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Principal: National Infrastructure Development Ltd. 1134 Budapest, Váci út 45	Date: February 2009 Design number: 52.065/507
Name of design documentation: **M86 expressway** Environmental, cultural, heritage protection and feasibility impact study of the section between Szeleste-border of Győr-Moson-Sopron county between km sections 98+300-119+235	Drawing number: 6 scale: page number: 43xA4
Name of special plan: **Environmental impact study**	Software: WORD File name:
Design part: Non-Technical Summary	document page: e-mail address of responsible designer: hernadyne@uvaterv.hu

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1. Presentation of the essential points of the activity

1.1. Introduction

The principal who ordered the environmental impact study is the investor of the facility, National Infrastructure Development Ltd.

The order of the Road and Railway Design Ltd. applied to the preparation of an environmental, cultural heritage protection and feasibility impact study about the section of M86 expressway between Szeleste-Győr-Moson-Sopron country border.

The implementation of the planned investment is justified by the following resolutions and plans:

M86 dual carriageway between Szombathely—Csorna is included with a two-lane layout in the Annex of Act LXVIII of 2007, amending Act CXXVIII of 2003 on the "Public benefit nature and development of the network of expressways of the Republic of Hungary."

Containing an indicative list of traffic development projects planned to be implemented in the period between 2007 and 2013, the annex of government Decree 1004/2007. (I.30.) includes a 2x2 lanes layout for main road no. 86, the section between Szombathely—Csorna (in the long term: M86). The road section included in this Road Impact Study is part of the expressway network planned in the long term, after its completion it will receive a significant role in handling international through traffic.

1.2. Problems of the existing road network

At present the only main road providing access to the region is the existing no. 86 class II road, which enables access to Mosonmagyaróvár, Győr and Budapest via Csorna. It also plays a significant role in international transit traffic, providing the only access on a main road to West Slovakia and Slovenia and Croatia. After May 2004 the freight traffic going on this latter continued to increase, which is due, in addition to natural traffic increase, to the expansion of the European Union, but mainly to the road tax levied on the Austrian A2 motorway, running parallel with the Hungarian road, on trucks exceeding 3.5 tons. The freight traffic increase of 140% and 100% on the border crossing stations of Rajka and Rédics respectively, reflects the rearrangement of freight traffic.

The Sopron - Sárvár - Balaton route of no. 84 2nd class main road - which crosses the no. 86 main road at Hegyfalu - primarily functions as a regional and touristic route. Between Szombathely and Sárvár the no. 88 main road connects these cities forming the shape of a triangle with the two main roads mentioned above. Situated on the left bank of Répce, the no. 8614 road cannot be an alternative for handling the traffic, neither on account of its configuration, nor its role in the road network.

The existing main road no. 86 has been created by utilizing the lower ranking roads running across the localities. This is why in most of the affected localities the transit sections running in populated areas are sometimes quite narrow and winding, matching the street structure of the inner area of the locality (Szeleste, Hegyfalu), in other places they are wider but extremely long (Vámoscsalád, Vasegerszeg, Répcelak). It can be determined for each locality that the separating effect of the - now increased - traffic taking place on the transit sections is strongly felt, it may pose accident risk and cause a strain on the environment (increased noise, deterioration of air quality), and access times may also increase owing to traffic congestions.

1.3. Preliminaries

Acting under the commission of National infrastructure Development Ltd. (1134 Budapest, Váci út 45.), in November 2007 UNITEF'83 Műszaki Tervező és Fejlesztő Zrt. submitted to the Chief National Inspectorate of Environment Protection, Natural Protection and Water Management the preliminary assessment documentation of the section of the M86 expressway between Szeleste-Győr-Moson-Sopron border, in order to enable the conduct of the preliminary assessment procedure. Based on the preliminary assessment documentation and after a public hearing held in January 2008, and the negotiation held in March with the participation of the executive officer of the village of Nick and the executive officer of the town of Répcelak, the Chief Inspectorate issued its resolution no. **14/145-35/2008.** In the resolution they required the submission of an environmental impact study for options „D" and „F".

1.4. Basic details about the facility

Length of the planned track:

Option „D" 20 800 m
Option „F" 21 318 m

Cross-sectional layout:

Name	Design speed (km/h)				
	110 dual carriageway	90-70 main roads	90-70 byways	60 other public road	— Agricultural road
Width of the traffic lane	3.50	3.50	3.50	3.25	3.0
Width of the dividing lane	3.60	2.6			
Service lane (when there are 2x2 lines)	2.50	–	–	–	–
Shoulder along the service lane	1.0				
without service lane	2.0	2.5-2.0	2.0	1.5	1.0
Safety lane	0.25	0.25	0.25	0.25	
Width of the crown of the road	24.6	12.0-11.0	11.0	9.5	8-7
Facing width	15.0	7.50	7.5	7.0	6-4

Expressway no. M86 will be constructed with features corresponding to a planning speed of Vt=110 kmph, with K.II.A. category classification, as a dual carriageway with 2x2 lanes.

According to our present knowledge, along the entire length we should expect an appropriation width of approximately 60 metres.

Major quantities

	Option „D"	Option „F"
Topsoil removal (th m^3)	571	597
Storage locally (th m3)	43	46
Transport to the depot (th m3)	528	551
Levee construction and transport (th m3)	2566	3381
Construction of pavement (em^2)	494	520

Junctions

A junction will be constructed on two points on the section:

- The grade separated junctions of both versions with main road no. 84 (105 km section.)
- grade separated junction with road no. 8447, option D (115+500 km section)
  option F (113 km section)

Structures

on the „D" path:

99+049	km s.	a creek bridge with a 3.0 m opening (Béresdombi creek)
99+323	km s.	Overpass above the MÁV railway line
100+270	km s.	a creek bridge with a 6.0 m opening (Kőris creek)
100+390	km s.	culvert with an opening of 2.0 m
100+625	km s.	Underpass under a dirt road

101+347	km s.		culvert with an opening of 2.0 m
101+500	km s.		Underpass under the wildlife crossing
101+818	km s.		Underpass under a dirt road
102+158	km s.		a creek bridge with a 6.0 m opening (Kőris creek)
102+296	km s.		culvert with an opening of 3.0 m
103+180	km s.		Underpass under a dirt road
104+878	km s.		Underpass under main road no. 84
105+949	km s.		Underpass under a dirt road
106+711	km s.		culvert with an opening of 3.0 m
107+668	km s.		Underpass under road no. 8448
108+856	km s.		Underpass under the wildlife crossing
109+861	km s.		Underpass under road no. 8449
111+755	km s.		Underpass under the access road
113+897	km s.		Underpass under a dirt road
114+964	km s.		a creek bridge with a 3.0 m opening (Új-Csörgető ditch)
115+575	km section		Underpass under road no. 8447
117+000	km	section	a creek bridge with a 6.0 m opening (Kőris creek)
117+133	km	section	Underpass under the access road
118+592	km	section	Underpass under a dirt road
119+078	km	section	wildlife crossing with an opening of 20.0 m above the Small Rába creek

on path „F”:

111+770	km	section	Underpass under the access road
112+970	km	section	Underpass under road no. 8447
114+126,6	km	section	a creek bridge with a 6.0 m opening (Kőris creek)
114+444	km	section	Underpass under the access road
116+506	km	section	a creek bridge with a 6.0 m opening (Metszés creek)
117+560	km	section	Underpass under the access road

Rest area:

On the section constituting the subject of this study the construction of a rest area is suggested in one place, in the area of the locality of Vámoscsalád, between sections of 111 km and 112 km.

Site of the engineer’s site

According to the current concept, the operation of the dual carriageway section between Szeleste and the County Border will take place from the operation engineer’s site of Szilsárkány, thus no engineer’s site will be constructed on this section.

2. Presentation of impact processes and impact areas

When considering the stages of activity, we can break down the impacts of the investment into the following:

- construction
- impacts of the facility
- impacts of the functioning of the facility
- impacts of the operation of the facility
- abandoning is not characteristic of this activity, so we will not be dealing with it.

In the impact analysis we will not be able to deal with the impact of construction in detail, since we do not have data of appropriate depth. The specific data related to construction will become available after the contract has been granted and the detailed technical designs are available, therefore in the case of planning stages prior to these, only general descriptions can be provided, ones that do not depend on the contractor, its pool of machines and the schedule of the construction.

In the case of impacts related to traffic (such as noise, air pollution) primarily the impacts of operation are manifest, therefore we will only assess these impacts here.

We describe the impacts of construction, operation and functioning, furthermore, concerning construction-related path facilities, the **generally occurring impacts**, in the following part, broken down to environmental element:

Soil, groundwater

Impacts of the facility
The area occupation by the road will result in the reduction of arable land. The size of the area depends on the size of the land to be expropriated, which means the technically necessary strip of land, as with all road construction investment, i.e. a 60 m wide strip of land in our case. The construction of junctions and one rest area planned on the section will require additional land. No engineer's site will be constructed on this section. Both track options will require undeveloped land under agricultural cultivation, located on the periphery.

Another impact that may occur - primarily in the case of high levees - is the change in the structure and density of the soil. In consideration of the features of terrain and the planned levels of the track, we can determine that, for the most part, the road will run on a levee 1 to 3 metres high. In the vicinity of the structures it may become necessary to construct major levees on smaller sections, as well as the development of deep cuttings.

In operation the soil may primarily get polluted through the precipitation of polluting materials. Based on earlier surveys, concerning certain time horizons, of these the most important was pollution by lead, which was registered in the strip of land along the road. In 1999 the distribution of lead-containing gasoline was terminated in Hungary, therefore we do not have to anticipate the precipitation of lead. Other air pollutants may precipitate in a diffuse manner, in areas that cannot be accurately identified, which also means that their concentration is negligible in the land strip along the road as well.

When the road is in operation, oil pollution may be significant in the case of incidents. In such cases they may primarily pollute the soil in the vicinity of the shoulder and the trench. As an indirect effect - in the case of infiltration, as a result of subsoil water movements - it may also occur in large areas.

On the one hand, the impact of construction may be manifest as use of additional land, which may mean, in addition to the areas to be expropriated, the temporary use of arable land. If that happens, after the use has been terminated, the area will have to be re-cultivated. Another impact of construction may be soil pollution occurring in the sites used for the storage of heavy machinery, or pollution deriving from the storage of hazardous materials. Therefore, these areas will have to be designated with special care. Is sensitive areas or in the area of catchments, no sites may be established for the storage of machines or hazardous materials. The storage of hazardous waste is also prohibited in these places.

The receptors of the surface are the arable land along the track, even including the water layer, and the operating and explored catchments built on that, the irrigated areas and the irrigation wells.

As a direct affected area, we may consider the area occupied by the path, the size of which is the same as the size of the area to be expropriated. In the junctions and road passes this may exceed the average value of 60 metres.

The direct affected area of the construction also covers the building yards. The exact location of these can only be determined prior to the start of construction, when the contractor has been designated and the organization plan is available. These areas will only be used as long as the construction is in progress. After that, the area will have to be re-cultivated.

