M86 expressway section Győr-Moson-Sopron county border – Csorna North between 119+235 – 149+651 km segments

ENVIRONMENTAL IMPACT ASSESSMENT

NON TECHNICAL SUMMARY

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Ordered by:

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CONTENTS

1. BACKGROUND

Upon an assignment by Nemzeti Infrastruktúra Fejlesztő Zrt., **UTIBER Közúti Beruházó Kft**. prepares the environmental and heritage protection impact assessment for the M86 expressway Győr-Moson-Sopron county border - Csorna section. UTIBER Kft. assigned VIKÖTI CONSULT Zrt. to prepare certain technical parts of the environmental impact assessment.
The biota survey combined with field visit was conducted by Geo-falcon Bt.
The heritage protection impact assessment was conducted by the Cultural Heritage Protection Service.

In 2008, upon assignment by Nemzeti Infrastruktúra Fejlesztő Zrt., ÚT-Teszt Kft. prepared the preliminary environmental survey documentation (EKVD) for the M86 expressway section between Győr-Moson-Sopron county border - Csorna that was submitted to the National Inspectorate for Environment, Nature and Water (OKTVF). OKTVF required in its Decision No 14/2285-17/2008. the submission of a detailed impact assessment for Route A, Option A/1 that goes through the narrowed section of the grassland at Szilsárkány (see Annex I. Decision 14/2285-17/2008.).

The planned route starts south-east of the existing main road #86, joining the route shown in UNITEF'83 Zrt.'s 2007 EKVD (119+235 km segment). At the end of the design section M86 expressway joins main road #86 with a grade separated junction with exit lane completed with scheduled construction (149+600 km segment).
This plan contains a route option (A) based on the preliminary environmental impact assessment conducted on the basis on the preliminary assessment documentation (EVD) and the decision of the environmental authority closing such assessment.

Option A/1 is a suboption developed during the design of Option A, that differs from Option A only in the correction made due to a nature conservation area near Szilsárkány. For this reason only this route is discussed below.

Connections with public roads

The development tasks of M85 and M86 expressways, including main road #8 Győr – Csorna East and the Csorna bypass section, are included in the TOP programme.

The design section connects to the route shown in the preliminary assessment documentation of the Győr-Moson-Sopron county border – Szeleste section prepared by UNITEF'83 Zrt. (plan number: 2495) in November 2007. (Number and date of decision issued by OKTVF: 14/145-35/2008, 2 April 2008) Currently the Environmental Impact Assessment is being prepared for this section.

The M85 expressway Győr – Csorna section has an environmental licence, the Enese bypass section included in this section has a construction design. The planning application drawings for the "intermediate" sections is under way.
After lengthy analyses and studies currently the planning application drawings for the M85-M86 expressways Csorna bypass section Phase I are being prepared by Út-Teszt Kft.

The preliminary assessment documentation for the M85 expressway Csorna – Pereszteg section was prepared and submitted for licensing by Főmterv – Utiber Consortium in October 2008.

The route that is the object of the design and its connections with public roads are shown in the overview map E.02.

2. PRESENTATION OF THE PLANNED STRUCTURE

The object of the Environmental Impact Assessment is M86 expressway GyMS county border – Csorna section Option A, including an analysis of unexpected events (accidents, non-natural emergency events and natural disasters) and the estimated environmental impacts and consequences following abandonment.

The purpose of the Environmental Impact Assessment is to estimate and analyse the environmental impacts of the planned expressway and change in traffic, to make proposals for minimisation of harmful impacts and to explore any circumstance that could exclude the implementation for environmental reasons.

2.1. Basic data of the structure

Alignment on the site design

Settlements on the planned M86 expressway county border – Csorna section route: Rábakecöl, Vásárosfalu, Beled, Magyarkeresztúr, Zsebeháza, Szil, Sopronnémeti, Szilsárkány, Csorna and Dör.

According to the design conditions and the concept approved in the study for decision preparation the design section starts south-east of main road #86 and joins the route shown in UNITEF'83 Zrt.'s 2007 EKVD (119+235 km segment).
Then the route continues between Beled and Vásárosfalu towards northeast, crosses interconnection road #8611 with a junction and main road #86 with an underpass. The planned expressway crosses near Páli road #8607, then runs almost parallel to the Szombathely – Csorna railway line and crosses near Zsebeháza interconnection road #8605 with a grade separated junction.
The expressway crosses near Sopronnémeti roads #8604 and #8602 with grade separated junctions.

Then near Szilsárkány and Sopronnémeti it crosses a nature conservation area; at the end of this section the expressway joins main road #86 with a grade separated junction where it connects to interconnection road #8601. At the 140+933 km segment it crosses dirt road #2 with an underpass.
The following M86 route and the common section of the M85-M86 expressways bypass Csorna on the east side. At the two ends of the common section of the M86 and M85 expressways, southeast and northeast of Csorna, grade separated junctions for access were constructed to join and to separate the two roads. The common section of the expressways crosses with an overpass Keszeg brook (26+171 km segment) and the Győr-Sopron GySEV railway lines (22+969 km segment) and dirt road #1 with an underpass.
Csorna-Pápa railway line:

According to the request of the Ministry of Economy and Transport already the earlier review study plan and the EKVD included 3 options for the M85 expressway – Csorna-Pápa railway line crossing:
Option A: with the assumption that the railway line will remain unchanged, thus the common section of M85-M86 will cross it with an overpass.
Option B: in the case of final elimination of the railway line the expressway will run at normal embankment height with a bicycle road crossed above it.
Option C: the railway line crosses above the expressway (it can be implemented after the construction of the expressway in the medium or longer term)

When this plan documentation was prepared a decision was made on the option and design must be continued with a combination of Options B and C (the expressway runs on normal embankment height, with a paved road suitable for bicycle traffic that crosses above it, in a later phase the railway line can be crossed above the road, if needed).

On the last section of M86 expressway, that is almost 2km long, it crosses Keszeg brook with an overpass (147+849 km segment) and crosses interconnection road #8512 with an underpass at the 148+274 km segment. At the end of the design section M86 expressway joins main road #86 with a grade separated junction with exit lane completed with scheduled construction (149+600 km segment).

Height alignment

The planned expressway runs on its entire design section on plain landscape, the route goes on an almost 2.00m high embankment (see the longitudinal sections on the overview site plans E.03).

Design parameters

According to Road Construction Technical Regulations ÚT 2-1.201:2004 “Design of public roads” this design task includes according to the Client’s decisions and earlier studies M86 expressway with the following design class and speed:

Planned road	Design class	Environmental condition	Design speed
M86 expressway	K.II.	B	110km/h

Cross-sectional structure

The expressway will be constructed according to the K.II.B design class (according to UME 2004) with 2x2 traffic lanes, with 25.60m crest width. Traffic lane width: 3.50m, emergency lane width: 3.0m.

Key geometric figures:

– Traffic lane width:	3.50 m
– Traffic lanes:	2x2
– Middle separation zone width:	3.60 m
– Internal safety zone width:	0.25 m
– External safety zone width:	0.25 m
– Carriageway wearing course width:	
for 2x2 lanes:	7.50m
for 2x2 lanes with fast lane-slow lane:	11.00m
– Emergency lane width:	3.00 m
Emergency lane wearing course width:	2.75 m
– Shoulder	
Next to emergency lane:	1.00 m
Next to fast lane-slow lane:	2.00 (1.75)m
– Crest width:	
with emergency lane:	25.60 m
with fast lane-slow lane:	27.10 m

For the secondary crossing main roads #86 and #85 the design speed: 90km/h, crest width: 12.00m, while for the crossing roads: 10.00m.

Junctions

<u>The following grade separated junctions must be constructed on the M86 expressway Beled-Csorna section:</u>

- M86-road #8611: half-cloverleaf junction with crossing traffic at the 123+646 km segment.
- M86-road #8605: half-cloverleaf junction with crossing traffic at the 132+809 km segment.
- M86-main road #86: half-cloverleaf junction on one side at the 139+427 km segment.

