Transinvest
Budapest

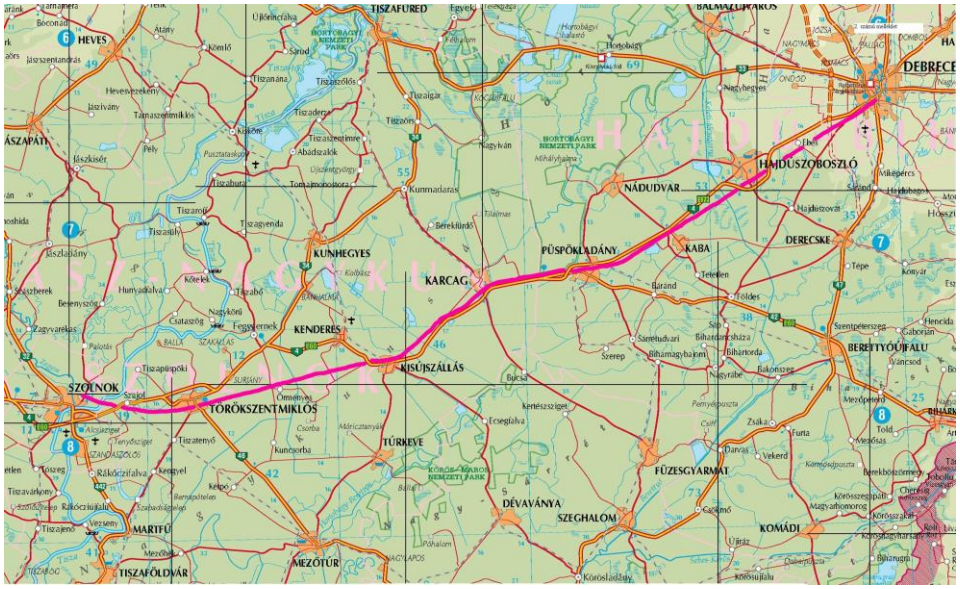
May 2012

Support application
Appendix IV

Szolnok – Záhony line reconstruction
Item I.

Application for Support for the reconstruction of Szajol (excl.) – Püspökladány (inlc.) railway line section (with overview of the entire Szajol -Debrecen railway line)

Environmental summary



Transinvest-Budapest Kft.

Kereskedelmi Iroda
Mérnök Iroda
Építő Iroda

1106 Budapest
Fehér út 10.
Postacím:
1581 Budapest, Pf. 96.

Telefon: 252 1577
Fax: 252 3577
trinvest@transinvest.hu
www.transinvest.hu

Cégjegyzékszám: 01-09-063800
Fővárosi Bíróság Cégbírósága
Adószám: 10322837-2-42

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1. Executive summary

This project aims the reconstruction of the main line nr. 100 (AGC E 52) between Szajol and Debrecen; it is the first phase of the entire Szajol – Debrecen – Nyíregyháza – Záhony line reconstruction project.

Total length of the line is 107.9 km, currently it is a two-rail, electrically driven line, and the reconstruction is necessary because of the obsolescence of the line infrastructure. The following railway stations are involved: Szajol – Törökszentmiklós, Törökszentmiklós, Fegyvernek – Örményes, Kisújszállás, Karcag, Püspökladány, Kaba, Hajdúszoboszló, Ebes, Debrecen.

The aim of the investment planned:

- Building of upper and lower track line geometry appropriate for 160 km/h speed and 225 kN axle load, as well as other infrastructural development of the line and its facilities (line network, switches, upper lines, railway platforms, objects of virtu, underpasses, public works, guards, communication devices, noise barriers and other facilities).
- Increasing the carriage of goods and passengers by rail in E-W direction and on international level.
- Improvement of passenger transport safety and comfort.
- Unloading of public road system of the area
- Imrpoving the industrial and tourism quality of the area by shortening the journey time and applying modern technologies
- Decreasing of environmental element loading

The line to be reconstructed is one of the very busy industrial and tourism (eg. spa) corridors in the eastern half of the country between the capital city and Debrecen.

The expected modernization date: between 2009 and 2013. Within the frame of this the existing lines will be re-built, the guards, electrical and telecommunication systems will be modernized.

As part of the background, the decision preparation study made for the Szajol – Debrecen line section by BGME Road and Railway Construction Department in 2004, has to be mentioned.

MÁV Zrt. General Director's Department, EU Program Department issued an invitation for tenders under appointment from the Ministry of Economy and Transport of the Republic of Hungary dated 28 December 2004 for the preparation of complete permit plans necessary for the reconstruction of Budapest-Szolnok-Debrecen-Nyíregyháza-Záhony national main railway line Szajol (excl.) - Püspökladány (incl.) line section.

Complete permit plans for the reconstruction of the railway line were prepared by the planning tender winner Consortium (RING Mérnöki Iroda, Bi-Logik Kft., UVATERV Kft. and their subcontractors) as main planning contractor in October 2007, to which an environmental permit was issued by Central-Tisza Region Environmental, Nature Conservation and Water Affairs Inspectorate under file no. 1115-55/2008. on 28 May 2008, and its amendment under file no. 1115-75/2008 on 17 July 2008.

Central-Tisza Region Environmental, Nature Conservation and Water Affairs Inspectorate held a public hearing at Kisújszállás Mayor's Office (Kisújszállás, Szabadság tér 1.) on 21 March 2008 at 10 a.m., with information provided to the public in advance by announcement

and through the county newspapers, with 30 days between the date of announcement and the date of public hearing, and by sending invitations to the dedicated authority, the stakeholders and the applicant. Public hearing was completed in order, and no excluding reasons was raised against the planned project.

The minutes of the public hearing were sent to the stakeholders and the participating authorities, and were also disclosed to the public in the settlements involved. No comment has been received to the minutes (see Minutes no. 1115-36/2008, KÖTI-KTVF)

The documentation of the environmental impact study, which is the basis of this plain environmental summary, made by Unitef '83 Zrt. for the reconstruction of the Szajol (excl.)-Püspökladány (incl.) line section in 2007 was presented at the public hearing.

Bringing the planned investments to life and the re-building works influence the quality of environmental elements differently:

Regarding the **underground, day water and ground** the environmental elements load will not change following the reconstruction, provided proper operation. As for the ground and ground water building the underpasses will mean load.
Rail line impacts on the ground: land seizing, change of ground functions, influence of contaminants on the ground. The waste resulting from bringing the planned modifications into life mean first of all possibility of environmental danger because of the ground contamination. The following can happen: oil contamination of the line ground in case of engine leakages or failure, waste water, feces carried to the ground from train toilets, damage, chemicals used for line maintenance.
Marking and establishing temporal waste and dangerous waste containers used during re-building must be done where the environment is not sensitive to ground layer and ground water, while the ground layer characteristics and general ground water flow directions must be taken into account.

Re-building the line in question also contains a drainage system plan. The aim of the planned works realization is also to ensure a crossing for line building. During the reconstruction many new construction works will replace the old ones, for which bed re-arrangement is necessary in the given distance. In case of bed corrections the surface water drainage characteristics will in fact not change. According to the evaluation calculations the length of rivers will not change significantly in comparison with the current state.

In the air environment there will be no significant changes either, as it remains an electrically driven line after the investments, too.

The planned rail line reconstruction has no significant impacts on the **living world** near the rail track. The rail line is crossing a strongly transformed, anthropogenic railscape. On the surrounding lands mostly agricultural work is performed. After the ecological state assessment it was observed that most of the near-line living spaces are degraded, only very few of them are still in natural-like state. With regard to the flora degradation level and the small number of protected plants the assessed area can not be considered sensitive or vulnerable. From the point of view of bird species the rail line development and transformation can cause low, temporal load during the re-building in comparison to the current state. The protected plants are introduced in Appendix 9.5, the genome rescue proposals can be seen in Appendix 9.1.

The rail line in question touches **NATURA 2000 areas** at one shorter section: The HUHN 20146 Hegyesbor (Karcag) is a seeded nature preservation area crossed by the rail line, the widening of the main road no. 4 at Karcag by an underpass affects the area on 1042 m, and the HUHN 10002 Hortobágy (Karcag, Püspökladány) specific ornithological area is affected by a rail line crossing on a 4187 m long section. Therefore it is necessary to consult with the National park specialists in charge.

Building has considerable influence on the **built environment** if the work is done right next to a populated area, or if the transportation lines lead through a populated area. The line reconstruction is performed from the rail, both transportation and building machines use the rail.

On the Szolnok – Debrecen rail line section it concerns an **archaeological dig** as well as an archaeologically interesting area. At the Kisújszállás area Árpád-era villages were sprung, therefore a separate heritage protection study was prepared for this area. The documentation prepared by the Field Service for Cultural Heritage states that before starting with the ground works archaeological excavations must be performed at Szajol, at the Tinóka-brook shore and near Örményes village.

In the municipalities involved in the line reconstruction different **architectonically listed** buildings and building groups, but the distance of these from the line is so big that the investments will be of no relevant influence.
Railway station buildings listed as being under architectonical protection: the Kisújszállás railway station, the Püspökladány railway station building.

Though the rail transportation has many environmental advantages, one of the most considerable among the environmental disadvantages is the **traffic noise** influencing the housing areas along the railway track, therefore this study handles it as a most important question.
The next aim of studying the railway traffic noise was that to determine its influence on the rail line rebuilding after the plan fruition at middle-term distance (in appr. 10 years) as exactly as possible.
On the examined rail line section at some places of railway or road traffic noise (Kaba, Hajdúszoboszló) the railway traffic noise of entraining works will also increase the noise level. Along with the traffic noise protection survey in the study also active (building noise barrier walls) and passive (change of doors and windows) application of noise muffling will be listed.
Studying the noise and vibration load of the examined railway line section it can be summed up that a significant decrease in the level of noise and vibration load is expected in comparison with the current state, which will not reach the critical value near neither of the surrounding houses.

According to the examinations performed in the current planning phase it can be stated that the planned investment will not bring relevant environmental risks, its long-term economic and indirect environmental effects are positive, negative effects can locally appear to small extent because of the building process and noise load when operating.

Because of the existing operating railway line mostly communal **waste** can be found in the area, this is particularly true for municipality sections, railway station surroundings, which are more polluted because of the passangers waiting for trains and the trains passing by. The

planned underpasses do not touch carcase or waste dumps. With obeying the relevant regulations handling, collecting, transporting and depositing the building and dangerous waste resulting from the building and operational works does not mean relevant load to the environment.

1.1. Main effects of the building works

1.1.1. Ground, underground water

The facility land seizing can result in soil area decrease. Bearing in mind that main focus is on the modernization of the existing rail line, land seizing depends on the size of the line correction, length, the banking area and the areal needs. Building underpasses can also result in having resort to more seized area, which can mean temporal use of agricultural land beyond the seized area. If this happens, after finishing the work the landscape must be recultivated.

Soil contamination or contamination caused by storing dangerous materials on places used for storing the machines can also be an effect of the building process. In sensitive areas or near water bases storage of machines or dangerous materials is not permitted.

1.1.2. Day water

Bearing in mind that main focus is on the modernization of the existing rail line, only the effect of the facility on the environment of the underpasses is considered. The line can split the water drainage areas, it can create partial water drainages. This can cause load and runoff changes at certain stages. The surface drainage conditions can also change, if relevant deforestation is performed at the given area. (Correction of the Kál – Kápolna line rail running into the Kisújszállás station) The bed state changes in relation with the underpass establishments, in such cases elutriation (wash-out) or mudding can appear. When building the construction works work machine fuel dripping can cause contamination.

