

Subject:

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

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VIBROCOMP

M60 EXPRESSWAY SECTION BETWEEN PÉCS- BARCS

ENVIRONMENTAL IMPACT ASSESSMENT FOR AN AMENDMENT TO AN ENVIRONMENTAL PERMIT

CLEAR SUMMARY

SECTION BETWEEN STAKE MARK 91+000 KM AND THE COUNTRY BORDER

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KEY FINDINGS

1. The Environmental Impact Assessment (EIA) for the purpose of this Environmental Permit Modification is *the „The expressway M60 section between stake mark 91+000 km and the country border“*.
2. The construction of the expressway M60 between Szigetvár-Barcs and the country border, as a high speed road, is subject to an environmental impact assessment **pursuant to the point 37 a) of Annex 1 to Government Decree No. 314/2005 (XII.25) (construction of a highspeed road (motorway, expressway) including junction elements)**.
3. On 30 November 2017, the expressway M60 from stake mark 31+160 km (area of Pécs) to stake mark 95+613 km (up to the junction of the connecting road No. 6623 and the main road No. 6) was granted an environmental permit under file number PE/KTF/4213-114/2017. This **environmental impact assessment has been prepared for the modification of the section of the stake mark 91+000 km to the country border**. The need to amend the permit is justified by the need to modify or extend the alignment.
4. The planned investment is on the basis of the **Point 1.1.56 of Annex 1 of the Government Decree 345/2012 (XII. 6.)** (Implementation of the section between Szigetvár and Barcs, and the country border of the expressway M60) **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**.
5. The **purpose** of this documentation is to assess the environmental impacts of the proposed investment and to make recommendations to minimise adverse impacts where possible. This will help ensure **compliance with the current environmental legislation** and obtain the **necessary environmental consents for building permits and construction**.
6. The content of this documentation has been compiled in accordance with the environmental legislation in force, taking into account the **Act LIII of 1995 on the General Rules for the Protection of the Environment, Act LIII of 1996 on the Protection of Nature** and **Government Decree 314/2005 (XII.25.)** on the Environmental Impact Assessment and the Unified Environmental Use Authorisation Procedure.
7. According to Article 10 of the Government Decree 275/2004 (X.8.) on sites of European Community importance for nature protection, if the project may affect a Natura 2000 area, either alone or in combination with other plans or projects, the impact of the project on the Natura 2000 area must be assessed. The proposed development will affect the HUDD10002 Western Drava Bird Protection Area of high priority and the HUDD20056 Central Drava Nature Protection Area of high priority, therefore a **Natura 2000 Impact Assessment** has been prepared for this area.
8. On the basis of the studies and assessments carried out, it has been concluded that the **implementation and operation** of the proposed project is likely to result in adverse impacts, primarily from a **wildlife protection perspective**, but that development is not expected to cause significant conflicts if the proposed measures are complied with. In order to prevent and mitigate the impacts estimated for the period of implementation of the planned investment and during operation and maintenance, **measures/precautions have been formulated** for each environmental element in the chapter on the environmental element concerned. **After implementation and operation, the expected impact on each environmental element**

is acceptable and not significant.

9. By fulfilling **the proposed measures**, the nature and extent of the anticipated environmental effects of the proposed investment, as identified in advance during the implementation and operation of the project, **are considered acceptable under the applicable environmental regulations and legislation. *The implementation of the facility will meet the relevant environmental standards.***

1. INTRODUCTION

The section between Pécs and Barcs between the reconnection of the main road No. 6 of the expressway M60 was granted an environmental permit in 2018. The further preparation of the 65 km long section is divided into two phases.

1. The 37 km long section between Pécs and Szigetvár in the west, for which the permit plans are already being prepared.
2. The 28 km long section between Szigetvár west and Barcs includes 2 further sub-sections:
 - One from the Szigetvár west junction to the Barcs east junction of the main road No. 6. This sub-section has an environmental permit.
 - The other sub-section is the approximately 3 km long sub-section between the east junction of Barcs of the main road No. 6 and the country border, which does not have an environmental permit.

On 30 November 2017, the expressway M60 from stake mark 31+160 km (Pécs area) to stake mark 95+613 km (up to the junction of the connecting road No. 6623 and the main road No. 6) was granted an environmental permit under file number PE/KTF/4213-114/2017. This environmental impact assessment has been prepared for the modification of the above permit of the section between stake mark 91+000 km to the country border. The need for the amendment of the environmental permit is justified by the modification of the authorised alignment from the stake mark 91+000 km, and its south extension from the connecting road No. 6623 and the junction with the main road No. 6.

On 02 February 2021, the National Infrastructure Development Corporation (NIF Zrt.) received the order for the preparation of the section between Szigetvár - Barcs and the country border of the M60 under the number KIFEF/ 13508/2021-ITM.

On the basis of Government Decree 362/2022 (IX.19.), the Ministry of Construction and Transport took over the tasks of the defunct NIF Zrt. from 01 January 2023.

Vibrocomp Kft. will prepare the environmental impact assessment of the project in subject and the Natura 2000 impact estimate documentation on the basis of the relevant legislation on behalf of the Pannonway Építő Kft.

The subject of the present impact assessment is **the environmental impact assessment for the modification of the environmental permit of the expressway M60 from the stake marks 31+160 km (area of Pécs) to the stake marks 95+613 km (junction of the connecting road No. 6623 and the main road No. 6) between the stake mark 91+000 km and the country border.**

The construction of the section in question, linked to the construction of the bridge on the river Drava, will be carried out in a separate phase, in a separate project, and therefore the bridge on the river Drava is not the subject of this document.

We declare that:

In the case of the investment in subject, no related activity as defined in Section 2 § e) of Government Decree 314/2005 (XII. 25.) **shall be considered.**

The environmental impact assessment does not contain any **classified information** within the meaning of Section 3 of Act CLV of 2009 on the Protection of Classified Information, nor any **business secrets** within the meaning of Section 2:47 (1) of Act V of 2013 on the Civil Code.

2. MAIN BASIC DATA OF THE PROPOSED ACTION

2.1.1. Existing conditions

The design area is located in Somogy County, east of the town of Barcs.

The main elements of the infrastructure network in the area are the main road No. 6 and the main road No. 68. There is a roundabout junction at the stake mark 258+726 km of the main road No. 6, which is connected to the connecting road No. 6623 (at the stake mark 25+916 km) and to the Darányi street. The roundabout is located outside of the urban area of Barcs, to the east of the town, on the north side of the railway line No. 60.

To the east of the roundabout junction of the connecting road No. 6623 and the main road No. 6, there is an industrial development area, solar parks, a reclaimed landfill and a waste treatment plant.

To Croatia, there is currently a two-lane bridge over the River Drava. The existing border crossing station is located in Hungary.

2.1.2. Presentation of the planned conditions

Alignment guidance

Alternative No. 3

The planned alignment is connected to the stake mark 91+000 km of the previous section having an environmental permit. The total length of the planned alignment alternative is 8605 m.

At the beginning of the section, the alignment starts with a longitudinal slope of 0.50% and runs close to the ground level, with an embankment height of around 1 m. Between stake marks ~96+650-94+400 km, 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 up to the stake mark ~97+300 km, the depth of the road cut varies typically between 5-6 m. After the section in the road cut, the planned stake mark continues in an embankment and ends at the end of the design section, crossing the riverbed of Drava.

Facilities crossed:

- 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 line 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 planned alignment is connected to the stake mark 91+000 km of the previous section having an environmental permit. The total length of the planned alignment version is 8671 m.

At the beginning of the section, the alignment starts with a longitudinal slope of 0.50% and runs close to the ground level, with an embankment height of around 1 m. Between stake marks ~96+650-94+400 km, 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 up to the stake marks ~97+600 km, the depth of the road cut varies typically between 5-6 m. After the crossing the brook Zimona at stake mark 97+610 km, the planned stake mark continues in an embankment and ends at the end of the design section, crossing the riverbed of Drava.

Facilities crossed:

- 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 line No. 60 – Underpass
- Stake mark 97+610 km Crossing of the brook Zimona– Overpass
- Stake mark 97+534 km Crossing dirt road No. F975K – Underpass
- Stake mark 99+571 km River Drava - Overpass

Basic design data

Expressway M60

Type of road:	outskirts area
Environmental circumstances:	A.
Class of public road:	high speed roads (expressway)
Class of design:	K.II.A.
Design speed:	110 km/h
Width of roadway:	20,00 m

Junction roads - direct (direct) connecting roads (roads A and C)

Type of road:	outskirts area
Environmental circumstances:	A.
Design speed:	60 km/h
Width of roadway:	8,00 m

Junction roads - direct (indirect) connecting roads (roads B and D)

Type of road:	outskirts area
Environmental circumstances:	A.
Design speed:	40 km/h
Width of roadway:	8,00 m
Design lifetime:	20 years

