**PREPARATION OF**

**M44 EXPRESSWAY**

**SECTION BÉKÉSCSABA – SALONTA (NATIONAL BORDER)**

**PST: A044.22**

# ENVIRONMENTAL IMPACT ASSESSMENT

# NON-TECHNICAL SUMMARY

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**April 2026**

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https://www.mmk.hu/kereses/tagok
http://ttsz.am.gov.hu/szakertok/szemelyek

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# 1. INTRODUCTION

The aim of the project is to promote the economic and transport integration of the Hungarian-Romanian border region, which is currently cut off from each other, by exploring and preparing the development opportunities of the main transport corridors between the two countries and the related secondary road network – in such depth that the border between Hungary and Romania, which will become a Schengen member, does not pose any physical obstacle to the passenger and freight traffic between the two countries at any level.

In its letter KIFEF/22243/2022-ITM, the Ministry of Innovation and Technology (hereinafter: ITM) ordered the preparation of a project entitled "Preparation of the expressway between the M44 expressway (Békéscsaba) and the national border (Salonta)" in order to develop cross-border connections. Within the framework of the preparatory tasks, it is necessary to prepare a study plan, an environmental impact study and obtain an environmental permit. However, in order to speed up the preparatory tasks, based on the decision of the Ministry of Economic Affairs, it is also a task to prepare the permit and construction plans and to obtain the construction permits necessary for implementation.

**Basic data of the permit applicant:**

Ministry of Construction and Transport
1054 Budapest, Alkotmány utca 5.
KRID ID: 661766363
short name: EKMUTHAT

Environmental permits are requested for the following facilities:

- M44 main road in the case of V01 design 43047 m (between section 0+000 – 43+047 km), in the case of V02 design 43378 m (between section 0+000 – 43+378 km)
- Expansion of the engineering sites in Békéscsaba and Sarkad
- New engineering site at Doboz
- Axle weight measuring station near Újszalonta
- Junctions and structures

The project also includes dirt roads for access to the cut properties and the construction of junction connections. In addition, the permit application also applies to related facilities, such as structures, public utilities and bicycle paths. The subject of the permit is presented in detail in Chapter 2.2 Basic data of the planned facility.

According to our current knowledge, the implementation of the first phase of the project is assumed by 2030 at the earliest, and the handover of the second phase by 2033.

# 2. THE PLANNED FACILITY

### Planning parameters, activity volume

Road category: expressway

Crown width: 20 m

Number of traffic lanes: 2×2 lanes, without emergency lanes

Design length: 43044 m (between section 0+000 – 43+044 km) in the case of V01 and 43375 m (between section 0+000 – 43+375 km) in the case of V02 design

The main road design of 2x2 lane outlying roads with a crown width of 20 m.

### Horizontal and vertical rout alignment

The planned new expressway would continue towards the national border, starting from a new grade-separated interchange to be constructed near km 111+500 of the existing M44 expressway. The new section would follow the same technical standards and design parameters as the already completed expressway. The total planned length is 43.044 km (between km 0+000 and 43+044) for the V01 version and 43.431 km (between km 0+000 and 43+431) for the V02 version.
The route begins near km 111+650 of the M44 expressway, where a new half-cloverleaf interchange will be constructed at the former junction of Main Road 47 and the M44. For the first 4 km, the alignment runs along the boundary of the settlements of Murony and Békéscsaba. It crosses Main Road 47 on an overpass at km 3+736, where another half-cloverleaf interchange will be established.
At km 4+069, the route enters the administrative area of Békéscsaba. The MÁV railway line No. 120 (Szolnok–Békéscsaba–Lőkösháza) will be crossed by an overpass at km 4+833. The alignment then approaches Main Road 470 from the south while bypassing the nearby fishing lakes. Dirt Road 0709 will pass beneath the expressway through an underpass, which will require modification of the existing road. Dirt Road 0111 will also cross the alignment through an underpass. In this area, one affected farm building will need to be demolished.
The crossing of Main Road 470 will take place at km 10+411 through a grade-separated interchange. A full-service rest area will also be developed at this location. Several farmhouses within the area of the planned rest stop will need to be demolished.
The route crosses the Élővíz Canal at km 11+482 and the Gerla backwater at km 12+571. Additional farmhouse demolitions will also be required near km 9+900 and km 13+100.
After the interchange with Road 4238, the alignment turns to the right and continues parallel to the Doboz–Gerla border canal. It bypasses the Natura 2000 protected area known as the Körösköz forests (HUKM20011) from the north without directly affecting it, then curves left towards the embankment of the Kettős-Körös River. The river crossing, including its floodplain which is also designated as a Natura 2000 protected area, takes place at km 17+700 approximately perpendicular to the river. After crossing the river, the road turns slightly to the right.
The planned expressway bypasses the built-up area of Doboz from the north. At km 19+508, Zsibongó Road will be rerouted beneath the M44 through an underpass. Between km 19+800 and 21+150, the route crosses the Natura 2000 protected area called Körösközi erdők (HUKM20011). The alignment then bypasses a solar park from the north before continuing along a straight section parallel to an existing dirt road (Plot No. 032).

The Varga-hossza main canal will be crossed by an overpass at km 20+647, where the existing dirt road will also need to be relocated. At the end of the bypass section, the alignment turns slightly left and crosses Road 4234.
A grade-separated interchange will also be constructed at the crossing with Road 4234 at km 21+227. On the northern side of the expressway, an engineering and maintenance site may be established for operation purposes.
After the interchange, the alignment turns slightly right and continues along a long straight section.
A large wildlife crossing will be constructed at km 24+346, which will also allow the passage of a dirt road.
Two alternative alignment versions were developed for the section between km 24+346 and 30+300.

V01 version

After the wildlife crossing, the route turns northeast. Following the bridge over the Fekete-ér Canal at km 26+432, the alignment enters the administrative area of Sarkad. It then crosses the Gyepes main canal — including its riverbed and riparian zone, which are also designated as Natura 2000 protected areas — by bridge before reaching the settlement of Sarkad.

V02 alternative version

Because the V01 version crosses the Fekete-ér Canal and the Gyepes main canal at technically unfavourable angles, an alternative V02 version was developed for this section. The V02 alignment diverges from the V01 route at km 24+000 and continues in a straighter direction before crossing the Gyepes main canal at a more favourable angle after a left-hand curve. Although the V02 version is 387 m longer, the improved crossing geometry of the watercourses significantly reduces construction costs and is expected to be more acceptable from a water management perspective.

After the section with the two alternative versions, a grade-separated interchange will be constructed at the junction with Road 4219 connecting Sarkad and Sarkadkeresztúr. This interchange will provide access between the expressway and the local road network serving the nearby settlements.
Near km 35, a simple rest area will be established to provide safe stopping opportunities for both passenger cars and heavy goods vehicles.
The route bypasses the settlement of Méhkerék from the north and crosses the existing MÁV railway line No. 128 (Békéscsaba–Kötegyán–Vésztő–Püspökladány) on a flyover.
Another grade-separated interchange will be constructed near the boundary of the settlements of Újszalonta and Méhkerék, providing the nearest access to the national border. Existing Road 42153 will require realignment because of a nearby gas plant and solar park. The interchange will have a half-cloverleaf design. The deceleration and acceleration lanes will continue towards the border as collector-distributor lanes in order to provide access to the planned border control station for truck inspections. The checkpoint will be designed on both sides of the road, allowing the inspection of trucks travelling both to and from Romania.
The M44 expressway will reach the Romanian border at km 43+044 (or km 43+375 in the case of the V02 version). The border crossing complex itself will not be located within the territory of Hungary.

**Cross-sectional design**

Crown width: 20.00 m
Number of traffic lanes: 2x2

***Table 1. Planned intersections***

| Km no. | Node type | Connecting / Crossing Road/Railway/Watercourse |
|---|---|---|
| 0+000 km no. | Beginner, half-clover junction | M44 |
| 3+736 km no. | One-sided half-clover csp. Diagonal half-clover csp. | M44 - M47 |
| 10+411 km no. | Complex rest area combined with a junction | M44 - Main road 470 |
| 21+227 km sz. | Diagonal Half-Clover | M44 - Road 4234 |
| V01: 32+037 km<br>W02: 32+368 | Half-clover | M44 - Road 4219 (Sarkad) |
| V01: 35+000 km<br>W02: 35+331 | Simple resting place (Sarkad) | M44 |
| V01: 40+715 km no.<br>W02: 41+046 | Half-clover | M44 - Road 42153 (Méhkerék) |
| V01: 42+000 km no.<br>W02: 42+331 | Checkpoint (Méhkerék) | M44 |

**Rainwater drainage concept, watercourse bed corrections**

The elevation of the planned trails follows the existing terrain level, the track level will be lifted from the terrain at a minimum height of 2-3 m on an embankment. The entire length of the roadway is embankment-like, the track level has been determined in such a way that the drainage of the pavement structure above the high inland water level and groundwater level is ensured.

Rainwater flowing down from the road surface either flows down the shoulder and slope like a shroud, or in the case of a larger drop in length and embankment height, it collects along drainage edges and flows down through slope chutes into the drainage system established next to the track.

Drainage bases can be built on the entire section to accommodate the runoff and accumulating rainwater. The terrain is table-like, so the slope of the drainage ditches is typically 3 ‰ longitudinal. In the case of a length drop of less than 3 ‰, a reservoir ditch must be designed.

The bottom level of the reservoir ditches will be established at least 1.0 m above the standard groundwater level in order to protect groundwater.

The description of rainwater drainage by sections can be found in the following tables. Rainwater is either deposited in a surface receptacle or in reservoir ditches. Desiccation is not planned.

***Table 2. Drainage design***

| **Affected Roadway Section [km gauge]** | **Name of the receiving watercourse / Reservoir ditch** | **Watercourse section** | **Watercourse affected hrsz.** | **Watercourse standard flow [m3/s]** | **bottom-width [m]** |
|---|---|---|---|---|---|
| 0+00 - 4+500 | Reservoir trench | - | - | - | 1,0 |
| 4+500 - 5+780 | Gyuriréti Canal | 6+104 | Békéscsaba 0722 | 0,442 | 1,2 |
| 5+780 - 6+100 | Gyuriréti XII Canal | 0+241 | Békéscsaba 0718 | 0,576 | 1,8 |
| 6+100 - 7+100 | Gyuriréti-IX. Canal | 0+738 | Békéscsaba 0714 | 0,145 | 0,6 |
| 7+100 - 10+380 | Reservoir trench | - | - | - | 1,0 |
| 10+450 - 11+634 | Gyuriréti Canal | 0+732 | Békés 053/1 | 0,9 | 2 |
| 11+634 - 12+490 | Sikonyi-perceiving channel | 1+052 | Békéscsaba 0436 | 0,289 | 1 |
| 12+615 - 13+800 | Doboz-Gerlai Border I-1 Canal | 0+732 | Békéscsaba 01213 | f.i. | f.i. |
| 13+800 - 14+700 | Reservoir trench | - | - | - | 1,0 |
| 14+700 - 16+657 | Dánfokéri Canal | 5+866 | Box 0189/12 | 1,022 | 1 |
| 16+681 -17+200 | Doboz-Gerlai Határ III. Canal | 0+354 | Box 0190 | 0,416 | 0,6 |
| 17+200 - 17+420 | Reservoir trench | - | - | - | 1 |
| 17+800 - 19+474 | D3 Magsári 1 channel | | | | |
| 19+474 - 19+900 | V-8. Magsári Canal | 3+123 | Box 010 | 0,48 | 0,8 |
| 19+900 - 21+300 | Reservoir trench | - | - | - | 1 |
| 21+300 - 23+100 | Channel D-5 | 0+593 | | | |
| V01 | | | | | |
| 23+100 - 26+425 | Reservoir trench | - | - | - | 1 |
| 26+450 - 27+900 | - | - | - | - | 1 |
| 28+200 - 29+660 | Reservoir trench | - | - | - | 1 |
| 31+600 - 32+300 | Channel C-IX | 2+554 | Sarkad 0209 | 0,19 | 0,6 |
| 32+300 - 34+260 | Reservoir trench | - | - | - | 1 |
| 34+293 - 35+094 | Horgaséri Canal | 2+397 | Sarkad 021 | 0,257 | 0,8 |
| 35+094 - 35+680 | Horgasér Side Canal | 1+130 | Sarkad 021 | f.i. | f.i. |
| 35+680 - 37+400 | Reservoir trench | - | - | - | 1 |
| 37+400 - 37+900 | Oly-ér | 2+697 | Bee wheel 0195/6 | f.i. | f.i. |
| 37+985 - 39+460 | Reservoir trench | - | - | - | 1 |
| 39+460 - 39+841 | Canal F-VII-7 | 0+878 | Bee wheel 085/20 | 0,115 | 1,2 |
| 39+841 - 41+250 | Channel F-VII-10 | 0+210 | Beewheel 073/2 | f.i. | f.i. |

| Affected Roadway Section [km gauge] | Name of the receiving watercourse / Reservoir ditch | Watercourse section | Watercourse affected hrsz. | Watercourse standard flow [m3/s] | bottom-width [m] |
|---|---|---|---|---|---|
| 41+250 - 41+860 | Channel F-VII-5 | 0+721 | New Salonta 0416 | 0,069 | 0,6 |
| 41+860 - 43+000 | Reservoir trench | - | - | - | 1 |
| V02 | | | | | |
| 23+100 - 27+000 | Reservoir trench | - | - | - | 1 |
| 27+000 - 27+245 | Channel C-IV-2 | 1+282 | Doboz 099 | 0,23 | 0,8 |
| 27+245 - 27+861 | S-14.-csatorna | 1+170 | Sarkad 0684 | f.i. | f.i. |
| 27+861 - 29+123 | Reservoir trench | - | - | - | 1 |
| 29+300 - 31+970 | Reservoir trench | - | - | - | 1 |
| 34+680 - 35+481 | Channel Horgaséri | 2+397 | Sarkad 021 | 0,257 | 0,8 |
| 35+481 - 36+067 | Channel Horgaséri | 1+130 | Sarkad 021 | f.i. | f.i. |
| 36+067- 37+787 | Reservoir trench | - | - | - | 1 |
| 37+787 - 38+287 | Oly-ér | 2+697 | Méhkerék 0195/6 | f.i. | f.i. |
| 38+287 - 39+847 | Reservoir trench | - | - | - | 1 |
| 39+847 - 40+228 | Channel F-VII-7. | 0+878 | Méhkerék 085/20 | 0,115 | 1,2 |
| 40+228- 41+637 | Channel F-VII-10. | 0+210 | Méhkerék 073/2 | f.i. | f.i. |
| 41+637 - 42+247 | Channel F-VII.-5. | 0+721 | Újszalonta 0416 | 0,069 | 0,6 |
| 42+247- 43+387 | Reservoir trench | - | - | - | 1 |