1.1.3. Air

During the duration of building the work and transport machines can cause air pollution. The latter is a seasonal effect, it can predominate at bigger areas because of transport lines, material mining. It disappears with the building being finished.

1.1.4. Living world

1.1.5. Human

A change in the health state of the population can be seen mostly because of the effect changes caused by the railway and road traffic during the rail line modernization.

During the building works temporal noise and vibration load can be bargained for.

1.1.6. Plants, animals

The rail line modernization can cause livind space degradation only in case of sweep correction and building of crossings. The size of this depends on the location of livind spaces, their size, land seizing of construction works and cuttings. The transport routes, the storage

places of building materials also seize land, polluting the natural living spaces. This danger is significant if the building works are performed near protected or precious living world areas. Establishing material mining areas (with a relevant environmental permission) also causes temporal leaving off or significant change of the living space. One section of the rail line in question touches NATURA 2000 areas (from the point of view of environmental protection) at one shorter section: At the HUHN 20146 Hegyesbor (Karcag) seeded nature preservation area the rail line modernization and the switch and upper lines reconstruction will be done within the area of the MÁV, so the protected areas will not be damaged. Because of the underpasses road widening there is a need for a minimum area seizing. The rail line length on this protected area is 1042 m. The HUHN 10002 Hortobágy (Karcag, Püspökladány) specific ornithological area is affected by a rail line crossing. The rail line length on this protected area is 4187 m. The protected species are introduced in Appendix 9.5, the rescue proposals can be seen in Appendix 9.1.

1.1.7. Built environment

As for the rail line modernization its effect on the built environment is rather positive. With the modernization noise and air pollution prescriptions could be applied, and housing area protection can be taken care of. The area seizing can cause a negative effect, which can result in immobilities expropriation.

1.1.8. Landscape

Building of underpasses goes hand in hand with ground surface change, forming railway cuttings and dykes, temporal surface deformation for the time of building in case of needs outside the expropriation area. Dollying caused by surface change, work staging area and placing the waste and land seizing can range outside the track line of the roads used.

1.1.9. Noise

The noise over the building period is seasonal, it can affect bigger areas by transport routes and material mining places. This effect disappears with the building being finished.

1.1.10. Waste

Collecting, handling and storing of building and dangerous waste produced during the rail line reconstruction, building of crossings and operating the facilities with regard to the legal regulations in force can cause irrelevant negative effects.

1.2. Main effects of operation

1.2.1. Ground, underground water

The ground can be affected by contamination because of oil drippings from the trains on the rail tracks or because of incorrect packaging of the transported materials. This can cause under-bedding material contamination. This usually does not spread further because of the small size of the contamination.

In case of road crossings the ground can get contamined with the condensated air-polluting materials from traffic, which can condensate at non-protected areas, which means its concentration is irrelevant by the road areas, too. Handling the slipping roads in winter can also cause changes in the quality of the ground. Its direct efect can be seen near the road shoulders and ditches. It can affect the ground water by infiltration, in such case it can affect also larger areas because of ground water movement.

1.2.2. Day water

During the rail track operation the main effect on the flowing water will be mostly because of the dripping fuel or contamination caused by accidents. Operation blast mainly appears during winter handling of slipping crossings.

1.2.3. Air

There is no effect of the rail track operation on air as environmental element, as the line is electrically-driven.

1.2.4. Living world

1.2.5. Human

The noise protection of the populated areas next to the rail line recently loaded by noise will be solved by the modernization. Establishing underpasses and thus ensuring smooth traffic can also cause traffic increment. Modernization serves the interests of the area, better accessability, faster and more developed transportation line results in development of municipalities as well. It can also influence the development of tourism.

1.2.6. Plants, animals

With establishing track lines living space segmentation is the biggest negative effect of establishment and maintenance. The effect of traffic can show up also in hitting the animals. The road will or can restrict the daily space for moving, it can cut off migration lines. Living space segmentation is already done by the existing rail line, additional effects can show up with road cuttings.

1.2.7. Built environment

The underpasses improve the traffic relationships among the cut off areas and the accessibility of peripheries under operation.

1.2.8. Landscape

The influence of the operation on the landscape as a complex unit is done via changing the different environmental elements (day water, noise, air). From the landscape point of view establishing underpasses can be negative, however, the negative impacts can be decreased by seeding plants. Operation has no other relevant effects from the landscape point of view.

1.2.9. Noise

In the examined area of affection the environmental noise levels basically equal the traffic noises. Traffic noise levels in the surrounding of the protectable residential buildings is made up of the sum of railway traffic and road traffic noises. The noise protection consists of active (noise barriers), passive (change of windows and doors of the affected buildings), bedding change (vibration reduction) solutions at the affected places. Based on the studies the modernized track noise level will decrease in comparison with the actual state following the line modernization, and by implementing noise reduction regulations applying the noise reduction requirements can be ensured on a long-term basis.

2. The Hungarian EIA procedure - Introduction

In Hungary application of EIA is prescribed by Law no. 53/1995 and the EIA 20/2001 (II.14.) environmental protection rules. When the project and planning works started and when submitted to EIS environmental office it was regulated by an Order. This Order was in force until December 31, 2005. As the administrative action started well before, these Order prescriptions were to be applied.[1]

Under the Environmental Assessment Procedure a unique environmental permission is issued.

The office in charge of issuing such permissions was the local Environmental, Nature Protection and Water Authority.

The Hungarian EIA procedure has two phases: the preliminary and - in case of need - a detailed examination phase. The preliminary phase - from legal point of view - is in compliance with the EU-applied combined protection and handling activities. The Aspirant submits the examination results to the Authority in a Preliminary Environmental Study, or in a Detailed Environmental Impact Study. The detailed examination phase is compulsory also in case the partial activities with significant impact on the environment exceed the determined values or sizes. This all is dealt with in the 'A' prescription list (is in compliance with the EC directive Appendix 1). With regard to the activities listed in list 'B' the data collected in the preliminary phase must be used as a base for the detailed EIA engagement decisions.

At the end of the preliminary phase the authority can decide as below:

- Issues the environmental permission, it informs the competent local authority and ends the procedure (it applies only to activities in list 'B')[2]
- It prescribes a need for preparing a detailed study and determines further topics that need to be examined as well as the requirements that need to be fulfilled by then, or
- Rejects the petition.

[1] The regulation in force is the 314/2005 (XII. 25.) EIA and IPPC procedure Order, which is in force since January 1, 2006.

[2] According to the new rule referred to the preliminary phase can not be ended with a decision, only by stating, whether the project requires an environmental permission or not. Environmental Permission can be issued only after the detailed impact assessment.

Informing the public and examining the opinions received during the legal procedure is done in two ways:

- In the preliminary phase the authority sends the prepared study to the relevant local authority/authorities. The neighbouring local authorities recieve a notice about the planned investment and the EIA study, then following their statement regarding their competence the Local authorities receive the whole study documentation. The affected societes get publically informed or by means of other local form of informing about the planned development and about the possibilities of supervising the EIA study. Written notices can be submitted to the Mayor's Office.
- The authority is to organize a public discussion only if the procedure reaches the detailed examination phase.

3. Short introduction of the project

One of the goals of the Hungarian traffic policy is to make the Hungarian railway network available for international passengers and goods carriage in quick steps once joined the EU in order to meet the transportation expectations. The main point of view is, like it is in practice in many other European countries, to make the railway transport as safe and comfortable as possible, as well as to negatively load the surrounding environmental elements to as little extent as possible. It is necessary to improve the cultural level of railway transport and increase the travelling speed, and it is important to improve the way the passengers wait for and approach the trains, as well as their quality, servicing, comfort and safety.

The aim of the investments is to improve the operation factors, the transportation time and energy saving by more even travelling speed, as well as decreasing the load of environmental elements, which is to be a consequence of a well done modernization.

The goal of the facility is basically not environmental, but to ensure a possibility for safe, economical and civilized railway transportation. The improvement and modernization is indispensable also for the EU accession process itself. This though brings indirectly also environmental benefits from more points of view.

In case the investments fail, the consequences of a well done modernization will fail as well. This would mean the following:

- the operational factors will not improve,
- the travelling time will not decrease,
- the more even speed caused energy saving will not be reached,
- and we can not count with less load on the environmental elements

The current project is aimed to reconstruct the Szajol - Debrecen main rail line nr. 100 (AGC E 52) with a total length of 107.9 km. This is the line which is most used for railway transportation between Budapest and Ukraine, as a part of the TINA network. This is also the line on which transportation between Serbia and Ukraine and Russia is performed, as it is the shortest rail line in this context.

The rail line that is to be modernized is a very important industrial and touristic (eg. Hortobágy, Hajdúszoboszló spa) corridor between the capital city and Debrecen.

There are even more touristic and environmental investments brought in this area, by realization of the project it would be much more auspicious to access this region.

From the introduced versions as for the environmental point of view there is a significant difference between a 140 km/h and 160 km/h line geometry. The modernized rail line however means a railway connection quality without which the goods and passengers transport would need to be moved to public roads and that would result in worse environmental impact.

A possible increase in road traffic would show up in more polluted air, in increase of noise protection values and in land seizing. A decision supporting a railway modernization and investment would therefore itself mean taking the regional environmental points of view into account and focusing on environmentally friendly transport.

On a long-term basis the high speed (160 km/h) version is more auspicious, while the improved technical parameters ensure the conditions of modern tranportation for a longer time, and with higher track speed it serves the idea of environmentally friendly transport better.

The technical description of this study shows the modernization works in more details. Introduction of the following main problems and modernization tasks is along with the track characteristics approached first of all from environmental point of view.