Related intervention elements

Drava bridge

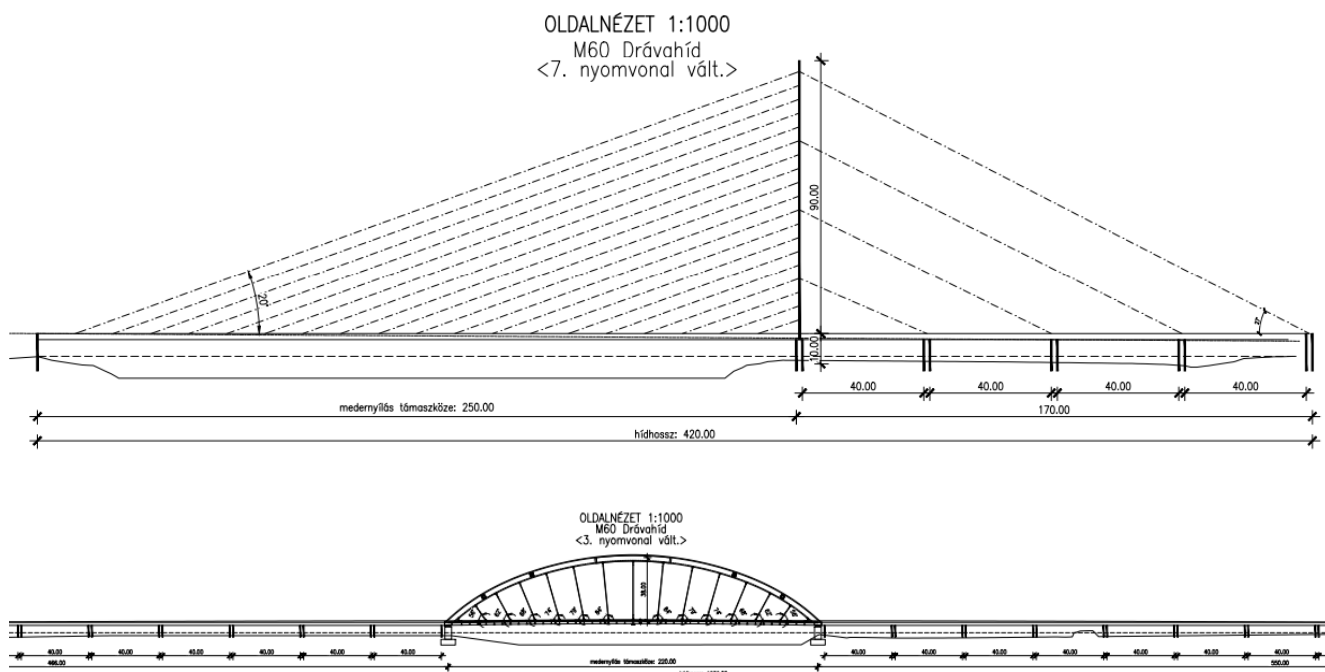
In both planned options, the construction of the Drava bridge will also be an intervention. In the present case, the most economical solution for the given opening range is the arch bridge, also because the connecting floodplain sections are approximately from the same length, so a symmetrical structure is aesthetically justified.

During the construction of the bridge, there will certainly be a need for a temporary excavation road alongside the bridge in the floodplain, connecting to the road network. The floodplain openings will be reinforced concrete beam structures, and the biggest machines used for construction will be a piling machine, a truck crane and 40-tonne trucks.

In the case of Drava bridges, the floodplain openings can be built with prefabricated beams by crane, and an excavation road must be built next to the bridge. The construction of the riverbed openings is likely to require a floating crane, which will need a working area of the same size as the bridge footprint, close to the bridge on the bank, with a public road connection. In the case of pushing, the girder should be built on one side of the road, served by the same road parallel to the bridge as is needed for the floodplain openings. Because of the width of the bridge, it would be advantageous to have an excavation road on both sides. There will also be a need for additional mobilisation areas around the bridge, with a space required roughly equivalent to the bridge area.

In all cases, the construction of the bridge must start before the road is built, so the alignment of the road in front of the floodplain can be used as a mobilisation area.

The exact area affected depends therefore also on the organization, the contractor and the construction technology, and will be addressed in detail in later planning phases.



3.1.1 Two possible layouts of the planned Drava bridges

Junction versions

Version „A”

In the case of junction version „A”, a symmetrical, half-cloverleaf shaped, grade separated junction has been planned. The main road No. 6, will be corrected west of the existing roundabout junction of the main road No. 6. and the connecting road No. 6623, moving away from the railway line No. 60 in the corrected section.

In case of version „A”, the building of the Autócsárda on Darányi road would be expropriated and relocated to another site at the owner's decision.

The construction of two roundabout junctions is planned on the main road No. 6, together with the correction of the Darányi road.

In the case of the future realisation of the bypass road No. 68 at Barcs, a new structure will have to be built towards the expressway No. M60, the bypass will connect to the existing roundabout on the abandoned Darányi road.

Version „C”

In the case of junction version „C”, a symmetrical, half-cloverleaf shaped, grade separated junction has been planned. The main road No. 6, will be corrected west of the existing roundabout junction of the main road No. 6. and the connecting road No. 6623, moving away from the railway line No. 60 in the corrected section.

In the case of the version „C”, the junction roads A and B will be shifted to the north. A connecting branch will be built between the two roundabouts; which section will become part of the bypass after the construction of the bypass main road No. 68 at Barcs.

The construction of three roundabout junctions is planned on the main road No. 6, together with the correction of the Darányi road and the construction of the bypass No. 68 at Barcs will be granted.

Associated facilities

Complex rest area

The rest area is located around stake mark 93+100 km of the expressway M60, in the administrative area of Barcs.

The number of parking spaces is defined as follows (per sites):

- 46 cars for passenger cars,
- 4 handicapped accessible parking spaces for people with reduced mobility,
- 5 car parking spaces for the future E-charging station (granting of space, technical conditions are part of a future planning),
- 25 truck parking spaces for trucks,
- 3 parking spaces for buses.

Utilities

Utility interventions affected by the proposed alignments were also examined in the EIA.

Water drainage

The technical solutions for water drainage are presented in chapter 5.2 Surface water protection of the EIA.

Basic data of the licence applicant

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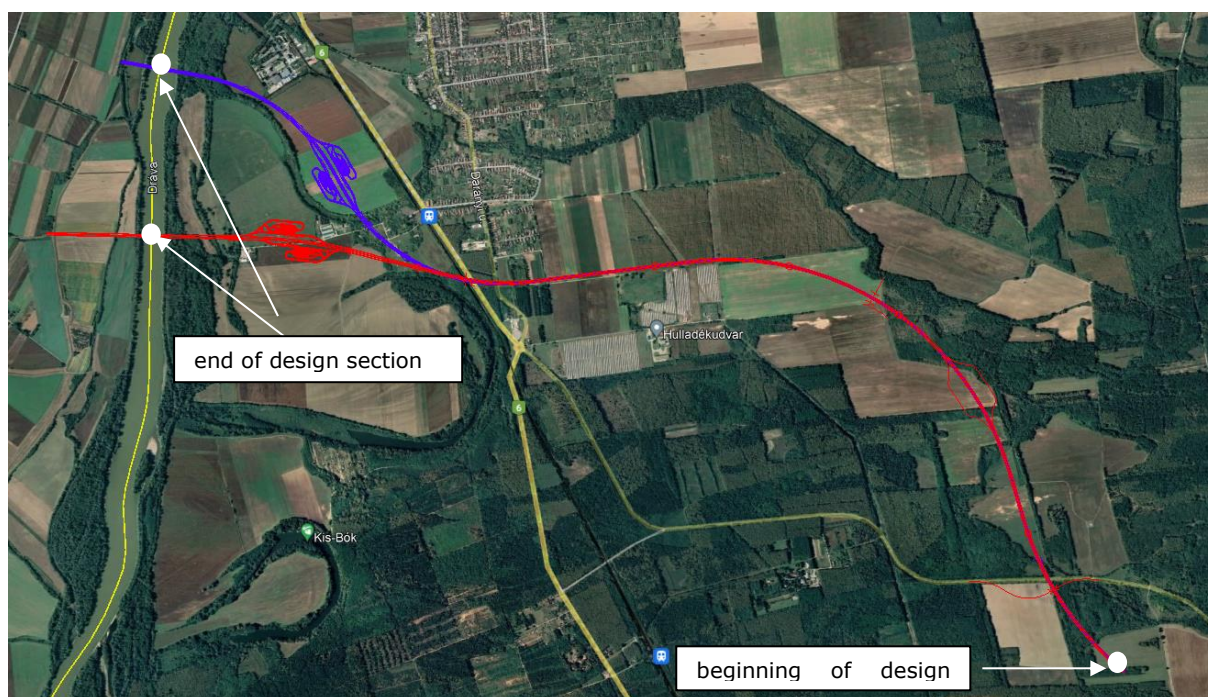


Figure 2.1: Alignment of the planned road

3. EXPECTED CHANGE IN THE CONDITION OF THE ENVIRONMENT

3.1. PROTECTION OF SOIL, GROUNDWATER AND SURFACE WATER

Soil and groundwater

The **direct impact area, in relation to the soil** is the entire construction area of the alignment, including storm water drainage ditches, mobilisation and depot areas and any material gaining sites that may be constructed. It is within this area that the soil may be directly affected during the construction phase and within this area that direct contamination may occur in the event of a natural disaster.

For **groundwater, the direct impact area** is difficult to identify and can only be determined by modelling (influencing effect of the soil as a mediating medium). The contamination of groundwater is not expected if the project is carefully planned and implemented, and therefore no delimitation of the impact area is necessary.

The indirect impact area for soil and groundwater is interlinked. 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 structure, the contaminant, its properties and the amount released, as well as the time that has elapsed since the contamination.

Soil characteristics, groundwater conditions:

The findings of the Environmental Impact Assessment (EIA) for the closed environmental permit procedure No. PE/KTF/4213-114/2017 are maintained for all relevant sections of the expressway M60 between stake marks 31+160 - 91+000 km. This documentation only examines the sections that will be modified or are extensions to the previously planned road.

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 concern brown forest soil with clay and alluvial meadow soils.

The alluvial meadow soils affected by the variants under study belong to the medium fertility soils, while the brown forest soils with clay belong to the low fertility soils.

Based on the Soil Investigation Report and Geotechnical Planning Report prepared by Terraexpert Ltd. in June 2022, the following conclusions can be drawn:

On the surface, the common alignment is mainly covered with granular soils, silty sand, fine sand, medium sand. Fine-grained layers, silt, sandy silt soils are also common below a depth of 3 m. Because of the abundance of silty sands on the surface, the surface assemblage is frost-risky or frost-sensitive. Approaching the Drava after the separation, predominantly fine-grained layers, silt, sandy silt, and possibly thin to medium clay soils are typical near to the surface.

According to the National Spatial Plan (Országos Területrendezési Terv - OTtT), none of the variants under consideration affects the zone of arable land with excellent soil conditions.

The planned alignment alternatives affect the area of the hydrocarbon deposit Darány I. Since the raw material extraction takes place at great depth, the planned investment will have no impact on it.

