelihood of the impacts and receptor sensitivity are determined as high. After taking mitigation measures, as shown in Table 6-58, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-57. Impact and Mitigations for Archaeological Cultural Resources and in Construction Phase of the Project

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Chance of Destruction of Archaeological and Cultural Resources • Registered archaeological area and immovable cultural assets • Intangible cultural heritage • Unexpected find of cultural heritage during the pre-construction and construction phase	Construction works	The Archaeological areas and Heritage buildings that overlap the AoI of the Project. (See Chapter 5)	<u>Design and pre-construction</u> • During the route selection process, existing cultural heritage sites and intangible values were taken into a consideration. • Chance Find Procedure will be developed and implemented by the Employer. <u>Construction</u> • The Project Owner / Employer will provide all the conditions and enable smooth and constant monitoring of works during the entire duration of the earthworks, by the archaeological supervision. • The Contractor will follow the national requirements with respect to “chance finds” which may emerge during construction. • During the construction work, if archaeological or historical sites and objects are discovered the Contractor shall mark and secure new identified sites (with a protective railing or other means of protection) to avoid damage in the course of road construction and immediately notify the relevant Institute for the Protection of Cultural Monuments.

Table 6-58. Scoring of Impact on Archaeological and Cultural Resources

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Overall Rating (IA)=SCxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (SC)**	**Likelihood (L)**	**Residual Impact**
Chance Destruction of Archaeological and Cultural Resources	-1 **Negative**	1 **Project Site**	2 **Short Term**	5 **Very High**	5 **High**	-3.25	4 **High**	-13 **Medium**	-1 **Negative**	1 **Project Site**	2 **Short Term**	2 **Low**	5 **High**	-2.5	1 **Low**	-3 **Low**

6.10 Visual Landscape and Land Use

The Motorway components such as bridge, overpasses, underpasses, culverts, interchanges toll plazas and other project components will be a source of change in the existing visual environment. Construction of the Motorway and its components will result in the changes in the existing land use. Accordingly, landscape character of these areas will change permanently. The width of the expropriation corridor changes depending on the scale of excavation and fill requirements and siting of the road structures such as interchanges, service areas, etc. Therefore, landscape in the mentioned area will be affected. In addition, quarries and camp sites will have potential impacts on landscape.

In the visual analysis, first of all the settlements that will be constantly affected by the project were evaluated. All of the sensitivity of the settlements is assessed as medium. In addition to the settlements, recreational areas such as trekking routes, rafting and boat tours and other recreational areas (picnic areas etc.) were also evaluated. In this context, 13 recreational activity areas were taken into consideration. Sensitivity of the recreational areas is assessed as high sensitivity. The recreational areas evaluated are given in Table 6-59 and Figure 6-3

Table 6-59. Recreational Areas

Trekking Route	Rafting and-Boat Tour	Other Recreational Areas
Trekking Route-1 (Mrzenica Monastary) in Mrzenica	Rafting-Boat Tour-1 in Ćićevac	Recreational Area-1 in Makreasane
Trekking Route-2 (St. Mark's Church) in Kukljin	Rafting-Boat Tour-2 in Trstenik	Recreational Area-2 in Adrani
Trekking Route-3 in Bogdanje	Rafting-Boat Tour-3 in Vrnjci	
Trekking Route-4 in Grabovac		
Trekking Route-5 in Stulac		
Trekking Route-6 (Stubal Monastary) in Stubal		
Trekking Route-7 in Sirca		
Trekking Route-8 in Sirca		

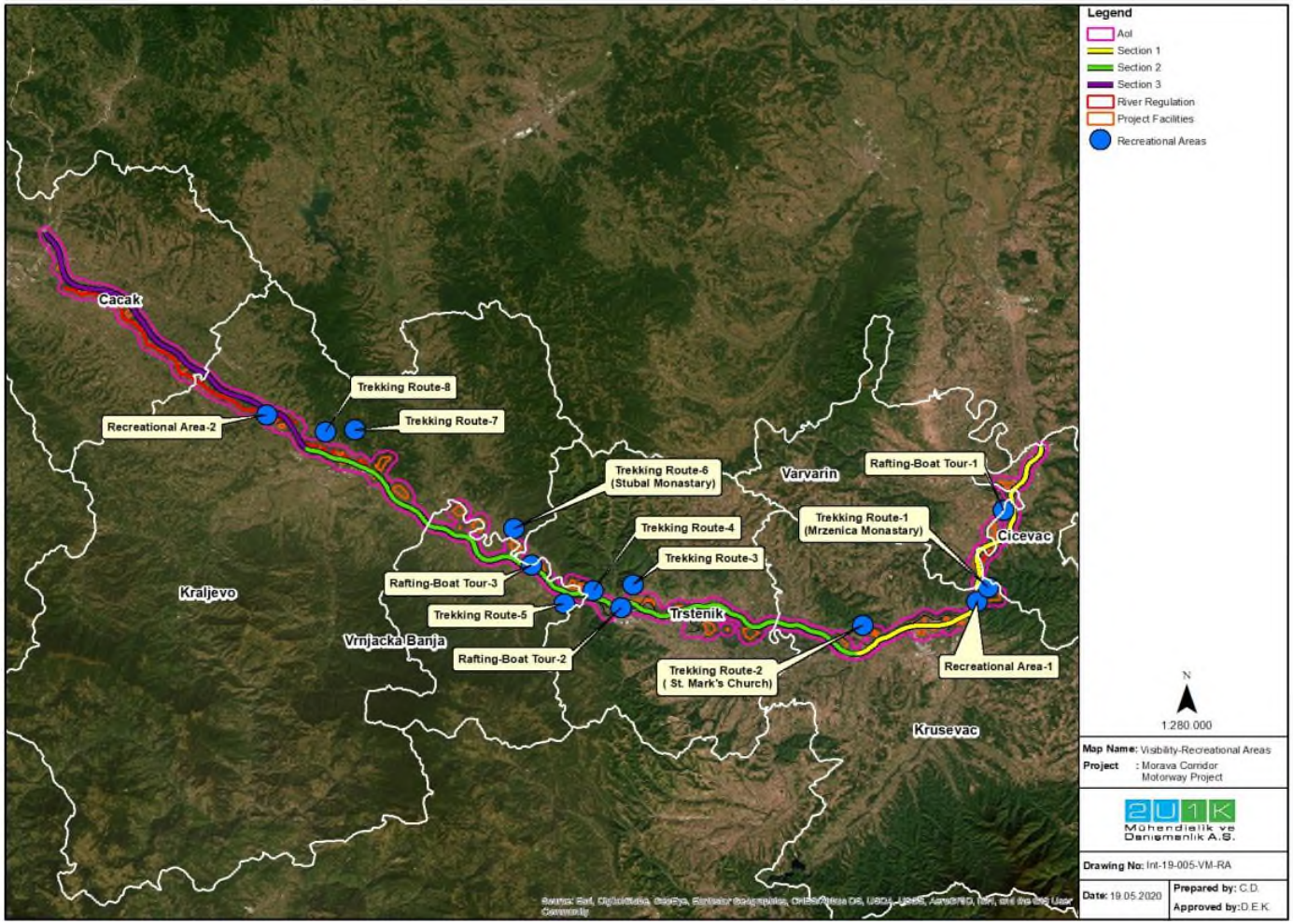

Figure 6-3. Recreational Areas

Visual analysis was carried out by considering the barrier effect of the existing vegetation in the area with topographical features at all potential points of view. All potential points of view were selected as observer points. Due to the flat terrain behavior of the project area and habitats characteristics of the region, the visibility of the road and river regulation project is limited.

As a result of the analysis, it was concluded that the project components are only visible from Recreation Area-1 in Makresane, Recreation Area-2 in Adrani and Trekking Route-5 in Stulac. The project is not visible from other areas.

6.10.1 Construction Phase

The Impact Assessment on Visual Landscape Ecology during the Construction Phase

Table 6-60 details the impact and mitigations for the Visual Landscape in the Construction Phase of the Project.

Table 6-61 shows the overall rating of the impacts before and after mitigations. All of the potential impacts on settlements may cause medium receptor sensitivity with very high magnitude. Therefore, the overall impacts prior to mitigation measures are medium. At the same time, the potential impacts on the three recreational areas mentioned above may cause high receptor sensitivity with very high magnitude. Therefore, the overall impact prior to mitigation measures is high on recreational areas while the other overall impacts are medium. After taking mitigation measures, as shown in Table 6-61, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-60. Impact on Visual Landscape (Construction Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Change of landscape due to changes in land use • Land use and topographic structure and vegetative pattern are factors affecting the proposed Motorway width. It was considered that impacts on landscape would be basically the physical impacts of the project in terms of land-take and change of the landscape due to the changes in the land use. It will be also added that the Proposed Motorway Route mostly passes through agricultural lands (no unique landscape value).	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Camp Sites Material Storage Storage, Re-Use and Disposal of Excavations Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	<u>Construction</u> • Construction footprint areas including Project Facilities will be as minimal as practicable. • Visual barriers will be installed if area is subjected to high visual impacts where practical. Planting native species will be used as visual barrier. In areas with short construction period, adult trees should be translocated for establishing the visual barriers. Areas where visual impact will occur are provided in the Visibility Map given in Appendix-5 • Construction sites will be kept tidy and workers will have necessary knowledge/training about the issue.
Visibility of new structures from Settlements • Visual impacts may occur in a wide area when topography allows. The activities and structures can be observed from further distances.	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Camp Sites Material Storage Storage, Re-Use and Disposal of Excavations Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	
Visibility of new structures from Recreational Areas • Visual impacts may occur in a wide area when topography allows. The activities and	Top-soil stripping Top-Soil Storage Tree Cutting /Vegetation clearance Camp Sites	Recreation Area-1 Recreation Area-2 Trekking Route-5	

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
structures can be observed from recreational areas.	Material Storage Storage, Re-Use and Disposal of Excavations Re-instatement of Camp Sites and Access Roads Rehabilitation of Borrow Pits Movement of the vehicles		

Table 6-61. Impacts Scoring on Impact on Visual Landscape (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impact**
Change of landscape due to changes in land use	-1 **Negative**	2 **Municipality**	2 **Short Term**	5 **Very High**	3 **Medium**	-3	5 **Definite**	-15 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	3 **Medium**	-2.25	2 **Low Probability**	-5 **Low**
Visibility of new structures from Settlements	-1 **Negative**	2 **Municipality**	2 **Short Term**	5 **Very High**	3 **Medium**	-3	5 **Definite**	-15 **Medium**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	3 **Medium**	-2.25	2 **Low Probability**	-5 **Low**
Visibility of new structures from Recreational Areas	-1 **Negative**	2 **Municipality**	2 **Short Term**	5 **Very High**	5 **High**	-3.50	5 **Definite**	-18 **High**	-1 **Negative**	2 **Municipality**	2 **Short Term**	2 **Low**	5 **High**	-2.75	2 **Low Probability**	-6 **Low**

6.10.2 Operation Phase

The Impact Assessment on Visual Landscape Ecology during the Operation Phase

Table 6-62 details the impact and mitigations for the Visual Landscape in the Operation Phase of the Project.

Table 6-63 shows the overall rating of the impacts before and after mitigations. All of the potential impacts on settlements may cause medium receptor sensitivity with permanent duration and very high magnitude. At the same time, the potential impacts on the three recreational areas mentioned above may cause high receptor sensitivity with permanent duration and very high magnitude. Therefore, the overall impacts prior to mitigation measures are high. After taking mitigation measures, as shown in Table 6-63, the residual impacts decrease significantly, and the residual impacts are classified as low.

Table 6-62. Impacts on Impact on Visual Landscape (Operation Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Change of landscape due to changes in land use • Land use and topographic structure and vegetative pattern are factors affecting the corridor width. It was considered that impacts on landscape would be basically the physical impacts of the Motorway in terms of land-take and change of the landscape due to the changes in the land use. It will be also added that the Proposed Motorway Route mostly passes through agricultural lands (no unique landscape value).	Movement of the vehicles Operation of Service Stations Operation of Maintenance Station	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	<u>Design</u> • Planting will be implemented to restore or compensate for lost habitats. • Planting mixes will be selected using native species and planting will be set out to establish new and enhance existing native habitats. The use of native species throughout the area is important in order that the Motorway planting will, over time, become almost indistinguishable from the vegetation naturally occurring in the surrounding area. • Planting will be implemented to reconnect hedgerows or areas of planting formerly severed as a result of the construction works in order to maintain wildlife corridors and reinstate local landscape character • Landscape design will be coherent with regional landscape identity to the extent possible • Planting treatments will be designed to visually screen road structures and earthworks from nearby housings and settlements • Planting treatments will be interrupted to open up key views and vistas which reinforce local identity and minimize driver monotony <u>Operation</u> • In the places where the motorway is monotony, it is necessary to refresh it by planting decorative species that don't require maintenance. Preventing monotony will also have a positive impact on traffic safety. • Arranging community trees and shrubs along the motorway for re-giving natural-looking area. In addition, these areas will be grassed for erosion control. In this way, maintenance needs of the areas can be kept to a minimum.
Visibility of new structures from Settlements • Visual impacts may occur in a wide area when topography allows. The activities and structures can be observed from further distances.	Movement of the vehicles Operation of Service Stations Operation of Maintenance Station	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	
Visibility of new structures from Recreational Areas • Visual impacts may occur in a wide area when topography allows. The activities and structures can be observed from recreational areas.	Movement of the vehicles Operation of Service Stations Operation of Maintenance Station	Recreation Area-1 Recreation Area-2 Trekking Route-5	

Table 6-63. Impacts Scoring on Impact on Visual Landscape (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impact**
Change of landscape due to changes in land use	-1 **Negative**	2 **Municipality**	5 **Permanent**	5 **Very High**	3 **Medium**	-3.75	5 **Definite**	-18.75 **High**	-1 **Negative**	2 **Municipality**	5 **Permanent**	2 **Low**	3 **Medium**	-3	2 **Low Probability**	-6 **Low**
Visibility of new structures from Settlements	-1 **Negative**	2 **Municipality**	5 **Permanent**	5 **Very High**	3 **Medium**	-3.75	5 **Definite**	-15 **Medium**	1 **Positive**	2 **Municipality**	5 **Permanent**	2 **Low**	3 **Medium**	-3	2 **Low Probability**	-6 **Low**
Visibility of new structures from Recreational Areas	-1 **Negative**	2 **Municipality**	5 **Permanent**	5 **Very High**	5 **High**	-4.25	5 **Definite**	-21 **High**	-1 **Negative**	2 **Municipality**	5 **Permanent**	2 **Low**	5 **High**	-3.5	2 **Low Probability**	-7 **Low**

6.11 Social Impact Assessment

The Motorway projects have both negative and positive impacts from a socio-economic standpoint. Land acquisition and loss of income generation due to land acquisition can be characterized as negative impacts; while short and long term employment opportunities, increase in local development due to accessibility and transportation benefits can be described as positive impacts.

This section of the impact assessment assesses the direct and indirect potential socio-economic impacts of the Project. In order to explain the cause of the expected impacts of the Project for socio-economic stand point of view, each subsections either refers and repeats the data derived from the baseline studies (Chapter 5 of the ESIA Report) to emphasize on the existing conditions of the AoI. In that aspect, given the baseline conditions will explain the reason behind expected impacts for each different topics discussed in below.

Major social issues subject to assessment are:

- Population
- Infrastructure
- Economy
- Resettlement and Land Acquisition
- Ecosystem Services
- Labour and Working Conditions
- Occupational Health and Safety
- Community Health and Safety and,
- Vulnerable People.[18]

[18] Human Rights is scoped out in this Section of the ESIA Report.

6.11.1 Population

6.11.1.1 Construction Phase

The main impact source for the population influx during the construction phase is expected to be the immigration of the construction workers and the people seeking for the job opportunities. In addition to the direct employment opportunities during the construction phase, the Project is expected to create a wide range of project-related economic opportunities that will increase the number of the local population.

The construction phase of the Project is expected to be four years and the peak period of the Project is expected to be 2022. During the peak period, the number of the direct construction workers will be approximately 3,800.

According to the Guidance document of the World Bank “Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labor Influx”; the influx of workers and followers can lead to adverse social and environmental impacts on local communities, especially if the communities are rural, remote or small (World Bank, 2016).

The direct impact zone of the population influx will be the settlements located in the close vicinity to workers accommodation sites. The workers accommodation for Section-1 will be established in the borders of the Kruševac Municipality. The worker accommodation site is located in the borders of the industrial zone and located at a distance of 1.7 km to the residential areas. Figure 6-4 below is showing the location of the accommodation for Section-1.

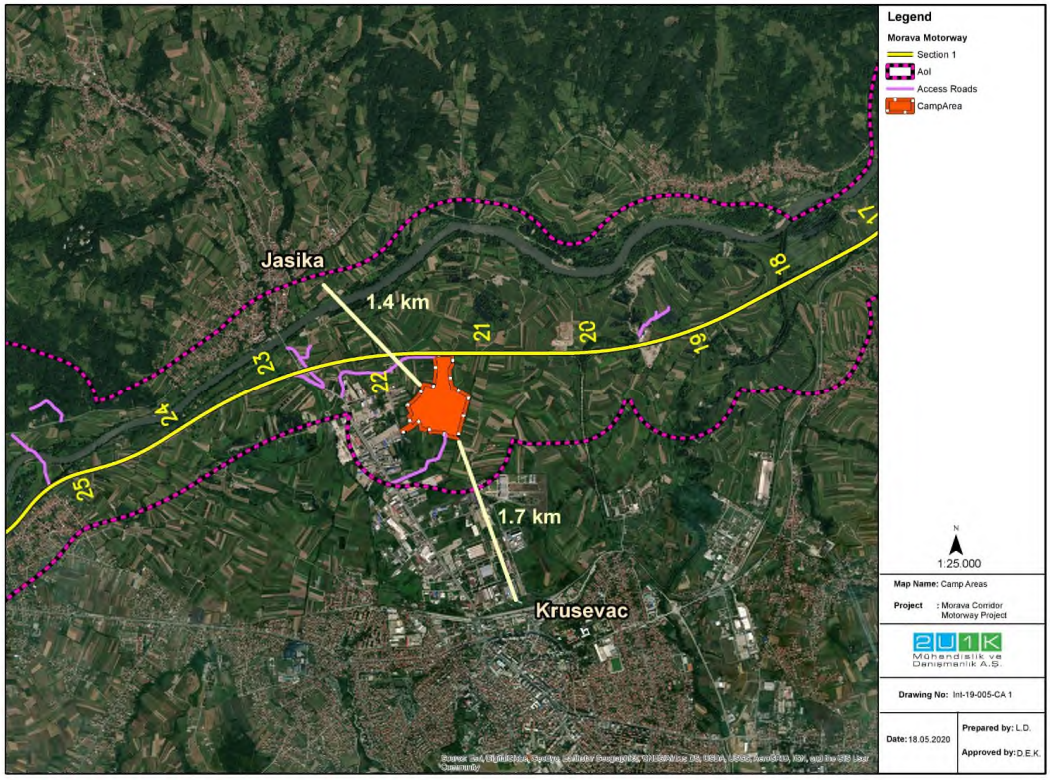

Figure 6-4. Workers Accommodation Location for Section-1

The workers accommodation camp for Section-2 is planned to be established within the borders of the Trstenik Municipality. The closest settlements to the accommodation are Vrnjci Village which is located at a distance of 200mm and Trstenik which has residential areas approximately 500 m to the camp. Figure 6-5 represents the location of the workers camp for Section-2.

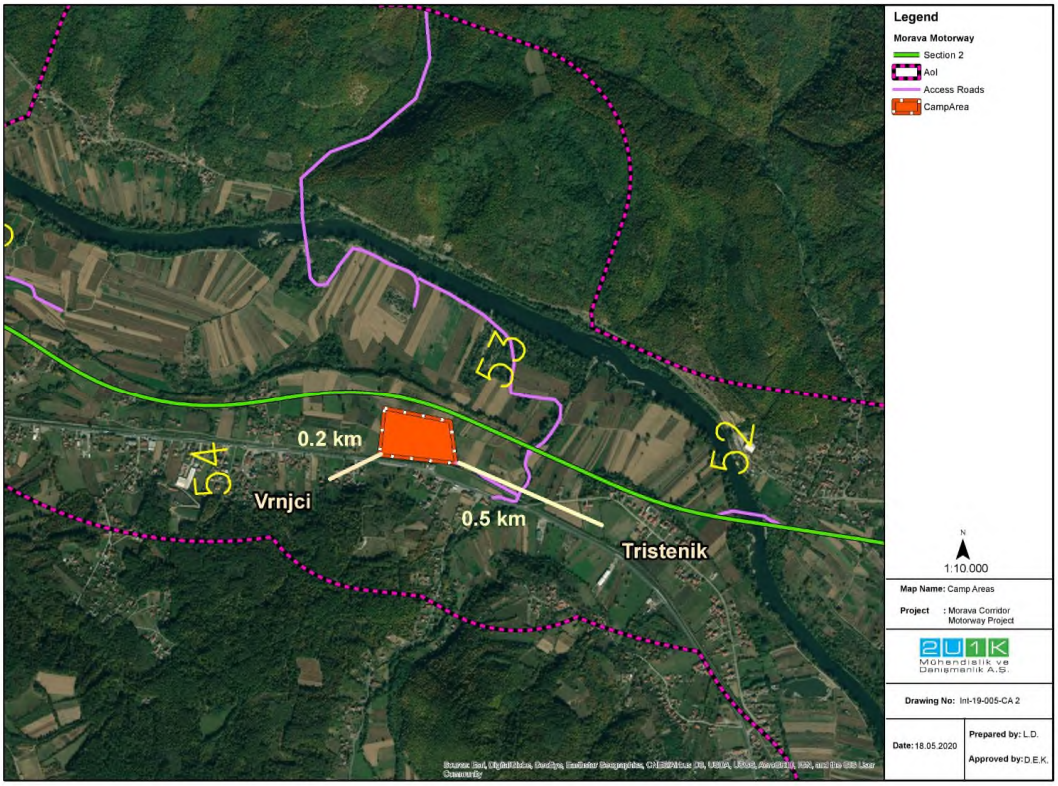

Figure 6-5. Workers Accommodation Location for Section-2

The location for the workers accommodation for Section-3 is within the borders of the Adrani Village in Kraljevo Municipality. The residential areas to the workers accommodation are at a distance of approximately 50 m.