The area to be developped is shown in the Figure below:

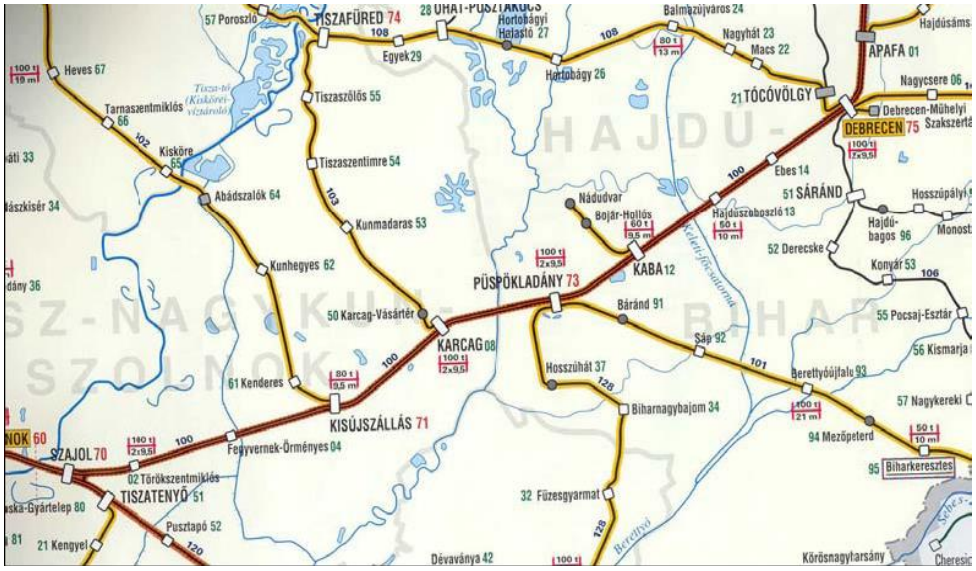

Figure 1: Szajol-Hajdúszoboszló rail line

The preliminary planning works and the environment assessment was done on the below 17 subsections:

Subline name	Approximate subline section length (km)	Subline length (km)	Note
Szajol-Törökszentmiklós	1115+00-1189+50	7.45	open track line
Törökszentmiklós	1189+50-1204+00	1.45	station
Open track line	1204+00-1303+50	9.95	open track line
Fegyvernek-Örményes	1303+50-1318+00	1.45	station
Open track line	1318+00-1453+00	13.50	open track line
Kisújszállás	1453+00-1470+00	1.7	station
Open track line	1470+00-1617+50	14.75	open track line
Karcag	1617+50-1631+00	1.35	station
Open track line	1631+00-1772+00	14.10	open track line
Püspükladány	1772+00-1792+50	2.05	station
Open track line	1792+50-1889+00	9.65	open track line
Kaba	1889+00-1908+50	1.95	station

Open track line	1908+50-2013+00	10.45	open track line
Hajdúszoboszló	2013+00-2039+00	2.60	station
Open track line	2039+00-2081+50	4.25	open track line
Ebes	2081+50-2144+00	3.25	station
Open track line	2114+00-2204+33	9.033	open track line
Total		**107.9**	

Chart 1: Sublines' name and length

MAIN PROBLEMS TO BE SOLVED	MODERNIZATION TASKS
▪ track characteristics: 2-track, electrically driven, with different track axes distance	▪ track characteristics: 2-track, electrically driven, with unified track axes distance
▪ allowed speed: 120 km/h	▪ allowed speed increase: to 160 km/h, according to the EU norms
▪ axis pressure 210 kN	▪ axis pressure increase to 225 kN
▪ at many places the bad quality of the clay dykes results in speed decrease to only 80 km/h ▪ aging of switches ▪ track base water drainage not working properly, problem with drainage cleanness ▪ low platforms, no underpass ▪ lack of noise protection	▪ bedding change, re-builing (rock detritus bedding, without gaps) ▪ new witches, use of iron-concrete riffle-base engine, ▪ building of new weep-hole ▪ strutting of low load ground with protective layer, geomesh and geotextile ▪ cleaning of ditches ▪ platform lifting, building of underpasses, stairs, lifts taking the least possible damage caused to the environment into account ▪ active noise protection - building of noise barriers ▪ passive noise protection - change of doors and windows, applying sound insulation

The table below shows the summary of impacts on the environmental elements.

Impact bearer	Impact	Nature of change	Qualification
Soil	Land seizing for new bed Filling of old bed	Cease of agricultural soil Establishing new agricultural soil area	Ceasing Neutral
Water	Building of bed corrections	Not applicable drainage change	Acceptable

Air	Building of bed correction	Air polluting material emissions	Acceptable
Living world, Landscape	Building of bed correction	Plants, cultivation changes. Decrease of living spaces	Acceptable
	Filling of old bed	Establishing new agricultural soil area and living spaces	Value added
Built environment, human	Building of bed correction	Increas in flying dust, gases, noise and vibration load while building	Acceptable

Chart 2: Studying the recourse of environmental elements (source: MÁVTI)

4. Main environmental relations of the project - Introduction

The EIA liability of the planned project is justified by expanding the capacity of an existing infrastructural service. Therefore introducing and evaluating the existing rail line traffic and its environmental impact in details was not the aim of the designers when preparing the EIA of the planned modernizations.

Based on the works of realization and operation of the project the environmental impact can be divided into four groups:

- **impacts of the construction phase:** temporal (lasting several weeks or months) impact on the working area and its direct surrounding.

Building technology includes the following: surface and sub-surface modifications (ground works) with machines, track building works, building, rebuilding, repair, change of construction works, insulation and drainage solutions, as well as building and repair of related facilities (electronical safety devices, upper lines, telecommunication, etc.)

- **traffic impacts:** increase in amount and speed of trains can cause changes with regard to noise emissionson the planned modernized rail line section. Rapid change of other unexpected impacts, eg. drainage of collected day water to day waters or lands, impacts on plants and animals, use of land.

- **impacts of the operational phase:** consistent, or in case of maintenance sectional (at certain intervals) impact on the working area and its direct surrounding. Does not cause significant changes in environment.

The technology of operation includes mowing, ditch maintenance, construction works maintenance, waste collection and temporal storage, noise barriers and fence maintenance, plants running.

In broader context the indirect impact of development can mean decrease in parallel road traffic thank to the developped, auspicious rail traffic conditions. The decreased road traffic results in improved air quality, so the planned development can assist in permanent improvement. Though while environment is not the main goal of the development, it was unnecessary to measure this auspicious effect when preparing the project.

5. The currently most important environmental conditions and fruition of the project area

Though the rail transportation has many environmental advantages, one of the most considerable among the environmental disadvantages is the traffic noise influencing the housing areas along the railway track, therefore this study handles it as a most important question.

The other focus point is the environmental protection and study of the areas important from the point of view of negative effects as per the EU and NATURA 2000 point of view.

5.1. Noise and vibration

Noise examination was determined by the below main standards and regulations:

- 8/2002. KÖM – EÜM common regulation about noise and vibration load limit values determination
- MSZ 18150-1/1198 Examining and evaluating the environmental noise
- MSZ15036/2002 Free space sound spread
- MSZ 07-2904/1990 Calculation of railway traffic noise
- ÚT2-1.302 Calculation of road traffic noise

		Threshold values (LTH) for LAM, appr. levels (dB)							
No.	Area protectable from noise	In holiday and living areas closed from traffic between public institution; on recreation public areas		service road; along a road without transit traffic		along collective road; connecting road; approach; other road; railway side track and station; air–port and helicop–ter station, port		highway, motorway; I. class main road; II. class main road; bus station; railway main track and sta–tion; airport and helicopter station, port	
		day 6 – 22 h	night 22 – 6 h	day 6 – 22 h	night 22 – 6 h	day 6 – 22 h	night 22 – 6 h	day 6 – 22 h	night 22 – 6 h
1.	Marked section of a holiday resort, spa resort, healthcare area, protected natural area	45	35	50	40	55	45	60	50
2.	Populated area (small town, suburb, rural, settlement)	50	40	55	45	60	50	65	55
3.	Populated area (big town/city), mixed area	55	45	60	50	65	55	65	55
4.	Economic area and special area	60	50	65	55	65	55	65	55

3. chart: Traffic noise threshold values according to the 8/2002 KÖM–EÜM common regulation

The Szajol – Debrecen main rail line environment was grouped according to lines 2, 3 and 4 in the above chart, where the relevant **traffic noise load threshold values are day $L_{a,eq,N}$ = 65 dB, night $L_{a,eq,N}$ = 55 dB,**

According to Appendix 3 of the 8/200. KÖM – EÜM common regulation about building works the **building work noise** noise loads are **day $L_{TH,N,ép}$ = 60 dB, night $L_{TH,N,ép}$ = 50 dB.** If work is performed within 25 m from the protectable buildings, or if the noise emission of work machines is higher than the values above, then temporal noise shields or shortened working time are to be applied.

Based on the above it can be stated that during the day the environmental noise load is expected to remain below the relevant threshold values during the duration of building works.

Determination of the current noise conditions in the relevant area was also measured in situ. Comparing the examination results and the threshold values it must be said that in some cases the noise level exceeds the 65 dB day and 55 dB night threshold values, here noise protection arrangements are to be made. (see later) According to the measurements the average noise level increase is: day 2 – 6 dB, night 2 – 7 dB, without noise reduction.

The protectable area was determined after studying the available plots and terrain study. The Szajol - Debrecen noise protection planning section is a 107.9 km long rail line section, where continuous populated areas can be seen in the following municipalities: Törökszentmiklós, Fegyvernek-Örményes, Kisújszállás, Karcag, Püspökladány, Kaba, Hajdúszoboszló, Ebes and Debrecen.

The built surroundings of the rail track in these municipalities is mostly made up of family house areas, where the family houses are mostly one-storied. The sections between municipalities are made up of settlement-like groups of buildings with different distance from the rail track, part of them is populated, part of them serves economic purposes. From the point of view of environmental noise the afected area out of the built-up areas it is cca 150 m right and left of the rail track axis, within built-up areas the distance decreases with the density of the buildings.

In the next part we will deal in more details with the particular sections, but only analysing the relevant stations.

Szajol-Kisújszállás section

5.1.1. Törökszentmiklós station

In the afected area the terrain height between the buildings and the rail track is basically equal on both the right and left side of the rail track.

The roads influencing the environmental noise level and noise load caused by railway traffic are mainly found in Törökszentmiklós (by-pass road nr. 4629 - rail line slice 1191+65, Tényői road and main road nr. 45 - rail line slice 1203+45).

Based on the available data it was stated that building a **noise shielding wall** is recommended at these sections:

side	line slice		height (m)	length (m)	area (m^2)	average distance from main track (m)
	from	to				
Left side	1174+60	1177+00	2	240	480	5
Left side	1177+80	1179+40	2	160	320	5
Left side	1186+55	1189+80	3	325	975	19
Right side	1191+87	1192+38	3	55	165	9.5
Right side	1192+62	1193+30	2.5	82	205	25
Right side	1199+80	1202+10	3	230	690	14
Right side	1202+30	1203+40	3	110	330	3.3
Left side	1209+50	1211+00	3	150	450	5
Left side	1211+00	1211+20	2.5	20	50	5
Left side	1211+20	1211+60	2	40	80	5
Total				**1412**	**3745**	

Chart 4: Geometrical data of the planned noise shield walls at Törökszentmiklós station

Passive noise protection (change of windows and doors)

At places where building a noise shield wall is not possible because of traffic safety or economic reasons (overlooking the roads and crossings, single buildings), noise loads below the noise levels affordable for protected buildings must be ensured by passive protection devices (appropriate sound/noise isolation windows and doors).

Noise level in the protectable building rooms depends also on the environmental noise load and facade noise isolation, as well as on the room dimensions and its acoustic characteristics. Measuring the necessary sound/noise isolation values was done based on the night environmental noise load and the relevant inner noise load threshold values.

Applying passive noise protection in Törökszentmiklós is necessary for 11 buildings, number of windows and/or doors: 32. The sizes and noise isolation characteristics of these windows and doors are different, their exact determination will be done before realization.

5.1.2. Fegyvernek-Örményes station

In the afected area the terrain height between the buildings and the rail track is basically equal on both the right and left side of the rail track. The rail track runs in a populated area described as suburban. The lowest measured distance of houses from the rail tracks varies between 20 and 50 m.

At Örményes line nr. 4204 (1304+50 rail line slice) influences the noise level. There is no relevant area for active noise protection around this station, applying passive protection is necessary in case of 7 buildings. The number of relevant protectable windows and/or doors is 28.