***Table 3. Watercourse corrections***

| Watercourse name | Length of watercourse correction |
|---|---|
| Gyuriréti Canal | 100 |
| Gyuriréti XII Canal | 114 |
| Gyuriréti Canal | 187 |
| Doboz-Gerlai Határ III. Canal | 131 |
| V-8. Magsári Canal | 194 |
| Channel D-5 | 672 |
| S-14 Canal | 141 |
| Peckesi-csatrona | 143 |
| Channel C-IX | 228 |
| Horgasér Side Canal | 193 |
| Canal F-VII-7 | 235 |
| Channel F-VII-10 | 431 |

***Table 4. Structures***

| Artwork sign | Structure Coupon | Crossed facility, obstacle | Type |
|---|---|---|---|
| V01/0 | Before 0+000 | Separation csp., junction branch transfer | overpass 27.00 m {29.50} crowns |
| V01/1 | ~3+736 | Main Road No. 47 | overpass 12,00m {20,00} crowns above |
| V01/2 | ~4+833 | MÁV No. 120. Bp. - Szolnok - Békéscsaba - Lökösháza - oh. vv. | overpass, 2-track vv. Above |
| V01/3 | ~6+683 | Dirt road | underbridge 20.00m {26.00} crowns |
| V01/4 | ~8+213 | Dirt road | underbridge 20.00m {26.00} crowns |
| V01/5 | ~10+411 | Main Road 470 | underbridge 20.00m {26.00} crowns |
| V01/6 | ~11+482 | Living water channel | overpass, over a watercourse |
| V01/7 | ~12+571 | Gerlai Backwater | overpass, over a watercourse |
| V01/8 | ~13+520 | Road 4238 | underbridge 20.00m {26.00} crowns |
| V01/9 | ~17+700 | Kéts-Körös River | overpass, over the river |
| V01/10 | ~19+508 | Zsibongó Street (paved road) | underbridge 20.00m {26.00} crowns |
| V01/11 | ~20+647 | Varga Longitude Main Canal | overpass, over a watercourse |
| V01/12 | ~21+227 | Road 4234 | underbridge 27.00 m {29.50} crowns |
| V01/13 | V01~24+345<br>V02~24+345 | Game passage + dirt road | underbridge, 20.00m {26.00} crowns |
| V01/14 | V01~26+425<br>V02~26+247 | Dirt road | underbridge 20.00m {26.00} crowns |
| V01/15 | V01~28+141<br>V02~29+231 | Grassland Main Canal | overpass, over a watercourse |
| V01/16 | V01~28+581 | Peckesi Canal | overpass, over a watercourse |
| V01/20 | V01~29+693<br>V02~30+080 | Dirt road | underbridge 20,00m {26,00} |
| V01/17 | V01~32+044<br>V02~32+431 | Road 4219 | underbridge 27.00 m {29.50} crowns |
| V01/21 | V01~35+724<br>V02~36+111 | Dirt road | underbridge 20,00m {26,00} |
| V01/22 | V01~37+361<br>V02~37+748 | Dirt road | underbridge 20,00m {26,00} |
| V01/18 | V01~37+930<br>V02~38+317 | MÁV No. 128 Kötegyán - Vésztő - Püspökladány vv. | overpass, 1-track vv. Above |
| V01/23 | V01~39+574<br>V02~39+961 | Game passage + dirt road | underbridge, 20.00m {26.00} crowns |
| V01/19 | V01~40+712<br>V02~41+099 | Road 42153 | underbridge 27.00 m {29.50} crowns |

The planned bridge of the Kettős-Körös is a net-suspended orthotropic arch bridge, where the steel arches are located on the edges of the structure and the traffic directions are on separate structures. The spectacular flat curves harmoniously fit into the environment, but at the same time they provide an experiential passage through the river, and with the net-arranged suspension cables, the places also refer to basket weaving. During the construction of the bridge,

temporary area occupation must be expected, which means the use of a 25-25 m strip from the axis of the bridge.

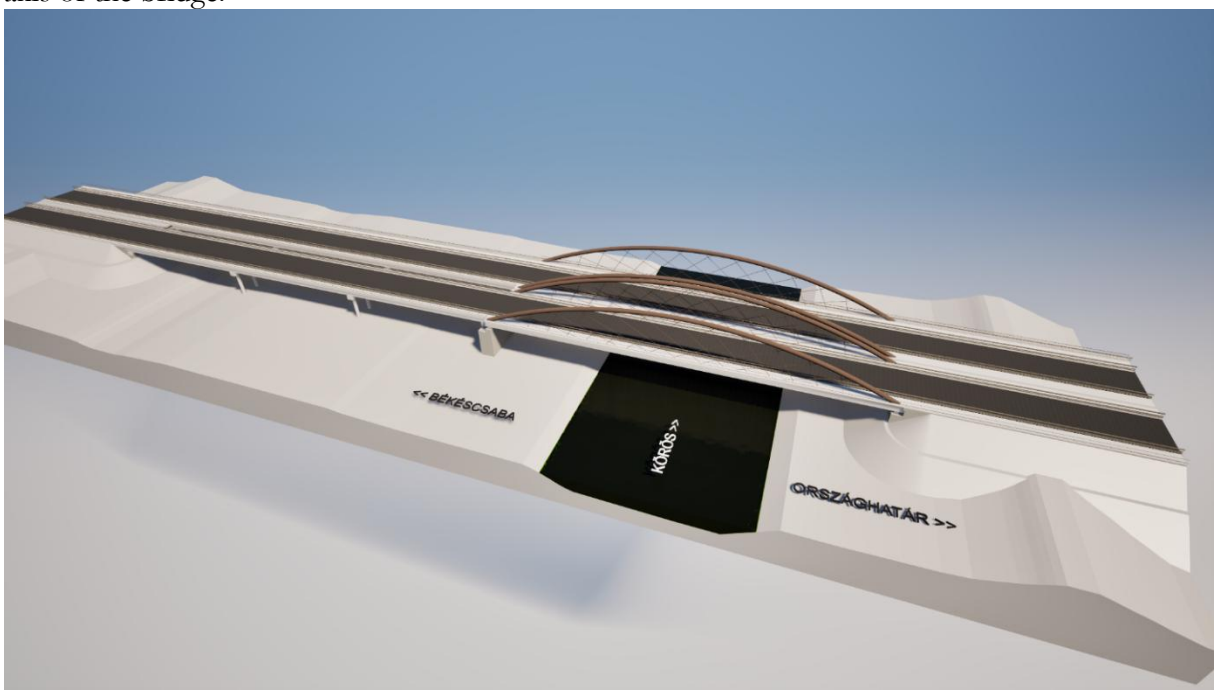


***Figure 1. Planned bridge over the Kettős-Körös from the south.***

The substructures of the bridge are built with drilled reinforced concrete piles, on top of which there are on-site monolithic reinforced concrete access structures. The brace girder and arch girder of the river bridge are assembled on the shore and then put into place using push technology with the help of yokes and arch stiffening scaffolds. The tensioning of the suspension cables is carried out in the final position of the bridge. The floodplain bridge is built using the traditional construction method (lifting in beams and then making a deck slab).

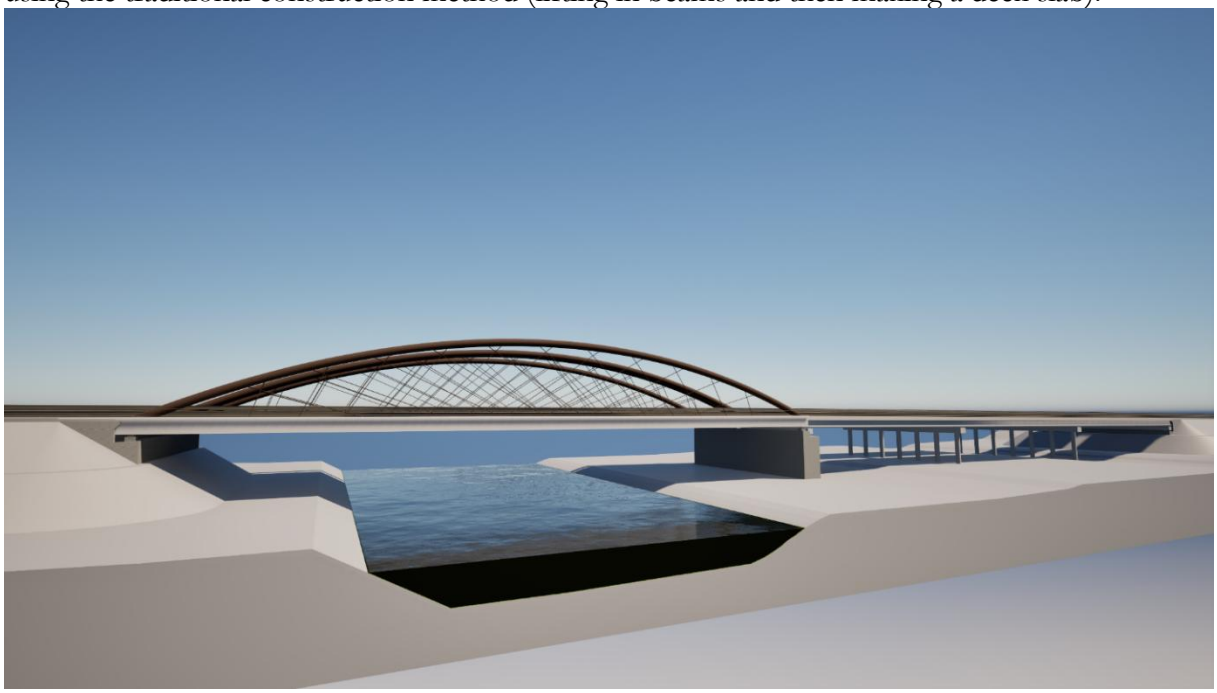

***Figure 2. Visual design of the planned bridge of the Kettős-Körös from the north***

Landscape visualisations are included in the 5.8.5.2. Changes in the landscape.

During the construction of smaller bridges, temporary area occupation must be expected, which means the use of a 15-15 m strip from the axis of the bridge.

***Table 5. Utility constructions***

| km no. | Nature of public utilities | Intervention |
|---|---|---|
| 0+086 | Existing 400kV overhead line | Redemption |
| 0+145 | Existing high-voltage overhead line | Redemption |
| 19+518 | Existing sewage discharge line | Redemption |
| 21+211 | Existing high-medium pressure gas pipeline | Redemption |
| 22+373 | Existing high-medium pressure gas pipeline | Redemption |
| V01 28+070<br>V02 29+280 | Existing high-medium pressure gas pipeline | Redemption |
| V01 29+631<br>V02 30+018 | Existing high-medium pressure gas pipeline | Redemption |
| V01 32+024<br>V02 32+411 | Existing high-medium pressure gas pipeline | Redemption |
| V01 35+944<br>V02 36+331 | Existing high-medium pressure gas pipeline | Redemption |
| V01 41+104<br>V02 41+491 | Existing high-medium pressure gas pipeline | Redemption |

In the course of preparing the environmental impact assessment, it is necessary to examine whether the planned public utility crossings and replacements are activities subject to a preliminary assessment pursuant to Government Decree 314/2005 (XII.25.). Points 76, 77, 79, 95 and 104 of Annex 3 of the Government Decree provide for the public utilities subject to preliminary examination, which are supplemented by point 131 of Annex 3.

Based on this, only those replacements with the new route need to be examined, where the new location of the route of the pipeline reaching the threshold value affects a protected natural area, Natura 2000 area, water base or site, or cave protection zone in a different way than the existing one, or a significant modification of the existing facility is planned.

**According to our current information, no public utility replacement or intervention is planned that has to be subject to an environmental screening procedure.**

During the later planning phases, it is necessary to check whether the above statement still exists for the new route of the replacements.

### Expansion of the Békéscsaba maintenance facility on site

The Békéscsaba maintenance facility was established at 144 Berényi Road, Békéscsaba (hrsz: 0633/2, area 48,411 m2).

The main goal is to create a modern operational background that is also suitable for the management of the expressway network, which will surely perform the increased tasks from the time of handover.

The most significant transformation is the expansion of the capacity of the site: the number of employees will increase from 74 to 118, which will require the establishment of new office and social functions. The office and social building will be expanded by about 800-850 m², with standby rooms, a dispatcher and server room, foreman's offices, a larger briefing area and a recreation room. The existing workshop building is outdated, so after its demolition, a new, modern workshop-garage building with a repair pit, a locksmith's workshop and modern repair equipment is necessary.

Due to the significant expansion of the machinery and vehicle fleet, the construction of a new, closed, tempered machine storage with a floor area of at least 1300-1500 m² is justified, with an entrance on both sides and adequate leachate drainage. In addition, it is necessary to establish covered, closed garages for cars and vans, as well as the establishment of a separate small machine storage area.

The storage capacity will also be significantly expanded: several separate panel warehouses, material storage, covered and open battery storage, hazardous goods and lubricant storage, and a new 3500-ton salt storage building with brine mixing system and tanks will be built. In addition, the establishment of crushed stone storage facilities and a landfill area of 8–10,000 m² is also justified.

At the infrastructural level, a complete public utility and electricity network review and replacement will be carried out, with the construction of modern, energy-efficient (e.g. heat pump, solar panel) systems. A new integrated security system (cameras, license plate recognition, access control), a weighbridge, a modern fuel station, extended parking lots and a new entrance system are also part of the development.

Overall, the transformation of the engineering site is a complex investment that requires the construction of new buildings and modern technical infrastructure, which will raise the traditional road engineering functions to the level of expressway operation.

**Expansion of the Sarkad maintenance facility on site**

The maintenance facility is located in the inner area of Sarkad on an area of 4452 hrsz, 28,512 m2, at 40 Anti Road. The maintenance departments need to be completely renovated and rebuilt within the existing areas.