According to the MBFSZ map database, the planned alignment alternatives do not affect any solid mineral deposits.

According to the map database of the Mining and Geological Survey of Hungary (MBFSZ), the groundwater table is typically 2-5 m deep or 5-10 m deep.

Based on the Soil Investigation Report and the Geotechnical Planning Report prepared by Terraexpert Ltd. in June 2022, the following conclusions can be made regarding the groundwater: In the design sections, the groundwater table was observed at depths of 2-5 m up to the vicinity of stake mark 94+000 km. After that, the groundwater table at rest sank to a depth of more than 5 m everywhere, and in places to a depth of more than 10 m along the section of the alignment up to stake mark 97+550 km.

The groundwater will again be close to the surface (5 m or within 5 m) after stake mark ~97+600 km for alignment alternatives.

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 design 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 studied variants do not affect protection areas of drinking water abstraction. Closest to the variants is the estimated protection area of the water body of Barcs, which is located at a distance of approximately 2.1 km.

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.

The project will inevitably lead to a reduction in the quality and surface area of the soil, the area occupied by the roadway and its associated facilities will be part of the infrastructure.

The total length of the alignment alternative No. 3 is 8605 m, the total length of alignment alternative No. 7 is 8671 m. The planned road has a 2x2 lane design with a planned width of roadway of 20 m.

Two variants of junction are planned, one symmetrical, half-cloverleaf shaped, grade separated junction is planned for variant „A”, and two roundabouts are planned on the main road No. 6, together with the correction of the Darányi road. One symmetrical, half-cloverleaf shaped, grade separated junction is planned for variant „C”, and three roundabout junctions is planned on the main road No. 6, together with the correction of the Darányi road and the construction of the bypass No. 68 at Barcs will be granted.

A complex rest area will be created around stake mark 93+100 km of the expressway M60.

Agricultural land use is the predominant land use in the vicinity of the proposed project, but a smaller proportion of forested areas are also affected by the proposed alignment alternatives. Although agricultural land is affected by the alignment alternatives, the negative impact of the land occupation is mitigated by the fact that no areas of prime farmland are affected.

The permanent or temporary withdrawal from cultivation of the land, mobilisation areas and depots occupied by the project must be authorised by the competent territorial land office.

At these sites, the top layer of humus must be extracted according to the humus management plan and then stored in temporary depots for use during construction.

During construction, the soil is compacted by heavy machinery.

The utility replacements associated with the project will result in additional expropriation of groundwater, but no direct impact area can be identified. In the case of a transmission line, the spatial position of the groundwater table may be altered by the foundation of the poles, but the poles are considered point-like and their impact is minimal.

No soil contamination is expected in the work areas, except for possible natural disasters. In the event of a natural disaster, the contractor and, during operation, the operator must have an appropriate emergency plan.

During the operation, soil and groundwater contamination can occur mainly due to public 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 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.

During operation, the level of contamination can be significant mainly in relation to accidents, involving accidents with trucks.

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 public road development will not have any negative impact on groundwater.

Recommended measures:

The temporary and permanent use of agricultural land for other purposes is subject to authorisation. For the permanent and temporary abandonment of the agricultural land occupied by the alignment

of the road, as well as the mobilisation roads, depots and storage areas, the land may be used for other purposes with the permission of the real estate authority. The permit must be obtained in advance, before the use of the land (for other purposes) begins.

The humus depots should be kept free of weeds until they are used. Weeding on the surface of the temporary depots must be prevented until they are re-spread within a short period of time. Weeding must be prevented by mowing, in the state before seed production.

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.

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, typical of the landscape, and grassing with appropriate species.

In order to protect groundwater resources, in the event of a natural disaster, the contractor and, during operation, the operator must have an appropriate emergency plan. The plan should include how to prevent or minimise the spread or leakage of contaminants from the pavement or contaminated area to the ground in the event of an accident.

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. During the works, the contractor shall provide oil absorbents, a means of collecting oily waste and a storage container at the work site.

In the event of a possible natural disaster, the Drainage Directorate of South Transdanubia (Dél-dunántúli Vízügyi Igazgatóság - DDVIZIG) must be notified immediately so that it can take the appropriate measures.

Surface water

For surface water, the direct impact area is determined by public road traffic emissions and natural disasters, on the storm water drainage system along the alignment and 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 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**.

Surface water conditions:

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 Spatial Plan of Somogy County both alignment alternatives affect the zone of the large water body.

Based on the Spatial Plan of Somogy County, the variants of alignment do not affect the zone of the regularly flooded area.

The area under study, which is located within the 3-2 Rinya Valley Planning subunit, is also at risk of flooding based on the 30-year (3.3%), 100-year (1%), and 1,000-year (1%) probability of potential flooding maps (source: [www.vizugy.hu/Árvízi kockázatkezelés](http://www.vizugy.hu/Árvízi_kockázatkezelés)).

Planned water drainage:

The impacts on surface water status during both construction and operation are mainly determined by the way and efficiency of water drainage of the new section of the road.

Storm water run-off from the road surface either flows in sheets along the bank and gullies or, in the case of larger gradients and embankment heights, collects along drainage verges and flows through gullies into the drainage system alongside the road. Recipients: the eastern branch of the brook Zimona, the main branch of the brook Zimona and the river Drava.

In the design section, the variants of alignment will run both in embankments and road cuts. Storm water will be channelled through ditches and, where necessary, in-cut channels will be created. Depending on the gradient, the trapezoidal ditches will be paved.

To protect receptors, a sediment trap is recommended at the point of discharge. At the end of the sediment trap, before the inlet, a dam of sheet piles is required to provide a barrier in case of a natural disaster.

The limit values for the contamination of direct discharges into the receptor are laid down in Annex 2 of Decree No. 28/2004 (XII. 25.) of the Ministry of Environmental Protection and Water Management. In the design area there is a watercourse with a generally protected receptor category 4, where the permitted level of organic solvent extract is 10 mg/l.

During construction, impacts on the quality of watercourses and other surface waters can be significant. The planned alignment crosses small watercourses in several places. During construction, adverse impacts may result from the maintenance and repair of machinery in the vicinity of watercourses, therefore such activities should not be carried out in the vicinity of watercourse crossings.

The construction of watercourse crossings should be carried out during low water periods, and the operators should be consulted before the works start. If it is necessary to construct paved ditches, they shall be of watertight construction.

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 of watercourses can occur mainly in cases of natural disaster. 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 be 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.

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 facilities will have no discernible impact on the water balance.

According to Annex 5 of Decree No. 28/2004 (XII. 25.) of the Ministry of Environmental Protection and Water Management concerning "Emission Standards of Water-pollutant Substances and Laying down Rules of Application on the basis of the specific limits that may be set by the authority for direct introduction into the recipient (minimum value for total aliphatic hydrocarbons (TPH) 3 mg/l, maximum 20 mg/l), the calculated values of the estimated oil pollution over the entire design section of the planned link road do not exceed the permissible limit, even the stricter one of 5 mg/l according to the periodic water flow. So the estimated oil contamination in the receptor is below the limit value. On this basis, the construction of a sediment trap is sufficient for the discharge of rainwater into the receiver.

Recommended measures: 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 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.

The quality of the storm water to be discharged into the receiver must at all times meet the requirements of Decree No. 220/2004 (VII. 21.) of the Government providing "Rules on the Protection of Surface Waters Quality" and Decree No. 28/2004 (XII. 25.) of the Ministry of Environmental Protection and Water Management concerning "Emission Standards of Water-pollutant Substances and Laying down Rules of Application".

The planning must take into account plan No. 05.NMT.02. of large body of water management and the Decree No. 83/2014 (III. 14.) of the Government.

For the implementation of storm water drainage, an application for a water right establishment permit must be submitted to the Disaster Management Authority Department of the Baranya County Deputy Director General's Office, together with the permit documentation pursuant to the amendment of Decree No. 18/1996 (VI.13.) of the Ministry of Transport, Communication and Water Management regarding the request and its annexes necessary for authorizations affecting water rights.

3.2. AIR QUALITY PROTECTION

Description of the current situation

The air quality values for the area were determined on the basis of the data of the nearest measuring station - the automatic measuring station located at the Apáczai Csere János square in Pécs - as part of the National Air Pollution Monitoring Network. The monitoring station in Pécs is located ~55 km from the design area and measures air pollution from an urban background. Air pollution levels in the design area are determined by public road traffic (main road No. 6, connecting road No. 6623) and by emissions from domestic heating during the heating season. In addition, seasonal agricultural activity contributes to air pollution.

On the nearest automatic measuring station to the design area the annual limit values for any of the components measured over the last 5 years, as well as in the baseline measurements has not been exceeded, so the air quality of the study area is considered good.

Air pollution during construction

In all cases, air pollution from construction is temporary and the impact on a section is relatively short-lived. This extra pollution is mainly due to rough excavation and exhaust fumes from machinery. The air pollution levels of particulate matter (PM₁₀) expected during the construction phase of the rough excavation works were performed using the AERMOD View 10.0.1. software for average meteorological conditions. Based on the model calculations, the average distance to meet the 24-hour health limit value (50 µg/m³) for particulate matter (PM₁₀) is 115 m for road construction, 77.4 m for intersection construction and 13 m for rest area construction.

As regards the construction phase, it can be concluded that, under average meteorological conditions, during rough earthworks, the 24-hour health limit value for particulate matter (PM₁₀) is not expected to be exceeded at the nearest residential buildings during road construction, junction construction and rest area construction. The 24-hour health limit is met with a high level of safety even with background pollution.

The excavation activities of the proposed utility replacement will have a lower dust load than the excavation activities considered in the documentation and therefore do not require a separate assessment from an air quality perspective. If work organization processes allow, the utility replacement will be carried out at the same time as the excavation work, so it will not cause additional pollution.

Air pollution during operation

Traffic-related air pollution is mainly determined by total emissions of vehicle and dispersion patterns, which depend on the following factors:

- the volume and composition of traffic, specific emissions from vehicles,
- speed of traffic, obstructions,
- geometry of the route,
- meteorological conditions,
- infrastructural conditions.