Kisújszállás-Püspökladány

5.1.3. Kisújszállás station

Noise protectable areas can be found right of the track. Between 11440+50 – 1453+90 and 1457+50 – 1476+50 rail line slices the track runs on a dyke, and the heights of the populated areas in comparison with the rail track is approximately 1.5 - 2 m lower. Between line slices 1453+90 and 1464+50 (Pillangó street, station) the rail track and its surrounding is in the same height.

side	line slice		height (m)	length (m)	area (m^2)	average distance from main track (m)
	from	to				
Right side	1456+56	1457+96	2	140	280	24.3
Total				**140**	**280**	

Chart 5: Geometrical data of the planned noise shield walls at Kisújszállás station

The number of protectable facades at the station in question is 2, which means change of 11 windows and/or doors in total.

5.1.4. Karcag station

Populated area can be found left of the rail track. The rail track line is found near the south-south-eastern town border, from the point of view of environmental noise it the impact area reaches the marginal municipality areas, the populated areas can be found cca. 1.5 - 2 m lower than the track itself.

The size of noise levels is along with the rail noise load influenced also by the track line nr. 4206 (rail line slice nr. 1619+80), the 3401 by-pass road (rail line slice nr. 1631+90) and main road nr. 4 near Karcag.

This rail line section is not entitled to active noise protection, one building near the rail line slice nr. 1633+40 in Karcag is entitled to passive noise protection.

Püspökladány-Debrecen

5.1.5. Püspökladány station

The rail track leads mostly on a dyke, the populated areas on the right and left side are cca. 1.5 – 2.5 m below the rail track height. In Püspökladány main road nr. 42 and by-pass road nr. 3405 (rail line slice nr. 1773+75) influence the noise levels.
Per the study the noise protection walls are recommended to be built at the below places:

side	line slice		height (m)	length (m)	area (m^2)	average distance from main track (m)
	from	to				
Right side	1744+60	1747+00	2	240	480	4.2
Right side	1749+80	1753+00	2	320	640	4.2
Right side	1756+80	1759+00	2	220	440	4.2
Right side	1773+10	1773+60	3	50	150	4.2
Total				**830**	**1710**	

Chart 6: Geometrical data of the planned noise shield walls at Püspökladány station

Number of protectable building facades: 25. Change of windows and/or doors is recommended in 97 cases.

Kaba station

The station and the outhouses can be found just after the Kaba road crossing between slices 1893 and 1894, here also visibility principles (visibility triangle) must be taken into consideration when noise shielding.

Residential buildings can be found south-east of the rail track behind the station building, approximately ~ 60 m from the track axis, on the other side of a public road. Most of the 15 houses at the Vasút street are one-storied, they are appr. ~80 cm lower, it means noise spread is free between the rail track as noise source and the points of interest.

Noise protection proposal	Side by the rail slice division	Starting slice	Finishing slice	Noise protection wall length [m]	Passive length [m]	Number of protectable facades [pcs]	Distance from the track [m]	Dist. from the act. line [m]	Wall construction height [m]	Noise baffle panel height [m]	Noise baffle panel surface [m2]	Note
Wall	right	1890+21.00	1891+50.00	**129**	0	3	**3.34**	**19.34**	**2.50**	**2.00**	**258**	0,00
No	right	1891+40.00	1892+00.00	**0**	60	2	**0**	**0**	**0.00**	**0.00**	**0**	0,00
Wall	right	1892+08.00	1892+45.00	**37**	0	2	**14**	**26.5**	**2.50**	**2.00**	**74**	Instead of the existing fence
Wall	right	1892+85.00	1892+95.00	**10**	0	2	**26.73**	**39.23**	**2.50**	**2.00**	**20**	Instead of the existing fence
Wall	right	1893+03.00	1893+17.00	**14**	0	2	**26.61**	**39.11**	**2.50**	**2.00**	**28**	Instead of the existing fence
Wall	right	1893+17.00	1893+43.00	**26**	0	2	**24.02**	**36.52**	**2.50**	**2.00**	**52**	Instead of the existing fence
Wall	right	1893+47.00	1894+95.00	**148**	0	2	**22.98**	**35.48**	**2.50**	**2.00**	**296**	Instead of the existing fence
No	right	1892+40.00	1892+60.00	**0**	20	1	**0**	**0**	**0.00**	**0.00**	**0**	0,00
Wall	right	1895+59.00	1896+55.00	**96**	0	5	**31.78**	**43.78**	**2.50**	**2.00**	**192**	Housing edge + 1 m
Wall	right	1896+55.00	1897+82.00	**127**	0	5	**26.2**	**38.2**	**2.50**	**2.00**	**254**	Housing edge + 1 m
Passive	right	1895+00.00	1896+60.00	**0**	160	8	**0**	**0**	**0.00**	**0.00**	**0**	0,00
		Total		**587**							**1174**	

Chart 7: Kaba station - active and passive noise protection proposals

From the chart it is seen that the recommended noise shielding wall length is 587 m and passive protection is 160 m long with 8 facade surfaces included. Change of windows and/or doors is recommended in 31 cases.

5.1.6. Hajdúszoboszló station

The rail track approaches Hajdúszoboszló from sout-west between rail slices 2020 – 2036.

The protectable area is the old station building ant its surrounding. There is a ~ 15 m tall storage building standing ~ 20 m from the track with 4-5 old, one-storied buildings next to it, some of theme probably belonged to the old MÁV building. Protecting these can mean a problem because there is a railway crossing near, because of the visibility triangle these buildings can be protected only via passive noise protection. The populated area can be considered nearly flat as for its relief characteristics, the terrain level is equal, bases of the protectable facilities are on the level of the track line, therefore there is free noise spread between the rail track as noise source and the relevant points.

Buildings of the Déli line are situated ~ 100 m from the rail track, this is on the border of the protectability, but these are shielded by the above mentioned economic, living and storage buildings.

Noise protection proposal	side by the rail slice division	Starting slice	Finishing slice	Noise protection wall length [m]	Passive length [m]	Number of protectable facades [pcs]	Distance from the track [m]	Dist. from the act. line [m]	Wall construction height [m]	Noise baffle panel height [m]	Noise baffle panel surface [m2]	Note
Passive	left	2021+40.00	2022+10.00	**0**	70	3	**0**	**0**	***0.00***	***0.00***	***0***	*0.00*

Chart 8: Hajdúszoboszló station - active and passive noise protection proposals

Per the measurement data available it is not necessary to protect Hajdúszoboszló station actively, using a noise protection wall, but passive protection is necessary for 3 facades, with 12 windows and/or doors in total.

5.1.7. Ebes station

The rail track approaches Ebes municipality from sout-west between rail slices 2094 – 2106.

On the right side (according to the driving direction) heading towards for Debrecen the Ebes station can be found in the 2098+40 slice. On this side apart from the station building only the Sarkadi settlement and other agricultural facilities can be found.

Ol the left side at right angle on the track axis 7 streets can be found, and a road crossing can cross the track in the 2102+14 slice, which will be re-built to an underpass. First buildings of these perpendicular streets are ~80 m from the rail track and the room windows - and in some cases also the entrances - are facing the track. The relevant points behind these houses are noise-shielded by them, therefore we count only with small noise load.

The populated area can be considered nearly flat as for its relief characteristics, the terrain level is equal, bases of the protectable facilities are on the level of the track line, therefore there is free noise spread between the rail track as noise source and the relevant points. When protecting the crossing and the surrounding houses we need to consider the visibility triangle, therefore only passive protection is possible in these cases.

Municipality	Noise protection proposal	Side by the rail slice division	Starting slice	Finishing slice	Noise protection wall length [m]	Passive length [m]	Number of protectable facades [pcs]	Relief level [m.B.f]	Pile base top [m.B.f.]	Wall construction height [m]	Wall-terrain gap [m]	Wall height over construction [m]
Ebes	Passive	0	2092+50.00	2092+50.00	0	0	1	0.00	0.00	0.00	0.00	0.00
Ebes	Wall	left	2094+20.00	2097+00.00	280	0	10	100.51	100.58	3.00	0.07	2.07
Ebes	Wall	left	2097+65.00	2103+03.00	538	0	19	101.32	101.39	2.50	0.07	2.07
Ebes	Wall	left	2102+98.00	2107+50.00	452	0	10	101.80	101.88	2.25	0.08	2.13
Ebes	Wall	right	2100+25.00	2102+30.00	205	0	2	101.82	101.90	2.00	0.08	2.08
Ebes	Wall	right	2102+30.00	2103+00.00	70	0	1	102.00	102.08	2.00	0.08	2.08
Ebes	Passive	right	2095+40.00	2095+10.00	0	30	0	0.00	0.00	0.00	0.00	0.00

Chart 9: Ebes station - active and passive noise protection proposals

5.1.8. Debrecen station

The rail track crosses the city of Debrecen between slices 2195-2280.

The municipality has six road crossings, where the visibility triangle must be considered, therefore many buildings can be protected only by passive noise shielding.

The planning section starts with rail slice 2231+80. A school is situated on the left side, which is followed by 4-storied buildings of the Wesselényi housing estate. The populated area can be considered flat, the terrain level is equal, bases of the protectable facilities are on the level of the track line, therefore there is free noise spread between the rail track as noise source and the relevant points. There is a road overpass by slice 2237+30. The section between this and the Munkácsy M. street consists of houses with their windows/doors heading the rail track. On the other side of the street the line of 10-storied houses on the Dobozi housing estate starts with facades being 70-110 m from the rail track. By slice nr. 2244+10 a public road (Huszárik Gál street) crosses the track, a housing estate of 2-storied buildings can be found right in front of it. Until the next crossings (Knizsi street - slice nr. 2249+90; Jánosi street, Sámsoni road) one-two storied family houses can be found. From Kemény Zsigmond street (slice nr. 2258+00) the overall picture changes and after a half-ready multi-storied block multi-storied blocks can be found as far as the Kassai street. Following this only one or two buildings can be found sporadically on the left side of the track.

On the other (right) side heading backwards from slice nr. 2282+00 to cca half of the slice nr. 2273+80 (shooting-range crossing) weekend houses can be seen, but these are far away from the rail track. After this different buildings (former barrack, car service, etc.) can be seen until the crossing. Than as far as by the road crossing at slice nr. 2264+00 industrial units can be seen. A 4-storied building is opposite the crossing.

Following this by the planned section border 1-2-storied family houses can be found.