The most important planned intervention is the demolition of the existing office and social building and the construction of a new, modern building for the expected number of 70-75 people (adjusted to the current staff of 37 to 71). In the new building, a dispatch centre, standby rooms, a briefing and training area (100–120 m²), foreman's offices, a recreation room, and appropriate archiving and storage functions are planned.

The demolition of the workshop building and the establishment of a new workshop-garage integrated with the temperature-controlled machine storage are planned. The new facility will include a two-station assembly shaft (20–22 m), additional assembly stations, a locksmith's workshop (approx. 150 m²), modern repair equipment, a battery charger, a small machine repair room and a social block. A minimum 26 m wide, temperature-controlled garage will be built for trucks and winter adapters, as well as a covered machine storage of about 1000 m² and a separate small machinery warehouse.

Significant expansion will also take place in the field of storage and material storage: new field warehouses, covered and open element storage facilities, hazardous goods and lubricant storage, and a new salt storage building with a capacity of 3500-4000 tons will be established with a brine mixing system and tanks instead of the current 800-ton salt storage facility. In addition, it is necessary to establish crushed stone storage facilities and a landfill area of about 0.8 hectares.

The development also includes a new, modern fuel station (with 2×25 m³ tanks), a 60-ton weighbridge, an extended – partially covered – car park, a full fence and barrier entry, as well as the construction of an integrated security system. The overhaul and replacement of the entire public utility and electrical network, the establishment of modern space lighting, and the development of IT and data transmission infrastructure (dispatcher, server and technical rooms) are also basic requirements.

All in all, the development of the engineering department in Sarkad means a complete site reconstruction, which will raise the existing, obsolete infrastructure to a modern, energy-efficient and safety-related level suitable for the operation of an expressway network, with completion at the same time as the handover of the M44.

**New maintenance facility in the area of Doboz**

In view of the length of the new expressway, it is necessary to place an maintenance facility between the settlements of Sarkad and Doboz, which will be planned at the junction of the expressway with road 4234, in an agricultural area, with placement close to the junction, as a greenfield investment, as a new combined engineering site.

The total area requirement of the new site – including additional facilities and external landfills – is 5.5–6.0 hectares, to which an additional 1.5–2.0 hectares of open-air landfill area is attached. The engineering team must ensure the joint operation of the expressway and the existing national road network, with a total of 71 employees, with a reinforced staff of dispatchers, road inspectors and skilled workers. The fleet is significantly expanding: among other things, 8 trucks, 4 Unimogs, winter adapters, salt spreaders, snow ploughs, special mowers, as well as traffic engineering and maintenance equipment are required.

The office and social building must be suitable for accommodating 7 standby rooms for three people, foreman and administrative offices, and a separable briefing/teaching area of 80-100 m². A separate recreation room must also be provided for those working on 12 and 24 hour duty. In the energy design of buildings, modern, preferably renewable energy sources (geothermal or heat pump system, solar panel) solutions with low operating costs must be used.

The workshop-garage complex is of paramount importance: a through assembly hall with a 20-22 m long, two-station assembly shaft (with a 12-14 ton hoist), additional repair stations, a locksmith's workshop of about 350 m² and equipment necessary for the maintenance of heavy machinery. A temperature-controlled closed machine shed with a minimum width of 26 m must be established for trucks, with an entrance on both sides.

The full public utilities of the site, the construction of a modern electrical and data transmission network, optical backbone network connection, server room (min. 6.25 m²), IT and security technology system (cameras, license plate recognition, access control, fire alarm) supporting 24-hour dispatch service are basic requirements.


***Figure 3. Planned location of the maintenance facility at Doboz***

## M44 - 470 km junction (10+411 km) Complex rest area combined with a junction

The trail crosses road 470 j at section 10+411 km. The track leads off-road, on a small embankment, the main road 470 j will be crossed over the expressway. The planned complex rest area can be developed west of road 470 j, due to the existing and planned industrial and agricultural developments on the other side of the road.


***Figure 4. Complex rest area combined with a junction***

The external road network of the complex rest area provides access to the expressway. The inner and outer roads of the rest area and the junction branches are connected to each other by roundabout sub-junctions. Its design is basically symmetrical. Due to the space requirement of the complex rest area, the junction branches were placed so far from road 470 j that its planned structure falls on a section of the river course.

It is also possible to place a solar battery and electric fast charging stations at the rest area.

### M44 (V01: 35+000 km, V02: 35+387) Resting area/truck stop (Sarkad)

In accordance with UME regulations, a simple rest area must be placed on the M44 main road. The design is connected to the M44 expressway by accelerator-deceleration connections, and provides safe stopping opportunities for cars and trucks on the inside.


***Figure 5. Simple resting place (Sarkad)***

It is also possible to place a solar battery and electric fast charging stations at the rest area.

### M44 (V01: 42+000 km no., V02: 42+387) Checkpoint (Méhkerék)

In the design, freight traffic is diverted from the main track to the pre-screening phase with the help of pre-signals. If there is no disruption in the pre-filter, it is released back to the main track, if the pre-filter indicates a problem, it is diverted into the rear part and the necessary more detailed examinations are carried out. After the rear control section, a two-sided truck parking area will be created in the middle, providing the possibility of parking to the side. On the entrance section, a connection will be established, which is normally closed but can be opened for extreme vehicles, which leads directly to the parking area.

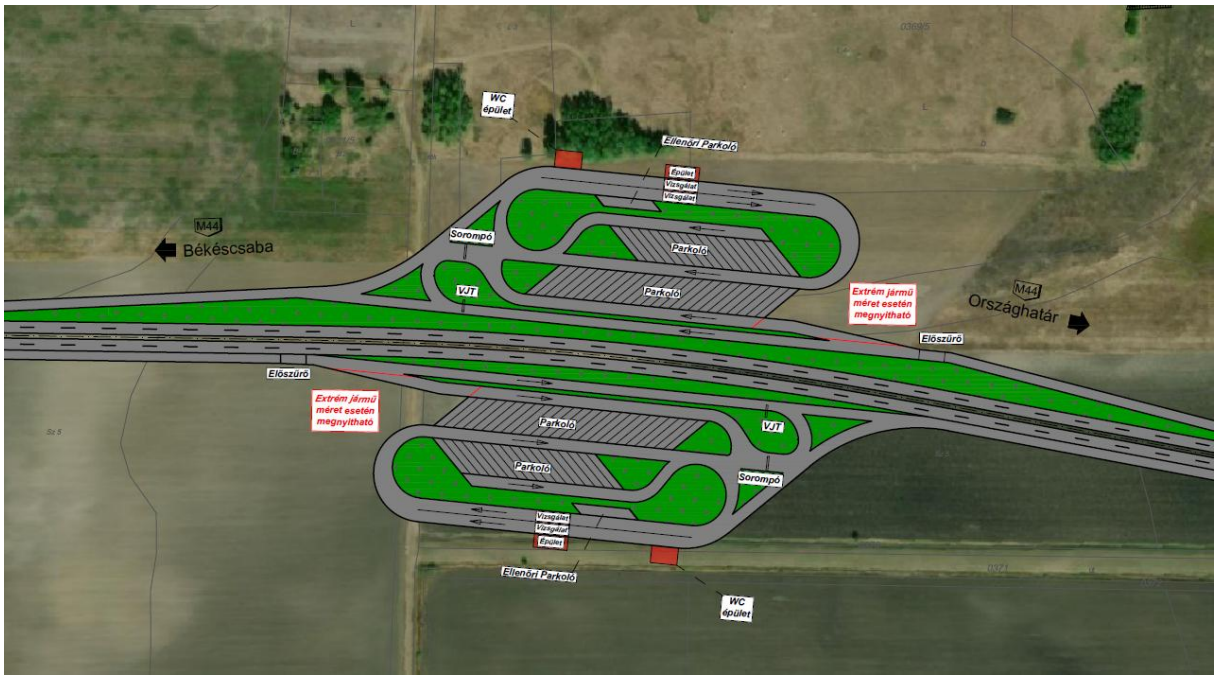


***Figure 6. Checkpoint (Méhkerék)***

# 3. EFFECTS, IMPACTS, IMPACT BEARERS, AREAS OF IMPACT

In this chapter, we examined the following conditions, activities and their effects on the individual environmental elements in the case of the planned junction branches and roads:

Current state: the current state is evaluated as a reference state.

Construction: an activity of a certain period of time, the effects of which may occur within the work area (area to be expropriated), in its immediate surroundings, or through transports on the road network of the area and in the surrounding settlements.

Implementation, operation: it appears in the occupation of the area and the dividing effect. The effects will persist with the establishment of the facility, regardless of the traffic.

Impacts of traffic, which are mainly related to the emission of noise and air pollutants from motor vehicles.

Impact of facility operation: impacts generated by maintenance and upkeep processes.

Abandonment: the termination of the junction is unlikely due to its national importance, so we do not wish to deal with it further.

Emergency: the effects of accidents, fires and the release of hazardous materials can be expected during the construction and operation of junction branches.

The influencing factors are the above activities and the facility itself, during which the state changes of the environmental elements start. Impact bearers are environmental elements or systems in which state changes can be detected or detected.

The environmental elements and systems examined are the following:

- Earth, groundwater
- Surface water
- Air
- Wildlife: humans, plants, animals
- Built environment
- Landscape (the environment as a whole)

Risk factors:

- Noise, vibration
- Waste
- Air pollutants
- Human presence

The total area of impacts is the sum of the areas of direct and indirect effects. The direct area of impact is made up of the areas that can be assigned to each of the impact factors, which can be the areas of spread of certain material or energy emissions into soil, water and air, as well as the areas of direct use. The immediate area of influence is the part of the environment where the change in environmental load can be detected. The indirect impact area is the area of the impact processes that spread due to the changes in the environmental state in the areas of direct impacts.

## 3.1. Protection of soil and groundwater

### 3.1.1. Current status

*3.1.1.1. Geograpy*

The geological structure of the affected area is determined by the sedimentary filling of the Körös region and the formation of river forms. The landscape is characterized by the presence of younger riverine and aeolian sediments settling on the deeper Pannonian sediments, with a flat surface and a slight slope.

The zone of arable land with good and excellent production site conditions of the National Spatial Planning Plan (effective from 2019) is affected by the route in several sections. The involvement is realized within the expropriation limit.

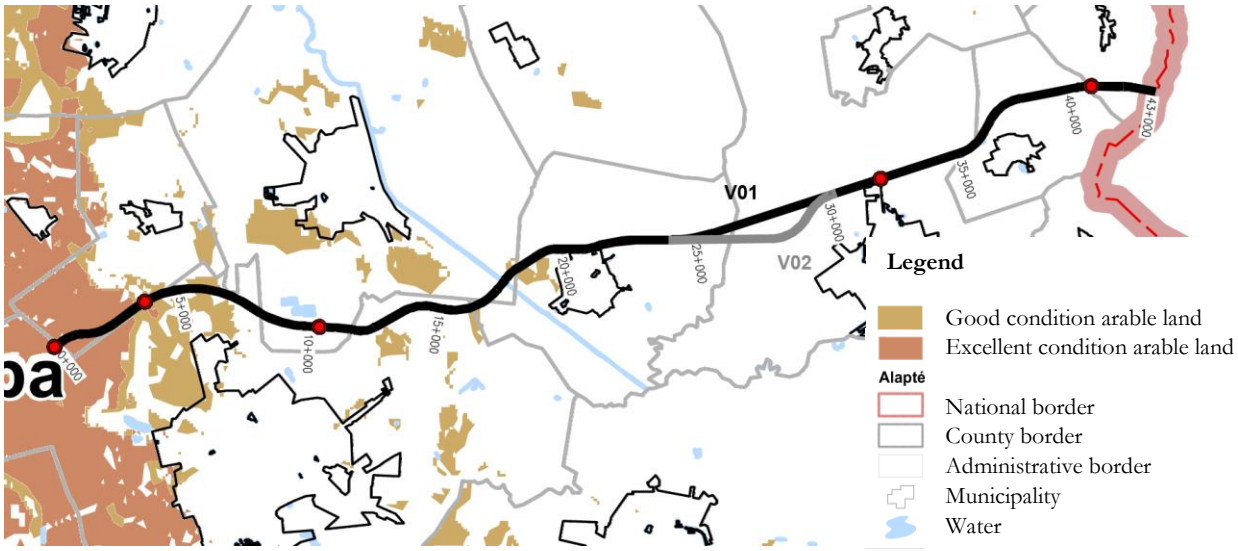


***Figure 7. Impact on the zone of arable land with good and excellent production site conditions***

The landscape is characterized by fine-grained toplayers, slow infiltration, well-protected deep aquifers and the presence of shallow, sensitive groundwater of varying quality. The surface water network, especially the Körös River and the inland water channels, play a significant role in the dynamics of groundwater, especially in shallow systems.

The location of **groundwater** affects the design of the road's elevation and drainage. The most critical sections in the area of Békéscsaba in terms of groundwater are between the 4+200 – 7+000 km section, where the resting level of the groundwater surface stretches between 0-1 m below the surface. In addition, high groundwater levels are to be expected everywhere between section 0+000 and 20+000 km, but the groundwater level is also between 1 and 2 m in the vicinity of section 25+000 and 32+000 km.