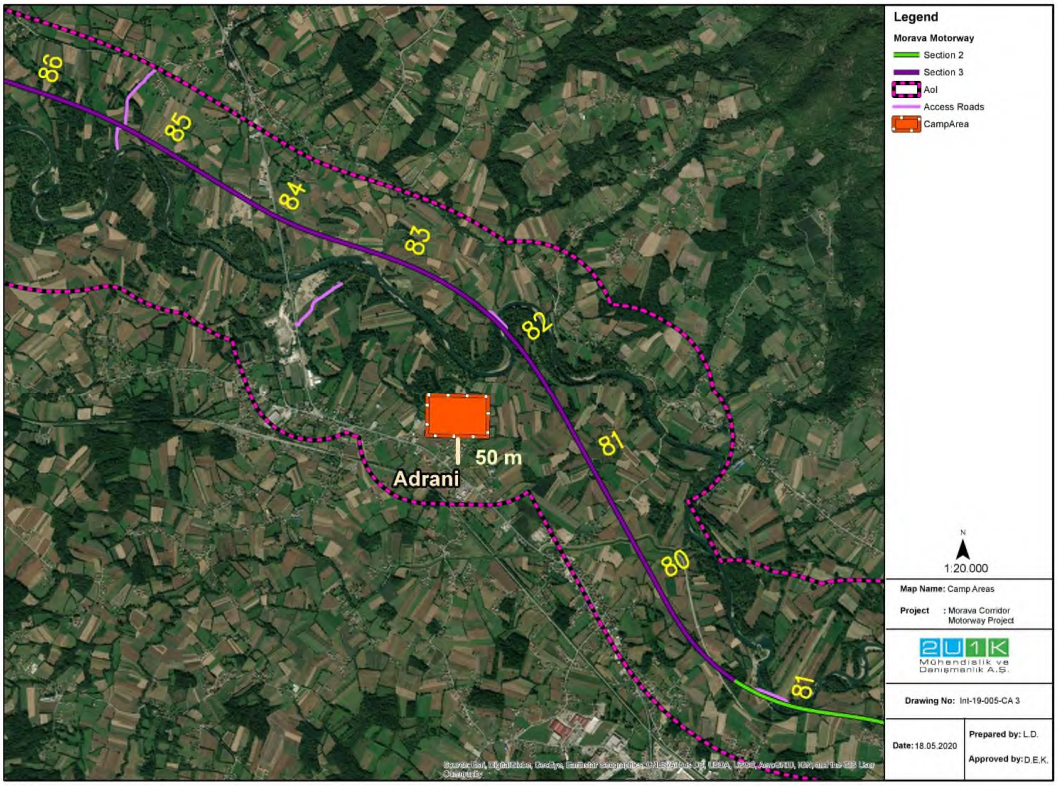

Figure 6-6. Workers Accommodation Location for Section-3

Populations of settlements that are planned to be established for the workers accommodation vary between 1,300 and 2,300 people. During the peak period, an average of 2,000 people is expected to stay in accommodation camps which doubles the population of the nearby settlements. In this respect, all settlements close to accommodations considered as sensitive receptor. Jasika is considered to be more sensitive considering to its rural characteristics. However, Adrani is located at the closest point to the workers accommodation in Section-3 (i.e., 50 m) which makes Adrani the most sensitive receptor to the population influx impact caused by the migration of the workers.

The Impact Assessment on Population during the Construction Phase

The Table 6-64 presents the potential population related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction. In that regards, Table 6-65 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-64, Table 6-65 then assess the residual impacts of the Project.

When assessing the potential construction impacts of the Project, all of the population related impacts observed to be negative, municipal and short term. The overall rating of influx of

additional population, increase burden on competition of for public services and inflation of the price of goods and services are assessed as medium, considering the receptor sensitivity and likelihood of the impacts. After implementation of proposed mitigation measures, the likelihood of the impacts are observed to increase in which caused all of the impacts' residual impacts as low.

Table 6-64. Impacts on Population (Construction Phase)

Impact Description	Impact Source	Sensitive Receptor (s)	Mitigation /Enhancement Measures
Increased risk of illicit behavior and crime: The influx of workers and service providers into communities may increase the rate of crimes and/or a perception of insecurity by the local community.	**Construction phase labor force**	Jasika Vrnjci Adrani	Pre-construction and Construction • Workers will be paid adequately to prevent theft potential. • Workers will be paid into bank accounts. • Priority will be given to the local labor where possible and practical. • Worker accommodation facilities will include leisure areas to reduce the interaction of the workers with the local communities. • Code of Conduct will be developed in compliance with the Serbian legislation. Hard copies will be provided in English and the native languages of the workforce. • All workers (including international workers) will be trained in their native languages about the Code of Conduct and dismissal policy in particular in criminal cases.
Risk of social conflict: Conflicts may arise between the local communities and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources.	**Construction phase labor force**	Jasika Vrnjci Adrani	Pre-construction and Construction • Code of Conduct will be developed in compliance with the Serbian legislation. Hard copies will be provided in English and the native languages of the workforce. • All workers (including international workers) will be trained in their native languages about the Code of Conduct. • All workers (including international workers) will receive Project Orientation and Cultural Awareness training that covers sensitive issues on the local communities. • Before mobilizing the workers to the camp accommodation, the Camp Manager and the local CLOs will inform the local communities about the international workers.

Impact Description	Impact Source	Sensitive Receptor (s)	Mitigation /Enhancement Measures
Influx of additional population ("followers"): job seekers in the region can migrate to the Project area to get benefit from the job opportunities of the Project.	**Construction phase labor force**	Jasika Vrnjci Adrani	Pre-construction and Construction • Recruitment Plan will be prepared and implemented to prevent spontaneous influx of job seekers. • Employment capacity and the qualifications required for the construction will be disclosed to the public to prevent unrealistic expectations. • Cooperation will be developed with the local municipalities and local employment agencies.
Impacts on community dynamics: In case the accommodation areas lack to provide social facilities and services to the Project workers, additional pressure may occur to the local community services as the Project workers seek for services, in which may affect the dynamics of the existing local community of the Project area.	**Construction phase labor force**	Jasika Vrnjci Adrani	Pre-construction • Mitigation measures will aim to prevent burden on the communal services and AoI. • Worker accommodation will be established to reduce pressure on the facilities of the local communities. Workers accommodations will be established in compliance with the Guidance by IFC and EBRD Workers' Accommodation: Processes and Standards to reduce pressure on the facilities of the local communities. . The guidance includes but not limited to: 1. Basic collective social/rest spaces are provided to workers. Standards range from providing workers multi- purpose halls to providing designated areas for radio, TV, cinema. 2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, and educational facilities. 3. Workers are provided with dedicated places for religious observance if the context warrants. 4. Workers have access to public phones at affordable/ public prices (that is, not inflated). 5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated ((IFC, EBRD, 2009)

Impact Description	Impact Source	Sensitive Receptor (s)	Mitigation /Enhancement Measures
Increased burden on and competition for public service provision: The presence of construction workers and service providers (and in some cases family members of either or both) may generate additional demand for the provision of public services, such as water, electricity, medical services, transport, education and social services. This is particularly the case when the influx of workers is not accommodated by additional or separate supply systems.	**Construction phase labor force**	The sewage system is a sensitive receptor in all settlements. In Grocani, Bosnjane, Bivoje and Vrba the existing electricity system is not adequate for the villagers.	Pre-construction • Wastewater treatment system and septic system will establish in the Project Facilities as a good practice. • When required, coordination with local municipality and electricity companies will be carried out to ensure the need assessment for the electricity and water supply by the Contractor for the construction and domestic usage does not cause the capacity to decrease. • Project Owner will assist the Contractor with the cooperation with the local authorities about the water and electricity consumption. • Since the majority of the neighboring villages do not have a sewage system the Camp Management Plan (CMP) may establish capacity building measures within the location of camp accommodation areas to prevent any residual impacts.
Gender Based Discrimination	**Construction phase labor force**	Jasika Vrnjci Adrani	Pre-construction • Information tools and hiring women CLOs to access women in the AoI is recommended. During the Women Focus Group Discussion (FGDs), it has been raised by the participants that the women members of the community cannot participate in the decision-making process and they do not have equal roles in the community. • Code of Conduct will be developed in compliance with the Serbian legislation. Gender equality, positive discrimination and the sexual harassment issues and approach on gender sensitivity should be included. • All workers (including international workers) will be trained in their native languages about the Code of Conduct. • All workers (including international workers) will receive Project Orientation and Cultural Awareness training that covers sensitive social issues on the local communities. Construction • Grievance mechanism will record any gender based complaints and necessary measures will be taken accordingly.

Impact Description	Impact Source	Sensitive Receptor (s)	Mitigation /Enhancement Measures
Local inflation of prices: Increased Project spending on wages, procurement of local goods and services will have the potential to cause localized inflation.	**Construction phase labor force**	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Construction • Market rates for procurement of goods, services, land and labour should be paid in order to avoid directly causing an increase in the price of local goods, services, land and labour.

Table 6-65. Impacts Scoring on Population (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Increase risk of illicit behavior or crime	-1	2 Municipal	2 Short term	2 Low	5 High	2.75	2 Low	**-6 Low**	-1	2 Municipal	2 Short term	2 Low	5 High	2.75	1 Improbable	**-3 Low**
Risk of social conflict	-1	2 Municipal	2 Short term	2 Low	3 Medium	2.25	2 Low	**-5 Low**	-1	2 Municipal	2 Short term	2 Low	3 Medium	2.25	1 Improbable	**-2 Low**
Influx of additional population	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	3 Medium	**-9 Medium**	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	2 Low	**-6 Low**
Impacts on community dynamics	-1	2 Municipal	2 Short term	2 Low	3 Medium	2.25	2 Low	**-5 Low**	-1	2 Municipal	2 Short term	2 Low	3 Medium	2.25	1 Improbable	**-2 Low**
Increase burden on competition for public service	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	3 Medium	**-9 Medium**	-1	1 Project Site	2 Short term	3 Moderate	5 High	2.75	2 Low	**-6 Low**
Gender based violence	-1	2 Municipal	2 Short term	2 Low	1 Low	1.75	2 Low	**-4 Low**	-1	2 Municipal	2 Short term	2 Low	1 Low	1.75	1 Improbable	**-2 Low**
Local inflation	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	3 Medium	**-9 Medium**	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	2 Low	**-6 Low**

6.11.1.2 Operation Phase

During the operation phase of the Project, the main source of the population change is expected to be the outmigration of the people who lost their all agricultural lands and where the overpasses locate in the highly populated residential areas. The Project may also lead population increase due to mobility of the people as a result of the better transportation structure and urbanization.

Population decrease

The implementation of the Project may cause out-migration for new job opportunities due to the fact that people who will lose their entire agricultural lands as a result of land acquisition and access to the livelihood sources may leave the region. The magnitude of this impact will be determined during the Resettlement Action Plan (RAP) preparation process.

Comment on the Spatial Plan:

Vrnjci: *"…the planned overpass directly threatens the life of the inhabited population in these plots of the settlement Vrnjci, Vrnjačka Banja, where there is high population density and where there will be no conditions for further living, because you will certainly agree that life below the overpass is not possible."*

Answer to Comment and Mitigation Measure:

"…the possibility of displacement of the planned graded junction in Vrnjačka Banja will be examined."

Population increase

The Project is expected to connect more than 500,000 people by linking more than 20,000 small and medium-sized enterprises through the Corridor X and XI, which run to Austria and Greece by way through Slovenia, Croatia, and Macedonia; and to Italy and Romania via Montenegro. The mobility is expected to create long term population increase in the AoI. The establishment of the Motorway will lead urbanization and in parallel with the urbanization process; the business sectors will be developed in the area and employment opportunities of the new sectors will increase the population figures.

Comment on the Spatial Plan:

Čačak: *"…From the airport "Morava" at Lađevci, the Highway should be entered directly. Mrčajevci, as a place with large number of inhabitants, and the villages gravitating towards this place, as an important tourist destination and the area with great economic potential, should have a connection with the Highway.*

It would be of great significance that the old road Čačak-Kraljevo, i.e. a large number of villages on the right bank of the West Morava in the area from Čačak to Kraljevo, have connection with this Highway. This would be a great opportunity for economic development of this very large region."

Answer to Comment and Mitigation Measure:

"*The airport "Morava" currently does not have a direct access to the Highway, other than via the Adrani loop. In the future, as already specified in the Spatial Plan, when preparing technical and planning documentation for the future Highway link Batočina-Kragujevac-Knić-connection with E-761, the position of loop which will*

provide more optimum connection of the airport with the Highway E 761 will be defined. This link connecting with the Highway should be solved by way of the Spatial Plan of the local self-government.

In the textual part of the Plan, the need for accommodating the specified emergency services will be defined, what will be also spatially located during preparation of the urban-technical documentation."

The Impact Assessment on Population during the Operation Phase

The Table 6-66 presents the potential population related impacts and the proposed mitigation measures to prevent stated impacts due to Project operation. In that regards, Table 6-67 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-66, Table 6-67 then assess the residual impacts of the Project.

When assessing the potential operation impacts of the Project, increase and decrease in population is expected. The population decrease as a result of PAPs whom become landless and may decide to out-migrate is a negative impact at Municipal level. On the other hand, the operational activities may attract people from other regions to migrate to the Project Area in parallel with economic development and urbanization at District level. The receptor sensitivity is high based on the observations made on the social field studies in terms of population decrease, therefore, the impact is considered as medium. With the implementation of the proposed mitigation measures, especially implementation the Resettlement Action Plan, the likelihood of occurrences of negative impacts will be reduced to low.

Table 6-66. Impacts on Population (Operation Phase)

Impact Description	Impact Source	Mitigation /Enhancement Measures
Population Decrease	**Loss of Livelihoods**	Design • The livelihood sources of the PAPs will be taken into consideration during the approval of the Spatial Planning process which frames the borders of the Project establishments. • Overpasses and underpasses will be designed considering the agricultural activities. • Detailed "Resettlement Action Plan" will be prepared to determine the PAPs and develop practical mechanism to prevent the outmigration. • Replacement of the lost assets within the acquired land with similar assets at the same or better standard to ensure continuity of current livelihoods will be achieved through provision of materials, seedlings, labor, and additional financial and legal assistance. Pre-construction • Priority for the employment opportunities of the Project will be given to people whom lost their livelihoods. • Skill development training will be provided to local labor force. • Cooperation will be established with the local governmental bodies including job agencies and agricultural institutions to develop effective community development programs and strategies.
Population Increase	**Increased mobility due to developed transportation and urbanization**	Design • Enable the construction of commercial buildings in new locations as a planned reserved space. Operation • Strengthening competition among business entities through the development of local institutions necessary for the faster development and structural adjustment. • Identifying and implementing a new industrial development policy as a combination of targeted policy with justified, direct state interventions and horizontal measures without special protection sectors with care for key inputs, labor, capital, infrastructure services, research and development. • Encouraging the development of information and communication technologies, information technology infrastructure, electronic networks, databases and sources of data and statistics as a basis for speeding up growth in general and the new service sector in particular. • Give preference to local processing of agricultural products, agroindustry and other "clean" branches of economy that will take advantage of the location advantages derived from proximity to the market, for multipurpose border - crossing centers. • Development of a rational and functional structure of the settlement network. • Identifying settlements that can most effectively serve as service, manufacturing and commercial centers of the surrounding area.

Table 6-67. Impacts Scoring on Population (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Population decrease	-1 Negative	2 Municipal	4 Long term	3 Moderate	5 High	3.5	3 Medium	**-11 Medium**	-1 Negative	2 Municipal	4 Long term	3 Moderate	5 High	3.5	2 Low	**-7 Low**
Population increase	+1 Positive	3 District	4 Long term	4 High	3 Medium	3.5	4 High	**14 Medium**	+1 Positive	3 District	4 Long term	4 High	3 Medium	3.5	5 Very High	**18 High**

6.11.2 Infrastructure

6.11.2.1 Construction Phase

Health Services

Influx of the Project workers may increase demand on local health services. Among the 48 affected settlements within the Social AoI, 29 of them do not have a primary health care centers within the borders of their villages. In general a typical primary health care centers includes; preventive health care for all population categories, urgent care, general medicine, health care for women and children, health visitor service, laboratory and other diagnostics, prevention and treatment in dental care, employee health care, i.e. occupational medicine and physical medicine and rehabilitation.

Considering the insufficient of health services of more than half of the affected settlements of the Social AoI, the influx may impose pressure to the existing health services. The capacity of existing health facilities may not be able to absorb major disruption any potential demand for care and attendance to acute conditions of the influx workers (in case of curative or emergency cases).

According to the World Health Organization, fewer than 2.3 doctors per 1,000 inhabitants would be insufficient to achieve coverage of primary healthcare needs of the settlement. In that regards, Ćićevac, Varvarin and Trstenik Municipalities have insufficient healthcare coverage within their borders. Further details on the density of the doctors in each affected municipality is presented in Table 6-68.

Table 6-68. Density of the doctors in each affected municipality

Municipality	Number of Doctors	Number of Doctors per 1,000 inhabitants
Ćićevac	12	1,4
Kruševac	348	2,9
Varvarin	18	1,1
Kraljevo	343	2,9
Vrnjačka Banja	81	3,1
Trstenik	50	1,3
Čačak	279	2,5

Source: Institute of Public Health of Serbia, 2018

There are 10 villages affected by the Project in the Čačak Municipality in which 8 of them do not have health facilities within its borders. Among those 8 villages, the distance of the closest health facilities is stated to be approximately 5 km away.

Furthermore, there are two affected villages within the borders of Varvarin Municipality which neither of the settlements have health centers within its borders. The closest health facilities from the affected villages of Varvarin Municipality is approximately 7 km away.

Therefore, in the scope of health services, considering inadequate health services Varvarin and Trstenik Municipalities, settlements in those settlements may be imposed to more diverse impacts on health services compared to other municipalities.

Table 6-69 presents all the affected villages within the borders of Social AoI without health services and type of the closest Project units (Proposed Motorway Route and construction associate facilities) to these settlements.

Table 6-69. Affected villages within the borders of Social AoI without health services

Municipality	Villages that don't have Primary Health Care	Closest Project Facility
Ćićevac	Grad Stalac	Borrow & Batch
	Mrzenica	Borrow & River Regulation
Kruševac	Bele Vode	Motorway
	Kosevi	Borrow
	Maksresane	Batch
Varvarin	Bosnjane	Borrow
	Maskare	Borrow
Kraljevo	Adrani	Borrow & Camp & River Regulation
	Grdica	Borrow & River Regulation
	Obrva	Borrow
	Popovici	River Regulation
	Sirca	River Regulation & Borrow
	Sumarice	Borrow
Vrnjačka Banja	Stulac	Borrow & Asphalt
	Vrnjci	Borrow & Batch
	Rudinci	Camp & Asphalt & Borrow
Trstenik	Bogdanje	Borrow
	Lozna	Quarry
	Seliste	Motorway
	Grabovac	Motorway
	Ugljarevo	Borrow
Čačak	Baluga	Motorway
	Katrga	Motorway
	Preljina	Batch
	Rakova	Motorway
	Sokolici	Motorway
	Stancici	Batch & Borrow
	Konjevići	Motorway
	Goričani	Borrow & River Regulation

Infrastructure

The establishment of three worker accommodation camps with worker accommodation (with an average of approximately 2,000 workers) and other project construction facilities and activities may lead to temporary increased pressure and potential cuts of utility supply such as electricity, water supply, and waste management, in particular for settlements located closer to the project facilities and activities. Disruption to utilities could result in impacts to livelihood or quality of life and if unmanaged could result in health impacts.

According to Community Level and Household Surveys, electricity cut offs occur rarely in all affected villages. Almost all of the affected villages throughout the Project sections observed to have insufficient sewage system and the domestic waste are being disposed through wild dumping. This subject is also covered in the Spatial Plan of the Project and according to Plan, priority will be given to complete sanitation of the settlements in the Social AoI. The reconstruction and extension of the sewage network and the construction of a sewage treatment plant are planned to be constructed in accordance with the requirements, needs and economic development of the Social AoI. In this regard, to mitigate negative impacts and increase existing sewage capacity of the settlements, the following objectives were claimed in the Spatial Plan;

- organized solution of the sewerage system,
- planned construction of sewerage networks sewage treatment plants for sewage and process wastewater; and,
- establishment of a system for quality and quantity control of discharged wastewater.

The Spatial Plan of the Project also made assessments on each affected municipality and addressed key infrastructure insufficiencies, in which may provide further information on the existing infrastructure conditions and cover any gaps from the outcomes of the social field study. The Table 6-70 below presents the summary of the outcomes made according to the Plan.

Table 6-70. Infrastructure shortages According to Spatial Plan

Municipality	Infrastructure Shortages
Ćićevac Varvarin	• Uncontrolled and improper disposal of domestic waste
Kruševac	• Wastewater is directly discharged into the Waste Morava without treatment. • Sewage in rural areas are insufficient. • Septic tanks are either discharged into nearest ditches or water courses. • Disposal of solid waste from villages are disorganized.
Kraljevo	• Inadequate treatment of municipal waste and wastewater
Vrnjačka Banja	• Lack of landfill, recycling and wastewater treatment systems
Trstenik	• In central settlements, transportation and disposal of waste is sufficient. On the other hand, in the villages waste is disposed in landfills.
Čačak	• Large number of wild landfills.

Source: Spatial Plan, November 2019

Traffic & Accessibility

The potential impacts on the local road network as a result of the construction activities (i.e. transportation workers, material and equipment, waste disposal, etc.) are disruption to traffic and transportation due to road crossings and damage to local roads from heavy traffic movement to and from project facilities and activities. Disruption to road infrastructure and reduced access due to road cuttings may result negative impacts on the livelihood or quality of live if not managed properly. Considering the importance of the road network to ensure mobility between settlements along the Social AoI and access to municipality centers, services (i.e. education, health, etc.) as well as access to agricultural fields, all PAPs are considered as highly sensitive.

The Project has a risk of reducing access to agricultural fields in case of appropriate road underpasses are not designed. During the stakeholder consultations of the Spatial Plan on August 2019, PAPs raised the potential of reduced access to agricultural fields after the implementation of the Project. The common concern is that the number of underpasses may not be located close enough to the affected fields and this may cause increased transportation costs to the farmers who would have spent more money and time for access. Furthermore, some of the local businesses were concerned that during the construction of the Project, their businesses may not be accessible to the customers. These concerns were addressed by the committee of the Spatial Plan as access roads will be provided to the businesses to continue their activity. In Sirca village of Kraljevo Municipality, the residents were concerned to accessibility of pedestrians, and this was addressed through the design of the Proposed Motorway Route by considering the construction of a road bridge over the regulated river bed of the West Morava River, as well as the construction of an overpass or underpass below the highway for the pedestrians of the Sirca village.

The Impact Assessment on Infrastructure during the Construction Phase

The Table 6-71 presents the potential infrastructure related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction. In that regards, Table 6-72 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-71, Table 6-72 then assess the residual impacts of the Project.

The impacts regarding the infrastructure during the construction phase is observed to be negative and in Municipal extent. All of the potential impacts may cause high receptor sensitivity due to insufficient infrastructure services in the region, therefore, the overall impacts prior to mitigation measures are medium. The extent of the Project's impact is expected to be in Municipal level without any mitigation measures. With the implementation of proposed mitigation measures given below, the extent of the infrastructure related impacts are expected to be reduced from Municipal to Project Site with the compliance of international good practices.

Table 6-71. Impacts on Infrastructure (Construction Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Pressure on the local healthcare infrastructure as a result of incoming construction workforce	Labour Influx Lack of health services 29 villages	Čačak Municipality Varvarin Municipality Trstenik Municipality	Pre-construction • Emergency Preparedness and Response Plan (19) (EPRP) will be developed that considers the role of communities and community infrastructure as appropriate in responding to emergency events. • Health Services assessment will be conducted of available health services Local and District levels and will assess the situation of settlements and in the vicinity of the construction sites, camp and other Project Facilities to ensure no reduction in services available to local settlements occurs. • Preventive health basic measures will be carried out regarding COVID 19 Pandemic and WHO recommendations will be implemented • Camp accommodation and site facilities should include first aid and emergency response for safety, fire and environmental hazards and incidents. • Camp accommodation will include first aid and medical facility for its international workers which is expected to mitigate potential burden on the existing local health infrastructures, and in accordance with the Occupational Health and Safety Law enforced in 2005 (Official Gazette No: 101). • Infrastructure and Utilities Management Plan (IUMP) will be developed before setting up the camps. The Plan will assess the infrastructure potential of the surrounding area (i.e., water supply, wastewater and sanitation services, electricity supply, potable water supply, and solid waste management). If the camps are established in a location with no sufficient capacity, services and utilities the Contractor will establish its own utility services when required, e.g. Power generators.