Municipality	Noise protection proposal	Side by the rail slice division	Starting slice	Finishing slice	Noise protection wall length [m]	Passive length [m]	Number of protectable facades [pcs]	Relief level [m.B.f]	Pile base top [m.B.f.]	Wall construction height [m]	Wall-terrain gap [m]	Wall height over construction [m]
Debrecen	Fence	left	2232+00.00	2236+00.00	0	400	0	9	0.00	0.00	*0.00*	*0.00*
Debrecen	Wall	left	2236+00.00	2237+10.00	110	0	0	54	122.90	122.97	*0.07*	*2.06*
Debrecen	Wall	left	2237+10.00	2239+70.00	260	0	0	0	123.33	123.40	*0.07*	*2.08*
Debrecen	Passive	left	2239+70.00	2244+85.00	0	515	0	97	0.00	0.00	*0.00*	*0.00*
Debrecen	Wall	left	2244+85.00	2248+65.00	380	0	0	77	123.64	123.71	*0.07*	*1.97*
Debrecen	Fence	left	2248+75.00	2249+15.00	0	40	0	3	0.00	0.00	*0.00*	*0.00*
Debrecen	Passive	left	2249+15.00	2250+60.00	0	145	0	16	0.00	0.00	*0.00*	*0.00*
Debrecen	Wall	left	2250+60.00	2252+20.00	160	0	0	208	125.20	125.27	*0.07*	*2.02*
Debrecen	Wall	left	2252+20.00	2258+20.00	600	0	0	0	124.92	124.99	*0.07*	*2.02*
Debrecen	Wall	left	2258+20.00	2260+50.00	230	0	0	0	124.42	124.49	*0.07*	*2.02*
Debrecen	Slope	left	2260+50.00	2261+30.00	0	80	0	15	0.00	0.00	*0.00*	*0.00*
Debrecen	Passive	left	2261+30.00	2261+90.00	0	60	0	36	0.00	0.00	*0.00*	*0.00*
Debrecen	Slope	left	2261+90.00	2262+70.00	0	80	0	15	0.00	0.00	*0.00*	*0.00*
Debrecen	Passive	left	2262+70.00	2265+10.00	0	240	0	11	0.00	0.00	*0.00*	*0.00*
Debrecen	Passive	right	2281+30.00	2263+00.00	0	1830	0	52	0.00	0.00	*0.00*	*0.00*
Debrecen	Wall	right	2263+00.00	2261+10.00	190	0	0	179	124.49	124.56	*0.07*	*1.89*
Debrecen	Wall	right	2261+10.00	2259+30.00	180	0	0	0	124.22	124.29	*0.07*	*1.82*
Debrecen	Wall	right	2259+30.00	2258+30.00	100	0	0	0	130.74	130.81	*0.07*	*1.87*
Debrecen	Wall	right	2258+30.00	2252+20.00	610	0	0	0	124.92	124.99	*0.07*	*2.02*
Debrecen	Wall	right	2252+20.00	2250+60.00	160	0	0	0	125.20	125.27	*0.07*	*2.02*
Debrecen	Passive	right	2250+60.00	2249+15.00	0	145	0	14	0.00	0.00	*0.00*	*0.00*
Debrecen	Wall	right	2249+15.00	2246+60.00	255	0	0	55	123.95	124.02	*0.07*	*2.47*
Debrecen	Wall	right	2246+60.00	2244+90.00	170	0	0	0	123.44	123.51	*0.07*	*2.02*
Debrecen	Passive	right	2244+90.00	2241+65.00	0	325	0	40	0.00	0.00	*0.00*	*0.00*
Debrecen	Fence	right	2241+65.00	2240+00.00	0	165	0	20	0.00	0.00	*0.00*	*0.00*
Debrecen	Passive	right	2240+00.00	2238+00.00	0	200	0	12	0.00	0.00	*0.00*	*0.00*
Debrecen	Wall	right	2238+00.00	2236+40.00	160	0	0	8	-0.18	-0.11	*0.07*	*1.89*

Chart 10: Ebes station - active and passive noise protection proposals

5.2. Environmental areas

According to the preliminary documentations the following Ex lege protected areas can be found in the region: **mounds, saline lakes and marshes.**

The track section leads through Nagykunság region, the biggest protected areas of which are under the authority of the Hortobágy National Park and the Körös-Maros National Park. In the surrounding of the investment-related area the Hortobágy National Park Middle-Tisza protected landscape area and the Körös-Maros National Park Bihari plain protected landscape area can be found.

As a part of the environmentally sensitive areas (ESA system) the Hortobágy National Park in Nagykunság near Karcag is a region, which represents a significant part of the Hortobágy National Park maintenance plan determined as a D zone (buffer zone), which includes the whole of the Hortobágy microregion as well as the eastern part of the Nagykunság's Tiszafüred-Kunhegyesi section and the areas around Karcag.

This region partially plays a role of the national park's protection zone. Along with this it is the home and feeding area of many rare, protected bird species. The other sensitive area is the Bihar region with the Berettyó-Körös area's middle part - the Bihari plain microregion and the whole of the Berettyó-Kálló Köze, as well as the Nagy Sárrét belonging to the Hajdú-Bihar county.

The ESA environmental value maintenance areas together with the non-protected ones form the living space of one of the most numerous populations of great bustard in our country. The region is a home also for numerous populations of rollers, Montagu's harriers, corncrakes and partridges.

Along the Szajol – Debrecen railway line an **ecological research** done within 50-50 m from the track determined 21 natural or natural-like living spaces.

Living spaces can be formed along the rail track either naturally or by regeneration, or on the dyke side and in the water drainage sitches following the rail track after finishing the building works. The living spaces do not form coherent units along the rail line. Most of these are saline living spaces, saline puszta, loess puszta and loess meadow spots. One group of the reeds and marsh living spaces is natural-like, the other is degraded (infected by false indigo).

It can be stated that most of the living spaces along the rail line is degraded, only little part of the plant resources is natural-like.

One section of the rail line in question touches **NATURA 2000 areas** (from the point of view of environmental protection) at one shorter section: At the **HUHN 20146 Hegyesbor (Karcag) seeded nature preservation area** the rail line modernization and the switch and upper lines reconstruction will be done within the area of the MÁV, so the protected areas will not be damaged. Because of the underpasses road widening there is a need for a minimum area seizing. The rail line length on this protected area is 1042 m. The **HUHN 10002 Hortobágy (Karcag, Püspökladány) specific ornithological area** is affected by a rail line crossing. The rail line length on this protected area is 4187 m.

From the point of view of bird species the rail line modernizations, development and modifications will not cause load increase in comparison with the current state. Fore more sensitive and rare species it is not characteristic to settle next to beehive line facilities. For more resistant and more often species the change in rail traffic does not mean any difficulty, as they live undisturbedly even 50-100 meters from the track.
These modernizations can cause temporal living space loss at some of the seeded living spaces, thus material seizing is not possible here, or can be solved by taking the transport lines into account. In order to spare avifauna it is recommended to forbear workmanship in hatching period: March 31 - August 1.

According to the plans the in the 1426+47 km slice the shell bridge will be demolished. According to the consultation minutes the shoot does not vindicate on this pass, though it can play an important ecological role. The role of this is though the result of a later procedure.

To sum it all up it can be stated that the planned changes do not mean an danger to plants or birds in comparison to the current state.

5.3. Natura 2000 areas

The impact estimation for the Natura 2000 sites of the plan area is presented in Supplement no. 04B-1.

In the railway line in word, a shorter section of the railway track affects **NATURA 2000 sites** which are significant from the point of nature conservation: In the **HUHN 20146 Hegyesbor (Karcag) priority nature conservation site**, the railway line renewal and the reconstruction of sub-and superstructure will happen within MÁV's area, so protected areas will not be damaged. Road widening due to different-level road crossing will need just a small extra area. The length of the railway line in that protected section is approx. 1042 m. The **special bird sanctuary area HUHN 10002 Hortobágy (Karcag, Püspökladány)** is affected by the reconstruction of the level-crossing on the railway line. The length of the railway line in that protected section is 4187 m.

Railway track renewal, development and conversion works will not cause any increase on the current level of burden on bird species. More sensitive and rare species typically do not settle by busy line facilities. More frequently occurring and more tolerant species are not disturbed by a change in rail transport as they live undisturbed even at 50 – 100 m from the track.
Temporary loss of habitat may be caused by renewal works at certain priority habitats, therefore, no barrow pit may be made there, and transportation routes should take the issue into account. To protect the bird world, implementation works should be avoided in the hatching period: 31 March – 1 August.

Additional negative effects may be mitigated by the following actions:

- Avoid the use of chemicals harmful to wet habitats.
- Establish spoil areas and operational sites outside the Natura 2000 Site.
- Mowing the nutrition plant of southern festoon within the impact area, and moving the worms before the implementation works.

If the proposed impact reducing actions are considered, the reinforcement and modernization of the superstructure of the existing railway track will not have any measurable negative impact either on the marking bird species and their habitats in the Natura 2000 sites, or on other protected plant and animal species.

6. Examination of environmental impacts according to the viewpoints of the environtmental authority

According to the regulation nr. 4119 – 5/2006 issued by the Middle Tisza Environmental, Nature protection and Water Authority an environmental impact study process was enacted with regard to the prescriptions formulated in the given regulation. Companies preparing the environmental impact study submitted the below complementary proposals:

6.1. Permission plan phase

6.1.1. Ground, underground water

Working out the final dehydratation solutions is necessary. Touchability of water bases, mode of introduction and introducing the cleaning works needs to be clarified.

6.1.2. Day water

Working out the final dehydratation solutions is necessary here as well. It is necessary to verify the ditch capacities and to specify the place of the necessary works. The water drainage systems of the rail track and those of the crossing roads must match.

6.1.3. Air

When preparing the rebuilding permission plans it is necessary to perform air pollution tests as well as to examine possibilities of protection.

6.1.4. Living world

When constructing or deconstructing level crossings it is necessary to consult with the national parks.

6.1.5. Built environment

When preparing the permission plans it is necessary to exactly determine the size of land seizure. Consultations with municipalities and inhabitants are missing, it is important to supply these.

6.1.6. Landscape

It is necessary to resolve the conformity of the constructable facilities with the plans of municipalities, further consultations with local autonomies are also necessary. The level and two-level crossings are to be consulted with the national park.

6.2. Building phase

Building technology includes the following: surface and sub-surface modifications (ground works) with machines, track building works, building, rebuilding, repair, change of construction works, insulation and drainage solutions, as well as building and repair of related facilities (electronical safety devices, upper lines, telecommunication, etc.).

6.2.1. Ground, underground water

Not only marking and establishing temporal waste and dangerous waste containers used during building must be done where the environment is not sensitive to ground layer and ground water, but also ground layer characteristics and general ground water flow directions must be taken into account.
Applying temporary insulation plates for storing dangerous waste (eg. polyethylene foils) is welcome, particularly with regard to contamination sensitive areas.

6.2.2. Day water

In flowing water environment it is important to take care so that machine maintenance, oil change is not performed there. It is sensible to mark such machine storage places further from flowing waters. When building bridges and track construction works it is necessary to pay attention that contamination does not reach flowing waters or ditches.

6.2.3. Air

In order to diminish these effects it is important to protect against dusting by complying with technological prescriptions. Only such vehicles and machines can take part in building these facilities, that comply with environmental prescriptions applied for moving dust sources. The working and transport machines' engines do not burden the air of the surrounding environment with emission gases. The building material transport lines must be planned in a way that they touch populated areas to as little extent as possible. It is forbidden to burn waste during building and landscaping.

6.2.4. Living world

Only permitted mine areas can be used for material gaining, when marking it living world protection points of view must be considered. When marking transport lines, living spaces must be considered, it is recommended to give these a wide berth. At protectable or protected valuable living spaces or near them the space needed for performing building works must be as small as possible. At such places agricultural land must not be exploited for road building purposes. At seeded nature protection or NATURA 2000 areas material exploitation places can not be marked.

6.2.5. Built environment

When building shorter transport lines must be privileged, when marking which using public roads leading through municipalities must be avoided, and railway transport must be given a priority if at all possible. When building crossings it is important to make a status photo documentation of the surrounding buildings in case heavy transport is performed on road sections that touch populated areas.

6.2.6. Landscape

When marking the building area transport lines it is necessary to pay attention to protecting populated areas as well as that of the valuable living world. Rehabilitation of ruined surfaces when building and improving the status of transport lines must be done as soon as possible. The waste created must be handled and transported away. In case of level and two-level crossings in municipalities it is possible to establish biologically active surfaces, planting, which strip the view of traffic areas. At dollied areas it is important to pay particular attention to roll back the appearance and spread of agressive weeds.