Concerning the soil, we can consider the air purity protection zone on the two sides of the track as an indirect affected area. In the case of dual carriageways, this means at least 50 m on either side, measured from the axis, which must be designated as a protective zone according to the applicable directive on the protection of the purity of air (Government Decree 21/2001. (II.14.), as amended).
In the case of subsoil water, the affected area is limited to the area of the shoulder and the trench, therefore it remains within the area of expropriation. In the case of groundwater the indirectly affected area is the area affected by the stream of water. The size of this area depends on the features of the soil, the level of the groundwater table, the features of groundwater streams and the level of pollution.
Concerning incidents, the directly affected area usually does not exceed the boundary of expropriation, it is mainly limited to the area between the shoulder and the trench.
The indirectly affected area in the case of groundwater is also the area to be polluted by the flow of subsoil water.

Surface water

The effect of the facility can be manifest in the change of the catchment area. The road may cut up the catchment area and establish partial catchment sites. These may result in changes of certain sections of water streams and in the supply of water.

Another impact of the facility is a change in the surface drainage conditions. Changes in drainage conditions may be caused, on the one hand, by changes in the ratio between paved and unpaved surfaces of the neighbouring areas. It also affects drainage conditions if the road collects, by its system of trenches, the waters that had formerly been spread out on the surface and infiltrated, and then drains them into the receptacle on one point, in a concentrated manner.

Changes in the state of the riverbed are related to the construction of the road. These may derive from adjustment of the riverbed, the riverbed cladding occurring at points where watercourses cross and favourable or adverse changes of the conditions of slope. In this case washouts and alluvions may occur.

The functioning of the road will mainly affect the water quality of the watercourses. The effects on watercourses derive from the precipitation of air pollutants, the wear and tear of components, fuel dripping and pollution from accidents, in emergency situations.

Since the termination of the distribution of leaded fuel (1999), the precipitation of air pollutants has decreased significantly for surface waters as well. Its impacts are negligible in the case of crossing watercourses.

The adverse impacts of operation will be mainly manifest in non-slip treatment. After the snow melting in the spring, the salt contents in watercourses may increase temporarily. Its effect is brief, but intensive on the section following the crossing. In the rest of the year we do not have to anticipate any salt load stemming from the precipitation of the road.

During construction the impacts on the quality of watercourses and other surface waters could be significant. These may stem from the fact that machine maintenance, repair may be performed in the vicinity of

watercourses. During the construction of bridges and track structures the dripping fuel of heavy machines could cause pollution.

It may cause temporary changes in the condition of the riverbed in the case of line transport and construction, if crossing the watercourse is enabled by the laying of the temporary culverts. When the works have been completed, the riverbed will have to be restored.

The receptors of the area are the crossing and parallel watercourses, lakes and reservoirs.

The direct affected area is generally 25 to 50 m in the crossing of watercourses and the place of inflow of precipitation waters on the upstream side, on the downstream side it is 50 to 100 m depending on the nature of the watercourse. When the riverbed is adjusted, the entire adjusted section belongs to the direct affected area. The catchment area is part of the indirectly affected area, and the area impacted by any changes in the surface drainage conditions is also an indirect affected area.

Air

Any effect on air as an environmental element may occur during operation and during the term of the construction. This latter periodical effect may occur in a larger area concerning the transport routes and material sourcing places. It will be terminated upon the completion of construction.

When exploring the impacts of functioning, we will assess those areas where the impact of the completed investment will manifest in the long run, compared to the situation without implementation it will cause a change of at least 25% on the road network.

The receptor and the residents of the direct and indirect impact area.

Direct affected area - the area along the road where the load falls below the limit value. If the calculated loads fall below the limit values within the area of expropriation, then the direct affected area will be at least 50 m on both sides, as measured from the axis of the expressway.

Indirectly affected area - the totality of those areas where the measure of the load imposed by the transport running on the road section under consideration will change (increase or decrease) by at least 25%, considering the generally applicable conditions.

Wildlife: Humans

Health impacts

Changes in the health condition of the residents after the commissioning of the road may primarily occur as a result of the impacts caused by traffic. The impacts may occur delayed in time, permanently, concerning the residents under load.
In terms of health we can identify positive and negative effects. Along the roads that are currently very much loaded by noise and air pollution - if a decrease of traffic can be anticipated there - we can talk about positive impacts, while along the new road, owing to the increase of the load - if it affects a significant and residential area - primarily negative impacts will be manifest.

In our assessment we will characterize the affected area of health by the affected areas of the two most important environmental elements related to traffic: those of noise and air.

Socio-economic effects

In the case of an infrastructure development project, the impacts on social-economic life are generally favourable, but in individual cases it might also be neutral for development. Favourable impacts are generally manifest in the field of economic life. A negative impact may occur if the investment induces such adverse processes that are alien to the development tendencies of the region, its traditions, features and the environment, trigger additional investments not matching the region, or the size of the investments does not

match the environmental features. However, these impacts can usually only be registered in the vicinity of the junctions, since driving onto or off the road is possible in these places.
Socio-economic affected area - those localities in the given whose development is affected - promoted or impeded - by the existence of the road.

Wildlife: Natural environment

The construction of roads on the periphery will primarily result in the termination of living environment and habitats. The loss in habitats depends on the length of the road section to be constructed, the footprint of the service facilities and the number and size of the affected habitats.

The ambient living environment will also be modified through the establishment of the road. Roads running in cuttings or on a levee will change the geology of terrain, modify the microclimatic features, and in certain cases it will also change the conditions of water regime. The combined effect of these factors will change vegetation in the vicinity of the roads, which impact will also affect the fauna or indirectly.

In the case of path facilities, the most significant jeopardizing effect of establishment and operation is the fragmentation of habitats. The isolation of habitats will result in the isolation of the genetic pool of a particular population, thus indirectly it leads to genetic drift. The resilience of the remaining minor populations will decrease in several respects. The fragmentation of habitats will cause changes in the vegetation of living space, which in turn, has repercussions on the fauna as well. Habitat fragmentation, the effect of traffic is manifest in the "most spectacular" manner in the hitting of animals. The carriageway will or could narrow down the daily space of movement and may cut off routes of migration.

The vegetation on the edge of the road, but also the road itself has a special attractive effect. The vegetation on the shoulders and face slopes of completed roads is usually different than the vegetation of neighbouring areas, e.g. those of roads running between plots of plow-land is much more diverse, therefore it attracts animals from faraway places. Pavement of a temperature different than the ambient temperature may also be attractive for the animals.

The effect of construction on wildlife
Road construction also causes further, temporary loss of habitats. The routes of transport, the dumping of construction materials take up significant space, which disrupts and pollutes natural habitats. This danger is especially significant if construction takes place near an area under protection or with valuable wildlife. In this case the unnecessary use of habitats should be reduced to the smallest possible extent.

Together with the traffic increased by transport, construction will pollute the environment temporarily in a larger area than later (deterioration of air quality, noise pollution, soil pollution). The disturbances caused by human presences mean a special form of environment pollution. In other periods (e.g. reproduction period or during periods of scarcity of feed in the winter, when many species gather into larger groups) this disturbance may significantly change the usual behaviour of animals.

The construction of path facilities, including roads, involves the disruption of the surface, through the break-up of natural vegetation it creates an opportunity for migrant species into the interior of areas with natural wildlife, resulting in the proliferation of weeds there, thereby functioning as a "negative ecological corridor".

In terms of protection of wildlife, the directly affected area means the area of directly affected natural or semi-natural habitats running along the path. In the case of small habitats it may be the entire habitat. When designating the directly affected area, the directly affected area designated for protection against noise and protection of air purity must also be taken into account, if the given habitat is sensitive to those. The affected area covers areas with natural or semi-natural wildlife to be used in construction, if they are exposed to harmful effects from the construction (poaching of the soil, establishment of deposit sites, changes in the condition of the riverbed, changes in water regime, etc.).

Its directly affected area is the vicinity of about 100 m of the path of the planned expressway. Here we can register habitat destroying and fragmenting effects.

Indirectly, if we change the terrain, the microclimate, the available area, we arrive at affected area figures that differ from species to species.

Built environment

The facility of the impact will be manifest in the effect of the road separating partial areas within or outside of localities, in the reduction of areas through land use, furthermore, in the change of the value of the area (appreciation or depreciation). This latter manifests itself as an indirect impact, shifted in time to after the commissioning of the road. The dividing effect and the reduction of area will occur as indirect impacts, simultaneously with the start of construction and with commissioning. The dividing effect may be reduced by road passes, construction of junctions.
The impact deriving from the functioning of the road is related to the rearrangement of traffic, and means change in the noise and air pollution loads affecting individual parts of localities.

In terms of their direction, the impacts of establishment and operation may be positive or negative.

We consider as part of the directly affected area those localities where there are environmental elements on which the dual carriageway has an indirect impact.

All areas, localities are considered as indirectly affected areas where any impact of the investment is felt (such as regional development, rearrangement of traffic, dividing effect, land occupation).

Landscape

Concerning the land occupation, the impact of the facility will be manifest in the following:

- impact on individual landscape values
- changes in the methods of landscape utilization
- cutting through connections,
- changes occurring in the landscape

Within the area of expropriation - which is a strip of about 60 m on both sides in this case - the earlier methods of cultivation, natural or semi-natural areas, individual landscape values may be terminated and replaced by a strip of traffic. The establishment of the path will also change the old network of connections of the region. Primarily, the regime of the existing road network will be transformed, but the changes will also affect the ecological connections and the water network.
Owing to difficulties with accessing the cut-through areas, the profitability of economic activities performed in the individual areas may decrease, which may even result in the abandonment of land cultivation if no road passes are provided. This impact may be terminated or attenuated by providing passes by dirt roads and the establishment of parallel dirt roads.
The changes in the landscape are related to the alignment of the road. The geological conditions of terrain significantly affect how the road fits the landscape, how much it is covered and visible.

The impact of construction, in terms of landscape protection usually generates temporary changes, but the impact can also be final. It is mainly related to the establishment of material sourcing places and dumping sites. The construction of the road will involve changing the surface of terrain, the installation of cuts and levees, the temporary disruption of the surface, limited to the time of construction, if areas outside of the area of expropriation are used. Construction will mean the establishment of a significant volume of levees, the start of sourcing of materials suitable for the construction of levees.

The impact of operation on the landscape as a complex unit, through the change of various environmental elements.

The impacts of the functioning of the road are dealt with in detail in the various specific chapters (surface water, noise, air). Here we only highlight those impacts that are not dealt with in detail in these chapters.

One of the most significant impacts along the new track will be probably an upsurge of investments. Good traffic connections will make the area more valuable for the performance of production and service activities. This impact can be mainly registered near the junctions.

The directly affected area is that part of the district where the path will run, the landscape, individual landscape value and method of landscape utilization will be directly affected.

The indirectly affected area, which is usually a theoretical concept, is that part of the landscape from which the road can be seen, and those elements of the region, the landscape, that are visible from the road.