The following grade separated junction must be constructed on the M86 and M85 expressways Csorna bypass section:

- M86-M85 expressways south access junction southeast of Csorna: trumpet-shaped on the left side, at the 142+381 km segment.

- M86-M85 expressways north triangle-shaped access junction northeast of Csorna at the M86:147+300, M85:22+000 km segments.

- M86-main road #86 exit long-term traffic junction at the end of the design section: trumpet-shaped junction on the right side at the 149+600 km segment.

- M85-main road #85 junction: at the M85 expressway 20+615 km segment.

Road structures

M86 expressway and the structures listed in the table below will be constructed:

No.	Km segment	Name (based on longitudinal section)
M86 expressway GyMS county border – Csorna (M85-M86 south access junction) section		
1	119+770 km segment	overpass over Répce spillway reservoir
2	123+646 km segment	underpass under road #8611
3	124+523 km segment	overpass over Keszeg brook
4	125+035 km segment	overpass over road #8428
5	127+365 km segment	overpass over Keszeg brook
6	127+786 km segment	underpass under main road #86
7	129+055 km segment	underpass under road #8607
8	131+830 km segment	overpass over Keszeg brook
9	132+809 km segment	underpass under road #8605
10	136+118 km segment	underpass under road #8604
11	136+634 km segment	underpass under road #8602
12	136+990 km segment	overpass over Keszeg brook
13	138+827 km segment	overpass over Keszeg brook
14	139+421 km segment	overpass over main road #86
15	139+893 km segment	overpass over Keszeg brook
16	140+933 km segment	underpass under dirt road #2
17	142+324 km segment	underpass under M85 expressway junction branches
Common section of M85 and M86 expressways (between M85-M86 south and north access junctions)		
18	26+171 km segment	overpass over Keszeg brook
19	25+393 km segment	underpass under dirt road #1
M86 expressway section north of Csorna (between M85-M86 north access junction and M86 – main road #86 exit long-term junction)		
20	147+849 km segment	overpass over Keszeg brook
21	148+274 km segment	underpass under road #8512
22	149+600 km segment	underpass under main road #86 exist lane junction branches
Main road #86 entry lane		
23	0+444 km segment	overpass over Csorna – Hegyeshalom railway line
M85 expressway (between 19+800 km segment - M85-M86 north access junction)		
24	22+969 km segment	overpass over Győr-Sopron GySEV railway line
25	22+442 km segment	overpass over main road #85
26	22+150 km segment	underpass under M86 interconnection lane #1
27	20+614 km segment	underpass under correction #85

Additional road structures in the design area:

No.	Km segment	Name
Near M86 expressway		
28		overpass over Keszeg brook with road #8601
29		Overpass over Keszeg brook with dirt road #11
Near M85 expressway		
30		overpass over GySEV railway line with road # 8422
31		overpass over main road #85 with interconnection lane #1
32		Overpass over main road #85 with interconnection lane #2

Environmental structures:

127+365 km segment Game crossing structure under M86 combined with crossing of Keszeg brook (underpass)
130+390 km segment Planned game crossing structure over M86 expressway
138+827 km segment Game crossing structure under M86 combined with crossing of Keszeg brook (underpass)

Recommended places for rest areas

The study "Designating places for engineering buildings and rest areas needed for operation of the expressways network in Győr – Moson – Sopron and Vas counties" assigned a place for a complex rest area on the design section near Zsebeháza. Accordingly, after review of the route a complex rest area on both side needs to be constructed at the 135+300 km segment.

Recommended place for the engineering building

The recommended place for the engineering building is near the 139+500 km segment, on the right side, near the M86-main road #86 junction.

2.2. Activity volume

The designed route starts south-east of the existing main road #86, joining the route shown in UNITEF'83 Zrt.'s 2007 EKVD (119+235 km segment). At the end of the design section M86 expressway joins main road #86 with a grade separated junction with exit lane completed with scheduled construction (149+600 km segment).

Total length of the planned route option: **30.36km**

2.3. Estimated time of construction and commissioning

The estimated time of the construction and commissioning of the planned section (2013) depends on the funds available for the project (implementation cost). It means that some uncertainty as to the time of construction and commissioning may exist.

3. PRESENTATION OF THE IMPACT AREA

Based on an analysis of the phase of the activity the impacts of the project can be broken down as follows:

- **Construction** – a definite term activity whose impacts can arise within the work area (area to be expropriated), in its direct proximity, and on the road network used for transport and the surrounding settlements.
- **Impact of the structure** – arises primarily in area occupation and as separating impact. The impacts exist with the construction of the structure, irrespective of the traffic.
- **Impact of the functioning of the structure** – impacts generated by the traffic, primarily connected with noise and air pollutant emission of vehicles.
- **Impact of the operation of the structure** – impacts generated by maintenance procedures
- **Abandonment** – in the case of motorways and roads this is not applicable to the activity. Therefore it will not be addressed in the further part.

To enable easier determination of the impacting factors the project should be broken down to more specific steps, phases that generate the environmental impacts.

These are the following:

a.) designation of route option(s)
b.) property expropriation, area occupation
c.) construction of borrow pits
d.) earthworks, landscaping, construction of road base
e.) construction of new road and connected structures
f.) construction and operation of draining and dewatering system
g.) construction of junctions, structures
h.) planting
i.) construction of environmental structures
j.) traffic during the operation
k.) change in traffic on other transport paths
l.) ensuring operability (e.g. road maintenance, salt spraying in winter)
m.) operation of connected structures
n.) accidents, non-natural emergency events

The impact area is the area where impacts can be detected to the extent regulated by law. When the boundaries of the area are determined the provisions of Annex 7 to Government Decree 314/2005. (XII.25) are considered.

3.1. Direct impact area

According to Annex 7 to Government Decree 314/2005. (XII.25) the direct impact area is "the areas that can be assigned to the impacting factors that can be

– the area in the environmental element concerned where given material or energy emissions penetrate into the earth, water, air,

– areas where earth, water, fauna and flora, built environment are directly used."

Soil

The route of the expressway runs mostly on agricultural areas and bypasses the settlements crossed by the current route.

The direct impact area means in respect of the *soil* the total construction area of the route, including rainwater draining channels and borrow pits. Within this area the soil can be impacted in the construction phase; on this area direct pollution of the soil can occur in the case of an emergency event in the period of operation.
In addition to the environment polluting impact we should mention also the removal of arable land and damage to the surface caused by the road structure and the connected structures, and the use of areas connected with construction works (area of borrow pits, depots).

Key attention must be paid that during the period of construction and operation no factor should arise that hinders the further cultivation of surrounding agricultural areas and profitability of farming.

During the construction we have to reckon with regular passage of heavy machines along the road being constructed, consequently with compacting of the soil to an extent that has negative effects. After the completion of works, before the handover of the work site, recultivation of the agricultural lands affected must be done through tilling the soil and restoring its earlier condition.

Waters

In the case of **surface waters** the direct impact area is determined by road traffic emissions and emergency situations. In this area surface pollution washed into the soil by downflowing rainwater can have an impact. The impact area of surface waters can extend to the rainwater draining ditches constructed along the route and the secondary structures, and can include a 100m long section of recipient watercourses.

In respect of **subsurface waters** direct impact area cannot be identified. In the areas of the paved carriageway, draining ditches, infiltration ditches and borrow pits the infiltration conditions change that can modify the replacement of ground water as an indirect impact. This impact is, however, minimal and cannot or can hardly be detected in the case of a line structure.

Subsurface waters need to be analysed primarily in areas sensible to pollution.

Air

The air pollution impact area can be estimated on the basis of the volume and composition of vehicle traffic that determines emission of pollutants and propagation conditions that depend on numerous factors (wind speed and direction, stability of the atmosphere, diffusion, building rate of the area).
The direct impact area on the design route sections, access roads, junctions according to our measurements and calculations made so far:

- high load (above limit): max. 10-20m (the size of the impact area will be defined more precisely when calculating the air quality),
- low load: 50–100m from the axis.