We evaluated the expected long-term pollution at a distance of 50 m from the alignment No. 3 and No. 7. of the Planned road (road No. 6623 - end of planning section). The long-term pollution was calculated by summing the values of the OLM automatic measuring station and the expected long-term air exposure from traffic at a distance of 50 m. Long-term pollution was compared with hourly (CO and NO₂) and 24-hourly (particulate matter PM₁₀) health limits. Based on the calculations, it can be concluded that the hourly and 24-hourly health limits are expected to be met with a high degree of certainty for all three components under consideration in long term: The values obtained are 42.4% of the limit value for NO₂, 4.76% for CO and 36.8% for PM₁₀.

However, it is important to note that at the distance of the nearest residential building (172 m), more favourable concentration values are expected than the calculated values.

In the two alternatives, the closest building to be protected is 41 m and 52 m from the axis of the road, so we slip towards the safety, taking into account a reference distance of 20 m for alternative „A“ and 50 m for alternative „C“.

For all three components tested, the hourly and 24-hour health limits are met with a high degree of certainty: The values obtained are 42,5 % and 31,2 % of the limit values for NO₂, 4,5 % and 4,3 % for CO and 36,8 % and 36 % for PM₁₀.

It is important to note, however, that at a distance (41 and 52 m) of the nearest residential building, more favourable concentration values are expected than the calculated values.

Road networks connected

Compared to the long term reference condition, the following conclusion can be drawn for the road section connected:

- there will be no forecasted traffic and emission change at the section of intersection of Bajcsy-Zs.-68 (roundabout) and at the section of connecting road No. 6623 under study,
- an increase of 42% in traffic and emissions is expected on the section of the (Bajcsy) Darányi street (roundabout-roundabout),
- a reduction of 37-50% in traffic and emissions is expected on the sections of the main road No. 6 (up to the intersection of the axis No. 7) and of the main road No. 6 from the roundabout to the outer sections

Even with the increase in traffic, the health limit values are still met for all three components. The nearest buildings are located 10-20 m from the axis of the road, at which distance the hourly (CO and NO₂) and 24-hour (PM₁₀) health limit values are expected to be met.

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

Recommended measures:

- Transport activity is not recommended in low-traffic streets.
- During the demolition of buildings, continuous sprinkler irrigation is recommended due to the proximity of the buildings to be protected.
- During construction works, the rate of dusting can be significantly reduced by increasing the sprinkler irrigation, i.e. by continuous sprinkler irrigation.
- The transport of materials used in the execution of the works shall be carried out in closed containers or in temporary covered containers preventing spillage and dusting, or by means of a vehicle for special-purpose, or transport vehicle ensuring these conditions, in such a way as to exclude air pollution.
- Outdoor storage should be planned to minimise the release of air pollutants into the environment.
- By regular cleaning of the road the diffuse dust emissions from roads must be minimised.
- In dry weather, it is necessary to clean and to remove dust from the transport routes by sprinkling.
- The technical condition of the transport fleet must be satisfactory, both in terms of engine and bodywork (free of dusting). This should be checked regularly.
- Material gaining sites should be chosen as close as possible to the alignment and transport routes should be chosen avoiding populated areas as much as possible.
- Sites of the machinery and equipment used to the construction should be located as close as possible to the alignment, away from residential areas and avoid unnecessary movements on surrounding roads.
- It is proposed to organise transports phased and out of peak times.
- In the constructed sections the gullies must be grassed and planted as soon as possible to reduce dust.

3.3. WILDLIFE PROTECTION

The alignment alternatives affect the core area of Danube-Drava National Park, the West-Drava Special Protection area (HUDD10002), the Middle-Drava Special Conservation Area (HUDD20056), the core area of the national Ecological Network, the puffer site and transitional zone of the UNESCO Biosphere Reserve Mura-Drava-Danube. The temporary area occupation (i.e. significant use and transformation of a given area) of 16.650 m² (30 m x 455 m), needed for the bridge construction was completely designed in case of the Eastern alignment no. 3 on the area of the Danube-Drava National Park and Natura 2000 sites.

The joint alignment runs along the southern boundary of the road bypassing Barcs from the south, between the stake marks 96+800-97+000, for a length of about 160 m within the National Park. The western alignment alternative No. 7 runs for 175 m in the national territory of the Danube-Drava National Park, which is protected by specific legislation as a natural area of national importance, while the eastern alignment alternative No. 3 runs for 1,060 m in the habitats of the Danube-Drava core area, and the temporary land reservation of 13.650 m² (30 m x 455 m) required for the construction of the bridge is also planned for the core area of the national park.

The ex lege protected fens in the vicinity of the planned expressway M60 have been represented on the maps in the Annex of Protecting wildlife, using the overlays provided by the Danube-Drava National Park Directorate. There is no direct impact, the nearest fen, Nagybók, is 130 m from the joint alignment at stake mark 96+800.

Two hectares of the local nature reserve Belcsapuszta have been protected since 2003 and include the ruined Kremsier Castle and the surrounding park. The planned alignment alternative No. 7 passes within 100 m between stake marks 97+400-97+500, there is no direct impact.

The planned investment does not affect any of the areas listed in Annex 2 of the Decree No. 7/1996 (IV. 17.) of the Ministry of Economic Affairs and Trade on the Establishment of the Danube-Drava National Park - Property Register Parcel Numbers and Forestry Plan Indicators of the Specially Protected Area of the Danube-Drava National Park.

In 2022, the Danube-Drava National Park Directorate provided us with biotic data on the planned variants of alignment and their surroundings.

During the field inspections, a total of 81,699 stems of protected plant species were found in the planned expropriation areas, distributed as follows (the nature conservation values were given according to the Decree 13/2001. (V. 9.) KöM on protected and specially protected plant and animal species):

- Rough Horsetail (*Equisetum hyemale*) 2300 stems – nature conservation value: 5.000 HUF/individual,
- Spinulose Wood Fern (*Dryopteris carthusiana*) 273 stems – nature conservation value: 5.000 HUF/individual,
- Snowdrop (*Galanthus nivalis*) 70-80 thousand stems – nature conservation value: 10.000 HUF/individual,
- Hard Shield Fern (*Polystichum aculeatum*) 5 stems – nature conservation value: 5.000 HUF/individual,
- Mullein Pink (*Lychnis coronaria*) 210 stems – nature conservation value: 10.000 HUF/individual.

The number of individuals per species and the coordinates of the occurrence sites are presented in a table in the main document of KHT's. The area of the temporary land reservation of 13.650 m² (30 m x 455 m) required for the construction of the bridge on the eastern section of the alignment alternative No. 3 is likely to provide habitat for many more protected plants, so the implementation

of the alignment alternative No. 3 will result in the loss of habitat for many other protected plants. This will be clarified before construction.

Based on the observations made during the botanical surveys and the biotic data obtained from DDNPI, the 2 variants of alignment studied are evaluated below.

Alignment No. 3: The alignment runs through planted alders to the east of the Kaposvári road, which contains a significant number of protected plants. It avoids the northern, unprotected forest block in the north and west. It passes through young oak trees and fields west of the solar panels. It crosses a small section of protected area (forest) south of the road No. 6, then reaches the river Drava south of the pig farm, through protected grassland (pastures and meadows) and woodland. 250 m north of the Drava, already within the national park, it crosses the filled remnant of an old backwater, which functions as a waterway habitat with willow bushes and locusts. Close to the Drava, thousands of populations of 2 protected species of plants (Rough Horsetail and Snowdrop) can be found along the planned alignment. The area of temporary land reservation required for the construction of the bridge is planned to be 100% within a national park core area or Natura 2000 area, which is likely to provide habitat for a number of additional protected plants, and will be clarified prior to construction.

Alignment No. 7: The alignment runs through planted alders to the east of the Kaposvári road, which contains a significant number of protected plants. It avoids the northern, unprotected forest block in the north and west. It passes through young oak trees and fields west of the solar panels. It crosses a small section of protected area (forest) south of the road No. 6. It runs to the north of the pig farm, close to but not crossing the protected area, which is a watercourse (brook Zimona) bordered by reeds and old willows. After crossing the stream, the alignment runs west of the edge of the protected area in agricultural land. It reaches the Drava at the unprotected mixed acacia forest. The only protected area affected is the crossing of the Drava. On the bank of the Drava and on the border of the protected area, the alignment crosses old willows and a group of old poplars. Close to the Drava a significant population of protected plant species (Snowdrop, *Epipactis* sp., *Polystichum* sp.) is found along the planned alignment.

Northern starting point of the joint alignment: 2 mature oak trees with trunk diameters of 130-150 cm fall within the proposed alignment in the forest strip located here.

From a nature conservation point of view, the final alignment should be chosen so as to minimise the impact of the construction of the route and the expropriation of the construction area on protected and Natura 2000 sites, as the EIA shows that this is the area with the highest concentration of protected flora and fauna. Accordingly, of the two alignment alternatives, the western alignment No. 7 causes less damage to nature conservation.

Both alignment alternatives affect the habitat of 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). In addition, the brook Zimona, which is the habitat of the strictly protected 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. Neither of the two versions is much better than the other. The only advantage of the variant No. 7 is that it crosses a significantly smaller area of protected Natura 2000 habitats than the variant No. 3. From a nature conservation point of view, the variant No. 7 is slightly preferable.

In the study area there are a number of protected species or species worthy of protection, which use the area as a regular habitat, breeding and feeding area. No species of high conservation value were detected.

Impact of construction and operation

In the case of the eastern alignment No. 3 the loss of Natura 2000 habitats is expected to be as follows:

- 6440 Alluvial meadows of river valleys of the *Cnidion dubii*: 80035,16 m², i.e. 8 ha, and the temporary reservation of land for the construction of the bridge, which will cover additional ~7.500 m²;
- 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae): 1569,77 m².