[19] An Emergency Preparedness and Response Plan will be developed in line with Environmental, Health, and Safety (EHS) Guidelines: General EHS Guidelines (IFC, 2007)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			Construction • A Grievance Mechanism will be developed to record, avoid and address incidents caused by the construction activities (e.g. Electricity and water cutoffs, traffic blockages, disruption of local roads where patients are travelling to hospitals daily).
Negative impacts on local infrastructure: The establishment of a construction camp with worker accommodation and additional facilities may lead to temporary increased pressure and potential cuts of utility supply such as electricity, water supply, and waste management.	Influx	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Design and Pre-construction • Emergency Preparedness and Response Plan20 (EPRP) will be developed that considers the capacity of communities and current situation of the community infrastructure to respond to emergency events efficiently. • Infrastructure and Utilities Management Plan (IUMP) will be developed. • Camp Management Plan (CMP) will be developed that considers infrastructure and utility needs for construction sites, accommodation, workshops and warehouses. • During the preparation of all plans, engagement with local authorities and utilities companies will be undertaken to ensure continuity of supply to communities. Construction • The Project will implement a Grievance Mechanism and address infrastructure related grievances in line with the Stakeholder Engagement Plan (SEP) of the Project. • Training construction workers regarding to good practices on resource efficiency.
Potential Impacts on Local Network: The potential impacts on the local road network as a result of the construction activities (i.e. transportation workers, material and equipment, waste disposal, etc.) are disruption to traffic and transportation due to road crossings	Construction activities	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality	Design and Pre-construction • Traffic Management Plan (TMP), Infrastructure and Utilities Management Plan (IUMP) and Emergency Preparedness and Response Plan (EPRP) will be developed and implemented. • Temporary loss of, or access to, infrastructure or services should be avoided by - providing alternative routes and roads, as necessary

[20] An Emergency Preparedness and Response Plan will be developed in line with Environmental, Health, and Safety (EHS) Guidelines: General EHS Guidelines (IFC, 2007)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
and damage to local roads from heavy traffic movement to and from project facilities and activities. Disruption to road infrastructure and reduced access due to road cuttings may result negative impacts on the livelihood or quality of life if not managed properly.		Kraljevo Municipality Čačak Municipality	- inform local communities of program and sequence of works. • In case of using local roads for transportation, repair works will be made in collaboration with the local authorities. <u>Construction</u> • Engagement will be made with local authorities on the issue of traffic movement during construction phase.

Table 6-72. Impacts Scoring on Infrastructure (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Pressure on the local infrastructure during construction activities	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	3 Medium	**-9 Medium**	-1	1 Project Site	2 Short term	2 Low	5 High	2.5	2 Low	**-5 Low**
Pressure on the local infrastructure due to project facilities	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	3 Medium	**-9 Medium**	-1	1 Project Site	2 Short term	2 Low	5 High	2.5	2 Low	**-5 Low**
Impacts on local road network	-1	2 Municipal	2 Short term	4 High	5 High	3.25	3 Medium	**-10 Medium**	-1	2 Municipal	2 Short term	3 Moderate	5 High	3	2 Low	**-6 Low**

6.11.2.2 Operation Phase

The emerging market`s economic growth is positively impacted by the implementation of quality infrastructure projects. Transport infrastructure, in particular, is linked with improvements in an emerging market`s economy through reduced transportation costs and increased accessibility. These two factors not only impact directly on productivity and growth but also indirectly impact by enabling higher levels of private investment.

The Project aims to improve the quality of life and create the conditions for demographic renewal and encourage people to return in Project region. The Project is expected to contribute improve transportation within the region and also improve transit and intermediary links between pan-European infrastructure corridors as well.

The Project will indirectly lead to an increase in economic activities such as tourism, infrastructure services, agricultural and industry, real estate investments and employment levels. The Project will provide the local residents with better accessibility to social, health and educational services in larger towns in Serbia. Also, the locals that use the public transport would likely experience decrease in travel time due to reduced traffic in the Project region.

On the other hand, the potential for unplanned and uncontrolled economic and population growth could lead to issues surrounding sanitation, and service delivery. In terms of impacts on infrastructure, the increased population due to economic growth of the region may lead to a surge in demand for water, power, sewerage and waste facilities, health and education facilities, and telecommunications. As mentioned in Chapters 5.14.3.7 and 6.10.2.1, almost all of the affected villages observed to have insufficient sewage system and the domestic waste are being disposed through uncontrolled dumping. According to the Spatial Plan, reconstruction and extension of the sewage network and the construction of a sewage treatment plant are planned to be constructed to prevent any negative impacts during the operation phase of the Project.

The Spatial Plan introduces various developments in infrastructure to mitigate negative impacts and improve the livelihood of the local residents within the Project region.

According to Spatial Plan, the existing power supply will be sufficient for the operation phase of the Project. The Social AoI is equipped with a power grid and substations with nominal voltage of 220 and 110 kV and distribution network and substations with 35 and 10 kV.

The Impact Assessment on Infrastructure during the Operation Phase

The Table 6-73 presents the potential infrastructure related impacts and the proposed mitigation measures to prevent stated impacts due to Project operation. In that regards, Table 6-74 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project.

Considering the Project will adopt and apply the given mitigation measures in Table 6-73, Table 6-74 then assess the residual impacts of the Project.

Pressure on local infrastructure during operation phase may occur in Municipal level without any improvement on the existing Municipal infrastructure. According to mitigation measures, the likelihood of the potential impact is expected to be low.

Table 6-73. Impacts on Infrastructure (Operation Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Pressure on the local healthcare infrastructure as a result of in migration	Job opportunities Expand in local market	Varvarin Municipality Trstenik Municipality	Operation • Considering inadequate health services Varvarin and Trstenik Municipalities, settlements in those settlements may be imposed to more diverse impacts on health services compared to other municipalities, therefore, it is recommended that incorporation with the Project Employer and local authorities should be made in case the in-migration resulted insufficiency in health services to take any possible action.
Pressure on sewage system Lack of waste management	In-migration Expand in local business and services	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Construction • Project Employer is recommended to be cooperate with responsible authorities in case necessary improvements will be required for local infrastructure. Operation • Project Employer to be in close coordination with the related local authorities to curtail inconvenience to the residents of the Project area.

Table 6-74. Impacts Scoring on Infrastructure (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Pressure on the local infrastructure during operation activities	-1	2 Municipal	4 Long term	4 High	5 High	3.75	3 Medium	**-11** **Medium**	-1	2 Municipal	4 Long term	3 Moderate	5 High	3.5	2 Low	**-7** **Low**

6.11.3 Economy

In this Section, the potential economic (national and local) and employment (direct and indirect) impacts associated with the construction and operation of the Project are assessed.

IFC's Good Practice Note on Non-discrimination and Equal Opportunity states that "*good practice companies operating in emerging markets often set specific targets for creating local employment opportunities, building local capacity through training, and advancing country nationals to replace expatriates in management positions*". IFC further explains that large projects can have ripple effects on the economy, creating jobs and business opportunities, increasing competitiveness, and generating tax revenues for national and local governments.

6.11.3.1 Construction Phase

High number of unemployment in the Social AoI

In all affected municipalities, unemployment is stated to be a significant issue. Especially considering the fact that increased number of out-migration of young generation occurred over the recent years due to lack of job opportunities. The Republic of Serbia considers individuals aged between 15 and 64 as a working age and according to national statistics unemployment rate of Social AoI ranges from 11% to 35%. Table 6-75 presents the employment profile of the Project affected municipalities.

Table 6-75. Unemployment Ratios of the Municipalities

Municipality	Working Age Population (2018)	Unemployed (2018)	Unemployment Rate	Number of Affected Settlements
Ćićevac	2,702	802	29.5 %	4
Kruševac	39,897	11,861	29.7 %	7
Varvarin	5,067	974	19.2 %	2
Kraljevo	38,889	10,459	26.9 %	11
Vrnjačka Banja	8,609	3,005	34.9%	7
Trstenik	12,500	4,326	34.6 %	7
Čačak	64,127	7,229	11.8 %	10

All of the Social AoI is considered as highly sensitive in terms of economic impacts. Among the affected municipalities, Trstenik municipality is observed to be most affected from the lack of employment opportunities in the AoI. On the other hand, considering the unemployment rate (34.9 %) and number of villages (seven) affected by the Project related activities, especially during the expropriation process, Trstenik municipality is one of the highly sensitive receptors when assessing the local economy. Also, considering the unemployment rate (26.9%) and number of affected villages (11), it can be stated that Kraljevo municipality is moderately sensitive in terms of economic impacts of the Project.

During the baseline assessment, a team of social experts conducted Focus Group Discussions (FGD) with the local women in Čačak, Varvarin, Kruševac, Vrnjačka Banja and Kraljevo municipalities to understand role of the local women and gender specific conditions of the Social AoI. Target groups interviewed were farmers, unemployed women, older women, general population, Roma women and young women. It was observed that there is no gender inequality for job opportunities in the region and majority of the local women are contributing in the household income through agricultural activities. However, both local men and women are suffering from lack of job opportunities. Considering the former experiences on private and public sectors, local women were willing to be part of the Project whether through direct or indirect job opportunities.

Direct and In-Direct Job Opportunities

The Project will provide temporary employment opportunity for the duration of construction phase (expected to be 4 years, at this stage). This includes individuals employed by the Project as well as contractors and subcontractors for the pre-construction and construction activities. The average number of the construction workers will be 3,100 and the peak number of the project workers will be approximately 3,800. Majority of the unskilled workforce are expected to be hired locally within the Social AoI, with the majority of skilled construction workers expected to be recruited internationally. Considering the income increase on local employees, it is expected to have increase in general spending on goods and services, which may lead to additional job creations in the region.

During the consultations through Household Surveys conducted by 2U1K, occupational skills of the PAPs were identified to provide general outlook of the availability of the types of labour force and Table 6-76 presents the details of the outcomes of the Surveys.

Table 6-76. Available skills of the PAPs

Municipality	Ćićevac	Kruševac	Varvarin	Kraljevo	Vrnjačka Banja	Trstenik	Čačak	Total
Technically educated person	162	280	5	342	455	1372	126	2742
Driver	60	245	25	290	920	390	312	2242
Construction worker	100	383	60	275	905	355	162	2240
Heavy machinery operator	10	58	5	67	88	40	50	318
Security personnel	10	65	7	41	55	27	60	265
Electricity technician	162	102	7	42	149	26	68	556

Indirect Employment opportunities also include jobs supplying the goods and services required to support the construction process including; asphalt from local refinery, machinery fuels from local market, cement, iron, construction vehicles and machinery, food, laundry, security and transport services and other services to support accommodation camps (considered as indirect employment). The procurement of goods and services for the Project is expected to contribute to the economy to the extent that these services are purchased municipal, district or national level.

The procurement of goods and services from the local business is likely to have a positive impact on economic growth and result in employment opportunities during the 4-year construction phase by creating new businesses and jobs. Also, it is assumed that an increase in demand of goods and services will lead to increase in supply. This is likely to create the pull factors which are needed to restore the attractiveness of the local communities and keep young people in the villages and even encourage in-migration. During the interviews with the local NGO's (conducted on 26.09.2019), Association of Serbian Businesswomen stated that, at least two companies from Čačak who participated in the construction of the Corridor X and Milos Great Highway benefitted from improving the skills and qualifications of their workforce.

From the outcomes of the baseline] assessment, majority of the PAPs may not be qualified for the skilled positions required by the Contractor, however, PAPs will benefit from the employment opportunities through unskilled positions. On the other hand, the Project will result in long-term capacity enhancement for the local workforce during the construction phase. Especially, long-term benefits from on the job and formal training opportunities for individual workers. This will also apply for local companies who would provide services in terms of capacity enhancement. The companies who will provide services would also reputational benefits from working on a major national Project.

Negative Impacts on the Local Economy Due to Expropriation

The Project is expected to cause economic displacement on land users, business owners and farmers within the borders of AoI due to expropriation. Negative impacts on people, households and communities may result from economic displacement as a result of loss of assets or access to them, loss of employment or other aspects of livelihood, welfare and/or amenity, due to direct changes in land use on which the Motorway and its ancillary facilities will be constructed.

Based on the Household and Community Level Surveys, the PAPs are predominantly involved in agricultural activities as their main source of income. Also, livestock activities are common for household purposes. The Project will require temporary and permanent land acquisitions that will lead to physical and economic displacement of PAPs. There will be loss of agricultural land, forest land, business land and private land as a result of the Project. PAPs that will go through expropriation on agricultural lands may experience loss of main or partial source of their household income. This may occur especially in the cases where remaining parcels of

the agricultural land after expropriation is not suitable for cultivation. On the other hand, some of the farmers may experience loss of their best quality arable land due to expropriation, which may cause reduced production and consequent loss of income. These types of concerns were expressed by locals during the disclosure of the Spatial Plan (August 2019), and according to the minutes of meeting, farmers who had concerns regarding losing best quality arable lands were offered an exception to exclude arable lands during the land acquisition as much as possible.

The Impact Assessment on Economy during the Construction Phase

The Table 6-77 presents the potential economy related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction. In that regards, Table 6-78 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-77, Table 6-78 then assess the residual impacts of the Project.

During the construction phase of the Project, both direct and indirect economic opportunities at municipal is expected to occur. The magnitude of the potential impacts will be increased to high with the implementation of proposed enhancement measures from municipal to district level, especially the implementation of the Local Procurement Plan will lead equal competition opportunity.

Table 6-77. Impacts on Economy (Construction Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Employment Opportunities: Local unemployment is a significant issue in the Social AoI. In that regards, the Project will require temporary direct workers for the duration of the construction phase. The labour requirement for the construction of the Project will be primarily sourced from local labour force and complemented by international workers.	Employment or Recruitment: The average number of the construction workers will be 3,100 and the peak number of the Project workers will be approximately 3,800 for the construction phase.	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Pre-construction • Recruitment procedures will be developed and aim to: - provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled, and skilled workforce - give priority to vulnerable persons (especially those who will be economically disabled) - give priority to Social AoI as much as possible, for the scope of good practice. • The Contractor and the Employer will outline and require a fair and transparent, gender neutral recruitment process for all job openings. The Contractor should seek to employ Project PAPs on each Sector of the Project route. • The Contractor should encourage Subcontractors to employ local personnel. Construction • Capacity enhancement benefits will be increased through training programs for contractors and subcontractors on related policies, as well as phased capacity building and targeted training programs for national and local suppliers agreed with local government and industry organizations to benefit local capacity enhancement.
Procurement Opportunities: Employment opportunities include jobs supplying the goods and services needed to support the construction process, including construction vehicles and machinery, food, laundry, security and transport services and other	Construction activities Services for the Project Facilities	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality	Pre-construction • Project should seek to maximize the benefits for local communities in terms of both direct and indirect employment opportunities and purchasing of local good and services. • Procurement Plan will be developed and implemented. Project should adopt measures within its purchasing policy to provide opportunity for local

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
services to support accommodation camps. In addition, the increased income of the direct and indirect employees will lead to an increase in general spending on goods and services as well as potentially related job creations.		Čačak Municipality	scale businesses to tender for procurement of subcontracted good and services (e.g. advertising locally).
The Project will result in long-term capacity enhancement for the local workforce during the construction phase. This includes long-term benefits from on-the-job and formal training opportunities for individual workers, and the possibility for capacity enhancements for local and national companies. These companies would also reap reputational benefits from working on a national major Project.	Construction activities Services for the Project Facilities	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	<u>Construction</u> • Increase capacity enhancement benefits through training programs for contractors and subcontractors on related policies, as well as phased capacity building and targeted training programs for national and local suppliers agreed with local government and industry organizations to benefit local capacity enhacement.
Impact on Agriculture: Agriculture is one of the main income sources of the Project region, implementation of Project may lead farmers landless or move on to different sectors.	Expropriation for the Project	PAPs who engaged in agriculture and livestock	<u>Pre-construction</u> • During land expropriation and acquisition process, cooperation between the Project Owner and Project Operator (Corridors of Serbia, Ministry of Construction, Transport and Infrastructure (MCTI) and Roads of Serbia) should consider the following measures; - support for the development of cooperatives and farmers associations should be provided - ensure the implementation of education programs for farmers; implementation of local agricultural incentive programs, - provide seminars to direct for farmers to promote and modern approaches to farming. - Implementation of RLRF and RAP.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			Construction The Project Owner/Employer will encourage and interact with Ministry of Agriculture to include the PAPs within their training programs (eg. reskilling, opportunity, diversity).

Table 6-78. Impacts Scoring on Economy (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Employment Opportunities	1 Positive	3 District	2 Short-term	3 Moderate	5 High	3.25	5 Definite	16 **Medium**	1 Positive	4 Regional	2 Short-term	4 High	5 High	3.75	5 Definite	19 High
Local Procurement Opportunities	1 Positive	3 District	2 Short-term	3 Moderate	5 High	3.25	5 Definite	16 **Medium**	1 Positive	4 Regional	2 Short-term	4 High	5 High	3.75	5 Definite	19 High

6.11.3.2 Operation Phase

Benefit to the National Economy

The Project connects Preljina near Čačak with Pojate on the A1 Motorway (the North-South motorway in central Serbia) through Kruševac, where it will provide a linkage for the residents (more than 500,000 people) and 21,000 companies. This will include better accessibility for businesses in the Project region to expand their geographical markets and resources to other areas and countries.

The majority of the National Highways in Serbia are under tolling[21]. Therefore, the primary national benefit will be derived from the toll collection for the Motorway. Furthermore, the Project will significantly shorten the travel time and the Social AoI will benefit from the improved carriageway with higher quality transport movement and safer infrastructure. In general, this will improve the facilitation of goods transport costs and commune of financial resources within the country.

On the other hand, the locals whom travel frequently for any occasion could still use village roads to acess their business, farm or any other local location since the Project do not bind the locals to only use the Motorway.

Benefits to the Local Economy

The Project is expected to attract more investors in the Project region. The increased investment will bring in more employment opportunities to the local people, including diversification of economic activities. This is quite significant considering the fact that majority of the expropriated land are agricultural lands, and PAPs whom may be affected economically can shift and continue to attribute their income through newly introduced economic fields.

In order to develop local economy throughout the operation phase of the Project, the Spatial Plan indicates that there will be two maintenance facilities within the Motorway alignment in which it is expected to employ local community within its departments. Also, the Project will establish amenities including; parking lots, rest areas, motels, gas station (including grocery, cafes and restaurant) which are expected to increase benefits to the local economy. Therefore, after the establishment of the Project, roadside businesses may enhance and facilitate trade along the Project corridor.

Based on the economic indicators of previous motorway projects, it is expected that between 20 and 50 permanent local employees will be hired for the tolling station and toll collection of

[21] There are charges for the passage of several motorways leading across the Serbia, the current state in 2019 is 645 km of highway tolls with 47 toll gates. On toll roads are subject to the obligation to pay tolls for all motor vehicles using these roads, including motorcycles, quads and tricycles.

the Motorway in general. The following operational activities are expected to be required which will result in direct employment opportunities within the Social AoI:

- Traffic and safety operation:
  - Route patrolling;
  - Operation and maintenance of traffic and safety; and,
  - Emergency operations.
- Tolling operation:
  - Cash collection and money management in toll lanes; and,
  - Operation and maintenance of toll office, including user data management (vehicle classification, license plate number, toll plaza lane entry / exit corrections, Illegal Passes etc.).

The Project will be subject to regular maintenance, including summer and winter maintenances, in which will provide procurement opportunities of local and national contractors. Some of the procurement activities related to maintenance expected to be required listed as following:

- Routine maintenance, cleaning and limited repair of the motorway, interchanges and connecting roads including the related structures and infrastructures;
- Watering, trimming and mowing of non-decorative green areas;
- Winter maintenance with preventive and corrective activities;
- Operation and routine maintenance, cleaning and repair of the toll related structures, infrastructures, building, facilities, ancillaries;
- Maintenance of equipment; and,
- Routine inspections for all motorway assets.

Indirect job opportunities are expected to further stimulate employment opportunities and increase the livelihood of PAPs. Other induced impacts are considered to be mostly in the service sector such as tire repair services, on the road assistance and auto mechanics.

According to the Spatial Plan, the Proposed Logistic Centers are expected to be constructed in Čačak and Kraljevo municipalities by the Government of Serbia after the operation phase of the Project. These centers can employ between 500 and 10,000 employees, which may provide significant benefit for the locals who seek employment. The Spatial Plan also states that, industrial zones are planned to be constructed along the Motorway corridor located in Kraljevo, Kruševac, Čačak, Trstenik, Varvarin and Ćićevac municipalities. The details of the

planned industrial zones are currently being arranged, no further details are provided in the Spatial Plan.

The Impact Assessment on Economy during the Operation Phase

The Table 6-79 presents the potential economy related impacts and the proposed mitigation measures to prevent stated impacts due to Project operation. In that regards, Table 6-80 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-79, Table 6-80 then assess the residual impacts of the Project. The only negative impact caused by the Project operation phase is expected to be decrease in agricultural sector in the Region. With the implementation of proposed mitigation measures, the likelihood of this impact may decrease from medium to low, in which the overall impact is assessed as low. On the other hand, direct and indirect job opportunities and increase in economic development of Region could be improved with the proposed enhancement measures.

Table 6-79. Impacts on Economy (Operation Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Direct and In-direct Employment Opportunities: Employment for the operation and maintenance activities of the motorway, bridge and tolls will be required, resulting in long-term employment opportunities for the municipal, district and national workforce. Local contractors and subcontractors as well as national and local companies will have the opportunity to be involved in maintenance and repair works as well as services to be provided in amenities. It is assumed that operation and maintenance work will require a mix of skilled and semiskilled labor, which may be employed from the municipal or district workforce.	Operation and maintenance activities of the motorway, bridge and tolls as well as amenities services	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Operation Recruitment policy and procedures of the Employer should aim to provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled, and skilled workforce, and giving priority to vulnerable persons (especially those who will be economically disabled). Priority will be given to Social AoI. • Training for PAPS to increase their employability should target identified PAPs within the scope of intervention of the RAP. • The training for PAPs whom seek employment should be provided to obtain jobs with the Project to the extent possible, with in the scope of intervention of the RAP • The Operator should require and develop policies for a fair and transparent, gender neutral recruitment process for all job openings. The Project Owner should seek to employ PAPs on each Sector of the Project route. • As a good practice, Subcontractors should be encouraged to employ local personnel within the scope of their recruitment policy and procedures.
Increase in Economic Development in the Region: The operational stage of the Project is expected to improve connectivity for the transport of goods, services and people between the provinces of the region leading to a better economic growth potential of the Social AoI. This would include improved trade and access to tourism points as well as better accessibility for businesses in the region to expand their geographical markets and resources.	Increase in demand of goods, supplies and services	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Operation • The operation phase of the Project will seek to promote local employment (including job training for the operational activities) and purchase local goods and services to the extent possible.

Table 6-80. Impacts Scoring on Economy (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Direct and In-direct Employment Opportunities	+1 Positive	3 Municipal	4 Long - term	1 Minor	2 Low	2.5	2 Low	**5 Low**	+1 Positive	4 Regional	4 Long - term	2 Low	2 Low	3	4 High	**12 Medium**
Increase in Economic Development in the Region	+1 Positive	5 National	4 Long - term	3 Moderate	4 High	4	4 High	**16 Medium**	+1 Positive	5 National	4 Long - term	3 Moderate	4 High	4	5 Definite	**20 High**

6.11.4 Resettlement and Land Acquisition

This section discusses potential impacts on the land use and the PAPs whose land will be expropriated. Detailed information on the Project Owner's commitments for the PAPs and physical, economic displacement and livelihood impacts caused by Project implementation in all Project phases can be found in Resettlement and Livelihood Restoration Framework (RLRF) prepared as a part of ESIA Disclosure Package.

Also, Resettlement Action Plan (RAP) is currently being prepared by an independent consultant company in order to:

- mitigate adverse social and economic impacts of expropriation and temporary or permanent losses by providing compensation for losses of property on the basis of replacement costs and ensure implementation of the activities of displacement with appropriate data disclosure, consultations and participation of the PAPs,
- re-establish or even improve sources of income and living standards of resettled persons to the level before Project impact.

The Project Employer will prepare and make available to all PAPs and interested stakeholders the summary document of the RAP, after final RAP has been adopted, in addition of appropriate full RAP disclosure.