Noise

In respect of noise load the direct impact area is the area near the planned route that needs protection, i.e. residential buildings, institutions, holiday resorts and protected natural areas. These will be exactly identified in the Noise protection section.
Considering the traffic noise limit the estimated impact area is 100–1,200m (the size of the impact area will be specified more precisely when calculating the noise emission).

Fauna and flora

The direct impact area is the areas occupied during the project; road surface, slope, borrow pits that cause separation/occupation of habitats, and disturbance caused near the direct proximity of the road and animals hit by vehicles. The direct impact area of this project is determined in detail in the Fauna and flora section.

3.2. Indirect impact area

According to the above mentioned decree "The indirect impact areas are the areas where changes in the environment caused in the direct impact areas spread over and cause an impact."

Soil and waters can suffer indirect pollution e.g. through ground water and surface water pollution caused by an emergency event; its impact area is difficult to estimate.

In the case of *air pollution and noise load* impact area can be the area along the existing road network that needs protection where as a result of the planned road construction and traffic rearrangement air pollution and noise load change (decrease or increase) is expected.

In respect of the *fauna and flora* indirect impact means the impact of air and soil pollution to the roadside flora and location-bound species of animals.

In terms of *landscape aesthetics* impact area means the total area from where the route can be seen.

In terms of *landscape usage* the impact area includes the route that is an area mostly removed from cultivation or other utilisation, and the area where the utilisation will in some form be modified.

In the following section the current situation of the design area as an environmental element will be presented with the impacts of construction and operation.

The condition of the previously estimated impact area will be presented with breakdown by environmental elements and systems. Determination of the baseline condition is used for

estimating the extent and qualification of changes caused by the project. Description of the condition does not aim at covering the condition of all environmental elements and systems of all areas, only those actually impacted in the given area will be addressed.

4. PRESENTATION OF THE EXPECTED CHANGE IN THE CONDITION OF THE ENVIRONMENT

4.1. Presentation of traffic survey results

Based on national cross-sectional traffic counting figures the traffic corridors of main roads #85 and #86 are national roads with higher than medium traffic.
In Csorna and the surrounding area over the last period annual traffic increase exceeded the average. The increase was higher in the Csorna sections of main roads #85 and #86.
Both main roads have high freight traffic, main road #85 section between Győr-Csorna and main road #68 experienced significant increase of transit traffic since May 2004. On main road #86 increase in freight traffic is caused, in addition to the EU enlargement, by the fact that on motorway A2 in Austria that runs parallel to this main road since 2004 trucks over 3.5 tons pay distance-based toll. The resultant traffic rearrangement is well reflected by the increase of freight traffic at the border crossing points Rajka and Rédics by 100% and 140%, respectively. It is not desirable that the transit sections carry such freight traffic as long-distance traffic.
The situation of light truck traffic is similar, additionally the relatively higher traffic on main road #68 is also strongly present.
Overview map II.3. drawing and the traffic tables showing the current and estimated future traffic volume on main roads #86 and #85 in the 'No project' case well reflect that Csorna plays a very important traffic crossing role by carrying traffic towards Győr-Sopron and Szombathely-Mosonmagyaróvár. Based on traffic figures, the analysed areas have low capacity reserve for traffic carriage.
Traffic surveys show that construction of M86 expressway and the M85-M86 expressways Csorna bypass section is justified, based on traffic, traffic composition, travel speed, traffic congestion figures.
Traffic loads show that the Csorna bypass section can result in about 40–45% traffic decrease in Csorna urban area.
The 2028 traffic status shows that M86 and M85 expressways running on different routes, considering also the developments that will be made on the public road network, will on the average by about 30–45% decrease the traffic on the current main roads, improve noise and emission levels, accident figures and access time in the region.

4.2. Ground, subsurface water

In terms of soil

When preparing the impact assessment the following factors were analysed:

- The geographic capabilities of the design area
- Evolutions of the geologic and hydrogeological conditions of the area concerned
- Existing minerals
- Construction-geological parameters of the design area
- Current geologic condition and structure of the design area
- Soil types and characteristic area usage along the route
- Areas with land improvement in the design area

- Area needed for the project in the direct and indirect area, temporary and final occupation of area, raw material need and sources
- Necessity of monitoring

The following documents were used for the studies:

- Geotechnical expert opinion prepared for Csorna bypass section planning application drawings (covered by about 40–50% of the current route),
- Technical literature, data and maps available in the archive of the Hungarian Geology Institute on the design area,
- Drilling sections of the deep-drilled wells near the design area (Hydrogeological Information System (VIFIR)),
- Agrotopographic map of the design area
- Authority position statements, opinions and data supply earlier requested
- Other technical literature available on this subject

Summary of investigations:

Total length of the planned route option: 30.4km

The route and its impact area is classified in the following geographic categories:

- Macro-region: Kisalföld,
  - Region: Győr basin,
    - Micro-region group: Rábaköz,
      - Micro-region: Kapuvár plain,
      - Micro-region: Csorna plain.

The planned route includes Magyarkeresztúr II gravel pit No **B2** and areas Nos **B4** and **B10** with research right.
The detailed location of the mines is shown on overview site plan E.03 and in Annex VI./2.

Rábaköz is a plain area south of Hanság, with almost uniform structure and surface. Its key feature is that continuous gravel-sand layers with almost identical development level lie under the cover layers of almost identical thickness and quality.
From Csorna towards the area of Kapuvár and towards south and southeast the gravel set lies everywhere very close to the surface.
In the middle and south part of the area a more compact soil containing higher percentage of mud and clay exists (near Bogyoszló, Beled, Magyarkeresztúr, Páli, Szil, Szany etc.). At some points gravel almost comes to the surface, only a humus layer covers it.

Along the rivers and on the flood plains between dams flood plain sediments accumulate (muddy sand, sandy mud), its thickness is not significant yet, coarse river sets are located below it.

<u>The key geographic features of the design area are presented with the drilling cross-section surveys made at 6 cross-sections:</u>

Cross-section 1: Répcelak – Rábakecöl area

Cross-section 2: Bogyoszló-Dör area
Cross-section 3: Csorna area
Cross-section 4: Pásztori-Dör area
Cross-section 5: Bogyoszló-Szilsárkány area
Cross-section 6: Páli-Eedve-Vica line (Páli-Beled-Vadorfa area)

The upper layer in the design area generally contains clay, sandy clay with low water conductivity.
In general we can say that the design area is less endangered by infiltration of pollutants due to the clay cover layers above the ground water level.

The ground structure prevailing in the design area is flooded meadow soil that increasingly contains humus and clay towards north. North and east of Csorna up to Rába large marshy meadow soil also exists. These generally do not contain calcium carbonate.
Based on the above, and that **the soil value rate does not exceed 60% at any point**, we can declare that **the soils on the route do not have higher than average fertility**.

According to information received from the Water Directorate and the Kapuvár Water Company **there is no improved land** in the design area in the area operated by them.

Temporary area usage is expected to be needed on a 90–100m wide zone, i.e. it will affect an area of 3,040, 000m^2.

Based on the model cross-sections, the actually used area will be a 60m wide zone, i.e. the actual area occupation will be 1,824,000m^2.

The impact of road construction on landscape protection will be neutral, when ignoring the use of land.

In terms of subsurface waters

When preparing the impact assessment the following factors were analysed:

- Hydrogeological capabilities along the route
- Environmental condition of subsurface waters along the route
- Sensibility of the design area
- Location of water bases and water company wells in the design area
- Necessity of monitoring

The following documents were used for the studies:

- Geotechnical expert opinion prepared for Csorna bypass section planning application drawings (covered by about 40–50% of the current route),
- Technical literature, data and maps available in the archive of the Hungarian Geology Institute on the design area,
- Drilling sections of the deep-drilled wells near the design area (Hydrogeological Information System (VIFIR)),

- Authority position statements, opinions and data supply earlier requested
- Sensibility map of the design area (VITUKI)
- Other technical literature available on this subject

Summary of investigations:

The upper layer along the route is Holocene yellow-brown aleurite sand and clay. Pleistocene coarse alluvial sediments are below it down to a depth of 13–65m. Fine-grained Upper Pannonic set of medium cohesion is below it with generally sandy, muddy layers. The layers have good water supply and conductivity capabilities. The permanent water level is 0.9–5m below the surface.

