

Subject:

M60 autótút előkészítéseként a barcsi határmetszés és Dráva-hídi kapcsolat érdekében Tanulmányterv, Környezeti Hatástanulmány és KBHV készítése

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M60 EXPRESSWAY SECTION BETWEEN PÉCS-BARCS

NOTIFICATION OF THE HUNGARIAN REPUBLIC ABOUT THE PLANNED ACTIVITY IN ACCORDANCE WITH THE ESPOO CONVENTION

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1. INTRODUCTION

The M60 expressway received an environmental permit in 2018 for the section between Pécs and Barcs to reconnect the main road No. 6. The further preparation of the 65 km long section is carried out in two stages.

1. The 37 km long section between Pécs and West of Szigetvár, whose authorisation plans are being prepared.
2. The 28 km long section between the West of Szigetvár and Barcs consists of 2 further subsections:
 - The first section is between the junction of the West of Szigetvár and East of Barcs's main road No. 6. junction. This subsection has an environmental permit.
 - The other subsection is an approximately 3 km long subsection between the junction of the East of Barcs' main road No. 6 and the border, this subsection does not have an environmental permit.

On 30 November 2017, the M60 highway from section 31+160 km (Pécs area) to section 95+613 km (connecting road No. 6623 and junction with main road No. 6) was granted an environmental permit under file number PE/KTF/4213-114/2017. The subject "environmental impact assessment" was prepared for the modification of section from stake mark 91+000 km to the country border. The necessity of the modification of the environmental permit is reasoned by the modification of the alignment with permit from stake mark 91+000 km, furthermore its extension towards South from connecting road No. 6623 and the junction of main road No. 6.

The National Infrastructure Development Corporation (NIF Zrt.) received the assignment of the task for the preparation of M60 section Szigetvár - Barcs on the 2nd February 2021 under number KIFE/ 13508/2021-ITM.

The tasks of the defunct NIF Zrt. were taken over as of the 1st January 2023. based on the Government Decree 362/2022. (IX.19.) by the Ministry of Construction and Transport.

Vibrocomp Kft. prepares the environmental impact assessment based on the relevant legislations and the impact estimate documentation due to Natura 2000 involvement on behalf of Pannonway Építő Kft.

The design section ends at the Hungarian-Croatian border at the stake mark defined as the alignment, in the mutual border crossing point in accordance with the valid bilateral agreements.

The subject road section is planned to be built as the continuation of the alignment that gained an environmental permit in 2017 - with its small modification. The construction of the planned road as a high-speed road with a 2x2 line cross-section and 20.00 m roadway width requires obtaining an environmental permit.

The high speed road would ensure a new link with the Croatian border instead of the current border crossing leading within the urban area and enhances the competitiveness of the area.

The current documentation is to present the reviews of the cross-border impacts prepared under the procedure of environmental impact assessment started in accordance with Government Decree 314/2005 (XII. 25.) Point 37. a) of Annex 1 (constructing high-speed road (motorway, expressway) with junction elements) based on the Espoo agreement based on a documentation that was prepared for the modification of the environmental permit for expressway M60 stake mark 31+160 km (Pécs area) to stake mark 95+613 km (connecting road No. 6623. and the junction of main road

No. 6) based on the environmental impact assessment reviewing the section of M60 between stake mark 91+000 km and the country border.

The planned investment is based on Point 1.1.56 of Annex 1 of the Government Decree 345/2012 (XII. 6.) (Implementation of the section between the M60 expressway Szigetvár and Barcs, the national border) on the declaration of public administrative authority cases related to individual transport development projects as matters of special importance is part of a transport infrastructure investment of major importance from a national economic point of view.

The subject of the environmental impact assessment

The subject of the planned investment is the section of expressway M60 stake mark 91+000 km that partially has an environmental permit.

Building the expressway M60 between Szigetvár-Barcs country border as a high-speed road is an activity subject to environmental impact review **based on the Government Decree 314/2005. (XII.25.) Point 37. a) of Annex 1 (constructing high-speed road (motorway, expressway) with junction elements).**

On 30th November 2017, the M60 highway from section 31+160 km (Pécs area) to section 95+613 km (connecting road No. 6623 and the junction with main road No. 6) was granted an environmental permit under file number PE/KTF/4213-114/2017. For the above **the environmental impact assessment subject of the current documentation for the modification of section from stake mark 91+000 km to the country border was prepared.** The necessity of the modification of the permit is reasoned by the modification of the alignment and its extension until the country border.

As the previous design sections did not approach the country border yet, the current Espoo documentation was prepared based on the environmental impact assessment of the current section, with a review of the previous sections not affected by a modification of the permit.

The execution of the subject section linked to a bridge construction over river Drava may be conducted in a separate phase, project. The exact design of the bridge to be built is not yet available in the current procedure, but the documentation could take into account the planned crossing of Drava and the longitudinal section design.

According to Article 10 of the Government Decree 275/2004 (X.8.) on sites of European Community importance for nature conservation, if the project may affect a Natura 2000 site, either alone or in combination with other plans or projects, the impact of the project on the Natura 2000 site must be assessed. The planned development affects the **Western-Drava special bird protection area HUDD10002 and the Mid-Drava special natural conservation area HUDD20056**, therefore Natura 2000 impact estimate documents were made for these areas to conduct the environmental permit procedure.

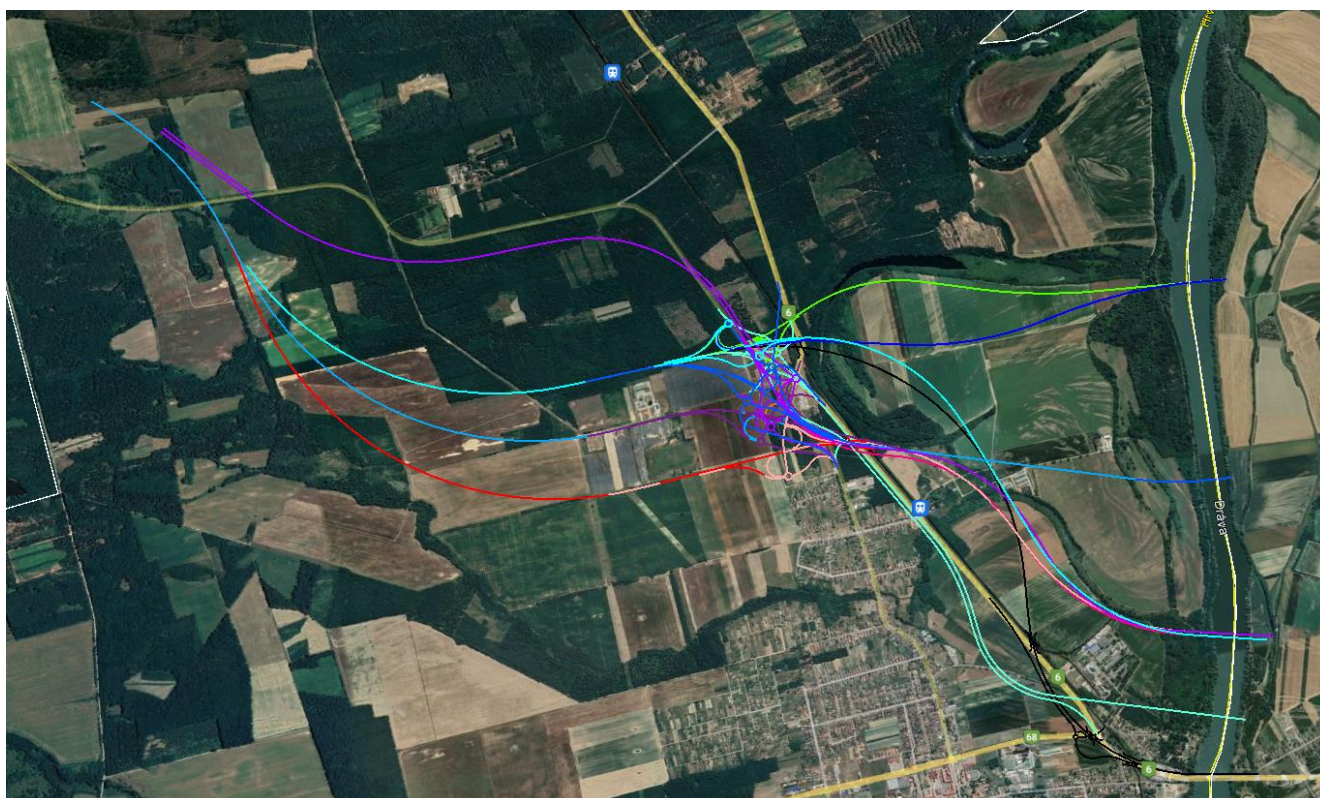
2. PRESENTATION OF DESIGN HISTORY

On 30th November 2017, the M60 highway from section 31+160 km (Pécs area) to section 95+613 km (connecting road No. 6623 and the junction with main road No. 6) was granted an environmental permit under file number PE/KTF/4213-114/2017.

In order to continue the road until the country border as planned, Vibrocomp Ltd. prepared the environmental working part of the pre-decision study for the expressway M60 section between Barcs stake mark 91+000 km and the country border in 2021.

The current high-speed road section was designed in context with the previous alignment alternatives, there is no justification for its independent implementation, however, the alignment marking that affects the administrative area of Barcs has a major impact on the border junction point, thus only the alignment alternatives of this section will be presented in this chapter.

The documentation also examined part of the section already authorised due to the need for alignment correction in the meantime. 13 alignment alternatives were examined in the study, which were partly a combination of each other. The alternatives arrive on four alignment corridors from the area north of railway No. 60, and continue in five directions on the southern areas of the railway.



3.1.1. Alternatives examined in the pre-decision study

Those alignments that meant environmental conflict even according to one inspection criterion, were not suggested for further design. The rest of the alignments considered for further design from all criteria were given no ranking.

As result of the design and consultation processes following the pre-decision study two alternatives were selected for further design at study level, alternatives 3 and 7.



3.1.2. figure In-study alignment alternatives (3 – red, 7 – purple)

The results of the study inspections are summarized in the following table.

3.1.1. table Results of study inspections

<i>Environmental medium/impact factor</i>	<i>Evaluation parameters</i>	<i>Best alternative</i>
Soil	Area occupation based on length	alignment No. 3
Groundwater	Impact on groundwater quality protection area	no difference
	Impact on water base protection area	no difference
Surface water	Number of water crossings	alignment No. 3
	Impact on area regularly flooded by inland water	no difference
	Impact due to flooding	no difference
Air quality	Distance of the nearest residential/protected building	no difference
Wildlife	Impact on protected natural values and areas	alignment No. 7 - with suggested modifications
Landscape	Impact on landscape protected area, use of forests, use of new land, impact on National Ecological Network	alignment No. 7
Built environment	Impact on archaeological sites, monuments	alignment No. 3

Environmental medium/impact factor	Evaluation parameters	Best alternative
Noise	Distance of nearest residential house, necessity of noise mitigation	no difference
Waste	Quantity of waste streams generated during the construction	alignment No. 3

The study plan also investigated the planned junction designs. These do not have cross border impact as they do not influence the design of the main road alignment.