6.11.4.1 Construction and Operation Phase

The Project includes approximately 112 km long Motorway from Pojate to Preljina and with 40 bridges, 20 overpasses and 10 interchanges and regulation of the West Morava River (with total length of 32 km of regulation works). The proposed regulation designs are to protect against flooding and eliminate more consecutive sharp bends and bank erosion.

The Project will lead to impacts associated with land use and land base livelihoods including physical and economic displacement.

The existing land use of the Social AoI will be affected by the construction of the Project and its components as well as by the project facilities and activities. There will be loss of business, municipality, governmental and individual land as a result of the Project. The land types and person who will have compensation rights were provided in the RLRF of the Project.

The Project execution will require permanent acquisition of land by using expropriation. The Project is expected to cause economic displacement and physical resettlement, however, at this stage, the magnitude of displacement is not completely known. Identification of the landowners for Section 1 and Section is completed. At this stage, the Preliminary Design of Section-2 is currently in progress in parallel to the national EIA process; therefore the exact amount of expropriated land is currently unknown.

The CoS will be responsible for the expropriation activities for all Sections of the Project. Responsible Institutions and their roles on land acquisition and expropriation for the Project is provided in Table 6-81.

Table 6-81. Responsible Institutions on Land Acquisition & Expropriation

Section	Expropriation	Construction Employer	Operator
Section 1	CoS	CoS	CoS
Section 2	CoS	CoS	CoS
Section 3	CoS	CoS	RoS
Responsibilities	Land cadastral maps Expropriation administration Payment	Supervision of design and construction (through and third party Consultant) Ownership of RAP Monitoring	Operation and maintenance of motorway

According to the data obtained from CoS and the Contractor, arable land (non-irrigated arable land) and heterogeneous agricultural areas (with complex cultivation patterns) cover the largest area along the AoI, which covers 500 m on each side of the motorway along the Project route.

Table 6-82. Land Use Areas in AoI

Land Type	Area (ha)	%
Arable land	10,453.63	61.2
Mineral extraction sites	74.12	0.4
Residential buildings of villages and urban peripheries	814.82	4.8
Rural industrial and commercial sites still in active use	142.47	0.8
Road networks	129.41	0.8
Broad-leaved forest	4,564.51	26.7
Grassland	177.36	1.0
Artificial Ponds	110.37	0.6
Water courses	618.64	3.6
Total	**17,085.33**	**100**

Source: Community Level Surveys, 2019

The Project will avoid the acquisition of lands or land use rights that result in any physical or economic displacement where possible. If the land acquisition and displacement is unavoidable, the Project will apply the mitigation measures as agreed in the Resettlement and Livelihood Restoration Framework of the Project to minimize the impacts resulted by displacement. The impacts resulting from the economic and physical displacements are summarized in the Table 6-83.

Table 6-83. Potential Impacts Caused by the Economic and Physical Displacements

Project Impacts in Preconstruction Phase Under the Responsibility of CoS	Project Impacts in Construction Phase Under the Responsibility of Contractor *(if the cause solely owned by the contractor)*
• Economic Displacement of Agricultural Land PAP's livelihoods • Economic Displacement of Construction Land • Economic Displacement of Unviable Land • Loss of Annual Crops • Loss of Plants and Trees • Loss of Wood mass • Loss of Forest • Loss of Buildings Used for Livestock • Loss of Immovable Assess • Negative impacts on agricultural workers • Loss of business structures • Loss of structures used for living premises (no physical resettlement is needed but used for leased as a source of income) • Physical displacement of buildings • Displacement of structures used for agricultural and livestock activities • Physical displacement of unviable buildings • Physical displacement of state- owned buildings • Physical displacement of public utility and community health resources • Impact caused by temporary occupancy • Impacts on vulnerable groups • Additional land requirement due to alignment change • Access to the Natural sources • Access to ecosystem services (river, forest, hunting areas) • Access to agricultural lands • Access to ecosystem services (river, forest, hunting areas) • Impact on local businessescultural heritage • Changes in community dynamics and social network	• Impacts on local businesses • Unplanned Damages to agricultural lands during Construction • Unplanned Damages to Crops, trees During Construction • Loss of livelihoods due to noise and dust • Loss of livelihoods due to access to the agricultural lands during the construction • Unauthorized entry to private lands

The key land acquisition activities including the identification of the required land, identification of PAPs, land valuation, negotiation with landowners and the identification of the affected people and compensation, land valuation, preparation of the land acquisition files, and announcement of the Project layout through newspapers have been carried out for Section-1, by CoS. This process will be supplemented if needed in the course of the RAP definition/implementation.

The potential major impacts may be experienced by the locals who may have to expropriate all or most of their land and other property and move to the other locations. Moderate impacts may be experienced by the locals who may lose smaller portions of their land and assets and who may not need to physically relocate. Losses may not only be limited to property owners

with legally recognized property rights, but some impacts could possibly be experienced by people without ownership rights, such as tenants and informal or itinerant land users.

During operation phase, the most likely potential impact would be damage to crops near the Motorway corridor from maintenance activities or vehicular access.

Below present the land acquisition requirements for the Motorway construction and the project facilities according to each Section in order to understand Section specific impacted areas and types of lands for the Proposed Motorway Route and construction facilities in terms of land acquisition.

To understand the scope of the impact and the justification of the proposed mitigation measures, following subsections provide required permanent and temporary lands for the Project and its facilties for each Section, respectively. In order to do so, maps for respective expropriation area for the Proposed Motorway Route followed by the maps preparead for the locations of the project facilties of each Section shown in below.

Section 1

For the construction of the Motorway in Section-1, 267 ha area is required permanently including land required for camp sites.

The expropriation zone of the motorway alignment passes through 17 Cadastral Municipalities[22] within the borders of the three Municipalities including; Kruševac, Ćićevac and Varvarin. The private lands constitute 83% of the affected lands including the 1% of the business. Public land constitutes 17% of overall impacted land; of which Government lands consist 14% of the affected lands and Municipal land 3%.

[22] Cadastral municipality is a subclass of administrative territorial entity and records property ownership in a cadastre, which is a register describing property ownership by boundary lines of the real estate. The land record in Serbia is kept by cadastral municipalities.

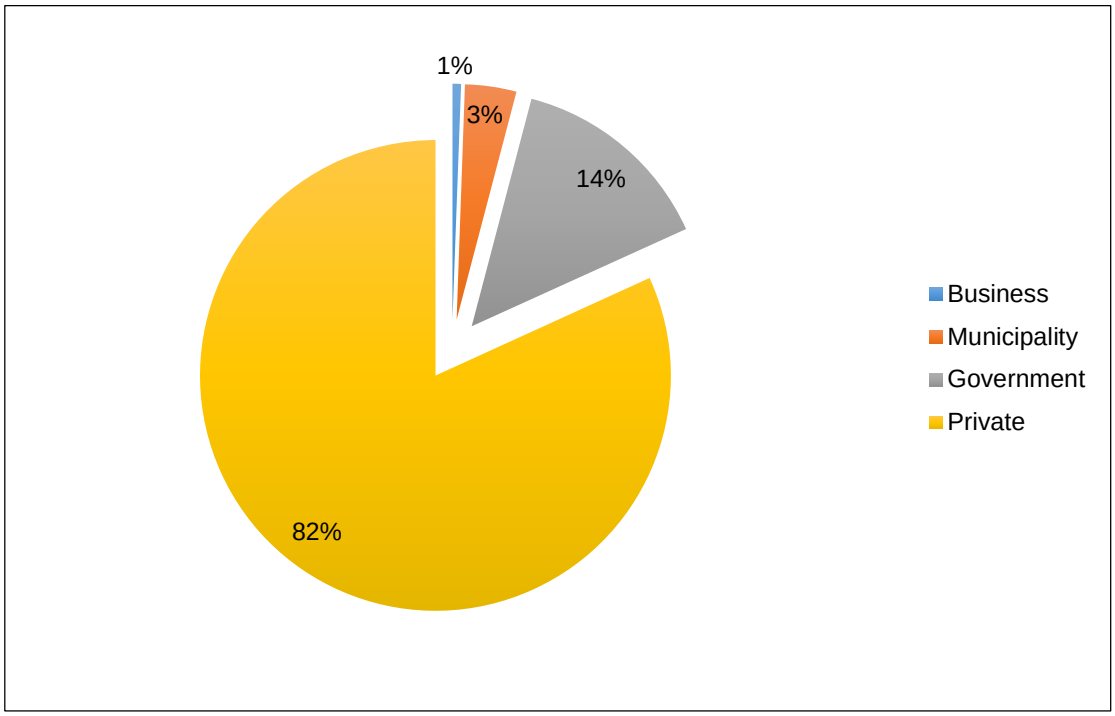

Figure 6-7. Land Types According to the Ownership Status

The list of PAPs within Section-1 is provided by CoS. Land acquisition data for private parcels includes size of land impacted per parcel. Based on received information, 38% of PAPs have lost more than 80% of their parcel. Almost a quarter of PAPs have lost less than 10% of their parcel.

Project Facilities will also require land acquisition. The Facilities for Section-1 consists of beam plant, borrow area, precast yard, quarry, subbase plant SW plant, asphalt plant, and the camp area. Total land required for the project facilities is approximately 600 ha. The Figure 6-8 presents expropriation route, river regulation and location of the Project facilities for Section 1.

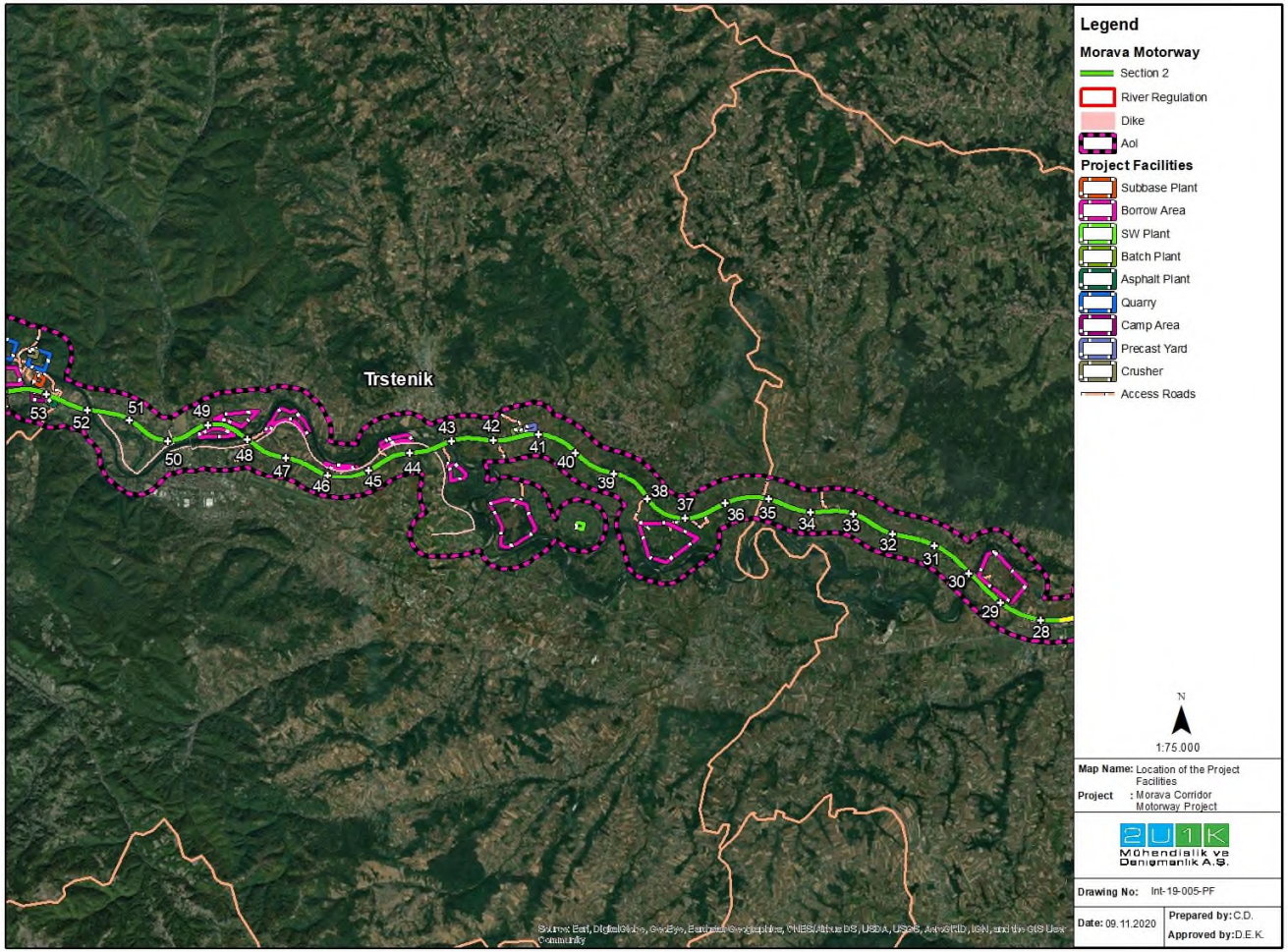

Figure 6-8. Expropriation Route and Location of the Project Facilities for Section

Section 2

For the construction of the Motorway in Section-2, at this stage of the Project, it is estimated that 530 ha is required permanently. Furthermore, land required area for the temporary usage (access roads, storage areas) will be determined in the further stages of the Project Design.

The expropriation zone of the motorway alignment passes through the Kraljevo, Vrnjačka Banja, Trstenik Municipalities. This Section includes 42 Cadastral Municipalities. The project facilities for the Section-2 will consist asphalt plant, batch plant, beam plant, borrow area, precast yard, quarry, subbase plant SW plant and the camp area. Total land required for the facilities is estimated at approximately 750 ha (maximum) at this stage of the Project.

The Figure 6-9 and Figure 6-10 presents expropriation route, river regulation and location of the Project facilities for Section-2.

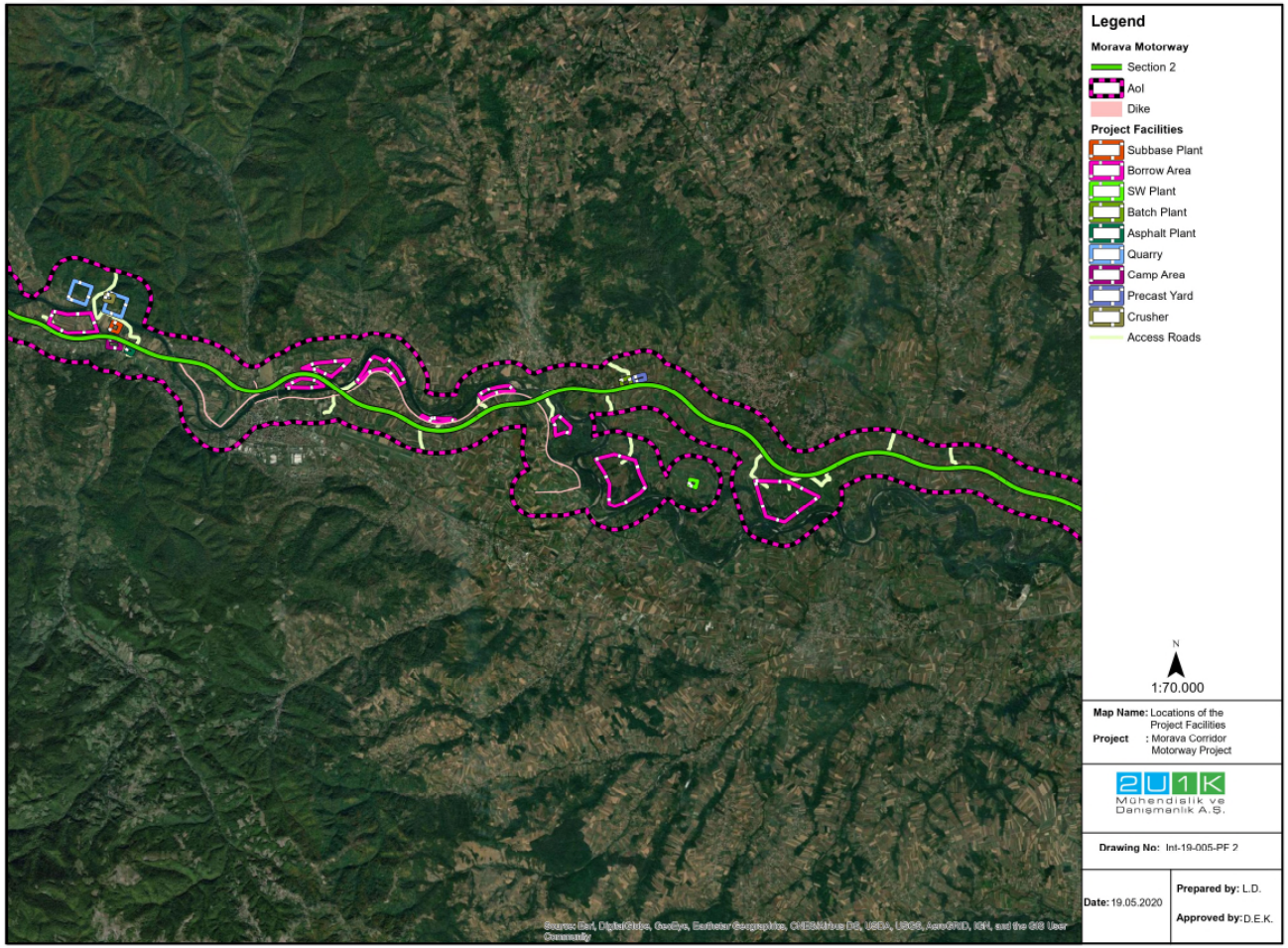

Figure 6-9. Expropriation Route and Location of the Project Facilities for Section 2

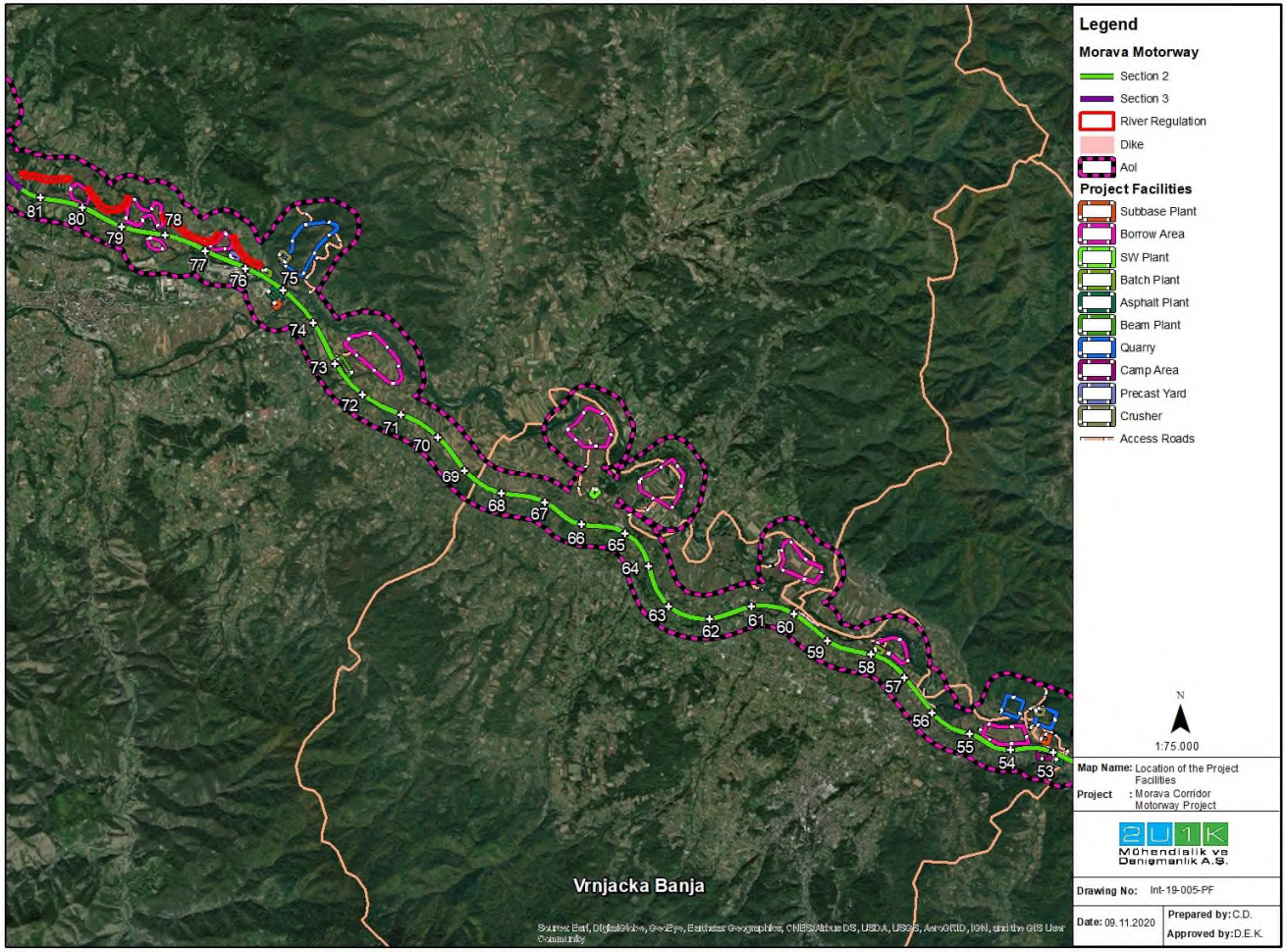

Figure 6-10. Expropriation Route and Location of the Project Facilities for Section 2-a

Section 3

For the construction of the Motorway in Section-3, at this stage of the Project, it is estimated that 320 ha is required permanently. Furthermore, land required area for the temporary usage (access roads, storage areas) will be determined in the further stages of the Project Design.

The expropriation zone of the motorway alignment it passes through the Čačak Municipality. This Section includes 17 Cadastral Municipalities.

The project facilities and activities for Section-3 will consist batch plant, beam plant, borrow area, precast yard, SW plant and the camp area. Total land required for the facilities is estimated at approximately 200 ha at this stage of the Project.

The Project will also require some temporary land take for construction access roads, construction laydown areas and camps, temporary storage of excavated materials/soil, cut trees etc.

In addition to land acquisition, the Project may cause severance impacts from dividing the land parcels. During the disclosure of the draft Spatial Plan (August and November 2019), the landowners and land users expressed the importance of accessibility to their agriculture lands. Hence, the Commission for Conducting the Public Insight of the Spatial Plan stated that the Project will take necessary measures such as interchanges, overpasses, bridges and underpasses in order to retain the accessibility of the land owners and users to these areas in order to minimize any adverse impact on the livelihood resources.