Noise

Noise is not an environmental element, but being an impact carried by air, it must be assessed. Any effect through the carrying element may occur during operation and during the term of the construction. This latter periodical effect may occur in a larger area concerning the transport routes and material sourcing places. The impact will be terminated upon the completion of construction.

When exploring the impacts of functioning, we will assess those areas where the load deriving from road traffic will cause a change of ±1 dB(A) in the "with investment" scenario or compared to the long-term state without investment.

The receptor is the community living in the directly and indirectly affected area.

Directly affected area - In consideration of the provisions in Government Decree 284/2007.(X.29.) on the individual rules of protection against ambient noise and vibration, Article 5, in this case the affected area is 56 - 67 m. Article 7 of the above statute provides for the affected area of transport activity.

Indirectly affected area - if we assess the change of traffic conditions, then the indirect affected area is the totality of those areas where the measure of the load imposed by the transport running on the road section under consideration will change (increase or decrease) by at least 25%, considering the generally applicable conditions.

Waste

Waste is also a factor that jeopardizes the environment. It may harm the soil, groundwater and surface water. In accordance with the applicable statutes, arrangements must be made for the appropriate collection of waste generated by the construction and operation of the dual carriageway and their storage in the collection site for the operations. These arrangement will make it possible to avoid any adverse impact on the environmental elements.

For the purposes of waste handling, the directly affected area means the area within the border of expropriation, in which the waste is generated and collected. If the path of the dual carriageway touches upon a waste deposit side, the area of the site is part of the directly affected area.
The site preparation area temporarily occupied by construction is also part of the directly affected area, waste can also be generated in that site and its collection may become necessary.

The indirectly affected area can be designated concerning the removal and disposal of waste. The waste generated along the track - primarily hazardous waste - will be transported to the collection site operating in the engineer's site, which makes it part of the indirectly affected area.

The fact that in this stage the dumping site to be used during construction is not known, furthermore, that the engineer's site to be established will be in charge of waste collection, and a specific waste management plan will have to be created for the building permit, in the following part there is no need to deal with the indirect affected area meaningfully.

3. Estimation, assessment of environmental impacts

3.1. Soil, groundwater

3.1.1. Activities affecting the environment

When analysing the environmental impacts of the proposed investment, we have assessed the drivers according to the provisions of Government Decree 314/2005. (XII. 25.), for the various stages of the activity.

These are:
- Construction stage
- Operating stage

In the case of motorway the abandonment stage is not applicable and therefore we do not deal with it.

Construction stage
- Removal of the topsoil
- Land development
- Establishment of material sourcing points
- High water table
- Establishment of water construction, stormwater drainage structures
- Work of road construction machinery
- Construction of the carriageway and the related facilities (rest areas, filling stations, restaurants, etc.)

Operating stage:
- Motorised traffic
- Operation of the related facilities
- High water table
- Drainage of rainwater, desiccation
- Occurrence of accidents, pollution in incidents
- Deicing during the winter
- Road maintenance and repair

3.1.2. Impact processes

Construction stage

Soil and rocks
- The removal of the topsoil will result in the destruction of soil in the affected area.
- The dumping and reuse of the removed soil would mean, on the one hand, the protection of the topsoil, on the other hand, the disruption of structure.
- During construction the soil will be compacted as a result of machinery moving on it.
- The operations of heavy machinery could pollute the soil (fuel or lubricants may seep into the soil).
- Landscaping, the likelihood of soil erosion will increase after the removal of vegetation.
- In the material sourcing point necessary for the production of construction materials the soil will probably disappear, the modality of area utilization will change and landscape injuries will be created. After the completion of sourcing and the completion of recultivation the condition of the environment will improve.

Underground water
- The establishment of cuttings and levees could cause changes in the level of groundwater
- On the material sourcing points to be established changes may occur in water dynamics.
- High water table

Operating stage

Soil and rocks
- Area occupation will permanently modify the use of the area, the method of cultivation. Arable land will decrease.

- During operation pollutants arising from motorised traffic will be demixed in the soil: materials in the burning emission of fuel and oil.
- As a result of non-slip treatment in winter, the salting materials get into the soil
- In the operation of the service facilities waste is generated
- If there is an accident or emergency, pollutants might get into the soil

Groundwater
- High water table
- As a result of landscaping and the creation of a paved surface, the hydrological conditions, drainage, infiltration will change
- Since the purifying effect may not always be appropriate, from the desiccated bins of rainwater pollutants might seep into the groundwater.
- As a result of washout, pollutants jeopardizing the soil might reach the water table.
- If there is an accident or emergency, pollutants might get into the soil.

3.1.3. Anticipated change in the condition of the environment

Construction stage.

Soil and rocks

Along the length of the carriageway and in the area of the service facilities the topsoil will be removed permanently, this is the most dominant impact of the construction on the environment.

The topsoil is removed from the path prior to the construction. Arrangements must be made in order to protect the topsoil (Act XL of 1994 on Arable Land).

The removed humus-containing topsoil must be dumped in a landfill and transported to agricultural areas, or utilized in planting and re-cultivation along the carriageway. The original structure of the removed soil will deteriorate and its fertility will change, removal will modify the structure of the soil. During the term of storage the life of the soil, the number of micro-organisms in the soil will decrease. Therefore, after removal the soil should be utilized as soon as possible, but it structure will deteriorate even in this case. After planting the structure of the soil and its fertility will once again improve. The topsoil handling plan will be prepared by the contractor in the detailed technical design.

In the area where heavy machines are moving the soil will be compacted, which means deterioration of his structure. This area takes up more land than the future carriageway.

It should be ensured that the waste materials (construction debris) should be stored and disposed of appropriately, in order to avoid pollution.

Typically, in the this planned section, road cuttings will only be necessary near structures. The construction of structures is determined by proper sizing. It must be taken into account that, if the inclination of the rocks and the sediment and the slope of the artificially created face slope are even, then the rocks may slide or crack along the layer.

Owing to the high water table, the foundations must be sized, the plane of the foundation and the drainage structures must be set in such a manner that they should not jeopardize the foundation of the road.

Ameliorated land

According to the data supplied by the West Transdanubian Environmental and Water Management Directorate, there are ameliorated areas with water law license between km segments 98+300-100+100 and 107+220-107+500.

The designs prepared for the above works are in the possession of the Water Management Directorate. Hegyfalu- Répcementi agricultural cooperative complex amelioration plan, Number in the water register:

3666 Szeleste- Kőrismente agricultural cooperative, amelioration technical design, stage I/A, Number in the water register: 7677

Operating complex amelioration detailed technical design, Kőrismenti agricultural cooperative stage II, Number in the water register: 7967

Répcementi agricultural cooperative Hegyfalu stage II/A complex amelioration plan, Number in the water register: 7486/A

The West Transdanubian Environmental and Water Management Directorate is not aware of the implementation of the designs.

Groundwater

The existing high water table in the future construction area may reach the level of the foundation, therefore this must be taken into account with built layers located more deeply. When planning the construction works (removal of the layers to be replaced and laying, compaction of the built-in layers) and in actual construction this must be anticipated. A way must be found for the reduction of the level of groundwater, also in order to avoid harmful freezing. The built-in path section may also cause a change in groundwater flow, therefore structures, opportunities should be planned in order to ensure the free flow of these.

During construction, the anticipated impacts on groundwater should be primarily assessed in places with a high water table. We can observe these areas in the vicinity of Köris Creek. Here the level of groundwater does not exceed 1 m. Here the track of the expressway will be probably placed on the levee or the bridge. In this case it must be taken into account that the load exercised by the superstructure of the road will go through a compaction of young, loose and unconsolidated sediments, and through the reduction of the space of the pore. As a result, its draining capability may also be significantly reduced. The construction traffic along the carriageway will have a similar impact. Owing to the high water table and the deterioration of drainage capability, as well as the slight sinking of the plane it may also happen that the stormwater will only seep into the soil sluggishly, and may get stuck on the surface of the water.

In the case of subsoil water located deeply, in areas covered with young sediment (Holocene), if there are Pleistocene aquiferous - water barring formations near the surface, the cutting of the road may reach or get close to the water table.

In the case of groundwater near the surface, the waste generated in construction could also get into the groundwater. The technological materials used in construction, or chemicals in the case of incident, may accumulate in the groundwater.

Operating stage

Soil and rocks

Sources of soil contamination in the operating stage:

Source	Expected impacts
Gas emissions (CO_2, SO_2, NO_x)	soil acidification
NO_x and nitrogen containing substances	nitrogen accumulation
Pollutants arising from the wear of brake pads wear of tires and metal parts	Asbestos, Zn, Cu, Cd pollution
Fuel dripping from vehicles and lubricants	Oil contamination of the soil
Transported materials spilled in accidents	To be determined on a case-by-case basis
Salting of the road surface	Soil acidification, deterioration of soil structure
Weed control along the curbside	Appearance of herbicide derivatives

Soil contamination will begin and continue with the pollutants arising from vehicle traffic. The fuel and lubricants getting out from the vehicles and the asbestos and heavy metal pollution arising from wear and tear will reach the road and then infiltrate the soil washed in by rainwater. Gaseous pollutants will get onto the surface of the soil by deposition through the air, from which they will get washed in with rainwater. In Hungary the distribution of lead-containing fuel was terminated in 1999, therefore in the neighbouring areas we do not have to anticipate the accumulation of lead.

Another possibility for soil contamination derives from the salting of the road in winter. The chloride ions of NaCl, the substance used for salting, are poisonous to living organisms, and the accumulation of sodium ions in the soil will decrease its pH and deteriorate its crumbly structure. The quantity of deicing materials (sand and salt) is regulated, the maximum amount allowed to be spread simultaneously is 40 g/m2, or up to 1200 g/m2 annually, which may be less depending on the weather.

Pollution from accidents may occur in the case of emergency situations. It is not possible to determine the pollutants in advance. Its effects are temporary in time. In the case of incidents we should anticipate oil pollution the most often, furthermore, pollutants may get into the soil depending on the transported material. The pollution will affect the shoulder and the direct environment of the carriageway. It does not spread beyond the affected area designated for the soil. Wash-in and movement of subsoil water could take it to more remote areas as well.

Herbicides are used for weed control on the curbs of the motorway. Weed control affects a very small strip only. Since most of the track is under agricultural cultivation, involving the use of herbicides, therefore this does not impose an additional load on the soil.

Groundwater

Owing to the high water table, we must take it into account concerning rainwater drainage that in addition to rainwater, in sizing we must also consider groundwater. It also needs to be taken into account when designing the levelling of the drains. Failure to do so will result in the establishment of ice lens during the winter at freezing temperatures, after the melting of these lens the carriageway may sink.

Groundwater is primarily jeopardized by pollutants washed off the road and those spilled in incidents. Protective measures need to be taken only where the pollution may infiltrate deeper and reach the water producing layer, but in any case efforts must be made to prevent to the pollution of groundwater and the environment. Today in planning we do not have to anticipate the lead pollution of fumes emitted by automobiles. In any incidents that may occur the pollutants that may be released must be assessed individually and the damage must be contained.