An analysis of ground water level detecting wells show on the basis of long-period (1991–2000) averages a ground water level of 2.86–3.36m below surface. These average values are substantiated also by geotechnical drilling section figures and information from archives and map files.

Along the planned expressway in the area of the North Transdanubia Inspectorate of Environment and Water **3 public service drinking water plants exist**: at Beled, Páli and Csorna.

The planned route **does not touch any of the above water bases**.

Water company wells: in Beled – 5, in Páli – 2, in Csorna – 8. The planned route **does not touch any of the above wells**.

Based on the order of layers existing in the design area, presented in the soil protection chapter the following can be declared:

- The upper layer in the design area generally contains clay, sandy clay with low water conductivity.
- Where the upper layers have good water conductivity, the clay layers are also present in greater depths.
- At many points ground water under pressure exists that prevents pollutants from infiltration, while the clay layer prevents their downflow.
- Analysis results show that the subsurface waters in this area are in a good condition, the only problem can be the large number of agricultural cooperatives and animal husbandry farms, but their impact is not relevant for the planned structure (nitrate pollution).

In the case of compliance with technical regulations and mandatory preparation for emergency cases generation of load on and pollution to the subsurface waters can be excluded.

4.3. Surface waters

When preparing the impact assessment the following factors were analysed:

- Hydrographical capabilities along the route
- Environmental condition of surface waters along the route (e.g. water quality)
- Sensibility to flood of the design area
- Estimated volume of rainwater generation
- Possibilities of draining and placing rainwaters flowing from the carriageway
- Blending the TPH pollution of rainwaters flowing from the carriageway
- Necessity of monitoring

The following documents were used for the studies:

- Technical literature, data and maps available in the archive of the Hungarian Geology Institute on the design area,
- Hydrographical Yearbook, 2003 figures
- Surface Waters Water Quality National Core Network monitoring points data
- Data supply from the responsible VIZIG and Kapuvár Water Company
- Other technical literature available on this subject

Summary of investigations:

The design area is located in the Győr Basin, in Rábaköz, in the area bordered by Rábca, Répce and Rába.

The analysed section of M86 mostly runs through the Rába-Hanság inland water bay, the section above the Répce spillway reservoir touches the Nicki inland water bay.

Along the planned route natural lakes and reservoirs do not exist, only a few gravel pit lakes can be found. (Beledi gravel pit lake: near the 127+770 km segment and certain part of the Magyarkeresztúr mining area is also a small gravel pit lake near the 130 km segment.)

Surface water withdrawal is not carried out in the design area.

The water bodies of larger watercourses (Rába, Répce, Rábca) in the area concerned are according to the Water Framework Directive (VKI) not risky. At the same time the small watercourses and inland channels of the design area are rich in plant nutrients and minerals due to rainwaters coming from settlements without sewer network, the large number of animal husbandry plants and pollutants washed into the area through inland waters, inappropriate purification efficiency of sewage purification plants, etc.
*The water bodies of **Keszeg brook**,* that is the most affected by the planned expressway, *have strongly modified nutrient and minerals content that results in a classification according to VKI in the risky category* (Keszeg brook upper and Keszeg brook lower). Relatively few data on their water quality are available. When input of diluting waters is missing (e.g. in winter frost period) mud is often sedimented in the river bed.

According to Annex 2 to Decree 28/2004. (XII. 25.) KvVM the living waters in the design area are classified in the surface water quality category “4. Recipients in areas of general protection level”.

The following emission limits apply to direct inlet:

pH value	6.0–9.5
total suspended matters	200mg/l
KOI_k	150mg/l
Organic dissolvent extract	10mg/l
Total salts	no

Planned living water recipients of rainwaters:

Recipient (1):	Répcelaki spillway reservoir channel – Rába - Mosoni-Danube - Danube
Recipient (2):	Keszeg brook (and inland channels flowing into it) - Rábca – Mosoni-Danube – Danube

In terms of surface waters the project can be implemented, but the following must not be ignored:

The grassy ground ditches planned to be used for rainwater drainage have high TPH binding capability, but it is certainly not sufficient for reaching the 10mg/l TPH inlet limit. Additionally, it must be considered that due to the presence of fatty substances with bad water penetration capability extensively existing in this area desiccation efficiency is relatively low. For this reason the rainwaters flowing from the ditches should be conducted through biological filtering field, then conducted to the recipient watercourse. The inlet environment and the recipient basin must be stabilised with a coating against wash-out.

Since Keszeg brook and the inland channels are inclined to formation of deposits, in each case technical solutions must be preferred that can prevent the rainwater sediments and muds getting to the recipient.

4.4. Air protection

When preparing the impact assessment the following factors were analysed:

- Air quality impact area and baseline condition
- Permitted load in the area
- Air pollution during operation
- Air pollution during construction
- Maintenance impacts
- Necessity of monitoring

The following documents were used for the studies:

- Data from sampling stations of the competent Environmental Inspectorate's measurement network
- Air quality condition survey conducted by the Fodor József National Public Health Centre, National Environmental Health Institute
- Emission logbook of the Transport Institute
- Modelling calculations were made with the air purity protection modelling programme Transzmisszió 1.1 and the air purity protection modelling software Aircalc 3.0.

Summary of investigations:

The area concerned is located on the Kapuvár and Csorna plain small regions, in Kisalföld, in Győr-Moson-Sopron County.

The meteorological basic data of the area are as follows:

	Kapuvár plain	Csorna plain
Annual average temperature	10ºC	10ºC
Annual rainwater	640mm	615mm
Prevailing wind directions	north, north-west, south-west	north-west
Wind speed	3m/s	3m/s

Currently the competent local authority, the Győr-Moson-Sopron County Inspectorate of Environment, Nature and Water does not have any sampling station in its manual measurement network that is suitable for assessing the baseline condition of air purity.

The nearest measurement stations are located in Győr and Sopron, but due to their location these are not suitable for analysing without correction the impact of the planned structure on the environment.

In terms of transport-related air pollution the greatest problem near the design area is in Csorna urban area the high truck traffic resulting from the east-west and north-south transit roads (main roads#85 and #86) crossing and the connected air pollution that puts significant load on the air of the city.

According to test results on **the baseline condition** significant load cannot be detected in respect of any component in the analysed area.

In Csorna the higher NOx and NO_2 values reflect the impact of main road #86 on the air environment.

All in all, we can declare about the **operating condition** that immission load exceeding the health limit will not be generated in respect of any analysed parameter in the direct impact area near the structures that will be constructed.

Construction of the expressway will have a definitely positive impact in the direct environment of the structure. Without the construction the load on the population will further increase, imission exceeding the limit cannot be excluded in respect of NO_x.

We can declare about the **condition during construction** that the pollutant emission caused by movement of vehicles in the area is insignificant.

In the direct environment of the intervention area air pollution caused by the operation of machines will increase, but generation of emission exceeding the limit in the inhabited areas that must be protected can be excluded.

Generation of air pollution exceeding the limit through dusting can be excluded.

The planned expressway is not expected to cause pollution in the direct impact area beyond the air purity protection zone.

In the indirect impact area the structure will have a positive impact due to the traffic reducing impact of the connected high-traffic roads.

4.5. Noise & vibration protection

When preparing the impact assessment the following factors were analysed:

- Noise protection classification of the design area
- Definition of the noise protection impact area
- Current noise condition
- Expected noise load in the long-term reference condition
- Expected noise load in the long-term condition
- Noise load during construction
- Expected vibration load
- Necessity of monitoring

The following documents were used for the studies:

Noise measurements were made with SVAN 958 noise analyser and SV12L microphone with standard positioning. Before and after the measurements acoustic calibrator was used to calibrate the instrument.

SOUNDLPAN noise protection mapping software was used for noise load modelling.