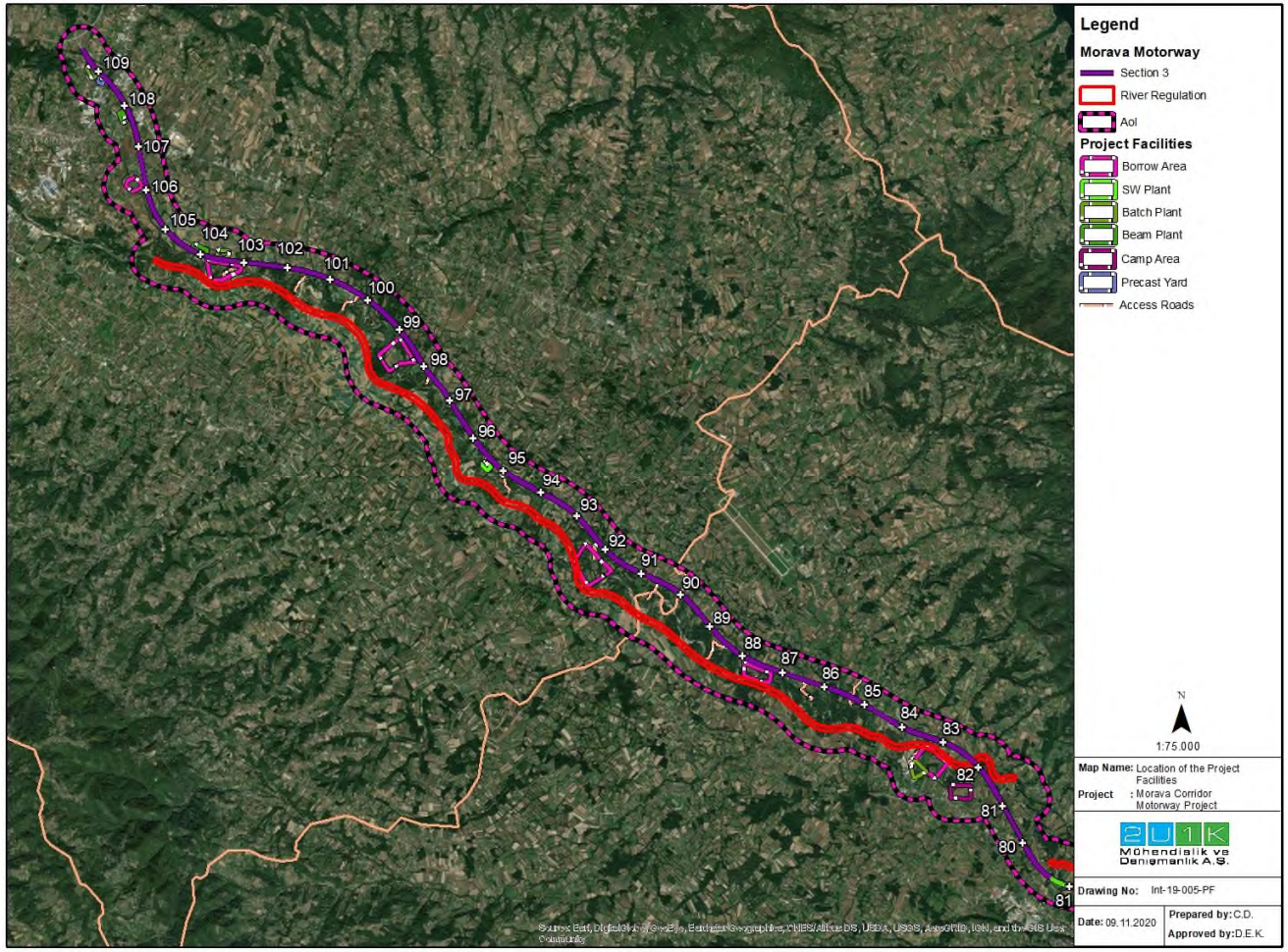

Figure 6-11. Expropriation Route and Location of the Project Facilities for Section 3

The Impact Assessment on Resettlement and Land Acquisition during the Construction and Operation Phase

The Table 6-84 presents the potential resettlement and land acquisition related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction and operation. In that regards, Table 6-85 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-84, Table 6-85 then assess the residual impacts of the Project.

All impacts caused by the resettlement and land acquisition have negative nature, however, duration of the impacts may change according to temporary and permanent requirement of the land. The magnitude of the impacts for permanent land requirement and resettlement are assessed as high and the magnitude of the temporary land requirement and possible damage assessed as low. The likelihood of all impacts are definite, excluding the unplanned damages, before the implementation of the proposed mitigation measures. The sensitive receptors for land acquisition and resettlement impacts are those who will lose their land, structure, business and income sources. Prior to the mitigation measures, the sensitivity of the receptors mainly considered as high. The implementation of mitigation measures (i.e. compensation and other type of assistances provided by the Project Employer), the sensitivity of the receptors who will lose lands is expected to reduced as shown in Table 6-85.

Table 6-84. Impacts on Resettlement and Land Acquisition (Construction and Operation Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Loss of private and public lands due to expropriation The Project execution will require permanent acquisition of land by using expropriation. There will be loss of agricultural, forest, municipal, village and private land as a result of the Project. The existing land use of the Social AoI will be affected by the construction of the Project and its components as well as by the project facilities.	Loss of private and public lands due to expropriation	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	<u>Design</u> • Effects of physical and economic displacement will be minimized • People affected by the Project will be compensated in accordance with the Principles set in the in the RLRF. • As a minimum, Resettlement Action Plans (RAPs) will be prepared. It will detail the impacts of the Project on land ownership, land use, property and livelihoods. The RAPs will set out the measures needed to address adequately physical and economic displacements due to the Project. • A detailed socio-economic assessment will be undertaken for the RAP to identify impacts on PAPs, including land acquisition impacts and restriction to land use. • A census will be carried out to determine persons to be displaced by the Project, persons that are eligible for compensation and assistance, inventory of affected land and property. <u>Pre-construction</u> • Assistance will be provided to vulnerable persons who are not able to relocate and resettle on their own. • Additional targeted assistance (e.g., credit facilities, training, or job opportunities) will be provided and opportunities to improve or at least restore their income-earning capacity, production levels, and standards of living to Economically Displaced Persons whose livelihoods or income levels are adversely affected <u>Construction</u> • The amount of land occupied during the construction will be minimized. • Construction workers will be trained to stay within the border of the construction areas and expropriation corridor and avoid trespass on private land.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• For exceptional cases when the privately-owned land has to be used but the expropriation or court processes have not been finalized yet, no work will be started until bilateral agreements are settled and official consent letters are taken from the legal owners. • If complaints related with unauthorized use of privately-owned lands, damages on adjacent lands, etc. are received through Project's Grievance Mechanism, evaluation/inquiry will be conducted on a case-by-case basis and where necessary, corrective actions will be planned and implemented. • In case of any direct damage on private property as a result of the activities of the Project contractors or subcontractors, the Contractor will ensure that relevant corrective measures (e.g. repair, maintenance, rebuilding, restoration, etc.) are implemented.
Impacts on agricultural land: Agricultural lands will be affected during the land acquisition/ expropriation process	Expropriation	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	<u>Pre-construction</u> • Users of land will be timely informed when construction is planned to begin and how lost crops and damages will be compensated. • When displacement cannot be avoided, displaced persons will be provided with appropriate compensation for loss of assets per Expropriation Law (Official Gazette RS, No. 53/95 dated December 28, 1995, including changes of 23/01 dated April 6, 2001, 20/09 dated March 19, 2009 and 55/13 dated June 25, 2013) considering the provisions of the Spatial Law. • All users of land whose crops are lost or affected by any other damage during the construction will be compensated at a full replacement value, in accordance with Serbian legislation and IFC requirements. • If compensation alone is not sufficient to restore livelihoods, implementation of livelihood restoration in accordance with IFC requirements. • Grievance mechanism will be established

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			Construction • Impacts to agricultural and pasture lands will be minimized as far as possible by keeping the Project construction footprint as narrow as possible, and efficiently restoring any damaged areas
Impacts on business land: Business lands will be affected during the land acquisition/ expropriation process.	Expropriation	Owner of the business lands its employees in the following municipalities: Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Pre-construction • Business losses will be compensated at a full replacement value, in accordance with Serbian Legislation and the IFC requirements. • If compensation alone is not sufficient to restore livelihoods, implementation of livelihood restoration in accordance with IFC requirements. • Grievance Mechanism will be implemented in line with the SEP.
Temporary land allocation: Temporary land and property impacts (for borrow pits, excess material disposal sites, storage, access roads and worker camps) impacts will affect the landowners during the construction phase of the Project	Construction activities	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Construction • All of the disturbed sites will be rehabilitated as appropriate and agreed upon, following the completion of construction works.
Fragmentation of certain land plots: The Project implementation will cause the fragmentation of certain land plots.	Expropriation	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Deisgn and Pre-construction • Underpasses will be designed to ensure access of local people to agricultural lands, with sufficient dimensions for the passage of harvesters, vehicles, etc. where required. • Temporary access roads will be constructed in parallel to the Motorway route near agricultural areas/zones to provide access to agricultural lands, where practical.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Damage to crops during the construction and operation phase phase	Maintenance activities	Agricultural lands neighboring the Motorway within the Social AoI	Pre-constructon • Any loss of or damage to crops caused by Project activities will be compensated. Construction and Operation • The Project will minimize damage to crops by minimizing the area of disturbance caused by vehicle movement and other construction activities. • If complaints related with unauthorized use of privately-owned lands, damages on adjacent lands, etc. are received through Project's Grievance Mechanism, evaluation/inquiry will be conducted on a case-by-case and where necessary, corrective actions will be planned and implemented.
Physical and economic displacement of PAPs: The Project will cause temporary and permanent land acquisitions that will lead to physical and economic displacement of PAPs. There will be loss of agricultural land, forest land, business land and private land as a result of the Project. PAPs that will go through expropriation on agricultural lands may experience loss of main or partial source of their household income.	Physical and economic displacement of PAPs	PAPs who experience expropriation within the borders of Social AoI	Pre-construction and Construction • Employment Plan will be prepared. Local employment and PAPs who will lose income (agriculture and seasonal agriculture activities) or jobs due to Project related activities should be encouraged by establishing fair, transparent and equal opportunities for employment.

Table 6-85. Impacts Scoring on Resettlement and Land Acquisition (Construction and Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Loss of private and public lands due to expropriation	-1	1 Project Site	5 Permanent	5 Very High	5 High	4	5 Definite	**-20 High**	-1	1 Project Site	5 Permanent	4 High	3 Moderate	3.25	5 Definite	**-16 Medium**
Loss of business lands	-1	1 Project Site	5 Permanent	5 Very High	5 High	4	5 Definite	**-20 High**	-1	1 Project Site	5 Permanent	4 High	3 Moderate	3.25	5 Definite	**-16 Medium**
Temporary land and property impacts	-1	1 Project Site	1 Immediate	2 Low	5 High	2.25	5 Definite	-11 Medium	-1	1 Project Site	1 Immediate	1 Minor	3 Medium	1.5	5 Definite	**-8 Low**
Fragmentation of agricultural land plots.	-1	1 Project Site	5 Permanent	5 Very High	5 High	4	5 Definite	**-20 High**	-1	1 Project Site	5 Permanent	4 High	3 Moderate	3.25	5 Definite	**-16 Medium**
Loss of economic forestland function	-1	1 Project Site	5 Permanent	2 Low	5 High	3.25	5 Definite	**- 16 Medium**	-1	1 Project Site	5 Permanent	1 Minor	5 High	3	5 Definite	**-15 Medium**
Damage to crops during the operation phase	-1	1 Project Site	4 Long term	2 Low	3 Medium	3.33	2 Low	**-7 Low**	-1	1 Project Site	4 Long term	1 Minor	3 Medium	2.25	2 Low	**-5 Low**
Physical and economic displacement of PAPs.	-1	1 Project Site	5 Permanent	5 Very High	5 High	4	5 Definite	**-20 High**	-1	1 Project Site	5 Permanent	4 High	3 Medium	3.25	5 Definite	**-16 Medium**

6.11.5 Ecosystem Services

Ecosystem services are the benefits that people, including businesses, derive from ecosystems. According to IFC Performance Standard 6, the ecosystem services are organized into four types:

(i) provisioning services, which are the products people obtain from ecosystems;

(ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes;

(iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems; and

(iv) supporting services, which are the natural processes that maintain the other services (IFC, 2012).

This Chapter of the Impact Assessment covers the existing ecosystem services including types of usage along the AoI, respectively.

6.11.5.1 Construction Phase

This section of the Impact Assessment derived from the social field study conducted on 2019, and Spatial Plan of the Project (2019). The questionnaires prepared for the social field studies included specific topic for ecosystem services to:

- Identify drivers of ecosystem change likely to be associated with the project
- Identify potentially impacted ecosystems and ecosystem services and potentially affected beneficiaries
- Assess project impact on ecosystem services
- Assess current supply of priority ecosystem services and their contribution to beneficiaries well being

Impact on Forest Lands:

The Project alignment will pass through forestlands in each of the Municipalities within the AoI. The most affected Municipalities are located in Section-2 including Trstenik and Vrnjačka Banja Municipalities. The forestlands in the AoI are mainly used for wood, plant and mushroom collection and hunting purposes. All of the forest related activities are mainly used for household consumption according to the results of social field study.

Although the Project activities require forest utilization, no significance impact is foreseen on this ecosystem service, since most of the plants used are in the peridomiciliary spaces, and have spaces for use or complementary sources of supply for their use.

The areas required for the establishment of the Project and the purpose of the forest usage of the local communities are given in the Table 6-86.

Table 6-86. Required Forest Lands and the Forest Usage within the Municipalities

Name of the Municipality	Required land for the establishment of the Project (ha)	Details of the forest usage
Ćićevac	18.14	• Wood collection for heating purposes. • Plant collection (%5 of the AoI) for household purposes. • Hunting (Hunting Association "Hajduk Veljko" manages hunting in Mojsinjske mountains, and hunting area covers 11,203 ha.) • Wood collection, herb collection nor hunting is not made to generate income according to the result of field studies. All activities within the forest is for household consumption.
Kruševac	24.19	• Wood collection for heating purposes. • Mushroom collection for household consumption (Bela Voda village) • Timber collection for income generation (70% of the locals in Jasika Village collect timber to generate income) • Plant collection for household consumption (Kukjin and Jasika villages) • Hunting (Hunting Association of Kruševac manages the hunting and the area covers 52,464 ha)
Varvarin	8.73	• Wood collection for heating purposes. • Plant collection (%5 of the AoI) for household purposes. • Hunting (Juhor Hunting Association, manages the activity and the area covers 21,500 ha)
Trstenik	51.20	• Wood collection for heating purposes. o Wood consumed during the winter season in all affected villages is approximately 14.8 m^3 • Mushroom collection in Velika Drenova, Grabovac, Lozna, Ugljarevo and Medveđa villages for household consumption. • Hunting (Hunting Association "Radoslav Brkic Boza", based in Trstenik, manages the hunting and the area covers 41,287 ha) • None of the villages within the AoI collects herbs from the forest for income generation
Vrnjačka Banja	48.22	• Wood collection for heating purposes o Wood consumed during the winter season in all affected villages is approximately 16.25 m^3 • Mushroom collection in Vraneši, Vrnjci, Podunavci, Štulac and Novo Selo villages for household consumption • Hunting (Hunting Association "Vrnjačka Banja", manages the hunting ground "Vrnjacka River" with a total area of 10,445 ha) • None of the villages within the AoI collects herbs from the forest for income generation
Kraljevo	58.11	• Wood collection for household purposes. o Commercially timber production for income generation was detected in household located in Miločaj village within the AoI. • Plant collection for household consumption is rare, furthermore, plant collection is not income based. • Hunting (Kraljevo Association manages the hunting and the hunting area covers 50,000 ha)

Name of the Municipality	Required land for the establishment of the Project (ha)	Details of the forest usage
Čačak	11.39	• Wood collection for heating purposes. o Wood consumed during the winter season in all affected villages is approximately 13.4 m^3 • In Mrčajevci and Preljina villages, the locals collect mushrooms from the forest for household purposes. • Hunting is very rare in the affected villages of Čačak Municipality, only few residents go haunting to catch pheasant, rabbit and wild boar. • None of the villages within the AoI collects herbs from the forest for income generation

Source: Spatial Plan, 2019 and Social Field Surveys 2019

Impact on Beekeepers

During the site visit conducted by 2U1K in August 2019, it was observed that the Quarry area proposed by the Contractor is located in the close proximity to apicultural activity area. However, beekeeping activities are carried out various locations in the forest area, and the locations of all beekeepers could not be determined during ESIA studies. Beehives are also located in the close proximity to Motorway route in Mrzenica and Makrasane shown in Figure 6-12 and Figure 6-13.

Source: 2U1K, August 2019

Figure 6-12. Beehives in Mrzenica

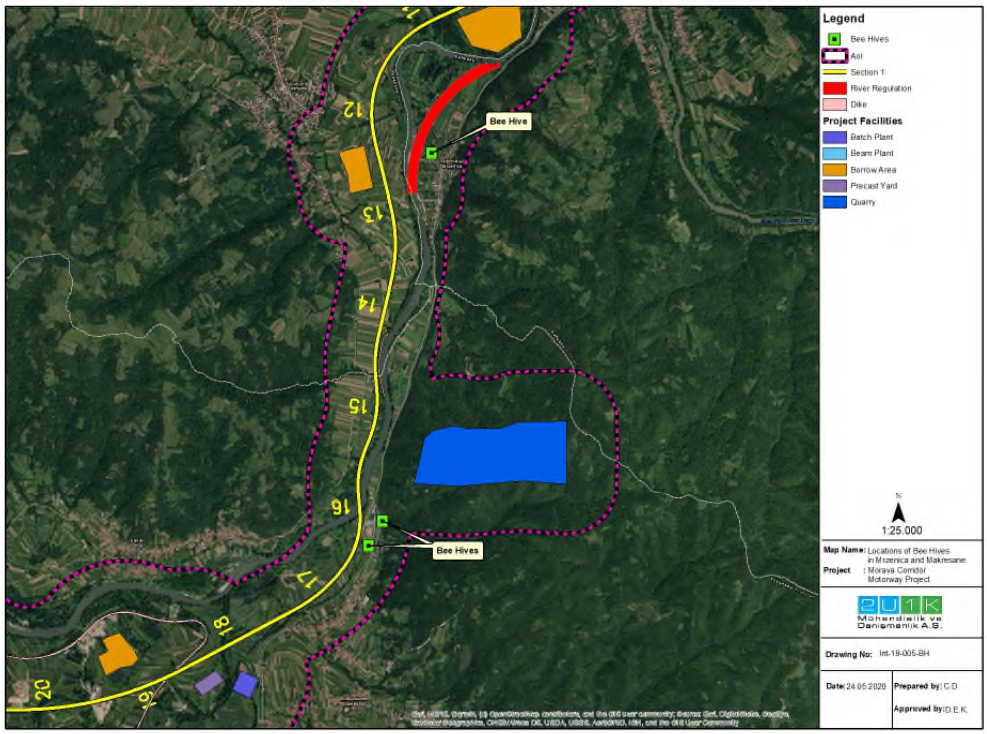

Figure 6-13. Beehives in Mrzenica and Makrasene

According to the information received from the Association of Professional Beekeepers, beehives located in the close proximity Morava River will be affected by the excavation and blasting activities of the Project including dust, noise and vibration. The beekeeper Association of Kruševac recommended that the construction activities should be conducted as much as practical distance from the beehives (in May, June, July they can fly 2 km) by considering the seasonal changes.

The quality of the flowers may be reduced as a result of the CO_2 and dust emissions and this may reduce honey production and quality.

Impact on Tourism

Within the borders of the AoI, municipality of Vrnjačka Banja is observed to have the most available touristic activities among other affected municipalities. Below presents details on the tourism activities and available hospitality services within the affected municipalities.

Table 6-87. Tourism activities within the AoI

Name of the Municipality	Available Touristic Activities and Areas
Vrnjačka Banja	• According to social surveys, there are no touristic facilities (i.e .hotel, hostel, camp site) among the affected villages • The main tourism source in the Municipality is thermal water. Special Mercury Hospital and HTP Fontana are the main touristic facilities. • Another tourism source is Goč mountain in terms of hiking trails, two hunting grounds, ski slopes with cable car, lake Selište, ponds. • Other tourist attraction in Vrnjačka Banja is the area with a recreational-tourist zone along the West Morava. This zone is mainly being used for hunting and fishing.
Kraljevo	• According to social surveys, Adrani village stated to have touristic facilities (i.e.hotel, hostel, camp site) among the affected villages.
Čačak	• According to social surveys, Mrčajevci and Preljina villages were stated to have touristic facilities (i.e. hotel, hostel, camp site) among the affected villages. • Ovčar-Kablar Gorge is a karst limestone canyon that is a touristic source of the Municipality.
Ćićevac	• According to social surveys, Grad Stalac village was stated to have touristic facilities (i.e. hotel, hostel, camp site) among the affected villages.
Kruševac	• According to social surveys, Citluk and Bivolje villages were stated to have touristic facilities (i.e. hotel, hostel, camp site) among the affected villages.
Trstenik	• According to social surveys, there are no touristic facilities (i.e. .hotel, hostel, camp site) among the affected villages.
Varvarin	• According to social surveys, there are no touristic facilities (i.e. .hotel, hostel, camp site) among the affected villages.

Source: Social Field Study (2019)

During the discussions with the head of villages, although there may be lack of touristic activities nor facilities among the AoI, it was stated that most of the affected settlement may have potential to become a touristic location. This matter is also covered in the Spatial Plan (November 2019) of the Project indicating the importance of Project to increase the tourism potential of the affected settlements through easier accessibility of the settlements.

Impact on River Usage

The Morava River is used by the villagers for various purposes including fishing, irrigation and transportation. The main impact on the river use is expected to be from the regulation of the river. River regulation activities will not create additional worker accommodation sites within the scope of Project activities. Also, existing roads will be used within the scope of regulation works. Based on the Hydrotechnical Study Corrıdor of the Highway E-761, Section Pojate-Prelina conducted by Jaroslav Cerni (2016), Table 6-88 presents the areas of the river regulation along with the closest settlements according to Project sections, respectively.

Table 6-88. Areas of the River Regulation

Section Number	Settlement	Distance Between the River Regulation and the Village Center (km)
1	Grad Stalac	1,339
	Maskare	1,597
	Mrzenica	0,247
	Bosnjane	1,308
2	Sirca	0,527
3	Grdica	0,966
	Adrani	2,504
	Popovici	0,649
	Milocaj	0,883
	Obrva	1,409
	Goricani	1,643
	Katrga	2,072
	Mrcajevci	3,744
	Donja Gorevnica	2,484
	Stancici	1,336

As can be seen from the Table above, Section 3 is expected experience more river regulation impacts among the Project sections. According to Household and Community Level surveys, none of the locals among the Section 3 derives household income from the Morava River. Popovici village, being the closest settlement to the river regulation activities in Section 3 stated to use Morava River for fishing on household consumption. None of the affected settlements use the river for transportation purposes. From this aspect, regulation impacts on river usage could be managed sufficiently with proper mitigation measures.

During the social field studies, the head of each affected villages was asked the purpose of Morava River usage, which can be found below. Although fishing activities are common in majority of the affected settlements within the AoI, the locals do not generate income from fishing. On the other hand, Čačak Municipality is observed to be the only affected municipality that use the River for transportation purposes.

Table 6-89. Purpose of River Usage

Section	Municipality	Purpose of the River Usage	Name of the villages
Section 1	Ćićevac	Irrigation	Grad Stalac, Mrzenica, Poijate, Stalack
		Transportation	None
		Fishing (household consumption)	Grad Stalac, Mrzenica, Poijate, Stalack
		Recreation	Grad Stalac, Mrzenica, Poijate, Stalack
	Kraljevo	Irrigation	Adrani, Vrba, Grdica, Zaklopaca, Milocaj, Obrva, Popovici, Ratina, Sirca, Sumarce, Stubal
		Transportation	None
		Fishing (household consumption)	Adrani, Vrba, Grdica, Zaklopaca, Milocaj, Obrva, Popovici, Ratina, Sirca, Sumarce, Stubal
		Recreation	None
	Varvarin	Irrigation	Bosnjane and Maskare
		Transportation	None
		Fishing (household consumption)	Bosnjane and Maskare
		Recreation	Bosnjane and Maskare
Section 2	Kruševac	Irrigation	Bivolje, Bela Voda, Citlluk, Kosevi, Makrešane
		Transportation	Kukljin,
		Fishing (household consumption)	Makrešane, Jasika
		Recreation	Kosevi
	Vrnjačka Banja	Irrigation	Vraneši, Podunavci, Ruđinci and Gračac
		Transportation	None
		Fishing (household consumption)	Vraneši, Podunavci, Ruđinci, Vrnji, Novo Selo, Stulac and Gračac
		Recreation	None
	Trstenik	Irrigation	Bogdanje, Medveđa, of Velika Drenova and Lozna
		Transportation	None
		Fishing (household consumption)	Velika Drenova and Lozna
		Recreation	Velika Drenova and Lozna

Section	Municipality	Purpose of the River Usage	Name of the villages
Section 3	Čačak	Irrigation	Baluga, Dona Gorevnica, Katrga, Mrčajevci, Stančići, Konjevići and Goričani
		Transportation	None
		Fishing (household consumption)	Baluga, Dona Gorevnica, Katrga, Mrčajevci, Stančići, Konjevići and Goričani, Popovici
		Recreation	None

Spring and Well Water:

As can be seen from the Section 5 of the ESIA Report, majority of the affected settlements either use spring and/or well water for household consumption and irrigation purposes. The design phase of the Project took consideration and avoided to interact with spring and well water sources. It is important to note that, regulation activities on Morava River will be made in order to transfer water flow to prevent flood without distrupting groundwater levels and springwater. As stated in Chapter 6.3.2, groundwater level will be regularly monitored from existing groundwater wells located near the construction site.