As a result of the consultations following the study plan the environmental impact assessment contains both alignments No. 3 and 7. These alternative alignments provide the connection to the Croatian road network at two different points.

3. PRESENTATION OF THE PLANNED ACTIVITIES

3.1. REASONING THE NEED AND LOCATION OF THE FACILITY

The main purpose of the construction of the high speed road is to reach the country border and to promote the territorial development

Additionally, the following purposes can be set with regard to the construction of expressway M60:

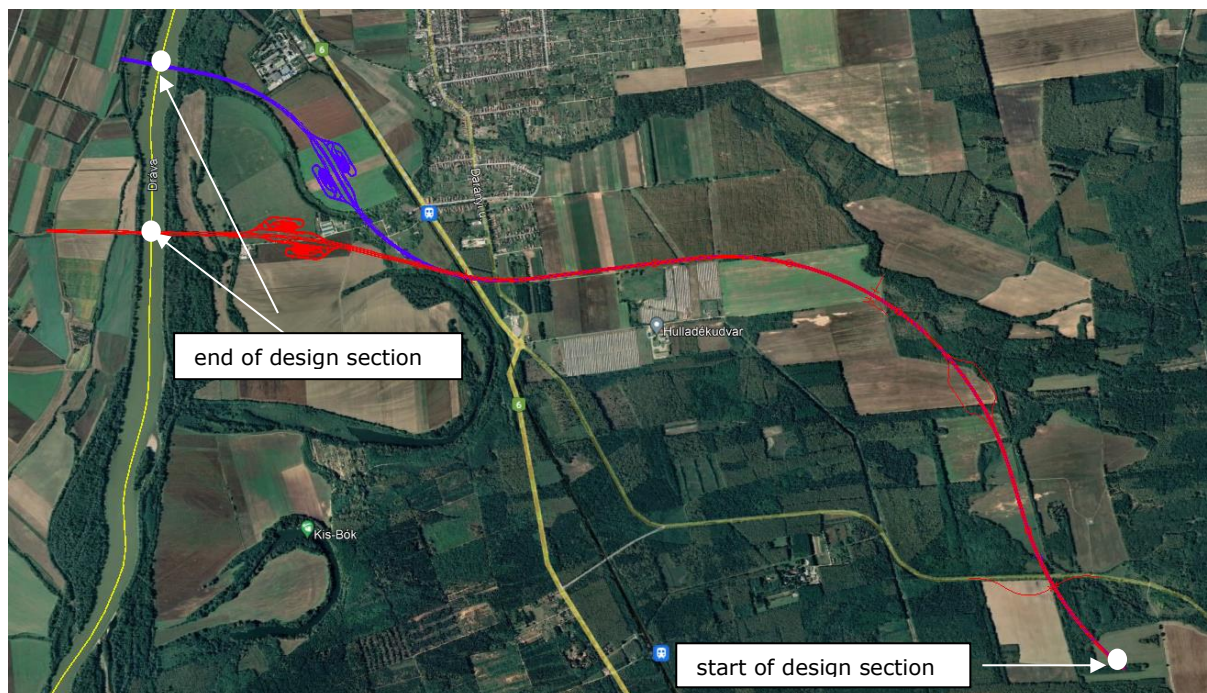
- Direct purpose:
 - Establishment of connection between high speed road M60 and the Croatian road network, thus avoiding the urban area of Barcs by the transit traffic. As a result, the impacts of the environmental damage on the affected residents of the settlement decrease (noise pollution, air pollution), the transport security, the travel comfort increases, the living conditions of the population improves.
 - Further purpose is the catch-up of the region. The transport development improves the availability, thus increases competitiveness. Good accessibility attracts capital and guides the choice of location for businesses. With the establishment of new businesses, the employment and by this the income of the population grows. Due to the implementation of the project the economic competitiveness of the area improves, its role in the transport competition grows which results in the growth of the living conditions of the population.
 - It is important to note that the previous effects would have a similar positive impact not only on the Hungarian side, but partly or entirely - depending on the alignment on the Croatian side - also on the Croatian areas.

3.2. TECHNICAL DETAILS OF THE ACTIVITY

The design intervention affects the administrative area of Barcs. The length of the section to be designed - depending on the alternative is ~ 8.6 or ~ 8.7 km, the road connects to the section with authorisation - with starting point at stake mark 31+160 km - at stake mark 91+000 km.

The alignment alternatives, and sub-versions established during the plan review are the following:

Alternative	Starting stake mark	ending stake mark	Length (m)
No. 3	91+000	99+604	8604.
No. 7	91+000	99+671	8671.



3.2.1. figure: Studied alternatives (3 – red, 7 – purple)

Technical characteristics:

- Character of road: unincorporated area
- Environmental circumstances: A.
- Classification of road: high speed road (expressway)
- Design classification: K.II.A.
- Design velocity: 110 km/h
- Width of roadway: 20.00 m
- Width of lane: 3.50 m
- Width of hard shoulder: 0.50 m
- Width of hard strip: 1.50 m
- Paved width: 8.00 m
- Designed lifespan: 20 years

Alternative No. 3

The alignment starts at the beginning of the section with a slope of gradient 0.50% and runs close to ground level, with a filling height of about 1 m. The road continues in a high filled section between stake marks ~96+650-94+400 km, sometimes approaching a height of 10 m. Afterwards until stake mark ~97+300 km the road runs in a road cut, with a variable cut depth, typically between 5-6 m. After the road cut section the designed longitudinal section continues in embankment and ends by crossing the riverbed of the Drava at the end of the design section.

Crossed facilities:

- stake mark 91+700 km connecting road No. 6623 - underpass
- stake mark 94+007 km crossing dirt road No. F940K - overpass
- stake mark 96+465 km main road No. 6 - underpass
- stake mark 96+770 km railway No. 60 - underpass
- stake mark 97+571 km crossing dirt road No. F975K - underpass
- stake mark 99+344 km River Drava - overpass

Alternative No. 7

The alignment starts at the beginning of the section with a slope of gradient 0.50% and runs close to ground level, with a filling height of about 1 m. The road continues in a high filled section between stake marks ~96+650-94+400 km, sometimes approaching a height of 10 m. Afterwards, until stake mark ~97+600 km the road runs in a road cut, with a variable cut depth, typically between 5-6 m. The road cut section ends by crossing the brook Zimona, afterwards the designed longitudinal section continues in embankment and ends by crossing the riverbed of the Drava at the end of the design section.

Crossed facilities:

- stake mark 91+700 km connecting road No. 6623 - underpass
- stake mark 94+007 km crossing dirt road No. F940K - overpass
- stake mark 96+646 km main road No. 6 - underpass
- stake mark 96+765 km railway No. 60 - underpass
- stake mark 97+610 km crossing brook Zimona - overpass
- stake mark 97+534 km crossing dirt road No. F975K - underpass
- stake mark 99+571 km River Drava - overpass

3.3. ESTIMATED DATE OF CONSTRUCTION AND PUTTING INTO USE

The investment starts according to the previous plans in 2027 and will be completed at the end of 2030, but the enforceability of these dates depends on the availabilities of the domestic funds.

3.4. CONNECTION TO THE CROSS-BORDER HIGH SPEED ROAD SECTION

Based on the consultations with the Investor National Infrastructure Development Corporation and other information on the border section, no agreement was established between the two countries with regard to the border junction point. We do not have designs of the connecting road section on Croatian side.

3.5. MAIN WORK PROCESSES OF THE CONSTRUCTION

The process of the construction is yet unknown; it will be prepared by the Constructor following the availability of the building permit.

4. PRESENTATION OF THE STATE WITHOUT ACTIVITIES

The connection between Pécs (Western bypass road No. 5831) and Barcs country border is currently ensured by class I. main road No. 6, which consists of mostly 2x1 lines. The main road runs crossing several settlements in the East-West direction.

There is no grade separated junction on the section designed to offload main road No. 6, it contains mostly at-grade junctions, with a roundabout in the junction of main road No. 6 and road No. 6623 at Barcs and several traffic light controlled junctions in the urban area of Szigetvár.

The main road No. 6 crosses at Barcs railway No. 60 - between Gyékényes and Pécs -, on the section - beside facilities established for small watercourses - one significant facility can be found, the Drava bridge which ensures the border connection between Hungary and Coratia.

Road No. E661 ensures the connection towards Virovitica (Verőce) on Croatian side.

Without developing high speed road M60 the traffic of main road No. 6 and road No. E661 on the Croatian side would increase significantly in the future, causing a continuously slowing traffic flow and a growth in the travelling time. This would imply in the design area and the Croatian impact area an increase of environmental pollution (noise pollution, decrease of air quality), furthermore due to the increasing traffic - especially the freight traffic - the conditions of the existing roads would deteriorate in a faster rate, causing worse availability and the decline in the competitiveness of the area. Furthermore, the deterioration of the road and the increasing traffic would increase the risk of accidents on the section.

5. IMPACT BEARERS, IMPACT AREA

Protection of soil, groundwater and surface water

Direct impact area

Geological structure

Under the direct impact area with regard to the soil we understand the entire construction area of the alignment, including the rainwater drainage ditches, the mobilisation areas and deposit areas and the quarries to be potentially developed. Within this area the soil may be impacted directly during the construction phase and within this area it may be polluted directly in case of natural disaster.

In the area taken out by the investment and related facilities the geological structure may be impacted by pollution during the operational phase. Pollution may happen directly and indirectly, via transmission of groundwater.

The surrounding cultivation areas are also impacted by the facility both during the establishment and the operational phase. Further cultivation and successful land management must be provided.

Surface water and groundwater

In case of surface waters, the direct impact area is determined by the emission of the road traffic and the accidents, in the storm water drainage ditch designed along the alignment and the associated facilities. This area is subject to the effects of surface contamination from washed in by storm water. The impact area on the surface water can extend up to the storm water drainage ditches along the alignment and associated facilities, and up to approximately 25-50 m on the upstream side of the receiving watercourses and approximately 100 m on the downstream side. The direction of waterflow, its water yield, the type of the pollutant, etc. influences the impact area,

thus different impact areas can arise at each possible load (but no significant change is expected in the current situation as a result of the construction of the alignment).

With regard to the *groundwater* the direct impact area can be defined with difficulty and only via modelling (the influencing impact of soil as transmitter). In case of the cautious design and construction no pollution of the groundwater is expected, therefore the delimitation of the impact area is not necessary.

Indirect impact area

Geological structure, surface water and groundwater

The indirect impact area is merged in case of the *soil and groundwater*. In the case of contamination of the two environmental elements, the indirect impact area is determined by the emissions from the facility and associated road traffic, as well as by the natural disasters. The impact area is difficult to estimate and depends on the quality of the geological medium, the contaminant, its properties and the amount released, as well as the time that has elapsed since the contamination, its extent can vary from some centimetres up to hundreds of meters.