Summary of investigations:

Evaluation of the current noise condition resulted in the following findings:

- In respect of the measurement points in the direct impact area of the planned expressway compliance with night limits can be ensured due to the relatively large distance to public roads.
- The only exception is Csorna urban area where currently limits are slightly exceeded generally for reasons connected with traffic on road #86.
- In respect of settlements affected by traffic on road #86 currently compliance with daytime limits cannot be ensured.

By evaluating the expected noise load in the long-term reference condition we can make the following findings:

In the direct impact area in periphery areas – where noise sources do not exist – noise load is minor, increase is not expected.

In the indirect impact area load on properties located along roads #85 and #86 with high traffic is expected to increase by 1.5–2dB due to long-term traffic increase.

Considering that over a period of 15 years the conditions of the analysed road section can also deteriorate, the above value can further increase.

Since the noise load already currently exceeds the limit defined in Joint Decree 27/2008. (XII. 3.) KvVm-EüM, without the construction of the planned expressway load on the residents of

properties concerned would further increase and their quality of life would significantly deteriorate.

Expected noise load in the long-term condition (with the construction of M86) and its evaluation

Construction of the planned M86 expressway will, with the exception of Vásárosfalu (public cemetery qualifying as place of piety), not result in exceeding the limits on properties located in the direct and indirect impact area.

Construction of the structure will have definitely positive impacts in the indirect impact area since on the average 4–5dB noise level decrease is expected in the settlements concerned.

All in all, operation of the structure will not cause any noise protection related problem. The structure will result in improvement of the quality of life of residents of the indirect area.

Evaluation of noise load during construction

The cemetery in Vásárosfalu is a place of piety, i.e. must be protected from noise. During the period of construction working processes on the closest located work site will result in a noise load that significantly exceeds the limit.

When the 8-hour daytime evaluation period is considered compliance with the limit can be ensured with 1.5 hours' working, i.e. work scheduling alone does not offer a solution.

A request for modification of the noise load limit in the intervention period by 5dB or exemption from compliance with the load limit should be submitted for the identified work site and period.

In the former case 4 hours' working in the daytime 8-hour period can ensure compliance with the limit.

In the indirect impact area significant increase of load on high-traffic main roads is not expected.

On lower ranked roads due to the current low traffic the load will significantly increase (by up to 6dB), but due to the location of borrow pits road sections located within or near settlements are not expected to be included in the transport routes. This way the areas to be protected will not be impacted when the load increases.

Considering that the total destination traffic is expected to be originated from more than one mine, the noise load increase will be lower than the presented value.

During the construction period efforts must be made to define transport routes that bypass settlements to the maximum possible extent.

Expected vibration load

Construction period

During the construction period the increase in the vibration load will not be high. Considering, however, that the quality of transport roads greatly determines the vibration load caused by traffic and heavy trucks can significantly deteriorate road quality, transport should, when possible, bypass settlements and use secondary roads to prevent increase of load.

Operation period

The protective distance needed for compliance with the noise load limits on expressways guarantees compliance with the vibration load limits.
Vibration load in the settlements concerned can significantly decrease after construction of the bypass road. It can reach up to 1–3mm/s^2.

4.6. Waste management

When preparing the impact assessment the following factors were analysed:

- Wastes generated during construction
- Estimated quantity of construction wastes
- Wastes generated during operation
- Collection and disposal of hazardous wastes
- Waste management requirements

Summary of investigations:

Reasonable waste management in compliance with legislation is a mandatory requirement during both construction and operation of the structure.

Collection, transport and delivery to a recovery or disposal company of the wastes generated must be carried out without endangering the environment.

During the construction generation of the following hazardous and non-hazardous wastes is expected:

Name	**EWC code**
Inert waste	
construction wastes (cement, concrete, brick, etc.),	170101, 170904
soil produced	170504
bituminous waste	1703-
Construction materials and secondary materials:	
waste of sealants and isolating materials, waste of paint, varnish and other anti-corrosion materials and coatings	-08 (-08 01, -08 02, -08 04,)
Municipal waste:	
Liquid municipal waste	200301
Solid municipal waste	
Selectively collected waste	
metal waste (iron, steel),	150104
wooden wastes,	150103
paper wastes,	150101
plastic wastes,	150102
Biodegradable wastes	200201
Miscellaneous wastes	

Hazardous wastes:

Name	EWC code
motor, engine and lubricating oils	13 02
waste battery	20 01 33
oily sand	16 07 08
oily rag	15 02 02
wastes from maintenance of vehicles	1601 -
bitumen mixtures, coal tar and tar mixtures	1703 -

paint residue and paint-stained packaging material	08 01 11 15 01 10
Contaminated solvent residues	1406-

Wastes expected to be generated during operation of the planned road section:

EWC code	Name
08 01 11*	waste paint and varnish containing organic solvents or other dangerous substances
08 01 12	waste paint and varnish other than those mentioned in 08 01 11
08 04 09*	waste adhesives and sealants containing organic solvents or other dangerous substances
08 04 10	waste adhesives and sealants other than those mentioned in 08 04 09
12 01 01	ferrous metal filings and turnings
13 01 10*	mineral-based non-chlorinated hydraulic oils
13 02 05*	mineral-based non-chlorinated engine, gear and lubricating oils
13 05 08*	mixtures of wastes from grit chambers and oil/water separators
14 06 03*	other solvents and solvent mixtures
15 01 01	paper and cardboard packaging
15 01 02	plastic packaging
15 01 04	metallic packaging
15 01 05	composite packaging
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances
15 02 03	absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02
16 01 03	end-of-life tyres
17 01 01	concrete
17 01 02	bricks
17 01 03	tile and ceramics
17 02 01	wood
17 02 03	plastic
17 03 02	bituminous mixtures containing other than those mentioned in 17 03 01
17 04 02	aluminium
17 04 05	Construction and demolition waste, iron and steel
17 05 04	soil and stones other than those mentioned in 17 05 03
17 09 04	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03
19 08 09	grease and oil mixture from oil/water separation containing only edible oil and fats
19 08 10*	grease and oil mixture from oil/water separation other than those mentioned in 19 08 09
20 02 01	garden wastes, biodegradable wastes
20 02 02	garden wastes, soil and stones
20 02 03	garden wastes, non-biodegradable wastes
20 03 01	other municipal waste, including mixed municipal waste
20 03 03	street cleaning residues
20 02 01	biodegradable wastes

If the collection, treatment and temporary storage system is constructed as proposed, wastes will not cause environmental problem.

4.7. Landscape protection

When preparing the impact assessment the following factors were analysed:

- Geographic capabilities
- Key parameters of the water network
- Landscape history, landscape usage, landscape structure
- Key data of settlements
- Green areas in the design area
- Interrelations with national and county level regional development plans and local development plans
- Definition of the landscape potential
- Alignment of the planned route with the existing landscape capabilities

Summary of investigations:

Land usage in this area is characterised by dominance of areas occupied by agriculture, the major part of the area of settlements is cultivated as arable land. This means that cultivation as arable land is the characteristic landscape element.

The nature of the landscape seen from the carriageway is determined by monotonous plain area, woody plants along the meandering Keszeg brook and channels crossing the route, grasslands and arable lands, this varied nature is reflected also by the scenery: In the first third of the section a long distance can be seen from a given point. The church towers in surrounding settlements can be well seen, in some cases even the nearest houses. When going from Csorna to Beled the Kőszegi mountains can be seen in the south-east direction. At the other parts of the section the field of vision is narrowed by plant zones and smaller groups of trees along agricultural roads.

Protected natural areas of national significance

Protected natural areas of national significance are not touched by the route.

Fertő-Hanság and Őrség National Park areas are the nearest in Hanság, near Barbacs and Kóny, but they are much outside the route impact area.

Protected natural area of local significance

Protected natural area of local significance does not exist in the administrative area of the settlements concerned.

Unique landscape values

Unique landscape value is the fauna and flora in the Szilsárkány Grassland Natural Area, in particular the protected species living there:

Marsh Gentian (Gentiana pneumonanthe),
fen violet (Viola stagnina),

Selinum dubium.