6.2.7. Noise

For the duration of re-building works (6 months) the building works noise threshold values in Appendix 2 of the KÖM – EÜM common regulation nr. 8/2002 must be kept. Incase this is not possible, temporary noise shielding panels and limited period of running must be applied.

The work organisation must be done in a way so that noisy building procedures are not performed at night.

6.2.8. Waste

During building works dangerous waste is produced; in compliance with the list of waste determined as dangerous per the KÖM order nr. 16/2001 this waste must be disposed of in accordance with the prescriptions in the order. It is the contractor's duty to collect and store the waste appropriately during the building assignment. One part of the waste can be collected and temporarily stored in appropriate containers or locker barrels at the place of their production or collection. Only waste of the same kind can be stored together. Storage of waste collected selectively must be secured with a covert surface. Once the building works are finished the building area - including the areas used temporarily - must be cleaned of waste, building debris, unnecessary building material and these must be transported away.

6.3. Operational phase

6.3.1. Ground, underground water

When performing winter anti-slip sanding it must be paid attention - in accordance with the weather - that only the necessary material is poured.

6.3.2. Day water

Before putting into operation damage prevention plan must be prepared, which contains the method of handling for the case of accidents. In case of an accident obturation places must be established in order to limit pollution spreading. After turning the damage away construction works must be cleaned as well in order to ensure their operational condition. The mud cleaned from the construction works must be examined and qualified, and in case it is considered a dangerous waste, it must be transported and stored accordingly together with the skimmed oil as per the government order nr. 98/2001.

6.3.3. Air

The rail track is electrically driven, it has no relevant influence on air quality. Emissions of cars crossing the track though pollute the air. The development tendencies show that this status will improve with the development of engines used, or with aggravation of the prescriptions applicable to engine producers.
It is not necessary to do an impact study for building two-level passes, air cleannes measurements must be performed when preparing the re-building permission plans; in case of need also possibilities of protection must be examined.
Traffic and content of the crossing roads' traffic is not expected to cause load exceeding the threshold values at populated areas.

6.3.4. Landscape

After starting the operation the environment, flora, landscaping and maintenance of the facility must be paid attention to.

6.3.5. Noise

At the planned area once the railway is operating, the planned noise shielding walls will guarantee keeping the environmental noise load values under the threshold limits. At places where building a noise shield wall is not possible because of traffic safety or economic reasons (overlooking the roads and crossings, single buildings), noise loads below the noise levels affordable for protected buildings must be ensured by passive protection devices (appropriate sound/noise isolation windows and doors).

6.3.6. Waste

One part of the waste can be collected and temporarily stored in appropriate containers or locker barrels at the place of their production or collection. Only waste of the same kind can be stored together, storage of waste collected selectively must be secured with a covert surface. The wastewater flowing down from the trains must also be taken care of.

7. Environmental arrangements

7.1. Ground and ground water protection

As the environmental information regarding the past and the present state of ground and ground water contamination seem to be satisfactory, the aim of our examination in this topic is limited to information in connection with re-building. Based on this the below can be highlighted:

- The analysing documentation contains first of all the places and range of contamination caused by diesel engines with regard to the current ground and ground water contamination. By re-building, reconstructing the track network, by changing the places of switches and engine waiting places these contamination focuses will also be replaced and new, less contamined areas will be more loaded. It is extremely important to protect the re-built track base (ground and ground water) actively or passively and to avoid ground contamination with oil.
- The compensations in the re-building related areas were only partially performed, one part of it will be done together with the re-building or in accordance with it.
- During re-building the tracks will be re-located, and also change of base dykes, subsurface and leaking (drainage) network will also be partially performed. The final technical plans regarding this step are not available at this moment of planning yet.

Based on these rough information it can be stated that the planned diesel engine pulling performed at the stations can have negative effect on the ground and ground water. In order to preclude this the limitation environmental proposals are as below:

- That part of the re-buildable track rainwater drainage network, where not performed yet, a supervision must be performed and planning must be done so that before every connection to a receptacle, where the ground and ground water can be contamined with oil according to the relevant contamination documentation, an economic and effective oil collector construction is to be established in order to protect the receptacle.

- At the already compensated areas in order to avoid further ground and ground water contamination applying special railway needs-developed 3-layer oil selective rail base protective pillows in the relevant contamination focuses could mean significant savings in comparison with the base change and the volume and costs of works. These relatively cheap (one engine length costs cca. 100.000 HUF) materials have an important environment forming effect and help to keep the size of contamination more under control.

7.2. Day water protection

Also a water arrangement plan is connected with the rail track re-building, an expertise on this was issued by the Middle and Upper Tisza Environmental and Water Authority, as well as the Trans-Tisza District Water Authority. The water arrangement plans are available.

At some places it is deciced how the rail track and flowing water crossing points will be arranged (construction works nr. 2600+66, 2627+46 and 2657+14).

The rail track reconstruction will not affect standing waters at all.

The aim of the planned water works realization is also to ensure a crossing for line building. During reconstruction instead of numerous construction works new ones will be built cca. 2-30 m from the old ones, and bank re-arrangement will be needed within these distances. In this phase of planning the water right permissions are in progress, technical plans were not prepared for bank corrections as for yet.

The interventions can be done with the permission of water authorities. Water right permission is needed for building these. The works can be started and done only with the authority permissions and under their supervision.

In case of bed corrections the surface water drainage characteristics will in fact not change. According to the evaluation calculations the length of rivers will not change significantly in comparison with the current state. The construction works will be supplied with pre- and post beds during bed correction.

The main negative effect of the corrections after implementation is the damage or partial disappearing of natural symbiosis (wollow-bed and grass associations along the river). The Eastern Main channel and smaller flowing waters, inland inundation channels can be found in these areas. This well established system will not be stripped by the water works necessary for re-building of the rail track.

The modernization will not change the actual location of the Eastern Main channel railway bridge, consequently no change is expected in the effect of the rail track on the flowing waters.

Possible damaging of the living world can be done when cleaning the bed, but it maintenance has an improving character for the future.

When realizing attention should be paid to minimizing the damaging effects and to handle the possible harms caused.

7.3. Noise reduction

Decreasing the traffic noise is possible by means of active or passive noise decreasing methods. Active noise decrease given the character of the investment (rail track rehabilitation will result in speed and traffic increase) can not be solved by noise emission decrease nor by re-locating the rail track further from the populated buildings, it can not be put into practice by increasing the protection distance. The only real method for active noise decrease is the improvement, modernization (to more quiet) of the engines. Efect of one of the characteristic parameters (the % proportion of disc brake trains) is handled by one of the approachis during calculations, which says applying 100 % disc brake trains can result in 6 dB noise decrease.

The most used and most efficient noise decreasing solution is the noise source shielding by establishing noise shielding walls between the rail track and the facilities.

The optimal value of the K_a shielding alleviation by the noise shielding walls is determined by the location and height of the wall. The extent of necessary shielding alleviation can be reached by the lowest height noise shielding wall (lowest costs) placed close to the noise source or to the place of judgement. A significant disadvantage of the latter placement is that MÁV Rt. can claim expropriation of new areas, it disturbs the population (shielding, obstruction of exit and view, etc.), its effect is seen only on shorter distance, and in many cases the same decrease can be reached only with higher walls rather than placing them close

to the rail track. This certainly does not exclude that in some cases it is the more auspicious solution in total.

If a noise protection wall can not be applied for any case, it is a spread solution to supply the doors and windows of the protectable house facades with better insulating doors or windows. This solution from necessity has numerous disadvantages, and the advantage can be seen only if protecting small number of protectable rooms on low costs can replace long noise protection walls. Its disadvantage is that it is able to protect only in case of protected rooms with doors or windows closed, thus it is able to protect only a small portion of the human living space and quality of living. The critical noise load by rail can be experienced at night, when most of the people are in their bedrooms.

Placing noise protection walls as the most suitable solution is often blocked by the rail crossing prescriptions (visibility triangle). In such cases the following posibilities are available:

- Applying transparent noise walls: This is a good solution per the experience from abroad, but in Hungary it is (as far as we know) not a practice yet, mostly because of damaging and cleaning-maintenance difficulties.
- Breaking the track lines of the noise protection walls placed along the rail line and leading the visibility triangle "outside the hypotenuse". This solution - dislocation of track lines from the rail body (to lead them outside the visibility triangle) - is though accepted, but in most cases it is accompanied with the already mentioned disadvantages: expropriation of new areas, traffic and view obstruction, need for higher walls, realization with bad acoustic efficiency.
- Establishing low (1-1.5 m) noise protection walls, above which a cca. 4 m high engine is clearly visible. Per the acoustic calculations in a portion of cases the noise reduction caused by low (1-1.5 m above the track line) noise protection wall could be enough for complying with the threshold values. But according to the visibility triangle prescription the view is free only if there is no building, terrain form or other view obstructing facility or flora exceeding 0.5 m height in the visibility triangle. With one part of the cases this condition is not met for other reasons either, in such cases it would be reasonable to apply this solution. To do this a number of transport safety regulation prescriptions need to be changed or supervised.
- Applying a special electronic guard system - a half crossing and a crossing with flashing lights connected to the rail signalization - could be another solution. This guarantees to the trains to pass the crossing with 15 km/h speed, thus the distance calculated as 5 times the track speed (applied for the visibility triangle) is reduced to 5×15 = 75 m. The visibility distance reduced this way obstructs the establishment of walls only to small extent.

Acoustic requirements required for the noise shielding wall

(For the side facing the track):

According to the "Noise shielding facilities. Acoustic qualification study" regulation nr. MSZ-13-121-1 about acoustic qualification of noise shielding walls:

- the wall to be fully occlusive Lαkö > 8 dB
- sound obstruction requirement (kö): Rkö > 25 dB

Only qualified EMI compliance certificate noise shielding walls meeting the above requirements can be built in.

Requirements for noise shielding walls and their construction:

- aesthetic
- traffic safety
- acoustic (atmospheric sound inhibition, sound absorption)
- weather resistant
- long life (at least 10 years)
- minimal maintenance need
- precise size-keeping
- inflamation resistance
- pollution resistance (car emissions, salt, water, oil)
- anti-corrosive
- light resistance
- anti-reflective nature
- etc.

Requirements for passive protection and its construction:

When planning the acoustics of passive protection and new, better sound insulation, the MSZ 04.0601/5 – 1989 "Building acoustics. Atmospheric sound insulation requirements for facade constructions" regulation and the 8/2002 (III. 2.) KöM-EüM common regulation (prescriptions in Appendix 4) must be kept. The particular protective arrangement (increasing glass thickness, sealing, building of a 3rd wing, etc.) must be done based on the examination of each and every place following the local pre-change study and documentating the current state.

7.4. Waste handling

The source of waste produced during railway transport is similar to those of direct ground contamination:

- Waste throwed out the window by passengers, and waste from the toilets (communal waste)
- Leakage/spread/pouring out different materials from goods wagons
- Waste resulting from train operation

In the first case paper, glass, metal boxes and other communal waste thrown out from trains can be contaminating. This is a consequence of incorrect passenger behaviour. On one hand it is dangerous, and on the other it worsens the aesthetic state of the track surrounding. The feces carried out from the passenger trains decomposes and its amount is irrelevant.

In the second case the poured out materials can appear as waste. This can be caused by incorrect goods packaging, outpour of bulk goods or liquid materials. The appropriate loading technology, keeping the working discipline and applying appropriate packaging and packing materials can eliminate these problems.