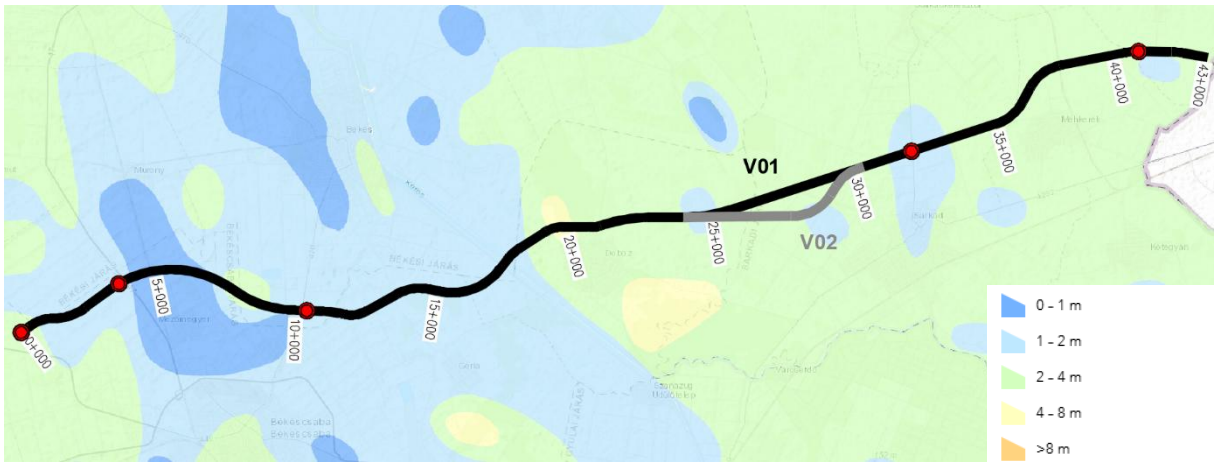


***Figure 8. Groundwater surface rest level below the surface in the vicinity of the trail***

According to the information of the competent Water Management Directorate, there are no wells with a water rights permit **at a distance of 100-100 m from the planned main road axis**. The area affected by the planning **does not affect the operational and long-term water resource protection areas designated in a resolution based on Government Decree 123/1997 (VII.18.).**

According to the information provided by the Békés County Government Office, the Department of Fire Protection, Industrial Safety and Water Management Authority, file number 30403/974-15/2025, there are no designated protective sections or protection zones in the settlements affected by the route, with the exception of Békés. Based on the documentation available to them, the M44 expressway - the regional water management and water protection authority has approved the construction of the M44 expressway in accordance with the 63486-027/2011. - the Békés Fürdő B-112, B-155. cat.

According to the information provided by the competent Water Management Directorate and the Department of Environment, Nature Conservation and Waste Management under file number BE/39/01486-17/2025, there is no known pollution in the planning area.

### 3.1.2. Effects

*3.1.2.1. Examination of the impact of construction and construction works*

Construction works can have an impact on the soil primarily through the following activities:

- occupation of territory,
- movement of machinery,
- filling of machinery with fuel and hydraulic oil,
- extraction of building materials,
- transport, and
- storage of hazardous substances and disposal of waste.

The most significant factor affecting the geological environment of the planned facility and its related facilities is the physical occupation of the area, which means a 2x2 lane construction according to the design cross-section, plus the occupation of the area of the adjoining facilities and the temporary occupation of the area of construction.

During the investment, no risky material will be introduced into the soil, and no technological wastewater will be generated.

In the design area, the upper, unsuitable top layer will be removed in a thickness of approx. ~0.3 m (humus). The trail passes almost entirely through agricultural areas. The impact of land occupation can be considered significant especially where the area requirement of the road results in the loss of high-quality soils with a high soil value from agricultural production. Typically, there are soils of medium or very poor fertility in the examined area, but the beginning of the trail also touches areas with excellent habitat conditions on 26 hectares.

In addition to the occupation of the area, another significant impact on the geological medium appears during the implementation of earthworks, with the establishment of embankment construction. The maximum height of the planned embankment is 10 m on a river track, no notch will be made.

If due care is taken with solid and liquid communal waste, as well as hazardous waste contaminated with hydrocarbons that may be generated in smaller quantities, contamination of soil and groundwater can be safely avoided.

Overall, it can be stated that in the construction phase, the planned investment will have an impact on the land occupation in the state of the geological medium, but the extent of the impact will be reduced by the fact that the route will be established in areas that are already used and are less valuable from an agricultural point of view and have a relatively low soil value.

*3.1.2.2. Long-term, operational-state examination*

The effects resulting from the operation of roads can be as follows:

- waste "production" (primarily communal waste of transport participants),
- precipitation and leaching of gases and other particles from the operation of motor vehicles,
- atmospheric dry sedimentation,
- pollutants washed away by rainwater.

After the implementation of the planned investment, direct pollution may occur during the period of operation as a result of the illegal waste abandonment, waste collected and stored in inappropriate conditions, negligent maintenance activities, and e.g. the inadequate technical condition of the vehicles and machines used, which carries an additional environmental risk in terms of the geological medium and groundwater. The above cannot be considered as an effect during normal operation.

Further expected negative effects may occur primarily as a result of road traffic emissions, pollutants bound on airborne dust and dust particles that become oily along the road. These include wear and tear materials, lubricants, gasoline and diesel droplets, juice from winter salting, and settling dust. Fuel and lubricants (dripping) from motor vehicles, as well as asbestos and heavy metal contaminants from wear and tear, can get into the soil and groundwater after being washed off with rainwater. The expected pollutants are CH derivatives and heavy metals.

**Effects of rainwater drainage and disposal**

The entire length of the roadway is embankment-like, the track level has been determined in such a way that the drainage of the pavement structure above the high inland water level and groundwater level is ensured. In the planning area, the planned route crosses several smaller

ditches and canals. The watercourses are the recipients of the planned footings, however, due to the topography and the table-like flat terrain, the waters can only be led into the recipients from a short stretch of road. In the area without drainage, in the absence of any other recipient, footings must be built as dimensioned reservoir ditches.

Desiccation is not planned.

### 3.1.3. Recommendations

*3.1.3.1. Tasks to be performed in later design phases, protective measures*

**Under construction**

In the absence of a construction technology plan, the effects of the construction phase are only estimated in detail on the basis of preliminary organizational ideas, so we make general regulations in accordance with the provisions of the law to mitigate the effects of construction;

- The designation and design of temporary storage facilities for waste and hazardous waste generated during construction, as well as fuel storage facilities for earthmoving machinery in a non-contamination-sensitive topcoat and groundwater environment, must be designated not only taking into account the characteristics of the topcoat, but also the general groundwater flow directions. For the construction of temporary, hazardous waste containers, it is desirable to use an insulation sheet (e.g. polyethylene foil) or to use the watertight surfaces existing in the inner area.
- The work must be carried out in such a way that the contamination of the soil is kept to a minimum.
- The area must be immediately cleared of contamination occurring during the works, despite the safety measures, to avoid the further spread of pollution.
- Soil protection instructions must be taken into account, taking care to ensure that transport routes take up as few agricultural and sensitive areas as possible.
- To prevent extraordinary situations, only machines in proper technical condition can be operated, and regular technical inspections are mandatory. In the event of lubrication and fuel spillage on the ground during the construction of lubricants and fuels resulting from the possible failure of machinery, equipment and transport vehicles, the spilled pollutants must be immediately collected together with the soaked medium (soil) in a closed storage container and treated in accordance with the provisions of Government Decree 225/2015 (VIII.7).
- With regard to the management of emergency events, the road manager must have an emergency plan, as well as the appropriate and rationally expected damage relief tools, and act on the basis of the plan.
- the upper, harvested humus topsoil should be deposited separately and, if technically possible, it is recommended to use it locally for final landscaping;
- the location of the assembly room is possible only in areas that are not or are less susceptible to contamination;

Operation phase:

- If chemicals are also used for the maintenance of roadside vegetation during maintenance, then in accordance with Decree 43/2010 (IV.23.) of the Ministry of Agriculture and Rural Development shall be complied with, and those engaged in the use of pesticides shall keep an up-to-date record of the use of pesticides, the requirements of which are contained in the decree.

## 3.2. Protection of surface waters

### 3.2.1. Current state examination

*3.2.1.1. Affected water bodies, hydrology of the design area*

The planning area is a landscape characterized by a dense water network, extensive river valley and inland water effects, where surface hydrological processes are determined by very low slope conditions, flood dynamics of rivers and the regulating role of drainage canal systems. The landscape is characterized by the absence or weakness of slow, natural surface runoff, precipitation and evaporation-controlled inland water flow, and the dominance of artificial water regulation and drainage networks. The defining elements of the hydrological image of the region are the flood waves of high water periods, the regulated oxbows, the water circulation controlled by the canals and the periodic appearance of inland water, which is one of the most important processes of water balance in the lowlands of the South-Eastern Great Plain.

***Table 6. Major watercourses crossed by the trail (named in the VGT with VOR code)***

| Place of crossing (M44 km) | Watercourse name | VOR Code | Recipient's name |
|---|---|---|---|
| 5+560, 10+400 | Gyuriréti Canal | - | Borosgyán Canal |
| 11+480 | Living water channel | AEP459 | Kéts-Körös |
| 12+540 | Gerlai Backwater | AEP516 | Living water channel |
| 16+430 | Dánfokéri Canal | - | Békés III Gastrointestinal Tract |
| 16+700 | Doboz-Gerlai Border Canal II. | - | Dánfokéri Canal |
| 17+670 | Double-circle | AEP668 | Hármas-Körös |
| 20+670 | V. Vargahosszai Main Canal | AEQ086 | Kéts-Körös |
| 26+430 | Black Stream Canal | | Grassland Main Canal |
| V01: 28+150<br>V02: 28+841 | Gyepes Main Canal Lower | AEP532 | Hosszúfok-Határér-Köleséri Main Canal |
| V01: 28+581<br>V02: not crossed | Peckesi Canal | - | Gyepes Main Canal |
| V01 34+293<br>V02 34+581 | Horgaséri Canal | - | Ancient Sirét Canal |
| V01 40+618<br>V02 41+005 | Wimmeri Canal | - | Hosszúfok-Határér-Kölesér |

The planned routes are 2.94. Békési and 2.91. They are moving in the Sarkadi Floodplain Bay. The area of flood bays is protected from flood floods by first-class flood protection lines. The planned M44 expressway crosses the main flood protection lines of the 12.02 Kéts-Körös left bank and 12.04 Kéts-Körös right bank along the Kéts-Körös river, as well as the localization embankment between Fekete-Sebes-Körös.

The appearance of inland waters is to be expected in certain sections of the planning area. Primarily, the surroundings of the 10+000 km and 17+000 km sections are endangered by inland water (highly endangered category), but it can be said about the entire planning area that the environment of the route is moderately endangered by intermittent inland flooding, and even more than half of its length is moderately endangered by inland water.


| Category | Rating based on relative flooding frequency | |
|---|---|---|
| 1. | <0.05 | An area not or hardly endangered by inland water |
| 2. | 0,05-0,10 | An area moderately endangered by inland water |
| 3. | 0,11-0,20 | An area with moderate risk of inland water |
| 4. | >0.20 | An area highly endangered by inland water |

***Figure 9. The trails on the Pálfai inland water hazard map, with explanation***

The section of the planning phase between ~8+000 and 33+000 km touches on reclamation areas in many places. After the water management within the framework of the association, in the 1960s and 70s, large agricultural holdings carried out industrial water management, and in the 80s, complex reclamation. The watershed has been implemented during both construction periods, and they are still in operation.

In the operational water-managed areas, field-level drainage is either not or at a low level.

### 3.2.2. Effects

*3.2.2.1. Examination of the impact of construction and construction works*

The elevation of the planned route follows the existing terrain level, the track level will be lifted from the terrain at a height of at least 2-3 m. The entire length of the roadway is embankment-like, the track level has been determined in such a way that the drainage of the pavement structure above the high inland water level and groundwater level is ensured. Crossed watercourses and canals serve as recipients of rainwater flowing from the road, but irrigation canals and dual-function inland water channels cannot be recipients.

With regard to surface waters, the impact of the facility may manifest itself on the one hand in the change of the catchment area: the road may fragment the catchment area and create partial catchments. This can cause changes in the load and water flow of certain sections of the watercourses. The fragmentation of the catchment area can be avoided by providing adequate passage and crossing under the road for all (permanent or intermittent) watercourses, ditches and valleys.

The construction of pipe culverts and bridges is planned for the passage of water in the watercourse crossings. The size of the pipe culverts is uniformly 1.20 m.

At places where the planned routes cross watercourses at an angle of less than 60°, or the route is placed on the route of the operating canal, or a rest area or a traffic junction of separate levels is built, the riverbed correction of the watercourses becomes necessary.

During construction, the effects on the quality of watercourses and other surface waters may result from the fact that machine maintenance and repairs are carried out in their surroundings. In order to prevent possible contamination, it is recommended to establish a parade area in areas further away from the affected watercourses. Particular attention must be paid to avoiding possible accidents, and if it still occurs, the builder must have an emergency plan and damage control must be started immediately in accordance with its contents.

Based on the current, study design level of the technical plans, bed correction is required in several places at the surface crossing of watercourses. Further interventions affecting the crossed watercourses are the construction or reconstruction of the structure of the crossing (bridge, culvert).

The free flow of surface water must be ensured during construction, and their passage must also be ensured during construction.

In the case of reclamation areas, if there is a need, the replacements must be provided in consultation with the managers and the competent Water Management Directorate, which will be planned in a later planning phase.

#### *3.2.2.2. Long-term, operational-state examination*

During the operation of the facility, there will be no significant change in the surface runoff conditions, but the concentrated amount of water arriving from the paved surfaces will cause an additional load on the existing system in the sections after the introduction - in the absence of infiltration into the soil.

According to the calculations made in the impact study, the estimated hydrocarbon pollution does not exceed the organic solvent extract concentration limits for the watercourses of the area, even taking into account the values recorded on the most busy section, even with the construction of a paved ditch (Annex 2 of Decree No. 28/2004 (XII.25.) Decree of the Ministry of Agriculture and Forestry - Emission *limits for the direct discharge of wastewater into the recipient*, determined according to water quality protection area categories). So we can state that according to estimates, the organic solvent extract (oils, fats) pollution reaching the recipients is most certainly below the limit, based on which there is no need to install a separate cleaning structure.

During the operation of the facility, the use of materials for winter de-icing poses a risk to surface waters. In the event of snow melting, the increased salt concentration in the watercourses can cause a significant load. The effect is limited in time to the period after the snow melts, and salt pollution in watercourses is not to be expected in the rest of the year. Compliance with the relevant regulations, careful work and the operation of the planned road do not have a significant impact on the water quality of the watercourses.

### 3.2.3. Recommendations

*3.2.3.1. Tasks to be performed in later design phases*

During the consultations conducted in connection with the study plan, the Körös Region Water Management Directorate indicated that a model examination should be carried out during the licensing planning as follows:

- Hydrodynamic model study of the adequacy of the new road bridge and bridge opening of the Kéts-Körös River.
- In the event of a dam rupture, modelling the receding flood in the area to be flooded, taking into account the approved route of the M44, presenting the expected extent of flooding, describing the flood localisation possibilities and, if necessary, preparing modified localisation and flood protection plans.