Owing to the proximity of groundwater and the permeability of the topsoil, the pollutants may get from the road into the water table within 1 day.

In the area of the planned section the sequence is generally made up of rows of layers from the Quaternary period. These sand-gravel formations contain clay and aleurite, sometimes in large thickness and in a very extensive area. We cannot exclude the deep seepage of water, however, the water barring formations will slow it down with a high probability. The currently applicable laws impose a protection of not more than 50 years for resources of potable water, we will need detailed explorations in order to identify the protective area accurately.

Classification of sensitivity pursuant to Government Decree 219/2004. (VII. 21.):

The protective areas of the catchments belong to the area of ***increased sensitivity***, together with the following localities:

Nick, Uraiújfalu.

Under the decree, in these places even the indirect pollution of the groundwater must be prevented, i.e. the release of potentially polluted water draining off the carriageway must be stopped (using a system of

stormwater trenches with watertight pavement), and the technical solution applied must also include the prevention of environmental damages caused by incidents (application of defence works).

The following localities are classified as ***sensitive***:

Szeleste, Pósfa, Hegyfalu, Zsédeny, Vasegerszeg, Vámoscsalád, Répcelak

In these localities it is prohibited to drain directly any kind of pollutants into the groundwater, subsoil water or even in temporary watercourses. This requirement can be fulfilled by applying an appropriate stormwater drainage system.

Catchments directly affected by the planned path of M86

Stratum water wells with no catchment protection plan

The aquifers of the catchments are sandy sediment from the upper Pannonia era. In the section between Szeleste and Répcelak, Nick we considered the productive wells fed from the stratum waters located within a strip 3 km from both sides of the track (Table 6.), and within that we separately explored the exposure of wells located within a strip of 0.5 km on both sides of the path.

In the exploration we took into account the distance from the path, the depth of the filtered layers from the surface, the thickness of the water barring formations located in the cap formations and the size of water production. We have assessed the rows of layers of catchments, but we had no opportunity to place these into the regional picture and prepare the recharge model. Distributed without any discernible pattern, the location of the Pannonia era watertight formations does not exclude a connection between the water-yielding parts and the surface, as the protective zone has a surface section.

Based on the above, we consider it necessary after the accurate designation of the path, simultaneously with the preparation of the detailed technical designs, that calculations, modelling should be performed including the designation of the protective areas of the affected waterworks wells.

Wells to be terminated

Wells marked Vasegerszeg K-2 and K-2/a are located along the planned path, at 23 m from the axis of the carriageway, it must be ensured that these wells should be backfilled appropriately and the water-yielding wells should be substituted.

We see no impediment to preserving the well marked as Répcelak K-6 (it is located 110 m from the axis of the road), provided that the recharge area does not have a surface section. The bottom of the well is at 90 m, which provides an insecure cap. We are of the opinion that the plans aimed at the designation of the protective area should be prepared simultaneously with the detailed technical designs. If, of the two options for the path to be constructed, the one bypassing Nick from the south is selected, it will become unnecessary to assess this well.

Preparation of plans serving the designation of the protective area as a priority

In addition to the well marked Répcelak K-6, we also consider it necessary to review the wells marked as Vasegerszeg K-3 and Uraiújfalu K-5. According to our assumption created based on the data available about the wells, the motorway will not jeopardize the recharge of the catchments of the two wells, but any warranted opinion or expert opinion affecting decision requires a professional revision of the two wells. These works must also be performed in the planning stage prior to construction, as presented above, so that any replacement of the catchment should have been completed by the time construction starts.

Possible design of a new well

In addition to passing the resolution on the termination of the wells marked Vasegerszeg K-2 and K-2/a, the opportunity of substituting Vasegerszeg K-3 and Uraiújfalu K-5 should also be considered. The design of the

new well could possibly replace the other two wells, too. We consider it necessary to involve parties with water right in order to develop the production of the above wells reasonably.

3.1.4. The anticipated impact in time

In terms of time, apparently, pollution during the term of construction imposes a temporary load, while pollution stemming from traffic and maintenance will be loading the environment constantly after the start of operation.

3.1.5. Measure of the anticipated impact

The extent of soil pollution depends of the characteristics of the soil. The soil type with bigger adsorption features will trap the pollutants better, while a worse adsorption capability means that there is a higher a probability that the pollutants will be washed out, get into groundwater. The higher the clay and humus contents of the soil, the better adsorption capability it has.

As shown by table 3, on the path the organic material content of meadow soils is the highest, while the lowest value is that of brown forest soil with washed-in clay. Brown forest soil with washed-in clay and brown soil contain the highest level of clay.

The water supply of the soil affects what is the volume of pollutants that will be washed out, released to groundwater. On the most part of the path we find soils that have good sinking and transmissibility features, water retention and water-absorbing capacity. Affecting the buffer capacity mentioned above, organic and inorganic colloid contents and water supply are related in the soils, therefore humic soils have high permeability and low water retention capacity, which means that in these areas there is a higher chance of pollutants getting into the groundwater.

3.1.6. Affected area

Soil

The affected area applying to the soil is a strip of 30 m on either average of the carriageway, where soil pollution can be felt directly.

Groundwater

Directly affected area: -the area of the carriageway and the related facilities

Indirectly affected area In the case of motorway sections having their own rainwater trench systems with watertight pavement no pollution can be released to the groundwater. If the rainwater drainage is not watertight, the size of the affected area depends on the depth of the water table, the characteristics of the soil and its leakage factors.

The quantity of pollutants that may be demixed on the soil or possibly infiltrate the groundwater, the identification of the affected area is uncertain. Another factor that needs to be addressed is the contamination created by the washing off of the oily mud occurring on car bodies by the lubricants and operating oils released from running vehicles. In most traffic accidents the fuel system gets damaged. In every case it must be prevented that the fuel flowing from the vehicles is released from the carriageway into an aqueous medium.

3.1.7. Measures proposed in order to protect the environment

- Appropriate layout of the device collecting and purifying rainwater. Since areas with high subsoil water should be expected along the entire length of the planned road, therefore rainwater drainage with watertight pavement is required.
- In the case of the catchments proposed above, definition of access times in a subsequent planning stage.
- Within a strip of 30 m from the edge of the carriageway regular monitoring tests are proposed on the upper 30 cm of the soil. In the examinations the limits provided in Joint KöM-EÜM-FVM-KHVM decree 10/2000. (VI. 2.) for geographical medium must be taken into account.
- Regular water testing is necessary from the observation wells located near the road. In the examinations the limits provided in Joint KöM-EÜM-FVM-KHVM decree 10/2000. (VI. 2.) for groundwater must be taken into account.

3.2. Surface water

3.2.1. Description of driver, impact processes

Impact of the operation of the road
Apart from the rainwater flowing off the road, the pollutants located above the road, in the air, may also penetrate the areas along the road directly, through washout in the atmosphere by rain.
It can also be seen that while pollutants may get to the receiving medium, the face slope of the motorway and the dewatering ditch itself have an important impact on their quantitative reduction. While rainwater flows down the ***face slope*** of the motorway, its hydraulic characteristics may change significantly and may deviate from the characteristics of other places, depending on the humidity and type of the soil and the density of grass. The possible routes of drainage may be the following:

a. Seepage and drainage under the surface in saturated or unsaturated state
b. Surface drainage

We identify 5 steps in surface drainage:

1. The surface gets fully saturated
2. All recesses get filled up with water
3. Precipitation is drained in a concentrated manner, in the routes that developed earlier
4. The water streams are combined and a thin, contiguous surface water layer develops
5. With the decrease of the intensity of raining the processes listed above will repeat in reverse direction.

In the case of surface drainage the likelihood of the retention of pollutants is lower than in the case of drainage under the surface. A surface drainage may be dominant if the situation of the soil is high, or in the case of soils with low water permeability.

Along the roads heavy metals can be primarily connected to dust. This dust contaminated with heavy metals is exposed to constantly changing circumstances. The heavy metal contamination may remain on the dust particle, it may get into the aqueous medium through desorption, attached to vegetation, or get adsorbed into organic materials in the soil (e.g. humin acids), but it may also be taken up by vegetation.

Any of the above phenomena could occur when it is raining, depending on the intensity of the rain, the type of soil, the type of heavy metals, the concentration of organic matter, the density and type of vegetation.

It has been found that the concentration of heavy metals decreases constantly as we move away from the edge of the road, at a distance of 30 to 50 metres it reaches the absolute minimum. The measure of the decrease follows this sequence in the case of the individual elements: Cd > Pb > Zn > Ni

The highest concentrations were measured in the grassy area located within 3 or 4 metres from the edge of the road, where the average concentration is 50% higher than in any area beyond it.

Based on certain data in the professional literature, within a distance of 10 m from the edge of the pavement 93% of Cu, 70% of Pb and Zn and 55% of Cd get adsorbed.

The vertical migration of heavy metals occur simultaneously with infiltration and depends on the type of the metal, the characteristics of the soil and concentration. The driving factors of horizontal and vertical migration are identical.

Vertical migration remains within the top 30 cm of the soil layer. Lead usually gets adsorbed in the top 15 cm layer of the soil. In the case of zinc adsorption is similar to that of lead, however, in the case of cadmium the gradient of decrease is not so characteristic.

Water drainage trenches (ditch, belt ditches) are very efficient in the removal of pollutants, if they are not paved.

In the case of paved trenches, practically we cannot talk about the removal of pollutants, since although the heaviest particles may be demixed, the next rain will wash them out from the trenches in a concentrated manner. The primary mechanism of removal is sedimentation and infiltration. While water is running along the length of the trench, the vegetation levels out the flow speed and water flow peaks.

The degree of efficiency of trenches in the removal of pollutants depends on several factors, of which the following are determining:
- length of the trench
- lengthwise decline of the trench
- existence or lack of spur dyke

There is no meaningful or substantial difference between the data of the professional literature and the data measured in Hungary.

Measurements show that we need to take action concerning removal in the case of 2 parameters, KOI_s and suspended solids. The quantity of oils and heavy metals is minimal, therefore no separate action is necessary for their removal.

The impact of salting in winter is a separate issue. Research on the impact of materials applied for non-slip treatment in winter has a long history. Their impacts are diverse, the traditional sodium-chloride based salting materials cause salinisation, high concentration of chloride may have a temporary impact on the take-up of minerals. Contaminated salting materials may contain small amounts of heavy metals and cyanide. Since these materials are released to the environment beyond the period of vegetation, practically they can cause problems only in the long run. The affected area of salting materials is extremely small in the case of water draining off the road and seeping on the face slope, since the majority of the agents will seep into the levee on the shoulder or the upper part of the face slope. Accordingly, the upper part of the levee shows signs of salinisation.

Impacts of road construction

Containers are usually installed in each section of the work area for the purpose of equipment storage and performing of minor administrative tasks. Water is supplied from drilled wells or from transportable water tanks, depending on the local conditions. Toilets will be provided in the form of mobile facilities, e.g. TOI-TOI toilets.