These plant species live with a few thousand individuals in this area, thus their flowering spots enrich the view in the vegetation period.

Landscape wounds

- Fractured, degraded areas

In the majority of the settlements some mining activity was carried out, gravel was extracted in the largest quantity. In most cases the already closed mines have not been recultivated yet, the remaining mine lakes are used at many points, generally as fishing lake.

- Negative vision elements

Waste depot:

Near the M85 route 21 km segment, at 1km distance south of the carriageway the Csorna waste depot can be found.

Power distribution (transformer) plant

At the boundary of Csorna at the 147 km segment of the M86 expressway at a distance of 100m on the left side the route lies a power distribution plant.

Opinions about the wind-power plant on Babarcsi út are mixed. It is not definitely a negative, rather an interesting vision element, the more so because this is the only such structure in this area. The wind wheel can be seen from the Győr-Sopron railway line crossing to the end of the design section (M86 150 km segment, M85 20 km segment).

The structural plans in several settlement plans include planted protective forest zones within a distance of 100m from the centre of road of the expressway.

Based on the Environmental Impact Assessment, these protective forest proposals are not justified neither for noise load, nor for air pollution respects, except the public cemetery in Vásárosfalu that is a protected structure (place of piety) where protective forest zone is recommended by the EIA.

The landscape potential was determined on the basis of scenery capabilities whereby the following aspects were considered:

- Relief: evaluation of relief energy and surface variety
- Coverage: calculation of biological activity value
- Borders: evaluation of the length and variety of borders

The difference between the lowest and highest point is only 28.1m, so we can declare that the **planned road has very low relief energy.**

In terms of surface variety the planned area is very monotonous or at least monotonous.

By evaluating the border lengths we can declare that **the planned area does not show high variety in terms of landscape potential.**

Alignment with the existing capabilities can be examined on the basis of the longitudinal section and site design on the basis of three aspects:

1. *Planned terrain – comparison of original terrain conditions*
2. *Evaluation of the landscape impact of the planned route*
3. *Presence of adverse vision elements in the landscape*

Almost half of the planned expressway runs on only 0–2m high embankment, thus it is well aligned with the landscape. Higher embankment is needed only at nodes, road and watercourse crossing points.

Due to the plain terrain straight plain sections exist in the highest share. Grade separated crossings that will be constructed on the route make the section more varied. Sections with different route follow each other on the average at each 300m distance, thus the section is not monotonous.

A total of 32 structures will be constructed in the total design area.
In terms of the landscape the best solution is to construct underpasses. The greatest change in the landscape is caused by 5–10m high embankments that will be constructed at the railway line-main road crossing points and by the planned nodes.

4.8. Built environment

Pursuant to Section 1 f) of Decree 18/2001. (X. 18.) NKÖM the planned project qualifies as major project. According to the above decree the prior archaeological tasks may be carried out by the Cultural Heritage Protection Service. Accordingly, the heritage protection (archaeological) impact assessment was prepared according to a contract with the responsible organisation.

Summary of the heritage protection impact assessment examinations:

The archaeological sites on the planned route of M86 expressway are a testimony of the Carpathian Basin's settlements and way of living. It is in our cultural interest to preserve and document these values.

Based on collection of data from earlier researches and a field visit conducted in December 2008 the planned route of the road **crosses 20 archaeological sites**. **The heritage protection impact assessment recommended archaeological exploration for 6 of them, while trial research for 14 of them**.

Since the project is a major project, the Authority is expected to require archaeological supervision along the entire route.

4.8. Fauna and flora

A survey of the fauna and flora combined with a field visit was prepared to explore the current condition by assigning ÚT-TESZT Kft. (plan No: 576). The complete document is included in the Annex on Protection of the Fauna and Flora to the Environmental Impact Assessment.

Summary of investigations on the protection of the fauna and flora:

The design affects the following protected areas and areas to be protected:

Area name:	Protection level	Impacted section	Segments
„Rábaköz" HUFH20001	NATURA2000	Outside the impact area	-
„Hanság" HUFH30005	NATURA2000	Outside the impact area	-
Szilsárkány grasslands	Nature conservation area	Crossed by the route	M86 138+600 – 138+945
Pásztori grasslands	Nature conservation area	Touched by the impact area	M86 140+730 – 141+140
Prépost-szeri forest	Nature conservation area	Touched by the impact area	M86 148+640 – 149+540
Herceg-szeri forest	Ecological network	Touched by the impact area	M86 143+425 – 143+645
Keszeg brook	Ecological network	Crossed by the route	M86 137+060, 138+760, 139+940, 143+250, 147+675

Areas under national protection were not affected.

We can say about the habitat separating effect on the analysed section that since the majority of the area is used as arable land or the route touches only the border of the natural area, the nature damaging impact is not significant.

The planned route does not touch any individuals of protected plant species.

The project can be qualified as feasible if the proposed protection measures are taken.

5. SUMMARY OF ENVIRONMENTAL MEASURES

5.1. Ground, subsurface water

In terms of soil

The (communal and hazardous) wastes generated during construction must be stored and treated according to relevant legislation.

After the construction soil tilling must be carried out to counteract the compacting impact of construction on the agricultural areas impacted.

The pollutant emission of machines must be reduced with appropriate maintenance and compliance with technological regulations. In the case of contamination damage restoration must immediately be carried out. By immediate soaking up the pollutant and fast removal and placing in containers of the contaminated soil such pollution can also be prevented. It is important that soaking materials in sufficient quantity be immediately available to the contractor. Soil contaminated with hydrocarbons must be transported from the area as hazardous waste by a licensed contractor for disposal.

In the areas affected by the construction and in the area of future borrow pits the soil must selectively (according to soil type) be removed according to a humus management plan and stored in a temporary depot, then the soil must be reused for grassing the embankment slopes. After the completion of construction works recultivation of the impacted roadside agricultural areas is required.

The removed humus and the raw materials used for road construction must be transported and stored in a way that minimises dust-off and secondary air pollution.

An Emergency Action Plan must be prepared for the case of potential emergency events and its regulations must be observed.

The size of impacts presented in the Environmental Impact Assessment does not justify monitoring.

In terms of subsurface waters

Since in a large share of the area we have to reckon with high ground water level (2–3m below surface), during the construction special attention must paid to avoiding contamination, compliance with technological regulations and maintenance of machinery. Preparations must be made for potentially occurring emergency events, the Emergency Plan must specifically address prevention of ground water contamination.

Since the planned structure is not expected to have negative impacts on any environmental element, building a monitoring system and scheduling regular tests is not justified.

5.2. Surface waters

The planned solution of inletting rainwaters to living waters must in each case be coordinated with the operator of the recipient.

When constructing bridges, culverts and the road structure attention must be paid not to pollute watercourses. Special attention must be paid to crossing Keszeg brook in the nature conservation area.

Communal sewage generated in the work sites in the period of construction must be collected in closed tank and transported to a sewage purification plant.

Dripping of fuel and motor oil from vehicles and machinery must be prevented through appropriate regular maintenance. Repair and refuelling of machinery must not be carried out near watercourses. Any hydrocarbons that may get onto the soil must immediately be soaked, the soaking material with the removed soil must be transported as hazardous material by a licensed contractor.

Government Decree 219/2004.(VII.21.) on the protection of subsurface waters allows desiccation in the design area. At points of relatively high ground water level near the recipients efforts must be made to ensure that the highest possible share of rainwaters are conducted to surface recipients.
At certain sections the inland channels are due to their size or condition not suitable for receiving downflowing rainwaters or the receiving watercourse is farther away, therefore infiltration ditches, infiltration beds with large surface should be constructed in areas where geological exploration showed grainy, sandy soil that ensures more efficient desiccation.

Compliance with the emission limits defined in Decree 28/2004. (XII. 25.) must be ensured when conducting rainwaters.