The direct impact area is subject to the effects of surface contamination from washed in by storm water.

The project may change water flow conditions in the vicinity of the watercourse it affects. This is understood as the indirect impact of the project on the surface water.

Protection of air quality

The direct impact area is the area occupied directly during the construction and the area alongside the designed road alignment.

During the operation the impact area of the air pollution may be estimated from the vehicle traffic volume, emission due to its composition and the laws of dispersion.

Wildlife protection

The direct impact area for wildlife protection of the newly constructed expressway M60 is determined in 100 meters. The noise emission caused by traffic, which can be considered the most significant disturbing impact, has its direct disturbing impact on the wildlife within this distance.

Under indirect impact area we can mean the distance from the alignment within which the visual impact of the vehicles and structures are perceived by the wildlife (impact bearers). This distance depends on the topography, the vegetation conditions (means smaller distance in case of sections bounded by wooded strips and alleys, and bigger in case of open areas), furthermore whether the alignment is on "ground level" or lifted, on an embankment. Drawing an average from the aforementioned circumstances the indirect impact area for wildlife protection can be determined in 250 meters from the alignment.

Protection of built environment

Regarding the built environment, we can talk about direct impacts if artefacts and archaeological finds are expected to be affected alongside the alignment by the area occupation due to the development of the public road.

From a townscape protection point of view, the indirect impact area is the area from which the planned investment will appear as a noticeable change from the settlements - this distance cannot be precisely defined, it varies point by point.

Landscape conservation

Regarding landscape conservation the direct impact area is the same as the area affected by the direct use of the designed alignment (width of roadway, junction roads, road fill and cut) as well as the territorial use of the associated facilities and designed structures, furthermore those areas that are affected by change in branch of cultivation due to the establishment and those landscape sections where in the view or foreground landscape (300 meters measured from the point of view) a clearly visible qualitative change is to be expected (e.g. obscuring or revealing the view).

Regarding landscape conservation, the direct impact area is the area from which the proposed alignment, including its associated facilities, is visible. The visibility depends on the altitude, the slope inclinations and lengths, the nature of hill-valley formations and the horizontal and vertical alignment of the road. The visibility, transparency and view from the road and onto the road are determined by the surface cover, territory use method and rate of infrastructures besides the geomorphological features. It must be taken into account in case of the vertical alignment that in case of for example a gully of 1-3 meters high formed on a typically lowland area is visible in the landscape from a distance up to 500 meters. On those sections, where the gully is below 1-meter-high, or the road leads in a cut, the visibility area is smaller, where it exceeds, this latter is bigger.

Protection against noise and vibration

From the point of view of noise and vibration protection, the part of the area affected by the planned installation (the study area) is considered to be the direct impact area of the connected roads where the vehicular traffic associated with the planned installation will cause an additional noise impact or a change in noise exposure.

Noise levels in the direct impact area were investigated in the following situations:

- current state (2022)
- designed long-term condition (2037)
- unchanged long-term condition (2037)

Direct impact area

The noise measurement was conducted according to the regulations of sections 5, 6 and 7 of the Government Decree 284/2007 (X.29.) on certain rules for protection against environmental noise and vibration prepared for the facilities to be protected within the impact area.

The design area is illustrated in Figure H0.

The current noise situation of the study area was collected from measurements at the main road No. 6, connecting road No. 6623, railway line No. 60, and the surrounding side roads, as well as by the sounds of nature.

To determine the delimitation of the impact area, background noise levels need to be examined in the vicinity of the design area. The measurement site was defined in such a way that it characterizes background noise levels of the areas alongside the alignment.

The following table contains the results of background noise levels obtained from the measurement

Measuring place	locality	L_{Aeq} daylight (dB)	L_{Aeq} night (dB)
MP3	Barcs Belcsapuszta 3. PN. 2802/1	42.6.	34.9.
MP2	Barcs, Ady Endre street 35. PN. 2425/2	40.7.	33.9.

It can be concluded from the results of the background noise measurements that on the assumed impact area of the ambient noise source, without the operation of the designed (examined) noise source, noise levels were found to be at least 10 dB lower than the limit value.

In accordance with the above, the direct impact area was defined according to Section 6 (1) a) of Government Decree 284/2007 (X. 29.) in a noise level limit of 45 dB for the night-time. The impact area determined by the physical delimitation was defined based on the criterion of the noise source giving the most delimitation.

The direct impact area is described by the data of the so-called "distance of impact area" in the table **Hiba! A hivatkozási forrás nem található.** below.

SETTLEMENT / ROAD SECTION (STAKE MARK)	Future (2037)		
	Noise load limit value/distance of impact area (m)	Noise exposure limit/delimitation of the impact area at night (dB)	Speed (km/h) car/truck
3./7. Alignment alternative			
A.a. - (end of design section - main road No. 6.) OUTSKIRTS	26/120	55/45	110/70
A.a. - (end of design section - main road No. 6.) URBAN AREA (ONLY IN CASE OF THE ALIGNMENT ALTERNATIVE NR. 7.)	18/85	55/45	50/50
A.a. - (main road No. 6 - road No. 6623)	30/140	55/45	110/70
A.a. - (road No. 6623 - beginning of the design section)	55/256	55/45	110/70
Junction A			
Darányi street (from the left to junction on the left side)	14/65	55/45	40/40
Darányi street (between the two junctions)	13/57	55/45	40/40
Darányi street (from the junction on the right side to main road No. 6)	10/45	55/45	40/40
LEFT+UNDER - (main road No. 6 - roundabout)	2,7/13	55/45	40/40
LEFT+OUTSIDE - (roundabout- M60)	4,3/20	55/45	40/40

SETTLEMENT / ROAD SECTION (STAKE MARK)	Future (2037)		
	Noise load limit value/distance of impact area (m)	Noise exposure limit/delimitation of the impact area at night (dB)	Speed (km/h) car/truck
3./7. Alignment alternative			
LEFT+INSIDE – (roundabout- M60)	3,1/14,5	55/45	40/40
RIGHT+OUTSIDE – (M60 - roundabout)	4,5/20	55/45	40/40
RIGHT+INSIDE – (roundabout - M60)	3,6/17	55/45	40/40
Junction C			
Darányi street (from the left to junction on the left side)	14/65	55/45	40/40
Darányi street (between the two junctions)	13/57	55/45	40/40
Darányi street (from the junction on the right side to main road No. 6)	10/45	55/45	40/40
LEFT+UNDER – (main road No. 6 – roundabout)	2,7/13	55/45	40/40
LEFT+MIDDLE (between the two roundabouts)	5,5/25	55/45	40/40
LEFT+INSIDE+UPSIDE (roundabout - M60)	2,5/12	55/45	40/40
RIGHT+DOWN – (M60 – roundabout)	3,6/17	55/45	40/40
RIGHT+UPSIDE (roundabout - M60)	5.	55/45	40/40

The environment of the direct impact area and its instalments to be protected are illustrated in figures ZH1-ZH4 in the Noise Mitigation Annex.

Impact area of connected roads

From the point of view of the protection against noise and vibration, the part of the area affected by the planned installation (the study area) is considered to be the impact area of the connected roads where the vehicular traffic associated with the planned installation will cause an additional noise impact or a change in noise exposure. Such road section in this case is the connecting road No. 6623, main road No. 6, and Darányi road.

Impact area of the construction transport

Regarding the noise mitigation impact area of the construction transport, the following statements can be given in accordance with Section 7 of Gov. Decree 284/2007 and chapter Impacts of construction in the test documentation:

The noise protection area of the construction transport extends to the material extraction and asphalt mixing plants. The transport can affect the design area in most cases on the alignment of the road under construction on the connection road No. 6623, main road No. 6 and Darányi road.

In the vicinity of access roads in subject, transport and delivery activities are not expected to cause an incremental noise change of more than 3 dB, and therefore no transport-related impact area can be impounded.

The transportation route must be chosen by the contractor to minimise the road and the other environmental damages.

Waste management

From a waste management point of view, the direct impact area is the construction site, where waste is likely to be generated during construction activities.

From a waste management point of view, the indirect impact area of the project can be linked to the area that will receive the waste from the construction and the waste generated during the operation period, and the transport routes.

6. INSPECTION OF THE CROSS-BORDER IMPACTS OF THE DESIGNED EXPRESSWAY BY ENVIRONMENTAL ELEMENTS

6.1. PROTECTION OF SOIL, GROUNDWATER AND SURFACE WATER

Existing conditions

Soil conditions of the design area

Based on the AGROTOPO GIS, Agrotopographic Database, created by the Institute of Soil Science and Agrochemistry of the Hungarian Academy of Sciences (MTA ATK Talajtani és Agrokémiai Kutatóintézet), the planned variations affect alluvial meadow soils along the border to Croatia.

The alluvial meadow soils are good water-absorbing and water-conducting, good water-storage, and good water-holding soils.

Agricultural area can be found on the area along the border, but plough fields with excellent production conditions are not affected.

The planning area does not affect hydrocarbon and natural gas deposits, nor the area of solid mineral raw material research in the vicinity of the border crossing point.

Groundwater conditions:

According to the map database of the Mining and Geological Survey of Hungary (MBFSZ), the groundwater table is typically 2-5 m deep around the country border.

Sensibility inspection of the inspected area

According to the Annex of the Decree 27/2004 (XII.25.) KvVM on the classification of settlements located in sensitive areas with respect to the conditions of groundwater, Barcs, where the planning area is located, is classified as a sensitive groundwater quality zone.

According to Annex 2.1 of the revised Watershed Management Plan of Hungary of 2015 and the map database of the General Directorate of Water Management (OFV), the planned activity does not affect designated protection zone of drinking water bases.

The complete area affected by the investment is qualified as nitrate-sensitive area.

Surface water conditions:

Based on the reconsidered National Watershed Management Plan (VGT3) the design area is part of the 3-2 Rinya River design sub-unit. Both alignment alternatives cross the eastern branch of the brook Zimona, the alignment alternative No. 7 crosses the brook Zimona one additional time, and both alignment alternatives cross the river Drava at the country border.

Based on the information of the South-Transdanubian Department of Water Affairs the alignment alternative No. 3 touches irrigated area in the vicinity of the current sewage treatment plant and

the pig farm. Ensuring the irrigation of the affected areas need to be planned in further design phases.

Based on the Spatial Plan of Somogy County, the design area does not lie in the zone of the regularly flooded area.

Based on the Spatial Plan of Somogy County, the design area lies along river Drava on the design area.

Presentation of planned water drainage:

According to the designs the storm water runoff from the roadway and the surrounding fields is collected mainly in earth bedded bar ditches, or insoles with paved design on both sides and is led into crossing drainage channels. Where needed, cut-in drains are installed.