The above examination shall be carried out on the route approved in the permit plan phase.

In the case of receiving watercourses and ditches, it must be ensured that the upstream and downstream sections are in good condition so that surface waters can be drained without obstacles.

In order to relieve the recipients, if the bed is not able to receive the standard precipitation, earth cores must be placed in a ditch to delay the runoff, and/or/or/if necessary, the receiving ditch must be arranged and expanded. The actual design must be specified in consultation with the operator KÖVIZIG during the licensing plan phase.

Government Decree No. 120/1999 (VIII.6.) on the tasks related to the maintenance of water and public water facilities must be taken into account in the course of planning. In the future, the conditions for the use of the sections of the so-called "dual-use" watercourses affected by the crossing as recipients, as well as the installation of cleaning structures and oil traps before the water inlet, shall be discussed.

*3.2.3.2. Protective measures for the period of construction and operation*

The construction must be carried out in such a way that the drainage of small and large waters in the bed of the watercourses without damage is ensured during the construction period.

The water from the bases of the road can be led into the crossed watercourses, but the materials washed into the watercourse from the roadway can inhibit the drainage of water, hinder maintenance work, thus giving additional tasks to the watercourse manager. The planning of sediment capture facilities near the rainwater inflow locations is recommended.

## 3.3. Human health, social and economic impacts

Of the emissions from transport, the population living in the area affected by the planning may be primarily affected by noise and air pollution to a health-damaging extent. Depending on these two environmental loads, we can draw conclusions about possible favourable or unfavourable trends. The analysis of air purity protection and noise and vibration protection is carried out in Chapters 5.5 and 5.6, and the differences in the effects on human health between the route variants are mainly due to these.
Other impacts on society and the economy include:

- changes in the use of land used by the road and the resulting changes in the quality of life and lifestyle that may occur
- traffic rearrangement in the surrounding area by the road
- changes in landscape

The expected impact of land occupation on lifestyle and quality of life due to changes in land use.
Overall, it can be stated that the construction of the expressway would be a development with a structural change effect; It would result in an economically more diversified, investment-friendly and exportable region, a more socially mobile, less emigrating community and a community that uses cross-border relations more intensively. The intervention would reduce the economic and social disadvantages arising from the periphery, while creating a new growth axis, which in the long run would be able to substantially reduce or reverse some of the current demographic-economic trends (decrease, ageing, dominance of public employment).

## 3.4. Wildlife protection: Flora and fauna

### 3.4.1. Current status

The planned investment does not directly affect a protected natural area of national importance, a special bird protection area (SPA), but it directly affects the protected natural area of local importance called Élő víz-kanal in the area of 11+500 km, the Fekete-, Fehér- and Kéts-Körös (HUKM20012) special nature conservation area between km 17+430 and 17+770, and the special nature conservation area called Fekete-, Fehér- and Kéts-Körös () between km 19+800 and 21+150 km.Körösköz Forests (HUKM20011), the Gyepes Canal (HUKM20020) special nature conservation area in the area of km 28+100 – 28+200, and the ecological corridor zone of the National Ecological Network in the section between km 38+200 and 38+500, and it does not directly touch or directly touch, but at two of the junctions connecting to the existing roads, it is approached by the special nature reserve called South Bihar Salt Marshes (HUKM20019) On the one hand, at the connection to the existing road 4219 j between km 32+000 and 32+200, and at the connection to the existing road 42153 j, in the vicinity of km 41+00.

### 3.4.2. Effects

Since the habitats in a significant part of the planning area are degraded or low-naturalness areas (agricultural areas), no nature conservation conflict can be predicted in these sections. An exception to this are the areas presented in the previous paragraph, where **in the case of the V01 design, the investment would affect a total of 34756 m2, i.e. 3.48 hectares, of which all of** them, except for an area of 232 m2, correspond to some habitat type of community importance. In addition, it affects a further 13442 m2, i.e. 1.34 ha, of habitat types of community importance with medium or lower naturalness. In **the case of the V02 design, it would affect a total of 33383 m$^2$, i.e. 3.34 hectares, of habitat patches of good naturalness**, of which, with the exception of 232 m2 of area, all correspond to a habitat type of community importance. In addition, it affects a further 13442 m2, i.e. 1.34 ha, of habitat types of community importance with medium or lower naturalness. In these areas, the effect of construction **is eliminating**, but taking into account the occurrence of semi-natural habitats in the area of the micro-region, the effect **is bearable on a regional scale**.

Three protected plant species can be found in the area directly affected by the investment: **the meadow aster** (*Aster sedifolius*), the **ragweed** (*Salvinia natans*) and, according to the data provided by the KMNPI, the **ligeborg starflower** (*Scilla vindobonensis*). Without relocation, the individuals directly affected by the construction would certainly die, however, if the protection proposals to be presented later are followed, the effect of the construction can **be considered** bearable.

There are several vertebrate and invertebrate species in the area affected by the investment, the occurrence of which has been taken into account in making the protection recommendations, and if observed, the effects of the construction and operation period can be **considered bearable**.

### 3.4.3. Monitoring recommendations

In connection with the planned development, biological monitoring studies are recommended. Biological monitoring should cover changes in the population of the protected plant species to be relocated.

The purpose of monitoring in connection with the relocation of protected plants is to monitor the population changes of the relocated plant specimens. During the monitoring, the modified

"A" sampling type of the protocol developed by the National Biodiversity Monitoring System for the monitoring of vascular plant species shall be used.

Biological monitoring tests must be started before construction, already in the phase of construction design preparation (baseline state – reference state). During the planning, the period of activity of the target groups must be taken into account, which varies from one organism group to another. Some groups of organisms can only be surveyed at a certain time of the year!

Wildlife protection monitoring task to be carried out as part of the Construction Technical Design Documentation:

- Precise determination of the location of monitoring, detailed elaboration and presentation of its methods;
- Assessment of the basic condition of protected plant species.

### 3.4.4. Protective measures

- Landscaping (lawn cultivation, shrub removal, tree removal, reed cutting) may be carried out between 1 October and 1 March in the areas necessary for the establishment of the facilities. On areas that have already been arranged, there is no need for further time restrictions on work.
- The existing dirt road and road network can be used for work and material transport, and the possibility of any construction traffic reaching areas of conservation value, as well as the disposal of construction debris and waste in these areas, must be excluded. To this end, in the area of 11+500 km in the protected natural area called Élő víz-kanal (Living Water Channel), between km 17+430 – 17+770 in the special nature conservation area called Fekete-, Fehér- and Kéts-Körös (HUKM20012), between km 19+800 – 21+150 in the special nature conservation area called Körösköz forests (HUKM20011), in the area of km 28+100 – 28+200 no landfills may be established in the Gyepes Canal (HUKM20020 Special Nature Conservation Area, in the ecological corridor zone of the National Ecological Network between 38+200 and 38+500 km, at the approach to the special nature conservation area called South-Bihar Alkaline Forests (HUKM20019 between km 32+000 and 32+200, at the connection to the existing road 4219 j, and in the vicinity of the 41+00 km at the connection to the existing road 42153 j, material extraction points, rest areas, parking lots, transport routes, and it must be ensured that work is carried out exclusively on the construction site within the expropriation limit.
- In view of the above, in the area of 11+500 km in the area of 11+500 km in the protected natural area called Living Water Channel, between 17+430 and 17+770 km in the special nature conservation area called Fekete-, Fehér- and Kéts-Körös (HUKM20012), between km 19+800 – 21+150 in the special nature conservation area called Körösköz forests (HUKM20011), in the area of km 28+100 – 28+200 km in the Gyepes Canal (HUKM20020 special nature conservation area, in the ecological corridor zone of the National Ecological Network between 38+200 and 38+500 km, at the approach to the South Bihar sodic forest (HUKM20019 special conservation area between 32+000 and 32+200 km, at the connection to the existing road 4219 j, and in the vicinity of the 41+00 km at the connection to the existing road 42153 j, construction works will only be carried out at the expropriation border, or after the construction of a temporary protective fence consisting of pillars and at least 1.5 m high at the edge of the predetermined construction site. The temporary protective fence must fulfil its function throughout the entire period

of construction, it must be clearly visible, weather-resistant, and in the event of a breakdown, it must be easy to repair and maintain. The material of the pole can be wood (e.g. acacia wooden pole), metal (e.g. closed section, angle iron, etc.).

- For the duration of the work carried out in the above protected and/or Natura 2000 areas, we recommend the employment of a contact person with the right to be a nature conservation expert and sufficient professional experience, a biologist or a nature conservation engineer degree. Before the field preparation works, the contact person prepares the map delimitation of the current occurrence of semi-natural habitats and protected species, presents it to the contractor and participates in damage prevention. On behalf of the contractor, it also participates in the nature conservation supervision, so if necessary, it directs the rescue work of protected species (plants, amphibians and reptiles, etc.), and decides on the start or stop of the works based on the occurrence of protected species at the time of construction and weather conditions.
- The contractor must relocate the protected plants to a safe distance from the trail to a location agreed in advance with the experts of the Körös-Maros National Park Directorate. Before relocation, the individuals must be assessed again in a safely recognizable condition and relocated in spring or autumn before the start of construction works. For resettlement, a resettlement plan must be prepared and submitted to the competent nature conservation authority (Békés County Government Office, Department of Environment, Nature Conservation and Waste Management Department, Department of Nature Conservation) for approval.
- Cutting down older, hollow trees should be avoided, as they can serve as a home for burrowing birds and bats. Before felling trees, it is necessary to make sure of the role of individual trees in nature and the necessity of felling. The trees to be kept and the trees to be cut down must be agreed with the experts of the Körös-Maros National Park Directorate.
- The date of felling the old trees must be agreed with the experts of the Körös-Maros National Park Directorate. Instead of felling old hollow trees, gentle cutting should be carried out, hollow trees should be deposited for at least 2 days before transport, and their shredding is not allowed. Before cutting, a wildlife conservation expert examines them for overwintering animals. If there is one, the necessary wildlife protection measures must be carried out before felling with the involvement of the experts of the Körös-Maros National Park Directorate, and preparations must be made for possible rescue tasks.
- Steep-walled depressions (e.g. trenches) formed during construction activities must not be left uncovered for several days, as this may cause the death of small mammals and amphibians. During the filling of these depressions and earthworks, it must be ensured that there are no animals that have fallen into them, and the work may only be continued after they have been rescued.
- Hydraulic engineering works should be carried out on the water-filled bed sections between 1 August and 31 October. This is the period when amphibian and reptile species are active, and in the water-filled riverbeds, even the young individuals of the current year are already sufficiently developed to have a significant chance of avoiding the effects associated with physical injury. Furthermore, during this period, the mobility of the juvenile fish of the previous year is sufficient to give them a better chance of avoiding work causing injury and possible mortality. Prior to construction, in the case of bed sections that are dry for a long time (at least 1 month) in the summer-early autumn period and are not characterized by permanent water cover, the time limit for the autumn-winter period is not justified.

- In the case of the protected water bodies concerned (e.g. Living Water Channel, Gyepes Channel), bed dredging must be avoided. If it is necessary for technical reasons, it is recommended to carry out the following method in the case of bed sections covered with water during the construction period or permanently covered with water in the period prior to construction, in order to protect all the aquatic organisms concerned, but especially the individuals of protected fish species:
    - during vegetation eradication and mud dredging works carried out with an excavator, it is recommended to remove the vegetation and mud of seaweed and sedges, bulrushes, reeds with a perforated or lattice excavator bucket;
    - it is recommended to keep the extracted plant mass and mud above the water for a few (at least 10) seconds (all the water should flow out of it above the canal / watercourse) so that the individuals in the spoon can leave the spoon with the water in it;
    - Only then is it recommended to put the dredged material on the shore.

  With the described method, the mortality rate of individuals of protected fish species can be significantly reduced, and the number of individuals of invertebrate species that come ashore (thus condemned to extinction) is also reduced.
- We recommend that immediately before activities carried out on protected water bodies (e.g. Living Water Channel, Grassland Channel) affected by bed modification (construction of structures, technically justified dredging), the locations (these are mostly located around structures and culverts) and harvest for rescue purposes where a significant amount of protected fish individuals are aggregated in a relatively small area. At the same time, we recommend providing the rescued individuals with the necessary conditions for survival and returning the individuals to the already dredged and water-covered sections of the affected channel as soon as possible, or to nearby suitable habitats, in consultation with the nature conservation manager.
- The covering or relocation of the beds of crossed protected water bodies (e.g. Living Water Channel, Gyepes Channel) is not permitted, and in order to protect protected species of community importance associated with wetlands, the destruction of coastal vegetation must be avoided.
- In order to protect protected species of community importance associated with wetlands, the preservation of the water quality of the Living Water Channel, the Kéts-Körös and the Gyepes Canal must be taken into account during the construction. In order to avoid accidental contamination of the water body, the planned construction works can only be carried out with machines in perfect technical condition, in compliance with the effective occupational safety and water damage prevention rules, and no type of storage site or landfill may be established near the watercourse.
- In the entire planning area, efforts must be made to use native plant species/varieties characteristic of the landscape in afforestation and plant planting. Deviations from this can only be made in special cases, for the purpose of serving nature conservation interests. In the planting plan, special attention must be paid to the fact that species/varieties that are considered invasive in Hungary should not be included among the plants to be planted (the list of these is included in Table 9 entitled Invasive neophytes in the Study Volumes of the Nature Conservation Office of the Ministry of Agriculture and Forestry). The planting plan must be reviewed by the authority of the first instance and the Körös-Maros National Park Directorate. When compiling the list of species, native species that tolerate extensive

maintenance well in accordance with the conditions of the production site must be used, and in the case of trees, long-lived, wind-resistant, primarily hard-leaved species that retain their foliage for a long time must be used. Species recommended for planting: trees: pedunculated oak (*Quercus robur*), field maple (*Acer campestre*), field elm (*Ulmus minor*), Hungarian ash (*Fraxinus angustifolia subsp. pannonica*), white poplar (*Populus alba*), black poplar (*Populus nigra*); shrubs: red-ringed dogwood (*Cornus sanguinea*), striped goat's twig (*Euonymus europaeus*), common frost (*Ligustrum vulgare*).