Almost in all cases, employees stay at rented accommodation with a facility for showering and hand washing. Catering takes place individually. Only cold meal can be provided in the work area.

Working machines are stored at the sites along the path, but repairs take place at the central repair garage or at specialist service garages. Oil change for heavy machines and earth-moving machinery is performed at specialist service garages.

Fuel is provided using own or leased tanker trucks. The tanker trucks are equipped with refuelling guns similar to those at the petrol stations, thus the risk of oil pollution minimal during refuelling. The following items occur as environmental impacts:
- Placing of municipal wastewater and rainwater of the building yards used in the during the construction works
- placing and storage of hazardous substances and municipal waste
- making of service roads and culverts at crossings of watercourses
- erosion protection during the construction works
- Protection against emergencies

3.2.2. Measures recommended for the sake of environment protection

Protective measures in the course of operation

We recommend the use of ***biofiltration trenches*** (a semi-natural system) for the removal of pollutants.

Unfortunately, the parameters of the watercourse such as the descent, the bottom level, and the stream are not known in the case of most of the receiving watercourses. Date from the relevant registries is fairly scarce. The above-mentioned parameter values shall be determined during the preparing of the building permit drawings, and the surveying of the watercourses shall also be performed during this phase of planning. ***Biofiltration trenches*** are canals with plants established in them which serve the drainage of water and in which the mechanical removal of pollutants is based partly on the filtering effect of the plants, partly on infiltration into the soil, and, in sections with low flow rate, on the sedimentation of floating particles.

In the trenches, the removal of pollutants is significantly influenced by the biological activity of the trenches. A significant part of degradation is due to biological activity, i.e. biochemical processes, however, sorption and ion exchange also take place. The nutrient uptake by higher plants represents additional removal of pollutants, however, the maximum demonstrable role of this process in the removal of nitrogen and phosphorus is 15 to 20 per cent. Due to the biochemical processes, the trenches may be regarded as independent biological reactors.

Their pollutant removal ability depends on the trench size, longitudinal descent, and the type of the plants established.

The service time of properly constructed and maintained is over 20 years.

Protective measures during the construction works

- The municipal wastewater generated at the building yards of the constructions works and the rainwater draining from paved areas shall be collected in appropriately sized storing tanks, and removed, using a sewer pumper, to a sewage treatment plant if necessary. In the case of applying TOI-TOI toilets the removal of municipal wastewater is resolved, only the collection and removal of rainwater need to be arranged for.

- No hazardous substance or waste shall be placed or even temporarily stored, or maintenance of machines, oil change or repair to any machine performed in the vicinity of watercourses.

- During the setting out of construction roads, either the existing bridges will be used, or, in the case of construction or transportation on the path, temporary culverts are placed into the bed of the watercourse to provide passage both for the vehicles and the water. In the case of temporary layout, the solution shall be designed in such manner that causes the least possible degree of damage to the state of the bed. The bed of the watercourse shall be restored after completion of the construction works.

- The implementation work and the plant establishment work shall be harmonized in such manner that the slope surfaces should be left without biological protection for the shortest possible time, and the formation of the slope surfaces covering level differences of 4 to 5 metres shall also be serve the protection against erosion.

- Should any pollution occur due to possible machine defects, the termination of such pollution, the elimination of damage, and the removal and disposal of the pollutant must be arranged for immediately.

- Any spilt or scattered pollutant shall be covered with adsorption materials, and then collected and neutralised or destructed. Relevant to polluted soil, the stipulations of Government Decree 98/2001. (VI.15.) "on the conditions of the activities related to hazardous waste" shall be followed.

3.3. Air

Impact assessment

In this plan, we studied the impacts originating from transport. This requires, in addition to the evaluation the data series available, the determining of the expected emissions of each source in their standard state and the loads expected.

Air pollution in the area of planning is caused by road traffic.

During our assessment, we evaluated the condition of the area on the basis of air pollution concentration values, and performed emission and immission calculations on the basis of current and foreseeable traffic data.

The emissions and concentration values of road traffic were calculated using the database of KTI compiled in 2000, in function of the traffic and composition, applicable speed and meteorological conditions of the given road sections. As the database does not break down the category of trucks, we also treated it as one category.

For our calculations, we took into account speeds of 90-90-70 km/h for roads, and 110-110-70 km/h for Expressway M86.

Transmission calculations were performed on the basis of the interrelations described in the series of standards MSZ 21457 and MSZ 21460. The achievement of the relevant limits was examined:
- for through roads: at a distance of 10 metres from the axis,
- for main roads: at 25 m,
- for expressways: at 50 m.

For our transmission calculations, we took the following parameters into consideration:
- Emissions for the period of MOF, as per rod section (g/h/m)
- Near-lull condition (wind speed <2.0 m/sec)
- a = 30o
- h = 0,3 m
- Flat surface covered with vegetation (z0=0.1)

We disregarded the impacts of existing woods and built up areas, thus deviating towards safety to some extent.

Assessment of the current state

For the assessment of the current state, we obtained necessary data from the database of National Air Pollution Monitoring System, which we evaluated and used for the preparation of this Impact Assessment. In addition, we also performed emission and immission calculations for certain elements of the road network affected, on the basis of the traffic data of 2007 obtained from the database of ÁKMI.

The average values of NO_2, SO_2, and settling dust concentrations for the assessed localities were below the respective limit values in each case, referring to excellent and good air quality, with one exception. A significant frequency and amounts of excessing of the limit values occurred in the spring, for nitrogen dioxide and settling dust.

Assessment of expected state

The traffic data forecast for 2023 on the basis of the data from ÁKMI were generated for two options: the planned project is implemented (Option WITH) or it is not implemented (Option WITHOUT).

The database includes no specific values for the year 2023, thus the values expected for 2010 were used for our calculations. Specific emissions show a tendency to decrease with time, thus we deviated towards safety by taking the data set forecast for 2010 into consideration for the year concerned.

The result of our calculations shows that the changes in the traffic of the roads affected by Expressway M86 are basically favourable for the localities affected, and not even its negative impact represents excessing of the air pollution limits along the feeder road.

According to the calculations for the expressway, it is not sufficient to provide a protection zone of 50 m from the axis at each side along the entire length of the path assessed, as specified in the relevant legal regulation, however, the increased area still requires no special measure from the aspect of air quality as it hosts no building to be protected.

Affected area

Directly affected area – Relevant to the expressway, the boundary of the protective zone specified in the relevant legal regulation is at 50 m from the axis of the road. Due to the traffic on the planned road, however, concentration values only decrease below their respective limits at distances of 56 to 67 from the axis, and for this reason, these distances should be regarded as the boundary of the protective zone.

Indirectly affected area – the total of those areas where the amount of loads (assessed for standard states) generated by the traffic on the sections in the area affected by the traffic changes by 25% at least (either increases or decreases).

Receptor

The receptor of the impacts is the population living in the areas affected either directly or indirectly.

3.4. Wildlife: Natural environment

Generally, it may be stated that the construction of the two planned paths (versions D and F), taking into account the minor modification of the path performed in Section 100 km, will entail the lowest possible damage from the aspect of environment protection, and no further modification is needed. As regards the expected impacts of the planned road it should be stressed that all activities must be performed in such manner that it cause the least possible harm to wildlife, and for this reason, the construction works starting with earthwork must be scheduled for periods outside the breeding season for the sake of protection of birds especially.

Groups assessed

Flora

The five sites assessed showed approximately the environment protection value anticipated on the basis of the preliminary site visits. In each site crossed by the path and regarded as worth assessing, the degradation of the flora, at least to a medium extent, may be observed. Only half of the rare and protected species could be demonstrated in “Rábaköz”, a Natura 2000 site (Site 5), and we found none of the rare and protected habitats, except for a tiny hardwood gallery forest at the southern edge of the area assessed, at safe distance from the motorway path. We found wildlife communities consisting mainly of common species at the rest of the habitats (Habitats 1 to 4). The presence of plants in very low numbers of specimens and species does not increase the ecological value of the concerned areas in itself. The locations of the protected plants are

indicated by coordinates in the flora list. After identifying the coordinates on the map, it can be established that the protected species occurred at the following distances from the axis of the path at the various sites: Site 2: 70 m, Site 3: 55 m, Sites 4 and 5: over 100 m. In the case of the habitats hosting protective plant species (Sites 2 to 5), a repeated botanical survey is to be performed prior to commencing the construction work, and the evacuation of the protected plant specimens must also be ensured from possibly expropriatable areas.

Amphibians – reptiles

Although all of the amphibian and reptile species in Hungary are protected, no population requiring special protection was found in any of the relevant areas. Species which tolerate disturbance and were found here usually occur even in the most degraded habitats. There was no reason to assess the specimen numbers of the amphibians and reptiles outside the egg-laying areas during our survey because this data has no importance in terms of environment protection. Of the five sites surveyed, egg-laying may occur at Site 4, however, its occurrence is so low that we could not find any heap of eggs. Most of the watercourses crossed by the path do not transfer migrating populations, thus they have no importance from the aspect of the protection of amphibians or reptiles, except for certain sections of Kis-Rába and Kőris-patak creeks.

Insects (at the Natura 2000 site only)

The assessed section of the expressway bypasses the forest of the nearby flood basin of the river Rába, it only gets close to a minor, fragmented wood system. It may be stated that the assessed area is not a breeding area of the stag-beetle, any breeding of the species may take place there on a random basis only.

Such occasional occurrences or the small natural areas falling out do not affect the fate and breeding potentials of the stag-beetle population of the affected Natura 2000 area (Rábaköz).

At a distance of approx. 0.7 km from the assessed area are those habitats which are suitable for the biological properties of this species, and provide the living conditions for the population, which made them eligible for inclusion in the Natura 2000 program. Based on that, and because this species can fly well, some specimens may be observed occasionally in the assessed area, which is also indicated by earlier observation data, however, the loss of these specimen (being run over, etc.) does not jeopardize the survival of the entire population.

In connection with the assessed dragonfly species *Ophiogomphus cecilia* and *Coenagrion ornatum*, it may be established on the basis of the results that the area directly affected by the road construction (affected section of the river Kis-Rába) is not a typical breeding place of these species. The assessment showed that these species occur on the region, and even a significant population and the breeding place of the species *Coenagrion ornatum* was found in the nearby Keszeg-ér creek. In summary, it can be established that the construction of the road does not affect directly the breeding places of the species assessed, and thus it hardly influences the populations of the affected species, and does not jeopardize the survival of the populations.

In the course of sampling, the experts found that there is no suitable habitat for the *Maculinea* butterfly species in the area assigned for assessment, neither larvae nor imagoes were found, thus it may be established that none of the *Maculinae* species occur in the receptor area affected by the road to be constructed.

Birds

We managed to observe 29 species in the assessed area during the assessment period. This is 8 per cent of the domestic bird fauna.