Before leading the insoles into the receivers, the placement of silt-catching and inhibitor structures is recommended. The spread of contamination resulting from a possible accident can be limited by using the inhibitors.

Impacts during construction

Impacts during construction on the geological environment and groundwater

Soil in the vicinity of the designed alignment alternatives in the country border area is of mainly agricultural use.

From ground protection aspect the negative impacts during construction period consist of area occupation, the quantity of groundworks, the movement of the working machines and transport vehicles, depositing the generated waste and the usage of material gaining sites.

No such impacts possibly spreading to the other side of the border as a result of the implementation of the investment on the Hungarian side are expected.

The condition of the surface waters and groundwater is set primarily by the method and effectiveness of the water drainage of the investment both in the construction and operation phase. The groundwater condition is influenced furthermore by the wells, water bases found in the area, and the involvement of areas of high and extremely high sensitivity.

There are no groundwater quality protection areas of high sensitivity, water base or its protected area in the vicinity of the country border that would be affected by the planned investment.

Contamination of the soil and groundwater is unlikely during the works, except for natural disasters. In the event of a natural disaster, the contractor and, during operation, the operator must have an appropriate emergency plan.

From soil and water protection aspects the development on the Hungarian side does not have negative impacts on the neighbouring Croatian area.

Impacts during construction on the surface waters

During construction, impacts on the quality of watercourses and other surface waters can be significant. The examined alignments cross brook Zimona, its Easter branch and river Drava. During construction, adverse impacts may result from the maintenance and repair of machinery in the vicinity of watercourses and water channels. Therefore, care must be taken not to contaminate watercourses during construction of facilities and road structures.

The facility will have an impact on evapotranspiration and surface water infiltration as elements of the water balance. The paved surfaces increase surface evaporation, but reduce surface infiltration, so the balance remains in equilibrium. The installations will have no discernible impact on the water balance.

The alignment along the embankment may change the water catchment areas, may dissect them. This impact, however, may be neutralised by careful design of culverts, bridges and drainage ditches.

Impacts during operation

Impacts during operation on the geological environment and groundwater

The road is drained typically with earth bedded bar ditches.

During the operation, soil and groundwater contamination can occur mainly due to road traffic emissions, pollutants bound on dust settling from the air, and dust particles contaminated with oil along the road. These include abrasive materials, lubricants, petrol and diesel droplets, winter salting fluids and settling dust. In normal operation, these materials are carried off the road with the rainfall and are collected by the roadside embankment and ditch.

The pollutants to be expected, CH derivatives and heavy metals, infiltrate in small amounts into the soil, but based on literature and research results the pollutants are bound in the top 30 cm of the soil, and those washed into the ditch by storm water are bound to soil particles and are deposited in form of thin layer of silt. The infiltrating pollutants are broken down by a biofilm living in the root zone of the vegetation. The removal of CH derivatives of the unpaved earth bedded bar ditch is 70-80% effective on 500 m long in case of low precipitation. This means that their quantity is negligible by reaching the receiver. Contamination concentrations are further reduced by the reservoir drainage system.

The concentration of air pollutants that precipitate diffusely as a result of traffic is diluted and no longer has a significant effect in the areas next to the road.

During operation, the de-icing pavements in winter can also contaminate soil and groundwater through infiltration. The risk of this is significantly reduced by the fact that this adverse effect occurs for a relatively short time, typically within 10-15 m of the road axis, in decreasing concentrations away from the roadside.

The implementation of the planned project will not alter the existing conditions of water flow and the relationship between surface water and groundwater.

In addition to compliance with protective measures (e.g. the use of modern, environmentally friendly machinery and technological equipment), the implementation of the road development will not have any negative impact on groundwater.

The operation of the facilities on the Hungarian side will not influence the soil and groundwater conditions on the Croatian side.

An impact on the Croatian side during operation of the Hungarian road section may occur in case of a natural disaster. In such cases, immediate action must be taken to prevent further spread of the pollutant, followed by its removal through remediation. The competent environmental authority must be notified if needed, with the Serbian side being notified.

Impacts during the operation on the surface waters

The impacts influencing the condition of the surface waters in the operation phase are set primarily by the method and effectiveness of the water drainage of the new road section. Drainage design should consider the geology of the area and the availability of utilities.

During operation, contamination of surface watercourses may occur mainly indirectly. This can enter watercourses via groundwater, through metal from wear and tear on vehicle parts, rubber

and drip fuels, other oils and coolants, dust from road dusting and de-icing material sprayed on the pavement. The adverse effects of salting may be short-lived and small in the receptors due to the diluting effect of water produced during snowmelt.

Direct contamination can affect watercourses in the event of a natural disaster, which can be localised and eliminated primarily through remediation. The extent of the impact depends on the water flow in the watercourse, the condition of the riverbed and, last but not least, the fall factor of the riverbed. Of the contaminations of natural disasters that may occur during the operation of the road, hydrocarbon derivatives may have the most adverse impact on the water quality of watercourses and, last but not least, on its wildlife. However, the likelihood of natural disasters occurring and happening in the vicinity of watercourses is small.

According to the plans the storm water runoff from the roadway and the surrounding fields is collected mainly in earth bedded bar ditches on both sides. Studies prove that the earth bedded bar ditches can absorb about 60% of any pollution generated by water washing off road surface and infiltrating, through its pollutant retention effect. Contamination concentrations are further reduced by the reservoir drainage system.

The operation of the road is not expected to have any polluting effects on the groundwater through infiltration and, through this, on the surface water, either in terms of quantity or quality.

Environmental actions, monitoring

Measures recommended for the protection of geological environment and groundwater

After completion of the works, the revegetation of the land temporarily occupied by temporary mobilisation areas, containers, mobile mixing plant, shall be carried out.

During construction, only machinery and transport equipment in perfect condition may be used to avoid contamination, and regular technical inspections are mandatory. Technological discipline during construction can prevent the release of contaminants into the environment.

In the event of a possible natural disaster, immediate action must be taken to prevent the spread of contamination. Spilled contaminants must be collected in a closed storage container together with the infiltrated medium (soil) and treated in accordance with the provisions of Decree No. 225/2015 (VIII. 7.) of the Government.

Only mineral raw materials (stone, gravel, sand, clay or any mixture of these in any proportion) extracted under a valid and legally binding official permit may be used in the construction. The selection of the material gaining sites was made by choosing those being closer to the construction sites in order to reduce transport distances.

The road construction causes soil compaction, the extent of which can be minimised by reducing the extent of the work area, avoiding wider trampling than necessary, and by minimising the time spent by machinery and by work organisation. Once the construction is complete, the soil should be recultivated by soil loosening, followed by the planting of appropriate native plants.

Establishment of monitoring system on the Croatian side to detect expected contamination from the investment on the Hungarian side is not necessary.

Measures recommended for the protection of surface waters

Technological equipment and facilities must be operated and work processes organised in such a way that the activity does not cause water contamination. In general, the use of modern, environmentally friendly machinery and technological equipment is recommended.

In order to avoid extraordinary, unexpected pollution and contamination, compliance with technological standards and the technical condition of the equipment must be monitored closely and continuously.

During construction, cleaning the machinery must be done carefully to prevent contaminated water from entering the watercourse. No activity with pollutant spill (maintenance of machinery, refuelling, etc.) or machine storage facilities may be established in the vicinity of watercourses affected by the alignment. Vehicle cleaning may only be carried out in dedicated car washes.

Free water flow must be ensured at the construction of watercourse crossings and culverts, after completing the work the affected watercourse beds must be restored.

Storm water of the ditches next to structures (culvert/bridge) can be connected into the channel through an estuarine structure combined with a sand trap to protect the receiver (VGT3).

During the construction period, municipal wastewater generated at the construction sites must be collected in closed tanks and disposed of in a wastewater treatment plant with pre-treatment.

Establishment of monitoring system on the Croatian side to detect expected contamination from the investment on the Hungarian side is not necessary.

6.2. PROTECTION OF AIR QUALITY

Current conditions

The baseline air pollution of the design area is favourable, and the impact of distant roadside air pollution on the Hungarian side is not detectable on the Croatian side.

Impacts of construction

Dust generation in the vicinity of the construction is mainly expected from road and transport vehicle traffic, loading of transported materials, construction technology, excavation and landscaping. The impacts of air pollution during construction are only temporary, not expected outside the construction area and only within 100 meters of the working sites.

The construction of the road network on the Hungarian side does not pose an air protection risk on the immediate vicinity of the Croatian side.

Impacts of operation

Based on the emission values obtained from the calculations of the 2037 reference status for the Hungarian side, it can be concluded that, compared to the current conditions, an improvement in the concentrations of all the components studied is typically expected in the long-term reference status. The daily and annual limits currently set are met for all three distances.

Based on the emission values obtained from the calculations of the 2037 status it can be concluded that the daily and annual limits for direct and indirect impact areas are met with great certainty for all three distances.

The investments on the Hungarian side do not have impact on the Croatian side.

Environmental actions, monitoring

The planned investment will not cause significant changes in air pollution in the immediate vicinity or cause air pollution above the limit values on the direct impact area, therefore the investment is feasible without air quality protection measures.

Establishment of air monitoring system on the Croatian side to detect expected change in air pollution from the investment on the Hungarian side is not necessary.

6.3. WILDLIFE PROTECTION

Current conditions

The design area has a large overlap with the nationally protected Danube-Drava National Park, which is largely covered by natural habitats, which provides habitat for several protected (and highly protected) animal and plant species.

The protected plants are represented by Rough Horsetail (*Equisetum hyemale*), Narrow Buckler Fern (*Dryopteris carthusiana*), the Snowdrop (*Galanthus nivalis*), the Hard Shield Fern (*Polystichum aculeatum*) and the Mullein pink (*Lychnis coronaria*).

But in addition to the flora, the fauna is also extremely rich.

Both alignment alternatives affect the habitat of highly protected mammal species (European wildcat, pond bat, western barbastelle) and the feeding area of protected bird species (little egret, black-crowned night heron, white stork, European bee-eater, European honey buzzard) (wildcat, pond bat, western barbastelle). In addition, the brook Zimona, which is the habitat of the highly protected Eurasian otter, is affected by the alignment No. 7 at stake mark 99+200, while the Hungarian pike (*Zingel zingel*) near the bridge of alignment alternative No. 3 and the Ukrainian brook lamprey near the bridge of alignment No. 7 were identified as strictly protected species. We also detected the presence of the thick shelled river mussel of Natura 2000 in the vicinity of the bridge of the alignment alternative No. 3. Along the alignments, 20 protected arthropods were detected, mainly from protected habitats along the Drava and from Natura 2000 habitats.

From the aspect of subject investment, we can talk about cross-border impact as the designed expressway leads to Croatia above river Drava, the affected Natura 2000 sites form a united block with Srednji tok Drave Natura 2000 site, which is also a Special Protection Area for birds/SPA (HR1000015) and Special Area for Conservation /SAC (HR5000015).