In the case of the western alignment No. 7 the loss of Natura 2000 habitats is expected to be as follows:

- 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae): 1616,44 m².

In the case of Drava bridges, the floodplain openings can be built with prefabricated beams by crane, and an excavation road must be built next to the bridge. The construction of the riverbed openings is likely to require a floating crane, which will need a working area of the same size as the bridge footprint, on the bank, close to the bridge, with a public road connection. The extent of the work area required for this floating crane is currently unknown, but the creation of the work area on the bank of Danube bank result in the loss of additional habitat (91E0), whichever alignment alternative is chosen. In the case of pushing, the girder should be built on one side of the road, served by the same road parallel to the bridge as is needed for the floodplain openings. Because of the width of the bridge, it would be advantageous to have an excavation road on both sides within the planned expropriation boundary. There will also be a need for additional mobilisation areas around the bridge, with a space required roughly equivalent to the bridge area. The spatial extent of these mobilisation areas is currently unknown, but in the case of alignment alternative No. 3, their creation within the core area of the national park and Natura 2000 site will result in the loss of additional habitats, further increasing the significant impact on wildlife of the alignment alternative No. 3.

Since the planned investment will take place entirely in habitats that have not been used for this purpose so far, it will be necessary to create further organisational routes in protected Natura 2000 habitats and in northern non-protected forest areas. The de-vegetation of the expropriation area and the foundation earthworks will result in the removal of the original vegetation, which will result in the loss of the protected plant habitat detailed below. A further temporary effect will be the temporary disposal of the excavated soil, which will be implemented within the expropriation boundary. In addition to the elimination of habitats, the construction of the organisation routes and the bridge construction area will result in negative effects (noise and air pollution) of the traffic required during the construction and bridge construction on the adjacent national protected and Natura 2000 habitats for months, in the case of the alignment alternative No. 3. For alignment alternative No. 7, this will affect a much smaller area of nationally protected (national park) and Natura 2000 habitats. These indirect effects also have a negative impact on the activities of protected plants and protected or strictly protected animals.

Protected plant species are affected and their habitat will be lost if the project goes ahead. The occurrence of the species concerned is described in detail in the table in the botanical workbook, with exact coordinates. The implementation of the western variant or alignment No. 7 will affect about 4,000 individuals of Snowdrop (*Galanthus nivalis*), 4 stems of Hard Shield Fern (*Polystichum*

aculeatum) and 1 stem of Narrow Buckler-fern (*Dryopteris carthusiana*). The eastern alignment alternative No. 3 will eliminate the habitat of about 75,000 stems of Snowdrop (*Galanthus nivalis*) and 2,300 individuals of Rough Horsetail (*Equisetum hyemale*). In addition to the above, the protected plant occurrences affected by the northern joint alignment are: Narrow Buckler-fern (*Dryopteris carthusiana*) 272 stems, Hard Shield Fern (*Polystichum aculeatum*) 1 stem, Mullein pink (*Lychnis coronaria*) 210 stems. In the area close to the Drava, where a temporary reservation is planned to be established for the construction of the bridge, it is assumed that more hundreds individuals of additional protected plants may be affected, this will be clarified before the construction.

The eastern alignment alternative No. 3 between stake marks 97+800-98+850 km (up to the Drava) crosses nationally protected and Natura 2000 areas, which, if implemented, will eliminate habitats that provide habitat for more hundreds individuals of protected insects (e.g. cone-headed grasshopper, protected butterfly species) and which are regular feeding areas for protected and strictly protected bat species, protected and strictly protected bird species. In the area close to the Drava, where a temporary reservation is planned to be established for the construction of the bridge (13.650 m²), it is assumed that more hundreds individuals of additional protected insects (e.g. cone-headed grasshopper) may be affected, this will be clarified before the construction.

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 impact bearers of direct impacts, habitat disturbance can be considered as habitat loss, which is a definite negative effect on wildlife.

As described above, the projects will be implemented in a diverse habitat environment, making the protected and strictly protected species detailed in the botanical and zoological work section as potential impact bearer of the development. The habitat of the protected plants affected will be lost, so it will be necessary to relocate these plants before the start of works.

In addition to habitat loss, disturbance (e.g. noise and dust) associated with the works has a negative impact. This disturbance is considered to be unfavourable 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 specially protected habitats. The presence of wintering, feeding species may also be temporarily reduced in the immediate vicinity of work areas.

Construction-related natural disasters can potentially release contaminants into soil and watercourses. This can be avoided by working proactively.

During construction, it should be taken into account that during the breeding season (in order to protect protected species - such as ground-nesting birds, invertebrates!), construction works involving excavation should be avoided, and the proposed construction period should be outside this period.

The planned interchanges „A” and „C” and the connected road sections will be located in degraded habitats from a wildlife-conservation point of view, covered with low natural vegetation and will therefore not have a significant impact on habitat conservation.

A long-term conservation of Natura 2000 sites in the immediate vicinity of the development site, but outside the direct impact area of the Natura 2000 sites to be removed, is a priority, both under the Natura 2000 SDF and the reservation plan, and should be promoted by all possible means. With the working methods and implementation tools proposed, negative impacts can be avoided.

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.

This project will have a cross-border impact, as the planned expressway will cross the river Drava and will run into the neighbouring Croatia.

In the area of the nationally protected Danube-Drava National Park and its surroundings of 100 m (between stake mark 99+200 km and the national border in the case of variant No. 7, between stake mark 97+600 km and the national border in the case of variant No. 3, between stake marks 96+600-97+300 km in the case of the joint alignment), 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. To avoid this, and to reduce the impact, the new lightning should be designed as described in the chapter of Recommendation.

Proposed protection measures

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 de-vegetation and foundation earthworks: 1 of October - 1 of March. In addition, tree felling between 1 of October and 1 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 1 of March and 1 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 country 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.

For the bridge construction, it is currently not known exactly what technology will be used (only options are known). If the alignment will be carried out on an embankment, it is advisable to design the embankment crest as narrow as possible in areas of the national park core area and Natura 2000 habitats. If in case of the alignment No. 3 the track is carried on a bridge structure, the area under the roadway between the piers after construction should be rehabilitated by planting vegetation without trees.

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 plants recommended for planting in case of a vegetation with trees may be species of linden, ash, elm and poplar species, and in case of a vegetation without trees may be species of mixed grass seed obtained from the Directorate of the National Park (or from a source of supply specified by them). The planting plan must be agreed in advance with the Directorate of the Danube-Drava National Park, and planting may only be carried out in accordance with the plan approved by them in areas belonging to the national park or classified as Natura 2000.

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. Their location, based on the 2022 surveys, can be found in the table with coordinates given in the detailed botanical work section. In the year of construction, in the light of the final construction plans, it is necessary to reassess the locations of the protected plants (including the locations of the temporary occupation of the area required for the construction of the bridge and the organisation roads that will allow access to it), 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. The methodology of translocation must be set out in the translocation plan of the protected plants, which must be submitted to the nature protection authority for approval. Translocation via turf grass is out of the question due to the forest vegetation and the high tree root density, only translocation of individual specimens is expected to be feasible. This seems impractical for the more 10,000 individuals of known protected plants in the case of the eastern alignment alternative No. 3, which is one of the major reasons why this alignment alternative is not proposed for implementation.

In the case of the alignment No. 7, in order to reduce the impact on wildlife, the possibility of shifting the alignment to west in the course of reaching the bank of the Drava (between the stake mark 99+100 km and the country border) was examined during the planning. However, this was only possible to the extent of the current alignment, given the geometry of the road, the significant additional cost of additional areas to be affected and the extent of the additional intervention and destruction that would be required.

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 bridge structure 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 a bridge structure 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 strictly 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 bridge.

For the bridge of the expressway over the Drava and, in the case of alignment No. 3, the preceding route 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 dormouse, 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 strictly protected species that breed, migrate and feed in the airspace of the Drava and its floodplain by diverting them away from traffic.

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, 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 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.

Mitigation and prevention measures included in the Natura 2000 impact assessment documents annexed to this document:

- In Natura 2000 areas (mainly on grassland and fens), it is not allowed to set up depots, material gaining sites, to place machinery, or to establish new organisational routes.
- Transport and handling of materials can only take place on existing public roads, agricultural roads or existing organisational roads, sites and depots, no new alignments can be established in Natura 2000 areas.
- Afforestation (if it takes place) should only be carried out with native tree species appropriate to the production site, on the section crossing the Natura 2000 site. The use of invasive tree species for afforestation is prohibited.

- Clearance of woody vegetation may only take place outside the growing season along the entire section of the alignment affected by the development (between 1 of October and 1 of March).
- If the use of a Natura 2000 area is justified for any work, the planned location must be agreed in advance with the Danube-Drava NPI, and the implementation of the work can be carried out taking into account their requests.

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.

3.4. LANDSCAPE CONSERVATION

In terms of protection of landscape, the direct impact area is the same as the area of actual use. The direct impact area is the area from which the proposed alignment, including its associated facilities, is visible.

Current situation

The planned investment is mainly located in the Central-Drava Valley, in the municipality of Barcs. Agricultural, forestry, municipal and water management land uses are all present in the design area today, and a potential of nature protection is also present. The landscape structure is dominated by the Drava and Natura 2000 sites. The proposed expressway will affect areas of arable land, forest, pasture and set-aside. Urban area is also affected.

According to the settlement structure plan of Barcs, the planned alignment is concerned zones of agricultural area, existing landfill area, planned commercial area, forest area, protected forest area, agricultural plant area, planned industrial area, planned protected forest area, utility area, non-buildable agricultural area and other existing water management area.

The planned alignment crosses several planned forest areas in Barcs.

According to the annex to Decree 9/2019 (VI. 14.) on the supplementary regulation of the preparation and application of spatial planning plans, the alignment of the planned expressway affects the zone of the landscape conservation area. The river Drava and the surrounding wooded and forested strip have a positive landscape effect in the vicinity of the alignment under study.