From the aspect of the bird fauna, the assessed area generally can be regarded as a low-quality habitat, as arable lands occupy large areas, while wood habitats are rather scattered, the path of the planned road only affects groups of trees and small spots of wood. Of the five sites assessed during this research, Site 1 is the most natural and most valuable habitat. In summary, it may be stated that the planned path of the road will not cause significant damage from the aspect of the bird fauna. Obviously, the reduction of the island type habitats and the increase in disturbance may cause minor problems but the species detected are relatively

widely spread in the country, and are likely to tolerate disturbance as well. Obviously, more specimens of the birds will be run over by motor vehicles after the expressway is constructed, but this quantity is not expected to be significant.

Bats (only at the Natura 2000 site)

According to the survey results, this area does not represent a significant habitat of bats at a national scale. We found the expected species in the area. All of the 5 bat species are frequent in the whole country. The occurrence of Daubenton's bat *(Myotis daubentonii)* is bound to water, we may find it on almost all water surfaces. Nathusius' pipistrelle bat *(Pipistrellus nathusii)* hunts around the bushes and trees of wet habitats. The soprano pipistrelle *(Pipistrellus pygmaeus)* frequently occurs in the habitats preferred by the above species as well, but is less bound to wet areas. Both the serotine bat *(Eptesicus serotinus)* and the common noctule *(Nyctalus noctula)* like open habitats.

All of the 5 species may occur in hollow poplars and willows, so landscaping may jeopardize their dwelling places. Both the *Myotis* and *Pipistrellus* species found need the presence of linear landscape elements, thus, if the areas covered with reed, bushes and trees adjacent to the water disappears probably these 3 species will not be able to feed here either.

The area is not especially significant from the aspect of the bat fauna at a larger scale, however, it should be noted that this small habitat assessed outstands from the surrounding agricultural areas like a small island full of food, so locally it plays an important role for the bat populations living here.

Huntable wild animal stock

The information obtained made it unambiguous that the amount of movement of wild animals is not negligible. It is especially important in the case of the red deer, where not only minor movement should be expected but also migration of large scale which connects populations and is important from the aspect of the exchange of genetic material. The occurrence of roes and wild hogs in the area is subject to the availability of food and shelter.

The sites assessed

Site 1

Although no protected plant species were found, the site as a habitat is not so degraded that it could be regarded as completely valueless. As a result of a minor modification in the draft plan, the path bypasses the habitat from north. Due to the proximity of the habitat, it is important to separate the area with a protective fence, and to keep the machinery close to the path during the construction works.

Prior to commencing the construction work, a survey shall be performed to find the birds nesting there and to evacuate them if possible.

Site 2

A habitat of poor quality from all points of view, however, a minor population of the protected and red-listed frosted pearl *(Succisella inflexa)* was found in a place. It cannot be excluded that new specimens may settle here by the commencing of the construction works, thus, prior to commencing the construction works, a quick survey must be performed in the surroundings of the coordinate point given on the path, and if protected specimen are found there they must be evacuated (in earth balls, in September or October) to an undisturbed and suitable part of Site 2.

Site 3

It is an even poorer habitat than Site 2, however, a protected plant species, the tall melilot *(Melilotus altissimus)* was found here, and, just like in the suggestion above, relocation (by spreading its seeds) must be resolved here as well. During the ornithological survey, the nesting of the peewit was observed on the nearby

arable lands. It is unlikely that the selection of the place of the nest was influenced by the proximity of Site 3, so no specific measure is needed.

Site 4

This abandoned pit full of water is a kind of habitat island in the strongly degraded landscape which surrounds it. During the construction, this area requires general protection which means separation from the machines by fence. It could not be proved at Site 4 that the animals laying eggs there would migrate in significant numbers, so the experts do not find the building in of culverts serving as "frog tunnels". Even if migration of a minor scale takes place in the egg-laying period, it is certainly not targeted, as the small and relatively new wet habitat is surrounded by homogenous arable lands from all directions. Thus, no special measure is necessary.

Site 5

In the case of the river Kis-Rába, it must be taken into consideration that in the basically arable land environment it represents the only route of movement, and, for some bat species, the only feeding place. It is important to find a technical solution here which does not break the line of the water flow with a culvert sized too narrow. The bridge for larger animals will adequately ensure undisturbed passage of the animals crawling over the watercourse. The protected spinulose wood fern must be relocated (in earth balls, in September or October) from the habitats which will disappear during the construction. The same applies to the snowdrops (in earth balls, in March).

Suggestion for the layout of protective fence and deer passage

Wild animals shall be prevented from accessing the expressway by building a wildlife fence along the entire section. Due to the composition of the fauna (the red deer may occur all along the section) it is recommended to build the fence with a height of 240 cm, and with its bottom anchored or sunk below ground level. Fastening of the lower part of the fence is necessary due to the occurrence of wild hogs. The height of the fence is given by the protective grid plus the span wire together. The recommended height of the protective grid is 20 cm below the total height of the fence. The lower stripe of 80 cm of the grid should be thickly woven, with horizontal wire spacing of 5 cm, with gradually increased spacing towards the top. Vertical wire spacing shall be 15 cm.

North of and parallel with our current path runs the railway and the existing Main Road 86. Those two infrastructural facilities have no fence currently. The protective fences to be built along the expressway does not necessitate the construction of fences along the other two facilities due to the distance between the facilities and the openness of the railway.

The construction of wild fauna passages is necessary at the gametrails explored in the previous assessment documentation and made more specific in the current wildlife protection section. The passages shall be designed with regard to the passage of huntable game (such as red deer, roe, wild hog). In the case of small mammals and small predators, the planned wild fauna passages will resolve the problem of passage, and the culverts which guide the watercourses through will also serve as passages for small animals as they are dry in a substantial part of the year.

Recommended places for wild fauna passage:

The environment of Section 101+550 km, and the environment of Section 108+800 km.

3.5. Built environment

3.5.1. Impact factors, affected area, impacts

Of the impacts of the expressway, we address the impacts which separate the area parts, change the value of the areas and the impact area of the traffic loads, or reduce the area sizes.

Pursuant to Government Decree 284/2007. (X. 29.) on certain rules on the protection against environmental noise and vibration, the direct impact area of the path varies from 591 to 663 m (Version D), and 587 m to 642 m (Version F), measured from the axis of the path. Those localities shall be regarded as indirect impact areas which are crossed by the path, and all the areas where any impact of the investment can be perceived.

3.5.2. Impacts of the facility

Separating effect

In the previous assessment phase, the designers chose solutions that neither the occupation of areas, nor the effect of separation of areas cause an outstanding problem.

The accessibility of agricultural lands after the construction of the road must be ensured everywhere. Pursuant to the relevant regulation, no real property may be left inaccessible, access must be provided in all cases, and with the least possible elongation of the access route. This goal is served by the dirt roads parallel with the path; these will be elaborated in detail (after obtaining the maps with the lot numbers) in subsequent phases of planning (building permit drawings and execution drawings).

The expressway occupies a strip with a width of approximately 60 m. It will bring about an increase in the values of the areas, partly because of the relieving of the inner areas of the localities and the areas along the main roads from the load of traffic, and partly because economic development is expectable in the environment of the junctions, based on previous experience.

Fitting into the development of the region

At the national level

The Expressway M86 is indicated in Annex I/1 to Act XXVI of 2003 on the National Zoning Plan (hereinafter referred to as the "OtrT") among the planned elements as M1 Mosonmagyaróvár District* - Csorna* - M9 Sárvár District*.

(* - planned element)

Section 9 (3) stipulates for the phase of more detailed planning that the location and protective zones of each construction must be specified in the priority district and county zoning plans, as well as in the structural plan of the locality affected.

In the meantime, changes were made in the layout of the expressway network (versions of M9 in the district of Szombathely), which were already taken into account in the zoning plan of the county, and thus, with regard to Section 10 (1) of the OTrT as well, the planned path complies with the contents of the zoning plan of Vas County.

At the regional levels (regional and county)

The transport corridors of the **region** do not serve the dynamically increasing north-bound and south-bound traffic. The West Transdanubian region lacks a characteristic north and south transport corridor including the expressways M9 and M86 and a quality railroad, which could be highly important both in making the internal cohesion of the region and in the Baltic-Adriatic relation, and would play an important role of connecting the said Pan-European corridors at the same time.

The zoning plan of Vas County (VTrT) (PESTTERV-URBANITAS) – It specifies the units of area utilization and infrastructural developments for the administrative area of Vas County on the basis of the National Zoning Plan.

Path D of the section of Expressway M86 between Szeleste and Győr-Moson-Sopron County (county border), with the exception of the section between Szeleste and Pósfa which has already got a permit, complies with the contents of the Zoning Plan of Vas County approved in the form Decree 8/2006. (IV.28.).

At locality level

In the following part, we present the comments (obtained on the basis of personal agreements) of the local governments in connection with the path assessed. We find it important to stress that agreements were made with the localities during the preliminary assessment procedure, which largely reduced the number of possible conflicts.

Szeleste and **Pósfa** localities belong to the same district notary office. The planned expressway affects the periphery of Szeleste in a length of 1000 m, and the periphery of Pósfa in a length of 1300 m. Path D (marked with red colour) indicated in the impact assessment follows the path indicated in the zoning plans with a minor difference.

The structure planned at the boundaries of the two localities (Section 99+049 km) bridges the MÁV railway line Szombathely-Csorna and the correction of a dirt road. A parallel dirt road is connected to the planned passage in a length of 1300 m in the area of Szeleste. According to the plan, a dirt road will cross the area of Pósfa (in Section 100+625 km). The two localities agrees with the above passage solutions.

The periphery of **Hegyfalu** is affected by the path in a length exceeding 4 km. Path D (marked with red colour) follows the path which is the closest to the locality in the zoning plan with a minor difference.

The previous plans included two dirt road passages in the area (Sections 101+818 km, 103+607 km). Two dirt roads in a total length of 1000 m are planned for the area of Hegyfalu.

The locality raised the claim that, instead of the passage in Section 103+607 km (which would be in a flood area), a dirt road should be implemented in Section103+180 km, on the path of an abandoned railroad. That railroad levee is currently used for the purpose of road traffic between Zsédeny and Hegyfalu.

The administrative area (periphery) of **Vasegerszeg** is affected by the path between Sections 104+850 km and 108+550 km. Path D (marked with red colour) follows the path in the zoning plan with a minor difference.

One of the junctions of this section, namely the junction with Main Road 84, is on this area. A dirt road passage (Section 105+949 km), and the crossing structure of Road 8448 are found on this area. A parallel dirt road in a length of 500 m was planned for the area of the community. The locality has no other claim.

The periphery of **Uraiújfalu** is affected by the expressway in a relatively short section (in a length of ~1000 m). The path affects an illegal landfill which has to be recultivated prior to commencing the construction works. Path D (marked with red colour) is identical with the path in the zoning plan. There is one dirt road passage in the area of the locality, in Section 108+856 km. Also, passage of Road 8449 will take place in Section 108+861 km. A parallel dirt road in a length of 300 m was planned in the area. The locality agrees with those above, and has no other claim.