Impacts of construction

During construction the following designated habitats may suffer area loss: 6440 Alluvial meadows of river valleys of the Cnidion dubii; 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

The habitat of thousands of stems of protected plants in the direct impact area of the works will be lost, so it will be necessary to relocate these plants.

The de-vegetation of the expropriation area and the foundation earthworks will result in the removal of the original vegetation, and the temporary deposit of the excavated soil - in addition to the loss of habitat for the protected species - also has as temporary impact.

In addition to habitat loss, disturbance (e.g. noise and dust) associated with the works has a significant impact. This disturbance is considered to be significant because the works will all take place along habitats that have not been regularly used (except for the agricultural areas concerned), in the vicinity of protected and strictly protected habitats. The presence of wintering, feeding species may also be temporarily reduced in the immediate vicinity of work areas.

Within 100-250 m of the central axis, there is an indirect effect. For some species being sensitive to disturbance (e.g. European Honey Buzzard, European wild cat), the latter effects can be considered indirect even at this distance, as individuals of these species are unlikely to return to

their original habitat and will seek new habitat in areas far away from the planned alignment of motorway. In the case of direct effects, habitat disturbance can be considered as habitat loss, which is a definite negative effect on wildlife.

In the direct vicinity of the bridge piers of the alignment No. 7, there are several microhabitats with soft sediments, in which young individuals (larvae) of the strictly protected Ukrainian brook lamprey develop for years, so a possible removal of soft sediments may cause their loss. It is recommended that these sections are electrofished immediately prior to this type of intervention (up to 2 weeks prior to soft sediment removal). Relocation of larvae to a lower section of the Drava is justified in such cases.

Impacts of operation

The impact on wildlife will be significantly higher than the foregoing, due to the fact that the areas affected are not used for this purpose. Both noise and air pollution affect organisms in adjacent habitats.

Once the expressway is built, there is a risk of being hit by a car, and the possibility of hitting protected and strictly protected species. The possibility of hitting protected animals is a potential source of danger, against which limited precautions can be taken. The area most at risk in this aspect is the Drava and the surrounding forests and grasslands close to nature. There are a number of known sections along the entire section covered by the planning, where this would be a priority if implemented, and where massive collisions could be expected in the future. In these sections, we propose to install anti-collision devices. Running over may occur at any time along the entire section affected by the construction on an occasional basis, affecting a small number of protected creatures.

Within the nationally protected area of the Danube-Drava National Park and within a distance of 100 m from it (between stake mark 99+200 km and the national border in the case of alternative No. 7 and between stake mark 97+600 km and the national border in the case of alternative No. 3, between stake marks 96+600 km and 97+300 km for the joint alignment), as a natural habitat for protected insects and butterflies close to nature, the new outdoor lighting to be designed in the areas of alignments, bypasses, junctions and turn-offs may have an impact on the activity of protected insects and butterflies in the protected area.

Environmental actions, monitoring

It is recommended that vegetation clearance, tree felling and excavation works are carried out before or after the breeding of protected birds and protected organisms nesting on the ground, to prevent possible mortality. Proposed construction period for vegetation clearance and foundation earthworks: 1st of October - 1st of March. In addition, tree felling between 1st of October and 1st of March should be carried out with the involvement of the management of the national park or a nature protection expert for older trees, which may have overwintering animals such as small mammals or bats in their burrows or under their bark, and older trees should be assessed for this before felling. In the event that tree felling would be required between 1st of March and 1st of October, the contractor's wildlife protection specialist and a representative of the National Park Directorate shall jointly visit the areas where the trees would be felled and check for nesting or other protected species in the trees to be felled before the felling.

Within the nationally protected area of the Danube-Drava National Park and within a distance of 100 m from it (between stake mark 99+200 km and the national border in the case of alternative No. 7 and between stake mark 97+600 km and the national border in the case of alternative No. 3, between stake marks 96+600 km and 97+300 km for the joint alignment), as a natural habitat for protected insects and butterflies close to nature, the new outdoor lighting to be designed in the areas of alignments, bypasses, junctions and turn-offs may have an impact on the activity of

protected insects and butterflies in the protected area. Light sources can be an ecological trap for light-flying insects, and these creatures are more likely to be hit by a car. In order to avoid this, and to reduce the impact, the new outdoor lighting must meet the following criteria: it must be designed to be low-lighting for insects and bats; it must not emit light towards the Danube-Drava National Park, and luminaires must be fitted with shading booms in that direction; the minimum possible lighting (minimum level set by law) must be provided.

Nationally protected, classified as habitats of Natura 2000 and ex lege protected fen habitats along the alignment (between stake mark 99+200 km and the country border on both sides for alternative No. 7, and between stake mark 97+800 km and the country border on both sides in the case of alternative No. 3, and between stake marks 96+800-97+200 km on the eastern side in the case of the joint alignment), outside the expropriation boundary, establishing of depots and material gaining sites is forbidden.

In the areas affected by the works in the sections indicated in the previous paragraph, the disturbed surfaces shall be rehabilitated after the completion of the works to prevent negative impacts caused by invading plant species. Native, landscape-specific plant species approved by the Danube-Drava NPI may be used in these sections, and invasive plants may not be planted.

The habitat of thousands of stems of protected plants in the direct impact area of the works will be lost, so it will be necessary to relocate these plants before the works start. In the year of construction, in the light of the final construction plans, it is necessary to reassess the locations of the protected plants, and in the light of this, and after prior consultation with the Directorate of the Danube-Drava National Park, the necessary translocation of the protected plants should be planned, plan for the translocation of protected plants must be drawn up, and implementation is only possible with official authorisation.

If the eastern alignment alternative No. 3 is selected, designed and then constructed, we consider that due to the impact on tens of thousands of protected plants and hundreds of protected animals, it is worth considering a structure of support pillars over the most critical habitats, which would mean an extended use of the bridge piers of the Drava crossing to protect a significant part of the protected natural values and to maintain the future permeability of the nationally protected and Natura 2000 site. An alignment running on support pillars instead of an embankment should be considered for the eastern section No. 3 between stake mark 98+350 km and the country border. It is advisable to route the expressway above the existing vegetation with trees along the Drava, so that protected and highly protected species can pass underneath without hindrance. At stake mark 98+350 km, there is a natural escarpment, which is the natural boundary of the Drava floodplain, and this is marked as the starting point of the alignment over the structure of the support pillars.

For the bridge of the expressway over the Drava and, in the case of alignment No. 3, the preceding alignment leading on a structure of support pillars over a nationally protected area, the nature of the river and its airspace as a migratory flyway and feeding area (and as a major ecological corridor) and the protection of the strictly protected natural values that have been shown to use the area (e.g. pond bat, western barbastelle, little egret, black-crowned night-heron, European bee-eater) justify the construction of a bird protection wall on both sides of the expressway. In the case of alternative No. 7, it is proposed to construct it between stake mark 99+100 km and the country border (above the Drava and its floodplain), while in the case of alternative No. 3, it is proposed to construct it between stake mark 97+700 km and the country border.

For the bridge of the expressway over the Drava and, in the case of alignment No. 3, the preceding alignment leading on a structure of support pillars over a nationally protected area, the nature of the river and its airspace as a migratory flyway and feeding area (and as a major ecological corridor) and the protection of the highly protected natural values that have been shown to use the area

(e.g. pond bat, western barbastelle, little egret, black-crowned night-heron) justify the construction of a bird protection wall on both sides of the expressway. In the case of alternative No. 7, it is proposed to construct it between stake mark 99+100 km and the country border (above the Drava and its floodplain), while in the case of alternative No. 3, it is proposed to construct it between stake mark 97+700 km and the country border.

For each of the above sections, a bird protection wall at least as high as the height of the lorries is considered necessary on both sides of the expressway. Its most important function, in addition to protecting wildlife from noise and light pollution, will be to prevent the running over of protected and highly protected species that breed, migrate and feed in the airspace of the Drava and its floodplain by diverting them away from traffic.

In the case of the alignment No. 7, in order to reduce the impact on wildlife, it would have been more favourable to shift the alignment to further west than it is now in the course of reaching the bank of the Drava (between the stake mark 99+100 km and the country border). During the design process, it was recommended multiple times to shift the former alignment further west than it is now, but according to the information from the construction designer this was possible only to the current extent, taking into consideration the geometry of the road and the extent of the impact on surrounding properties. It could be avoided during construction by shifting west, to affect the brook Zimona bed, which is the habitat of the protected dragonfly, protected beaver and highly protected otter, furthermore the aged willows and poplar group standing on the border of the protected area on the bank of Drava (these trees are habitats to protected species) would not interfere with the implementation of the project. Alignment no. 7 shifted west would reach the protected area on the bank of Drava in a homogeneous acacia, thus significantly smaller number of protected plants would be impacted during the alignment design.

For the implementation of the western alternative No. 7, an ecological gateway at the crossing of the brook Zimona between stake marks 97+550-97+600 km is considered appropriate. The bridging of the watercourse should be managed in such a way that the watercourse should not be subject to any negative impacts, but should maintain its current function as a habitat and ecological corridor to protect the protected species that use the habitat. A "bridge" should be built across the watercourse, not touching it.

If a new road bridge is built, its part near to the shore should be designed in a bat-friendly way, allowing bats (pond bats, common noctule, soprano pipistrelle) to settle, thus compensating for the long-term loss of shelter (disappearing forest areas!). The design of suitable settlement sites for bats should be agreed with the Directorate of the Danube-Drava National Park during the planning stage, and the construction should be carried out on the basis of their recommendations.

In the direct vicinity of the bridge piers of the alignment No. 7, there are several microhabitats with soft sediments, in which young individuals (larvae) of the highly protected Ukrainian brook lamprey develop for years, so a possible removal of soft sediments may cause their loss. It is recommended that these sections are electrofished immediately prior to this type of intervention (up to 2 weeks prior to soft sediment removal). Relocation of larvae to a lower section of the Drava is justified in such cases.

In the vicinity of semi-natural habitat of protected insects and butterflies, the outdoor lamps established in the area of detours, intersections and junctions, off-ramps may have impact on the lives of protected insects and butterflies living on the protected area. Light sources can be an ecological trap for light-flying insects, and these creatures are more likely to be hit by a car. In order to avoid this, and to reduce the impact, the new outdoor lighting must meet the following criteria: no light shall be emitted towards the Danube-Drava National Park, and luminaires must be fitted with shading booms in that direction; the minimum possible lighting (minimum level set by law) must be provided.

We propose nature protection monitoring. It is recommended that the effectiveness of the mitigation measures proposed in this document and in the Natura 2000 impact assessment for the species at risk is monitored for at least 3 years after the construction of the road and after the start of operation. This monitoring study should include an assessment of the effectiveness of the proposed ecological gateways and the effectiveness of the proposed bird protection walls. If any structures are not having the desired impact, then in the future, rebuilding of the structures or ways to eliminate the negative impacts should be proposed and implemented. The methodology for the monitoring studies should be developed in the light of future requirements of the nature protection authority and the monitoring plan should be agreed with the authority before the monitoring studies are carried out.