The core area of the Danube-Drava National Park, the HUDD10002 West-Drava KMT, the HUDD20056 Central-Drava KJTT, the core area of the national Ecological Network, the buffer area and the transition zone of the Mura-Drava-Danube UNESCO Biosphere Reserve (MAB) are highlighted as valuable landscape elements or groups of elements in the direct vicinity of the planned road development.

Landscape assessment

In addition to the natural elements listed above, the following elements can also be considered as valuable and outstanding landscape elements or groups of elements:

- the river Drava and its backwaters

- the wooded, forested areas surrounding the river Drava,
- the alleys.

According to the database of the National Environmental Information System (OKIR), the alignment of the proposed relief road does not affect any specific landscape values.

Various conflicts and problems may arise during the implementation of the planned expressway. The most important of these are:

- the planned road crosses a Natura 2000 site
- the planned road crosses forest areas
- the planned road crosses a protected landscape area,
- the negative impact regarding the landscape aesthetic of the planned expressway.

Impact of construction and operation

The change in land-use patterns **during construction** occurs mainly in the permanently occupied areas: the loss of former cultivated land (arable, forest, pasture) and areas close to the nature and the development of transport land in their place. The planned project will not significantly change the use of the adjacent areas, but the commercial, economic and service potential of the roadside areas may be improved due to better accessibility. The planned relief road and its associated facilities (e.g. interchanges) will appear as a new linear landscape element of artificial origin in the landscape structure. The landscape structure is therefore expected to change to a lesser extent in a long-term basis. The road development will transform the former connections of the area. In particular, the public road network is being transformed, but the changes may also affect ecological links. Changes in the accessibility of the cut areas may reduce the intensity of farming in some areas, while in other areas there may be increased farming and the re-cultivation of previously abandoned areas.

The current biologically active areas in the design area are typically fields, forests and pastures, parts of which will be fragmented or lost as a result of the land-use corridor of the proposed expressway. The planned road will also affect planned forest areas, so it will be necessary to take them out of forestry. Planned forest area will be affected. All of these should result in a reduction of biologically active surfaces in the design area. The construction of the road is expected to require tree felling and brush clearance, the extent of which is not known at this stage of the planning.

The view of the earthwork, roadway and interchanges that will be built as part of the planned project will be a dominant feature in the landscape. The construction of new structures is also planned. The roadside drainage ditches have a negligible impact on the landscape, but the road on the embankment is expected to be relatively visible.

The planned intervention will involve the construction of 4 underpasses and 2 overpasses for the alternative No. 3 and 3 overpasses for the alternative No. 7.

The planned investment will be visible from the direction of Barcs regarding residential areas.

Construction work will be visible from a greater distance in some sections where the road is being built in open, unsealed agricultural land. In these locations, the visibility of excavation works, transport and deposit sites is several hundred metres due to less hidden areas.

During the **operational phase**, the proposed investment will have less impact on the existing landscape structure. Along the roadway, between the road and the boundary of the municipal land, the proportion of set-aside land may increase. Good transport links and the location of production and service activities can enhance the value of these areas, and it is expected that new facilities - mainly commercial, service and economic - will appear in some areas near the new road.

The proportion of biologically active surfaces in the road area will not change during the operational period, but a further decrease in biologically active surfaces is predicted with expected construction in the future.

By destroying the surface and disrupting the natural vegetation, the construction of trail structures such as roads allows invasive species to enter the more natural habitats, thus acting as a negative ecological corridor.

The expected disturbances due to the level of traffic during road operation may lead to an increase in the ecological barrier effect. The ecological stability of valuable habitats in the immediate vicinity of the alignment may be weakened.

From a landscape point of view, the road will cause significant, permanent, negative landscape changes.

Recommended measures:

The mobilisation routes should be designed in such a way that sensitive areas identified for landscape conservation (residential areas, areas of ecological value, landscape conservation area) are not permanently and irreversibly damaged. During the construction works, only existing paved roads and unpaved dirt roads should be used for transport purposes, if possible. Where possible, older woody vegetation should be protected. In the affected Natura 2000 area and the elements of the ecological network (stake marks 96+750-97+100 km, 97+750-98+900 km) it is forbidden to build deposits and material gaining sites, and it is necessary to use them as little as possible during the work.

Efforts should be made to minimise the proportion of surfaces that become temporarily or permanently biologically inert.

Along the entire length of the planned alignment, the ruined surfaces will have to be rehabilitated. In addition, attention should be paid to the aftercare of the rehabilitated area and the vegetation in these areas (mainly manual eradication of weeds and invasive species) for 3-5 years after the landscaping and planting after the construction. Key sections for rehabilitation:

- sections within and bordering the Natura 2000 site (stake marks 96+750-97+100 km, 97+750-98+900 km),
- the sections of the Ecological Network affected (stake marks 96+750-97+100 km, 97+750-98+900 km),
- sections of the landscape conservation area (stake marks 91+000-94+100 km, 96+850-97+200 km, 98+100-98+900 km).

For alignment No. 3, if a section of the alignment is carried on a bridge structure, the area between the piers below the roadway will be rehabilitated by planting vegetation between the piers after construction.

In the case of embankments of more than 5 m in height, the areas of gullies are of particular concern from a landscape point of view, as they are subject to significant and permanent disturbance of the surface, which has a long-term impact on the landscape. The best way to integrate tall gullies into the landscape is to plant them appropriately, which will also help to bind the gully.

Planting along the planned alignment is necessary to provide a levelling surface to alleviate the pressure from public road traffic. The plants used for planting must be resistant to the effects of transport, require little maintenance, be suited to the site and, as far as possible, be native species. No invasive species (e.g. acacia, box elder, etc.) can be planted. 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. Plants recommended for planting are

linden, ash, elm and poplar species, as well as grass seed mixes obtained from the Directorate of the National Park (or from a source of supply specified by them).

During the further planning of the planned investment, in the case of later planning phases, such as the plantation section of the permit plan, it is necessary to separately request the preliminary nature conservation opinion of the competent Danube-Drava Park Directorate on the species list to be used for plantation.

3.5. PROTECTION OF BUILT ENVIRONMENT AND CULTURAL HERITAGE

From the point of view of the built environment, **direct** impacts can be considered if the development of the public road is likely to affect cultural heritage and archaeological sites along the alignment.

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.

Current situation

On 30 November 2017, the expressway M60 from stake mark 31+160 km (Pécs area) to stake mark 95+613 km (up to the junction of the connecting road No. 6623 and the main road No. 6) was granted an environmental permit under file number PE/KTF/4213-114/2017. For this section, the previous findings made in the history remain unchanged. In this chapter, the section between the stake mark 91+000 km of the planned alignments alternatives and the country border is examined.

The planned bypass will run within the administrative boundary of Barcs, and will also cross the country border into the Croatian municipalities of Terezino Polje and Katinka and Veliko Polje (which are administratively part of Lukač).

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.

According to the Spatial Plan of Somogy County, the planned changes will not affect the zone of World Heritage and the zone of expected to be a World Heritage.

Within 250 m of the planned alignment alternatives and junction variants there are 2 protected architectural assets which are not affected by the alternatives. The proposed investment will not affect any monuments or historical environment.

For the heritage protection assessment of the project, the Hungarian National Museum prepared the preparatory work part of the Preliminary Archaeological Documentation (ERD-I.) of the "Preparation of the study plan, environmental impact assessment and EIA for the alternatives I. and II. in preparation of the expressway M60 for the intersection of the Barcs border and the connection to the Drava bridge" in 2022 on behalf of Pannonway Építő Kft.

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.

Impact of construction and operation

The sections of the planned road bypasses will reduce traffic on urban roads, thereby improving the quality of life for residents and helping to preserve the condition of buildings and the built environment.

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.

The construction and operation of the proposed project will not have a direct impact on protected architectural values, but will directly affect an archaeological site and a site of archaeological interest. These sites could be threatened by the proposed project.

Potential utility replacements will have no impact on the built environment.

Proposed protection measures

The recommendations of ERD-I should also be followed in further planning and implementation. Further heritage proposals may be subject to change later in the light of the construction plans.

In the course of the archaeological value assessment, no heritage elements to be preserved and to be avoided by earthworks according to Article 21 (3) of the Government Regulation were identified in the area of the planned alignment.

The archaeological sites are under general protection under the Act on the Protection of Cultural Heritage (Kötv). According to Section 19 (2) of Kötv., elements of the archaeological heritage may only be moved from their original position within the framework of archaeological excavation.

Due to the methodological specificities of the surface survey, it should be taken into account that the identified sites are probably larger than they could be measured.

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**.

The Hungarian National Museum is entitled to carry out test excavations and geophysical survey related to the Preliminary Archaeological Documentation, pursuant to Section 23/C (3) of the Kötv. and Section 3 (3) of the Government Decree.

In the course organisation it should be payed particular attention to organising work in a way that minimises disruption to residential areas. In order to protect architectural and built values, transport routes with the greatest impact on the built environment should be avoided when designating built-up areas. During the construction of urban sections of the road, the accessibility of residential areas during construction must be ensured.

Should archaeological finds be discovered during the excavation works, the relevant provisions of the Act on the Protection of Cultural Heritage shall be complied with and the authority shall be notified immediately through the notary.

3.6.NOISE AND VIBRATION MITIGATION

From the protection against noise and vibration point of view, the part of the area affected by the planned facility (study area) is considered to be the

- direct impact area of the planned installation where the planned installation will cause noise pollution or noise pollution changes,
- and the impact area of the roads connected to the planned installation where the vehicular traffic associated with the planned installation will cause additional noise pollution or noise pollution changes.

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

- in the current situation (2021)
- in a long-term reference situation (2037)
- in a planned long-term situation (2037)

Impact area

The direct impact area is described by the data of the so-called „distance of impact area" in the table below.