The overall construction of the Project is not expected to cause negative impact on both resources. Furter details on river regulation works within the scope of the Project is given in Chapter 3.3. of the ESIA Report.

Cultural and Intangible Values:

During the social field study, specific questionnaires were dedicated to determine and understand the existing tangible/intangible cultural heritages among the AoI. Besides acknowledging, Archaeological and cultural resources (See Chapter 6.9 for details), it is important to identify cultural and spiritual values specific to the AoI. Potential contacts between the local population and non-local workforces unfamiliar with the traditional conventions and customary modes of behavior may also negatively impact on traditional intangible culture of the AoI.

As mentioned in the Section 6.9 of this Impact Assessment, there are various types of registered cultural heritages among the AoI.

According to the Spatial Plan of the Project (November, 2019) and the information derived during the social field study, there are two sacred trees that and old building located within the borders of AoI. Thus, the Motorway route and area of the river regulation works will not coincide with any archaeological area and immovable cultural assets and will not impact these areas. During construction phase of the Project, a Chance Finds Procedure will be prepared and it will be implemented for the all Project sections. The Procedure will include measures; in case of a chance find occurs during the excavation works.

As stated, there are two sacred trees within the borders of AoI; located in Bela Voda villige and Donja Gorevnica village respectively. As stated in the Spatial Plan of the Project, these trees were left outside of the selected route of the Motorway. In addition, according to the design of the Project, none of the Project construction facilities will be neighboring these trees.

The locals access to of these sacred trees are through existing unpaved village roads. During the operation phase of the Project, the access to the sacred tree located in Bela Voda village will be through under pass.

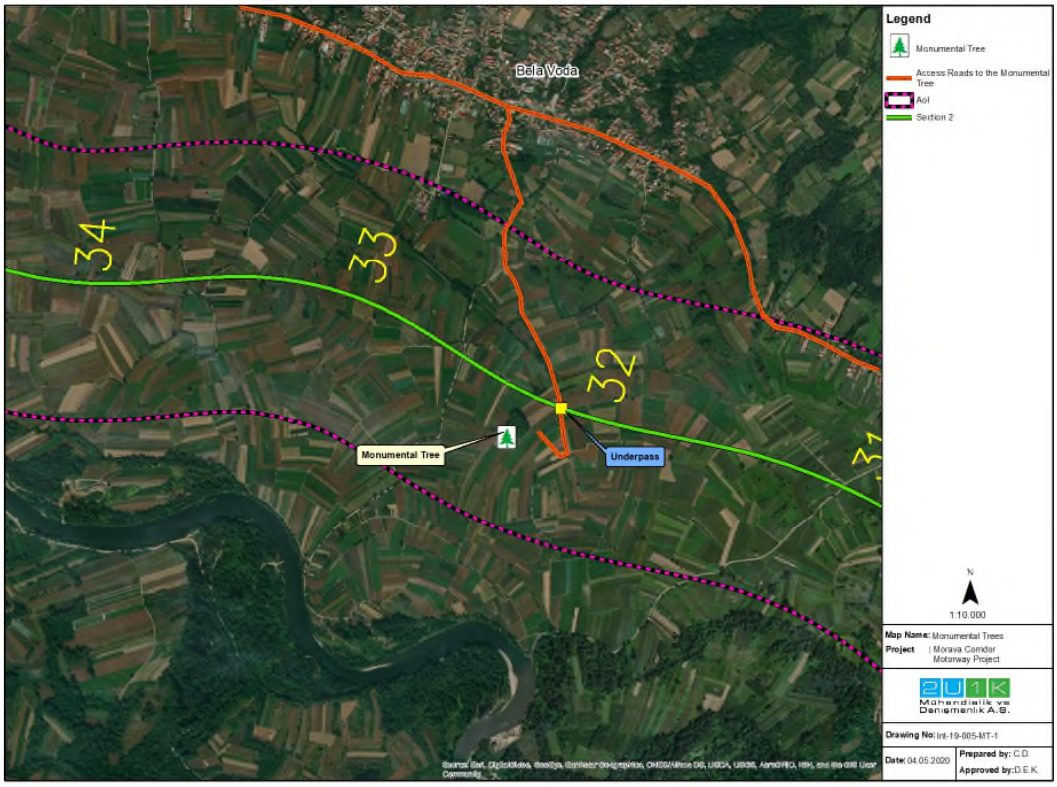

Figure 6-14. Monument Tree Located in Bela Voda Village

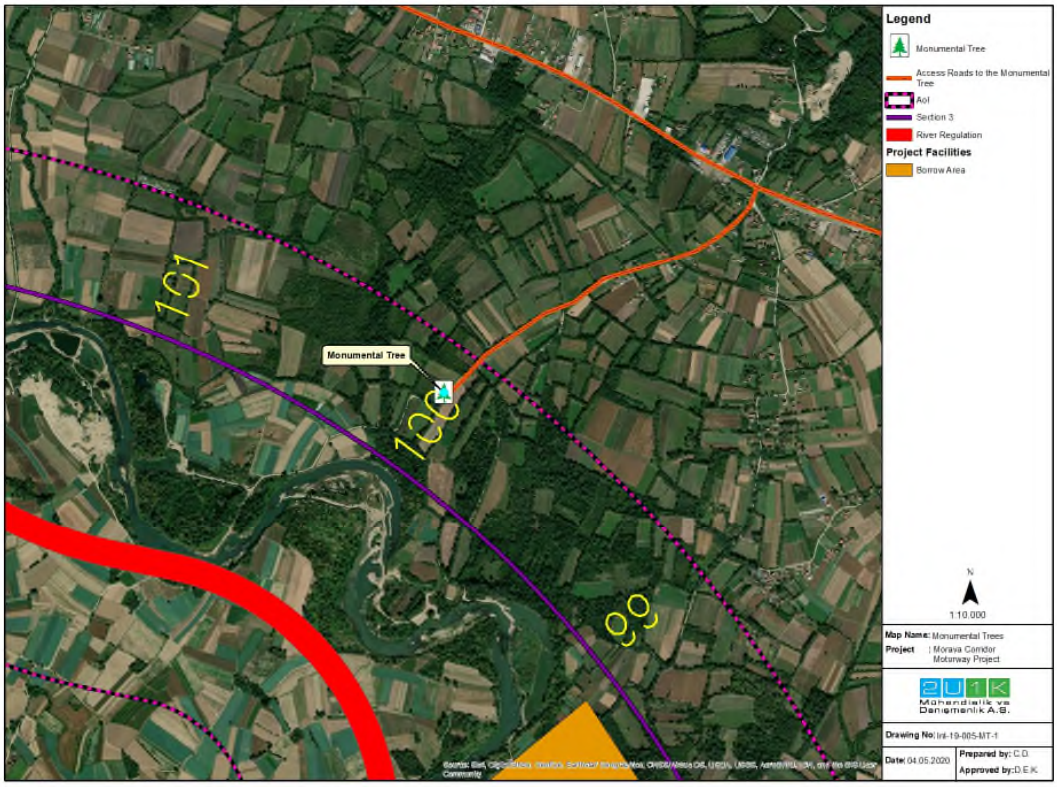

Figure 6-15. Monument Tree Located in Donja Gorevnica

On the other hand, the sacred tree located in Donja Gorevnica Village will use the existing path as there will be no limits to access.

In case of unexpected tangible/intangible cultural heritage determined during the pre-construction / construction activities; the Contractor will not remove any nonreplicable cultural heritage, unless all of the following conditions are met:

- There are no technically or financially feasible alternatives to removal;
- The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal; and
- Any removal of cultural heritage is conducted using the best available technique. (IFC PS 8 Guidance Note,2012).

Last, it is important to note that, there is no Indigenous People residing among the AoI. Details on existing archaeological and cultural resources, along with the proposed mitigation measures are addressed in Chapter 6.9 of this ESIA Report.

The Impact Assessment on Ecosystem Services during the Construction Phase

Table 6-90 presents the potential ecosystem services related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction. In that regards, Table 6-91 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-90, Table 6-91 then assess the residual impacts of the Project.

The impacts on ecosystem services have negative nature. Access to the forest lands and impacts apiculture activities have Municipal extent, however, impact on river usage, leisure activities and tourism have district extent. The likelihood of the negative impacts on apiculture are assessed as medium considering the possible changes on the location of the borrow pits and quarries. With the implementation of mitigation measures, the likelihood of the negative impacts decrease as can be seen in Table 6-91.

Table 6-90. Impacts on Ecosystem Services (Construction Phase)

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
Access to Forest Lands	Deforestation	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Pre-Construction • Local authorities and the villagers will be informed before the construction activities within the forest land to not create any limitation on firewood collection, herbs collection and hunting Construction • Hunting and collection of wild animals will be strictly prohibited within the Project area. • Maintain ongoing engagement between the Project and local communities, with communities informed in advance of any vegetation clearing to allow pre-harvesting of resources such has wood fuel, mushrooms, building materials or other useable resources. • For households who obtain income from timbering activities commercially, compensate for unavoidable loss through in-kind restoration or other type of compensation methods applicable to the IFI requirements. • Piles of woody vegetation cleared for construction activities are to be made available to communities to access it for use as wood fuel or other purposes.
Impact on Apiculture	Quarries Borrow pits Construction activities	Kruševac Municipality	Pre-Construction • Exact location of the beehives will be determined during the RAP preparation and if required, logistic assistance should be provided the move the beehives. • Seasonal requirements for apiculture will be considered during the planning of construction works. The Beekeepers Association of Kruševac recommended that the construction activities should be conducted as much as practical distance from the beehives (in May, June, July they can fly 2 km). • In case of grievances, beehives will be moved away from the Motorway Route with the assistance of CoS. Construction • Monitoring will be held within the scope of the RAP to analyze the livelihood impacts of the beekeepers.

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
Impact on River Usage	Excavation activities River regulation	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Kraljevo Municipality Čačak Municipality	Design • In forming the new river bed and banks, preserve as much as possible, their original and authentic look and purpose. In the case of cutting riverbed, it is necessary to ensure some culverts for the smooth flow of water and the movement/migration of aquatic organisms, including fish. Construction • The communication tools developed within the scope of the SEP will be implemented to inform the PAPs and the local authorities on the river regulation. • Wastes and any other product containing hazardous chemical substances (i.e. fuel) will not be stored in the proximity of freshwater features. Avoidance of any spill affecting to the freshwater ecosystems. • Construction activities will be carried out carefully and impacts caused by human activities will be minimized especially between 30th April to 15th June in order not to harm the species that is exist in the West Morava River.
Impact on Leisure Activities and Tourism	Construction activities	Vrnjačka Banja Municipality Kraljevo Municipality Čačak Municipality	Construction • Addition to SEP, suitably qualitied technical staff and environmental management procedures will be developed and implemented. • Planting native species will be used as visual barrier. In areas with short construction period, adult trees can be translocated for establishing the visual barriers to prevent the impacts on the tourism activities.

Table 6-91. Impacts Scoring on Ecosystem Services (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Access to Forest Lands	-1 Negative	2 Municipal	1 Immediate	3 Moderate	5 High	2.75	5 Definite	**-14 Negative Medium**	-1 Negative	2 Municipal	1 Immediate	3 Moderate	5 High	2.75	3 Medium	**-8 Negative Low**
Impact on Apiculture	-1 Negative	2 Municipal	1 Immediate	2 Low	5 High	2.5	3 Medium	**-8 Negative Low**	-1 Negative	1 Project Site	1 Immediate	2 Low	5 High	2.25	2 Low	**-5 Negative Low**
Impact on River Usage	-1 Negative	3 District	1 Immediate	4 High	3 Medium	2.75	5 Definite	**-14 Negative Medium**	-1 Negative	3 District	1 Immediate	4 High	3 Medium	2.75	4 High	**- 11 Negative Medium**
Impact on Leisure Activities and Tourism	-1 Negative	3 District	1 Immediate	3 Moderate	5 High	3	5 Definite	**-15 Negative Medium**	-1 Negative	2 Municipal	1 Immediate	2 Low	5 High	2.5	4 High	**- 10 Negative Medium**

6.11.5.2 Operation Phase

During the operation period of the Project, access to the ecosystem services will be limited, including forest areas, irrigation from the Morava River and the permanent withdrawal of forest lands by the Project will result in loss of its economic function as well as socioeconomic value for local communities including ecosystem services use.

The Impact Assessment on Ecosystem Services during the Operation Phase

The Table 6-92 presents the potential ecosystem services related impacts and the proposed mitigation measures to prevent stated impacts due to Project operation. In that regards, Table 6-93 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-92, Table 6-93 then assess the residual impacts of the Project.

During the operation phase, the main impact is expected to be access to the ecosystem services. With the provision of the required access to the service areas and the implementation of the mitigation measures, the likelihood of the impact is expected to be reduced to low.

Table 6-92. Impacts on Ecosystem Services (Operation Phase)

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
Access to Ecosystem Services	Access limitation during operation phase		Design • Access to the ecosystem services will be ensured by providing required overpasses and underpasses. • An ecological bridge will be constructed at suitable point. • In case any damage to Irrigation system, damaged channels will be re-constructed. • In case of grievances, beehives will be moved away from the Motorway Route with the assistance of CoS. • Detailed “Resettlement Action Plan” will be prepared to determine the PAPs whom will be affected by the impacts on the livelihoods as a result of access to ecosystem services.

Table 6-93. Impacts Scoring on Ecosystem Services (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Access to Ecosystem services	**-1**	**3 District**	**4 Long Term**	**4 High**	**5 High**	4	**3 Medium**	**-12 Negative Medium**	**-1**	**3 District**	**4 Long Term**	**4 High**	**5 High**	4	**32 Low**	**-8 Negative Low**

6.11.6 Labour and Working Conditions

The impact assessment of labour and working conditions is considered together for both the construction and operation phase, as similar consequences can arise as well as same mitigation measures will be applied for both phases of the Project.

The Contractor envisages a 60 hour working week within the conditions provided by the national labour legislation which in addition will provide:

- Redistribution of working hours supporting the construction schedule needs, while complying with the labour law, and the options set within.
- Addional payment for extra working hours in accordance with national labour law
- Provision of accommodation in accordance with national standards
- Health and wellbeing program for all employees
- Occupational health and safety program for all employees
- Prevention program that identifies opportunities to reduce exposure to occupational health and safety risks
- Training program for all employees, with focus on high risk activities
- Work organization at site in order to make easier and more efficient for employee to complete their tasks
- Grievance procedure for employees to compliance with the requirements of good practices required by the International Finance Institutions.

6.11.6.1 Construction and Operation Phase

The Project will result in temporary employment for the duration of construction phase (expected to be 4 years, at this stage). The average number of the Project workers will be 3,100 and the peak number will be approximately 3,800. To the extent possible, the unskilled workforce are expected to be hired from the local of AoI. On the other hand, majority of the skilled construction workers are expected to be sourced from the Contractor, and these will be primarily temporary international workers. This recruitment process has been implemented by the Contractor on previous infrastructure projects. The Contractor will be responsible for human resources for the construction phase.

For operation phase of the Project, it is expected that between 20 and 50 permanent local employees will be hired for the tolling station and toll collection of the Motorway, in which will be the responsibility of Roads of Serbia for the operation phase.

Throughout the construction and operation phases, the Project will comply with national labor, social security and occupational health and safety laws as well as the principles and standards of ILO convention. The national principles embodied in the ILO convention are:

- The abolition of child labor,
- The elimination of forced labor,
- The elimination of discrimination,
- Collective bargaining.

The detailed information of the Legal Framework of the Project is presented in Chapter 4 of this ESIA Report. However, in order to understand the applicability of the mitigation measures, additional information of the labour related national requirements are also specified in this section below.

Child labour: The Constitution (Official Gazette of the RS. No. 98/2006) and Labour Law (Official Gazette of the Republic of Serbia no. 24/05, 61/05, 54/09) guarantee special protection to the family and the child and prohibit the employment of children under 15 and for hazardous work under 18. These provisions are in line with international standards.

Forced labour: The Constitution prohibits slavery, keeping persons in conditions tantamount to slavery and all forms of trafficking in persons. The Law on the Protection Program for Participants in Criminal Proceedings (Official Gazette of the RS. No. 85/05) regulates the protection of and assistance to victims of human trafficking.

Occupational Health and Safety: The Constitution guarantees the right to occupational safety and health and the right to protection at work, as well as special protection at work for women, young persons and persons with disabilities. The Occupational Safety and Health Act was significantly amended in 2015 to be aligned with EU standards Health and Safety.

Trade Unions: The Constitution guarantees the freedom of association in trade unions. The freedom to associate in trade unions is the only trade union-related right guaranteed by human rights protection instruments ratified by Serbia. This freedom entails the right to establish a trade union and join it of one's own free will, the right to establish associations, national and international alliances of trade unions and the right of trade unions to act independently, without interference from the state.

Collective Bargaining: The Labour Law requires collective bargaining agreements for any company with more than 10 employees. To be recognized as a collective bargaining agent, a union must comprise 15 percent of the workforce. The collective agreements may apply on the general, sectorial or at company level.

Working Conditions: The Constitution protects the right to fair and favorable working conditions and equal access to work. Working conditions are primarily regulated by the Labour Law and the Employment and Unemployment Insurance Act (adopted on 13.05.2019). The employment

of foreign citizens in Serbia is regulated by the Law on Employment of Foreigners. Representatives (Official Gazette of RS", no. 31/2019) of the public and private sectors, consulted in 2013 and 2015, reported that the Labour Law did not sufficiently allow flexible forms of employment.

- Workplace harassment: The Act on the Prevention of Harassment at Work (Official Gazette of the Republic of Serbia", No. 36/2010) obliges employers to inform workers in writing of the provisions of the law and to ensure, among others, that work is organised in a manner precluding harassment and that it protects workers from harassment. The Act applies also to sexual harassment and provides employees with the opportunity to obtain faster and more efficient protection than the one provided by the Labour Law.
- Wages: The constitution guarantees the right of workers to fair remuneration for work. According to the Labour Law, employment contracts violating the principle of an appropriate wage shall be deemed null and void. The overtime rate is at least 26 percent higher than the wage base, as is work in shifts or at night, in the event the employment contract does not specify remuneration for such work. This is in line with international standards.
- Working hours: The Constitution guarantees the right to limited working hours, daily and weekly rest and paid annual vacations. The Construction Contract between the Government of the Republic of Serbia BEJV; and the Special Law (Law on Establishing Public Interest and Special Procedures for the Implementation of the Project for Construction of the Infrastructure Corridor of E-761 Highway, Section Pojate-Preljina) envisage 60 hours of average working hours in a week.
- Social security: The Constitution guarantees the rights of workers and their families to social protection and insurance, the right to compensation in case of temporary inability to work and to temporary unemployment allowances and the right to pension insurance. The social security system covers nine benefits: old age, invalidity, survivors, sickness, maternity, employment injury, unemployment, medical care and family benefits. The unemployed are entitled to allowances paid out for a maximum of 12 months, ranging from 80 to 160 percent of the minimum wage.

The Impact Assessment on Labour and Working Conditions during the Construction and Operation Phase

Table 6-94 presents the potential labour and working conditions related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction and operation. In that regards, Table 6-95 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-94, Table 6-95 then assess the residual impacts of the Project.

The possibility of the inadequate management of the labour (ie. labour discrimination, inadequate payroll process, etc.) may create negative impacts on the direct and indirect labour force. The extent of impact is expected to municipal, considering the requirement of skilled and unskilled labour. Considering the best labour practices of the Contractor, the likelihood of the impact is expected to be low without mitigation measures. The likelihood of the negative impacts will be reduce from low to improbable with the proposed mitigation measures.

Table 6-94. Impacts on Labour and Working Conditions (Construction and Operation)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Labour Risks and Impacts Related to Women Employment and Non-Discrimination and Equal Opportunity	High number of unemployment women in the Social AoI	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Pre-construction / Construction / Operation • The Contractor and Operator will apply equal opportunities to women in all of their branches. • Further measures will be put in place to encourage female participation in indirect workforce, such as providing specific training where required, enabling flexibility and job-sharing opportunities for women with children to participate.
Labour Risks and Impacts Related to Subcontractor and Supply Chain Management (Including Child and Forced)	High level of unemployment in the Social AoI	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Pre-construction / Construction / Operation • The Contractor and Operator will not employ nor permit any subcontractor to use child labour, and in accordance with Serbian legislation, any person under the age of 18 may not be assigned to any hazardous work within the Project. • The Contractor and Operator will prohibit the use of forced labour by ensuring full compliance with national legislation and the provisions of relevant conventions and other international standards
Working conditions and terms of employment for international and national workers.	High number of local and international workers Accommodation of approximately 2,000 workers in camps	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Pre-construction / Construction / Operation • Workers will have contracts which clearly state the terms and conditions of their employment and their legal rights. Information will include, but not be limited to: - entitlement to wages, hours of work, overtime arrangements and overtime compensation, and any benefits (such as leave for illness, maternity / paternity or holiday) - able to join trade unions of their choice and have the right to collective bargaining - contracts will be verbally explained in their native languages to all workers where this is necessary to ensure that workers understand their rights prior to any employment contract to be signed. • Cultural Awareness Training will be provided an on-boarding requirement to all non-local workers, and in particularly foreign workers.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Worker Grievance Mechanism will be developed and will: - be open to all the staff and their contractors, - be publicly advertised by the Project in the workforce, - be easily accessible by workers - be free of retribution - allow anonymous complaints to be raised and addressed. • All Project parties will require all contractors to sign an anti-corruption and responsible procurement policy. • For all contractor contracts, the Project will make explicit reference to the need to abide by IFC standards and ILO conventions in relation to labor and welfare standards, freedom of association and reference must be made to child and forced labor. Emphasis will also be placed on anti-discrimination measures. Where young people below the age of 18 years are employed, it will be made clear that they will not be employed in hazardous work and their work will be subject to an appropriate risk assessment. <u>Pre-construction</u> • Camp Management Plan will be developed and comply with 'Workers' accommodation: processes and standards, a guidance note by IFC and the EBRD' (2009) • Design of the accommodation camp will include measures for managing the camp to ensure adherence to international standard for providing a safe environment that is clean, and adequate sanitary. Measures will include: - waste management - provision of potable water, - provisions of minimum amount of space for each worker - laundry facilities - cooking facilities (separate area for the foreign personnel, if necessary) - provision of first aid and medical facilities - provision of heating and ventilation.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Camp Management Project will include a Code of Conduct for construction workers <u>Construction</u> • During the construction phase, the Contractor's HSE plans and procedures include requirements for induction and training on expected behaviors and on disciplinary procedures (including dismissal procedures for unacceptable conduct). • In case of a collective dismissal required, Retrenchment Plan will be developed by the Contractor to mitigate adverse effects of job losses on the workers concerned. Retrenchment of workers is likely to be required across the lifespan of the Project, particularly during the transition from construction to operation. Retrenchment of workers will be undertaken in line with national law and international best practices, and will include providing skills to enable individuals to secure alternative employment. o The effectiveness of all retrenchment should be monitored including the timely close out of retrenchment-related grievances <u>Operation</u> • Human Resources Policy will be developed and implemented. Under the policy, the project proponent shall provide all employees with information regarding their rights under national labour law, including their rights related to wages and benefits. The policy covers working conditions, right to organize, non-discrimination, grievance mechanisms, child labour, and forced labour.
For operation phase of the Project, it is expected that between 20 and 50 permanent local employees will be hired for the tolling station and toll collection of the Motorway.	Risk of not continuing good labour practices	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	<u>Operation</u> • The workers will have contracts which clearly state the terms and conditions of their employment and their legal rights. Information will include, but not be limited to, entitlement to wages, hours of work, overtime arrangements and overtime compensation, and any benefits (such as leave for illness, maternity / paternity or holiday). All workers will be able to join trade unions of their choice and have the right to collective bargaining. Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand their rights prior to any employment contract to be signed.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• The Project will put in place a worker grievance mechanism. The grievance mechanism will be open to all the staff and their contractors. The grievance mechanism will be publicly advertised by the Project in the workforce. It will be easily accessible by workers, free of retribution and will allow anonymous complaints to be raised and addressed. • The Operator will establish human resources policy for all operational employees with information regarding their rights under national labour law, including their rights related to wages and benefits. The policy will cover working conditions, right to organize, non-discrimination, grievance mechanisms, child labour, and forced labour. • All contractor contracts, the Project will make explicit reference to the need to abide by Serbian Labour Law (Official Gazette No. 75/ last amended on 2014). IFC standards and ILO conventions in relation to labor and welfare standards, freedom of association and reference must be made to child and forced labor. Emphasis will also be placed on anti-discrimination measures. Where young people below the age of 18 years are employed, it will be made clear that they will not be employed in hazardous work and their work will be subject to an appropriate risk assessment.