Since Keszeg brook and the inland channels are inclined to formation of deposits, in each case technical solutions must be preferred that can prevent the rainwater sediments and muds getting to the recipient.

When the grassy ground ditches planned to be used for rainwater drainage have a TPH binding capability that is not sufficient for reaching the 10mg/l TPH inlet limit, the rainwaters downflowing from the ditches should be conducted through filtering field, then to a recipient watercourse.

The inlet environment and the recipient basin must be stabilised with a coating against wash-out.

If bed correction is needed when crossing Keszeg brook, efforts must be made to restore the original condition as far as possible. With this solution the ecological corridor function of Keszeg brook would not significantly be harmed.
Where combined game crossing structure will be constructed bed narrowing, concreting, excavation etc. should be avoided where possible.

Monitoring proposal

By considering the modelling results we can declare that only Keszeg brook, as recipient will be exposed to perceivable load.
To monitor the impacts of the motorway two monitoring points should be assigned in the affected section of the watercourse, at the 15+700 fluvial km (20+000 – 22+176 km segment) and 42+500 fluvial km (124+523 – 125+035 km segment).

The designated locations should be specified more exactly in the licensing procedures, when the inlet points are known.

Scope of parameters to be examined:
- TPH
- pH
- Conductivity

Frequency of examination:
Quarterly sampling should be carried out in the year of construction. Based on the results and the decision of the competent Inspectorate for Environment, Nature and Water the frequency of examinations can be reduced.

To ensure that the results can be evaluated, in the course of requesting commissioning licence and before the commissioning of the planned expressway a survey of the baseline condition should be conducted at the above identified points.

5.3. Air protection

When construction materials are transported dust pollution significantly increases due to wind and dust-off. To avoid this, vehicles should be covered to prevent dust-off.

The routes used for transport and earth deposited have to be regularly sprinkled until repeated utilisation to prevent dust-off.

To reduce dust-off slopes in the constructed sections should be grassed and vegetation should be planted as soon as possible.

Since the quantity of the emitted pollutant greatly depends on the performance of the vehicles, modern vehicles with low pollution emission should be used for the construction.

Pursuant to the several times amended Government Decree 21/2001. (II. 14.) in order to protect expressways a **protective zone** located at least **50 m** from the centre of the road must be constructed.

Air protection monitoring is recommended by the Impact Assessment as follows:

Assessment points:

- house at Csorna, Virág utca 7.
- house at Sopronnémeti, Rákóczi Ferenc u. 9.
- Zsebeháza Kossuth Lajos u., sports ground
- Vásárosfalu Fő u., cemetery

Scope of parameters to be measured:

- carbon monoxide (CO),
- nitrogen dioxide (NO_2),
- nitrogen oxides (NO_x),
- ozone (O_3)
- flying dust (PM_{10})

Measurement period: 24 hours
Frequency of measurement: Must be determined on the basis of the results and the decision of the competent Inspectorate for Environment, Nature and Water.

5.4. Noise & vibration protection

During the construction period efforts must be made to define transport routes that bypass settlements to the maximum possible extent. When possible, the route of the road that will be constructed should be used for transport.

The house located at the boundary of Vásárosfalu and the cemetery (place of piety) qualify as protected places.

The protected facade of the house is perpendicular to the planned road section, thus the limit will not be exceeded, only approximated.

In order to keep good relations with the residents replacement of the doors and windows of the house concerned should be considered to avoid deterioration of noise feeling. Replacement of doors and windows should be a more aesthetical and cost-efficient solution than a noise shielding wall at the boundary of the settlement.

When evaluating excess of limit at the **cemetery,** as protected structure, the following aspects need to be considered:

- It is expected that noise limits will be exceeded only in night hours.
- Due to the distance of the route the noise shielding wall should be constructed near the cemetery which raises questions of aesthetics, therefore **we propose that protecting forest zone should be created**.

With a protective forest aspects of aesthetics would be observed, thus when obtaining permits coordination with the owner or manager of the area, or in the case of expropriation with the municipality should be held to take over responsibility for maintenance.

The about **150m long** (between 125+000 – 125+150 km segments) and **30m wide** forest zone should be placed directly next to the cemetery rather than next to the expressway.

The exact structure, location, size and place of the protective forest zone must be designed in the planning application drawings in compliance with the requirements of the authority and the operator.

The **house located at the boundary of Vásárosfalu** (125+000 km segment) qualifies as protected.

The protected facade of the house is perpendicular to the planned road section, thus the limit will not be exceeded, only approximated.

In order to keep good relations with the residents replacement of the doors and windows of the house concerned should be considered to avoid deterioration of noise feeling. **Replacement of doors and windows** should be a more aesthetical and cost-efficient solution than a noise shielding wall at the boundary of the settlement.

At the cemetery located in Vásárosfalu during the period of construction working processes on the closest located work site will result in a noise load that significantly exceeds the limit.

When the 8-hour daytime evaluation period is considered compliance with the limit can be ensured with 1.5 hours' working, i.e. work scheduling alone does not offer a solution.

A request for modification of the noise load limit in the intervention period by 5dB or exemption from compliance with the load limit should be submitted for the identified work site and period. In the former case 4 hours' working in the daytime 8-hour period can ensure compliance with the limit.

To record and continuously monitor the condition of the environment **noise monitoring points** should be set up at the following points:

Monitoring points:

- house at Csorna, Virág utca 7.
- house at Sopronnémeti, Rákóczi Ferenc u. 9.
- Zsebeháza Kossuth Lajos u., sports ground
- Vásárosfalu Fő utca cemetery

Baseline measurement: directly before the construction

Values to be measured:
Design equivalent 'A' sound pressure level in daytime and night period. Noise load must be measured according to the standards MSz 13-183/1-92 "Measurement of traffic noise. Noise from traffic on public roads." and MSz 18150/1-98 "Analysis and evaluation of environmental noise."

Vibration load monitoring proposals

During the construction period, if the transport route touches any protected structure, vibration load measurement may be necessary at the critical points.
In other cases monitoring is not justified.

In the period of operation due to the particularities of vibration propagation and the large distance of the protected structures it is not justified to designate monitoring points.

5.5. Waste management

Construction wastes generated during the construction must separately be treated according to the regulations of Joint Decree 45/2004. (VII. 26.) BM-KvVM. Wastes may be delivered only to a technical company holding a relevant licence.

The request for building permit must include the construction waste plan sheet shown in Annex 2 to the above decree, then the request for commissioning permit must include the construction waste registration sheet.

According to the requirements of the National Inspectorate for Environment, Nature and Water a waste management plan must be prepared in connection with the construction.

Management of the hazardous wastes generated during the construction works must be carried out according to the requirements set forth in Government Decree 98/2001 (VI.15.).

The wastes subject to selective collection must be delivered to a waste recovery or waste management organisation, while in the case of biodegradable wooden wastes recovery by the population can also be supported.

Hazardous materials may be delivered for disposal exclusively to an organisation holding a relevant licence.

Depending on the quantity of hazardous waste generated, construction of a hazardous waste depot with the parameters defined by relevant laws is required.

Transport on public roads is allowed only with vehicles defined in the above decree, the waybill must show the type, hazard class, composition, etc. of the waste.

Delivery of wastes must be documented, such data and information may be requested by the competent Inspectorate for Environment, Nature and Water in the procedure of granting the commissioning permit.

A record of wastes generated during the operation must be kept according to the regulations of a separate act and used for preparing the mandatory quarterly and annual data supply.

5.6. Protection of the built environment

The planned route running at an appropriate distance from the urban areas of settlements may not touch any monument, building of monument value or building having unique landscape value.
Access to building plots is ensured through grade separated crossing of roads and dirt roads and construction of parallel service roads.

Construction of the analysed route is feasible in terms of the built environment.

Since the project qualifies as a major project, the Environmental Authority is expected to require archaeological supervision along the entire route.

5.7. Landscape protection

When protecting forest with a width below 20m is used along the route, correction calculations with the value indicator 6, as defined by Decree 9/2007. (IV. 3.) ÖTM, may be applied.