SETTLEMENT / ROAD SECTION (STAKE MARK)	Prospect (2037)		
	Noise exposure limit/distance (m) of the realized impact area	Noise exposure limit/delimitation of the impact area at night (dB)	Speed (km/h) automobile/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
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

SETTLEMENT / ROAD SECTION (STAKE MARK)	Prospect (2037)		
	Noise exposure limit/distance (m) of the realized impact area	Noise exposure limit/delimitation of the impact area at night (dB)	Speed (km/h) automobile/truck
3./7. Alignment alternative			
RIGHT+DOWN – (M60 – roundabout)	3,6/17	55/45	40/40
RIGHT+UPSIDE (roundabout - M60)	5/	55/45	40/40

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 facility (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 a road section in this case is the connecting road No. 6623, main road No. 6, Darányi road.

Current situation

The current noise situation of the study area is determined by the noise pollution from the main road No. 6, the linking road No. 6623, railway line No. 60 and the surrounding side roads, as well as by the sounds of nature.

Comparing the current noise levels (measured and calculated), with the limit values under 27/2008. (XII. 3.) Common Regulation of KvVM (Ministry of Environment and Water) and EüM (Ministry of Health), it can be concluded that the noise levels of the public road in the vicinity of the direct and indirect impact area does not exceed the prescribed limit values, neither during the day nor at night, in either case.

Impact of construction

Noise emissions from machinery and equipment used during construction and the environmental noise exposure from the construction work are estimated on the basis of literature data and previously carried out noise measurements.

Since the contractor, and therefore the exact technology, machinery, etc., is undefined yet, the construction work can be estimated by taking into account the distance between the study area and the nearest protected area, that, while maintaining the estimated operational and noise parameters given above, **noise levels are expected to be in the permissible levels** due to the long distance to the nearest protected areas.

During the organization of the transports, it is suggested to arrange the vehicles supplying the filling material to transport the material extracted from the excavation process as a return transport. In this way, it is guaranteed the transport of the latter does not have a separate environmental burden.

Previous experience has shown that depending on the construction schedule, transports to the site will be around 2-3 tracks/hour.

It can also be noted that the transport of materials takes place on existing road sections which are typically crowded. Therefore, with proper organisation, and avoiding night transport, no significant increase in noise levels should be expected.

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.

Noise levels during operation will not be affected by the planned utility replacement, so no separate assessment is required.

Impact of operation and working

For noise levels in the direct impact area, as calculated, it can be concluded that noise levels from public road traffic in the vicinity of residential areas and residential buildings do **not exceed the limit values for either alternatives, neither during the day nor at night.**

In the long-term condition, **no traffic noise levels above the limit values is expected in the indirect environment of any of the variants** of the proposed expressway M60 **during daytime and night-time.**

Protection against vibration

Due to the construction of the new expressway, no detectable increase in vibration exposure is to be expected in existing buildings, the weighted equivalent acceleration of vibration does not exceed the limit values under 27/2008. (XII. 3.) Common Regulation of KvVM (Ministry of Environment and Water) and EüM (Ministry of Health), i.e. AM = 10 mm/s² during the day and AM = 5 mm/s² at night, or the maximum A_{max} = 200 mm/s².

Vibration during construction is not expected to pose an environmental risk due to the distance from the residential buildings.

3.7. 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. 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.

Waste in the current environment

Waste is not expected to be generated at the proposed project site by default. The proposed investment will not affect a landfill site or an abandoned or rehabilitated landfill site. The alignment alternatives under consideration run alongside an existing wastewater treatment plant. The alignment alternative No. 3 leads closer to the treatment plant, while the alignment alternative No. 7 leads a little further away.

In the settlement affected by the planned investment, Dél-Kom Nonprofit Kft. is responsible for public waste management services.

Impact of construction

Non-hazardous, hazardous and municipal waste is expected to be generated during the construction and finishing works of the facilities (including material gaining sites), throughout the entire project period, according to the schedule of works.

The legal collection of waste will take place in the mobilisation (organisational) area, and the Construction Plan contains details on the collection, treatment and documentation of waste.

The main categories of waste generated are:

- construction material (cement, concrete, bricks, etc.) scrap, waste,
- sealant and insulation waste,
- bitumen waste,
- waste paints, varnishes and other coating and anti-corrosion materials,
- contaminated diluents and solvents,
- metal scrap (iron, steel),
- wood wastes,
- paper wastes,
- plastic wastes,
- oil and oily waste,
- other wastes.

Depending on the construction techniques used, the above wastes are expected to be generated throughout the project period, according to the schedule of works. A quantitative estimate of waste from demolition activities is included in the Environmental Impact Assessment. Their exact amount will be defined in the Construction Plan.

Depending on the number of people working in the project area, municipal waste is generated continuously.

Most of the waste generated is non-hazardous construction and demolition waste. Hazardous waste generated during construction and demolition works, as well as their soil residues, must be collected separately. With regard to the hazardous waste generated, the provisions of Government Decree No. 225/2015 (VIII.7.) must be complied with and it may be handed over to an authorised recipient for treatment, again in accordance with the principle of proximity and economy, always favouring the treatment of waste by recovery.

If it is possible to recycle a significant proportion of the excavated demolition material, the waste can be recycled into reusable material.

Among the construction waste, excavated soil, concrete and asphalt debris from construction (demolition, construction) can be recycled.

If these excavated demolished materials and soil are not used on the construction site, but are transported from the construction site, they are **considered waste** and must be classified in accordance with the Decree No. 72 of 2013 (VIII. 27.) VM of the Ministry of Rural Development concerning the list of wastes.

Pursuant to Section 2 (4) of the Waste Management Act (Ht.), excavated uncontaminated soil not used at the extraction site may be considered as a by-product if the conditions set out in Sections 8 a) to e) of the Waste Management Act (Ht.) are met or if it is recovered as waste and the conditions set out in Sections 9 and 10 of the Waste Management Act (Ht.) are met for the termination of the waste status.

The **excavated soil surplus** may be deposited at a place designated by the municipality only if it is considered a by-product under Section 8 of the Waste Management Article (Ht.), otherwise it may be handed over only to a recipient holding a final waste management permit.

The **inert wastes** generated during construction - as they do not undergo significant physical, chemical and biological transformation - can be used, after sorting, crushing and grinding operations, for the construction and consolidation of road bases, dirty road bases, as aggregates for new asphalt mixtures, as concrete admixtures, as fillers. Their transfer to an inert landfill is only justified if there is no possibility of recovery of the material.

Under the legislation in force on the management of demolition and construction waste, during the construction phase following the design phases, a record must be kept of the types of waste generated.

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

The replacement of utilities associated with the planned project may generate waste concrete with the identification code 17 01 01, waste aluminium with the identification code 17 04 02 and waste iron and steel with the identification code 17 04 05. Subject to compliance with the relevant legislation detailed above, the impacts of utility replacements from a waste management perspective are considered negligible.

Impact of operation and working

The road section is expected to generate small quantities of hazardous and non-hazardous waste once it is constructed and put into use. Their type is currently only partially known or can be predicted, and there is no information at this phase of the planning process on their exact quantity per types.

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 following activities generate waste during the operation of the road section:

cleaning,

- the transport of municipal waste,
- removal of fallen animal carcasses;

maintenance of green areas,

maintenance and repair,

- maintenance, painting and washing of the road way and road fittings (railings, posts);
- road surface repair (extracted asphalt);

during a potential natural disaster.

Non-recyclable non-hazardous waste should be treated in the same way as, or together with, municipal solid waste.

Activities related to hazardous waste must be organised in accordance with the provisions of Government Decree No. 225/2015 (VIII.7.) on hazardous waste.

Recommended measures:

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 waste generated may be handed over only to a licensed waste treatment operator, respecting the principles of proximity and economy, in all cases giving preference to treatment by recovery.

Waste may only 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.

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

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.

Inert waste generated during construction (construction debris not containing hazardous materials) must be placed in the nearest authorised municipal landfill for inert waste.

Municipal solid waste (municipal waste) generated during construction and operation must be collected in a closed waste container and regularly transported to a non-hazardous landfill (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 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 and licensed company.

3.8. CLIMATE RISK ANALYSIS

The assessment takes into account the relevant provisions and content requirements of the Governmental Decree No. 314/2005 (XII.25.) regarding the procedures of environmental impact assessment and the single procedure of authorization of utilization of the environment. The analysis was based on the criteria of the *Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient (hereafter: the Guidelines)*.

The sensitivity analysis has determined the **sensitivity** of the investment to primary climate change drivers and secondary impacts/climate change risks. The planned investment is highly sensitive to the following weather impacts in particular:

- an increase in the number of hot days (daily maximum ≥ 30 °C),
- increase in the number of heat wave days (daily mean temperature > 25 °C).

Exposure was estimated by assessing and ranking the extent to which the medium to high rated facilities, users and transport links identified in the sensitivity assessment are or will be exposed to adverse climate factors, the expected impacts of changes in these factors in terms of geographical location. The proposed relief road has a high exposure to the following factors in particular for the period up to the mid-21st century (2021-2050):

- increased UV radiation, reduced cloud formation.

The system sensitivity and the area exposure values are used to form a matrix to determine the **vulnerability** of the system under test. The proposed investment is considered vulnerable to the following impacts:

- an increase in the number of hot days (daily maximum ≥ 30 °C),
- increase in the number of heatwave days (daily mean temperature > 25 °C),
- increased UV radiation, reduced cloud formation.

Vehicles, road users, traffic and transport infrastructure will also be directly negatively affected by projected climate change (primary impacts). Based on the risk assessment, the high priority risk and consequence are:

- shortening the life of the road pavement, accelerating its ageing.

The negative impacts presented in this study, which are expected to be more numerous, are mainly relevant during the operational phase. **Mitigation recommendations** (in summary) include the replacement of biologically active surfaces, the use of pavement resistant to extreme weather conditions, and the development of an adequate water drainage system during the implementation of the project. During the design, construction and operation phases, the measures put in place will address the risks identified, both to eliminate them and to ensure the resilience of the system to climate change.

The proposed investment indirectly includes the following **climate change risk factors**:

- As temperatures rise and the frequency of heatwave days increases, roads are increasingly acting as heat traps, with heated asphalt further 'heating' the already warm air around them.
- Road encroachment reduces the amount of biologically active compensatory surfaces, such as forests and agricultural areas, which indirectly has a negative impact on climate change and the adaptive capacity of the impact area.
- Construction and operation also contribute to climate change through greenhouse gas emissions.