Table 6-95. Impacts Scoring on Labour and Working Conditions (Construction and Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Risks and Impacts Related to Women Employment and Non-Discrimination and Equal Opportunity	-1	4 Regional	4 Long term	3 Moderate	3 Medium	-3.5	2 Low	**-7 Low**	-1	4 Regional	4 Long term	3 Moderate	3 Medium	-3.50	1 Improbable	**-3 Low**
Labour Risks and Impacts Related to Subcontractor and Supply Chain Management (Including Child and Forced)	-1	4 Regional	4 Long term	3 Moderate	3 Medium	-3.5	2 Low	**-7 Low**	-1	4 Regional	4 Long term	3 Moderate	3 Medium	-3.50	1 Improbable	**-3 Low**
Working conditions and terms of employment for international and national workers.	-1	4 Regional	2 Short term	3 Moderate	3 Medium	-3	2 Low	**-6 Low**	-1	4 Regional	2 Short term	3 Moderate	3 Medium	-3	1 Improbable	**-3 Low**
For operation phase of the Project, it is expected that between 20 and 50 permanent local employees will be hired for the tolling station and toll collection of the Motorway.	-1	4 Regional	4 Long term	2 Low	1 Low	-2.75	2 Low	**-6 Low**	**-1**	**4** Regional	**4 Long term**	**2 Low**	**1 Low**	-2.75	**1 Improbable**	**-3 Low**

6.11.7 Occupational Health and Safety

6.11.7.1 Construction Phase

The Project is expected to create more than 3,800 direct employment opportunities during the peak of the construction period. Construction activities will involve the operation of heavy equipment and trucks, working at height, construction traffic, use of electric devices, handling of hazardous materials and other hazardous activities. Due to the nature of the activities being undertaken during construction, occupational health and safety is a key risk with the potential for accidents that may result in personal injuries and fatalities, as well as lost job-hours.

The construction of motorway projects may carry several key health and safety risks to the construction workers including;

- Work at heights,
- Slips and falls,
- Moving machinery,
- Struck by objects,
- Dust,
- Confined spaces and excavations,
- Epidemic diseases,
- Biological hazards (poisonous snakes).

In addition to general construction working the risks for this Project are working near water, driving, transportation of personnel, materials & equipment, manual handling & off loading, crane/lifting activities, hot work/welding, communicable diseases (leptospyrosis), public interface and dust (silica), in which will be detailed in the Construction Risk Register of the Project by the Contractor.

The Contractor's Environmental, Safety, and Health (ES&H) Core Processes (CPs) are the foundation for all project ES&H programs/plans and/or processes that will be implemented on the Project to ensure all activities are executed in an appropriate manner in accordance with regulatory and project specific requirements. They have been developed to address the different subjects that fall within the ES&H responsibilities and are built into the Morava Corridor Motorway Project policies, plans and procedures.

The categories of core ES&H work processes include general safe work procedures, ES&H training and competency, hazardous work/permit procedures, health and hygiene procedures, emergency planning/evacuation procedures and environmental assurance/compliance procedures.

Considering the potential risks, some of the construction activities may be classified as high risk with a significant potential for incident if no appropriate mitigation management systems are not adopted.

It is important to ensure that the Contractor and its subcontractors will employ workers that are suitably trained, and have the appropriate equipment to undertake their tasks in a safe manner. All workers associated with the Project, and in particular the site management, will be required to be familiar with the appropriate safety measures, starting with undertaking appropriate hazard and risk assessment for all activities. This should be followed by appropriate training, that personnel undertaking hazardous tasks are certified to do so and implementation of specific international requirements for working at height and working in enclosed spaces.

A particularly sensitive group of workers may be associated with the workforce sourced from the local communities who may not have previous experience of working on large-scale construction projects.

Last, in response to the COVID-19 outbreak, Serbia has adopted new legal measures that affect employers. Businesses are now required to support working remotely where possible and to take additional measures to safeguard the health of employees, among other new requirements. Namely, the Serbian Government has adopted a Decree on the organization of operation of employers during the state of emergency (Official Gazette of the R, No. 31/2020) ("Decree"), which entered into force on 16 March 2020. This Decree defines the special manner and organization of work of Serbian employers during the current state of emergency.

The Impact Assessment on Occupational Health and Safety during the Construction Phase

The Table 6-96 presents the potential occupational health and safety related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction. In that regards, Table 6-97 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-96, Table 6-97 then assess the residual impacts of the Project.

The impacts to the Occupational Health and Safety are likely to be direct negative. The impacts related to OHS is short term and extent is limited with the Project sites. Although, the duration and the extent of the impact leads the magnitude of the impact low, considering the worst case scenario (fatalities), the magnitude is assessed as high. With the implementation of the mitigation measures, and experiences of the Contractor from previous infrastructure projects, the overall impacts likelihood will be minimized to low.

Table 6-96. Impacts on Occupational Health and Safety (Construction phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Health and Safety Risks due to General Occupational Health and Safety Hazards	Inadequate training Inadequate OHS management Insufficient resources of OHS Inadequate supervision of workforce	Project Construction Workers for the Project and its facilities	Pre-construction and Construction • The Contractor will establish Occupational Health and Safety (OH&S) Management Plan with special focus on (but not limited to): movement of vehicles and traffic management, working at heights, working in confined spaces, working with hazardous materials, management of electrical hazards, prevention of unintended ground movements and collapse. OH&S Management Plan will acknowledge and reference to IFC EHS Guidelines for Toll Roads (2007) and IFC General EHS Guidelines (2007). • Contractual conditions will ensure that all sub-contractors to follow the OH&S Management Plan. • Organization of the work schedule will include specific risks e.g. flood. • Communication skills across the workforce will be multi lingual. • Enforcement, self-verification & consequence management will be implemented. • Appropriate number of EH&S officers per workforce group (e.g. risk based) will be employed to implement the EH&S program, including risks assessment, training, supervision of high risks tasks, subcontractor induction. • Site-specific factors which may contribute to excavation slope instability will be controlled. • During blasting operations, work areas will be evacuated, and blast mats or other means of deflection will be used to minimize fly rock or ejection of demolition debris. • Good cooperation with the local medical services will be ensured. • An OHS system will be established for the reporting and recording of occupational accidents and dangerous occurrences/incidents. • Personal Protective Equipment will be selected based on the specific hazards and risks of the task to be performed and properly maintained to keep them effective and operational throughout their use. • Individuals shall only carry out tasks for which they are competent and authorized to do so. Individuals shall only operate and use plant or equipment for which they are trained and authorized. Copies of all operator certificates will be retained. Emergency contact numbers will be made available at the work sites. This will include the fire and rescue service and the environmental inspection. • Emergency contact numbers will be made available at the work sites. This will include the fire and rescue service and the environmental inspection.
Health and Safety Risks due to Physical and Chemical Hazards	Accident and Injuries Inadequate training Inadequate OHS management Inadequate supervision of workforce	Project Construction Workers for the Project and its facilities	Pre-construction / Construction • The area around which elevated work is taking place will be barricaded to prevent unauthorized access and working under personnel on elevated structures will be avoided • Hoisting and lifting equipment will be rated and properly maintained, and operators trained in their use. • Elevated working platforms will be maintained and operated according to established safety procedures including use of fall protection measures (e.g. railings), equipment movement protocols (e.g. movement only when the lift is in a retracted position), repair by qualified individuals, and installation of locks to avoid unauthorized use by untrained individuals. • Ladders will be used according to pre-established safety procedures for proper placement, climbing, standing, as well as the use of extensions. • When working at height, proper fall protection measures will be implemented. Fixtures will be installed on bridge components. Safety harnesses with proper thickness and of suitable materials ensuring sufficient strength will be used. Rope safety harnesses will be replaced before signs of ageing or fraying of fibers become evident. • When operating power tools at height, workers will use a second (backup) safety strap. • Personnel exposed to high levels of noise will be required to use personal hearing protection devices/equipment. Where required for specific works, work rotation programs will be implemented to reduce cumulative exposure. • Weather forecasts will be monitored for outdoor work to provide advance warning of extreme weather and schedule the work accordingly. Protective clothing will be used where required

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Properly maintained construction machinery, equipment and vehicles will be used to minimize air emissions. • Engine idling time will be reduced in construction sites. • Direct diesel exhaust will be properly removed to minimize exposure of the operators. • Indoor working areas where vehicles or engines are operated will be ventilated or the exhaust gases will be properly diverted. • Lead-containing paint will be avoided, and appropriate respiratory protection will be used when cutting galvanized steel. • At work sites where dust levels are excessive, dusks will be used by relevant personnel.
Health and Safety Risks due to Emergencies and epidemic diseases	Inadequate training Inadequate OHS management Insufficient accident preventive measures	Project Construction Workers for the Project and its facilities	<u>Design</u> • Emergency Preparedness and Response Plan (EPRP) will be prepared and cover specific project risks such as spill containment and clean-up, flood, working over water, fire, rescue from height. The EPRP should include: - Risk assessment, - Location of medical rescue, fire-fighting resources and spill response equipment will be available along the route. - Procedure for staff and subcontractors to report any incidents and the investigation, remediation and preventive actions taken, - Emergency response information and training - Emergency Communication Procedure included in the Stakeholder Engagement Plan (SEP) and the Emergency Preparedness and Response Plan (EPRP) including with local communities and authorities • Sub-Contractors will develop and prepare site-specific EPRPs in line with the Contractor overarching plan. • Relevant emergency preparedness and response measures will be taken during emergency situations arising at the construction/work sites and Camp Sites. • The Pandemic Preparedness Plan will be implemented based on the prevailing situation with respect to Covid-19. The Pandemic Preparedness Plan will take into a consideration to Decree on the organization of operation of employers during the state of emergency (Official Gazette of the R, No. 31/2020) following measures have been adopted by the Government as: • During the state of emergency, the employer must enable employees to perform work remotely (i.e. outside of the employer's business premises (teleworking and work from home)), at all workplaces where such work can be organized in line with the general enactment (i.e. the employment rulebook or collective bargaining agreement of the employer, whichever is applicable) and the employment contract. • If the general enactment and the employment contract do not provide for the possibility for remote work, the employer may issue a decision allowing for work outside of the business premises, if organizational conditions allow so. Such a decision must contain the duration of working hours and the manner of supervision of the work of employees. The employer is obligated to keep records of employees who work outside of the business premises. • If the nature of the activity of the employer does not allow for organization of work in the manner provided above, such an employer must adjust its operations to the conditions of the state of emergency as follows: • − arrange shift work, if possible and without requiring additional resources, so that as few persons (employees and all other engaged persons) as possible work simultaneously at one premises. • − enable that all business meetings are held via electronic or other appropriate means (video link, video call, etc.); • − postpone business trips in Serbia and abroad, in accordance with the authority's ban / temporary restriction of entry and movement. • In order to ensure the protection and health of employees, engaged personnel and clients, employers must provide all general, special and extraordinary measures related to the hygienic

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			safety of facilities and persons in accordance with the Law on Protection of Citizens from Contagious Diseases. • For employees and engaged personnel who are in direct contact with clients or share a workspace with multiple persons, it is necessary to provide sufficient quantities of protective equipment in accordance with special regulations.
Health and Safety Risks due to Construction Traffic	Construction Traffic	Project Construction Workers for the Project and its facilities	<u>Design</u> • Traffic Management Plan (TMP) will be prepared. <u>Pre-construction / Construction</u> • Safe work zone will be established to separate workers on foot from the traffic; • For the construction works to be conducted at location where traffic exists, safe work zones will be established by taking relevant measures (closure of roads, diversion of traffic, use of protective barriers, cones, warning lights, etc.); • Weather forecasts will be monitored to provide advance warning of extreme weather to drivers and schedule the work accordingly. • Traffic control supervisors will be assigned with competence in traffic control principles and who will assume overall responsibility for the safety of the work zone setup. • Temporary traffic control devices, such as signage, warning devices, paddles, and concrete barriers in a consistent manner throughout the work zone to provide passing motorists with advanced warning of upcoming work zones; • Traffic control workers will be trained in topics such as traffic flow, work zone setup and proper placement of channelizing devices; and • All workers will wear high-visibility safety apparel.
Health and Safety Risks on Accommodation	Poor Accommodation Conditions	Project Construction Workers for the Project and its facilities	<u>Pre-Construction / Construction</u> • Worker accommodation will be designed and maintained to meet the standards defined in IFC and EBRD guidance on accommodation. The standards of the rooms or dormitory facilities should be designed to allow workers to rest properly and to maintain good standards of hygiene. This includes cafeteria, medical room, shower and toilets, wastewater treatment plants/septic tanks, water supply facilities (i.e. water well) • Worker accommodation conditions will be maintained to ensure a good standard of personal hygiene and hygiene in canteens need to be ensured to prevent contamination and the spread of diseases which result from inadequate sanitary facilities and may affect the community health and safety as well. • Medical facilities (first-aid facilities, additional medical facilities) will be maintained to ensure good standards of workers' health and to provide adequate responses in case of health emergency situations. • Basic leisure, social and telecommunication facilities will be provided for workers to rest and also to socialize during their free time. These requirements at the camp accommodation facilities should be optimized to minimize potential impacts on the workers' welfare and risk of work-related accidents and maximize the overall productivity. • Worker Grievance Mechanism will be established that will provide means for all Project personnel to lodge their complaints. • Only concrete plants will be located at Camp Sites; asphalt and medical plants will be sited close to the quarries to the extent feasible.
Labour Risks and Impacts Related to Subcontractor and Supply Chain Management (Including Child and Forced Labour Risks)			<u>Pre-Construction / Construction</u> The Contractor will not employ nor permit any subcontractor to use child labour, The Contractor will prohibit the use of forced labour by ensuring full compliance with national legislation and the provisions of relevant conventions and other international standards. These measures will be reflected in the Project's Employment Policy Document.

Table 6-97. Impacts Scoring on Occupation Health and Safety (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Health and Safety Risks due to General Occupational Health and Safety Hazards	-1	1 Project Site	2 Short Term	5 Very High	5 Very High	3.25	3 Medium	**-10 Medium**	**-1**	**1 Project Site**	**2 Short Term**	**3 Moderate**	**5 Very High**	2.75	**2 Low**	**-6 Low**
Health and Safety Risks due to Physical and Chemical Hazards	-1	1 Project Site	2 Short Term	5 Very High	5 Very High	3.25	3 Medium	**-10 Medium**	**-1**	**1 Project Site**	**2 Short Term**	**3 Moderate**	**5 Very High**	2.75	**2 Low**	**-6 Low**
Health and Safety Risks due to Emergencies and Epidemic Diseases	-1	1 Project Site	2 Short Term	5 Very High	5 Very High	3.25	3 Medium	**-10 Medium**	**-1**	**1 Project Site**	**2 Short Term**	**3 Moderate**	**5 Very High**	2.75	**2 Low**	**-6 Low**
Health and Safety Risks due to Construction Traffic	-1	1 Project Site	2 Short Term	5 Very High	5 Very High	3.25	3 Medium	**-10 Medium**	**-1**	**1 Project Site**	**2 Short Term**	**3 Moderate**	**5 Very High**	2.75	**2 Low**	**-6 Low**
Health and Safety Risks on Accommodation	-1	1 Project Site	2 Short Term	5 Very High	5 Very High	3.25	3 Medium	**-10 Medium**	**-1**	**1 Project Site**	**2 Short Term**	**3 Moderate**	**5 Very High**	2.75	**2 Low**	**-6 Low**
Labour Risks and Impacts Related to Subcontractor and Supply Chain Management (Including Child and Forced Labour Risks)	-1	1 Project Site	2 Short Term	5 Very High	5 Very High	3.25	3 Medium	**-10 Medium**	**-1**	**1 Project Site**	**2 Short Term**	**3 Moderate**	**5 Very High**	2.75	**2 Low**	**-6 Low**

6.11.7.2 Operation Phase

For the operation phase, there will be direct and indirect workers for the Project. Direct employees will be approximately between 20 and 50 and hired for traffic and safety operations and tolling operation departments of the Project. Indirect workers will be hired for maintenance of Motorway, infrastructures and equipment's throughout the operation phase of the Project.

The maintenance of motorway projects may carry several key health and safety risks to the workers including;

- Inadequate selection of worker for specific assignment
- Inadequate OHS Management

General occupation and health pre-cautions should be applied to all operation workers and for maintenance workers, specific mitigation measures should be implemented whether direct or indirectly hired.

The Impact Assessment on Occupational Health and Safety during the Operation Phase

The Table 6-98 presents the potential occupational health and safety related impacts and the proposed mitigation measures to prevent stated impacts due to Project operation. In that regards, Table 6-99 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-98, Table 6-99 then assess the residual impacts of the Project.

The impacts to the Occupational Health and Safety are likely to be direct negative. The lack of experience in Motorway maintenance may lead to complacency which increases the risks, on the other hand, considering the OHS management and trainings will be according to the mitigation measured stated below. The OHS related impacts are expected to be low.

Table 6-98. Impacts on Occupational Health and Safety (Operation Phase)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
Health and Safety Risks due to General Occupational Health and Safety Hazards	Inadequate OHS Management Inadequate selection of worker for specific assignment Emergency cases	Motorway Route Administrative Offices of the Motorway Toll collection locations Maintenance locations	Operation • Occupational Health and Safety Management Plan specific to operational activities will be prepared and OH&S Management Plan will acknowledge and reference to IFC EHS Guidelines for Toll Roads (2007) and IFC General EHS Guidelines (2007). • A system will be established for the reporting and recording of occupational accidents and dangerous occurrences/incidents. • Tollbooths will be equipped with proper ventilation and air filtration systems. • PPEs will be selected based on the specific hazards and risks of the task to be performed and properly maintained to keep them effective and operational throughout their use. • Individuals shall only carry out tasks for which they are competent and authorized to do so. Individuals shall only operate and use plant or equipment for which they are trained and authorized. Copies of all operator certificates will be retained. • Emergency contact numbers will be made available at the assigned areas. This will include the fire and rescue service and the environmental inspection.
Health and Safety Risks due to Physical and Chemical Hazards	Maintenance activities	Motorway Route Administrative Offices of the Motorway Toll collection locations Maintenance locations	Operation • Pavers with exhaust ventilation systems will be used and proper maintenance of such systems will be ensured to maintain worker exposure to crystalline silica (millers and grinders) and asphalt fumes (pavers) below applicable occupational exposure levels. • Correct asphalt product will be used for each specific application and application at the correct temperature will be ensured to reduce the fuming of bitumen during normal handling.

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Tollbooths will be equipped with proper ventilation systems; • Protective clothing will be used when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel, or other solvents. • Appropriate respiratory protection will be used when removing paints.
Health and Safety Risks due to Emergencies	Emergency cases	Motorway Route Administrative Offices of the Motorway Toll collection locations	<u>Design</u> • An Emergency Preparedness and Response Plan, covering the emergency situations (involving vehicles and pedestrians) that may occur during the Motorway's operation, should be prepared and implemented by trained personnel in order to avoid significant risks.
Health and Safety Risks due to Motorway maintenance	Insufficient Trainings Inadequate OHS Management	Motorway Route Administrative Offices of the Motorway Toll collection locations	<u>Operation</u> • Workers will only work in live lane(s) once advance signs are in place to warn road users of their presence. Where possible, operatives should face the oncoming traffic, or work with a lookout. • Works vehicles will support operatives and minimise the need to cross the carriageway. They should be positioned to prevent funneling of drivers toward the work area or into the path of oncoming traffic. • Incidents where vehicles have struck or displaced traffic management equipment or entered the works area should be recorded. This will allow the traffic management design to be reviewed and altered, if appropriate, to maintain the safety of drivers and workers. • Reflective signs and equipment need to be kept clean to maintain clear visibility. Replacing dirty or damaged equipment rather than cleaning or repairing it in situ will reduce time at the roadside. • Night workers (i.e. those regularly working between 11 pm and 6 am unless specified elsewhere in a written agreement)

Impact Description	Impact Source	Location of Sensitive Receptor	Mitigation /Enhancement Measures
			• Lone working should be assessed to determine if one person can do the tasks safely and if particular precautions are needed.

Table 6-99. Impacts Scoring on Occupation Health and Safety (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Health and Safety Risks due to General Occupational Health and Safety Hazards	-1	3 District	4 Long Term	3 Moderate	5 Very High	3.75	3 Medium	**-11 Medium**	-1	3 District	4 Long Term	5 Very High	5 Very High	3.75	2 Low	**-8 Low**
Health and Safety Risks due to Physical and Chemical Hazards	-1	3 District	4 Long Term	3 Moderate	5 Very High	3.75	3 Medium	**-11 Medium**	-1	3 District	4 Long Term	5 Very High	5 Very High	3.75	2 Low	**-8 Low**
Health and Safety Risks due to Emergencies	-1	3 District	4 Long Term	3 Moderate	5 Very High	3.75	3 Medium	**-11 Medium**	-1	3 District	4 Long Term	5 Very High	5 Very High	3.75	2 Low	**-8 Low**
Health and Safety Risks due to Motorway maintenance	-1	3 District	4 Long Term	3 Moderate	5 Very High	3.75	3 Medium	**-11 Medium**	-1	3 District	4 Long Term	5 Very High	5 Very High	3.75	2 Low	**-8 Low**

6.11.8 Community Health and Safety

6.11.8.1 Construction Phase

Traffic

The main impact source of the traffic on the community health and safety is expected to be the vehicle increase due to construction works including excavation and hauling of excess excavated material outside the construction platform, as well as installation works at the road and railway crossings. During the construction phase of the Project, the Contractor estimated 1,136 vehicles will be required, as shown in Table 6-100.