In case such materials are poured to the track that can cause severe changes in the state of the environment, such waste must be collected as soon as possible, taken away on the shortest possible track and made harmless in accordance with the prescriptions. The affected area must be put back into its original state.

At stations waste can result from loading goods or repairing engines.

While operating train engines metal dust from friction and oil dripping from wagons can appear, which causes first of all ground contamination. Avoiding dust is impossible, oil contamination can be avoided by appropriate maintenance.

Waste can appear also by rail track maintenance, this can be avoided by appropriate work and behaviour. It is worth mentioning the packaging material of herbicides used for track maintenance, which are clasified as dangerous waste, appropriate handling of these must be taken care of.

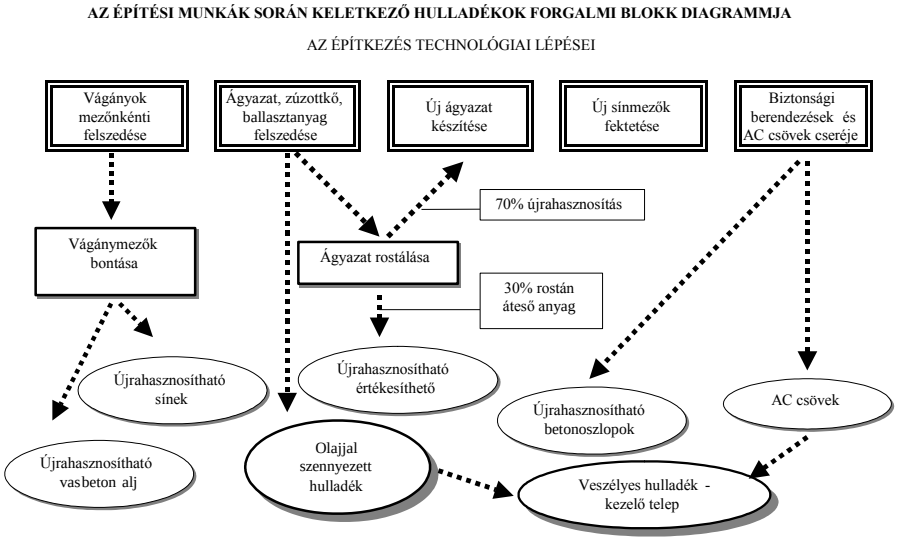

Figure 2: Graph of wastes created during building works (source: MÁVTI)

Two solutions can be applied for handling dangerous waste during realization: The agreement with the outsourcer can contain also the duty of carrying away of dangerous wastes created during construction works in compliance with the legal requirements, in such case the outsourcer's activities with dangerous waste should be regularly monitored and brought to book for in compliance with the legislative provisions.

In case the investor or the operator takes care of the collection and making the dangerous waste harmless himself, in the first phase of investments a closed, harm saver, roofed collector must be established and the dangerous waste produced during building works must be collected selectively and separately for 1 year via the company in charge of appropriate environmental duties. This way the investor or the later operating organization ensures the collection, disposal as well as registration and data sharing (basic registration of the activity performing organization within 60 days from the start of work, then registry and annual report duties).

In the current case a more general first solution is predicted, but this can definitely be determined only after the successful permission and tender procedure in the agreement made with the realization company.

The dangerous waste handling 192/2003 (XI. 26.) government order modified as 98/2001 (VI. 15.) government order must be complied with.

Also the 2000/XLIII act and the 164/2003 (X. 18.) government order must be complied with when handling waste.

8. Assessment of all impacts

From the data and information available there is no obstacle that would exclude the planned rail track reconstructions in case of complying with environtmental, landscape and nature protection, as well as water management rules.

According to the examinations performed in the current planning phase it can be stated that the planned investment will not bring relevant environmental risks, its long-term economic and indirect environmental effects are positive, negative effects can locally appear to small extent because of the building process and noise load when operating, but no objection can be brought up with regard to issuing the environmental permission.

Acording to the examinations the noise level will be reduced along the newly built track in comparison with the current level, and by applying noise reduction arrangements compliance with noise protection prescriptions on long-term basis can be ensured.

All the other necessary arrangements must be marked in the environmental permissions to be issued by the relevant authorities, and also in the building permission later on. If the documentation about the negotiations with the communities and municipalities (or the negotiable points) is missing, this must be supplied at a later stage.

Fulfilling the duties and requirements must be monitored during the building permission procedure, as well as before putting the modernized rail line into operation.

9. Appendix

9.1. Arrangements, proposals needed to save the genome of protected species

The renovation (bed riddling, builing in weep-holes, dyke building, rail change, concrete bed changes) and mainenance (cleaning of water drainage ditches, chemical control) works of the current rail lines mean danger first of all to plant species on the edge of the ballasts.

It must be paid attention that while material moving and realization oil or oil-contamined water or other chemical harmful to living organisms does not get into the environment from trucks, machines or during other works. With works that need to be done near water (standing and flowing water, channels, digs, temporary water) the above must be taken into consideration with even more attention.

The date of modernization and maintenance works is also very important. The most important is to perform the work outside the vegetation period or on frozen land, as the probability of vegetation harm is the lowest in this time. This all applies also to cleaning side ditches. In

order to maintain the bird world *work realization in the hatch period, which is March 31 - August 1, should not be done.* Performing building works outside the vegetation period is advantageous also for the vegetation of the area.

Only service roads should be used to approach the working areas. The building waste from modernization works (eg. old concrete bases, stones, etc.), unnecessary materials or machines must be removed from the area as soon as possible. It must be paid attention that during bed riddling, concrete base change the debris and unnecessary stones does not get into the grass bulks. At grassy areas, particularly at protected areas mentioned above material depositing should not be performed. In case it is really necessary to use the area, it should be limited to as small part as possible, thus the chance of the natural grass regeneration remains still high. It is not at all permitted to fill digs or water levels in the operational lanes.

In case of longer underground tracks a 45^0 slope must be established every 100 meters on both sides of the working ditch with 0.4 m width so that the animals falling into it can easily get out, in case the ditch remains uncovered for more than 24 hours. Before covering it the animals that fell into the ditch must be released.

The movement and noise accompanying the works does not mean big extra load for the living world, as the area was under disturbance anyway; the presence of disturbance-sensitive vertebrates along the line was not significant either. Nevertheless, from the point of view of the living world it is *better to perform works outside the reproductive period, in late autumn and winter.*

After the modernization there is no change in track use anticipated as for the environment.

9.2. The risks of potential water levels influencing the re-building planning based on the areal characteristics

The examined area and its surrounding is located in the microregion of the Alföld Southern Hajdúság, which is an alluvial cone plain covered with loess mud between 88-110 m above the sea level. The surface is vertically weakly dissected, the relative relief is under 10 m/km^2 everywhere (the average value is 2.5 m/km^2). The plain is diversed only by occasional 1-3 m high backs, mounds and 2-3 m high loess sand covered dunes. The S part of the area is densely covered with differnt filling status former river banks (belt lagunes are connected to these).

From hydrometeorological point of view the area belongs to th Continental climate zone. The mean early temperature is 10.4 °C, the average temperature varies between 9.1 and 13.2 °C. Dominating water direction: NE. Mean precipitation value: 530 mm/year.

The inland inundation can be considered a local characteristics of the area. Southern Hajdúság is mostly characterised as an area without outflow, thus this can cause inundation in many municipalities.

One part of the precipitation falling on the track bleeds away via the track dyke, the smaller part disappears via evaporation. On the open track the dehydratation of the track is guaranteed by the side ditches running on the sides of the track. During the building of ground wall the appropriate side ditches are established by cleaning the existing ones, and by building new side ditches where these are missing. Thank to the small precipitation and the ground characteristics the water in the ditches dries up, water drainage can be expected only in case of heavier rains. The ditch acceptors are the ditches and flowing waters crossing the rail track, or the water is carried away to the deep. The ditches are mainly uncovered soil ditches, short segments - usually around constructions - are covered ditches.

For the purpose of station track network dehydratation a weep system will be built. The weep network is divided into two parts by the platform underpass built next to the main buildings. The water is taken out from the weeps on more places: usually to the open ground ditch next to the open track, or to the deep next to the track, a former material seizure place. A weep will be built also under the underpasses between levels, that will also lead to the surrounding ditches.

When re-building the stations new, high platforms will be built, passengers underpasses will lead to these. The underpass stairs, ramps and the platforms will be covered with a platform roof. The water falling on the platform roof will be lead to the platform level by tubes placed on the pillars. The platform roof water (which is a clean rain water) will be carried away to the deep next to the track or to ditches.

9.3. Temporary areal and time limitations of municipalities involved in tourism

The areal regulation plans of the municipalities involved (Hajdúszoboszló, Debrecen) will have areal and time limitations with regard to noise emissions, which were determined by the 8/2002 III.22. KöM-EüM common regulation (see chart).

The 8/2002 III.22. KöM-EüM common regulation contains the following statements:

§ 3 (1) The traffic load threshold values at noise protectable areas are included in *Appendix 3* .

(2) The threshold values in Appendix 3 must be kept at newly planned or modified area usage areas for noise load from existing traffic noise sources as well as at existing protectable areas in case of creating a new noise source.

(3) Exceeding some of the noise load threshold values can be allowed by the environmental authority per Appendix 3.

(4) Modernization of existing traffic line or facility (noise source), after road capacity increasing

		Threshold values (LTH) for LAM, appr. levels (dB)							
No.	Area protectable from noise	In holiday and living areas closed from traffic between public institution; on recreation public areas		service road; along a road without transit traffic		along collective road; connecting road; approach; other road; railway side track and station; air–port and helicop–ter station, port		highway, motorway; I. class main road; II. class main road; bus station; railway main track and sta–tion; airport and helicopter station, port	
		day 6 – 22 h	night 22 – 6 h	day 6 – 22 h	night 22 – 6 h	day 6 – 22 h	night 22 – 6 h	day 6 – 22 h	night 22 – 6 h
1.	Marked section of a holiday resort, spa resort, healthcare area, protected natural area	45	35	50	40	55	45	60	50
2.	Populated area (small town, suburb, rural, settlement)	50	40	55	45	60	50	65	55
3.	Populated area (big town/city), mixed area	55	45	60	50	65	55	65	55
4.	Economic area and special area	60	50	65	55	65	55	65	55

The anticipated duration of re-building is 6 months. The recreation area, spa, etc. threshold values are: day $L_{TH,N,ép}$ = 60 dB, night $L_{TH,N,ép}$ = 50 dB. *The day period lasts from 6 am to 10 pm, the night period from 10 pm to 6 am. If work is performed within 25 m from the protectable area, or the noise produced by bigger machines exceeds the value specified above, temporal noise shielding paravans or shortened working times should be applied. It must be solved by the work organization so that noisy work is not performed at night.*

9.4. Topsoil saving

A topsoil saving ground protection policy was prepared in order to get the investment permission - by using the topsoil layer, saving, cultivating it and it serves as a base for area reparation works plan section so that it determines the depth of the topsoil to be saved, its quality, it proposes a topsoil volume to be saved and the methods of using the saved topsoil by consulting with the designer and the investor.

A topsoil management plan can be prepared only by a professional owning a permission to do ground protection planning. The topsoil saving plan is created together with the realization plans, which needs to be submitted as an appendix on an appropriate scale map draft with marking the thicknes of the saveable topsoil layer, together with a fathom lined plot of the areas that are to be used, with regard to the method of use.