6.4. PROTECTION OF BUILT ENVIRONMENT

Current conditions

The alignment on the design section runs mostly in unincorporated area, therefore, it does not have significant impact on the built environment. The historical monuments of the affected settlements are situated mostly in their urban area, which are avoided by the designed high speed road.

A Preliminary Archaeological Documentation (ERD-I) was prepared for the measured area. Out of the 2 archaeological sites identified in the total study area, 1 site is affected by the area of the complex control station of the alignment alternative No. 7. In addition, an area of archaeological interest has been designated - "RÉ 1" between the stake marks 98+850 - 99+000 km of alternative No. 7. The proposed heritage protection assessment for the site *Barcs - Belcsa-puszta (19593)* and the designated area of archaeological interest is a geophysical survey and test excavation.

Impacts of construction and operation

Construction will have a significant impact on the built environment in the case if it is directly adjacent to residential areas or if transport routes pass through residential areas.

Urban areas are affected by the alignment alternative No. 3 in the vicinity of the stake mark 97+800 km, and by the alignment alternative No. 7 between the stake marks 97+510-97+610 km and 98+625-98+685 km. The interchange variants (A and C) all affect the urban area of Barcs.

The values of the built environment are not threatened by the planned investment, but 1 archaeological site and the new area of archaeological interest are impacted on the Hungarian side of the border.

6.5. LANDSCAPE CONSERVATION

Current conditions

The planned investment is located within the Transdanubian Hills in the Inner Somogy and within this the Eastern-Inner-Somogy and Central Drava-valley sub-regions.

The designed bypass road accesses the town of Barcs, both urban area and unincorporated area, furthermore it crosses the country border to areas of Terezino Polje, Katinka and Veliko Polje (they belong administratively to Lukač).

The surface of **sub-region Eastern-Inner Somogy** is similar to the Western-Inner Somogy alluvial conglomerate, the difference is more in other ecological factors. The quicksand shapes are also typical here: the longitudinal gullies, wind grooves, residual ridges, gullies and wind holes. The quicksand surfaces are crossed by rather dense, but flat valleys facing N and S. Relative relief varies between 3-20 m/km² over most area but rises above 20 m/km² on the eastern and western

margins. The valley density is around the watershed and except for the SW edge (<4 km/km²) it is 4-8 km/km². (Dövényi, 2010).

The **Central-Drava Valley** sub-region is a 1-4 km wide alluvial plateau, extending from Órtilos to Drávatamási for 60-70 km, mostly divided into low- and high-altitude plateaus, Drava moraines and abandoned pools in the NNW-SSE valley on the left bank of the highly meandering river. It is flanked from NE on a short section by the loose rims of the East Zala Hills, then from SE of Csurgó by the 10-20 m high alluvial rim of wind-blown alluvial conglomerate of Western- and Eastern-Inner Somogy. This latter high bank reaches in some sections (e.g., between Berzence and Bélavár) even the relative altitude of 30 m, at the same time this is the maximum relative relief value of the sub-region; there are only a few meter differences in level within the plain. The rugged course of this Somogy high bank is very characteristic, curved in top view. All of these meander curves are textbook example of the lateral erosion of the mid-section river in the late Pleistocene – Holocene.

We can witness a young river-wash under Barcs. On the floodplain of the uncontrolled river, the widening valley sections are characterised by a mass of backwaters. There are low meander terraces in the bend of the watercourses of oxbow lakes, waterlogged flat troughs, Neoholocene levels. Some of the abandoned Drava pools have now permanent water flow (Zsdála, Dombo-canal, lower flow of Rinya). (Dövényi, 2010).

The terrain is the floodplain of Drava and its tributaries, previously forestall land. According to its potential vegetation the land was covered with floodplain forests and swamps. Agricultural, forestry, municipal and water management land uses are all present in the planning area today. The alignment accesses non-irrigated fields, pasture, areas with significant natural formation primarily under agricultural use and industrial areas.

The alignment alternatives under study do not affect/approach any specific landscape value.

Impacts of construction

Change in landscape usage methods can basically occur on the expropriated areas: the loss of the previous branches of cultivation, areas close to nature, specific landscape values and development of traffic area instead, in case such areas are affected by the development.

The impact on the specific landscape values is dual: negative if the construction of the roadway terminates the landscape value, positive if it contributes to its emergence and presentation. The planned development does not affect specific landscape value.

The road development slightly transforms the former network of the area. Primarily the road network is transformed but the changes have effect on the ecological connections and the water network as well. The change in the accessibility of the cut areas the farming intensity may decrease on some areas, while on other areas the more intensive farming may increase, and previously abandoned areas may be recultivated.

The most significant change regarding the subject project is the complete disappearance of existing vegetation in the road width along the designed new alignment; partial or complete loss of agricultural areas and forestry affected by the directly occupied area of the alignment; construction of new road and structures; eradication of existing dirt roads and construction of new ones.

The current biologically active surfaces on the design area are typically plough land, grassland, forest patches and orchards, parts or edges of which will be fragmented or will disappear due to the area occupation band of the planned expressway, therefore a slight reduction can be assumed in the biological activity value in the area.

The view of the earthworks, structures, other facilities to be built during the planned investment may appear as different, dominant element in the landscape.

Road sections in cuts and the water drainage ditches are barely, while the bridges and overpasses are distinctive structures, influencing noticeably the appearance and view of the landscape. Depending on its height the road on embankment may or may not be visible on the flat land.

At the beginning of the section, the planned intervention with a longitudinal slope of 0.50% and runs close to the ground level, with an embankment height of around 1 m. The roadway continues on a high embankment, approaching a height of 10 m in some places. After that, the roadway runs in a road cut, the depth of the road cut varies typically between 5-6 m. After the road cut section the designed longitudinal section continues in embankment and ends by crossing the riverbed of the Drava at the end of the design section.

Impacts of operation

The operation has an impact on the land as a complex unit, through the change of the various environmental elements. One of the most significant impacts along the roadway is expected to be the increase of potential of the areas excluding from cultivation between the bypass and the urban areas. These areas can be more valuable from the aspects of good traffic connections, establishment of production and service activities.

During the regular maintenance works the structure gauges, gullies and side ditches are cleaned by mechanical and chemical means from the plants that may have taken root there. In case of inappropriate use, the chemical residues may spread to the surrounding areas. Winter salting may have a negative impact on the health of roadside vegetation.

Environmental actions

Along the entire length of the planned route, the ruined surfaces will have to be rehabilitated. Furthermore, attention should be paid in these areas for 3-5 years after the landscaping and planting following the construction to the aftercare of the rehabilitated area and the vegetation that appears (mainly the manual eradication of emerging weeds and invasion species).

From landscape conservation aspect, particular attention is to be paid on the rehabilitation of the damaged surfaces left behind after the construction of the designed road and linked facilities in the areas of ecological value and highly protected areas (stake marks 96+750–97+100, 97+750–98+900 km), and the sections within the landscape conservation area (stake marks 91+000–94+100, 96+850–97+200, 98+100–98+900).

Within the expropriated areas planting work can be carried out after the rehabilitation of the abandoned dirt roads and ditches. The rehabilitation should be carried out outside of the road and ditches, within the expropriation boundary; furthermore, on other work sites outside the expropriation areas used during the construction – ensuring the pre-construction land use and ecological conditions. The rehabilitated area shall be returned to the cultivation branch of the adjacent land.

Rehabilitation of damaged surfaces left behind due to the construction of facilities linked to the other activities of the investment (e.g., bed corrections, other structures linked to water management, replacement of utilities) must be ensured in a similar way to the sections above.

Gullies created by fills/cuts of more than 5 m in height deserve special attention, their integration into the landscape can be best promoted by appropriate planting, which also contributes to the containment of the gully.

The mobilisation routes must be designed to avoid the permanent and irreversible damage of the natural and landscape values, and the sensitive areas from landscape aspect (urban areas, areas valuable from ecological aspect, landscape conservation area). It is advisable to also avoid the habitats that can be identified along the existing ecological network, forest and grassland areas.

Their precise design and selection for the construction phase will be possible with more detailed and more accurate technical data and technologies.

Replacement of the roadside woody vegetation that will be cut down due to the road construction must be taken ensured, providing optical guidance to help also the safe traffic of the road users. During further design the detailed planting design should take into account the requirements of the Technical Specification for Roads (TSR) in the permit and construction plans.

Grassing is recommended in the gullies below 5 m in height, and woody vegetation (bush or alley) planting is recommended on the gullies on embankments-cuts above 5 m in grade difference, at grade separated junctions and intersections, and in the immediate vicinity of the other roadside facilities.

The plants used for planting must be resistant to the impacts of the traffic, suitable for the soil conditions and, preferably, native species.

In addition, from an agricultural point of view, host plants of pests and pathogens that pose a risk to the crop (e.g. plum, wild pear) should be avoided in particular for the species to be used.

6.6. PROTECTION AGAINST NOISE AND VIBRATION

Current conditions

There is currently no public road at the proposed crossing.

Impacts of construction

As there are no residential areas to be protected from noise levels in the immediate vicinity of the planned new expressway link on the Croatian side of the border, the construction of the road links on the Hungarian side does not pose a noise risk to the immediate vicinity of the Croatian side.

To access the construction sites on the Hungarian side, transport traffic will use the existing Hungarian road network or the alignment of the line to be built (whichever alternative will be constructed). On the access roads, the small additional traffic generated by construction transport compared to existing traffic will result in virtually no change in noise levels along the construction-transport routes during the construction period.

Impacts of construction

Change of condition in case of non-implementation

The reference condition is the noise situation in 2037 that would occur if the planned road improvements (on the Hungarian side) are not implemented.

In the reference condition, no change in noise levels is expected along the planned new alignments, where no other noise sources are present, as these are traffic-free areas.

Change of condition in case of implementation

As there are no residential areas to be protected from noise levels in the immediate vicinity of the planned new expressway link on the Croatian side of the border, the construction of the road links on the Hungarian side does not pose any noise risk to the immediate vicinity.

The alignment alternatives on the Hungarian side do not result in noise levels above the limit values at any point, so no noise protection measures are justified.

The impact of the new road noise exposure on the Hungarian side will not be detectable in the nearest residential areas on the Croatian side (as it is located several hundred meters away).

6.7. WASTE MANAGEMENT

Current conditions

There is currently no public road at the proposed crossing, so no waste is expected to be generated.

Impacts of construction

The construction on the Hungarian side will have no impact on waste management on the Croatian side, as the waste generated during the construction will be managed within the territory of Hungary.

Impacts of operation

The competent public road operator (Somogy County Directorate of the Magyar Közút Nonprofit Zrt.) will take care of the collection and transportation of the municipal waste generated on the roads to be constructed.