- During the grassing of slopes and embankments, the use of non-native species such as Italian fescue (*Lolium multiflorum*), etc., should be avoided, instead (depending on the growing site) meadow fescue (*Festuca pratensis*), reed fescue (*Festuca arundinacea*), English fescue (*Lolium perenne*), meadow fescue (*Poa pratensis*), furrowed fescue (*Festuca rupicola*), red fescue (*Festuca rubra)*), brush grass (*Alopecurus pratensis*) is recommended.

- In order to prevent the damage to the natural habitats remaining in the surrounding areas and to the protected species living there, it must be ensured that species prone to invasion in the area of the investment are not introduced during the creation of green areas, or are immediately removed in the event of their spontaneous settlement. In order to prevent unwanted weeds and the spread of invasive species, mowing must be ensured in the areas affected by construction for at least 3 years, at least twice a year.

- In the case of watercourses, ecological connectivity must be ensured, for this purpose it is sufficient to use the appropriate opening size in the case of smaller channels, but in the case of bridge structures designed for larger watercourses (Living Water Channel, Gerlai Backwater, Kéts-Körös, V. Vargahosszai Main Channel, Gyepes Canal), it is also necessary to provide an unpaved, dry surface along the watercourse. Of these, the bridge structures planned for the Living Water Channel and the Kéts-Körös must also ensure the passage of large game species, in order to achieve this, in addition to providing a sufficiently wide, unpaved traffic lane, the appropriate height must also be ensured.

- Ecological connectivity must be ensured in the case of watercourses, and in order to achieve this, in the case of bridge structures planned for the Living Water Channel and the Kéts-Körös, an unpaved pavement should remain above the standard water level on both banks of the watercourse. In the case of these structures, as well as at the crossing of smaller channels and watercourses, the road technical specification UT 03.07.53:2019/M1 must be taken into account, thus ensuring ecological permeability on watercourses and in coastal strips. The technical parameters (diameter, cross-sectional size, coastal strip) of culverts and structures designed for crossed watercourses comply with the UT 03.07.53:2019/M1 road technical specification for the construction of ecological crossings. However, during the design, it must be taken into account that the passages cannot be permanently submerged during the typically spring movement, even in inland water years. In addition, the bridge structures planned for the Living Water Channel and the Kéts-Körös must be provided with the appropriate height (min. 4 m), and the road technical specification UT 03.07.53:2019/M1 must be taken into account when designing the structures whose plans are not yet available.

- In addition to the above, independent, overlaid big game crossings must also be planned, which provide passage for big game. Big game crossings must comply with the road technical specification UT 03.07.53:2019/M1. Big game crossings must be located at the following location:
    - 24+342 km no.; – independent big game passage;

- 39+574 km – big game passage combined with a dirt road crossing.

- In addition to ensuring the passage, it is also necessary to prevent wild species from entering the roadway, so we recommend the installation of a life protection fence on the entire route of the expressway, which must comply with the UT 03.07.53:2019/M1 road technical specification. Based on this, as red deer can also be found in the area, a minimum height of 2.4 meters is justified, in addition to which it is important to have a sunk or reinforced lower part to prevent the wild boar from entering. For this reason, we recommend the use of the 2.5 meter net, which is common in Hungary, of which 30 cm should be sunk into the ground, and the 2.2 meter height above the surface should be supplemented with a colored extension wire placed at an extra 20 cm.

- In order to protect insects, birds (e.g. owls) and mammals (e.g. bats) that lead a nocturnal lifestyle, it is recommended to design lighting that takes into account nature conservation aspects in addition to technical regulations. In places where lighting is absolutely necessary, it is recommended to use luminaires designed with the following recommendations:

  - It is very important that the luminaire is attached to the supporting structure in a plane parallel to the ground surface.
  - It is recommended to design luminaires with flat glass shades and directed light with baffles.
  - It is recommended to use the lowest possible light point height (up to 6 m).
  - Only warm light sources may be used. The maximum applicable color temperature should not exceed 2700 K.
  - The use of spotlights and floodlights directed above the plane of the horizon is prohibited.

  If public lighting is planned at the crossing of the Living Water Channel in the area of 11+500 km, or at the crossing of the Kéts-Körös between 19+800 and 21+150 km, or at the crossing of the forests north of Doboz between 19+800 and 21+150 km, the above regulations must be applied in any case, as the occasional presence of various bat species can be expected at these locations. At the connection to the existing road 42153 j., in the area of km 41+00, the use of public lighting must be expressly avoided, as the highly protected and rare large long-eared owl (*Gortyna borelii) can be found on the property adjacent to the area affected by the investment*, which is particularly sensitive to artificial light. The decorative lighting of the bridge of the Kéts-Körös is not recommended from the point of view of wildlife protection.

## 3.5. Air Protection

### 3.5.1. Current status and impacts

The air quality of the current state was determined from the data of the Hungarian National Automatic Air Quality Monitoring Network. According to the data, the air quality can be considered good in a national comparison.

According to preliminary calculations, during construction and construction works, air protection conflicts are expected during earthworks, in the case of which protective measures are required. It is important to note that our calculations were made on the basis of the machinery compiled on the basis of similar construction projects, so in the later planning phase we recommend that the Organizational Plan should also include an air purity protection expert opinion, which presents detailed examinations in possession of accurate data. Here you can formulate the exact protective measures that can reduce the loads.

In the long-term, operational state, the impact of the road section on air quality can hardly be quantified, and based on the calculations, the health limit values are met within the axis of the road.

### 3.5.2. Proposed protective measures

Protective measures are required during construction. As we wrote above, the following are only general protection recommendations:

- during construction, it is prohibited to cause air and odor loads to such an extent that it results in a permanent exceedance, in the narrow 50-metre vicinity of the construction site and transport routes measured from the axis;
- only modern machines with low air pollutant emissions may be used;
- the use of the best available technological equipment (B.A.T. = Best Available Technology);
- use only of machinery with a valid registration certificate,
- unnecessary idling of machinery must be avoided;
- dust pollution must be reduced to a minimum during construction works, including the storage of materials and waste;
- earthworks must be watered at appropriate intervals – as specified in the technological instructions;
- the slope surfaces of earthworks must be covered with a layer of humus to protect against dusting;
- at the time of deliveries, in dry weather (5 days of rain-free weather), where there is a sensitive impact carrier nearby, unpaved transport routes must be watered daily;
- use of material extraction sites or asphalt mixing plants as close as possible;
- During construction works, muddy wheels must be cleaned in the driveway of transport vehicles from the unpaved construction site to the main road (in a justified meteorological situation) and/or the mud applied to the paved road must be cleaned (by mechanical or manual force) in order to minimise dust build-up.

## 3.6. Noise and vibration

### 3.6.1. Current status and impacts

In its current state, noise conflicts develop in many places in the immediate vicinity of the existing road network. The noise pollution resulting from the dirt road network connecting the agricultural areas is negligible. The parts outside the settlements are free of noise.

During construction and construction works, according to preliminary calculations (loaded with estimates and uncertainties), limit values are expected to be exceeded. It is important to note that our calculations were made on the basis of estimates, so in the Construction Plan phase, we recommend that the Organization Plan should also include a noise and vibration protection expert opinion, which presents detailed investigations in possession of accurate data.

In the long-term reference state, as a result of the natural increase in traffic, the noise load increases by ~1-2 dB at each test point compared to the current state. This increase is independent of the investment. The purpose of the reference state examination is to be able to present the changes occurring as a result of the project on the surrounding road network (i.e. the indirect impact area).

It can be said that the project has a positive impact on the related road network overall.

The route of the M44 motorway passes through areas that have been barely or completely untouched so far. Based on the results, it can be said that the implementation of the project causes noise conflicts in several places. We have proposed solutions for all of these.

Topographical numbers of residential properties recommended for protection with noise barrier walls:

- Békéscsaba 0739/7,
- Békéscsaba 0481/2
- Békéscsaba 0460
- Békéscsaba 01214/2

We recommend the installation of noise barrier walls in the following areas:

The recreation area Békés 059/18, 059/22, 059/44, 059/45, 059/46, 059/47, 059/48, 059/57, 059/58, 059/59, 059/60, 059/68, 0104/12, 0104/14, 0104/17 and the residential area Doboz 027/16, 027/52, 030/3, 030/25

### 3.6.2. Proposed protective measures

**Operational status recommendations**

***Table 7. Noise Barrier Systems***

| Marking | Initial km section | Initial E.O.V. coordinate | End km Section | End E.O.V. coordinate | Length [m] | Acoustic height [m] | Side |
|---|---|---|---|---|---|---|---|
| J11 | 11+390 | X = 8089956<br>Y = 155231 | 11+660 | X = 809265<br>Y = 155181 | 274 | 3 | Right |
| B12 | 12+380 | X = 809964<br>Y = 155269 | 12+700 | X = 810240<br>Y = 155420 | 315 | 3 | Left |
| B13 | 13+240 | X = 810713<br>Y = 155681 | 13+500 | X = 810941<br>Y = 155808 | 261 | 3 | Left |

Acoustic requirements for noise barrier walls:

- Sound absorption category:
- e-UT 03.07.47:Category A4 according to the Technical Road Specification No. 2021

- Airborne sound insulation category:

  e-UT 03.07.47:Category B3 according to the Road Technical Specification

During the field visit, we found that there are several properties within a protective distance that are registered as residential properties in the land registry files, but in reality they do not fulfill this role. We do not recommend noise protection for these properties.

**Proposed conservation measures for the construction period**

1) During the night-time assessment period (22:00-6:00), it is prohibited to carry out work and transport activities involving environmental noise and vibration if there is a property to be protected within 300 meters. An exception to this may be if the given night work is particularly justified and the construction would be impossible if it were excluded. In the environmental work part of the Management Plan, the necessity of the given night work processes must be justified, and the exact scope, location, duration and environmental impact of these night work processes must be presented.
2) On Saturdays and Sundays, it is prohibited to carry out work and transport activities involving environmental noise and vibration if there is a property to be protected within 300 metres. An exception to this may be if the work on the given weekend is particularly justified and the construction would be impossible if it were excluded. In the environmental work part of the Management Plan, the necessity of the given weekend work processes must be justified, and the exact scope, location, duration and environmental impact of these weekend work processes must be presented.
3) Only modern, low-noise and low-vibration machines and transport vehicles may be used during construction (use of the best available technological equipment (B.A.T. = Best Available Technology)). If the B.A.T. is not applicable, only machinery and transport vehicles with engines classified at least EURO3, EPA Tier III, EU Stage III or equivalent must be used, as machinery and transport vehicles with older types of engines are expected to have higher noise and vibration emissions, so their use is not permitted.
4) Installed machines (e.g. compressors, aggregators, etc.) must be surrounded by a mobile soundproofing facility or masonry if there is a building or area to be protected from noise or vibration within a 100-meter radius of these machines.
5) Unnecessary idling of machinery should be avoided.
6) Where possible, the noise protection insulation of machines and/or machine components must be established (using noise-reducing coverings), and the removal of existing coverings is prohibited if there is a building or area to be protected from noise or vibration in the 100-metre vicinity of the given work.
7) In order to avoid future legal disputes, a structural survey of the ground condition of all buildings closer to construction sites (50 meters) and along transport routes (25 meters) must be carried out.
8) The Contractor also needs to prepare a noise and vibration protection chapter of the Organization Plan covering all work phases in the knowledge of the construction schedule and the contractor's machinery.

9) In the noise and vibration protection chapter of the environmental work part of the Organizational Plan, the expert/planner

   a) determine as accurately as possible the noise and vibration loads generated during the work phases of construction along the work areas and their surroundings, as well as along the final transport routes;

   b) transport routes should be designated in such a way that they use the existing main and collector road network and burden the hitherto unloaded environment as little as possible;

   c) It should also examine the possibility of rail material deliveries, and if it is expected to reduce road loads, rail transport should also be used in addition to road transport.

   d) also examine the need to carry out monitoring measurements.

The above protection measures can be reviewed on the basis of future investigations of the environmental work part of the Management Plan. The exact and final protection measures must be specified in the environmental work part of the Management Plan.

## 3.7. Built environment and cultural heritage

### 3.7.1. Current state examination

The buildings listed or under local protection are concentrated in the centre of the inner area of Békéscsaba and Békés, but there are also monuments in Sarkad and Sarkadkeresztúr. However, outside the historical settlement cores, fewer of these can be found, and the planned route and its insert version do not have any affects on monuments or historical monuments.

### 3.7.2. Effects

*3.7.2.1. Examination of the impact of construction and construction works*

During the construction phase, adverse environmental impacts causing deterioration of the built environment along transport routes and the factors triggering them may be the following:

***Table 8. Adverse environmental impacts and triggering factors (Source: State of the settlement and the built environment – Andrea Kristóf)***

| Triggering factor | Release mode |
|---|---|
| Air pollution | Corrosion damage |
| Soil and groundwater pollution | Corrosion damage |
| Soil mechanical characteristics and groundwater level change | Subsidences, slips, stability, static problems |
| Vibration Load | Structural damage |
| Inadequate management of construction waste | Waste pollution, surface pollution |

In order to prevent adverse environmental impacts on the built environment and the resulting depreciation, construction must be regulated and appropriate restoration works must be carried out. During the installation, the requirements of environmental, noise and vibration protection and life protection must be kept in mind.

**Building demolitions**
At the 6+800 km section, the route touches two buildings in the industrial-economic zone in the area of Békéscsaba, which need to be demolished.
Where the trail reaches the administrative area of Békés (km 8+161), the dirt road with lot number 0111 is routed through an underpass. In the area, the building of the affected farm must be demolished.
The crossing of main road 470 will take place between km 9+700 and 10+500, where a multilevel junction and a combined complex rest area will be established. It will be necessary to demolish the farms (4 pcs) affected by the area of the rest area and the junction.

Partial demolition of the buildings is also expected in the area of the engineering sites to be renovated, but exact data on the necessary demolitions will only be available in later planning phases.

*3.7.2.2. Long-term, operational-state examination*

In connection with the operation of the planned linear facility, the direct occupation of the area of the roadway and its related facilities and the emissions caused by the traffic on it, as well as the effects of maintenance, must be dealt with.