The periphery of **Vámoscsalád** is affected by the path in a length of 2700 m, and Version F deviated from Version D in this section. Of the versions planned, Version D corresponds with the path in the zoning plan. The only rest area planned for the section is in the area of the locality. The side road between Main Road 86 and Road 8447 will have passage in both versions (Version F: Section 111+772 km, Version D: 111+755 km). In Version F, a parallel dirt road is connected to the passage in a length of 900 m. The locality agrees with those above, and has no other claim.

Nick locality is surpassed by Version D from the north, and by Version F from the south.

Version D affects the periphery of the locality in a length of 2100 m. According to plans, there will be a dirt road passage in Section 113+897 km. The road construction plans include the construction of a parallel dirt road of 600 m in connection with the passage.

Version F affects the periphery of Nick in a length of over 4 km. If it is implemented, a junction will be constructed which will affect the area of the locality, and will provide connection with Road 8447. The passage of a side road will be implemented in Section 114+444 km. In connection with these, the plans include three parallel dirt roads, in a total length of 2800 m. Nick locality is for Path D (marked with red), and this version is included in the zoning plan. The implementation of Path F would be unfavourable for the locality, as in that case the traffic from the direction of Répcelak towards Expressway M86 would go through the inner area of the locality.

Répcelak is affected by Version F in a short section (in a length of ~2000 m), while the path in Version D runs through the area of the town as far as the end of the planned section (in a length of ~4200 m). According to current state, the paths affect no inner area.

Version D includes a junction with Road 8447 in the area of the town. The zoning plane of the locality indicates a prospective inner area (intersected by the path in a length of 200 m) next to the junction, however, the locality intends to utilise this area as an industrial-economic area.

In addition to the passage of Road 8447, both versions include a side-road passage (in Version F: Section 117+133 km, in Version D: Section 117+648 km). There is no significant difference from the point of view of the access to the prospective spa.

Répcelak is for Path D (marked with red on the map), and this version is included in the zoning plan. The town requests that bicycle road planned to run along the road with Lot No. 0144 between Répcelak and Nick should be taken into account when designing Expressway M86. According to the local government, it is not likely that the bicycle road would be constructed on the path of the terminated GYESEV railway line.

3.5.3. The impact of the construction works

The construction works will not have significant effect on the environment of the locality only if the area of the locality is affected by the traffic associated to the construction works only to a little extent or not at all. However, the amount of the impact can only be established later on, when the organisation plan is available. Whatever, large-volume transportations in inhabited areas or near them must be avoided as much as possible during the construction works.

Construction works have significant impact on an inhabited environment if it takes place close to such inhabited area or if the transportation routes go through it.

It is at Nick locality that the path gets so close to an inhabited area that it may entail direct impacts (noise, vibration, dust, etc.) of potentially harmful degree. We provided a suggestion for the routes serving transportation from existing mines in such manner that we took the inhabited areas into account when setting such routes out. If, nevertheless, transportation in large volumes takes place through inhabited areas, it stands to reason to survey the state of the affected road section and adjacent buildings.

3.6. Landscape

3.6.1. The effects of the planned facility on the landscape and the processes of impact

Impact factors

From the aspect of landscape protection, short-acting impacts which do not cause permanent changes are negligible (e.g.: the activities associated to the construction of the new road, except for the sources of production); those impacts require analysis which cause significant and permanent changes both in the life and appearance of the landscape.

Such **factors** during the current task include:
- sources of production
- occupation of area
- layout of earth structures, landscaping
- structures, junctions
- associated facilities
- supply of public utilities
- environment protection facilities
- plantation
- transport, maintenance
- change of traffic in the district
- emergencies, accidents

The relation of directly affected localities and the motor road

Benefits and positive effects in terms of landscape utilization

The junctions designed for the planned section project the development of the industry, economy and commerce of nearby localities, as facilities of these types are expected to settle around the junctions. This will bring about a decrease in unemployment, and the road construction itself generates new workplaces.

The path appears as a new landscape element, and the planned new road explores certain values (e.g.: unique landscape value; beautiful scenes of the wet habitats and spots of wood) which is primarily beneficial to travellers.

The social and economic effect of the new expropriations is expected to manifest in the significant increase of the value of lands (on the basis of special characteristics).

The motorway will reduce the traffic across the localities, which in turn will reduce the pollution of the environment.

As products of engineering and technology, the bridges planned will reflect the intellectual-technical level of the era as well, and thus, in addition to their functional role, they will also add to the value of the landscape. Owing to their construction, it is possible to provide the original continuity of the area bridged.

Conflicts and negative effects of landscape utilisation

In connection with the implementation of the new road, some sources of conflict in terms of landscape utilization emerge: division of areas which have been continuous so far, so the road will not only separate habitats from one another, breaking the continuity of an ecological corridor, but, in addition, the view of the road appearing in the landscape, as another linear element, will also break its uniformity.

As regards the arable lands, the appearance of the new road entails a conflict in terms of view, as it runs on a levee all along, but there is a more important conflict where it runs on an open area and where it runs close to the localities.

From the aspect of land utilization, a new transport area appears, moving vehicles and their lights can be seen from several kilometres. The construction of the motor road causes no change in land utilization.

From the aspect of land utilization, high levees represent a conflict, because the higher they are the wider stripe they affect, and they also cut the affected land utilization units in two.

In the direct vicinity of the new motor road, the characteristics of the terrain, drainage, and soil will change, air pollution increases during construction and use, and, additionally, noise is also regarded as environment pollution from the point of view of inhabited areas and wildlife habitats.

The high levees are new, strange elements in the affected area, their sight is dominant in their vicinity. In terms of landscape view, the planned road is neutral in those areas where it is far from inhabited areas and gardens, as its sight does not disturb the people living there. It may have negative effect where there is significant overlook from the direction of the localities because of the levees. We indicated such unfavourable overlooks in the layouts.

The sources of production required for the construction of the road may cause damaged landscape (although we may even talk about the enrichment of the landscape if recultivated or recycled sources of production are used), but only existing mines and other sources of production need to be used in the current section, that is, no new sources of production need to be opened.

3.7. Noise

3.7.1. Impact assessment

Impact on the road network

If observed prospectively, the decrease in noise pollution can be seen well on the basis of the protective distances after the construction of the facility. The expressway will bring about a decrease of the protective distance by 54% to 74% for the assessed main roads, and by 8% to 70% in the case of the side roads. As a result, the proportion of the population affected by excess of limits will decrease significantly.

The protective distance will increase in two sections as a result of the increase of traffic. The distance will increase by 70% at the Szeleste Bypass of M86, as its continuation will now be completed, but no homes are situated there. The protective distance will increase by 14% to 23% in this section of Main Road 84, due to its feeder road function, but this will not significantly increase the number of buildings to be protected.

Impacts of the planned facility

The two versions of the planned expressway run on the same path for about 13 km. They affect a home in the first section, at Section 103+160 km, however, that building will be expropriated due to its requirement of space.

Version “D” will bypass Nick locality from the north, and the house nearest to the road axis is at a distance of 207 m. On the basis of the traffic forecast until 2023 its daytime/night-time noise emission is 58.9/52.6 dB, respectively, i.e. no excess is expected.

Version “D” will bypass Nick from the south, its distance from the nearest homes is at least 600 m, thus its direct impact is not significant, and excessing of the limits can practically be excluded.

The impacts of the two versions can be compared basically on the basis of the connecting Road 8447, i.e. by comparing the indirect impacts.

If the northbound version is implemented the protective distance will be 24 m from the axis, due to the traffic running through the locality. In the case of the southern path, this distance is 32 m. As a result of the difference of 8 m the affected facilities to be protected are the same, only the possible exposure levels of the given buildings are different.

3.7.2. Affected area

We determined the affected area for the planned expressway. During our calculations, we computed those distances measured from the axis where the requirement 'limit value minus 10 dB', which is 45 dB in our case, is fulfilled. The section with only one path has the following real properties around:
- Pósfa – 30 to 40 buildings situated along Main Road 86,
- Hegyfalu – 2 agricultural sites,
- Vasegerszeg – about 20 buildings situated along Main Road 86, and 1 agricultural site,
- Uraiújfalu – 1 agricultural site.

In the case of Version D:
- Vámoscsalád – about 30 buildings and 1 agricultural site,
- Nick – about 150 buildings,
- Répcelak – about 50 buildings.

In the case of Version F:
- Vámoscsalád – about 25 buildings and 1 agricultural site,
- Nick – 1 agricultural site.

3.7.3. Effects of the construction works, noise pollution during construction

Preliminary assessment of the noise expected during the construction of the road could only be performed on the basis of information of the sources of production, the mixing plants, and the machine park of the builders. Assessment requires an organization plan which the contractor gets only prepared immediately before commencing the execution works (adjusting it to the actual circumstances). Accordingly, we can only make general comments in this phase of planning.

- The sites for the machines and equipment used for the construction works must be assigned as close to the path as possible, to avoid unnecessary movement on the road network around.
- The operation requiring the most movement of machines is earthwork construction. The harmful effects of this can be reduced by choosing sources of production situated close to the path, and by specifying transportation routes which avoid inhabited areas or run within the expropriation boundaries of the road. The use of the existing motor road section is recommended wherever possible.
- The layers of the pavement are primarily produced at mixing plants. A significant proportion of the necessary materials is transported from more distant places (from suitable stone mines). It is recommended to provide access by rail during the installation phase, in order to reduce road transportation through localities.

4. Changes expected in the state of health and quality of life of the people affected by the changes in environmental conditions

4.1 Effects on human health

4.1.1. Changes expected without the construction of the road

The changes that may be expected if the road is not constructed must be divided into two groups. First, the development trends with strong influence on the exposure of the area to noise pollution and air pollution must be taken in to account, and second, the changes in the exposure of the affected area in its state without development must be evaluated.

The development trends forecast further increase in the number of motor vehicles, with a steady decrease in the participation of outdated cars without catalytic converters in transport. The turnover rate of vehicles is also expected to accelerate. Emissions are expected to decrease due to the development of newly built-in engines and to the stricter and stricter legal requirements which apply to the manufacturers. We took these tendencies into account when performing our calculations for the chapter of air pollution and noise protection.

According to the air pollution calculations for the section, if the current section of the M86 expressway is not constructed the increase of traffic load will be perceived everywhere, but the associated air pollution will not increase in ratio.

As regards noise pollution, an average increase by 3 dB to 5 dB is expected as compared to the reference state in the indirectly affected area along the existing Main Road 86.

According to calculations, the buildings situated close to the road in narrower streets already fall within the protective distance of the night-time noise limit values, which means that excessing of noise pollution limit may be expected. In the case of a prospective ‘without’ version, this protective distance will increase by 50% to 150%, which means an increase in the noise pollution for the houses situated right at the side of the road. The amount of the expected excess is about 6 dB to 7 dB for a typical building in the localities which is situated at a distance of 18 m from the axis of the road. No change in the noise pollution should be expected in the areas which are free of traffic.