During construction, up to 27829 tonnes of CO₂ emissions will be generated for alignment alternative No. 3 and up to 28042 tonnes for alignment alternative No. 7, spread over several years depending on the duration of the construction.

During operation, the additional annual CO₂ emissions compared to the baseline will be ~1955.78 t for junction „A” and ~1967.52 t for junction „C”, if the project is implemented.

The current annual CO₂ absorption of the vegetation of the investment area can be determined from the areas used per crop type, and is as follows:

- for alignment alternative No. 3 and junction A: 538,8103 t,
- for alignment alternative No. 3 and junction C: 542,6001 t,
- for alignment alternative No. 7 and junction A: 581,5956 t,
- for alignment alternative No. 7 and junction C: 585,3859 t.

The extent of the planned planting is not yet known, but is expected to compensate to some extent for the negative impact of land-use change on CO₂ absorption.

To reduce the climate change impact of the investment, the following **measures** are proposed:

- use of machinery with low or zero GHG emission for construction and transport,
- use of technologies with low or zero GHG emission during construction,
- planting of native plants typical of the landscape (including trees, shrubs, grass, etc.) during revegetation.

4. SUMMARY ASSESSMENT

From the point of view of soil and groundwater protection, the negative impacts during the construction period will be related to the occupation of the project site, the scale of excavation works, the impact on areas of high and extremely high sensitivity and aquifers.

The total length of the alignment alternative No. 3 is 8605 m, of the alignment alternative No. 7 is 8671 m. The planned road has a 2x2 lane design with a planned width of roadway of 20 m. Two variants of junction are planned, one symmetrical, half-cloverleaf shaped, grade separated junction is planned for variant „A”, and two roundabouts are planned on the main road No. 6, together with the correction of the Darányi road. One symmetrical, half-cloverleaf shaped, grade separated junction is planned for variant „C”, and three roundabout junctions is planned on the main road No. 6. A complex rest area will be created around stake mark 93+100 km of the expressway M60. In both planned options, the construction of the Drava bridge will also be an intervention.

Although agricultural land is affected by the alignment alternatives, the negative impact of the land occupation is mitigated by the fact that no areas of prime farmland are affected.

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 2022 and the map database of the General Directorate of Water Management (OFV), the studied alignment alternatives do not affect protection areas of drinking water abstraction.

Studies have shown that a ditch system leading up to the receptor has a TPH retention effect, i.e. it reduces the level of pollution. The retention effect is 60% for a properly sized and grassed ditch and 20% for a paved ditch system.

The magnitude of pollution during the operation of the proposed road may be significant mainly in relation to natural disasters and accidents of trucks.

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.

Taking all this into account, the proposed investment is feasible from an earth protection point of view, subject to compliance with the environmental proposals.

The impacts on **surface water status** during both construction and operation are mainly determined by the way and efficiency of water drainage of the new section of the road.

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.

Storm water run-off from the road surface either flows in sheets along the bank and gullies or, in the case of larger gradients and embankment heights, collects along drainage verges and flows through gullies into the drainage system alongside the road.

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.

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. 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.

Air quality protection

On the nearest automatic measuring station to the design area the annual limit values for any of the components measured over the last 5 years, as well as in the baseline measurements has not been exceeded, so the air quality of the study area is considered good.

As regards the construction phase, it can be concluded that, under average meteorological conditions, during rough earthworks, the 24-hour health limit value for particulate matter (PM₁₀) is not expected to be exceeded during road construction, junction construction and rest area construction. The dust load from construction is negligible, the 24-hourly health limit is met with a high degree of certainty even with background pollution.

By complying with the air protection requirements during construction as described in the Proposed Protection Measures section, temporary dust load can be reduced further significantly.

For the alignment alternatives No. 3 and No. 7, the nearest residential building is 172 m from the axis of the planned alignments. Based on the calculations, it can be concluded that the hourly and 24-hour health limits are expected to be met with a high degree of certainty for all three components under consideration in long term.

Air pollution from traffic at the nearest residential building to the intersections is negligible.

For all three components tested, the hourly and 24-hour health limits are met with a high degree of certainty:

Overall, from an air quality protection perspective, the development is not expected to cause conflicts.

From a wildlife conservation point of view, the proposed project directly affects one nationally protected area (Danube-Drava National Park) and two Natura 2000 sites, for which Natura 2000 impact assessment documentation has been prepared.

Ex lege protected fens are located in the immediate vicinity of the development site. There is a locally protected nature reserve within 100 m.

In the case of the eastern alignment No. 3 the loss of Natura 2000 habitats is expected to be as follows: 6440 Alluvial meadows of river valleys of the *Cnidion dubii*: 87535.16 m², i.e. 8.8 ha; 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*): in an extension of 1569,77 m².

In the case of the western alignment No. 7 the loss of Natura 2000 habitats is expected to be as follows: 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*): in an extension of 1616,44 m².

Since the planned investment will take place entirely in habitats that have not been used for this purpose so far, it will be necessary to create further organisational routes in protected Natura 2000 habitats and in northern non-protected forest areas. The de-vegetation of the expropriation area and the foundation earthworks will result in the removal of the original vegetation, which will result in the loss of the protected plant habitat detailed below.

Protected plant species are affected and their habitat will be lost if the project goes ahead. The occurrence of the species concerned is described in detail in the table in the botanical workbook, with exact coordinates. The implementation of the western variant or alignment No. 7 will affect about 4,000 individuals of Snowdrop (*Galanthus nivalis*), 4 stems of Hard Shield Fern (*Polystichum*

aculeatum) and 1 stem of Narrow Buckler-fern (*Dryopteris carthusiana*). The eastern alignment alternative No. 3 will eliminate the habitat of about 75,000 stems of Snowdrop (*Galanthus nivalis*) and 2,300 individuals of Rough Horsetail (*Equisetum hyemale*). In addition to the above, the protected plant occurrences affected by the northern joint alignment are: Narrow buckler-fern (*Dryopteris carthusiana*) 272 stems, Hard Shield Fern (*Polystichum aculeatum*) 1 stem, Mullein pink (*Lychnis coronaria*) 210 stems. In the area where a temporary reservation is planned to be established for the construction of the bridge, it is assumed that the habitat of more hundreds stems of additional protected plants may be eliminated in the case of the alignment alternative No. 3, this will be clarified before the construction.

The eastern alignment alternative No. 3 between stake marks 97+800-98+850 km (up to the Drava) crosses nationally protected and Natura 2000 areas, which, if implemented, will eliminate habitats that provide habitat for more hundreds individuals of protected insects (e.g. cone-headed grasshopper, protected butterfly species) and which are regular feeding areas for protected and strictly protected bat species, protected and strictly protected bird species.

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, it is important to stress that the many elements of the conservation measures (proposals) must all be respected in order to protect wildlife.

Overall, it can be concluded that the proposed project will have an adverse impact on wildlife, even if the proposed standards are met.

From a landscape conservation point of view, agricultural, forestry, municipal and water management land uses are all present in the design area today, and a potential of nature protection is also present. The proposed expressway will affect areas of arable land, forest, pasture and set-aside. It covers both municipal land and planned forest areas.

Main conflict situations for the planned road: the planned road crosses a Natura 2000 site; it crosses forest areas; it crosses a landscape conservation area; and it has an adverse aesthetic impact on the landscape.

The change in land-use patterns during construction occurs mainly in the permanently occupied areas: the loss of former cultivated land (arable, forest, pasture) and areas close to the nature and the development of transport land in their place. The planned expressway and its associated facilities (e.g. interchanges) will appear as a new linear landscape element of artificial origin in the landscape structure. The landscape structure is therefore expected to change to a lesser extent in a long-term basis.

The investment should result in a reduction of biologically active surfaces in the design area. Planned forest area will be used, and tree felling and brush clearance will also be required.

The planned intervention will involve the construction of 4 underpasses and 2 overpasses for the alternative No. 3 and 3 overpasses for the alternative No. 7.

If the proposed measures are respected and the road and its facilities are properly integrated into the landscape, the project is considered acceptable from a landscape point of view.

In terms of the built environment, according to the Spatial Plan of Somogy County, the planned changes will not affect the zone of World Heritage and the zone of expected to be a World Heritage. Within 250 m of the planned alignment alternatives and junction variants there are 2 protected architectural assets which are not affected by the alternatives. The proposed investment will not affect any monuments or historical environment.

Out of the 2 archaeological sites identified in the total study area, 1 site is affected by 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.

Subject to the proposed protection measures, it can be concluded that the proposed investment is feasible in terms of the protection of the built environment.

For noise and vibration load in the direct impact area, as calculated, it can be concluded that the noise load from public road traffic in the vicinity of residential areas and residential buildings does **not exceed the limit values for either alternatives, neither during the day nor at night.**

In long-term condition, **no traffic noise load above the limit values is expected in the indirect environment of any of the variants** of the proposed expressway M60 **during the day or night.**

Since the contractor, and therefore the exact technology, machinery, etc., is not yet known, the construction work can be estimated by taking into account the distance, that, while maintaining the estimated operational and noise parameters given above, **noise load above the limit value is not expected** due to the long distance to the nearest protected areas. Noise levels during operation will not be affected by the planned utility replacement.

In summary, the project meets the relevant noise protection requirements.

From the waste management point of view, the amount of waste can be minimised during the construction works by complying with the listed waste management principles and the relevant legal requirements. Responsible waste management can be achieved by minimising the waste generated during construction and operation, by proper collection, transport and disposal of waste for recovery, and by taking the preventive measures listed above.

From a climate change perspective, it can be concluded that the proposed investment is *vulnerable* to the expected impacts of climate change. Furthermore, the impact of the planned investment on climate change is *small* due to its scale. Proper implementation of climate change mitigation proposals can significantly mitigate the expected negative impacts on the proposed investment.

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