With the realization of the project goals, a road will be created that contributes to the smooth flow of traffic with appropriate traffic engineering regulation, does not carry a traffic safety risk, the flow of traffic is safe, the heavily neglected area gets a boost, and the development of economically backward areas can begin. The immediate environment can be served without any obstacles, ensuring a quick connection between the districts.

The value of the residential areas in the settlements approached by the project may increase in value after commissioning due to their better accessibility.

The investment is basically aimed at the development of infrastructure outside the inner areas, and in this capacity, the operation contributes to the better functioning of the built environment, so it is usually of a corrective nature. The operation of the planned activity will have a partial modifying effect on land use compared to the current one, as agricultural areas will be used for roads.

### 3.7.3. Archaeological values

In the course of the public register of sites, literature and cartographic research, **data referring to 75** archaeological sites were collected in the 250 m zone of the area affected by the route plan. The field visit was carried out by the Hungarian National Museum between 27 October and 4 November 2025 in several teams for the route variants known at the time.

***Table 9. Archaeological sites identified in the 250-metre-wide zone of the investment***

| Name | Registration number | Source of information | Site type | Age of site | Position |
|---|---|---|---|---|---|
| Békéscsaba – Szentmiklós-puszta, Tanyahely | 3266, MRT 10. 2/458. | Field Trip | Colony | Prehistory, Sarmatians of the Hun period | buffer zone |
| Békéscsaba – **Szentmiklós-puszta, Muronyi side** | **3267, MRT 10. 2/459.** | **field visits, geophysical surveys, test excavations, archaeological observation** | **Colony** | **Bronze Age, Sarmatian, Avar Age, Árpád Age Late Middle Ages, Early Modern Age** | **Affected** |
| **Murony – next to Vandlik Farm** | **New site** | **Field Trip** | **Colony** | **Sarmatian** | **Affected** |
| **Murony – Pece vineyard IV.** | **Under registration** | **Field Trip** | **Location** | **Sarmatian, Árpád Age** | **Affected** |
| **Murony – Pece Vineyard II.** | **5813, MRT 10. 10/6.** | **Field Trip** | **Colony diaspora** | **Copper Age, Celtic, Sarmatian, Avar Age Turkish Age** | **Affected** |
| Békéscsaba – Hosszú-sor, riverside | 3255, MRT 10. 2/441. | Field Trip | Colony | Bronze Age, Sarmatian, Árpád Age | buffer zone |
| Békéscsaba – Kurta-sor, railway extension | **3258, MRT 10. 2/444.** | **field visit, trial excavation, excavation** | **Colony colony, Cemetery** | **Late Bronze Age (Gáva-c.), Celtic, Sarmatian (Gepida) of the Hun period, Árpád period, late Middle Ages, Turkish age** | **Affected** |

| Name | Registration number | Source of information | Site type | Age of site | Position |
|---|---|---|---|---|---|
| | | | | **Sarmatian, late Avar period** | |
| Békéscsaba – Hosszú-sor, riverbank I. | 3253, MRT 10. 2/439. | Field Trip | Colony | Sarmatian, Árpád Age | buffer zone |
| Békéscsaba – Kaszáló | Under registration | Field Trip | Colony | Sarmatian, Árpád Age, Late Middle Ages | buffer zone |
| Békés – Borosgyán V. | 2821, MRT 10. 1/144. | Field Trip | Colony | Late Bronze Age | buffer zone |
| Békés – Borosgyán, Béke Tsz goose farm | 2758, MRT 10. 1/81. | Field Trip | Colony<br>Cemetery | Gyulavarsándi k., Sarmatian, Árpád era unknown age | buffer zone |
| **Békéscsaba – Béke Cooperative, Goose Colony** | **3127, MRT 10. 2/231.** | **Field Trip** | **Colony** | **Prehistory (Copper Age?), Sarmatian-Hun Age, Avar Age, Árpád Age, Early Modern Age** | **Affected** |
| Békéscsaba – Borosgyán | 3284, MRT 10. 2/476. | Field Trip | Colony | Bronze Age, Scythian, Sarmatian, Gepid, Avar Age, Árpád Age | buffer zone |
| **Békés – Borosgyán, 6 October Brigade Accommodation** | **2823, MRT 10. 1/146.** | **Field Trip** | **Colony**<br>**diaspora** | **Late Bronze Age, Scythian, Sarmatian, Árpád Age**<br>**Yellow** | **Affected** |
| Békéscsaba – Vandháti iskola-dűlő | 2990, MRT 10. 2/92. | Field Trip | Colony village, church, cemetery | Late Middle Ages Árpád Age<br>(Sikköny village) | buffer zone |
| Edinburgh – Vandhát | 2989, MRT 10. 2/91. | Field Trip | Colony | prehistory, the Árpád era | buffer zone |
| Békéscsaba – Körösfás-zug | **3397, MRT 10. 5/73.** | **Field Trip** | **Colony** | **Bronze Age, Árpád Age, Late Middle Ages** | **Affected** |
| Békéscsaba – Körösfás bend | 2988, MRT 10. 2/90. | Field Trip | Colony | Árpád Age, Late Middle Ages | buffer zone |
| Békéscsaba – Kőgyes, Papp Farm | 3376, MRT 10. 5/52. | Field Trip | Colony | Prehistory, Gepida, Árpád Age, Late Middle Ages | buffer zone |
| Békéscsaba – Kőgyes-part II. | **3353, MRT 10. 5/29.** | **Field Trip** | **Colony** | **Scythian, Sarmatian, Árpád Age, Late Middle Ages** | **50 m buffer zone, dirt road** |
| Békéscsaba – Kőgyes-part I. | 3352, MRT 10. 5/28. | Field Trip | village, church, cemetery Colony | Árpád Age<br>Bodrogkeresztúri k., ottományi k., Gáva-k., Scythian, Sarmatian, late Middle Ages | buffer zone |
| **Békéscsaba – Kászmán shore** | **3355, MRT 10. 5/31.** | **field visit, excavation** | **Colony** | **AVK, Szakálhát Age, Copper Age, Scythian, Sarmatian-Hun, Late Avar, Árpád Age, Late Middle Ages** | **Affected** |
| Békéscsaba – Kászmán corner | 3354, MRT 10. 5/30. | field visit, site inspection | Colony<br>Cemetery | Tiszai k., Baden-k., Gáva-k., late Sarmatian, Árpád era unknown age | buffer zone |

| Name | Registration number | Source of information | Site type | Age of site | Position |
|---|---|---|---|---|---|
| **Békéscsaba – Kászmán** | **3357, MRT 10. 5/33.** | **Field Trip** | **Colony** | **Tiszapolgári k., Baden k. Bolerázi cs., Sarmatian, late Avar, Hungarian conquest period?** | **Affected** |
| Box – Box, Ó-Gerla | 715 | Field Trip | Colony | Gáva-k., Sarmatian, Árpád Age | buffer zone |
| **Békés – Dánfok, Kászmáni sarok II.** | **2860, MRT 10. 1/183.** | **Field Trip** | **Colony** | **Tiszapolgári k., Celtic, Sarmatian, Árpád era, late Middle Ages** | **Affected** |
| **Box – Maksár Major** | **687** | **field visit, site inspection** | **Colony** | **Baden k., Sarmatian, Árpád era** | **Affected** |
| **Doboz – Doboz-Sebesfok District II.** | **30** | **Field Trip** | **Colony** | **Prehistory, Sarmatians** | **Affected** |
| Box – Box, Sebesfok District I. | 688 | Field Trip | Colony | Bronze Age, Sarmatian, Migration Age, Árpád Age | buffer zone |
| **Doboz – Doboz, Óvári District, Forest Edge II.** | **714** | **Field Trip** | **Colony** | **Copper Age, Sarmatian, Árpád Age** | **Affected** |
| Box – Doboz, Óvári District II. | 674 | Field Trip | Colony | Late Bronze Age, Sarmatian, Árpád Age | buffer zone |
| Box – Doboz, Óvári-járás I. | 673 | Field Trip | Colony | Copper Age, Sarmatian, Árpád Age | buffer zone |
| **Box – Doboz, Óvári district, forest edge I.** | **713** | **Field Trip** | **Colony** | **Baden-k., Árpád era** | **Affected** |
| **Box – Box, Horse Guard** | **712** | **Field Trip** | **Colony** | **Prehistory, Sarmatian, Árpád Age** | **Affected** |
| **Box – Box, 200, reed pit** | **721** | **Field Trip** | **Colony** | **Prehistory** | **Affected** |
| Doboz – Doboz, Blonde Island | 731 | Field Trip | Colony | Prehistory | buffer zone |
| Sarkad – Fekete-ér channel, lock | 50467 | Field Trip | Treasure Finds | unknown age | buffer zone |
| **Sarkad – Sásfenék, Gyepespart** | **50815** | **Field Trip** | **Colony** | **Prehistory, Sarmatian, Árpád Age** | **Affected** |
| Sarkad – Gyepesi railway side | 50480 | Field Trip | Colony | Prehistory, Sarmatians | buffer zone |
| **Sarkad – Kis-telek** | **49544** | **Field Trip** | **Colony** | **Prehistory, Sarmatian, Árpád Age, Late Middle Ages** | **Affected** |
| **Sarkad – Békési út, Mózes-tanya I.** | **49548** | **Field Trip** | **Colony**<br>**diaspora** | **prehistory (Iron Age: Scythian?), Sarmatian, Árpád period, late Middle Ages-early modern age**<br>**Copper Age?** | **Affected** |
| Sarkad – Kis-telek, Debreceni-tanya | 49537 | Field Trip | Colony | Prehistory, Sarmatian, Árpád Age | buffer zone |
| Sarkad – Békési út, Debreceni-tanya VI. | 50496 | Field Trip | Colony | Árpád Age | buffer zone |
| Sarkad – Békési út, Debreceni-tanya V. | 50495 | Field Trip | Colony | prehistory, the Árpád era | buffer zone |
| Sarkad – Békési út, Debreceni-tanya I. | 50491 | Field Trip | Colony | Árpád Age | buffer zone |

| Name | Registration number | Source of information | Site type | Age of site | Position |
|---|---|---|---|---|---|
| **Sarkad – Békési út, Debreceni-tanya IV.** | **50494** | **Field Trip** | **Colony** | **Árpád Age** | **Affected** |
| Sarkad – Békési Road, Debreceni-tanya II. | 50492 | Field Trip | Colony | Sarmatian, Árpád Age | buffer zone |
| Sarkad – the northern side of Bakrét | 50855 | Field Trip | Colony | prehistory, the Árpád era | buffer zone |
| **Sarkad – Bogát, riverbank** | **73495** | **Field Trip** | **Colony** | **Árpád Age** | **Affected** |
| **Sarkad City Hotels** | **50600** | **Field Trip** | **Colony** | **Prehistory, Sarmatians** | **Affected** |
| **Sarkad – Town-accommodation II.** | **New site** | **Field Trip** | **Colony** | **Sarmatian** | **Affected** |
| Sarkad – Csonka vineyard, Tokai farm | 50654 | Field Trip | Colony | Prehistory, Sarmatian, Avar Age | buffer zone |
| Sarkad – Csonka vineyard, Pataki farm II. | 50696 | Field Trip | Colony | prehistory, the Árpád era | buffer zone |
| **Sarkad – Csonka-dűlő, Pataki-tanya I.** | **50695** | **Field Trip** | **Colony** | **Prehistory** | **50 m buffer zone from the rest area** |
| **Bee Wheel – Ecclesia É** | **New site** | **Field Trip** | **Colony** | **Neolithic/Copper Age** | **Affected** |
| Méhkerék – Ólyi-ér, Eklézsia-dűlő | 54603 | Field Trip | Colony | Prehistory, Sarmatian, Árpád Age, Late Middle Ages | buffer zone |
| **Méhkerék – Ólyi-ér, digópits** | **54647** | **Field Trip** | **Colony diaspora** | **Prehistory, Migration Age, Árpád Age Sarmatian** | **Affected** |
| Méhkerék – Calf pasture, Ólyi-ér | 54645 | Field Trip | Colony | Körös-k. | buffer zone |
| **Méhkerék – Ólyi-ér, digógödör** | **54605** | **Field Trip** | **Colony** | **Körös-k., Árpád era** | **Affected** |
| Méhkerék – Városerdő pasture | 54607 | field visit, site inspection | Pile | unknown age | buffer zone |
| Méhkerék – Ólyi vineyard, pasture edge | 54606 | Field Trip | Colony | Körös-k. | buffer zone |
| **Méhkerék – Balogh-ér, old Cooperative** | **54609** | **Field Trip** | **Colony** | **Prehistory** | **affected overpass** |
| **Méhkerék – Eszterházi member I.** | **33216** | **Field Trip** | **Colony** | **Middle and Late Neolithic, Tiszapolgári K., Baden-k., Late Bronze Age, Early Iron Age** | **Affected** |
| **Méhkerék – Calf pasture, Balogh-ér** | **54630** | **Field Trip** | **Colony** | **Prehistory, Sarmatian, Árpád Age** | **affected overpass** |
| Méhkerék – Eszterházi member II. | 33217 | Field Trip | Colony | prehistory, the Árpád era | buffer zone |
| **Méhkerék – Kenver vineyard, next to the railway** | **33220** | **Field Trip** | **Colony** | **Körös-k., AVK, Scythian** | **Affected overpass** |
| **Méhkerék – Sápi pasture, village** | **54638** | **field visits, excavations, archaeological demolition work** | **Colony village, church, cemetery** | **Scythian, Sarmatian Árpád period, late Middle Ages, early modern age** | **Affected** |
| Méhkerék – Hemp vineyard | 62774 | repository documentation | diaspora | Sarmatian | buffer zone |
| Méhkerék – Kender-dűlő, Sápi-ér | 54637 | Field Trip | Colony | Árpád Age, Late Middle Ages | buffer zone |

| Name | Registration number | Source of information | Site type | Age of site | Position |
|---|---|---|---|---|---|
| **Méhkerék – Wimmer vineyard, next to the canal** | **54598** | **Field Trip** | **Colony** | **Scythian, Árpád Age, Late Middle Ages, Turkish Age** | **Affected** |
| **Újszalonta – Wimmeri vineyard, Béke Tsz I.** | **54722** | **Field Trip** | **Colony** | **Gáva-k., Sarmatian, Árpád, Late Middle Ages, Turkish Age** | **Affected** |
| **Újszalonta – Wimmer vineyard, Béke Cooperative II.** | **54723** | **Field Trip** | **Colony** | **Sarmatian, Árpád era, late Middle Ages (15th-16th century)** | **50 m buffer zone** |
| Újszalonta – Wimmeri vineyard, Béke Cooperative III. | 54724 | Field Trip | Colony | Sarmatian, Árpád Age | buffer zone |
| **Újszalonta – Vérsziget vineyard, Csete farm** | **54728** | **Field Trip** | **Colony** | **Copper Age, Sarmatian** | **Affected** |
| **Újszalonta – Vér-sziget vineyard, Balogh farm** | **54725** | **Field Trip** | **Colony** | **Körös c., Middle Neolithic, Baden-c., Gáva-k., Sarmatian, Árpád period, late Middle Ages, Turkish period** | **Affected** |
| Újszalonta – Vérsziget, Csete-tanya | 54727 | Field Trip | Colony | prehistory, the Árpád era | buffer zone |
| Újszalonta – Blood Island, Morál-tanya | 54733 | Field Trip | Colony | Copper Age, Árpád Age, Late Middle Ages | buffer zone |

The elements of the archaeological heritage may only be removed from their original position within the framework of archaeological excavation.