4.1.2. Expected changes if the road is constructed

The development trends for the motor vehicle stock and emissions is the same as those above, due to the same period of time projected.

It can be seen on the basis of the calculations that the changes in the traffic on the roads directly affected by Expressway M86 are basically favourable for the localities affected, and not even the negative effects imply air pollution in excess of the limit values along the feeder road.

According to the calculations relevant to the expressway, it is not sufficient to provide the protective distance of 50 m from the axis at each side along the entire length of the path assessed, but despite that, the increased area requires no specific measure from the aspect of the protection of air quality, because no protectable building is found there.

The decrease in noise pollution following the construction of the facility can be seen well in the prospective state on the basis of the protective distances as well. The expressway will bring about a decrease of the protective distances by 54% to 73% for the main roads assessed, and by 8% to 70% for the side roads. As a result, the proportion of the population affected by excessing of limit will decrease significantly.

The protective distance will increase in two sections as a result of the increase of traffic. The distance will increase by 70% at the Szeleste Bypass of M86, as its continuation will now be completed, but no homes are situated there. The protective distance will increase by 14% to 23% in this section of Main Road 84, due to its feeder road function, but this will not significantly increase the number of buildings to be protected.

From the aspect of noise, Expressway M86 runs at sufficient distance from existing inhabited areas, thus it will not cause noise pollution in excess of the limit at the outside lines of houses of the a localities. The prospective development area of Répcelak locality lies in the direction of Path D, and the path intersects that development area in a short section. The area intersected is indicated in the zoning plan of the town as industrial-economic area.

4.2 Human, social and economic impacts

4.2.1. Expected changes without the construction of the expressway

Without this investment, the traffic, which is expected to increase, will invariably present loads to the inner areas of the localities along Main Road 86, which will further increase pollution and the risk of road accidents at the sections of crossing.

4.2.2. Expected changes with the construction of the expressway

The construction of this section of Expressway M86 is primarily important due to its traffic relieving function, which is associated by the additional benefit of its effects in terms of stimulation of the economy and providing better access to the areas affected. Its construction will primarily result in a decrease in the loads of the parallel section of Main Road 86. Its economy stimulating effect reaches beyond the localities affected by this section, but, owing to faster transport and the new junctions, smaller communities will also share such benefits, mainly in the form of broadening opportunities in the labour market and the tourism sector.

Path D intersects the prospective development area of Répcelak in a short section. The path on the one hand, and the isolating forest belt designed for the sake of the two localities (Nick and Répcelak) on the other, will reduce the size of this industrial-economic area.

5. Measures to be taken for the sake of the environment and human health

5.3 List of environment protection facilities

Protective forests

For the sake of Nick and Répcelak localities, we recommend the planting of a so-called isolating forest belt with a width of 20 m during the implementation of Version D:

■ At the left side: between Sections 115+117 km,

■ At the right side: between Sections 113+900 and 116+000.

The plant species to be used must be selected carefully: native tree species must be selected which are suitable for the actual local environmental conditions and are able to provide the function of a protective forest belt.

Passages for the fauna

With regard to the high path of the road and the results of the wildlife assessment performed, we planned structures to provide passage for the fauna at the following locations:

Section 101+500 km: independent fauna overpass, Section 108+856 km: independent fauna overpass, Section 119+078 km: Rába passage + fauna passage (with an opening of 20 m)

Fauna passages must be sized for the passage of huntable game (red deer, roe, wild hog), and thus, if applied as fauna overpassage, their width must not be less than 20 m. In a fauna passage combined with a watercourse, a stripe with a height of 4.0 m and width of 5.0 m must be provided (in a layout according to the ÚME Standard).

Wildlife protecting fences

Wild animals shall be prevented from accessing the expressway by building a wildlife fence along the entire section. Due to the composition of the fauna (the red deer may occur all along the section) it is recommended to build the fence with a height of 240 cm, and with its bottom anchored or sunk below ground level. Fastening of the lower part of the fence is necessary due to the occurrence of wild hogs. The height of the fence is given by the protective grid plus the span wire together. The recommended height of the protective grid is 20 cm below the total height of the fence. The lower stripe of 80 cm of the grid should be thickly woven, with horizontal wire spacing of 5 cm, with gradually increased spacing towards the top. Vertical wire spacing shall be 15 cm (in a layout according to the ÚME Standard).

Cleaning structures

Application of a semi-natural system (biofiltration trenches) for the removal of pollutants.

Paved trenches

A system of foot trenches and suspended trenches with impermeable lining must be constructed along the entire section included in the plan.

5.4 Specifying measures of environment protection

5.4.1. Tasks to solve in the later phases of planning

– We think that the plans of defining the protective area for the well Répcelak K-6 need to be prepared concurrently with preparation of the execution plans. If the final decision is in favour of the version

in which the path bypasses Nick locality from the south then the assessment of the above-mentioned well will not be necessary.

- The wells Vasegerszeg K-3 and Uraiújfalu K-5 need not be reviewed. On the basis of the data available relevant to these wells, we suppose that the expressway will not jeopardize the supply of the water sources of the two wells, however, a grounded opinion such as an expert opinion to support decision making may only be formed on the basis of a proficient survey of the two wells. These works must be performed in the planning phase immediately preceding the construction work, so that the water sources can be substituted by the time the construction is complete.
- The permission plans must contain the drawings of the intersecting and parallel dirt roads designed in agreement with the local governments affected. No inaccessible area may remain.
- In the course of further planning (permit drawings, tender drawings, execution drawings), special plant establishment plans need to be prepared, taking into consideration the aspects enumerated in the landscape protection chapter.
- The layout of the environment of the fauna passages and the implementation of isolating forest belts are also privileged items.
- In a subsequent planning phase (permission plan) it would be advisable to make noise calculations more specific relevant to the houses which are the closest to the path, taking into account the geometric conditions and the noise-reducing effect of the protective forest belt as well.

5.4.2. Tasks to perform prior to construction

- The wells Vasegerszeg K-2 and K-2/a are situated along the path, at a distance of 23 m from the axis of the path. Proficient filling and substitution of these supply wells must be ensured prior to commencing the construction work.
- The baseline measurements specified in the monitoring plan must be performed.
- I the case of habitats hosting protected plant species (Sites 2 to 5), a repeated botanical survey shall be performed, and the evacuation of the protected plant specimens situated within a potentially expropriatable area shall be ensured.
- Prior to commencing the construction work, a survey shall be performed in order to find the birds actually nesting in the work area and to evacuate them if possible (Site 1).
- A minor population of the protected and red-listed frosted pearls was found at Site 2. The occurrence of new specimens prior to commencing the construction work cannot be excluded, thus, prior to commencing the construction works, a quick survey must be performed in the surroundings of the coordinate point given, and if protected specimen are found there they must be evacuated (in earth balls, in September or October) to an undisturbed and suitable part of Site 2.
- The protected spinulose wood fern must be relocated (in earth balls, in September or October) from the habitats which will disappear during the construction. The same applies to the snowdrops (in earth balls, in March).
- Preventive archeological exploration is recommended in the case of the archeological sites which intersect the path. Trial excavation is recommended at the site situated at the Répcelak-Ajka part, while increased specialist supervision of the following areas and the area of archeological interest is recommended: Nick-Nemes meadows, KÖH 51051, Vasegerszeg -Hermina Table II, and the dirt road Hegyfalu-Kapusi út I. It is sufficient to provide archeological monitoring (i.e. specialist supervision) of the earthwork at other parts of the path.

5.4.3. Protective measures to comply with in the course of construction

- The municipal wastewater generated at the building yards of the constructions works and the rainwater draining from paved areas shall be collected in appropriately sized storing tanks, and removed, using a sewer pumper, to a sewage treatment plant if necessary. In the case of applying TOI-TOI toilets the removal of municipal wastewater is resolved, only the collection and removal of rainwater need to be arranged for.
- No hazardous substance or waste shall be placed or even temporarily stored, or maintenance of machines, oil change or repair to any machine performed in the vicinity of watercourses.
- During the setting out of construction roads, either the existing bridges will be used, or, in the case of construction or transportation on the line, temporary culverts are placed into the bed of the watercourse to provide both crossing and for the flow of water. In the case of temporary layout, the

solution shall be designed in such manner that causes the least possible degree of damage to the state of the bed. The bed of the watercourse shall be restored after completion of the construction works.

- The implementation work and the plant establishment work shall be harmonised in such manner that the slope surfaces should be left without biological protection for the shortest possible time, and the formation of the slope surfaces covering level differences of 4 to 5 metres shall also be serve the protection against erosion.
- Should any pollution occur due to possible machine defects, the termination of such pollution, the elimination of damage, and the removal and disposal of the pollutant must be arranged for immediately.
- Any spilt or scattered pollutant shall be covered with adsorption materials, and then collected and neutralised or destructed. Relevant to polluted soil, the stipulations of Government Decree 98/2001. (VI.15.) "on the conditions of the activities related to hazardous waste" shall be followed.
- The sites for the machines and equipment used for the construction works must be assigned as close to the path as possible, to avoid unnecessary movement on the road network around.
- The operation requiring the most movement of machines is earthwork construction. The harmful effects of this can be reduced by choosing sources of production situated close to the path, and by specifying transportation routes which avoid inhabited areas or run within the expropriation boundaries of the road. The use of the existing path is recommended wherever possible.
- The layers of the pavement are primarily produced at mixing plants which have their own air pollution impact. Such plant sites may obtain an implantation permit according to a separate procedure. A significant proportion of the necessary materials is transported from more distant places (from suitable stone mines).
- Road transportation after sunset and before sunrise shall be avoided due to high saturation of the surrounding road network (peak-hour situations occur in these periods). Additional traffic may cause prolonged traffic jams or significantly increased local loads in this situation.
- Construction activities shall be performed in such manner which causes the least possible damage to wildlife.
- All efforts must be taken to occupy only as big land area as essential for the construction of the new road, and to cause damage to the flora in the least possible area (expropriation in a width of 60 meters on average), and to cause change of the line of cultivation in the least possible area.
- The intactness of protected flora and fauna shall be guaranteed. The requirements of the environment protection authorities shall be complied with strictly, and relocation shall be performed where it is necessary and required. The protection of existing and remaining flora shall be ensured.
- The dirt roads that will be abandoned due to the construction of the new road shall be recultivated, and their areas returned to the line of cultivation of the respective adjacent areas. Relocation of the crucifix situated along Road 8447 shall also be arranged for!
- The detailed rules of the management of the waste generated in the course of the execution works shall be included in the environment protection and waste management plan for the construction work. The accurate data required for the making of the plan can only be given when the subcontractors are already known.
- The requirements for the period of operation will be included in the operation plans.
- The procedures and data service obligations specified in the relevant legal regulations shall be complied with during the periods of implementation and operation!

5.4.4. Protective measures to be complied with in the course of operation

- Proper functioning of the facilities of environment protection shall be ensured during operation.
- The measurements specified in the monitoring plan shall be performed.