The actual volume of the saveable topsoil must be determined from the ground protection plan and the data of crosshair sections in the topsoil saving plans by in situ sampling. The relevant determinations in the study are not satisfactory, they need to be completed by a ground saving designer specialist. As the environmental part's designer does not have topsoil management designing permission, only general statements can be done.

Following the deposition the usage can be among others:

- creating a soil layer in situ, area restoration
- using the topsoil layer at an appropriate agicultural area
- using the topsoil loam to terrain restoration as its topsoil layer
- using for recultivation at waste dumps, infertile, left mines, public areas as a surface topsoil layer.

The topsoil layer saved during ground works can not be used for filling the ground work holes, mine holes, landscape stigma, etc.
If the topsoil is planned to be used (not in situ, but) at agricultural areas, and the qualitative characteristics of the topsoil layer make it possible, then the marked agricultural areas are to be examined as for the method of use.
Spreading a topsoil layer can be done only at areas with the same or worse physical or chemical features, where spreading results in improving the qualitative characteristics, or the change is not measurable. The spread topsoil layes must be worked together, cultivated together with the original topsoil layer, it means spreading can be no thicker than 25 cm.

The topsoil layer is worth saving based on its quality

1. in all cases if
   - it is at least 20 cm deep
   - its topsoil content exceeds 1 %
   - it does not contain foreign or contaminating materials
   - its pH is not extreme, ie. the pH measured in a water suspension is between 5 and 8.7

2. optionally, if
   - its topsoil content is under 1 %
   - its carbonated lime content is over 20 %

- negative characteristics of the the surrounding, more unfavourable area soils can be moderated
- during recultivation of soil damaged by mining or in other way necessary topsoil layer is not available.

Completion must be performed based on the below:

Determination of the topsoil ground layer depth in the area affected by intervention must be done from the soil profile bore with density that is appropriate for the nature of the intended investment. The soil template in case of line facilities can be maximum 500 m. The template must be taken from the topsoil layer for laboratory purposes.

If the saveable topsoil can be used appropriately at the place of investment, it is done by creating a topsoil layer that together with the original one does not exceed 100 cm, laboratory examination of the soil in this area is not necessarily to be done.

At areas marked for utilization regardless on the method of topsoil layer utilization a template must be taken from different types of soil, but the template can represent an area of maximum 5 ha.

Laboratory examination of ground templates:

To be examined in all cases:

- topsoil content (%)
- physical binding (bound or muddy)
- pH, (H_20)
- all carbonate content ($CaCO_3$ %), or hydrolite acidity (y1)
- content of all salts soluble in water (%)

To be examined in case of professional need:

- fenolftalein alkalinity
- nutrients supplement
- all toxic elements content
- studying organic factors
- changing acidity (y2)

9.5. Protected plant and animal species

Flora of the areas along the track line

During terrain examination 176 vascular plant taxa from 30 template areas were registered. Among the registered species 4 or 7 are protected (see chart)

Most of the plant species represent three natural living space groups:

1. *Reed and marsh plants*: These can be found in ditches along the track, in channels near the track, in smaller delves or along artificial lakes, very often among them is the reed (Phragmites australis), the cat's tail and narrow leaf cat's tail (Typha latifolia, T. angustifolia), the gipsy wort (Lycopus exaltatus) and the great plains sedge (Carex melanostachya).

2. *Saline plants*: At the saline puszta along the track hard fescue (Festuca pseudovina), the viper's grass (Scorzonera cana), the meadow foxtail (Alopecurus pratensis), the narrow-leaved meadow-grass (Poa angustifolia) and the quackgrass (Elymus repens) is often or can be found.

3. *Plants of closed and half-dry, mostly bound-ground (loess) prairies* - these can be found partly on rail track dykes, on smaller ditch digs and in small spots in saline environment. The smooth brome (Bromus inermis), the field common eringo (Eryngium campestre), the protected pyramidal star of Bethlehem (Ornithogalum pyramidale) and the meadow sage (Salvia nemorosa) belong to these.

Summary of protected species

Szajol-Püspökladány section:

Scientific name	Common English name	Living space code	Template area	Value (HUF)
Aster sedifolius subsp.	**rhone aster**	F2, F3	3,14,19	2000
Ornithogalum pyramidale	**pyramidal star of Bethlehem**	F2, H5	6,11,13,14,17,21-25,29	2000
Salvinia natans	**floating moss**	A1	27	2000
Trapa natans	**water chestnut**	A1	17,27	2000

legend:

Per General National Habitat Category System (Á-NÉR):

A1- Still water free floating surface communities with Lemna, Salvinia and Ceratophyllum
F2 - Salt meadows
F3 - Tall herb salt meadows
H5 - Alföld (Lowland) steppes

Protected plants template area characteristics:

Area number	Template area location	GPS coordinates (EOV)	Slice
3	In the northern half of the track line, in line with the 173 km slice of main road nr. 4, on the border of the Hortobágy National Park	801310, 221510	1716
6	Forest on the south side of main road nr. 4 near km 170-170 (Apavári forest)	798866,220802	1690
11	Large grassy area between Karcag western connection road and main road nr. 4	789048, 216812	1565
13	South-eastern side of the track line, south of the Karcag puszta station	785738, 213950	1538
14	North-western side of the rail track, between the Villogó channel and the Kakat brook	783964, 212678	1508
17	Crossing point of the Kakat brook and the rail track	782550, 211116	1496
19	Old railway crossing of the main road nr. 4 and the main road nr. 4 overpass by Kisújszállás.	-	1437
21-25	Between stations Fegyvernek-Örményes and Pusztaszállás, on the northern side of the track	763247,206456,763126,206265,762367,206262,759975,205008,762652,206291	1287
27	Crossing of the Nagykunság watering channel and the rail track	-	1337
29	Bartapuszta	-	1249

Püspökladány-Debrecen section:

Round-headed leek *(Allium sphaerocephalon)*
Lime plant. Lives on stone grasses, puszta meadows, forest puszta, sandy meadows in loess puszta communities and at their secondary places. Its domestic and world portfolio is not endangered at the moment. *Intangible value: 5000 HUF*It appears between line slices 2184 and 2186 on the right side.

Dwarf almond *(Amygdalus nana)*
Loess indicating plant, inhabitant of forest steppe puszta scrogs. Its populations are currently endangered in Hungary. *Intangible value: 10 000 HUF*

Barrelier's bugloss *(Anchusa barrelieri)*
Lime plant. Plant of loess puszta, pastures, scrogs, steppe meadows. Its population in Hungary is potentially endangered. *Intangible value: 10 000 HUF.*

Along the track line between slices nr. 1950-1954+50 on the left side, appr. 100 roots.

Pannonian knapweed (*Centaurea sadleriana*)

Endemic lime plant species. Grows on stone grasses, puszta grass slopes, forest steppe meadows, loess puszta meadows, sand puszta, sand and loess pastures, scrogs, near forests. Hibridization is often within the community, therefore arguable morphological pieces are often, too. Its community over the world is small, but the Hungarian population is currently not endangered. It belongs to the "rare" group of the IUCN "Red List". *Intangible value: 2000 HUF*.

Appearance: sl. 1948+70-1952+50 right s., sl. 1951+20-1951+80 left s.

Linaria biebersteinii
Lime steppe plant. Grows on loess grasses and in their degraded residues. Its population in Hungary is potentially endangered. *Intangible value: 10 000 HUF*.

Lax-flowered orchid *(Orchis laxiflora subsp. elegans)*
Acidofil plant. Species of wet meadows, moor meadows and high sedges. Its population in Hungary is currently endangered. *Intangible value: 10 000 HUF*.

A large population of the species can be found on an ex lege protected moor meadow south of Nyíregyháza, near the rail track heading for Mátészalka.

Jerusalem sage *(Phlomis tuberosa)* Lime forest steppe species. A plant of loess puszta meadows, loess grasses, pastures, saline puszta. Its population in Hungary is potentially endangered. *Intangible value: 5000 HUF*It appears near line slice 1947+30 on the right side.

Not protected, but locally valuable species:

Scientific name	Common English name
Artemisia santonicum	**Artemisia**
Centaurium erythraea	**Common centaury**
Cephalaria transsylvanica	**Cephalaria**
Hieracium bauhinií	**Hawkweed**
Nonea pulla	**Wrinklenut**
Salvia verticillata	**Purple rain**
Thesium linophyllon	**Flaxleaf**
Melica transsilvanica	**Red spire**

Results of an ornithological study

The ornithological research was performed between April 29 - May 1, 2007 and June 1 - June 3, 2007.
The most often species are highlighted with bold font.

List of protected species:

Common English name	Scientific name	Intangible value (HUF)
Black-crowned Night Heron	Nycticorax nycticorax	100.000

Blackcap	Sylvia atricapilla	10.000
White Wagtail	Motacilla alba	2.000
Marsh Harrier	Circus aeruginosus	50.000
Northern Lapwing	Vanellus vanellus	2.000
Great Crested Grebe	**Podiceps cristatus**	**50.000**
Hoopoe	Upupa epops	50.000
Stonechat	Saxicola torquata	2.000
Ferruginous Duck	Authya nyroca	500.000
Yellowhammer	Emberiza citrinella	2.000
Common Chiffchaff	Phylloscopus collybita	10.000
Jackdaw	Corvus monedula	10.000
Common Buzzard	Buteo buteo	10.000
Marsh Warbler	Acrocephalus palustris	10.000
Song Thrush	Turdus philomelos	10.000
Long-eared Owl	Asio otus	50.000
Chaffinch	**Fringilla coelebs**	**10.000**
White Stork	**Ciconia ciconia**	**100.000**
Blackbird	Turdus merula	10.000
Nightingale	**Luscina megarhyhos**	**10.000**
Barn Swallow	**Hirundo rustica**	**2.000**
Kingfisher	Alcedo atthis	50.000
Common Cuckoo	Cuculus canorus	10.000
Great Cormorant	Phalacrocorax carbo	50.000
Blue Tit	Parus caeruleus	10.000
Red-footed falcon	Falco vespertinus	500.000
Little Ringed Plover	Charadrius dubius	10.000
Lesser Grey Shrike	Lanius minor	50.000
Little Grebe	Tachybaptus ruficollis	50.000
Black Tern	**Chlidonias niger**	**250.000**
Skylark	**Aluda arvensis**	**10.000**
Common House-Martin	**Delichon urbica**	**10.000**
Great Reed Warbler	**Acrocephalus arundinaceus**	**2.000**
Great Spotted Woodpecker	Dendrocopos major	10.000
Black-tailed Godwit	Limosa limosa	100.000
Great White Egret	Egretta alba	250.000
Long-tailed Tit	**Aegithalos caudatus**	**2.000**
Whinchat	Saxicola rubetra	2.000
Yellow Wagtail	Motacilla flava	2.000
Golden Oriole	Oriolus oriolus	10.000
Corn Bunting	**Miliaria calandra**	**10.000**
Great Tit	**Parus major**	**10.000**
Grey Heron	Ardea cinerea	10.000
Goldfinch	**Carduelis carduelis**	**2.000**
Red-backed shrike	Lanius collurio	10.000
Turtle dove	Streptopelia turtur	10.000
Common Kestrel	Falco tinnunculus	10.000
Robin	Erithacus rubecula	10.000
Greenfinch	**Carduelis chloris**	**10.000**