In this case, **when 84.5ha protecting forest is planted, the biological activity value is identical with the initial value.** (This would mean protecting forest of 20m width at a total length of 42km, i.e. 21km both on the right and the left side.)

It should be noted, however, that the activity value can be restored also with the creation of other green area (potentially combined with protecting forest).

The exact calculation and planning of restoration of the biological activity value and the related vegetation planting must be carried out in the further planning phases.

Recommendations for integration into the landscape:

- By reducing the inclination angle of slopes vegetation planting, grassing, visiting and maintenance of slopes will become easier.
- Carefully planned planting

5.8. Fauna and flora

To reduce the degradation to a minimum level in the sections where the road touches or crosses habitats with environmental or ecological value the **work site should be fenced off.**

Near the habitats of species highly sensible to disturbance adverse impacts can be reduced by **restriction in time**.

Name of area	Segments	Protected species	Protection type
Beled gravel pit	M86 127+770	Little bittern Sand lizard	Restriction in time
Szilsárkány grasslands	M86 138+600 – 138+945	Marsh Gentian Cnidium dubium Fen violet Common Club-tail Large copper Southern Festoon	Fencing off
Saker Falcon living space	M85 129+000 – 130+000	Saker Falcon	Restriction in time
Csorna brick factory pits	M85 128+825	European fire-bellied toad Ferruginous Duck Pied Avocet	Restriction in time

Construction of borrow pits can result in termination of habitats. These may be opened only with relevant licences. A basic requirement related to them is that they must be constructed in degraded areas which are not valuable in ecological and environmental terms.

The isolating impact of line structures can be reduced to an acceptable level by construction of game crossing structures, bridges and culverts at well thought-out appropriate places.

Based on the survey of the fauna and flora combined with a site visit, described in the Annex on Protection of the Fauna and Flora, the Environmental Impact Assessment proposes game crossing structures – considering the longitudinal sections prepared for the road plans – at the following points:

127+365 km segment	**Game crossing structure under M86 combined with crossing of Keszeg brook (underpass)**
130+390 km segment	**Planned game crossing structure over M86 expressway**
138+827 km segment	**Game crossing structure under M86 combined with crossing of Keszeg brook (underpass)**

It should be noted that **the overview map E.04.04. showing game migration routes** and the **orthophotos of the survey of the fauna and flora** show the number of individuals of deer and hares moving near the crossing of the planned route, thus the annual number of wild-boars and red deer were shown that includes the migrating individuals.

A basic condition of using **game crossing structures combined with watercourse** is that dry shore must be left on at least one side of the watercourse, if possible on both sides. The dry shore must be created in a way that it is at higher level than the highest water level earlier measured. Experience so far shows that game crossing structures with underpass design function well when their internal height reaches for red deer, that is the design species, 4m and the free space index is higher than 1.5 (free space index= width * height / length).
When constructing them various bed corrections, such as bed narrowing, concreting, excavation etc. should be avoided. When it is unavoidable, efforts must be made to restore the original condition as far as possible. With this solution the ecological corridor function of Keszeg brook would not significantly be harmed.

The place of ***game crossing structures with overpass design*** was assigned on the basis of examinations between the area of the former farm-stead with trees and bushes located on the south side of the Csorna-Szombathely railway line and Fölerdő, in an area with ploughland cultivation mode. Planting on the game crossing structure and in its direct environment must be carried out in a way that the traffic passing under them disturbs the games to the least extent possible. The covering vegetation must have a height and sufficient density to prevent games crossing at night seeing the lights of vehicles passing on the road.

The design parameters of game crossing structures is specified according to Road Technical Regulations ÚT 2-1.304, “Ecological crossing structures” as follows:

Parameters of game crossing structure with underpass design, dimensioned for the largest game living in the given area, red deer:
Minimum height: 4m
Passage zone width: 5m

The width of the game crossing structure must be determined on the basis of the free space index:

$$\text{free space index} = \text{free space width} * \frac{\text{height}}{\text{length}}$$

(This must be 1.5m or higher.)

Big games crossing structure over public roads

Width: 40–50m, but at least 20m.
On narrow bridges (width: 20–40m) a 40m wide sand-clock shaped access path should be constructed.

Monitoring proposal:

Ongoing monitoring of game crossing structures for a period of 4 years after commissioning is proposed in the section addressed. During this period comprehensive monitoring covering the entire year should be carried out primarily for games (red deer, wild-boar, deer, hare) at all crossing structures. This means that in all seasons crossing structures are continuously monitored for at least two weeks.

6. SUMMARY OF PROPOSED PROTECTION MEASURES AND MONITORING PROPOSALS

Proposed environment protection and nature conservation measures

Environmental element	Proposed measure	Place, km segment of the measure
Ground, subsurface water	- To prevent TPH contamination of ground water having a high level at certain points grassed rainwater draining ground ditches should be constructed.	Rainwater draining on the expressway will be designed in a later phase of planning.
Surface waters	- To ensure compliance with inlet limits applicable to contaminated rainwater getting to the recipients grassed ground ditches, as well as furrows with a widening shape functioning as biofilters should be constructed. - Technical solutions should be preferred that can prevent the rainwater sediments and muds getting to the recipient. - If bed correction is needed when crossing Keszeg brook, efforts must be made to restore the original condition as far as possible.	Rainwater draining on the expressway will be designed in a later phase of planning.
Air protection	- A protective zone of at least 50m from the centre of the road must be constructed.	Along the total length of the route
Noise protection	- Doors and windows should be replaced in the house located at the boundary of Vásárosfalu	125+000 km segment
	- Noise shielding forest zone should be constructed to protect the public cemetery in Vásárosfalu	M86 125+000 – 125+150 km segment
Protection of the fauna and flora	- Game crossing structure under M86 combined with crossing of Keszeg brook	M86 127+365
	- Bid game crossing structure over M86 expressway	M86 130+390
	- Game crossing structure under M86 combined with crossing of Keszeg brook	M86 138+827

Summary of monitoring proposals

Environmental element	Examined parameter	Location	Frequency
Ground, subsurface water	-	-	
Surface waters	– TPH – pH – Conductivity	*Keszeg brook* as recipient **20+000 – 22+176** km segment and **124+523 – 125+035** km segment	Before commissioning a survey of the baseline condition is required. In the year of construction quarterly sampling is proposed, then in the function of the results achieved the frequency of sampling can be reduced
Air protection	– carbon monoxide (CO), – nitrogen dioxide (NO_2), – nitrogen oxides (NO_x), – ozone (O_3) – flying dust (PM_{10})	– house at Csorna, Virág utca 7. – house at Sopronnémeti, Rákóczi Ferenc u. 9. – Zsebeháza Kossuth Lajos u., sports ground – Vásárosfalu Fő u., cemetery	Measurement period: 24 hours Frequency of measurement: Must be determined on the basis of the results and the decision of the competent Inspectorate for Environment, Nature and Water.
Noise & vibration protection	Design equivalent ‘A’ sound pressure level in daytime and night period.	– house at Csorna, Virág utca 7. – house at Sopronnémeti, Rákóczi Ferenc u. 9. – Zsebeháza Kossuth Lajos u., sports ground – Vásárosfalu Fő utca cemetery In the construction period, when the transport routes touch any protected structure, measurement of **vibration load** at the critical points can become necessary. In other cases monitoring is not justified.	Baseline measurement: directly before the construction Measurements can become necessary during construction when complaints are made.

Environmental element	Examined parameter	Location	Frequency
Fauna and flora	Comprehensive monitoring covering the entire year should be carried out primarily for games (red deer, wild-boar, deer, hare) at all crossing structures. This means that in all seasons crossing structures are continuously monitored for at least two weeks.	- **127+365 km segment** Game crossing structure under M86 combined with crossing of Keszeg brook (underpass) - **130+390 km segment** Planned game crossing structure over M86 expressway - **138+827 km segment** Game crossing structure under M86 combined with crossing of Keszeg brook (underpass)	Ongoing monitoring of game crossing structures for a period of 4 years after commissioning is proposed in the section addressed.