The waste generated is treated within the territory of Hungary, so there is no impact on the Croatian side.

Waste management proposals

During the construction and demolition works, efforts should be made to minimise the amount of waste generated, and to use and recycle the construction and demolition materials generated within the construction works.

The non-hazardous, hazardous and municipal waste generated will be handed over to a licensed recipient in Hungary for treatment. As regards recipients, preference is given to waste treatment through recovery, taking into account the principles of economy and proximity when choosing the location of the landfill site. Waste must be transported on designated material transport routes.

Temporary containers for waste and hazardous waste generated during construction works, as well as fuel containers for earth-moving machinery, must be placed on a surface with a layer of insulation or already paved, using a containment vessel, in such a way as to avoid contamination of soil and groundwater.

The collection and disposal of different types of municipal waste shall be the responsibility of the Contractor during construction and of the competent Road Manager during operation. The treatment of waste should aim at recovery, respecting the principles of economy and proximity.

The harvested soil shall be handled in accordance with the provisions of the Soil Conservation Plan.

On completion of construction, the construction site, including any temporary areas, must be cleared of waste, construction debris and surplus construction materials.

During construction, the classification and handling and placement of the extracted material, as well as the detailed rules for handling the generated waste, must be ensured within the scope of the Construction Plan.

The requirements for the operating period are proposed to be laid down in the management plans.

The procedures and reporting obligations laid down in the relevant legislation must be complied with during both the construction and the operation periods.

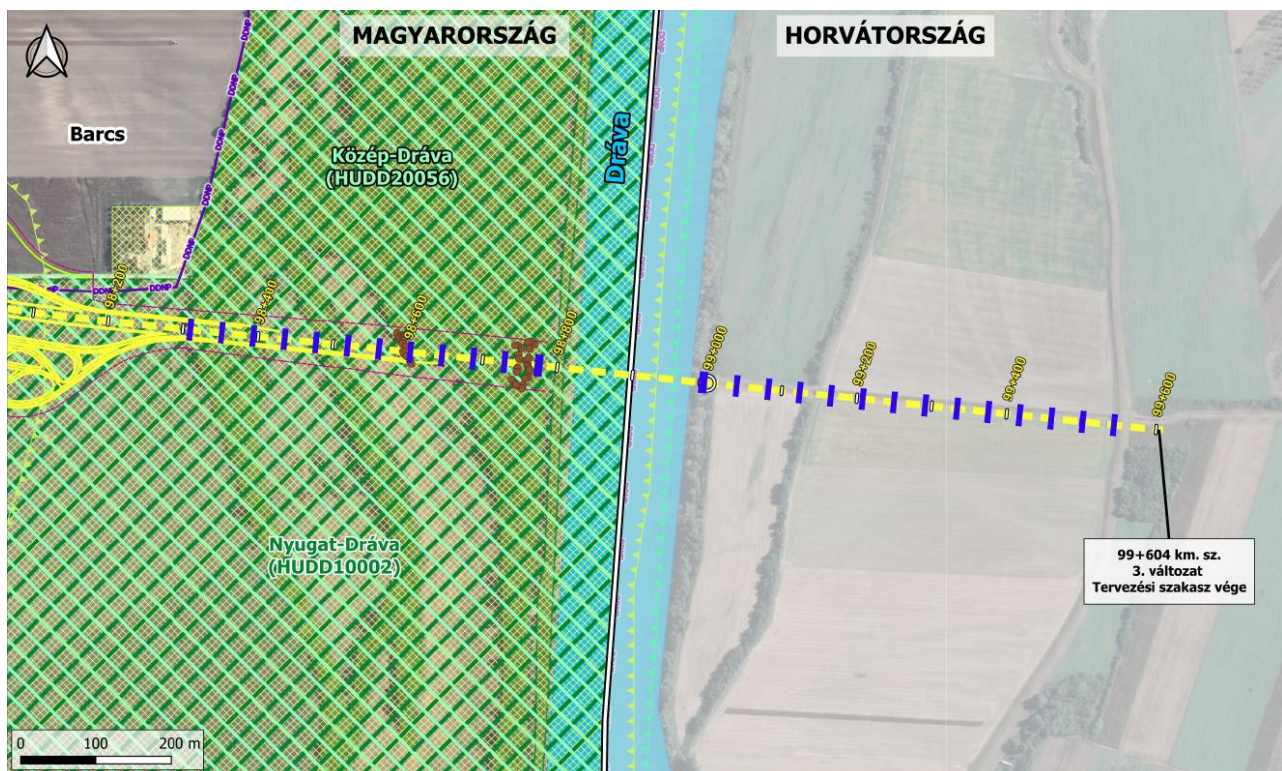
Inert waste generated during construction (construction debris containing no hazardous materials) must be placed in the nearest municipal landfill for inert waste, which must be licensed in Hungary.

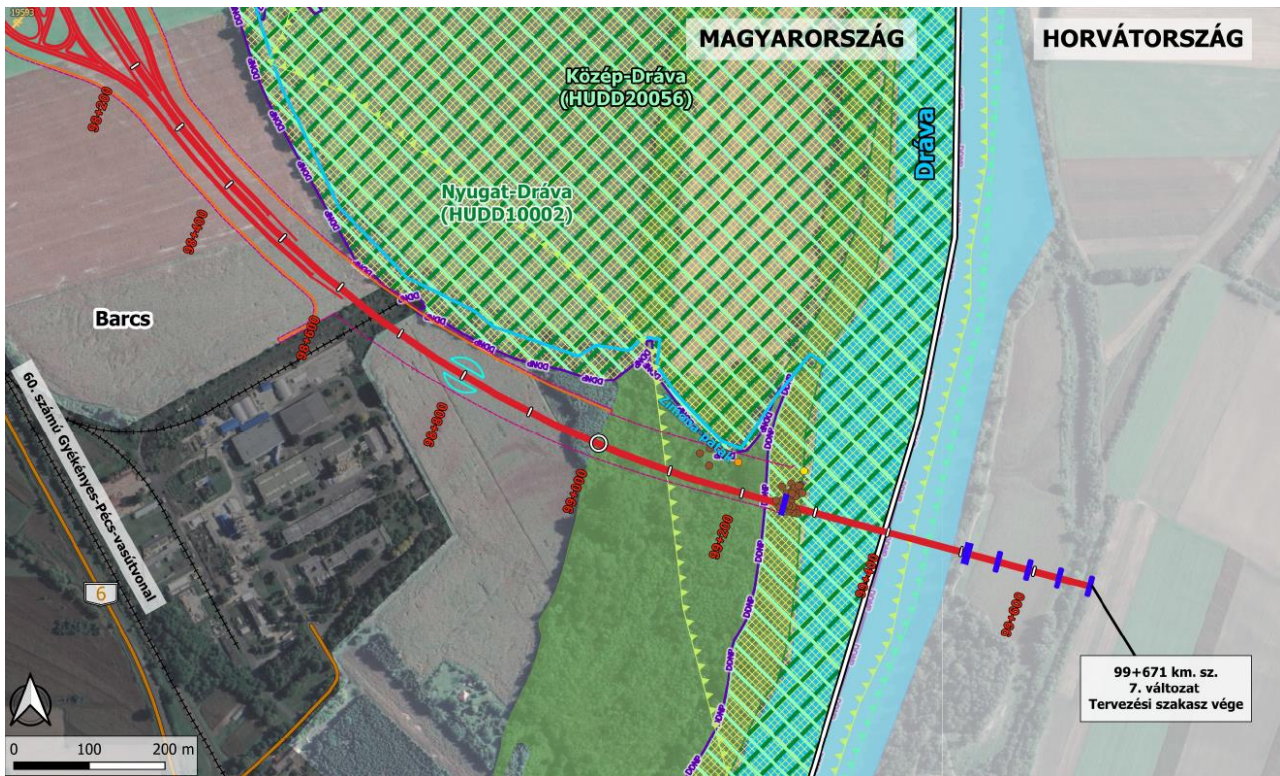
Municipal solid waste (municipal waste) generated during construction and operation must be collected in a closed waste container and regularly transported to a municipal landfill. The collection

and disposal of different types of municipal waste shall be the responsibility of the Contractor during construction and of the Road Manager during operation. Landfilling should preferably take place in solid waste landfills located in Hungary, operated by county or municipal authorities.

Hazardous waste generated during construction and operation must be collected separately from each other in a non-polluting way, as required by law, and must be recorded, reported and placed in a landfill for hazardous waste. The transport and treatment of hazardous waste may only be carried out by an authorised company, which is licenced in Hungary.

7. POTENTIAL ENVIRONMENTAL IMPACTS OF TRANSMISSION OF THE ALIGNMENT ON THE CROATIAN SIDE





Jelmagyarázat

<p>Alaptérkép</p> <ul style="list-style-type: none"> Országhatár Jelentősebb úthálózat Vasúthálózat Vízfolyás Állóvíz Belterület Üzentervezett erdőterület Régészeti lelőhelyek Műszaki adatok 3. nyomvonalváltozat 	<ul style="list-style-type: none"> 7. nyomvonalváltozat Tervezett leállóöblöl Tervezett kisajátítási vonal 3. változatot keresztező földutak 7. változatot keresztező földutak Tervezett Dráva pillérek Természetvédelem Biotikai adatok Hóvirág (<i>Galanthus nivalis</i>) 	<ul style="list-style-type: none"> Karéjos vesepáfrány (<i>Polystichum aculeatum</i>) Nőszófü faj (<i>Epipactis sp.</i>) Duna-Dráva NP UNESCO bioszféra rezervátum Natura 2000 SPA Natura 2000 SAC Országos Ökológiai Hálózat - magterület Tájvédelem Tájképvédelmi terület
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Figure 7.1: Transmission on the Croatian side and border crossing

7.1. PROTECTION OF SOIL, GROUNDWATER AND SURFACE WATER

Impacts of construction

The direct impact area in relation to the soil is understood to be the alignment and the entire construction area.

In areas on the Croatian side affected by the transmission line, there are areas under agricultural cultivation.

There are no groundwater resources to be protected in the border area.

No soil contamination is expected in the work areas, except for possible natural disasters. Soil contamination can occur during construction in the event of accidents or breakdowns of machinery,

equipment or transport vehicles involved in the works, when fuel or hydraulic oil is spilled on the ground.

According to the Croatian Land Protection Act ("Sl. glasnik RS", br. 112/2015), as a result of an accidental event causing soil contamination, the authority, through the persons in charge of the official control, shall order immediate measures to: the immediate investigate the polluting, hazardous and harmful substances in the soil; prohibit activities that may cause further soil contamination; order measures to stop the contamination and prevent damage or direct damage to the environment.

The person who has caused the pollution or damage to the land (hereinafter referred to as the "responsible person") shall provide the necessary funds to carry out the immediate measures. The person responsible for the damage must pay the costs of the immediate measures to the budget of the local government unit, the autonomous province or the Republic.