In order to prepare the final Preliminary Archaeological Documentation specifying the archaeological tasks to be carried out at the sites affected by the investment, further research must be carried out at the sites identified in this document, in order to determine the involvement of the archaeological sites and the nature, age and intensity of the sites.

During the further planning of the investment, the time and cost requirements of the necessary archaeological excavations must be taken into account.

**In the course of the archaeological value assessment, no heritage elements to be kept locally were found in the planning area that should be avoided by earthworks.**

## 3.8. Landscape protection

### 3.8.1. Current status and impacts

The planning area does not affect any unique landscape value, however, it does affect landscape protection areas at several locations. The section of the planned M44 expressway between Békéscsaba and the national border would be implemented on a new route throughout, so if it is implemented, the current land use and landscape would change. Due to the green area system due to the development, and thus the decrease in the biological activity value, it is necessary to pay special attention to the rehabilitation of the destroyed surfaces left behind after its construction, the planting of plants, and the integration of the newly appearing structures into the landscape, for which we make recommendations below.

On the following pages, you can find the visual plans of the Kettős-Körös bridge from different angles.


***Figure 10. Visual design of the bridge of the Kettős-Körös left bank, south view***

***Figure 11. Visual design of the bridge of the Kettős-Körös left bank deck level, south view***

***Figure 12. Visual design of the bridge of the Kettős-Körös left bank, north view***

***Figure 13. Visual design of the bridge of the Kettős-Körös right bank, south view***

*3.8.1.1. Rehabilitation of destroyed surfaces*

On the entire section of the planned route, the destroyed surfaces remaining during the construction must be rehabilitated. Rehabilitation is to be carried out outside the area of the roadway and ditches, within the expropriation limit, or in other work areas used during construction, with the basic conditions of land use and ecological conditions before construction. Furthermore, attention should be paid to the follow-up care of the rehabilitated area and the plant stock appearing on it for 1-3 years after the landscaping and planting of plants after the construction (primarily the mechanical eradication of emerging weed and invasive species).

Within the expropriated areas, the planting work can be carried out after the rehabilitation of the abandoned dirt roads and ditches. The rehabilitated area outside the expropriated areas shall be returned to cultivation according to the cultivation branch of the neighbouring area.

If the Investor decides to plant woody plants equal to the size of the total paved surface of the planned facility - which is about 95 hectares - then the part of the area to be expropriated for this purpose cannot be a protected natural area, Natura 2000, wetland or area with good fertility, or in protected areas it is only possible in the area of potential forest vegetation, with the use of tree species characteristic of the natural forest community. Afforestation is not allowed in wetlands and grassland communities of good naturalness.

*3.8.1.2. Forms of planting*

In connection with the planned development, the current green strip will have to be dismantled, and to make up for this, we propose to carry out plant planting on the surfaces affected by the construction, the aim of which is:

- preserving the current landscape potential of the landscape section;
- preserving the unique landscape structure and landscape character characteristic of the region;
- preserving the traditions, natural and cultural-historical values and relics characteristic of the region;
- the sight of the road and its associated facilities and the creation of harmony between the valuable landscape ensembles.

From the point of view of landscape protection, the integration of the road and its related facilities into the landscape can be solved by the development of the planned line and the planned planting of plants. Planting plants is the most effective means of integrating into the landscape. The replacement of woody vegetation to be cut down due to the planned investment must be ensured, ensuring optical guidance that also facilitates the safe traffic of road users.

In general, it can be said that on flat terrain or on an uphill, in the case of a straight road section, planting plants on both sides of a grove is recommended. In the case of a straight rounded arch, the sense of space can be improved by planting a shrub or a low group of trees in the middle of the slope. In the case of a circular arch on a flat terrain, or on an uphill or convex rounded arc, the planting of groves on the outside of the circular arch helps to mark the route of the road and to orient the driver more easily.

From a visual point of view, the path can be interpreted in two ways. What is the view of the road and what can be seen from the road. Its sight is different on the flat and hilly land, in different embankments and notches. Nothing can be detected from the road in a notch or in the case of a

space corridor (protective wall, protective embankment, protective forest), "everything" can be detected from the embankment.

The road on the embankment can be seen both in lowlands and hills. The possibility of covering it with a plant varies depending on the height of the earthwork. The sight of the artworks is also different. In other words, the underpasses are barely amended, while the overpasses, bridges and embankments higher than 9-10 m are striking artificial elements, significantly changing the landscape. Space shaping, covering, opening, spatial connections and spatial systems can be established with woody plants of different habits and growths. Flat rural facilities and earthworks can be "covered" more easily in all cases. A shrub strip with a height of 2-3 meters means full cover. Up to 3 m, the difference in level is barely perceptible or barely perceptible; The height of one floor can almost be "disappeared" by landscaping and planting in groves.

The use of tree groups at junctions and road connections is justified. In order to achieve an attention-grabbing effect, it is advisable to use species with different habits than usual.

In order to ensure the erosion protection of the slopes, the planting of creeping plant species and species requiring little maintenance and tolerating potentially unfavourable site conditions well can be recommended. When grassing the built slopes, native and landscape grasses should be brought to the fore, so we can help the slopes slowly integrate into the landscape, and we are likely to leave less space for invasive species.

**Taking into account the above, we recommend the following forms of planting:**

| Form of planting | Ingredients |
|---|---|
| Type 1 | The structures planned in multilevel junctions rise 8-11 m high from their surroundings. In the areas enclosed by junction branches, it is recommended to ensure that the landscape is integrated into the landscape by planting groves with trees and by planting shrubs on the slopes of the embankments, taking into account traffic safety aspects. The junction passages that rise high from the landscape, i.e. at a height of 8-11 m, can be covered with cover afforestation, taking into account that it takes several years for the planted tree stock to reach its proper function. |
| Type 2 | In the case of crossing dirt roads and inferior roads over the top, or in the case of existing wooded or forest areas, we recommend the placement of shrubs and ground cover shrubs on the sides of the embankment slopes or within the expropriation area, taking into account the use of species suitable for the existing habitat type. |
| Type 3 | It is recommended that the planned rest areas be established on the basis of a garden architectural plan. When planting plants at rest areas, it is important to isolate from traffic, create wind protection and create a shady rest area. For decoration purposes, it may be permissible to use different horticultural species. |
| Type 4 | In the case of a route running on an embankment, the integration of the line facility into the landscape can be ensured depending on the size of the future expropriation area belonging to the alignment. The embankment can be integrated into the landscape along the trail by alternating grove-wooded and shrub plantings on both sides. This can also be recommended in the vicinity of overpasses to be established at watercourse crossings.<br><br>In the case of notches, only shrubs are allowed to be planted on the slope side. |
| Type 5 | Overhead wildlife passages should be visually equipped with rows of trees and shrubs. The entire surface of the lane must be grassed. On the bridge structure, apart |

from grassing, only the planting of shrubs is acceptable. When planting plants, it must be taken into account that they do not touch the lane even if they are grown. In order to reduce the disturbing light and noise effect from road traffic and to avoid jumping, panels of at least 2.0 m high must be placed on both sides of the bridge. The joint construction of a protective fence and a row of logs at least 1.4 m high (measured from the level of the traffic lane) is also an acceptable solution. In the case of wildlife passages combined with an underdirected watercourse, type 4 is recommended, in which special attention must be paid to planting plants on the passage and its surroundings. The developing vegetation has an attractive effect on wild animals leading a hiding lifestyle, and also serves as a hiding place and shelter.

***Table 10. Recommended forms of planting***

| Affected km section | Structure | Description | Applicable form of planting |
|---|---|---|---|
| 0+000 km no. | Node | M44 separation junction | 1 |
| 3+736 km no. | Node | M44 - M47 connecting one-sided half-clover csp. Diagonal half-clover csp. | 1 |
| 4+833 km no. | Overpass | M44 overpass over the MÁV railway line | 4 |
| 6+683 km no. | Dirt road crossing | - | 2 |
| 8+213 km no. | Dirt road crossing | - | 2 |
| 10+411 km no. | Complex rest area combined with a junction | Complex rest area with junction connecting the M44 - 470 main road | 3 |
| 11+482 km no. | Overpass | M44 overpass over the Living Water Channel | 4 |
| 12+571 km no. | Overpass | M44 overpass over the Gerlai backwater | 4 |
| 13+520 km no. | Crossing road 4238 | - | 2 |
| 17+700 km no. | Bridge structure | Bridge structure over the Kéts-Körös | 4 |
| 19+508 km no. | Crossing roads | - | 2 |
| 20+647 km no. | Bridge structure | Crossing of the Varga-hosszai main canal | 4 |
| 21+227 km sz. | Node | M44 - 4234 Road Connecting Road 4234 | 1 |
| V01: 24+342 km no.<br>V02: 24+289 km | Overdriven big game passage | - | 5 |
| V01: 26+427 km no.<br>V02: 26+191 km | Overpass | M44 overpass over the Black Stream Canal | 4 |
| V01: 28+141 km<br>V02: 29+168 km | Overpass | M44 overpass over the Gyepes Canal | 4 |
| V01: 28+590 km | Dirt road crossing | - | 2 |

| Affected km section | Structure | Description | Applicable form of planting |
|---|---|---|---|
| V01: 32+044 km<br>V02: 32+368 km | Node | M44 - 4219 Road (Sarkad) connecting half-clover csp. | 1 |
| V01: 35+000 km<br>V02: 35+331 km no. | Easy resting place | Simple resting place (Sarkad) | 3 |
| V01: 37+932 km<br>V02: 38+319 km | Overpass | M44 overpass over the MÁV railway line | 4 |
| V01: 39+574 km<br>V02: 39+961 km | Overhead big game crossing combined with a dirt road passage | - | 5 |
| V01: 40+715 km no.<br>V02: 41+046 km | Node | M44 - 42153 j. road (Méhkerék) connecting the half-clover csp. | 1 |
| V01: 42+000 km no.<br>V02: 42+331 km no. | Checkpoint (Méhkerék) | - | 3 |

On other sections (river track, feedbacks), type 4 is recommended throughout.

During the preparation of the permit plans, the technical content of the planned facility will be specified, and accordingly, the planting proposals will also need to be reviewed. The planned planting should consist of native, fast-growing tree species and shrub species forming a dense branch for the given production site, e.g. white poplar, white willow, elm, pedunculated oak, and shrub species such as red ringed dogwood, wild rose.

The requirement for the plants used during the planting of plants is that they are resistant to the effects of transport, suitable for the conditions of the production site and, if possible, endemic species. The planting of invasive species (e.g. acacia, American ash) is not eligible for support anywhere in the area, other ornamental plants (e.g. non-spreading ornamental shrubs) can only be planted on sections located at a distance of at least 1 km from Natura 2000 sites and without natural accompanying vegetation.

The plant species that can be proposed in the planning area (domestic, native species) are the following:

native maples: Acer campestre *(Field maple*), Acer platanoides *(Early maple),* Acer pseudoplatanus *(Mountain maple),* Acer tataricum *(Tartar maple)*

bed corrections and watercourses, along wetter areas: Alnus glutinosa *(Glue alder),* Alnus incana *(Ash alder),* Populus sp. *(Noble Willow),* Salix alba *(White Willow),* Salix alba 'Tristis' *(Weeping Willow)*

Ashes: Fraxinus angustifolia subsp. pannonica *(Hungarian ash),* Fraxinus excelsior *(Tall ash),* Fraxinus ornus *(Flowering ash)*

lindens: Tilia cordata *(Small-leaved linden),* Tilia platyphyllos *(Large-leaved linden),* Tilia tomentosa *(Silver linden)*

oaks: Quercus cerris *(Oak),* Quercus farnetto *(Hungarian oak),* Quercus petraea *(Sessile oak),* Quercus robur *(Pedunculated oak),* Quercus robur 'Fastigiata'

shrubs: Berberis vulgaris, Colutea arborescens, Corylus avellana, Cotinus coggygria, Cotoneaster niger, Cornus alba 'Sibirica', Cornus mas (Fleshy dogwood), Cornus sanguinea, Euonymus europaeus, Euonymus europaeus, Euonymus verrucosus, *Prunus spinosa*, Rosa canina*, Rosa*

*pimpinellifolia*, Rhamnus cathartica*, Sambucus nigra*, Viburnum lantana *(Whiplash*), Viburnum opulus *(Kányabangita),* Ligustrum vulgare *(Common frost)*

*3.8.1.3. Fitting noise barrier walls into the landscape*

The coloring of the possible planned noise barrier may offer opportunities from a landscape protection point of view. The noise barrier wall primarily plays a role in sound insulation, but the noise barrier wall can perform several functions at the same time:

- the choice of the right pattern on the wall surface can have a significant impact on motorway drivers,
- A noise barrier wall can greatly contribute to the integration of the expressway into the landscape.

The pattern of a noise barrier wall can be understood as follows:

- Noise wall elements with the same texture in different colors
- Noise wall elements with the same color scheme with different textures (different pattern of the surface of the panels).

The color scheme and texture of the elements can be flexibly combined. The material, shape and colour of the elements can be varied along the length. The serial application of elements of different thicknesses enhances the sense of spatial effect.