Table 6-100. Number of Vehicles proposed during Construction Phase

Moving Vehicles	Number of Vehicle
Sedan Car	7
SUV 4*4	34
Passenger Bus	23
Worker Bus	36
Pick Up 163	163
Bitumen Distributor Truck	1
Repair Truck	7
Lube Truck	8
Tire Truck	6
Fuel Truck	16
Potable Water Truck	4
Water Truck	23
Heavy Truck Tractor	1
Transit Mixer 6X4	41
Concrete Pump Truck	6
Dump Truck 8X4	24
Dump Truck 6X4	688
Truck with Snow Plow	1
High bed Trailer	28
Lowbed	10
Farm Tractor Trailer	9
TOTAL	1,136

Source: Equipment List of BEJV

Communicable disease

The construction of each Section of the Project will require approximately 3,800 workers and during the peak period, infectious diseases and Sexually Transmitted Diseases (STD) may occur in the communities due to potential worker in-migration to the area.

According to the community-level survey, infectious diseases were reported only in Kraljevo and Varvarin. Among the total diseases, infection-related diseases have a scale of 2% and 15%. In the villages interviewed, no STD was specified.

Other source of the communicable diseases may be the inadequate management of household waste. During the social field survey conducted from August to September 2019, it is observed that the main village problems are directly related with the inadequate waste management and the sewage system. The majority of houses are using septic tanks.

Last, considering the prevailing situation with respect to Covid-19, Serbia has designated COVID-19 hospitals and quarantine locations across the country. All community hospitals and medical care centers through Serbia have opened COVID-19 clinics. The Clinics accepts patients with COVID-19 symptoms through a dedicated entrance separate from that used by other patients. If the test results are negative, the patient is released. If the tests results are positive, the patient will remain at the Clinic.

Construction related environmental impacts:

During implementation of the planned activities, dust, noise, mud on roads and landslides/unstable slopes impacts are expected to occur from the demolition and clearance of objects that are located along the intended route. Earthworks (including terrain cleaning, excavation, leveling), transport and disposal of excavated material and movement of mechanization and transport vehicles will cause increase in the traffic load in the AoI.

Construction noise is explained in detail in Section 6.5 of this ESIA Report. With the application of the mitigation measures regarding the construction noise, the significance of negative impacts are expected to reduce to 4% in other words, the overall impact of construction noise is expected to be low. From the social quality aspect of view, no additional measures are needed considered the given scenarios in Chapter 6.5.

The construction activities may cause negative impacts on surface water sources throughout the construction phase in case no mitigation measures are taken. The most significant impact on water regime is related to reconstruction of the sections of West Morava River. River diversion may affect the natural water flow due to construction of artificial structures and barriers, which may result in siltation of riverbed, flow during the high water period or heavy rains, etc. Chapter 6.3 of this ESIA Report explains the potential impacts on surface water including measures to minimize the negative impacts.

Last, for air quality related impacts, Chapter 6.4 of this Report addresses the Project's impacts on air quality and climate in detail.

Security around the Project site:

During the construction phase of the Project, security will be needed on the site. According to the results of the social field survey, there are total of 265 people who obtained a certification for private security living in the villages located in the Aoi. Security personnels who are part of the community and who are familiar with local customs may serve as a positive and visible point of contact between the company and the community.

According to the National legal requirements, the parties involved in the Project will follow the Law on Private Security (published in the Official Gazette of the Republic of Serbia No. 87/18 from 13 November 2018 which will come into force on 21 November 2018) to ensure security within the Project site.

The Impact Assessment on Community Health and Safety during the Construction Phase

The Table 6-101 presents the potential community health and safety related impacts and the proposed mitigation measures to prevent stated impacts due to Project construction. In that regards, Table 6-102 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-101, Table 6-102 then assess the residual impacts of the Project.

The impacts to the Community Health and Safety are likely to be direct negative. The impacts related to is Community Health and Safety short term and extent is Municipal. Although, the duration and the extent of the impact leads the magnitude of the impact low, considering the worst case scenario (fatalities), and the sensitivity of the local communities the magnitude is assessed as moderate to high. With the implementation of the mitigation measures, and experiences of the CoS from previous infrastructure projects, the overall impacts likelihood will be reduced.

Table 6-101. Impacts on Community Health and Safety (Construction Phase)

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
Disturbance to environmental health, quality of life and wellbeing during construction phase	Construction activities	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Design • Project Environmental Management Plan (EMP) will include Noise and Vibration and Management Plan that will be define the sensitive receptor locations, monitoring program and specific mitigation measures to be implemented. • The Project Environmental Management Plan (EMP) will include Air Quality Management procedures that will be implemented. • Planning of transport routes including temporary access roads, haul roads and construction work sites should be determined to avoid populated areas and away from sensitive receptors and villages as much as possible. • As Project construction progresses, buildings that may be potentially affected will be identified prior to construction, including assessing whether buildings are sensitive to night-time disturbance. • Traffic Management Plan of the Project will include measures on accessibility for local community. <u>Pre- Construction</u> • OH&S Management Plan will include awareness of community health and safety issues. OH&S Management Plan will include the Pandemic Preparedness Plan within its scope with respect to Covid – 19 and/or any other diseases present in the region. • Construction work schedule will be distributed to the affected settlements in a timely manner to inform any road closures and construction related cautions. • Air and noise monitoring will be undertaken in accordance with local regulations. Establish in advance a relationship with municipal environmental department. <u>Construction</u> • Operational area in borrow pits, access roads, work sites, construction camp sites, batch and asphalt plants etc. will be regularly monitored for air quality parameters such as PM10, PM2.5, SO2, NOx, HC, CO etc. (For Air Quality related measures; See Chapter 6.2.1 of the ESIA Report). • Construction work schedule will be distributed to the affected settlements in a timely manner to inform any road closures and construction related cautions. • Washing system will be implemented to prevent mud on roads.

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
			• Dust suppression mitigation measures such water sprinkling will be implemented in sensitive locations. • Operational areas in in borrow areas, access roads, work sites, construction camp sites, batch and asphalt plants etc. will be regularly monitored for noise levels representing all hours of a typical work shift. • In case of noise exceedance, silencers or acoustic enclosures on machines as well as portable sound barriers around stationary equipment, should be installed where applicable. • Movement of construction traffic through sensitive receptor community areas will be prevented or limited, wherever possible. If this cannot be avoided, additional measures defined in the Traffic Management Plan (TMP) such as slower driving rules, physical speed restrictions) will be applied. • Movement of construction traffic through sensitive receptor community areas will be prevented or limited, wherever possible. If this cannot be avoided, additional measures defined in the Traffic Management Plan (TMP) such as slower driving rules, physical speed restrictions) will be applied. • Sensitive receptors (e.g. hospitals, nursing homes, schools) will be provided with advanced notification of noisy works and project specific additional mitigation measures. • Special acoustic insulation and related mitigation measures will be evaluated on a case-by-case basis. • 20kph speed limit will be applied on unpaved surfaces close to settlements. • Wind breaks or dust protection systems (including sprinklers) should be built around the main construction activities where necessary and, if possible, near potentially dusty works to minimize the impact of nearby residential receptors. • Air pollution control equipment (e.g. baghouse) should be installed and operated for the asphalt plants. • During transportation on public roads, the excavated materials will be covered with nylon canvas or suitable materials with a grain size greater than 10 mm in public roads as good practice. • To reduce fugitive dust emission during vehicle operation on public roads and at construction sites, service roads and quarry/material borrow/storage sites, dust suppression methods (i.e. watering with water trucks, applying nontoxic chemicals, speed limits for mobile vehicles, using well-maintained vehicles/equipment) should be used.

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
			• In case of a Grievance, additional measurements will be implemented, and the results will be shared with the complainant. If the results of the measurements will not fit with the commitments given in the relevant environmental Chapters of the report, additional mitigation measures will be implemented.
Increased risk of communicable diseases and burden on local health services:	Workers' Accommodation	Kruševac Municipality Vrnjci Village Adrani Village	Pre- Construction & Construction • All workers will be informed on the Tetanus and Sexually Transmitted Diseases (STDs) including HIV during the orientation period and condoms will be provided to international workers. If required, vaccinating workers against Tetanus will be applied. • First aid facility including health and wellbeing facility will be established within the Camp accommodation. • All workers will be informed about the closest Public healthcare facilities. • If an increase in cases of disease or use of public health facilities is observed awareness raising training will be coordinated with the local health authorities.
Increased traffic and rise in accidents Potential to result in injuries or fatalities to drivers and passengers in non-project related vehicles or pedestrians.	Construction vehicles	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Pre-Construction • Traffic Management Plan (TMP) will be developed and implemented include good practice and specific mitigations for sensitive areas. • Traffic Management Plan (TMP) will be shared with the local authorities for their approval. • Local authorities will be informed regarding the date, time and route of the transportation activity. • Traffic signals and signs will be set up and will be clear and visible • Traffic flagmen will be appointed where necessary. • Temporary traffic control methods will be applied at intersections and connections that hold higher risk for accidents. • All drivers will obey the national speed limits and the drivers will be trained on the all Serbian traffic rules. • Contractor to ensure construction area provides measures and signage for safe pedestrian crossing. Crossing locations should take into account community preferences, including those related to convenience or personal safety. • Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the Project except at designated crossing points.

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
			Construction • Supervision and escort for heavy machinery (which requires escort and permit in line with Serbian Legislation) will be provided. • Supervision for vehicles carrying construction materials and equipment that pass over public or private roads and railway crossings will be provided. • Project related traffic will be regulated during certain dates and times where local community will require to commute (to/from schools, commercial areas etc.) or take on any agricultural activity (animal grazing or other farming activities etc.). • Temporary access to private property or appropriate accessing alternatives will be determined in consultation with the land owners or users. • Local authorities and community will be provided with detailed information on closure of roads during the road and railway crossings. • Methods for every road crossing will be determined and agreed upon with authorities prior to taking any action. All methods and construction techniques proposed by the Contractor will aim to minimize possible disruptions caused by road crossings. • Contractor will ensure that road safety training will be provided to employees. • The schools nearby the Project site will be informed about the peak movements of the vehicles and vehicle traffic will be minimized during hours when children are traveling to and from school. • Heavy machinery and vehicles utilized in transportation activities (including transportation of personnel) will be used by qualified and licensed drivers. • All drivers will know and comply with all traffic signs, are will be made aware of hotspots of intense traffic that are expected along the route and are trained properly for on and off-road conditions. • Managing and monitoring of working and resting hours drivers will be undertaken according to Serbian Legislation. • Monitoring security arrangements for loads, vehicles and drivers will be undertaken according to Serbian Legislation. • All project work sites, associated facilities, temporary roads, and traffic management works will be will be signposted in line Serbian Legislation and as required by the Traffic Management Plan (TMP).

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
			• Night drive/transportation will be limited as much as possible to reduce the risk of accidents and obtaining necessary permits shall night transportation be required. • Compensating damages caused by an accident due to project activities will be undertaken according to national legislative requirements and the Grievance Mechanism defined in the Stakeholder Engagement Plan (SEP) of the Project. • A Grievance Mechanism Procedure will be set up for communities and individuals to formally communicate their concerns, complaints and grievances and facilitate resolutions that are mutually acceptable by the parties. • The routes of the roads that will be used and the peak hours of the usage of the roads will be shared with village heads and management of the schools. • The CLOs of the contractors will provide awareness trainings to schools if there is a school located on the route of the roads that will be used. • Installation of barriers (e.g. fencing,) to deter pedestrian access to the Project construction area except at designated crossing points
Security around the Project site	Armed and non-armed security forces	Kruševac Municipality Vrnjci Village Adrani Village	Construction • Engagement activities prior to construction will ensure that local stakeholders are informed of the risks and consequences of entering the site; • Security personnel will patrol the site area to prevent any unauthorized access onto the site. They will also ensure that protocols for entering the construction site are enforced; • A management plan for security personnel will be developed and implemented by the Contractors, outlining expectations around security, • Conflict Management Training will be provided to armed security personnel, • The Grievance Mechanism for the Project will capture all grievances raised in relation to security and safety issues. These will be addressed promptly, and actions will be taken.

Table 6-102. Impacts Scoring on Community Health and Safety (Construction Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Traffic Density	-1 Negative	2 Municipal	2 Short-term	4 High	5 High	3.25	5 Definite	**- 16 Medium**	-1 Negative	2 Municipal	2 Short-term	3 Moderate	5 High	4	3 Medium	**- 12 Medium**
Communicable Diseases	-1 Negative	2 Municipal	2 Short-term	3 Moderate	3 Medium	2.5	2 Low	**- 5 Low**	-1 Negative	2 Municipal	2 Short-term	3 Moderate	3 Medium	2.5	1 Improbable	**- 3 Low**
Construction related environmental impacts	-1 Negative	2 Municipal	2 Short-term	4 High	5 High	3.25	4 High	**- 13 Medium**	-1 Negative	1 Project Site	2 Short-term	3 Moderate	5 High	2.75	3 Medium	**- 8 Low**
Security around the Project Site	-1 Negative	1 Project Site	2 Short-term	3 Moderate	3 Medium	3	2 Low	**-6 Low**	-1 Negative	1 Project Site	2 Short-term	3 Moderate	3 Medium	3	1 Improbable	**- 3 Low**
Earthquake	-1 **Negative**	4 **Regional**	1 **Immediate**	3 **Moderate**	5 **High**	-3.25	1 **Improbable**	**-3 Low**	-1 **Negative**	4 **Regional**	1 **Immediate**	3 **Moderate**	3 **Medium**	-2.75	1 **Improbable**	**-3 Low**
Erosion	-1 **Negative**	2 **Municipality**	1 **Immediate**	3 **Moderate**	5 **High**	-2.75	4 **High**	**-11 Medium**	-1 **Negative**	2 **Municipality**	1 **Immediate**	2 **Moderate**	3 **Medium**	-2	4 **High**	**8 Low**
Spillage/Leakage to Surface Water	-1 **Negative**	2 **Municipality**	2 **Short Term**	4 **High**	3 **Medium**	-2.75	4 High	**11 Medium**	-1 **Negative**	2 **Municipality**	2 Short Term	2 Low	3 Medium	-2.25	2 Low Probability	**-5 Low**

6.11.8.2 Operation Phase

Accessibility:

To mitigate potential impacts regarding to accessibility, the Motorway includes bridges, overpasses and underpasses in each section of the Project. Information about the bridges, overpasses and interchanges along the Proposed Motorway Route are presented in Table 6-103.

Table 6-103. Number of Bridges, Overpasses and Interchanges along the Sections of the Motorway

	Section-1	Section-2	Section-3
Bridge	10	15	15
Overpass	8	8	4
Underpass	1	5	9
Culvert	19	31	15
Interchange	4	5	2

Flood Risk:

During the disclosure period of the Spatial Plan from July to August 2019, 22 of 48 villages within the AoI expressed their concerns about the possible flood risk during the operation period. These villages are considered as sensitive receptors.

Noise:

Noise sources during operation stage of the project is mainly road traffic will be cumulated throughout the road axis. The speed of the light vehicles is taken as 130 km/h whereas the speed is taken as 80 km/h for heavy vehicles. The noise impact is assessed in the relevant environmental Chapter of the report in details. In the below boxes, the comments of the residents on the Spatial Plan are provided to show the sensitivity of the community on the noise impact during the construction.

Level crossing:

The risk during operation is the level crossing and the Project is passing through the two railways in km point 1 and km point 75.

Transport of dangerous goods:

The Dangerous goods are those that may jeopardize people's health, cause contamination of the environment or impose material damage, or that have dangerous properties for people's health and environment, which are as such specified by laws, other regulations and international contracts, which, on the basis of their nature or properties and condition, and related to transport, may be dangerous for safety or have proven toxic, corrosive, flammable,

explosive or radioactive effects. Dangerous goods also include raw materials of which dangerous goods are produced as well as waste if possess the properties of dangerous goods. Law on Transport of Dangerous Goods ("Official Gazette RS", No 88/2010) regulates the transport of the dangerous goods.

The Impact Assessment on Community Health and Safety during the Operation Phase

The Table 6-104 presents the potential community health and safety related impacts and the proposed mitigation measures to prevent stated impacts due to Project operation. In that regards, Table 6-105 provides quantitative assessment of the impacts through identifying; nature, extent, duration, magnitude, significance and likelihood of each potential impacts of the Project. Considering the Project will adopt and apply the given mitigation measures in Table 6-104, Table 6-105 then assess the residual impacts of the Project.

Project impacts on the community health and safety has negative nature. It has been observed that the flood risk during the operation phase has the highest magnitude and sensitivity level as a result, the overall rating of the impact is assessed as high. With the proposed mitigation measures, the impacts regarding the flood and operational noise could be managed and the receptor sensitivity will be reduced.

Table 6-104. Impacts on Community Health and Safety (Operation Phase)

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
Level crossings safety	Railway crossings	Two railway crossings	Operation • The set of precautionary measures will be implemented, including road operational safety procedures. • Regular inspection and maintenance of the Motorway will be carried out. • Safety management program will be implemented. • Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the Motorway except at designated crossing points; Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian or bikeways.
Noise during operation	Operational Traffic	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Design • Stone Mastic Asphalt (SMA) surfacing that cause's low noise will be used by the Contractor for the Motorway. • Natural topography will be used for noise protection. • Additional noise barriers will be considered for the sensitive receptors, as necessary. • The landscape screening will be done either by lowering the Motorway or adding soil embankment • The noise barriers adjacent to the motorway will be used. Operation • Noise level measuring during operation will be performed at annual intervals and in case of complaints by the local population. • Noise barriers will be used in the sensitive locations such as schools, hospitals and residential areas to reduce the sound as required.
Flood risk during operation	River regulation	Grad Stalac Mrzenica Stalać Bela Voda Adrani Vrba Grdica Miločaj Popovići Sirča Stubal Bogdanje Lozna Grabovac Medveđa Ugljarevo Novo Selo Podunavci Ruđinci Donja Gorevnica Katrga Goričani	Operation • The culverts will be maintained and monitored whether they perform as designed to the both sides of the Motorway. • Perform the most necessary regulation works to stabilize and bank erosion. • Drainage channels and ponds will be built to discharge the surface water. • Flood Management and Flood Escape systems and escape roads to be constructed. • Flood control contingency plans need to be formulated for the study area.
Transport of dangerous goods	Movement of vehicles with chemical and dangerous materials	Ćićevac Municipality Varvarin Municipality Kruševac Municipality Vrnjačka Banja Municipality Trstenik Municipality Kraljevo Municipality Čačak Municipality	Operation • The proper screening acceptance procedure will be implemented with development of the Emergency Preparedness and Response Plan (including Spillage Response Plan). • Speed limit will be implemented for the hazardous material carriage.

Table 6-105. Impacts Scoring on Community Health and Safety (Operation Phase)

Impacts Before Mitigation									Impacts After Mitigation							
Impacts	**Nature**	**Extent**	**Duration**	**Magnitude**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Overall Rating (IA)=CxL**	**Nature**	**Extent'**	**Duration'**	**Magnitude'**	**Receptor Sensitivity**	**Significance Criteria (C)**	**Likelihood (L)**	**Residual Impacts**
Level crossings safety	-1 Negative	1 Project Site	4 Long-term	2 Low	5 High	3	2 Low	**-6 Low**	-1 Negative	1 Project Site	4 Long-term	2 Low	5 High	3	1 Improbable	**-3 Low**
Noise during operation	-1 Negative	1 Project Site	4 Long-term	3 Moderate	5 High	3.25	5 Definite	**-16.25 Medium**	-1 Negative	1 Project Site	4 Long-term	3 Moderate	3 Medium	2.75	3 Medium	**-8.25 Low**
Flood risk during operation	-1 Negative	3 District	4 Long-term	5 Very high	5 High	4.25	4 High	**- 17 High**	-1 Negative	3 District	4 Long-term	4 High	3 Medium	3.5	4 High	**-14 Medium**
Transport of dangerous goods	-1 Negative	2 Municipal	4 Long-term	3 Moderate	5 High	3.5	2 Low	**-7 Low**	-1 Negative	2 Municipal	4 Long-term	3 Moderate	5 High	3.5	1 Improbable	**-3.5 Low**

6.11.9 Vulnerable People

Vulnerable groups refers to Persons who, by virtue of; gender identity, sexual orientation, religion, ethnicity, indigenous status, age, disability, economic disadvantage or social status. They can be affected by project impacts differently than others and may be limited in their ability to claim or take advantage of project benefits. Therefore, CoS (with assistance of relevant Municipalities, when needed), shall apply provisions for assisting disadvantaged or vulnerable individuals that may be more adversely affected by displacement than others and who may be limited in their ability to claim or take advantage of livelihood assistance and related development benefits.

6.11.9.1 Construction and Operation Phase

The sources of main impacts on the vulnerable people in the area are identified as traffic intensity, infectious disease and employment opportunities and land acquisition which were explained in the above sections in detail.

The following vulnerable groups were identified:

Vulnerable Category	Support Methodology
Elderly (aged over 65)	• Travel assistance • Assistance on acknowledging and signing official documents • Access to legal resources with an assistance in case of a need (i.e. transportation) • Assistance to access compensation payments • Assistance to clear and store materials from their land.
PAPs with size of a land less than 3 ha	• Assistance to find alternative land • Temporary livelihood assistance when required, • Job assistance • Replanting assistance
Disabled	• Travel assistance • Assistance to obtain personal documents • Assistance to access compensation payments • Access to legal resources with an assistance in case of a need (i.e. transportation) • Assistance to clear and store materials from their land.
Low income[23]	• Priority for job opportunity during the construction phase of the Project • Access to legal resources with an assistance in case of a need (i.e. transportation) • Assistance to access compensation payments • Travel assistance

[23] According to Statistical Office of Republic of Serbia **poverty threshold** amounts to 15 600 dinars a month on an average for a single person household. For a household with two adults and one child aged below 14, the threshold is 28 080 dinars per a month, while for a four-member household with two adults and two children aged below 14, it amounts to 32 760 dinars.

Vulnerable Category	Support Methodology
Informal structures	• Moving allowances
Women headed households	• equal employment opportunities for women;
Single parents households	• Where physical relocation is necessary, provide temporary housing • Temporary livelihood assistance when required, • Priority for job opportunity • Job assistance
Homeless	• Temporary livelihood assistance when required, • Priority for job opportunity • Job assistance
Seasonal Workers	• Temporary livelihood assistance • Priority for job opportunity • Job assistance

The above-mentioned impacts on vulnerable groups which will possibly arise during the construction phase are expected to be temporary.

The Project will use the Grievance Mechanism for communities and individuals to formally communicate their concerns, complaints and grievances and facilitate resolutions that are mutually acceptable by the parties; the routes of the roads that will be used and the peak hours of the usage of the roads will be shared with village heads and management of the schools. The CoS and the Contractor Department in charge of Community Relations (CR) will be responsible to implement this SEP during pre-construction and construction phases of the Project.

Table 6-106. Impacts on Vulnerable Groups (Construction and Operation Phase)

Impact Description	Impact Source	Sensitive Receptor	Mitigation /Enhancement Measures
Impact on the Vulnerable Groups	Employment opportunities Traffic density Project information Land acquisition Infectious diseases	Vulnerable Groups	<u>Pre-Construction</u> • Travel assistance will be provided to elderly and disabled people during land acquisition when required. • Assistance will be provided to elderly and low educated groups on acknowledging and signing official documents during land acquisition. • During land acquisition Legal assistance will be provided when requested to all groups. • Assistance will be provided to access compensation payments to disabled and elderly groups during land acquisition. • Where physical relocation is necessary, temporary housing will be provided to low income groups, women household heads and elderly groups during land acquisition. <u>Construction</u> • Traffic management plan will be implemented. • Face to face meetings will be held to inform the elderly people on the construction and operation activities. • Priority will be provided for the job opportunity during the construction phase of the Project to landless and low-income groups. • Equal employment opportunities will be provided to women; • Code of conduct will be implemented. • Skill development programs will be implemented.