The responsible person shall carry out the remediation, i.e. the reclamation of the land, under the conditions provided for in this Act, except in the case of land on which mineral resources are exploited, in which case the special provisions on mining shall apply.

No direct impact area can be identified for groundwater. No significant changes in groundwater flow patterns or infiltration are predicted as a result of the proposed project.

The indirect impact area is merged in case of the soil and groundwater. Indirect contamination of soils and water, e.g. groundwater from a natural disaster or surface water pollution, is difficult to estimate and its extent depends on the quality of the geological medium, the pollutant, its properties and the amount released, and the time elapsed since the pollution. This can only occur as a result of construction. In the event of a potential natural disaster, the immediate application of remedial measures will prevent the spread of contamination.

According to the Croatian Water Protection Act (Reg. No. 71-06-01/1-19-2), it is prohibited to discharge hazardous substances and other pollutants into waters and to dispose of them in places where there is a possibility of pollution of waters and the aquatic environment, except under the conditions specified in this Act or in regulations adopted pursuant to this or special legislation. If there is a risk of pollution or water contamination due to an unforeseen event, the polluter shall immediately inform the central state administration responsible for protection and rescue.

Impacts of operation

During operation, contamination of soil and groundwater may be caused mainly by the leaching of air pollutants. The air pollutants will be precipitated diffusely, the concentration will be diluted and therefore will not have a significant impact in the areas affected by the transmission of the road on the Croatian side.

The condition of the surface waters is set primarily by the method and effectiveness of the water drainage of the investment both in the construction and operation phase.

The operation of the transmitted road section will not influence the soil, surface water and groundwater conditions on the Croatian side.

7.2. PROTECTION OF AIR QUALITY

Current conditions

The nearest settlements in Croatia are located in <https://hu.wikipedia.org/wiki/Horv%C3%A1torsz%C3%A1g> Vrivena-Dravamente County. The closest settlements to the border crossing points of the studied alignments are ~ 500 m away.

Thanks to favourable climatic (N-S winds) and dispersion conditions, the overall air quality in Verőce-Drávamente County is acceptable.

Impacts of construction

Dust generation in the vicinity of the construction is mainly expected from transport vehicle traffic, loading of transported materials, construction technology, excavation and landscaping works. The impact of air pollution from construction is temporary and not expected outside the construction area.

Impacts of operation

From the perspective of current air quality, no significant increase in air pollution is expected in the direct impact area in the case of an implementation of the connected roads to the planned alignment on the Hungarian and Croatian sides. The project, if implemented, will reduce the current concentrations of air pollutants in the indirect impact area.

The calculated emissions of air pollutants are not expected to exceed the permitted limits even with the existing background air pollution.

The nearest settlement to the border crossing point is ~ 500 m from the crossing point, which, according to the investigations, is outside the impact area (106 m).

Overall, it can be concluded that the proposed development does not pose a conflict on the Croatian side in terms of air protection.

7.3. WILDLIFE PROTECTION

From the aspect of subject investment, we can talk about cross-border impact as the designed expressway leads to Croatia above river Drava, the affected Natura sites form a united block with Srednji tok Drave Natura 2000 site, which is also a Special Protection Area for birds/SPA (HR1000015) and Special Area for Conservation /SAC (HR5000015).

Due to the Natura 2000 implications, the transmission is expected to create a conflict of conservation interests on the Croatian side that will need to be clarified.

Impacts of construction

The extension of the planned expressway on the Croatian territory will have a much smaller impact than the Hungarian section, as the Croatian side of the Drava is dominated by agricultural habitats (mainly arable land, which is also part of the Natura 2000 network).

The semi-natural habitats are represented by the floodplain groves (91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*), which form a strip with a width of only a few individuals of tree in the planning area.

During the construction of the bridge, the works in the Drava riverbed will affect the species of fish of Community importance (*Aspius aspius*, *Cobitis elongatoides*, *Eudontomyzon vladykovi*, *Gymnocephalus baloni*, *Gymnocephalus schraetzer*, *Misgurnus fossilis*, *Pelecus cultratus*, *Rhodeus amarus*, *Romanogobio vladykovi*, *Rutilus virgo*, *Sabanejewia balcanica*, *Umbra krameri*, *Zingel*

nerd, Zingel zingel) and species associated with the coastal strip (*Lutra lutra*, *Castor fiber*) may also be affected, probably only temporarily.

Impacts of operation

The distracting effect of lighting (especially for nocturnal insects) and the risk of hitting (mammals, reptiles, amphibians, birds) may also be a real risk to be managed in the Croatian section.

Increased traffic in surrounding habitats makes it impossible for bird species associated with undisturbed areas to nest.

7.4. PROTECTION OF BUILT ENVIRONMENT

Impacts of construction and operation

The construction of the planned expressway will not compromise the values of the built environment. During operation, the planned expressway may have an impact on the built environment due to increased environmental pressures on sections of the expressway where it approaches urban areas, where built heritage of the settlements is concentrated. These impacts are not expected to be significant.

The results of road construction and archaeological excavations on the Hungarian side have no impact on the Croatian side.

7.5. PROTECTION OF LANDSCAPE

Impacts of construction

The construction of the proposed project will affect the existing landscape structure. Changes will include the loss of affected agricultural land and planned forest areas, and the partial disappearance of vegetation along the alignment. Road development can also accelerate development in other areas. From the Croatian side, the new expressway can be seen mainly from Terezino Polje and the villages of Katinka and Veliko Polje (which administratively belong to the region of Lukač).

The planned expressway ends in a forest or water management area within Hungary and Barcs. On the Croatian side, directly along the border, there are areas used for water management and agriculture, according to <https://www.google.com/maps>.

The closest valuable natural site to the proposed project on the Croatian side is the Natura 2000 site Srednji tok Drave, which is both a bird protection/SPA (HR1000015) and a nature conservation site of high priority/SAC (HR5000015).

In terms of landscape conservation, the impact of the Hungarian road section on the Croatian side is not expected to be significant due to the topography of the area concerned, its distance from natural values and the settlement environment.

Impacts of operation

In Croatia, the operation of the public road can have negative impacts on the surrounding agricultural areas due to the environmental effects of traffic (e.g. air pollutants deposited on the soil).

7.6. PROTECTION AGAINST NOISE AND VIBRATION

Noise impact of construction

As there are no residential areas to be protected from noise load in the immediate vicinity of the planned new expressway link on the Croatian side of the border, the construction of the road links on the Hungarian side does not pose any noise risk to the immediate vicinity of the Croatian side for either alternatives.

No use of the Croatian road network is planned for construction traffic on the Hungarian side.

Noise impact of operation

In the reference condition, no change in noise levels is expected along the planned new alignments, where no other noise sources are present, as these are traffic-free areas.

As there are no residential areas to be protected from noise load in the immediate vicinity of the planned new expressway link on the Croatian side of the border, the construction of the road links on the Hungarian side does not pose any noise risk to the immediate vicinity.

7.7. WASTE MANAGEMENT

Waste is expected to be generated during both road construction and operation.

Non-hazardous, hazardous and municipal waste generated during the construction activities will be handed over by the Contractor to a licensed recipient in Croatia, which will be stipulated in the construction contracts.

Small quantities of hazardous and non-hazardous waste are expected to be generated in the road section during repair and maintenance activities after construction and putting into use, solid waste from the maintenance of roadside green areas and from natural disasters and possible careless transport of goods.

Requirements for the operating period will be included in the management plans. The procedures and reporting obligations laid down in the relevant legislation must be complied with during both the construction and the operation periods.

The waste generated must be transported to designated waste treatment facilities in Croatia. The transporter must provide a contract for the rendering of the waste unsuitable.

Overall, it can be concluded that the planned investment should not have any negative impacts on the Croatian side, neither during construction nor during operation, by complying with the relevant legislation and responsible waste management practices.

8. SUMMARY

Below is a summary by sector of our findings regarding the impact of the investment on the Croatian side.

Protection of soil, groundwater and surface water

The negative impacts of the construction period are related to the land occupation of the project, the scale of the earth works, and the involvement of areas of high and extremely high sensitivity and water bodies.

Agricultural area can be found on the area along the border, but plough fields with excellent production conditions are not affected. The groundwater table is typically 2-5 m deep around the country border. There are no water bodies or protection zones of them in the vicinity of the state border that would be affected by the proposed project.

The condition of the surface waters is set primarily by the method and effectiveness of the water drainage of the investment both in the construction and operation phase.

There are no affected watercourses in the vicinity of the state border that could be negatively affected by the project. Impact on the river Drava is not significant

Contamination of the soil and groundwater is unlikely during the works, except for natural disasters. The operation of the facilities on the Hungarian side will not influence the soil and groundwater conditions on the Croatian side.

From soil and water protection aspects the development on the Hungarian side does not have negative impacts on the neighbouring Croatian area.

Protection of air quality

From an air protection point of view, it can be concluded that air pollution from the planned project will depend on the volume, composition and speed of traffic during operation. Overall, from an air protection point of view, the impacts of the Hungarian side of the project are positive and there are no negative impacts on the Croatian side.

The impact of the new sources of air pollution from the road on the Hungarian side will not be detected on the Croatian side. The air protection impact area of the construction or operation does not affect the territory of Croatia.

Wildlife protection

Overall, it can be concluded that the transmission on the Croatian side will cause a nature conservation conflict. The construction and post-construction traffic will pose a small but significant threat to natural assets.

The expected impacts will be local in nature, with the Hungarian side of the road having a potential cross-border impact, mainly due to lighting and new traffic.

Landscape conservation

From a landscape conservation point of view, agricultural and forestry land uses predominate in the landscape areas of the region concerned. Forestry is considered to be a dominant land use in the landscape character of the project area. Taking into account the topography and land use ratios, the entire section typically avoids large, contiguous forest blocks and forest block groups, but in some sections it passes through planned forest areas.

Overall, from a landscape conservation point of view, landscape disturbance and changes to the existing landscape structure may cause minor adverse effects, as the new alignment and associated facilities will cause a change in the proportion of built landscape features.

In terms of landscape conservation, the impact of the Hungarian road section on the Croatian side is not expected to be significant due to the topography of the area concerned, its distance from natural values and the settlement environment.

Protection of built environment

According to the available information, the proposed changes do not affect any monuments, but they do affect archaeological sites and areas of archaeological interest. The results of road construction and archaeological excavations on the Hungarian side have no impact on the Croatian side.

Protection against noise and vibration

From a noise and vibration protection point of view, it can be concluded that the construction of the new expressway on the Hungarian side - the effects of construction and operation - will not pose a noise risk to the direct environment on the Croatian side. The impact of the new road noise sources on the Hungarian side will not be detectable on the Croatian side.

The impact area of noise protection of the construction or operation does not affect any features or areas to be protected from noise on the Croatian side.

Waste management

The project will have no impact on the Croatian side from the waste management point of view, by minimising the waste generated during construction and operation, by proper collection and disposal.

Budapest, 20. January 2023